

ARGUS[®]

INEX 100A STS Module and MBS+PDU User Manual

019-061-B2



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Power

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INEX 100A STS Module and MBS+PDU User Manual

019-061-B2

Applies to 019-061-10, 030-440-10, 020-438-10, and 018-593-10.

The following documents and drawings are included in this manual to provide the necessary information required for installation, operation and fault diagnosis of the unit:

- **Specifications:** 019-061-B1
- **Installation and Operation Instructions:** 019-061-C0
- **Service Centers:** 048-693-10

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Specifications for INEX 100A STS Module and MBS+PDU

DC Auxiliary Power Input

Operating Range: 40 to 60Vdc within rated limits

AC Input

Voltage Range: 110/115/120Vac: 89 to 138Vac
208/220/230/240Vac: 176 to 276Vac

Over Voltage Threshold: 276 / 138Vac

Under Voltage Threshold: 176 / 89Vac

Back-feed Protection: Comply with safety requirement

Redundant Power Supply Design: Startup by priority source or alternative

NOTE: *the over/under voltage must be set by controller, if there is no additional setting, STS will adopt the widest range to set over/under voltage in order to guarantee its performance, for 110/115/120Vac system, the range is 89Vac (under voltage point) to 138Vac (over voltage point), for 208/220/230/240Vac system, the range is 176Vac (under voltage point) to 276Vac (over voltage point). But once the STS is set by user, it will keep the setting whether a controller exists or not, until such time that the STS is set by user again or next time the source connected to STS is changed from 120V (110/115/120) to 230V (208/220/230/240) or 230V (208/220/230/240) to 120V (110/115/120).*

AC Output

Waveform: Sinusoidal

Nominal Output Voltage: Same as mains AC or the output of inverter modules

Permissible Frequency Area: Max. $\pm 2.5\%$ (synchronize area of inverter)

Transfer Time: Typical 1/4 cycle, DIN VDE 0558 Part 5; IEC 146-4

Rated Power: 100A for 120 / 230Vac

Operation Methods: Inverter priority / Mains priority

Over Load Capability: $1.2 \times I_{nom} \geq 20s$
 $1.6 \times I_{nom} \geq 5s$
 $3200A \leq 10ms$ (Mains bypass)
 $I_{nom} = 100A$

Specifications for INEX 100A STS Module and MBS+PDU Continued

Mechanical

STS Module:	Dimensions: 88mm H x 218mm W x 270mm D [3.5" H x 8.6" W x 10.6" D] Weight: 2.1 kg (4.6 lb.)
STS Shelf:	Dimensions: 88.1mm H x 483mm W x 330mm D [3.5" H x 19" W x 13" D] Weight: 7.0 kg (15.4 lb.)
Hot Swappable:	STS hot swappable only available when MBS at Mains Bypass and Inverter Bypass position
Mechanical Bypass Switch Requirement:	The STS module used with a Mechanical Bypass Switch module shall provide voltage free system maintenance. It should be interlocked with the static switch module so that the static switch module cannot be removed without the maintenance bypass being activated.
Force Cooling:	Two fans
Alarm Relay:	Dry contact alarm output

Environmental

Operating Temperature:	-20 to +70°C (-4 to +158°F) -20 to +50°C (-4 to +122°F) with full performance
Storage Temperature:	-30 to +85°C (-22 to +185°F)
Operating Humidity:	0 to 95% relative, non-condensing
Heat Dissipation:	Forced air cooling
Operating Altitude:	1500m (4922 feet)
Audible Noise:	55dB ETS 300 753 Class 3.1

Standards

Safety Compliance:	EN 62040-1-1/IEC 62310-1/UL-1778
Certification:	CE, UL
RoHS:	Compliant
EMC:	EN55022 Class B
MTBF:	>200,000 hours as per Telcordia SR-332

The above information is valid at the time of publication. Consult factory for up-to-date ordering information. Specifications are subject to change without notice.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This section contains important instructions that should be followed during the installation and maintenance of equipment and batteries. **Please read all of the instructions before operating the equipment, and save this manual for future reference.**

The following safety symbols will be found throughout this manual, carefully read all information and abide by the instructions:



DANGEROUS VOLTAGE
This symbol indicates a dangerous voltage exists in this area of the product.



GAS HAZARD
This symbol indicates a gas hazard exists in the area of vented batteries.



NO MATCHES OR OPEN FLAMES
This symbol indicates a fire or explosive hazard exists in the area of the product.

The following levels of warning will be used with the above symbols:

- DANGER:** You WILL be KILLED or SERIOUSLY INJURED if instructions are not followed closely.
- WARNING:** You CAN be KILLED or SERIOUSLY INJURED if instructions are not followed closely.
- CAUTION:** You CAN be INJURED or equipment can be DAMAGED if instructions are not followed closely.

Before using the product, read all instructions and cautionary markings on the product and any equipment connected to the product.

This unit is designed for indoor use only. Do not expose the product to rain or snow; install only in a clean, dry environment.

CAUTION – To reduce the risk of fire hazard, do not cover or obstruct the ventilation openings. Do not install the inverter in a zero-clearance compartment.

CAUTION – Unless otherwise noted, use of an attachment not recommended or sold by the product manufacturer may result in a risk of fire, electric shock, or injury to persons.

CAUTION – Do not operate the product if it has received a sharp blow, it has been dropped, or otherwise damaged in any way – return it to a qualified service center for repair.

CAUTION – Do not disassemble the product – call our qualified service centers for servicing. Incorrect reassembling may result in a risk of electrical shock or fire.

WARNING – The input and output voltages of the product are hazardous. Extreme caution should be maintained when servicing or touching conductive components connected to the product.

Mechanical Safety

Power equipment can reach extreme temperatures under load.

Use caution around sheet metal components and sharp edges.

Electrical Safety

WARNING



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 inverter with damaged or substandard wiring.

Before working with any live battery or power system, follow these precautions:

- Remove all metallic jewelry; e.g., watches, rings, metal rimmed glasses, necklaces.
- Wear safety glasses with side shields (and prescription lenses if necessary) at all times during installation.
- Use OSHA approved insulated hand tools.

Do not work alone under hazardous conditions.

Ensure no liquids or wet clothes contact internal components.

Battery Safety

Servicing and connection of batteries shall be performed by, or under the direct supervision of, personnel knowledgeable of batteries and the required safety precautions.

Never reverse DC+ and DC- to battery.

Keeps the battery away from heat sources including direct sunlight, open fires, microwave ovens and high-voltage container. Temperatures over 60°C may cause damage. Make sure the area around the battery is well ventilated.

Always wear eye protection, rubber gloves, and a protective vest when working near batteries. Remove all metallic objects from hands and neck.

Use OSHA approved insulated hand tools. Do not rest tools on top of batteries.

Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.

Batteries contain or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Battery post terminals and related accessories contain lead and lead compounds; wash hands after handling (California Proposition 65).

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.

If you need to remove a battery, always remove the grounded terminal from the battery first. Make sure all accessories are off so you don't cause a spark.



WARNING

Follow battery manufacturer's safety recommendations when working around battery systems.



WARNING

Do not smoke or present an open flame when batteries (especially vented batteries) are on charge. Batteries vent hydrogen gas when on charge, which creates an explosion hazard.

Batteries are hazardous to the environment and should be disposed of safely at a recycling facility. Consult the battery manufacturer for recommended local authorized recyclers.

Wiring Requirements

Inverter is intended to be installed as part of a permanently grounded electrical per the National Electric Code ANSI/NFPA 70 (current edition). This is the single point earth ground for the unit.

The ground on the inverter is marked with this symbol: G / ⊕

The AC voltage and current on the inverter is marked with this symbol: L / N

The DC voltage and current on the inverter is marked with this symbol: - - - -

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1 Introduction

1.1 Scope of the Manual

This instruction manual explains the features, installation, startup and maintenance of the INEX 100A STS Module and MBS+PDU.

NOTE: *Images contained in this document are for illustrative purposes only and may not exactly match your installation.*

1.2 Product Overview

The STS (Static Transfer Switch) module increases system reliability by automatically switching between the inverter output and the AC mains. By setting up the priority of operation mode, users can change the system status of "on line mode" or "off line mode". The on line mode will keep the input power provided by inverter line and when inverter fails, the line will switch to AC utility line. In off line mode, the system power is always connected to the AC utility line and will switch to inverter power line when AC utility fails. The transfer time is less than 1/4 cycle which can avoid the power interruption. The reliable performance of the STS module can provide the maximum protection to the connected telecommunication equipment against possible damage caused by the system power failure.

STS Module Features:

- Small footprint and weight
- Universal input range
- Hot-swap replacement in shelf (w/ MBS option)
- Back-feed protection
- Redundant fan design
- Fast transfer time, typically less than 1/4 cycle
- Low audible noise <55dBa
- No cross connect
- Optional maintenance bypass switch function
- Operation Priority Setup of transfer side by setting in Control Module



Figure 1–INEX 100A STS Module and MBS+PDU

1.3 Illustration of Operation

STS-100 is designed to avoid operational disruptions of critical loads. This automatic static transfer switch (STS) automatically transfers critical loads from the primary AC power source to an alternative AC power source in the event of interruption or abnormal conditions.

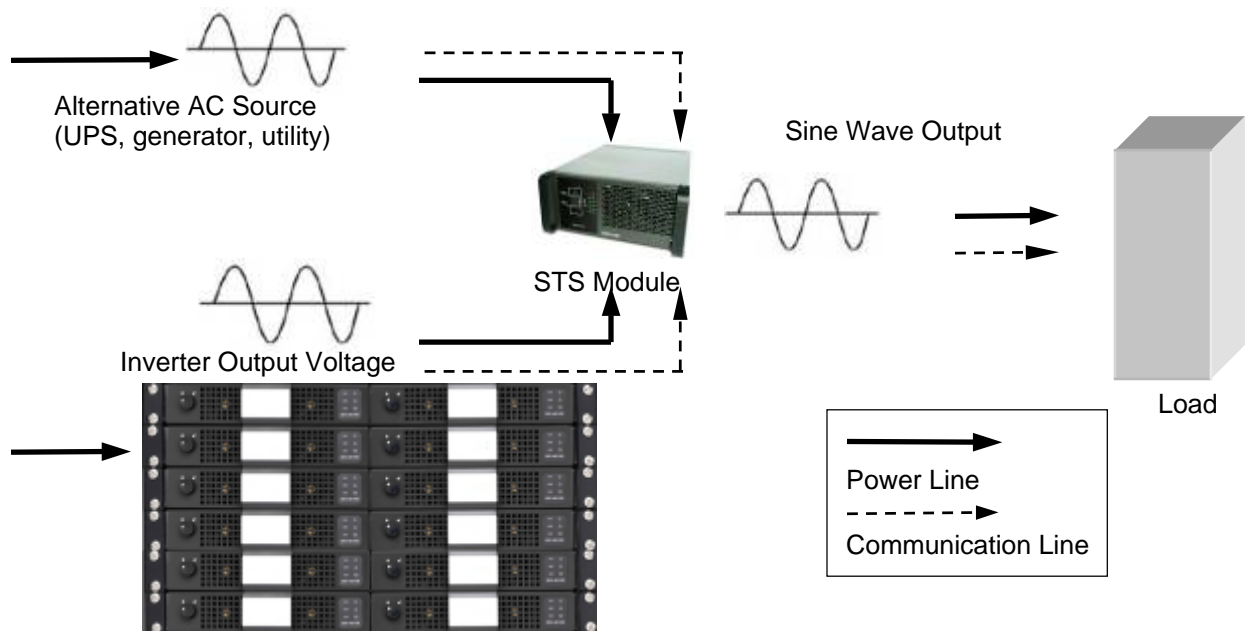


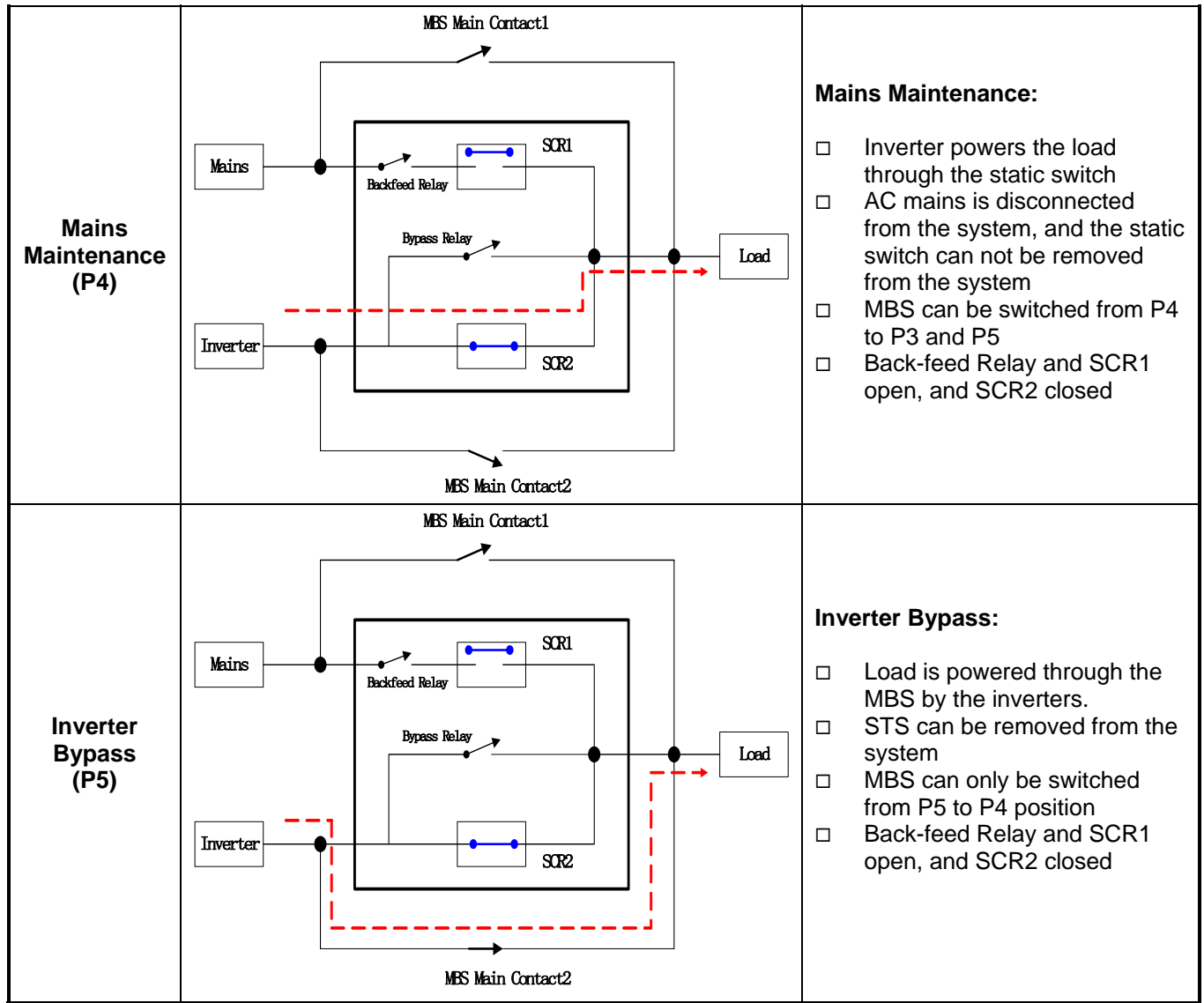
Figure 2—STS-100 operation illustrated

STS-100 transfers the critical load between power sources in less than 1/4 cycle upon loss of source. The fast transfer enables further redundancy in distribution, adding level of availability, flexibility and reliability to our customer's power infrastructure.

1.4 STS Operating Principles

MBS Status	Schematic operating principle of STS	Description
Mains Bypass (P1)		<p>Mains Bypass:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Load is powered through the MBS by Mains AC <input type="checkbox"/> STS can be removed from the system <input type="checkbox"/> MBS can only be switched from P1 to P2 position <input type="checkbox"/> SCR2 open, SCR1 and Back-feed Relay closed

<p>Inverter Maintenance (P2)</p>		<p>Inverter Maintenance:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Mains AC powers the load through the static switch <input type="checkbox"/> Inverters are on, but do not provide any load power <input type="checkbox"/> Inverter can be removed from the system, but the static switch can not <input type="checkbox"/> MBS can be switched from P2 to P1 and P3 position <input type="checkbox"/> SCR2 open, SCR1 and Back-feed Relay closed <input type="checkbox"/> When SCR2 short, the static switch will keep the off-line mode
<p>Normal Operation (P3)</p>		<p>Normal Operation:</p> <p>1. Mains priority</p> <ul style="list-style-type: none"> <input type="checkbox"/> Mains AC powers the load through the static switch <input type="checkbox"/> MBS can be switched from P3 to P2 and P4 position <input type="checkbox"/> SCR2 open, SCR1 and Back-feed Relay closed <input type="checkbox"/> When the main's voltage or frequency is abnormal, and the inverter is normal, the static switch should transfer to on-line mode <input type="checkbox"/> When SCR2 is short, the STS will keep the off-line mode
<p>Normal Operation (P3)</p>		<p>2. Inverter priority</p> <ul style="list-style-type: none"> <input type="checkbox"/> Inverter powers the load through the static switch <input type="checkbox"/> MBS can be switched from P3 to P2 and P4 position <input type="checkbox"/> SCR1 open, SCR2 and Back-feed Relay closed <input type="checkbox"/> When the inverter's voltage or frequency is abnormal, and the mains is normal, the static switch should transfer to off-line mode <input type="checkbox"/> When SCR1 is short, the STS will keep the on-line mode, and the Back-feed relay will open



1.5 Voltage and Frequency Range

The STS module has two voltage inputs and one voltage output. The two inputs are Mains voltage and Inverter voltage, and the output is System (output) voltage. STS will detect Mains voltage and Inverter voltage in order to decide system's supply mode when system is running. If both Mains and Inverter exist at the input, Mains has priority to decide the operation status of system; in other words, STS will first consider Mains status to decide system's running voltage and frequency. Following the confirmation of voltage and frequency, the over/under voltage and over/under frequency is set as follows:

Default Voltage		120Vac 110V/115V/120V	230Vac 208V/220V/230V/240V
Over Volt	Active	138Vac	276Vac
	Recovery	134Vac	268Vac
Under Volt	Active	89Vac	176Vac
	Recovery	93Vac	184Vac

Table A–Voltage default levels

	System Frequency	
	60Hz	50Hz
Frequency High Threshold	61.5Hz	51.25Hz
Frequency High Back	61.2Hz	51Hz
Frequency Low Threshold	58.5Hz	48.75Hz
Frequency Low Back	58.8Hz	49Hz

Table B–Frequency default levels

The STS will transfer to the auxiliary source if the priority input voltage exceeds a preset value. The over/under voltage limit can be set through controller, as shown on the following table. Users can set any value that is in the valid range. STS won't accept data that is out of the valid range; for example, you can set over volt point between 117~127 for 110V system, but the data that greater than 127 or less than 117 won't be accepted. The valid range is determined by the rated voltage sent to STS by inverter, as 110V, 115V, 120V (shown in the table).

Adjustable Range		120Vac			230Vac			
		110V	115V	120V	208V	220V	230V	240V
Over Volt	Adjustable Range	117~127	122~132	127~138	220~240	233~252	244~264	254~276
	Default Value	127	132	138	240	252	264	276
Under Volt	Adjustable Range	89~105	93~110	100~114	176~198	176~209	185~218	193~228
	Default Value	89	93	100	176	176	185	193

Table C–Inverter/System factory defaults

NOTE: If the STS has never been set for over/under voltage through the controller, then it will set the default value as shown on Table C. Once the over/under volt points are set through the controller, the values will be saved to EEPROM, and it will remain in effect until resetting happens; except that, the next time when STS powers on, the Mains/Inverter voltage changes from 120V system to 230V system or 230V to 120V.

2 Inspection

2.1 Packing Materials

All Argus products are shipped in rugged, double walled boxes and suspended via solid inserts to minimize shock that may occur during transportation. Packaging assemblies and methods are tested to International Safe Transit Association standards.

2.1.1 Returns for Service

Save the original shipping container. If the product needs to be returned for service, it should be packaged in its original shipping container. If the original container is unavailable, make sure the product is packed with at least three inches of shock-absorbing material to prevent shipping damage.

NOTE: *Argus Technologies is not responsible for damage caused by the improper packaging of returned products.*

2.2 Check for Damage

Prior to unpacking the equipment, perform a visual inspection and note any damage. Unpack the equipment and inspect the exterior for damage. If any damage is observed contact the carrier immediately.

In addition to the inverter module (Figure 1), the STS shelf and MBS/PDU panel consists of:

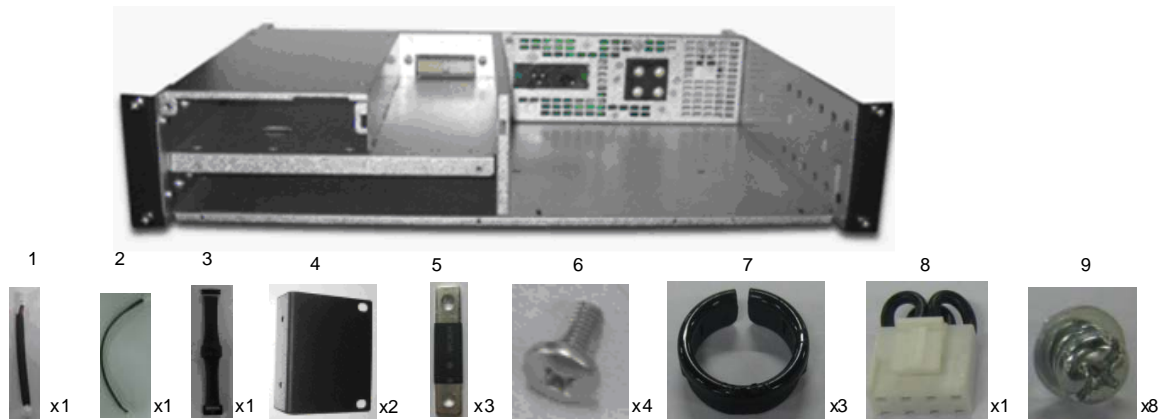


Figure 3–STS shelf and packing list

- 1) 1*CAN cable for controller
- 2) 1*DC Power cable for controller
- 3) 1*Communication cable
- 4) 2*23" mounting brackets
- 5) 3* inter-connection bus bars
- 6) 4*M6 screws for brackets
- 7) 3*protect circuit of shelf
- 8) 1*short jumper
- 9) 8*M6 screws for bus bar.

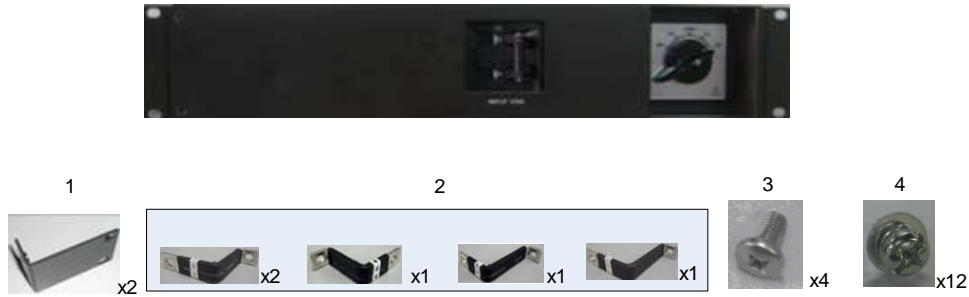


Figure 4–MBS/PD panel and packing list

- 1) 2*23'' mounting brackets
- 2) 5 *inter-connection bus bars
- 3) 4*M6 screws for brackets
- 4) 12*M6 screws for bus bar.

Continue the inspection for any internal damage. In the unlikely event of internal damage, please inform the carrier and contact Argus Technologies for advice on the consequence of any damage.



Verify that you have all the necessary parts per your order for proper assembly.



Call Argus Technologies if you have any questions before you proceed: 1 (888) 462-7487
Customers outside Canada and the USA, call +1-604-436-5547 for technical support.

2.3 Handling and Storage

If the STS module is going to be stored prior to installation, it 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 equipment should be covered with a tarpaulin or plastic wrapper to protect it against dust, dirt, paint, or other materials.

The equipment can be lifted from the front panel by drawing out the handle. Firstly, screw off the steel bolt, then drawing out the handle until the whole module out. When the STS module has to be installed in the shelf, the bolt should be screwed down.

3 Installation

3.1 Location

Unit is designed for installation in a protected environment. Factors to be considered in selecting a location include ventilation, temperature, humidity, and accessibility. Install the unit in a clean, dry location with an unrestricted air flow and sufficient space for rear and front access. Unit will provide its full capability in ambient temperatures from -5°C to 50°C. Higher ambient temperatures will lead to a shorter life. Gasses emanating from the battery can be corrosive and highly flammable, so isolate the unit from the battery as much as possible.

3.2 Frame Assembly

3.2.1 Install Controller/Interface/STS Chassis

1. The controller/interface/STS chassis is pre-installed with 19-inch rack brackets. For 23-inch rack mounting, please exchange with the proper mounting brackets.
2. Put the controller/interface/STS chassis to the equipment rack horizontally above inverter shelf, and align holes of mounting brackets and rack. Secure the chassis in position with four cross pan type nickel screws as shown:



Figure 5—Mounting the STS chassis to the equipment rack

3. All input and output connections are made through the knock outs located in the top of rear cover and both side panels. The rear cover accompanies the controller/interface/STS chassis originally. The rear cover shall be removed to start wiring.
4. Screw off the rear cover with a cross-head screw driver. Cut the rear cover with a diagonal cutter on the indication line. Remove the rear cover and you will be able to see the whole appearance of controller/interface/STS chassis PCB and connectors.

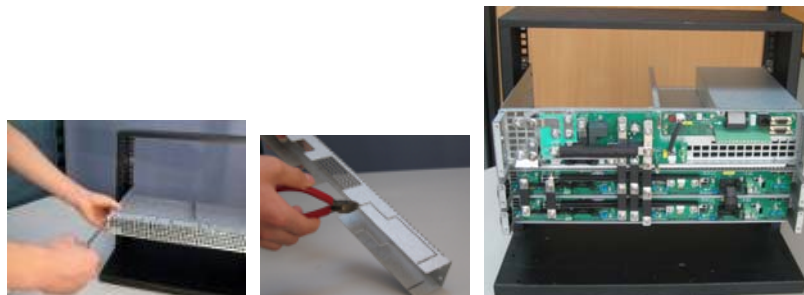


Figure 6—Preparation of the controller/interface/STS chassis rear cover

3.2.2 Install MBS/PD Chassis

1. The MBS/PD chassis is also pre-installed with 19-inch rack brackets. For 23-inch rack mounting, please exchange with the proper mounting brackets.
2. Put the MBS/PD chassis to the equipment rack horizontally above the STS shelf, and align holes of mounting brackets and rack. Secure the chassis in position with four cross pan type nickel screws as shown:



Figure 7–Mounting the MBS/PD chassis to the equipment rack

3. All input and output connections are made through the knock outs located in the top of rear cover and both side panels. The rear cover accompanies the MBS/PD chassis originally. The rear cover shall be removed to start wiring.
4. Screw off the rear cover with a cross-head screw driver. Cut the rear cover with a diagonal cutter on the indication line. Remove the rear cover and you will be able to see the whole appearance of MBS/PD chassis PCB and connectors.



Figure 8–Preparation of the MBS/PD chassis rear cover

4 Wiring

Before selecting the wiring, consider the following factors:

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

IMPORTANT

Use the table below as a guide only. Ensure that the installation complies with the specific wiring rules applicable to your country or area of jurisdiction.

Shelf number of 2 x 1000VA inverters cascaded	Input current maximum @40Vdc	AC output	Minimum size of DC input wire	AC output
1	46A	100A	#8 AWG	#2 AWG
2	92A		#4 AWG	
3				
4				
5				
6				
Shelf number of 2 x 1500VA inverters cascaded	Input current maximum @40Vdc		Minimum size of DC input wire	
1	69A		#6 AWG	
2	137.9A		#2 AWG	
3				
4				
5				
6				

Table D–Wiring guide

NOTE: DC input to maximum two shelves.

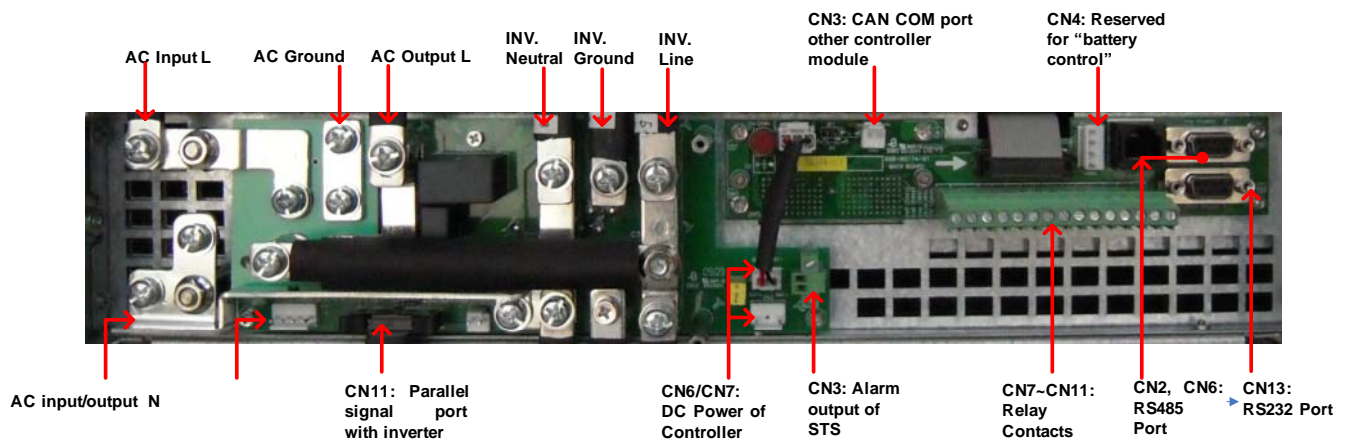


Figure 9–Rear view of STS chassis showing connections

4.1 Inverter Shelf Wiring With STS Chassis

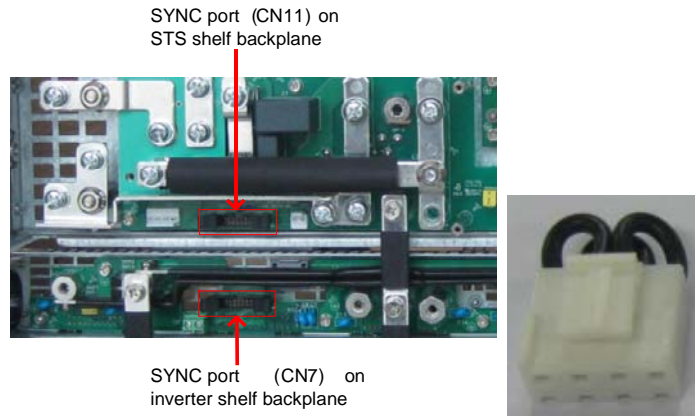


CAUTION

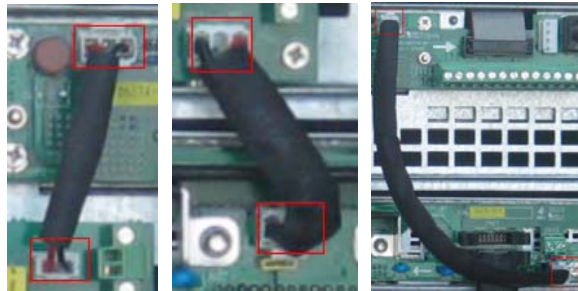
Shut down all the power sources before wiring. Disconnect battery cables from battery. Please follow the wiring instructions for your needs.

1. Locate the CN11 connector on the rear panel of STS shelf and CN7 connector on the rear panel of the inverter shelf. Connect these two connectors with the attached STS signal cable according to the following:

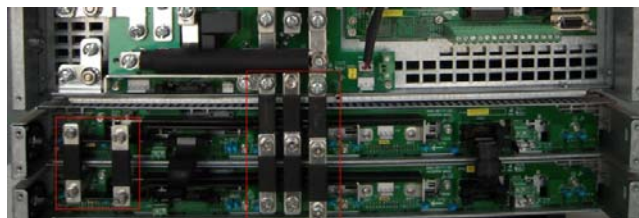
NOTE: 4-pin short jumper should be installed to CN1 connector on STS back PCB if MBS/PDU is excluded:



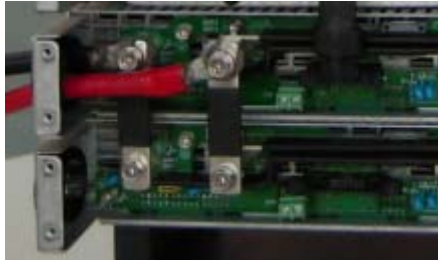
2. Connect CN6 (STS back PCB) to CN12 (controller back PCB) for controller DC power supply;
Connect CN7 (STS back PCB) to CN9 (inverter back PCB) for STS DC power supply;
Connect CN3 (controller back PCB) to CN8 (inverter back PCB) for CAN communication.



3. Connect AC & DC BUS bar of Controller/Interface/STS shelf to the AC BUS connector of the top level of inverter shelf in the first priority.



4. Connect DC input wires – put both wires through the wire hole on the left side of the inverter shelf. Use the cross pan type nickel screws, in the accessory kit, for fixing both DC INPUT wires.



5. Connect AC output/input/ground wires.



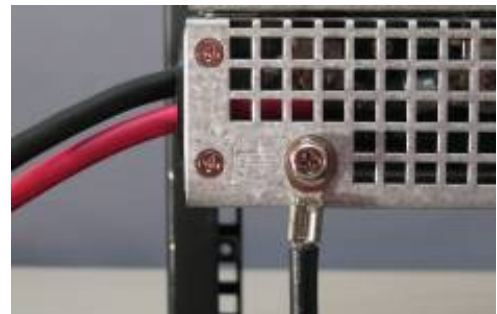
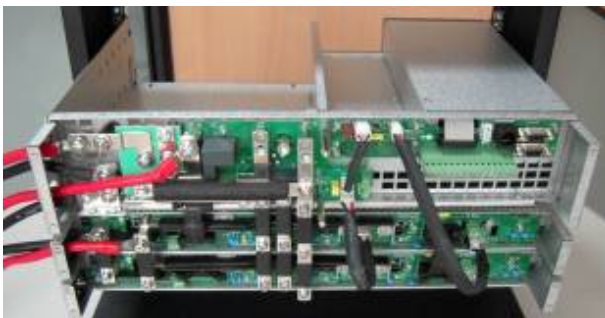
CAUTION

To connect AC output wires onto the system, only one AC line and AC Neutral are necessary to be connected either from STS shelf or inverter shelf.

User should knock out the hole for cable on STS shelf and add a protect circuit.



Connect AC HOT LINE to the (AC-L OUT) connector of STS & Controller shelf. Connect AC NEUTRAL LINE onto (AC-N) connector of the STS & Controller shelf.



Screw the rear cover to the STS & Controller shelf and then wire the ground cable to the rear cover (shown above).

4.2 STS Shelf Wiring With MBS/PDU

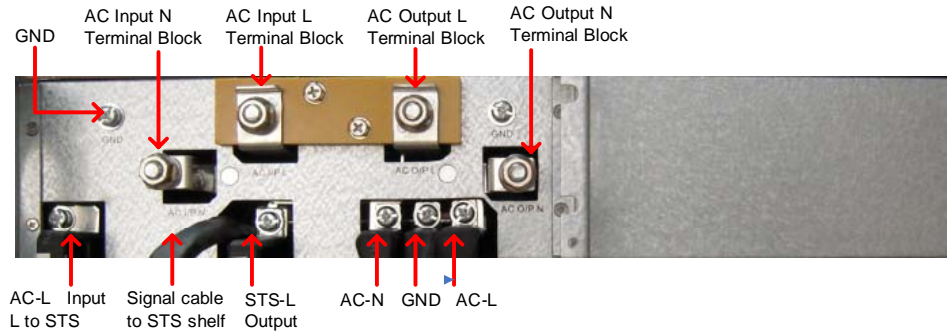
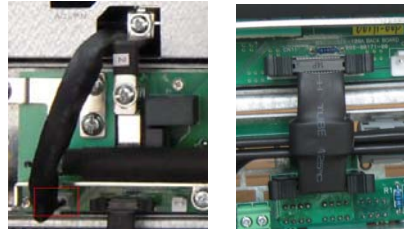


Figure 10–Rear view of MBS/PD chassis showing connections

1. Connect signal cable between MBS/PDU, STS shelf.

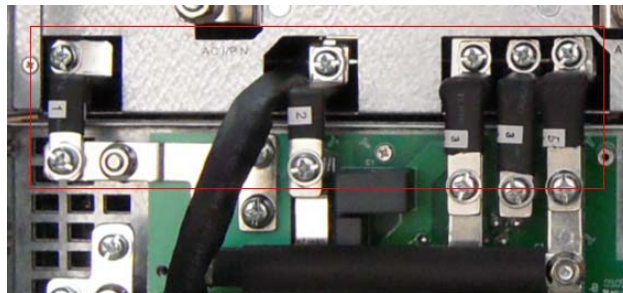
Connect the 4-pin MBS cable to the CN1 connector on the back PCB of the controller/interface/STS shelf. Then connect one end of the STS/inverter signal cable to the CN11 connector on the backplane PCB of the controller/interface/STS chassis. Connect the other end to the CN7 connector on the backplane PCB of the inverter.



2. Connect bus bar.

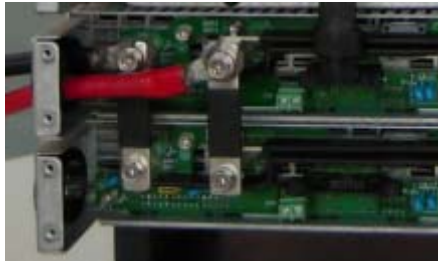
Connect the 5 bus bars accompanied with MBS/PDU to UC3, UC2, UC1 on the STS backplane PCB to the corresponding connectors of MBS/PDU as shown below:

- 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 x1 for (AC input L)



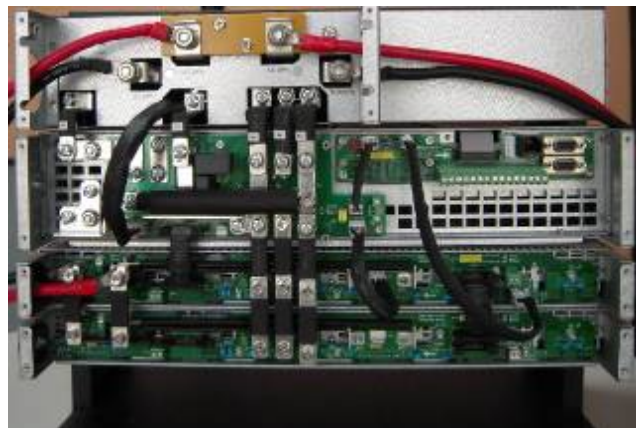
3. Connect DC INPUT wires.

Put both wires through the wire hole on the left side of the inverter shelf. Use the hex washer type nickel screws, in the accessory kit, for fixing both DC INPUT wires.



4. Connect AC output/input/ground wires.

Connect AC input to the terminal on the back left of MBS/PDU according to the position of the silkscreen. Screw the back cover onto the STS & Controller shelf.



5 STS Module Installation

1. To install STS module, slide it into a pre-wired chassis until the face plate is flush with the mounting ears. In order to prevent the STS module from being displaced, turn the lock bolt left to lock position.
2. At power on, the STS unit enters into a self-diagnostic mode. If everything is functioning correctly, the indicator will remain solid green, and STS will detect and transfer the better quality power to the load.
3. Remove the module by pulling outward.
4. If controller module and/or interface module is not incorporated, you can cover the excess cavity with optional cover plates. The optional cover plate comes into two pieces. After screwing the inner silver metal piece to the chassis bottom plate, use bolts on both sides to attach the black metal cover to the inner silver piece.



Figure 11–Front view of controller/interface/STS chassis



CAUTION

When installing STS module with MBS, it is not necessary to turn off the system. Please note the following: Put Maintenance Bypass Switch at **MBP** or **IBP** (determined by mains and inverter output status) position as shown below; otherwise, the incorrect install or removal action will damage the STS module frame because of the safety lock of the MBS.



Figure 12–MBS switch positions, MBP or IBP

5.1 Installation Check

Before turning the system on, review previous chapters for instructions pertaining to your particular system.

If the system fails to operate properly after turning on, recheck and verify to make sure all the connections are correct according to the installation instructions. Operation problems are usually caused by incorrect installation or setup.

- DC input terminals have correct voltage polarity.
- Utility input terminals have correct voltage connections.
- AC output terminals have correct voltage connections.
- Input conductor sized for correct amperes.
- Output conductor sized for correct amperes.
- Correct output voltage selected in personalization.
- Utility correct frequency selected.

Use Maintenance and Troubleshooting chapter.

6 Operation

The operation mode of STS is closely linked with the position of MBS.

MBS has two main connectors and three assistant connectors. The signal generated by three assistant connectors are passed to DSP for position detection. Once an assistant connector is closed, the signal generated is logic 0, in reverse, the signal will be logic 1, the combination of logic 0 and 1 forms eight kinds of status, there are five kinds of valid status.

SW1/SW2/SW3 are the logic level signals detected by CPU, the five kinds of valid status are shown as follows:

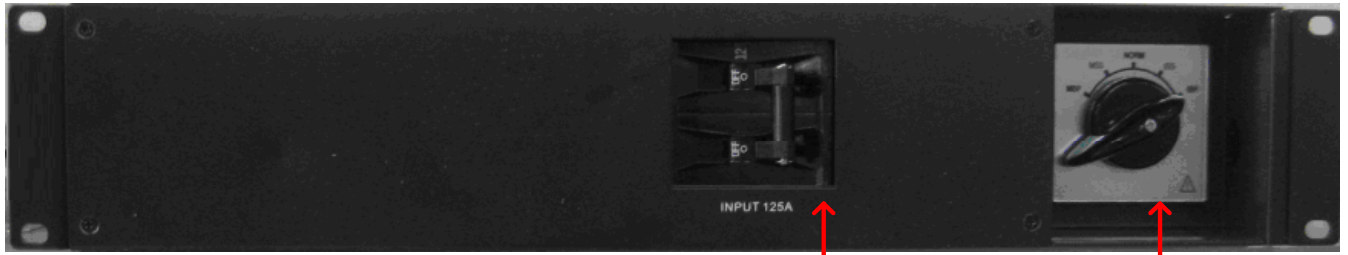
6.1 MBS Position (0—Low, 1—High)

	Contacts Signals				
	S W 1	S W 2	S W 3		
P1	0	1	1	Mains Bypass	
P2	0	0	1	Inverter Maintenance	
P3	0	0	0	Normal Operation	
P4	1	0	0	Mains Maintenance	
P5	1	1	0	Inverter Bypass	

The STS Module will continuously detect the position of MBS in order to decide the transferring action between different modes. At the time when STS is powered on, STS will judge whether the present position of MBS is valid.

If the status is invalid, STS will consider MBS not well connected, and it won't enter any operation mode, and the red LED will blink at 5Hz. At the same time, "MBS abnormal" alarm will be sent to controller. This phenomenon won't disappear until the detection signal becomes normal.

If MBS is changed when STS runs at one of the five valid positions, and this change happens between two adjacent positions, then STS will transfer to different mode based on current status; otherwise, STS won't take any action. For example, if MBS is at P3, STS will take action when MBS is turned to P2 or P4.



Main Input
Breaker 125A

Maintenance Bypass
Switch 125A

Figure 13—Front view of MBS/PD

7 Maintenance and Troubleshooting

7.1 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 (more often if required). We strongly recommend a contract with Customer Support Services for preventive and remedial maintenance. The technician or electrician performing preventive maintenance on the equipment must read and understand thoroughly this manual and be familiar with the indicators, controls, and operation of the equipment.

7.2 Troubleshooting Guide

If the system fails to operate properly and the installation, setup, and operation have been checked, use the following Troubleshooting table to determine the probable cause and obtain suggestions on how to proceed. It will not include all the fault conditions, please refer to the LED display status to adjust the cause.

Error Condition	Possible Cause	Recommendation
No AC output and all LEDs off.	Lack of input power.	Check if input cables and bus bars are all firmly connected to power source. 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 flashing 1 time / second.	STS AC input source is from utility, the inverter is in normal status; if the inverter is from abnormal status back to normal, the STS will switch the line from utility to inverter line.	Please refer to Troubleshooting for inverter.
Priority is On line, STS AC output is normal but with green LED flashing 1 time / second and yellow LED on.	SYS AC input source is from utility, but inverter is in abnormal status.	Please refer to Troubleshooting for inverter.
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 output is normal from Mains, but yellow LED is on.	STS AC input source is from utility, but inverter is in abnormal status.	Please refer to Troubleshooting for inverter.
Priority is off line, AC is normal, but with green LED flashing 1 time / second.	STS AC input source is from inverter, but utility is in abnormal status.	Check AC Mains connection and status.
No AC output, yellow LED is on.	The relay of utility power side is broken and cannot for closed circuit.	Turn MBS to mains or inverter bypass mode, maintain the STS module.
No AC output, yellow LED flashing 2 times / second.	The relay of utility power side is broken and cannot for closed circuit.	Turn MBS to mains or inverter bypass mode, maintain the STS module.
AC output is normal, green LED is on, yellow LED flashing 2 times / second.	The relay of utility power side is broken and cannot for closed circuit.	Turn MBS to mains or inverter bypass mode, maintain the STS module.
AC output is normal, green LED is on, red LED flashing 1 time / second.	Fan fails.	Turn MBS to mains or inverter bypass mode, maintain the STS fan.
AC output is normal, green LED is on, red LED flashing 1 time / s.	EEprom FAULT EEprom can't write or read data.	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 flashing 1 time / s.	CAN communication error.	Check the connection of CAN signal cables.
AC output is normal, green LED is on, red LED flashing 2 times / s.	SCR short fault.	Turn MBS to mains or inverter bypass mode, maintain the STS.
AC output is normal, green LED is on, red LED flashing 2 times / s.	Power supply fault.	Turn MBS to mains or inverter bypass mode, maintain the STS.
AC output is normal, green LED is on, red LED flashing 5 times / s.	MBS provides three sets of signals to STS for detecting wiring connection. When the connection is not at valid position, this alert appears.	Check if the MBS and STS signal cable is well connected.
AC output is off, red LED is on, other LED off.	STS fault mode.	Turn MBS to mains or inverter bypass mode, maintain the STS.
AC output is off, red LED is on, other LED off.	Over temperature.	Turn MBS to mains or inverter bypass mode, maintain the STS. Check if the environmental temperature is higher, or if there is anything blocking the vent.
AC output is off, red LED is on, other LED off.	Overload.	Decrease or remove the loads, then shut down or remove the STS module. Then connect is back and restart.
AC output is off, red LED is on, other LED off.	Output short.	Decrease or remove the loads, then shut down or remove the STS module. Then connect is back and restart.
AC output is normal, green LED is on, red and yellow LEDs flashing 2 times / s.	Inverter bypass mode.	STS internal temperature is too high. Check if there is anything blocking the vent or working overload for long time.

Table E--Troubleshooting for system

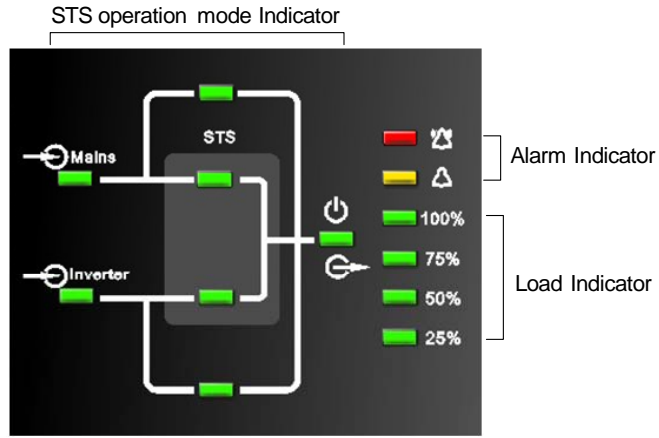


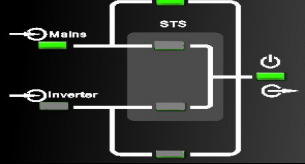
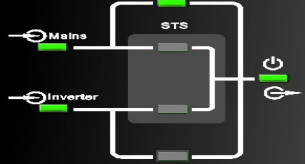
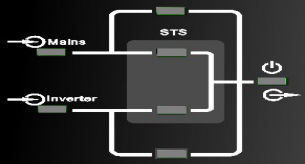
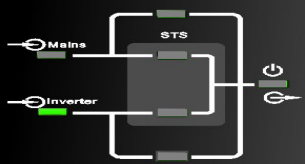
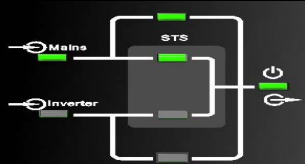

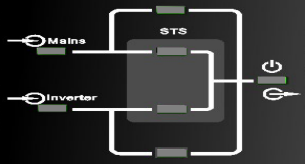
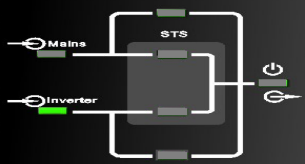
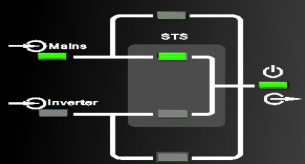
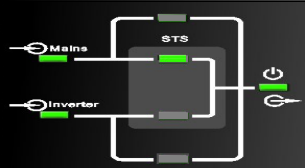
Figure 14–STS LED display

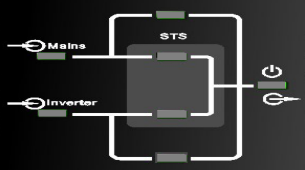
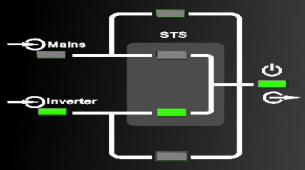
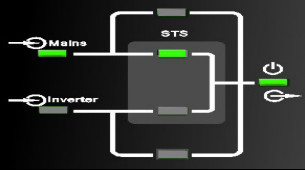
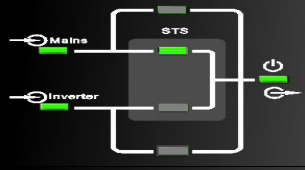
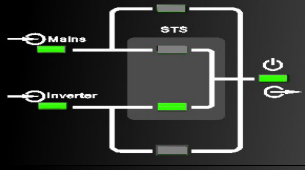
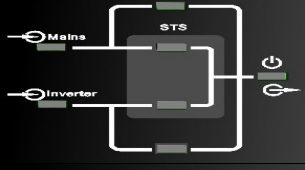
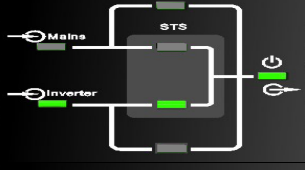
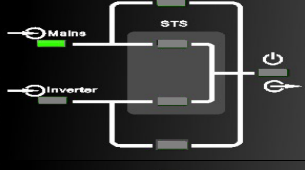
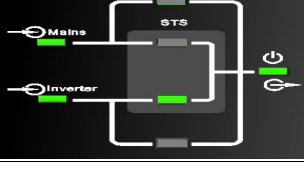
7.2.1 LED Indicators

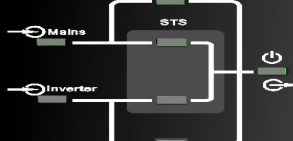





STS Module Yellow and Red LED Display Status			
Priority	Yellow LED	LED Signal	Status
Low ↓ High	Solid		Mains or Inverter abnormal.
	Blink (fast)		Back-feed relay open.
	Blink (fastest)		STS output abnormal.
Priority	Red LED	LED Signal	Status
Low ↓ High	Blink (slow)		Fan lock or CAN communication fail or EEPROM fault.
	Blink (fast)		SCR short.
	Blink (fastest)		MBS position abnormal.
	Solid		STS fault mode, overload or over temperature or output short

Table F–Inverter LED indicator display

7.2.2 STS Operation Mode Display Status

MBS position	LED Display	Status
Mains Bypass (MBP)		AC Mains exists but is unacceptable. Inverter output is unacceptable.
		AC Mains exists but is unacceptable. Inverter output is acceptable.
		AC Mains is off. Inverter output is unacceptable.
		AC Mains is off. Inverter output is acceptable.
		AC Mains is acceptable. Inverter output is unacceptable.
		AC Mains is acceptable. Inverter output is acceptable.
Inverter Maintenance (MSS)		AC Mains is unacceptable. Inverter output is unacceptable.
		AC Mains is unacceptable. Inverter output is acceptable.
		AC Mains is acceptable. Inverter output is unacceptable.
		AC Mains is acceptable. Inverter output is acceptable.

Normal Operation (NORM)		AC Mains is unacceptable. Inverter output is unacceptable.
		AC Mains is unacceptable. Inverter output is acceptable.
		AC Mains is acceptable. Inverter output is unacceptable.
		Priority: Off-line AC Mains is acceptable. Inverter output is acceptable.
		Priority: On-line AC Mains is acceptable. Inverter output is acceptable.
Mains Maintenance (ISS)		AC Mains is unacceptable. Inverter output is unacceptable.
		AC Mains is unacceptable. Inverter output is acceptable.
		AC Mains is acceptable. Inverter output is unacceptable.
		AC Mains is acceptable. Inverter output is acceptable.

Inverter Bypass (IBP)			AC Mains is unacceptable. Inverter output is off.
			AC Mains is acceptable. Inverter output is off.
			AC Mains is unacceptable. Inverter output exists but unacceptable.
			AC Mains is acceptable. Inverter output exists but unacceptable.
			AC Mains is unacceptable. Inverter output is acceptable.
			AC Mains is acceptable. Inverter output is acceptable.

8 Argus Conventions

8.1 Numbering System

Argus Technologies uses an eight-digit drawing number system, which is broken into three blocks. The first three digits describe the category of the product; e.g., rectifier or fuse panel. The next three digits indicate the sequence in which the product number was allocated in a particular category. The last two digits indicate the type of drawing, for example:

"-06"	Outline Drawing
"-08"	Customer Connections
"-20"	Main Assembly

Argus uses an eight-digit part numbering system for all components and sub assemblies. Each part is covered by its own unique number. Due to the quantity, categories will not be listed within this manual.

8.2 Acronyms and Definitions

AC	Alternating current
ANSI	American National Standards Institute
ATS	Automatic Transfer Switch
AWG	American Wire Gauge
COM	Common
CSA	Canadian Standards Association
DC	Direct current
DSP	Digital signal processor
EMC	Electromagnetic compatibility
HVSD	<u>H</u> igh <u>v</u> oltage <u>s</u> hutdown
IEC	International Electrotechnical Commission
LCD	Liquid crystal display
LED	Light emitting diode
LVSD	<u>L</u> ow <u>v</u> oltage <u>s</u> hutdown
MTBF	Mean time between failures
NC	Normally closed
NO	Normally open
OSHA	Occupational Safety & Health Administration
PC	Personal computer
RoHS	Restriction of hazardous substances
RU	Rack unit (1.75")
THD	Total harmonic distortion
UL	Underwriters Laboratories
USB	Universal serial bus

9 Outline Drawings

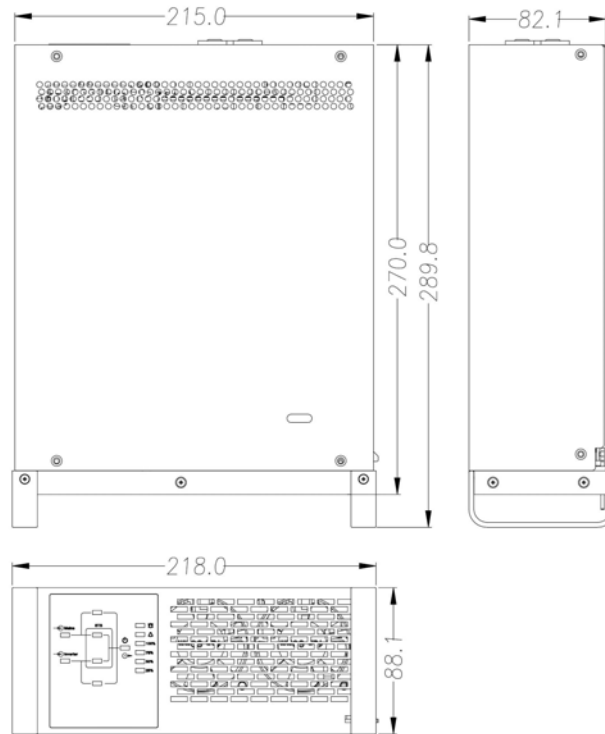


Figure 15—Dimensions of STS module

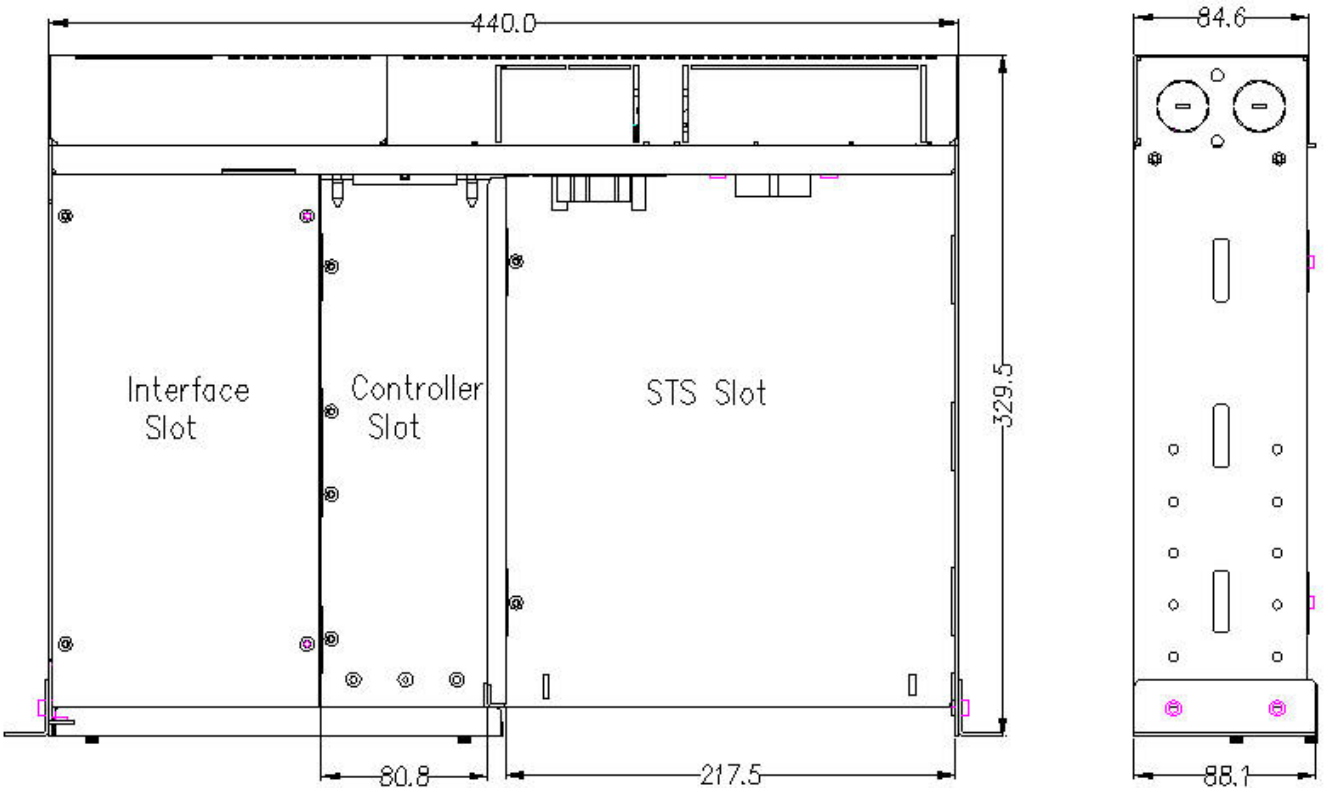


Figure 16—Dimensions of shelf for interface, controller, and STS

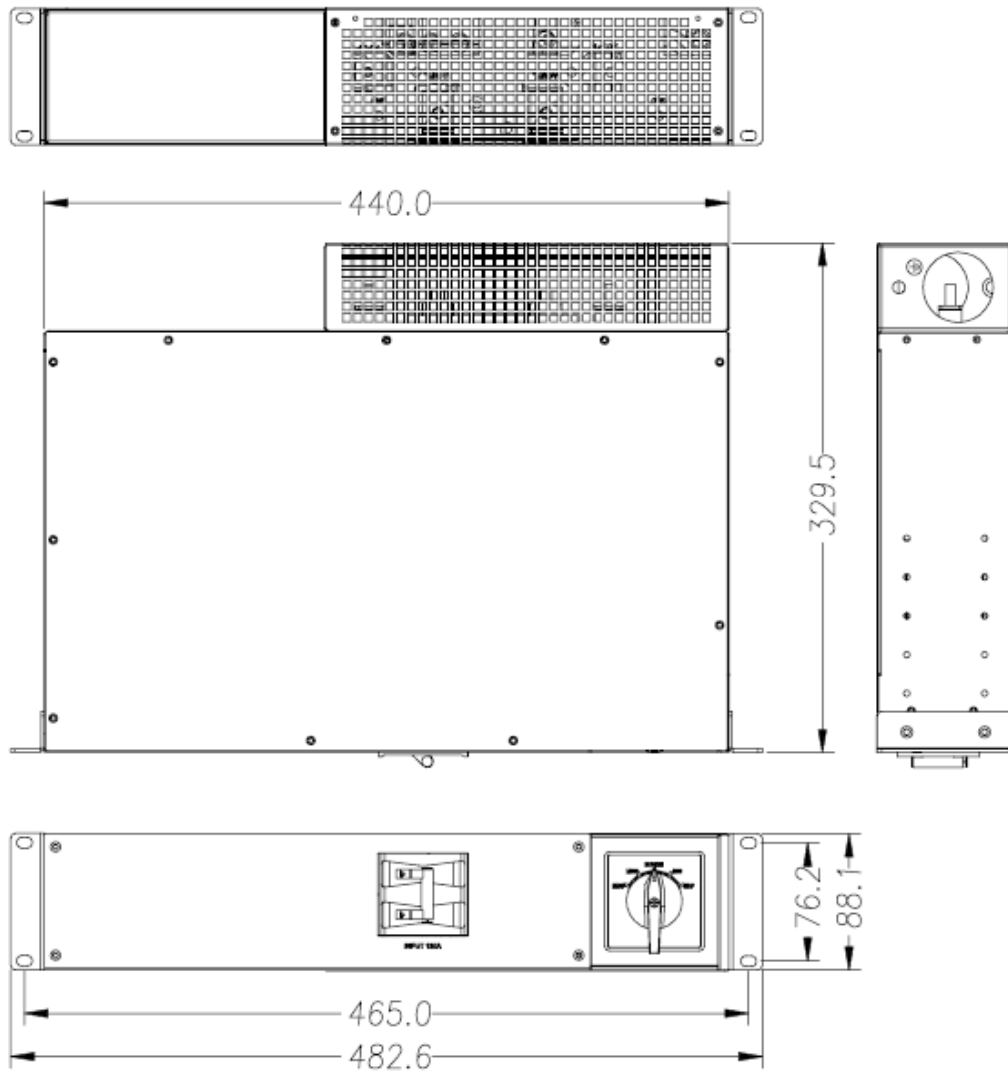


Figure 17–Dimensions of 100A MBS/PD shelf

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