



SABRE Series Inverter System



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# SABRE Series Inverter Power System

## KEY FEATURES

- Ultimate Power Density
- Hot-Plug N+1 Operation
- Highly Configurable
- Expandable to 18kVA
- “All Master” Dynamic Mechanism
- System Status Display
- Maintenance Bypass
- Various AC Load Distribution Options

The Gravitas Energy Systems **SABRE** is an integrated inverter power system, including, inverter, static transfer switch, controller, and remote communications interface modules.

The modular design and N+1 redundant capability of **SABRE** allows the system to be configured for a variety of complex Telecommunication and Industrial power requirements.

An “All Master” dynamic mechanism prevents interruption to critical loads from one or more inverter module failures.

**SABRE**'s static transfer switch provides automatic instantaneous load transfer, ensuring secure uninterrupted operation of sensitive electronic equipment.

The microprocessor controller gives real-time system status via an LCD display and LEDs indicators and also allows settings to be programmed through the front panel. With the communication interface module installed, it is possible to control and monitor the system remotely.



Communications Interface  
(shown with SNMP option installed)



Intelligent Controller



Maintenance bypass Switch  
(included in DPMBS2U & MBS2U-100)

AC Distribution  
(DPMBS2U-E shown)



Inverter Modules



Static Transfer Switch  
(50A unit shown)

## 'LITE' SYSTEM

SABRE 'Lite' consists of a number of different 19-inch power shelves housing two 1500VA/1200W hot-swap inverter modules. The shelves are 1RU high (1.75 inches) and provide various AC output termination / distribution types including NEMA 5-15, IEC60320-C13 and field wiring terminal blocks. A separate [datasheet](#) gives details of the available configurations.



- One Rack Spaces High: 1.75"
- 3000 VA for Two Units
- Automatic N+1 redundant operation
- 120VAC or 230VAC
- Form C Alarm Output
- NEMA, IEC320 & Terminal Block Output Options

SABRE 'Lite' can be coupled with the Vigilant Series AC Power Distribution units to provide a simple inverter solution which offers AC output distribution with 8 remotely switched NEMA or IEC60320 outlets. See the Vigilant Series [datasheet](#) for full details.

- True RMS Digital Current Meter
- Individual Outlet Switching
- User Programmable ON/OFF Sequencing
- Audible Alarm
- Remote Power Monitoring via WEB, SNMP & Bundled Software
- Event Alerts via Email, SNMP Trap



VIGILANT SERIES - PDUAC1US

## PRE-CONFIGURED SYSTEMS

The SABRE Series offers unparalleled flexibility of system configuration, but for most applications have similar requirements. For this reason we have defined several 'pre-configured' systems with 3, 6 or 9kVA capacity. All pre-configured systems include a Static Transfer Switch, Controller and Communications Module with SNMP option already installed.

Customers can choose bulk output only, bulk/distributed output without Manual Bypass, or bulk/distributed output with Manual Bypass. Distributed outputs are available with IEC60320 outlets for 120VAC or 230VAC operation and NEMA 5/15 outlets for 120VAC operation only.

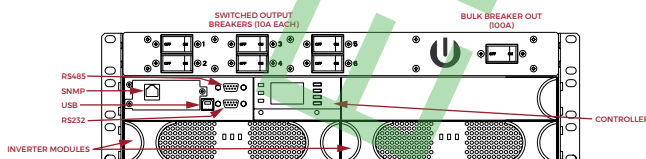
A separate [datasheet](#) details each of the available system units, which can accommodate 120VAC or 230VAC output inverter modules as required.

## CUSTOMER DEFINED SYSTEMS

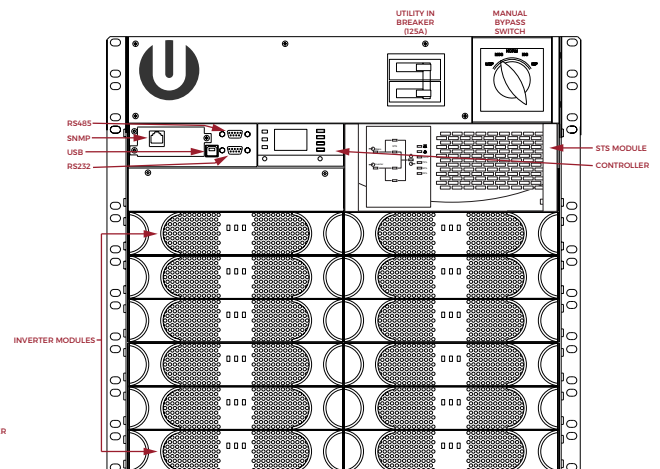
Customers can configure systems to their exact requirements ranging from 3KVA with no STS and optional 1RU distribution to a maximum of 18KVA with STS and MBS or any combination in between.

Examples of such a configurations are shown here.

For details on how to configure an alternate pre-configured or application specific system configuration see the last page of this brochure.



2kVA system with controller, communications with SNMP and 1U AC distribution with IEC outlets  
(pre-configured model number: IX3U-S-D1E)



18kVA system with 100A STS and MBS, controller and communications with SNMP  
(pre-configured model number: IX10U-TS100S-D2B)

# HOT-SWAP INVERTER MODULES

The SABRE Series inverter modules utilize advanced power electronic techniques for reduced size, achieving a power density 8.36W/inch<sup>3</sup>. With dimensions of 1.59"(40.5mm) height x 8.46"(215mm) width x 10.63"(270mm) depth these units install in pairs into a 1U high 19" rack-mountable ETSI 300mm power shelf.



- Pure sine wave
- Hot-swap replacement in shelf
- High efficiency, >89%
- Smart fan speed control
- Wide operation temperature range, -20 to +70°C
- N+X redundancy system, load sharing < 5%
- Lower audible noise < 55dBA
- High power density
- CAN Bus interface embedded

INVERTER MODULE SPECIFICATION	
DC INPUT	
Operating Range	40.5Vdc - 58Vdc for 48Vdc System
AC OUTPUT	
Output Waveform	Pure sine wave
Output Power	1500VA/1200W
Power Factor	0.8 maximum lagging or leading
Nominal Output Voltage	110/115/120Vac - INV1548, 208/220/230/240Vac - INV1548H
Output Voltage Variation	Maximum ±2%
Frequency	50/60Hz ±0.5%, programmable

# STATIC TRANSFER SWITCH MODULES

The SABRE Series Static Transfer Switch modules increase system reliability by automatically switching between the inverter output and the utility supply. The STS5048 (50A capacity) and STS10048 (100A capacity) can be programmed so that the system operates in a standby backup mode where the utility is the normal source of supply or alternatively the system can be the normal source of supply with automatic switch-over to the utility in the event of system failure.

- Universal AC input range
- Hot-swap capability with MBS
- Back-feed protection
- Redundant fan design
- Redundant power supply design
- Fast transfer time, typically less than 1/4 cycle
- Wide operation temperature range, -20 to 70°C
- Lower audible noise <55dBA
- Emergency Power Off function embedded
- No-cross connect
- Optional maintenance bypass switch function
- CAN Bus interface embedded



STS5048

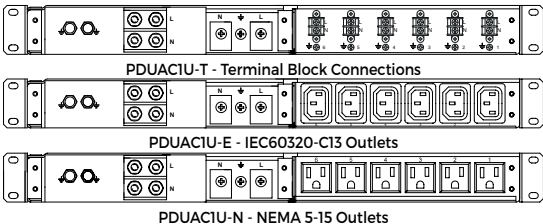


STS10048

# 1U AC DISTRIBUTION MODULE

The PDUACIU has 100A overall capacity and provides two means of distributing AC to the load; as a single bulk output and via eight IEC320 or NEMA outlet sockets with individual Magnetic Circuit Breakers.

- Compact design (1RU Height)
- Bulk Output Terminal Block with 50A CB [120/230V]
- 6 x NEMA 5-15 outlets with 15A CBs (-N) [120VAC only]
- 6 x IEC320-C14 outlets with 10A CBs (-E) [120/230V]
- 100A overall capacity





## 2U MANUAL BYPASS / DISTRIBUTION MODULES

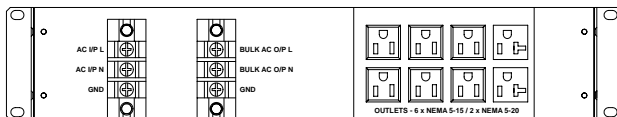
The DPMBS2U and MBS2U manual bypass and power distribution modules enable the user to manually switch between inverter output or utility output and to override the STS module for maintenance purposes. A mechanical interlock between these units and the STS module ensures that AC to the load cannot be inadvertently interrupted.

The DPMBS2U, used with systems up to 50A output capacity, provides two means of distributing AC to the load as standard: as a single bulk output or via eight IEC320 or NEMA outlet sockets with individual Magnetic Circuit Breakers.

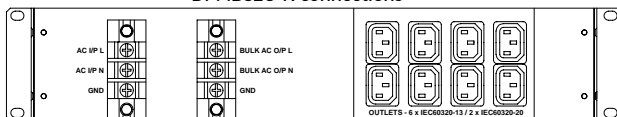
The MBS2U-100 is used with systems employing the STS10048 100A STS module and provides AC through a single bulk output.



DPMBS2U



DPMBS2U-N connections

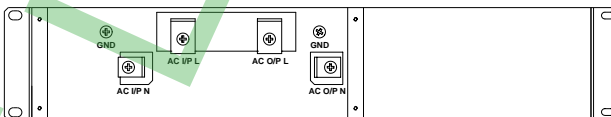


DPMBS2U-E connections

- 75A (DPMBS2U) or 125A (MBS2U-100) Bypass switch
- Enables hot-swap of STS module
- Bulk output on terminal block
- AC utility can be isolated via MCB
- 100A Master MCB
- 6 x NEMA 5-15 + 2 x NEMA 50-20 outlets (DPMBS2U-N) [120VAC only]
- 6 x IEC320-C14 + 2 x IEC320-C20 outlets (DPMBS2U-E) [120/230VAC]
- Individual CBs for each circuit on DPMBS2U models



MBS2U-100



MBS2U-100 connections

## CONTROLLER MODULE

The SABRE Series Controller, allows the user to monitor real-time system status such as output voltage, output current, alarm status, and also allows system parameters, to quickly be changed with the touch of a few keys on the front panel. With the Communications Interface Module installed the system can be monitored over a variety of interfaces with a local PC running Winpower.

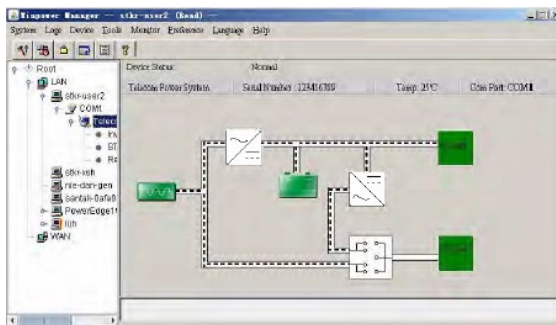


- Compact design (1RU Height)
- Programmable Dry contact alarms (5 in total)
- RS-232, USB TCP/IP (with IFC2000)
- CAN Bus interface embedded
- Hot swappable
- RealTime Clock
- LCD and LED indicator
- Audible alarm function embedded

## COMMUNICATIONS INTERFACE

The SABRE Series Communications Interface provides system connection to a computer via RS232 or USB for the purposes of monitoring, control or programming using the Winpower PC based software that provides a user friendly GUI interface.

An optional SNMP module provides alarm traps over a LAN interface.

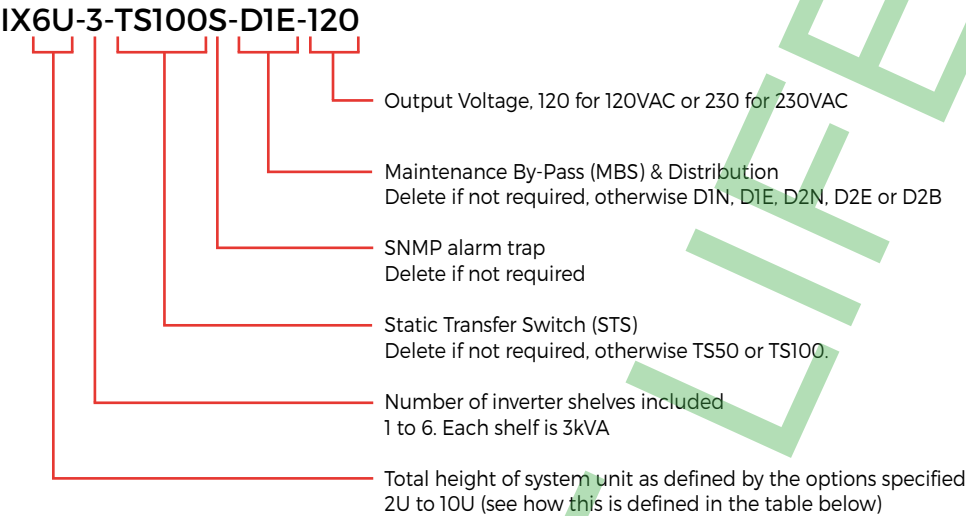


Winpower PC Software

DEFINING ALTERNATE & CUSTOM SYSTEM CONFIGURATIONS

Customers can customize an inverter design to meet their application requirements and still benefit from delivery of a factory assembled and fully tested product that minimizes installation time. Customers can choose the number of inverter shelves and types of distribution as well as adding or removing STS , MBS and communication options.

The following shows how to build an alternate configuration part number:



To define a custom systems complete the following table:

STEP	INSTRUCTIONS	SELECTION OPTION	RU	SELECTION	RU	EXAMPLE	
						SELECTION	RU
1	Select the number of inverter shelves (each shelf is 3KVA)	1-6	1-6			3	3
2	<b>Control Shelf/STS/Inverter alarm options, choose only one:</b>					TS50S	1
	NO STS and Relay Alarms	leave blank	1				
	NO STS and SNMP Alarm trap module	S	1				
	50A STS and Relay Alarms	TS50	1				
	50A STS and SNMP Alarm trap module	TS50S	1				
	100A STS and Relay Alarms	TS100	2				
	Controller + 100A STS	TS100S	2				
3	<b>Distribution Options choose only one [NEMA options are 120V only]:</b>					D2E	2
	NO Distribution [120/230V]	leave blank	0				
	6 NEMA 5-15 + 1 Bulk 100A [120V only]	D1N	1				
	6 IEC C13 + 1 Bulk 100A [120/230V]	D1E	1				
	6 Terminal Block + 1 Bulk 100A [120/230V]	D1T	1				
	6 NEMA 5-15/ 2 NEMA 5-20/ 1 Bulk + 75A MBS* [120V only]	D2N	2				
	6 IEC C13/ 2 IEC C19/ 1 Bulk + 75A MBS* [120/230V]	D2E	2				
	1 Bulk + 125A MBS (for use with 100A STS) [120/230V]	D2B	2				
4	Place the number of RU's for each selection 1-3 in the height column and this total goes in selection #4 to give the system total height in RU's					6	

\* Use with 50A STS



### DESCRIPTION

UNIPOWER's SABRE Series inverter systems operate from a 48VDC (40.5-58V range) input and produce either 120VAC or 230VAC nominal output at up to 9kVA total capacity. The low distortion 50 or 60Hz sine wave is produced using an advanced DSP controlled Architecture which achieve better than 89% efficiency and 10.5VA per cubic inch power density.

SABRE Series pre-configured inverter systems include a Controller and Static Transfer Switch with optional Power Distribution and Maintenance By-Pass facilities. Remote Communications to a PC is provided USB, RS232 or RS485 serial connections. SNMP alarm traps delivered over an Ethernet TPC/IP connection are also provided as standard.

### TWO-YEAR WARRANTY



CE  
 LVD2006/95/EC  
 ROHS2011/65/EU



### FEATURES

- ◆ Hot-Swap Inverter, STS and Controller Modules
- ◆ 19-Inch Rack Mounting
- ◆ 1500 to 9000 VA System Capacity
- ◆ 120VAC or 230VAC
- ◆ Low Distortion 50 or 60Hz Pure Sine Wave
- ◆ 40.5 to 58 VDC Input
- ◆ DSP Management & Control
- ◆ >89% Efficiency

### STANDARD SYSTEM CONFIGURATIONS

MAX. OUTPUT POWER		MAX. No. MODULES	OUTPUT VOLTAGE <sup>1</sup>	OUTPUT FREQUENCY <sup>2</sup>	DISTRIBUTION SOCKET TYPE	MANUAL BYPASS	RACK HEIGHT	MODEL NUMBER
3kVA	2.4kW	2	120VAC 230VAC	60Hz 50Hz	none	no	2U	IX2U-1-TS50S-120 IX2U-1-TS50S-230
3kVA	2.4kW	2	120VAC	60Hz	6 x NEMA	no	3U	IX3U-1-TS50S-D1N-120
3kVA	2.4kW	2	120VAC 230VAC	60Hz 50Hz	6 x IEC60-320	no	3U	IX3U-1-TS50S-D1E-120 IX3U-1-TS50S-D1E-230
3kVA	2.4kW	2	120VAC	60Hz	8 x NEMA	yes	4U	IX4U-1-TS50S-D2N-120
3kVA	2.4kW	2	120VAC 230VAC	60Hz 50Hz	8 x IEC60-320	yes	4U	IX4U-1-TS50S-D2E-120 IX4U-1-TS50S-D2E-230
6kVA	4.8kW	4	120VAC 230VAC	60Hz 50Hz	none	no	3U	IX3U-2-TS50S-120 IX3U-2-TS50S-230
6kVA	4.8kW	4	120VAC	60Hz	6 x NEMA	no	4U	IX4U-2-TS50S-D1N-120
6kVA	4.8kW	4	120VAC 230VAC	60Hz 50Hz	6 x IEC60-320	no	4U	IX4U-2-TS50S-D1E-120 IX4U-2-TS50S-D1E-230
6kVA	4.8kW	4	120VAC	60Hz	8 x NEMA	yes	5U	IX5U-2-TS50S-D2N-120
6kVA	4.8kW	4	120VAC 230VAC	60Hz 50Hz	8 x IEC60-320	yes	5U	IX5U-2-TS50S-D2E-120 IX5U-2-TS50S-D2E-230
9kVA	7.2kW	6	120VAC 230VAC	60Hz 50Hz	none	no	5U	IX5U-3-TS100S-120 IX5U-3-TS100S-230
9kVA	7.2kW	6	120VAC	60Hz	6 x NEMA	no	6U	IX6U-3-TS100S-D1N-120
9kVA	7.2kW	6	120VAC 230VAC	60Hz 50Hz	6 x IEC60-320	no	6U	IX6U-3-TS100S-D1E-120 IX6U-3-TS100S-D1E-230
9kVA	7.2kW	6	120VAC 230VAC	60Hz 50Hz	none	yes	7U	IX7U-3-TS100S-D2B-120 IX7U-3-TS100S-D2B-230

Notes:

1. Inverter modules must be ordered separately based on output voltage and total system capacity required. Modules types may not be mixed in the same system.
2. 120VAC inverters are pre-programmed to 60Hz, 230VAC inverters are pre-programmed to 50Hz. These settings can be changed from the front panel of the controller or remotely using the WINpower client application.
3. If in doubt about load PF (Power Factor) assume that it is 1.0PF.
4. The frequency shown in brackets can be obtained by reprogramming the unit from the system controller.

### INVERTER MODULES

OUTPUT POWER <sup>1</sup>	OUTPUT VOLTAGE	OUTPUT FREQUENCY <sup>2</sup>	MODEL NUMBER
1500VA @ 0.8PF 1200W @ 1PF	120VAC	60Hz (50Hz)	INV1548
	230VAC	50Hz (60Hz)	INV1548H



## SPECIFICATIONS

Typical at 48V Input, Full Load and 25°C Unless Otherwise Noted.

### INVERTER MODULES

#### INPUT

Voltage Range.....	40.5-58VDC
Undervoltage Warning Threshold .....	45VDC
Undervoltage Threshold.....	40VDC
Overvoltage Warning Threshold.....	58VDC
Overvoltage Threshold.....	60VDC
Input Current, 48VDC Input.....	28.4A
Input Protection.....	Fused Reverse Polarity Protection
Inrush Current.....	Less than 2x Rated I <sub>in</sub> (IEC62040-3-1999)
Isolation	
Input to Output.....	Reinforced Pri-Sec, 4242VDC / 1 min.
Input to Ground.....	707VDC (Varistor & filter caps removed)
Psophometric Noise Voltage.....	<1mV ITU-T 0.41 (16.66-6000Hz)
Reflected Psophometrics Noise Current.....	<1% YD/T 777-2006
Reflected Relative Band Wide Current.....	<10% YD/T 777-2006 (0-2MHz)
Wide Band Noise.....	<20mVrms (25Hz-20kHz)
Peak to Peak Noise.....	<150mV up to 100MHz

#### OUTPUT

AC Waveform .....	Pure Sine Wave
Output Power.....	1500VA @ 0.8PF or 1200W @ 1PF
Power Factor or Load.....	-0.8 to +0.8
Rated Output Voltage .....	120VAC or 230VAC (see model table)
Voltage Setpoints Available (via controller)	
INV1548 - 120VAC factory set.....	110,115 or 120VAC
INV1548H - 230VAC factory set.....	208, 220, 230, 240VAC
Output Voltage Variation.....	<±2%
Output Frequency.....	50Hz or 60Hz (see model table)
Frequency Variation .....	<±0.5%
Crest Factor.....	3:1 max.
THD of Voltage Waveform	
Linear Load.....	<3%
Non-Linear Load.....	<5%
Capacitive/Inductive Load.....	+0.8 to +0.8 PF
without exceeding permissible distortion for resistive load	
Efficiency.....	>89%
Overload Protection .....	
Electronic Current Limit at Overload & Short Circuit	
1.25 x Rated Current, Temperature Controlled	
1.50 x Rated Current for Periods <20 Seconds	
Dynamic Response.....	<±10%
Isolation, Output to Chassis.....	Basic Isolation (Pri-Gnd) 2121 VDC/1 min.
Surge Protection.....	EN61000-4-5
Telcordia GR-1089 Core ANSI C62.41-IEEE, STD 587-1980	
Load Sharing.....	<5% of Rated Load

#### CONTROL/STATUS

LED Indicators	
Inverter Status.....	Green OK, Red FAIL
Overload.....	Off OK, Yellow for Overload
Reverse Polarity.....	Off OK, Red for Reversed
Status/Alarm Information (via controller).....	Inverter Fail, Overload,
LVD Alarm, Fail Alarm, Thermal Derating, Power Output,	
Input Voltage, Output Voltage, Output Current, Output	
Frequency, Low Input Voltage Shutoff, Inventory Data.	
Runtime Info.....	Through Maintenance Feature in Controller

### STATIC TRANSFER SWITCH

#### INPUT

Voltage Range	
110/115/120VAC Systems.....	89-138VAC
208/220/230/240VAC Systems.....	176-276VAC
Over / Undervoltage Threshold (adjustable from controller)	
110VAC Systems.....	117 to 127VAC / 89 to 105VAC
115VAC Systems.....	122 to 132VAC / 93 to 110VAC
120VAC Systems.....	127 to 138VAC / 100 to 114VAC
208VAC Systems.....	220 to 240VAC / 176 to 198VAC
220VAC Systems.....	233 to 252VAC / 176 to 209VAC
230VAC Systems.....	244 to 264VAC / 185 to 218VAC
240VAC Systems.....	254 to 276VAC / 193 to 228VAC

#### OUTPUT

AC Waveform .....	Sine Wave
Output Voltage.....	Same as utility or inverter modules
Permissible Frequency Variation to Synchronise Inverters.....	±2.5%
Transfer Time.....	Typically 1/4 cycle
Rated Current.....	3kVA & 6kVA - 50A / 9kVA - 100A
Operation Modes (programmable).....	Inverter Priority or Utility Priority
Default Priority.....	Inverters

#### CONTROL/STATUS

LED Indicators	
Fault (red).....	Off OK, On FAIL
Warning (yellow).....	Off OK, Flashing for warning condition
Power On (green).....	On OK, Flashing for bypass
Status/Alarm Information .....	CAN communication failure
back-feed relay open, SCR short, output short, overload	
over temperature, mains unavailable, inverter unavailable	
output abnormal, fan failure, MBS position error	

### GENERAL

#### ENVIRONMENTAL

Operating Temp. Range	
Without Derating.....	-5°C to 50°C
With Derating.....	-20°C to 70°C
Storage Temp. Range.....	-40°C to +85°C
Humidity.....	0% to 95%, Non-Condensing
Cooling.....	Variable Speed Internal Fans (Field Replaceable)
Operating Altitude.....	1500m without derating

#### REGULATORY

Safety (Individual modules)	
Inverter/PDU/MBS/chassis.....	UL60950-1, EN60950-1, IEC60950-1
STS module.....	UL1778
EMC (individual modules).....	EN300 386:2001 Class B
Acoustic Noise (individual modules).....	55dB ETS300 753, Class 3.1

## PRE-CONFIGURED SYSTEM ORDERING GUIDE

- Choose the output voltage and total system capacity required and insert below the model number and quantity of inverter modules:

Inverter Model \_\_\_\_\_ Quantity \_\_\_\_\_ (6 max.)

- Select the 3kVA, 6kVA or 9kVA system that provides the required features such as load distribution and manual bypass and insert below.

System Model \_\_\_\_\_

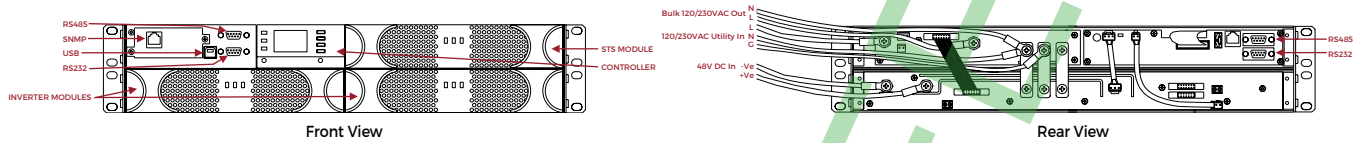
**IMPORTANT NOTE - ALL SABRE IX SYSTEMS ARE SHIPPED AS "MID-MOUNT" ASSEMBLIES.  
 FLUSH-MOUNT IS AVAILABLE, THOUGH NOT RECOMMENDED. CONTACT FACTORY FOR FLUSH-MOUNT OPTION.**

FOR ALTERNATE AND CUSTOM CONFIGURATIONS SEE PAGE 6 OF THIS DATASHEET

## 3kVA SYSTEM CONFIGURATIONS

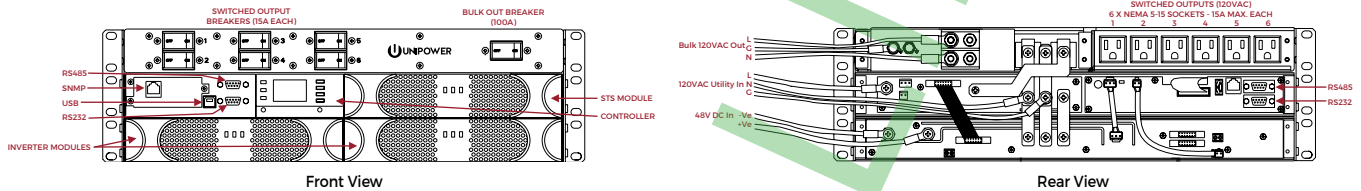
### IX2U-1-TS50S-120 or IX2U-1-TS50S-230

Bulk AC Output - 120VAC or 230VAC  
 STS not Hot-Swappable



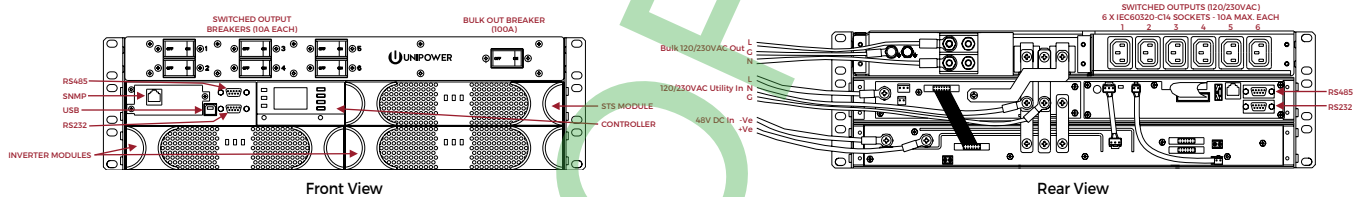
### IX3U-1-TS50S-D1N-120

Bulk AC Output / 6 x NEMA 5-15 Sockets - 120VAC Only  
 STS not Hot-Swappable



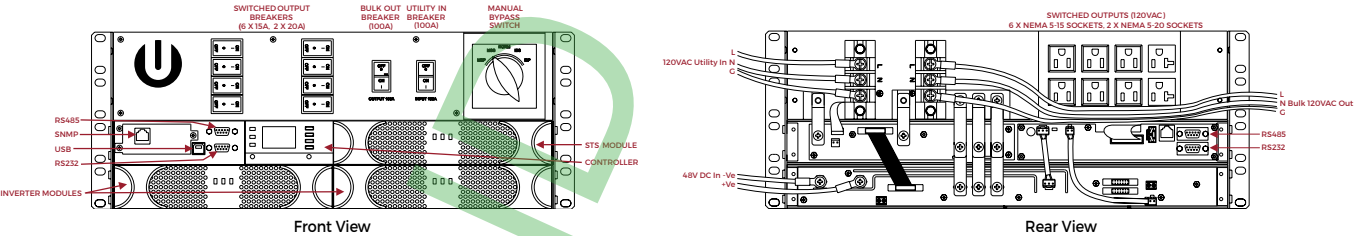
### IX3U-1-TS50S-D1E-120 or IX3U-1-TS50S-D1E-230

Bulk AC Output / 6 x IEC60320-C14 Sockets - 120VAC or 230VAC  
 STS not Hot-Swappable



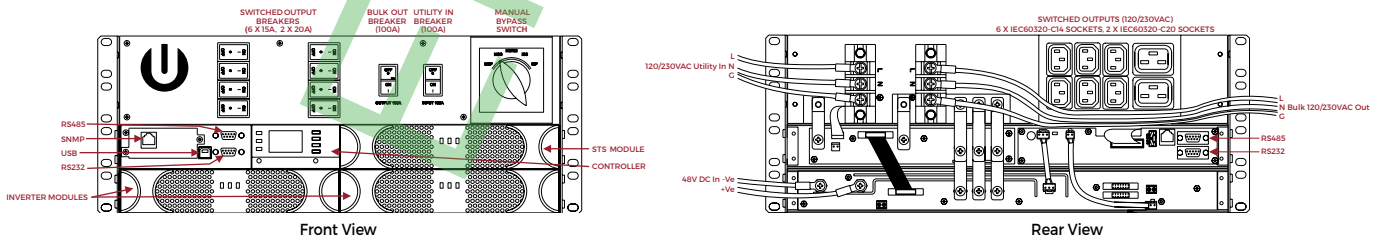
### IX4U-1-TS50S-D2N-120

Bulk AC Output / 6 x NEMA 5-15 Sockets / 2 x NEMA 5-20 Sockets - 120VAC Only  
 STS Hot-Swappable using Manual Bypass



### IX4U-1-TS50S-D2E-120 or IX4U-1-TS50S-D2E-230

Bulk AC Output / 6 x IEC60320-C14 Sockets / 2 x IEC60320-C20 Sockets - 120VAC or 230VAC  
 STS Hot-Swappable using Manual Bypass

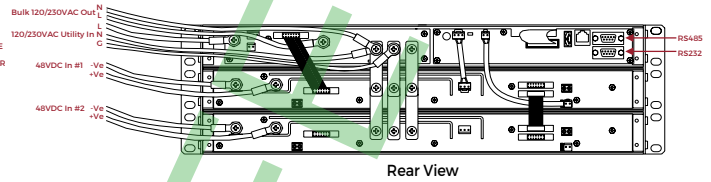
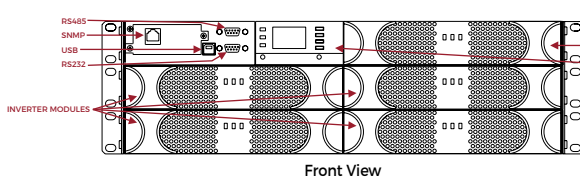


Rear views are with safety covers removed to show input and output connection details.

## 6kVA SYSTEM CONFIGURATIONS

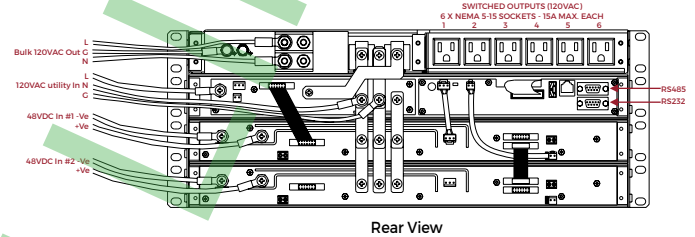
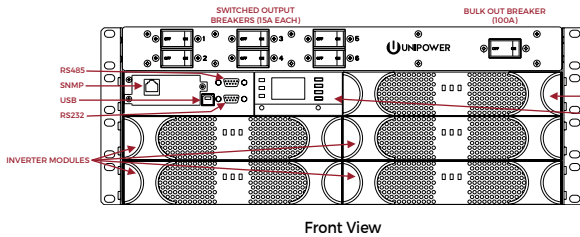
### IX3U-2-TS50S-120 or IX3U-2-TS50S-230

Bulk AC Output - 120VAC or 230VAC  
STS not Hot-Swappable



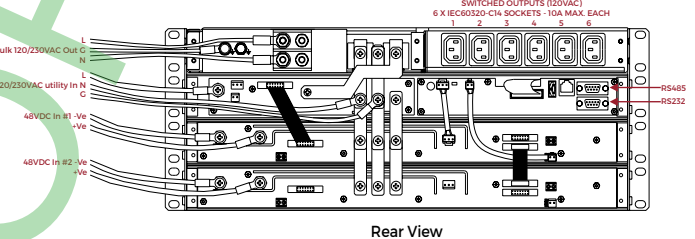
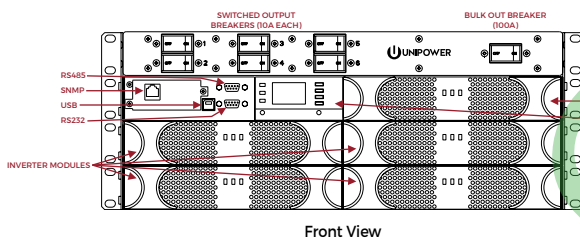
### IX4U-2-TS50S-D1N-120

Bulk AC Output / 6 x NEMA 5-15 Sockets - 120VAC Only  
STS not Hot-Swappable



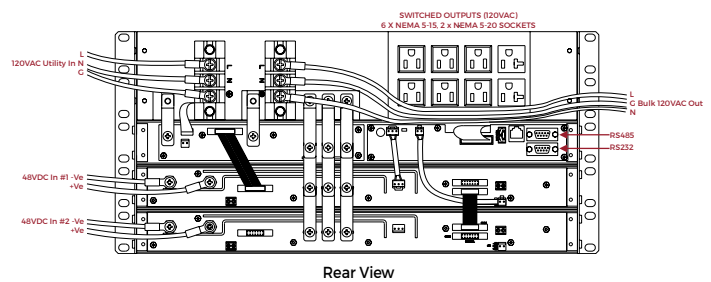
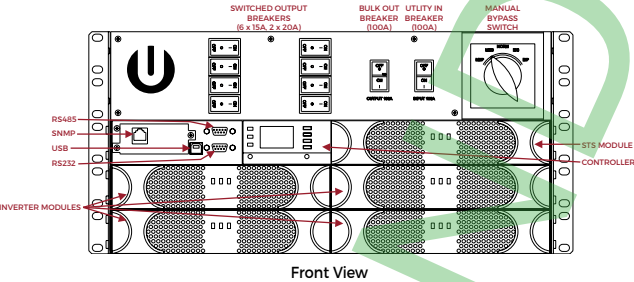
### IX4U-2-TS50S-D1E-120 or IX4U-2-TS50S-D1E-230

Bulk AC Output / 6 x IEC60320-C14 Sockets - 120VAC or 230VAC  
STS not Hot-Swappable



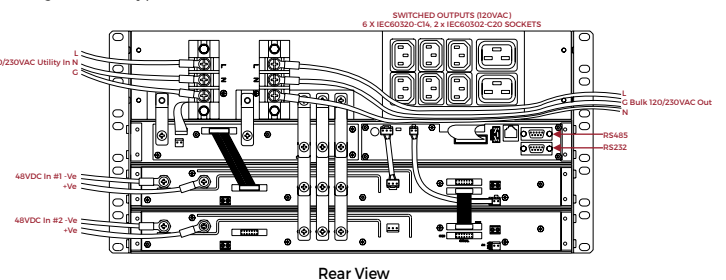
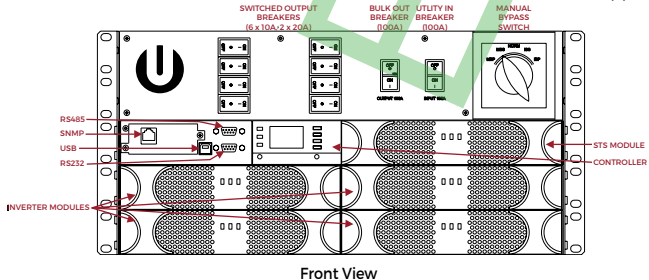
### IX5U-2-TS50S-D2N-120

Bulk AC Output / 6 x NEMA 5-15 Sockets / 2 x NEMA 5-20 Sockets - 120VAC Only  
STS Hot-Swappable using Manual Bypass



### IX5U-2-TS50S-D2E-120 or IX5U-2-TS50S-D2E-230

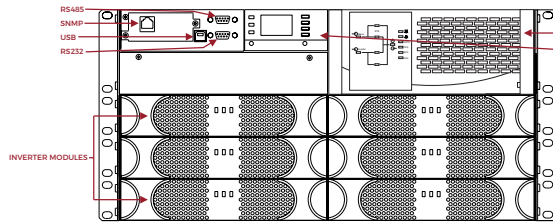
Bulk AC Output / 6 x IEC60320-C14 Sockets / 2 x IEC60320-C20 Sockets - 120VAC or 230VAC  
STS Hot-Swappable using Manual Bypass



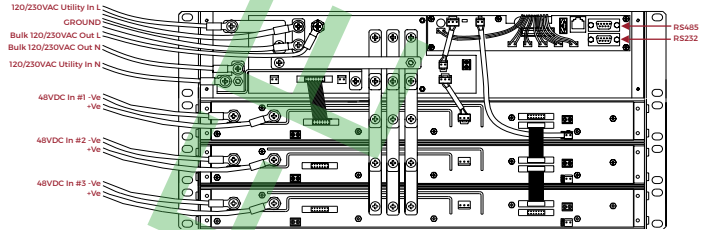
## 9kVA SYSTEM CONFIGURATIONS

### IX5U-3-TS100S-120 or IX5U-3-TS100S-230

Bulk AC Output - 120VAC or 230VAC  
STS not Hot-Swappable



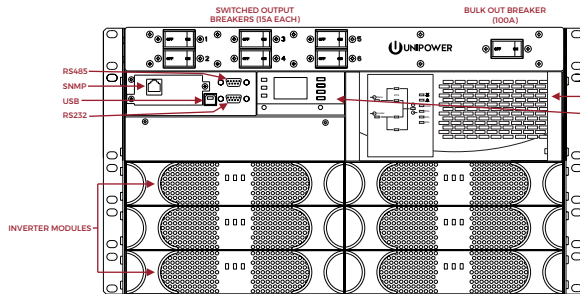
Front View



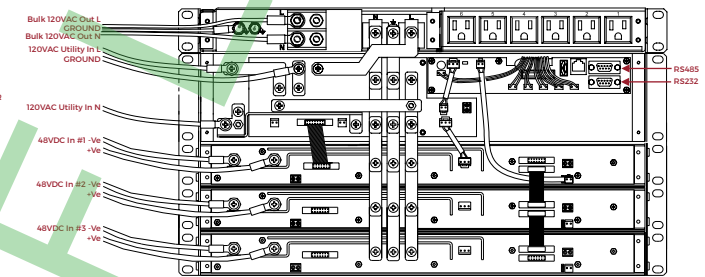
Rear View

### IX6U-3-TS100S-D1N-120

Bulk AC Output / 6 x NEMA 5-15 Sockets - 120VAC Only  
STS not Hot-Swappable



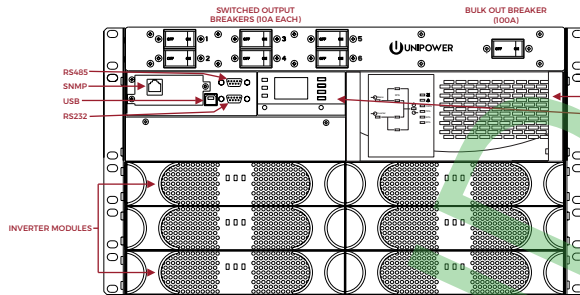
Front View



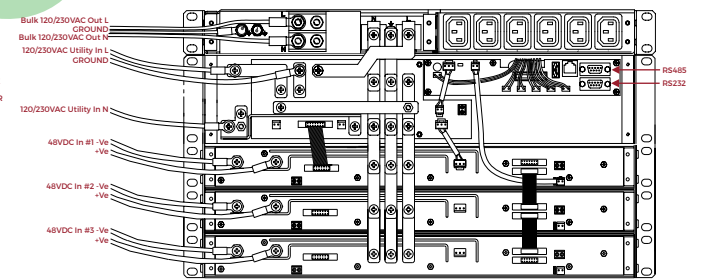
Rear View

### IX6U-3-TS100S-D1E-120 or IX6U-3-TS100S-D1E-230

Bulk AC Output / 6 x IEC60320-C14 Sockets - 120VAC or 230VAC  
STS not Hot-Swappable



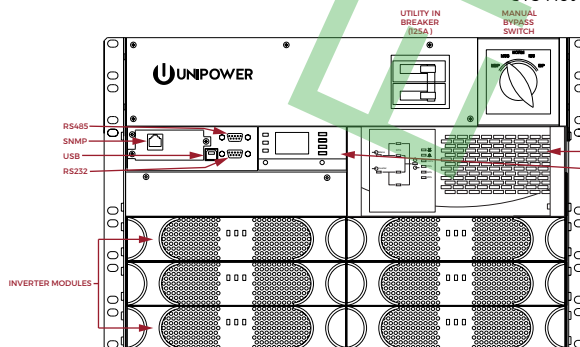
Front View



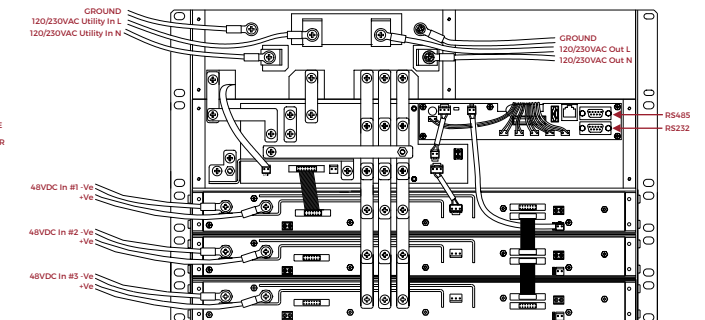
Rear View

### IX7U-3-TS100S-D2B-120 or IX7U-3-TS100S-D2B-230

Bulk AC Output - 120VAC or 230VAC  
STS Hot-Swappable using Manual Bypass



Front View



Rear View



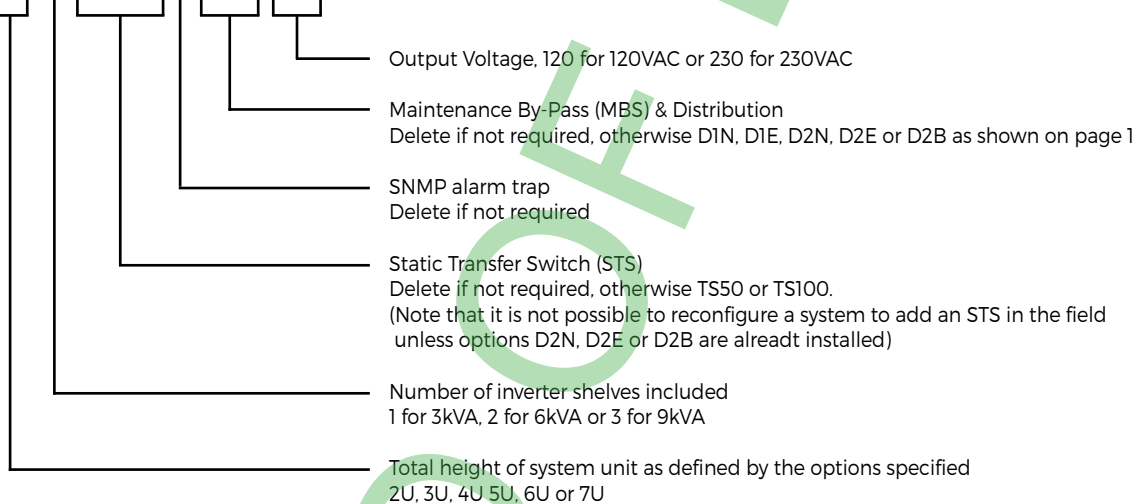
## ALTERNATE & CUSTOM SYSTEMS CONFIGURATIONS

The SABRE Series inverter system is highly configurable and can be configured in a variety of different ways to suit customer's specific requirements. The models listed on the front page of this datasheet have been pre-defined as 'STANDARD' configurations that will meet the needs of most applications and are supplied as pre-assembled integrated units. Alternate configurations can also be supplied pre-assembled, for example without the STS facility or SNMP alarm trapping. It is also possible to specify the individual shelves and modules to be supplied as individual piece parts for customers who want a system with some very specific configuration not easily obtained from the list of pre-assembled options or even higher overall power capacity.

### Alternate Pre-Assembled System Configuration

The following shows how to build an alternate configuration part number:

**IX6U-3-TS100S-D1E-120**



**ABSOLUTE MAXIMUM SYSTEM CAPACITIES  
(# PARALLEL MODULES)**

Output Voltage	With 50A STS/MBS	With 100A STS/MBS	Without STS/MBS
120VAC	6kVA / 50A (4 modules)	12kVA / 100A (8 modules)	18kVA / 150A (12 modules)
230VAC	12kVA / 50A (8 modules)	18kVA / 78A (12 modules)	18kVA / 78A (12 modules)

### Custom Systems

To define a custom system please refer to the **SABRE Systems Brochure** which describes each of the system piece parts in detail.

- Define the output voltage required - 120VAC or 230VAC nominal.  
This determines which inverter modules will be required, **INV1548** for 120VAC or **INV1548H** for 230VAC.
- Define the output capacity required - taking into account the absolute limits given in the table above.  
This determines the number of inverter modules and associated **INVRIU2** shelves (2 modules per shelf).
- Determine whether communications/SNMP, controller or STS functions are required.  
The capacity of the system will define which STS and associated STS/Controller shelf, **INVRIU2CS** or **INVRIU2CS-S** for the 50A STS, **INVR2UCS** or **INVR2UCS-S** for the 100A STS.  
Communications/SNMP will require inclusion of a **DSC1000** controller module.  
SNMP will required the Controller/STS shelf pre-configured with the **IFC2000** communications module, **INVRIU2CS-S** or **INVR2UCS-S**.
- Define whether an MBS and/or AC distribution is required.  
For distribution without an MBS specify either **PDUACIU-N** for 120VAC or **PDUACIU-E** for 230VAC.  
For distribution with an MBS up to maximum 50A capacity specify either **DPMB2U-N** for 120VAC or **DPMB2U-E** for 230VAC.  
For systems in excess of 50A capacity requiring an MBS specify **MBS2U-100**. Note that this unit only offers a bulk output and that distribution will have to be provided through other means, such as the **DPUACIU** configurable Power Distribution Unit.
- Order the selected piece parts as separate items for assembly as a system.





**INSTALLATION & OPERATING MANUAL**  
**GRAVITAS SABRE SERIES**  
**MODULAR INVERTER SYSTEM**

**[WWW.UNIPOWERCO.COM](http://WWW.UNIPOWERCO.COM)**

Manual No. SABRE-9a

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**IMPORTANT NOTE**

**INVERTER MODELS INV1000 AND INV1000H  
ARE NO LONGER AVAILABLE  
INFORMATION IN THIS MANUAL RELATING TO THESE  
MODELS HAS BEEN RETAINED ONLY TO SUPPORT  
THE EXISTING INSTALLED BASE**





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## 1. System Information & Description

The UNIPOWER SABRE Series Inverter System utilizes Digital Signal Processing controlled, 1000/1500VA, modular inverters, contained in a 19/23inch shelf, to supply 120/230VAC to telecom equipment when 48VDC (nominal) is supplied.

The controller, allows the user to monitor real-time system status such as output voltage, output current, alarm status, and also allows system parameter settings to quickly be changed with the touch of a few keys.

The Static Transfer Switch (STS), of which there are both 50A and 100A versions, increases system reliability by automatically switching between the inverter output and the AC utility supply, providing protection against interruptions caused by system failure. The STS can be programmed to provide the Utility supply to the load under normal conditions and switch to the inverters as a back-up in the event of utility failure; or alternatively the inverters can be the normal source of power to the load, using the Utility as a backup. The latter is the default condition as supplied. This programmability of primary and backup source allows the SABRE system to be used in many different applications including traditional Telecom as well 'Green' Energy.

The Maintenance Bypass Switch (MBS) consists of a mechanical switch providing free maintenance for the safe removal of the STS module without interruption of power to the load. The inverter modules are fully hot-swappable and operate automatically in an N+1 redundant configuration.

The SABRE Series Inverter System can accommodate up to 12 inverter modules for an output capacity up to 50Amps or 100A when employing one of the STS units or 100A without an STS at all. Up to 6 inverter shelves can be connected in parallel to supply AC power. The system can be installed in both 19-inch and 23-inch cabinet configurations.

### 1.1 Inverter Module Specification

#### 1.1.1 Electrical Specification

##### Input

Item	Specification	Remarks
Nominal voltage	48Vdc	
Operating range	40.5Vdc ~ 58.0Vdc	
Under voltage warning threshold	45Vdc	
Under voltage threshold	40Vdc	
Over voltage warning threshold	58.0Vdc	
Over voltage threshold	60Vdc	
Isolation AC-DC	Reinforced isolation (Pri-Sec) 4242Vdc/1min	
Inrush current	<2*I <sub>rated</sub>	IEC62040-3(1999)
Isolation DC-enclosure	707Vdc/1min	(Varistors and filter capacitor removed)
Input protection	Reverse Polarity Protection	
Psophometric noise voltage	≤1.0mV 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	<1.0mVps of (25Hz~5KHz) <20mVrms (25Hz~20KHz)	
Peak to peak noise	150mV up to 100MHz	

### Output

Item	Specification	Remarks
Waveform	Pure sine wave	
Output power	1000 VA/800W or 1500VA/1200W	Model Dependent
Power factor	0.8	
Nominal output voltage	110/115/120VAC or 208/220/230/240VAC	Model Dependent
Output voltage variation	Max $\pm 2\%$	
Output Frequency	50/60Hz	Programmable
Frequency variation	Max $\pm 0.5\%$	
Crest factor	3:1	
THD	<3%, linear load <5%, non-linear load	
Capacitive/inductive load	-0.8 to +0.8 without exceeding permissible distortion for resistive load	
Efficiency	Min 88% at rated load	
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	< $\pm 10\%$	
Over load protection	2* $I_{nom}$ , 5S max 1.5* $I_{nom}$ , 10S max 1.25* $I_{nom}$ temperature controlled $I_{nom}$ = 1000VA/output voltage	
Control		
Load sharing	< 5 %	
Display	3 LEDs installed at the front of faceplate	
Status/alarm information	Inverter failure (dry-contact) Remote info Inverter failure/Overload alarm/Low voltage disconnect alarm/ Fan Failure alarm/Thermal derating info/Power output/Input voltage/Output voltage/ Output current/Output frequency/Low input voltage shut off/Product info data Remote On/Off function	
Communication (internal)	CAN Bus	
Runtime info.	Handled through a maintenance feature in the controller	
Useful life	12 years	

### 1.1.2 Environments Specifications

Item	Specification
------	---------------

Operating Temperature	-20°C (-4°F) to 70°C (158°F), absolute maximum -5°C (23°F) to 50°C (122°F) with full performance
Storage Temperature	-40°C (-40°F) to 85°C (185°F)
Acoustic Noise	55dB ETS 300 753, class 3.1
Safety	UL60950-1/EN60950-1/IEC60950-1
EMC	EN300 386:2001. Class B compliance

### 1.1.3 Mechanical Specification

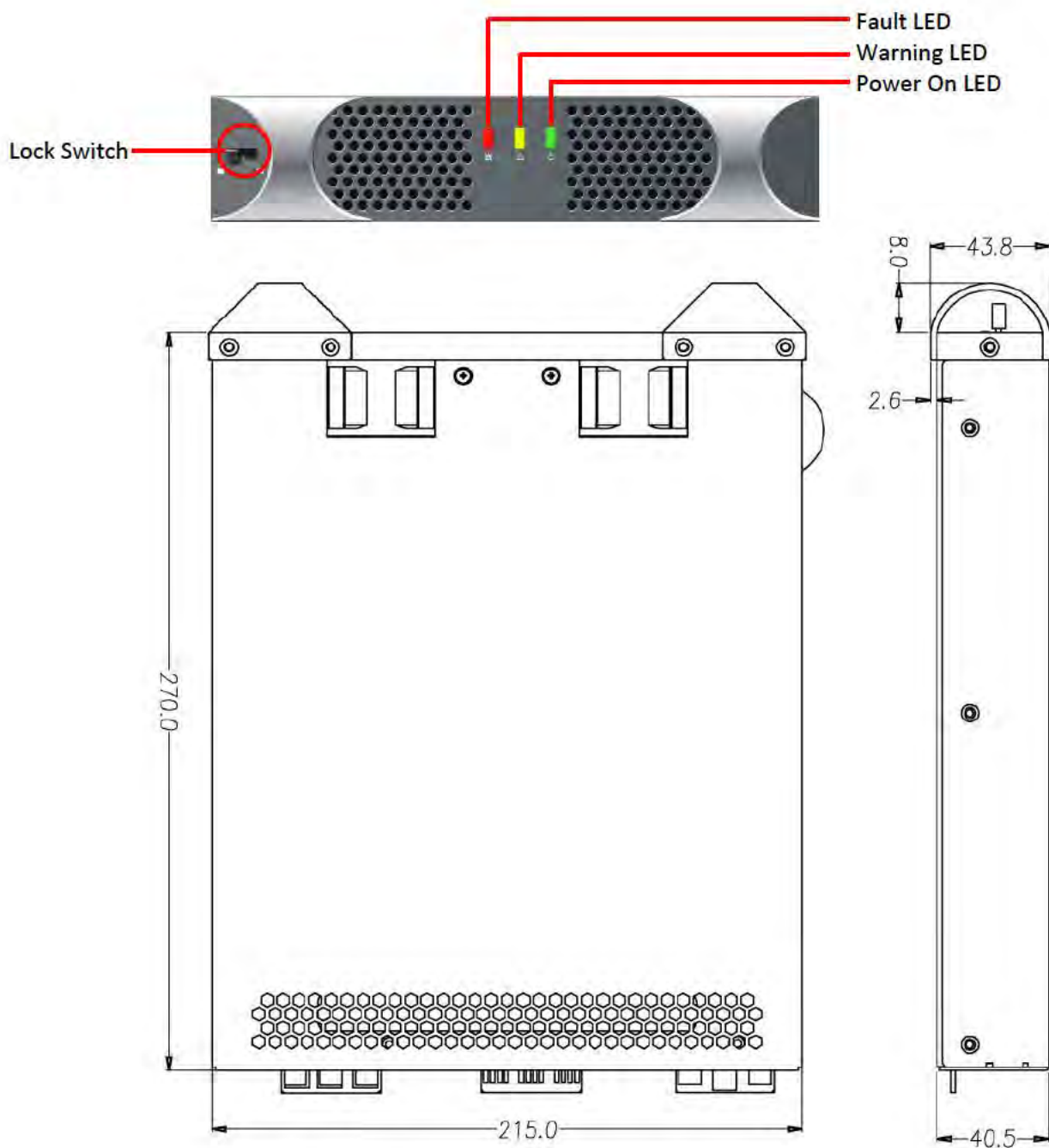
Items	Specification
Module Dimensions	Depth: ≤ 10.63" (270mm) Height, body: ≤ 1.59" (40.5mm) Height, front panel: ≤ 1.72" (43.8mm) (1U) Width: ≤ 8.46" (215mm) (5U)
Hot swappable	Inverter module can be changed in a live system
Hot pluggable	No wires need to be connected or tools required for installation of inverter into shelf
Force cooling	Smart control, easy replacement
# inverter modules in parallel	50A or 100A with STS, 100A without STS, see below.

### 1.1.4 SABRE Series Inverter Parallel Capacity

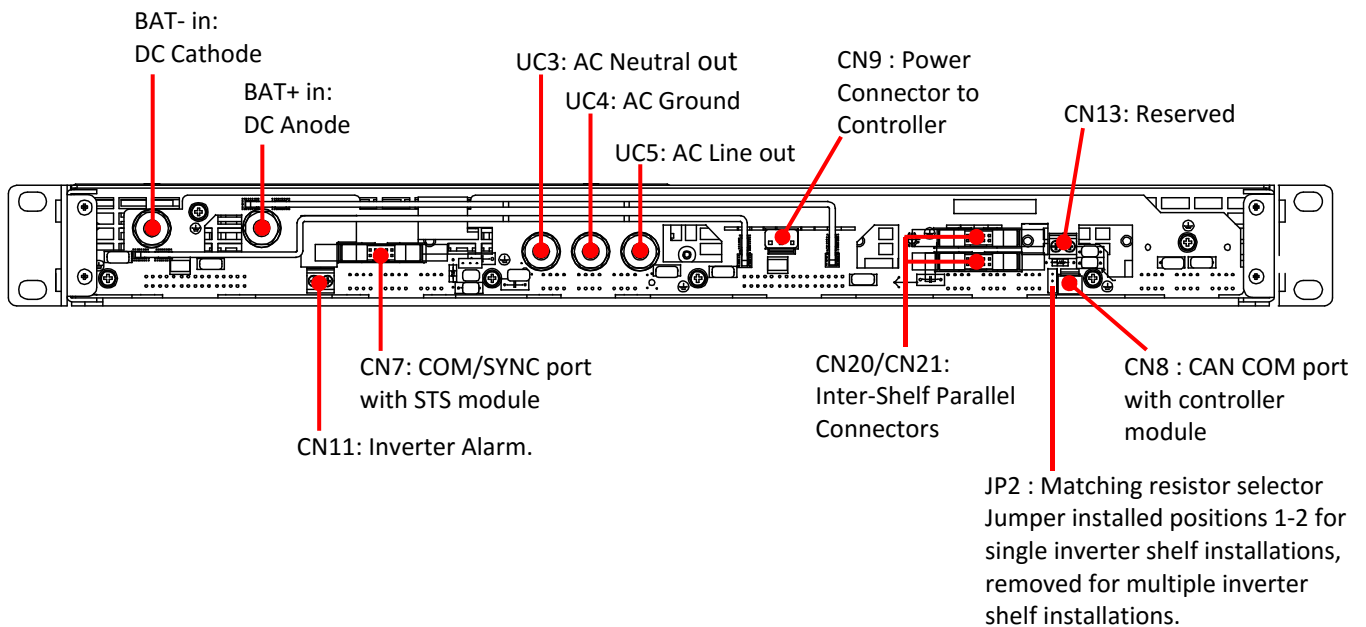
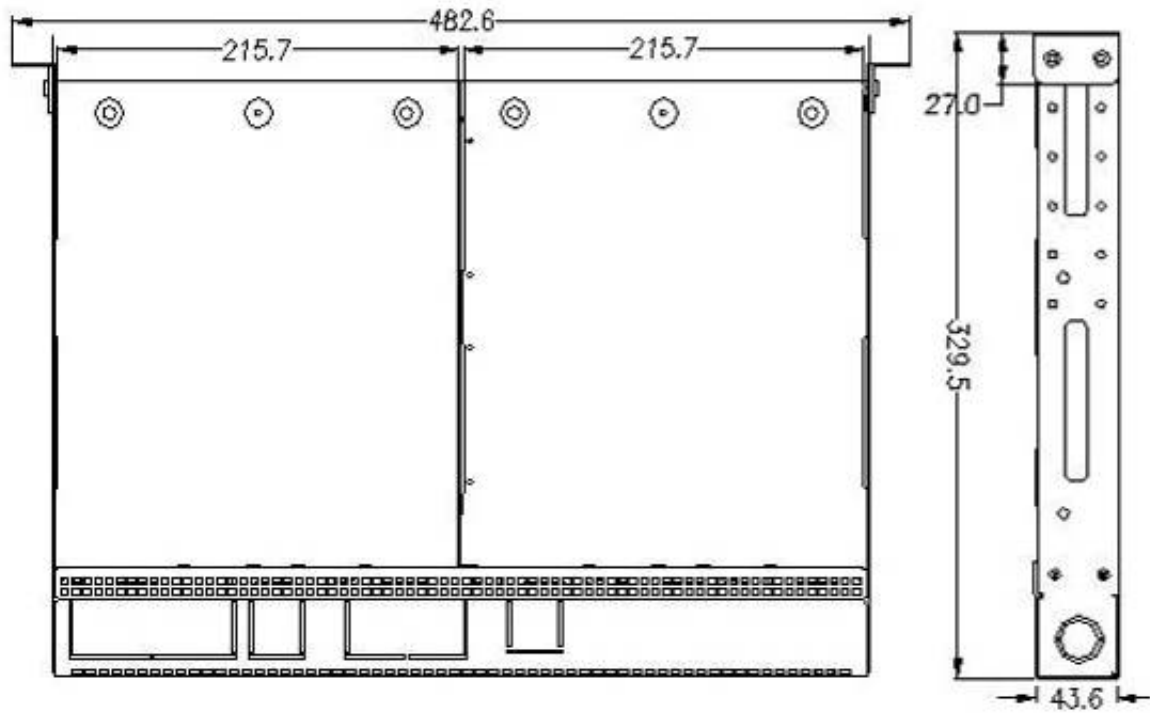
Module	With 50A STS & PDU		With 100A STS and PDU		Without STS/PDU	
	Max. # Parallel	Algorithm Max. Capacity	Max. # Parallel	Algorithm Max. Capacity	Max. # Parallel	Algorithm Max. Capacity
INV1048H (1000VA/230V Output) Module current = 4.4A	12	1000VA/230VAC=4.4A 50A/4.4A=11.36 units <b>50A/12kVA</b>	12	1000VA/230VAC=4.4A 100A/4.4A=S/W limit=12 units <b>52.8A/12kVA</b>	12	1000VA/230VAC=4.4A S/W limit=12 units <b>52.8A/12kVA</b>
INV1048 (1000VA/120V Output) Module current = 8.3A	6	1000VA/120VAC=8.3A 50A/8.3A=6.02 units <b>50A/6kVA</b>	12	1000VA/120VAC=8.3A 100A/8.3A=S/W limit=12 units <b>100A/12kVA</b>	12	1000VA/120VAC=8.3A S/W limit=12 units <b>99.6A/12kVA</b>
INV1548H (1500VA/230V Output) Module current = 6.5A	8	1500VA/230VAC=6.52A 50A/6.52A=7.66 units <b>50A/8kVA</b>	12	1500VA/230VAC=6.52A 100A/6.52A=S/W limit=12 units <b>78A/18kVA</b>	12	1500VA/230VAC=6.52A S/W limit=12 units <b>78A/18kVA</b>
INV1548 (1500VA/120V Output) Module current = 12.5A	4	1500VA/120VAC=12.5A 50A/12.5A=4.0 units <b>50A/ 6kVA</b>	8	1500VA/120VAC=12.5A 100A/12.5A=8.0 units <b>100A/12kVA</b>	12	1500VA/230VAC=12.5A S/W limit=12 units <b>150A/18kVA</b>

#### NOTES:

The system software limits the absolute maximum number of modules that can be paralleled to 12.  
Module types cannot be mixed in a single system.



**Figure 1. Inverter module dimensions (mm)**



**Figure 2. Inverter shelf dimensions (mm) & connections**



### 1.2 STS Module Specification (Model STS5048 – 50A capacity)

(For 100A STS specifications please see separate manual)

#### 1.2.1 Electrical Specifications

##### Input

Item	Specification
AC voltage range	110/115/120 VAC: 89 to 138 VAC 208/220/230/240 VAC: 176 to 276 VAC
Over voltage threshold	Adjustable using controller: 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 using controller: 176 to 198VAC for 208 VAC systems 176 to 209VAC for 220 VAC systems 185 to 218VAC for 230 VAC systems 193 to 228VAC for 240 VAC systems 89 to 105VAC for 110 VAC systems 93 to 110VAC for 115 VAC systems 100 to 114VAC for 120 VAC systems
Redundant power supply design	Startup power-on by priority source or alternative

**Note:** The over/under voltage settings are managed by the controller. If there is no controller installed, the STS module will adopt the widest range to set over/under voltage in order to guarantee its performance. For 110/115/120 VAC systems, the range is from 89VAC (under voltage point) to 138VAC(over voltage point); for 208/220/230/240 VAC systems, the range is from 176VAC(under voltage point) to 276VAC(over voltage point). However, once the STS module is set by the controller, it will retain the setting permanently so a controller can be installed to alter these settings and then removed if not required.

##### Output

Item	Specification	Remarks
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)	$\pm 1.5\text{Hz}$ for 60Hz Inverter $\pm 1.25\text{Hz}$ for 50Hz Inverter
Transfer time	Typical 1/4cycle	
Rated current	50A	All voltage settings
Operation methods	Inverter priority or Utility priority	Programmable

### 1.2.2 Alarm Information

Item	Specification
STS Alarms Information	CAN communication failure Back-feed relay open SCR1 short circuit SCR2 short circuit Output short Over load Over temperature Mains unavailable Inv unavailable Output abnormal STS fan failure MBS position error EEPROM fault

### 1.2.3 Interface

Item	Specification
<b>Human Interface</b>	
LED Indicator	3-LED installed at the front of faceplate
<b>Communication Interface</b>	
Communication	Communicates with controller and Inverter modules through CAN Bus interface

### 1.2.4 Operating status for the various positions of the MBS

The operation mode of STS is closely linked with the position of MBS. The MBS has two main contacts and three auxiliary contacts, signals generated by the three auxiliary contacts are passed to STS for position detection. Once an auxiliary contact is closed, the signal is logic 0, in reverse it will be logic 1. The combination of logic 0 and 1 can produce five valid position statuses.

#### Position status of MBS

SW1/SW2/SW3 are the logic level signals detected by STS, the five valid status conditions are as follows:

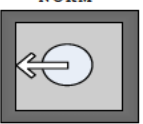
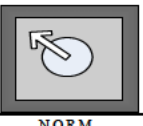
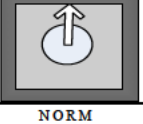
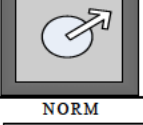

MBS Position	Contacts Signals			Mode Define	Postural Plot
	SW1	SW2	SW3		
P1	0	1	1	Mains Bypass (MBP)	<div> MSS NORM ISS MBP IBP  </div>
P2	0	0	1	Inverter Maintenance (MSS)	<div> MSS NORM ISS MBP IBP  </div>
P3	0	0	0	Normal Operation (NORM)	<div> MSS NORM ISS MBP IBP  </div>
P4	1	0	0	Mains Maintenance (ISS)	<div> MSS NORM ISS MBP IBP  </div>
P5	1	1	0	Inverter Bypass (IBP)	<div> MSS NORM ISS MBP IBP  </div>
Invalid	1	0	1	Reserved	
	0	1	0		
	1	1	1		

Figure 3. MBS positions (0 = Low, 1 = High)

The STS will continuously detect the position of the MBS in order to decide the transferring action between different modes. The STS will continuously detect whether the position of the MBS is valid. If the status is invalid, the STS will consider the MBS faulty, it won't enter any operation mode, and the red LED will blink at 5Hz, at the same time the "MBS abnormal" alarm will be sent to the controller, this phenomenon won't disappear until the detection signal becomes normal. If the MBS is changed when the STS is running at one of the five valid positions, and this change happens between two adjacent positions, then the STS will transfer to a different mode based on current status, otherwise the STS won't take any action. For example, if the MBS is at P3, the STS will take action when the MBS is turned to P2 or P4.

**Note:** Be sure not to change the MBS position immediately after the STS is inserted into the rack; wait at least 5 seconds if you want to change it and ensure that the MBS remains in each consecutive position for at least 1 second at one position.



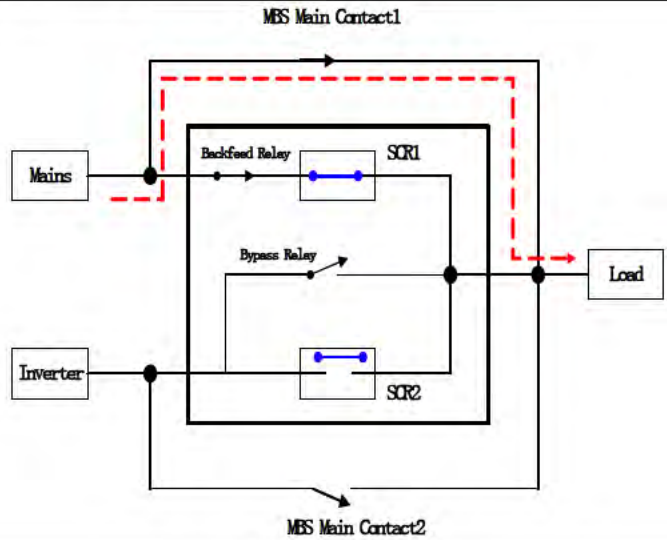
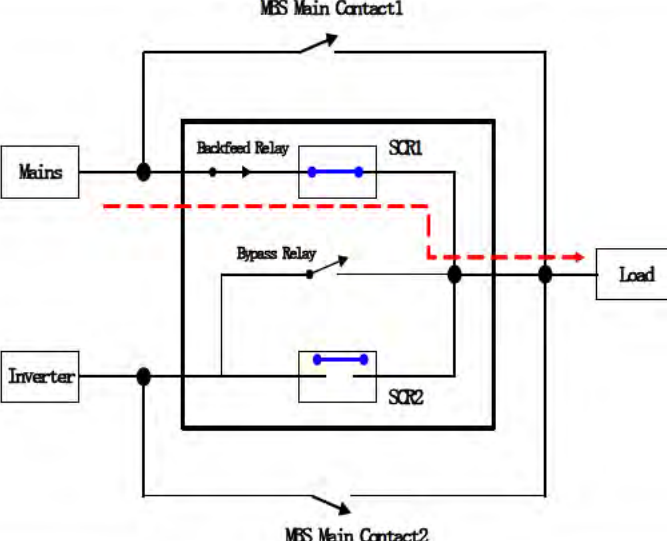
### 1.2.5 Operation principal of STS

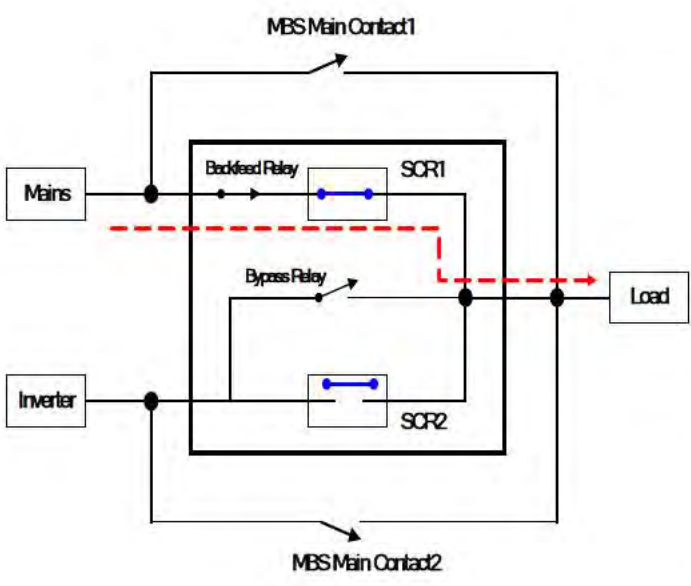
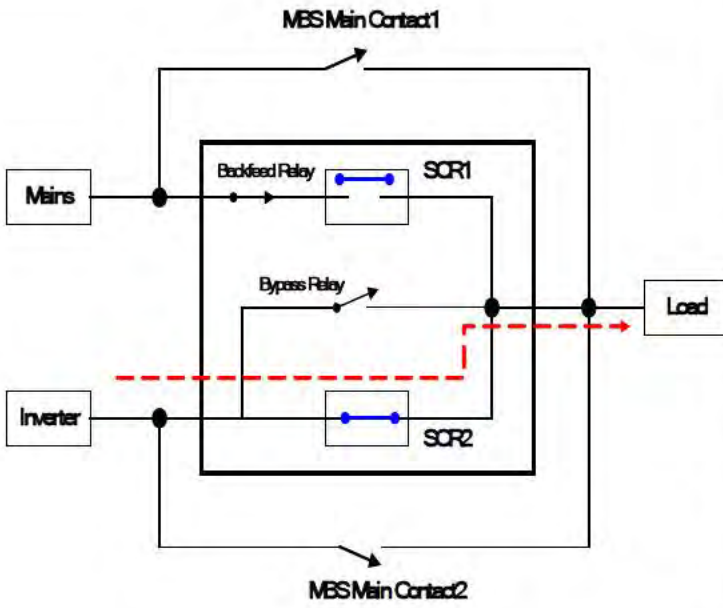
#### STS schematic introduce

The Static Transfer Switch (STS) module is an optional feature of the system. The STS increases system reliability by providing automatic switching between the inverter output and the AC mains source, providing protection from load interruptions caused by severe overload or inverter system failure.

The Maintenance Bypass Switch (MBS) is also an optional feature of the system. The MBS consists of a mechanical switch providing voltage free system maintenance for the safe removal of inverters or the static bypass module without load power interruptions. MBS has two main contacts, when the user moves the MBS manually to the Inverter Bypass or Mains AC Bypass positions, the MBS main contact 2 or the MBS main contact 1 will be closed, the inverter or mains AC will power the load via MBS directly, allowing removal of the STS module.

The operation of the STS at each valid state is shown in Figure 4 below:

MBS Status	Schematic operation principle of STS	Description
Mains Bypass (P1)		<p><b>Mains Bypass(MBP):</b></p> <p>Load powered through the MBS by the Mains AC</p> <p>STS does not provide any load power</p> <p>STS can be removed from the system</p> <p>MBS can only be switched from P1 to P2 position</p> <p>SCR2 open, SCR1 and Back-feed Relay closed</p>
Inverter Maintenance (P2)		<p><b>Inverter Maintenance(MSS):</b></p> <p>Mains AC powers the load through the static switch</p> <p>Inverters are on, but do not provide any load power</p> <p>Inverters can be removed from the system, but the STS cannot</p> <p>MBS can be switched from P2 to P1 and P3 position</p> <p>SCR2 open, SCR1 and Back-feed Relay closed</p> <p>When SCR2 is short, the STS will stay in off-line mode</p>

MBS Status	Schematic operation principle of STS	Description
Normal Operation (P3)		<p><b>Normal Operation(NORM)</b> <b>Mains priority:</b></p> <p>Mains AC powers the load through the static switch (unless reprogrammed to inverter power mode) MBS can be switched from P3 to P2 and P4 position SCR2 open, SCR1 and Back-feed Relay closed When the mains voltage or frequency is abnormal, and the inverter is normal, the STS transfers to on-line mode (inverters power the load) When SCR2 is short, the STS will keep the off-line mode</p>
Normal Operation (P3)		<p><b>Normal Operation(NORM)</b> <b>Inverter priority:</b></p> <p>Inverters power the load through the STS MBS can be switched from P3 to P2 and P4 position SCR1 open, SCR2 and Back-feed Relay closed When the Inverter's voltage or frequency is abnormal, and the mains is normal, the STS transfers to off-line mode (AC mains powers the load) When SCR1 is short, the STS will keep the on-line mode, and the Back-feed relay will open</p>



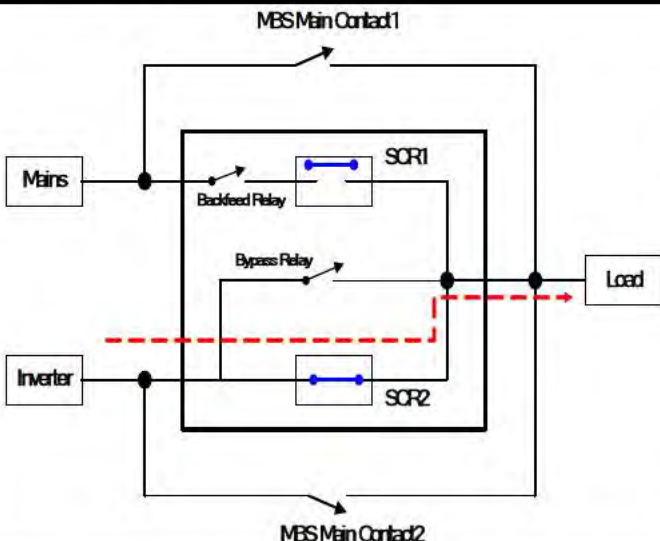
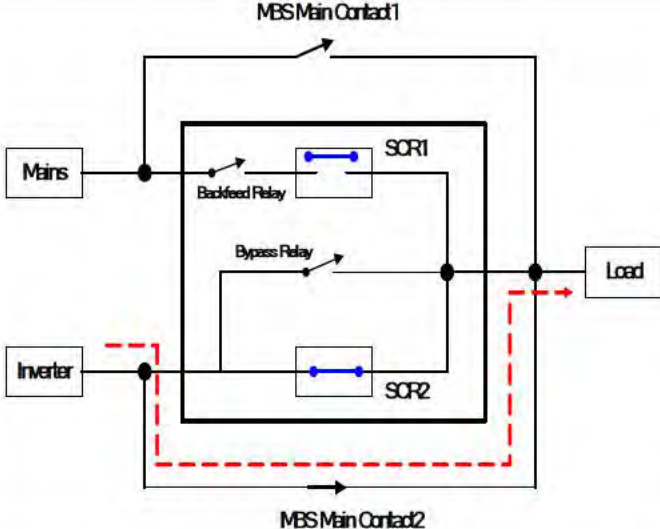
MBS Status	Schematic operation principle of STS	Description
<b>Mains Maintenance (P4)</b>		<p><b>Mains Maintenance(ISS):</b></p> <p>Inverters power the load through the STS AC mains is disconnected from the system, but the STS cannot be removed from the system MBS can be switched from P4 to P3 and P5 Back-feed Relay and SCR1 open, and SCR2 closed</p>
<b>Inverter Bypass (P5)</b>		<p><b>Inverter Bypass(IBP):</b></p> <p>Load is powered through the MBS by the inverters. The STS does not provide any load power STS can be removed from the system MBS can only be switched from P5 to P4 position Back-feed Relay and SCR1 open, and SCR2 closed</p>

Figure 4. STS operation principle

### 1.2.6 Voltage and frequency mode

The STS has two inputs and one output. The two inputs are from the AC Mains Utility and the Inverters; the output is the system output. The STS will continuously detect the AC Mains voltage and the Inverter voltage in order to decide the system's supply mode. If both the Mains and the Inverters are normal, the AC Mains has priority to decide the operation status of the system (unless the STS has been programmed by the user for Inverter priority). In other words, the STS will firstly consider the Mains status to decide the system's running voltage and frequency. Following confirmation of the voltage and frequency, the over/under voltage and over/under frequency are set as follows:

#### Over/under voltage window

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

#### Over/under frequency window

	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

#### Voltage Transfer Window

The STS will transfer to the auxiliary source if the priority input voltage exceeds a preset value, the over voltage and under voltage limits are as follows:

Adjustable range		120VAC			240VAC			
		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

### 1.2.7 Fan control

#### Fan speed control

The speed of the STS fans is decided by the output current and the NTC temperature, with the NTC temperature taking priority. When the temperature of the NTC is above 80°C the fans will operate at maximum speed. When the temperature is less than 70°C and the STS is not working in Inverter bypass mode the fan will operate according to the load current and valid fan numbers. The following tables show the relationship between the fan speed and load current. In normal circumstances, where both fans are running, the speed is based on definition -2 shown below. When one of the two fans is locked, the speed is based on definition -1.

If both fans are locked for more than 2 minutes the STS will transfer to Inverter bypass mode and the STS module will shut down.

#### One fan---- definition-1

Load	Temperature of NTC	Speed level
Load < 25%	<80°C	Speed2
25% ≤ Load < 50%		Speed3
75% < Load ≤ 50%		Speed4
Load > 75%		Speed5
Any load	≥80°C	Speed6(full speed)

#### Two fans---- definition-2

Load	Temperature of NTC	Speed level
Any Load	<80°C	Speed1(the lowest speed)
Any Load	≥80°C	Speed5

### 1.2.8 Over temperature protection

#### On-line Mode (Inverters Providing Power)

When the temperature is over 85°C, the STS will power the load through the bypass relay, and SCR2 on the side of the inverter will be open. If the temperature reaches 90°C, the bypass relay will open, and the load will be disconnected until the STS is restarted. The system will re-establish power through the inverter with SCR2 closed and the relay open when the temperature is under 65°C and at least one fan is running. The STS will then return to normal mode.

#### Off-line Mode (Utility/Mains Providing Power)

When the temperature is over 85°C, the STS will transfer to on-line mode if the Inverter is normal, then the over temperature protection is the same as on-line mode.

If the temperature is less than 65°C and at least one fan is running, the system will re-establish the power through the inverter with SCR2 closed and the relay open and the system will return to off-line mode.

Inverter bypass: 85°C

Inverter bypass back: 65°C

Temperature protection: 90°C

**Off-line mode**

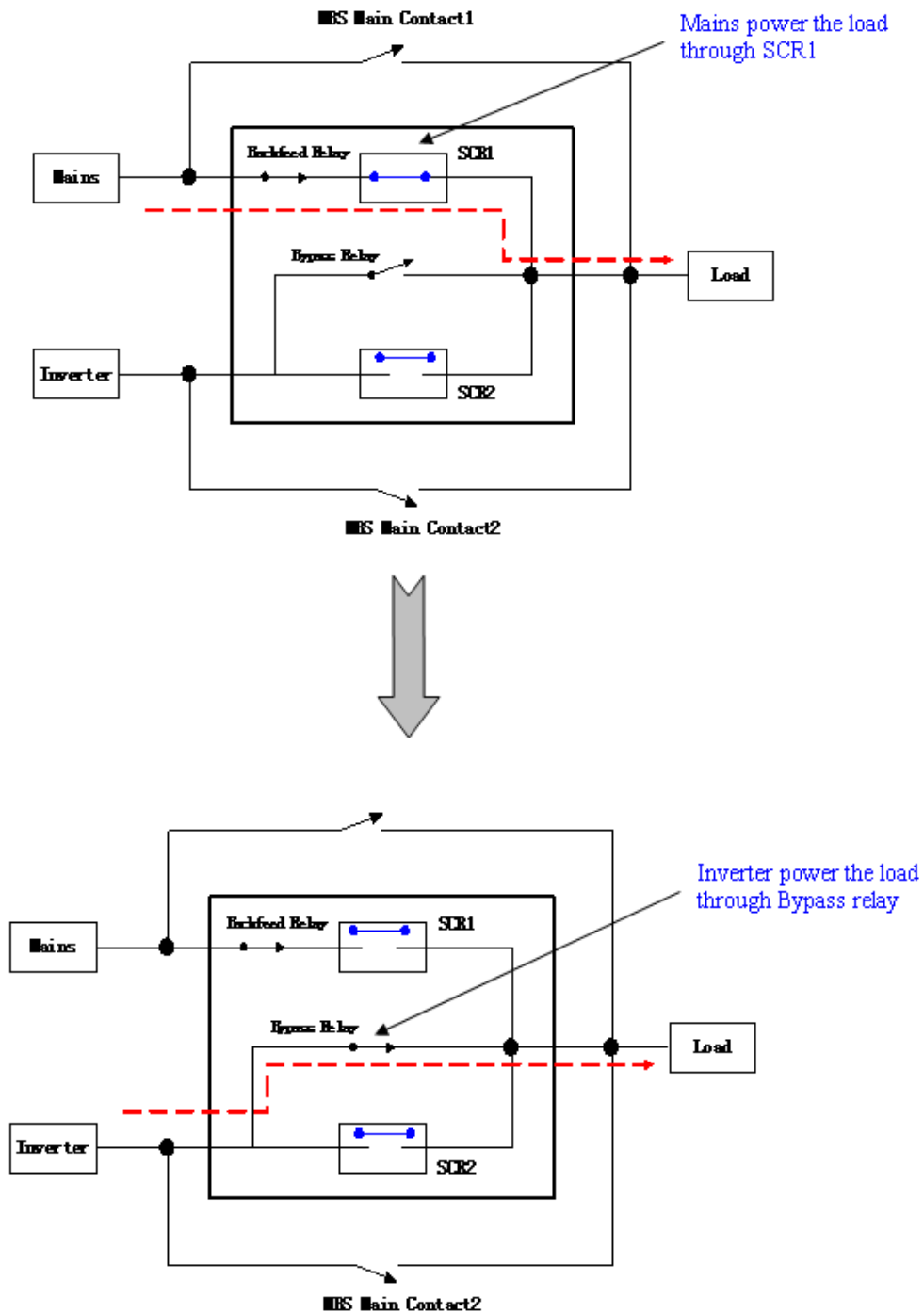


Figure 5. Off-line mode relay bypass transfer

### On-line mode



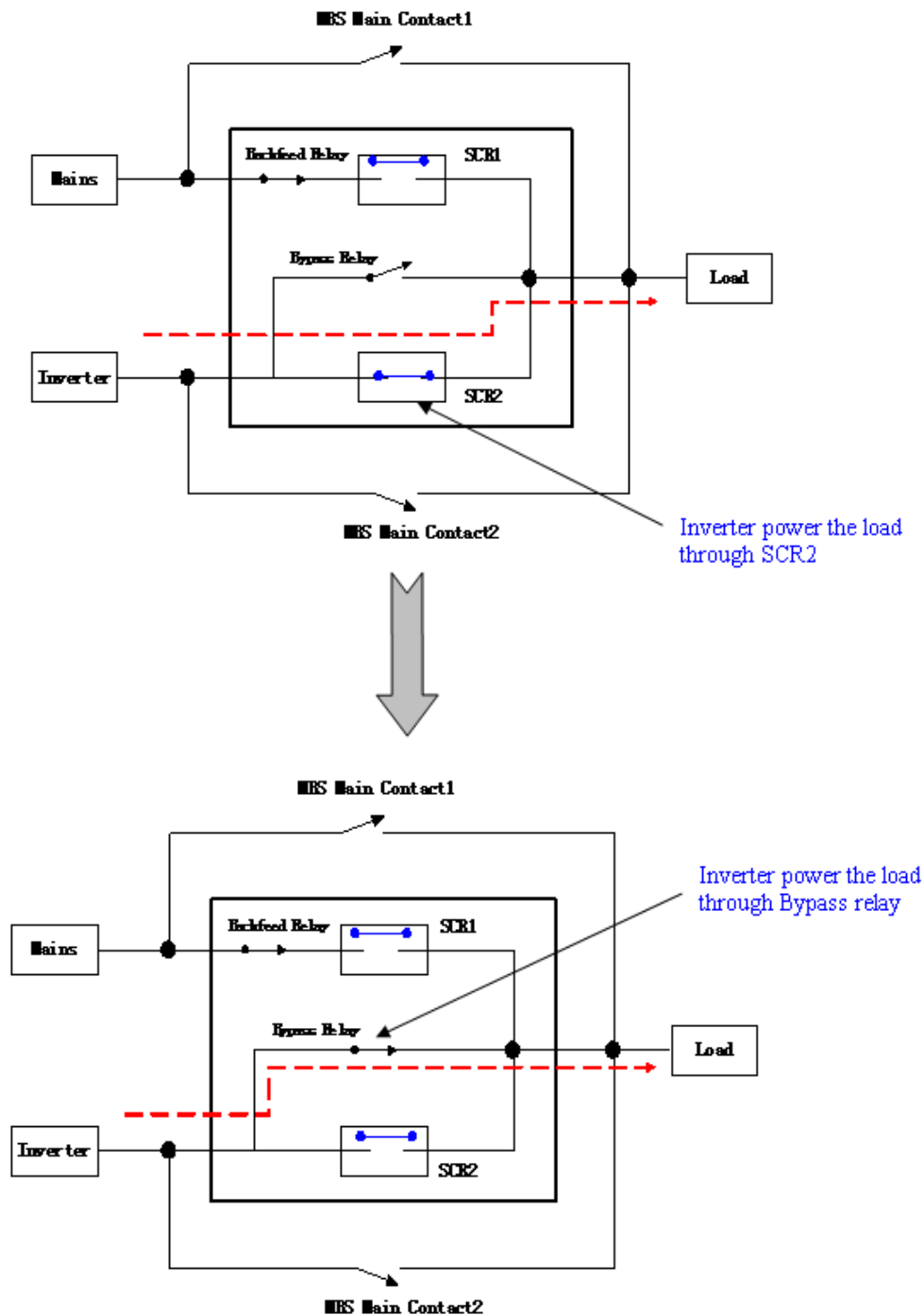


Figure 6. On-line mode relay bypass transfer

### 1.2.9 SCR short protection/Back-feed protection

#### On-line mode

The SCR1 on the mains side will be detected when the STS operates in on-line mode. If SCR1 is short, the back-feed relay will be open, and the system continues to power the load from the inverters. At this time, "SCR1 short alarm" will be sent to the controller.

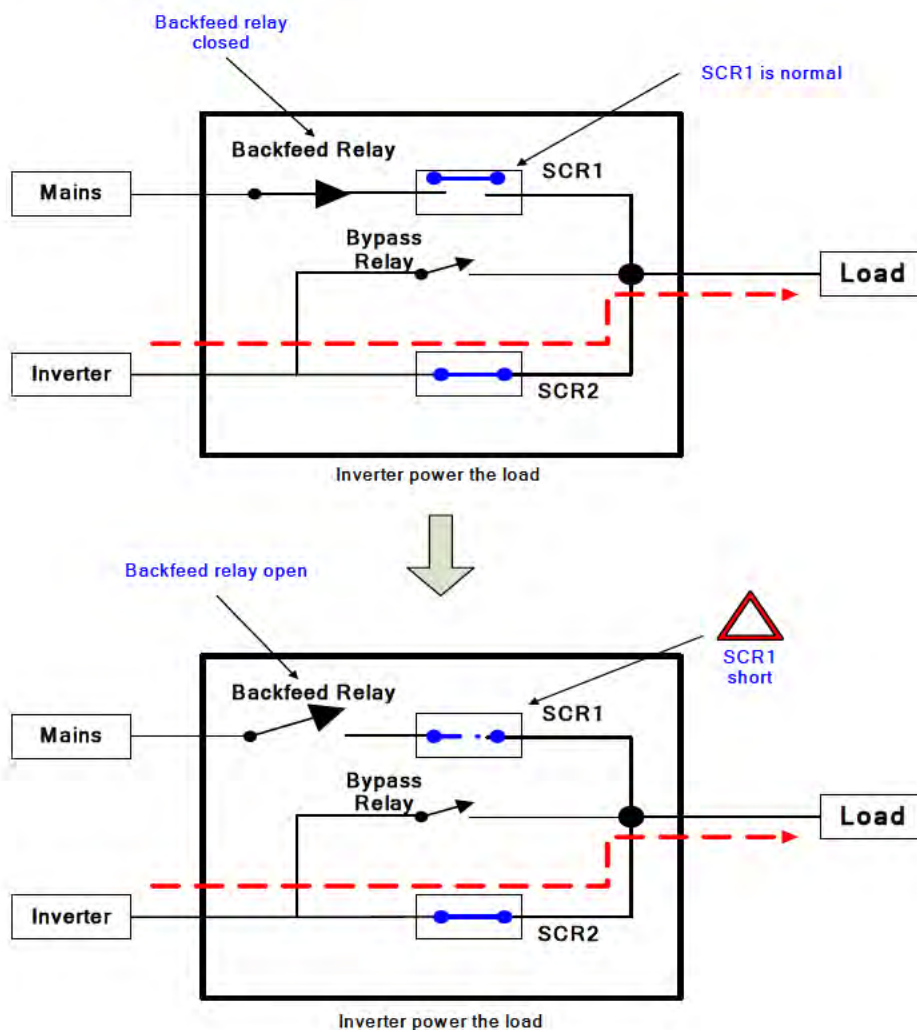


Figure 7. SCR1 short in on-line mode

### Off-line mode

The SCR2 that is on the inverter side will be detected when the STS operates in off-line mode. When SCR2 is short, the system will continue to power the load from the Utility. An "SCR2 short alarm" will be sent to the controller.

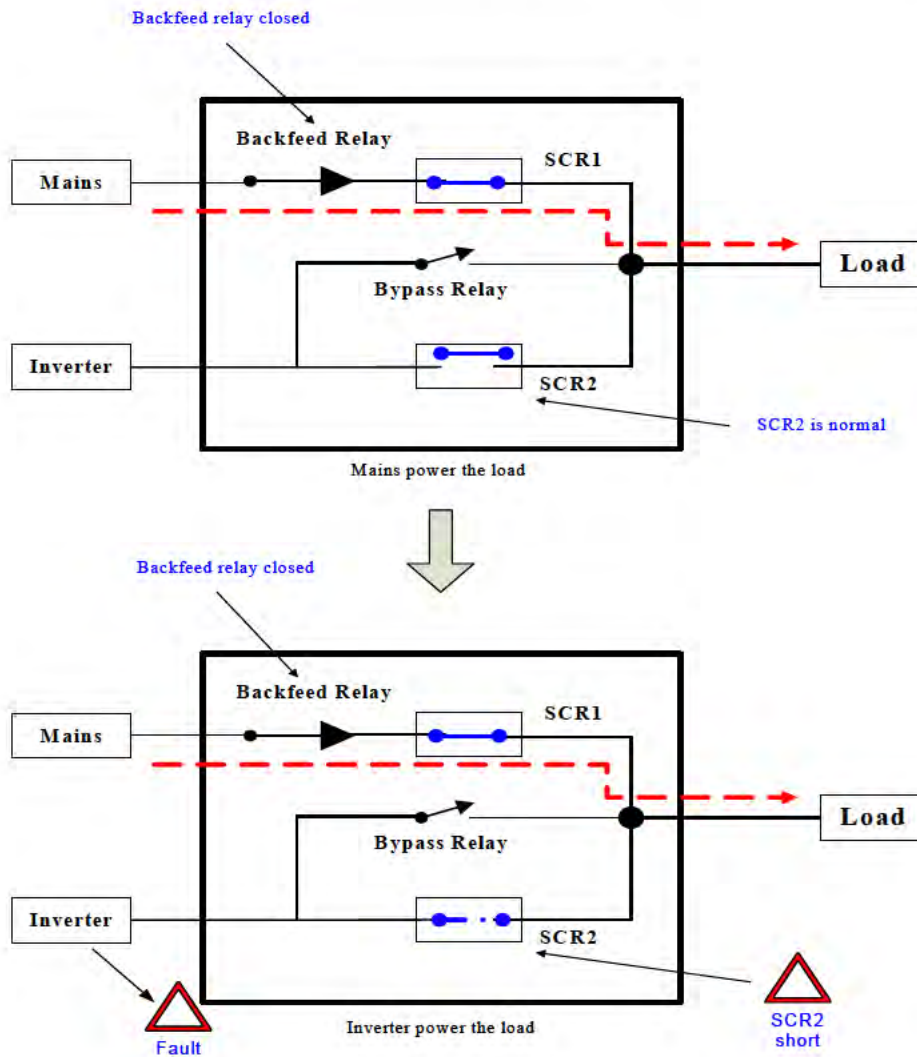


Figure 8. SCR2 short in off-line mode

### **1.2.10 Overload & Output short circuit protection**

#### **Overload protection**

##### **Method one**

When the STS is operating in either On-line or Off-line mode, the load current will be calculated in the firmware automatically. This calculation will be used in the overload protection function. After 20S at 120% overload, or 5S at 160% overload, the system will cease to provide output power, and the static switch will send an "Overload" alarm to the controller. (Note: The STS will need to have all power recycled to restart from this condition).

##### **Method two**

The STS will estimate the load capability of the system based on the number of installed inverters reported by the controller. For types INV1048 & INV1048H the definition of rated power in VA is "inverter number x 1000VA", with rated active power "VA x 0.8". For types INV1548 & INV1548H the definition of rated power in VA is "inverter number x 1500VA", with rated active power "VA x 0.8". When the Utility has priority (as normally supplied from the factory) the STS operates in off-line mode. With a change of priority to the Inverter the STS will estimate the load capability of the Inverters to decide whether to transfer to on-line mode. If the current load exceeds the load capability of the Inverters the STS won't transfer to on-line mode, otherwise it will transfer to on-line mode approximately 6 seconds later.

As an exception, the STS will immediately transfer to on-line mode without estimating the load capability of the Inverters when the utility voltage or frequency is abnormal.

#### **Output short protection**

Based on the different priorities, output short protection has different methods to deal with each situation.

##### **Mains priority**

If the Inverter is operating normally when an output short happens the STS will transfer to Inverter mode, then "Output short protection" will be sent to controller and finally the STS will transfer to fault mode.

If the Inverter is faulty or off when an output short happens the STS will shut off the output and an "Output short protection" message will be sent to controller (if present).

##### **Inverter priority**

If the Mains is normal when an output short happens the STS will transfer to Mains mode, and then an "Output short protection" message will be sent to the controller.

If the Mains is abnormal or not present when an output short happens the STS will send an "Output short protection" message and then transfer fault mode.

Note: Damage to the STS will occur if the short current exceeds 2400A.

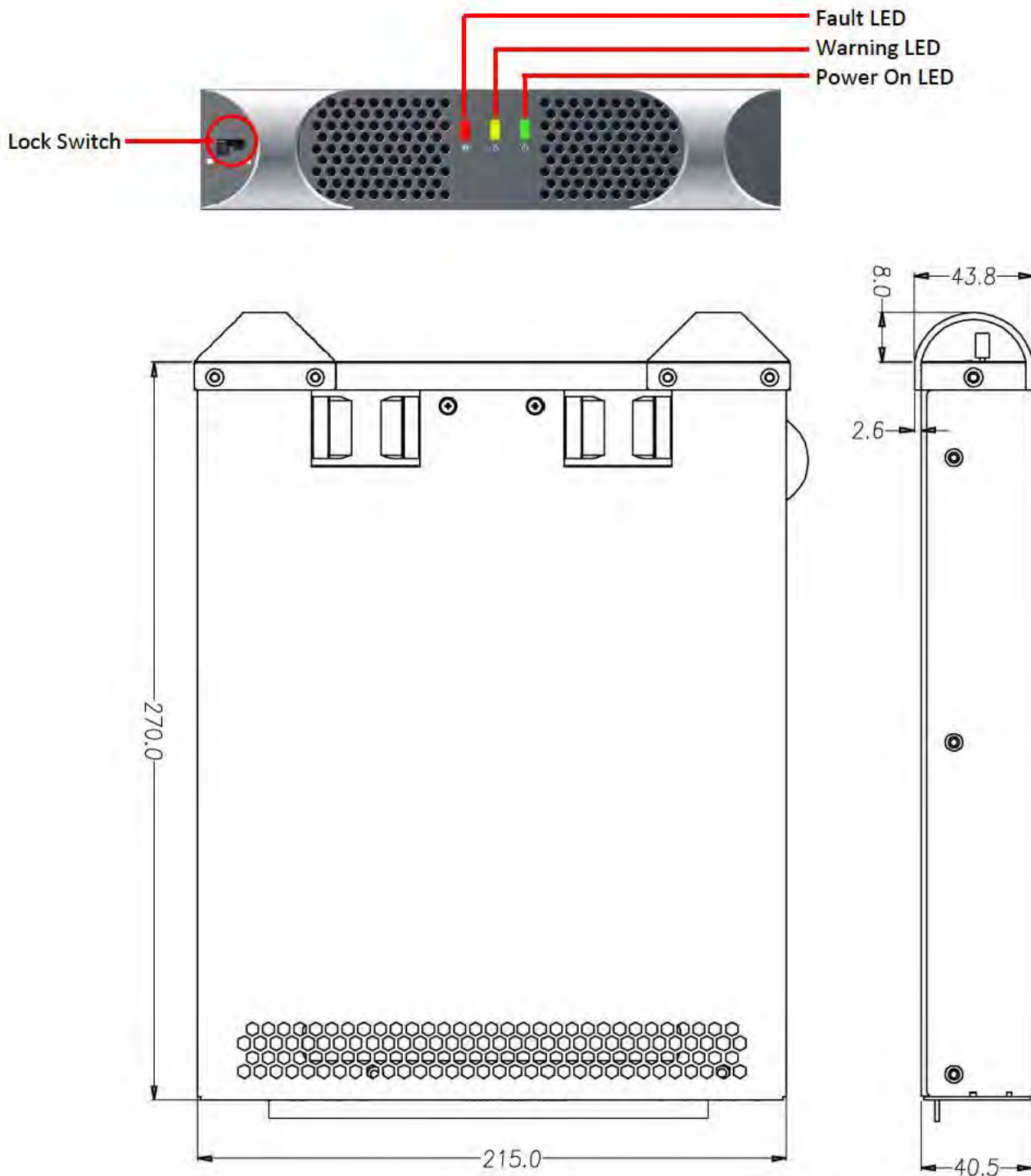
### 1.2.11 STS Module Environmental Specification

Item	Specification
Noise	55 dB, ETS 300 753, class 3.1
Operating temperature	-20°C (-4°F) to 70°C (158°F) -5°C (23°F) to 50°C (122°F) with full performance
Storage temperature	-40°C (-40°F) to 85°C (185°F)
Operating humidity	90% RH (non condensing)
Operating Attitude	1500m

### 1.2.12 STS Mechanical Specification

Item	Specification	Remarks
Dimensions W x H x D	8.46" (215mm) x 1.59" (40.5mm) x 10.63" (270mm)	
Weight	4.4lbs (2kg)	
Hot swappable	When MBS at Mains Bypass or Inverter Bypass position	Only when MBS installed
Mounting method	Plug-in type module	
Maintenance Bypass Switch (MBS)	The STS module used in combination with the mechanical Maintenance Bypass Switch module allows voltage free system maintenance. A mechanical interlock with the STS module ensures that the STS module cannot be removed without the MBS being activated.	MBS module must be installed immediately above the STS module
Cooling	2 Fans - easy replacement	





**Figure 9. STS module dimensions (mm)**



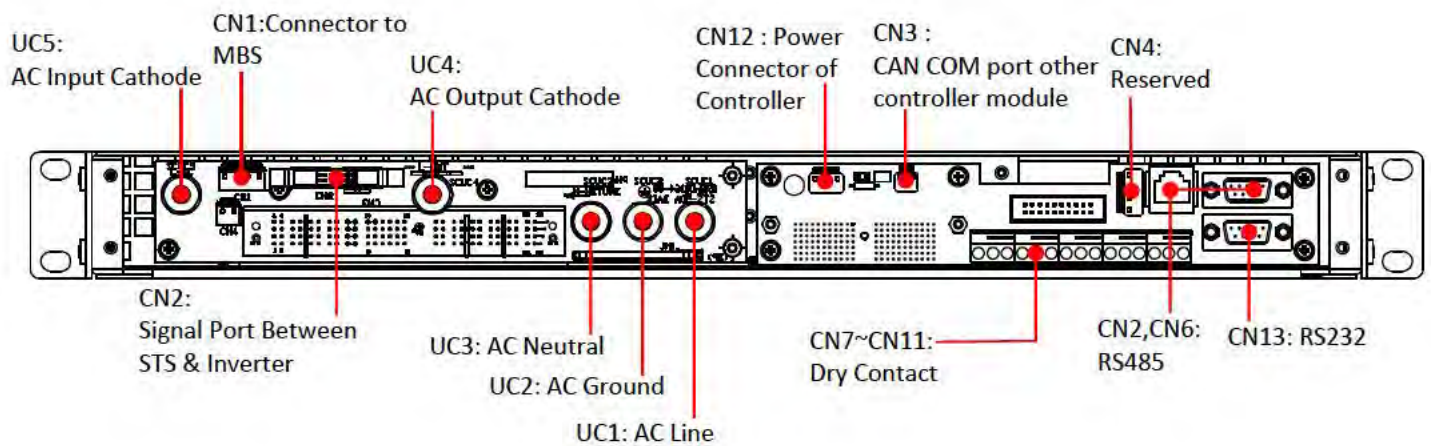
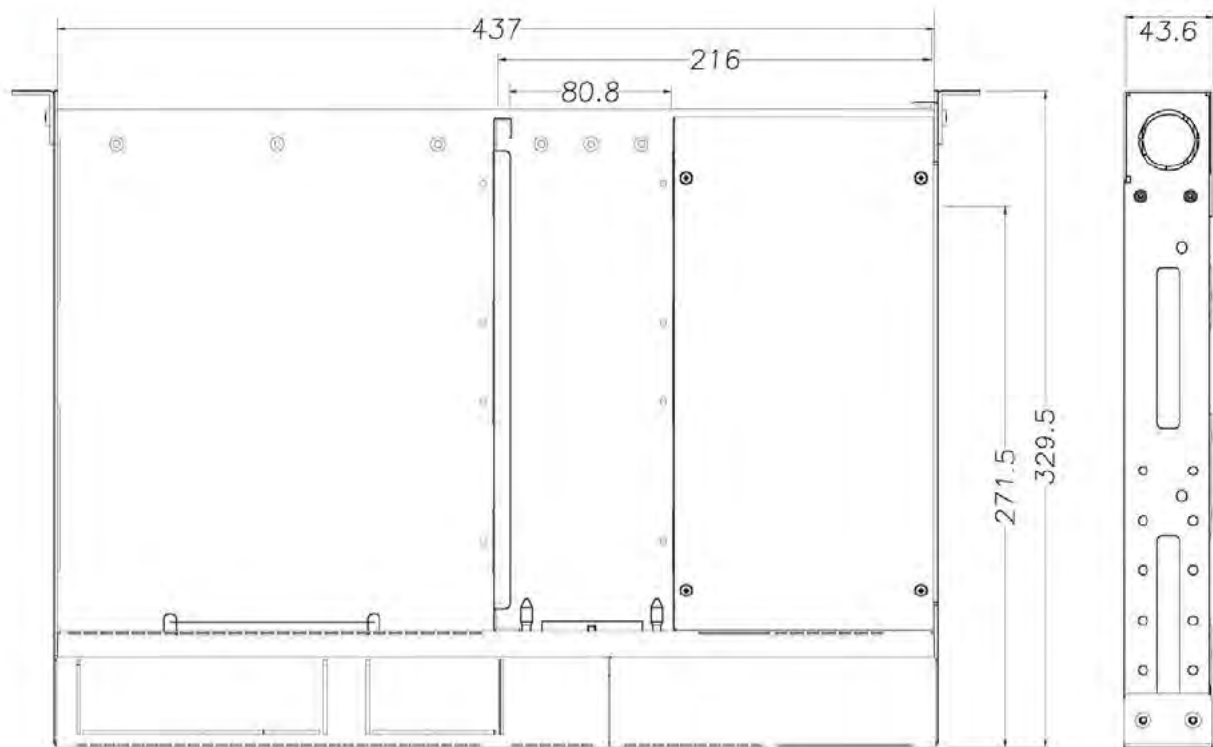


Figure 10. STS/Controller shelf dimensions (mm)

### 1.3 Maintenance Bypass Switch Module Specification (50A DPMBS2U-N & DPMBS2U-E)

(For 100A MBS unit specifications please see separate manual)

#### 1.3.1 Electrical Specification

Item	Specification
AC Input	110/115/120 VAC or 208/220/230/240VAC
Selectable Input Frequency	50/60 Hz
Rating Power	6kW for 110/115/120 VAC
	12kW for 208/220/230/240 VAC
Type (mechanical switch, 5 positions)	MBP (mains bypass) Position The load is powered through the maintenance bypass switch by the mains AC. The STS can be removed from the system.
	ISS (inverter static switch) Inverters are ON, but do not provide any load power. Inverter tests can be made.
	Norm Position The load is powered through the STS by the Inverters.
	MSS (mains static switch) The mains AC is disconnected from the system. This is achieved by opening the back-feed contactor.
	IBS (inverter bypass) The load is powered through the MBS by the Inverters. The STS can be removed from the system.

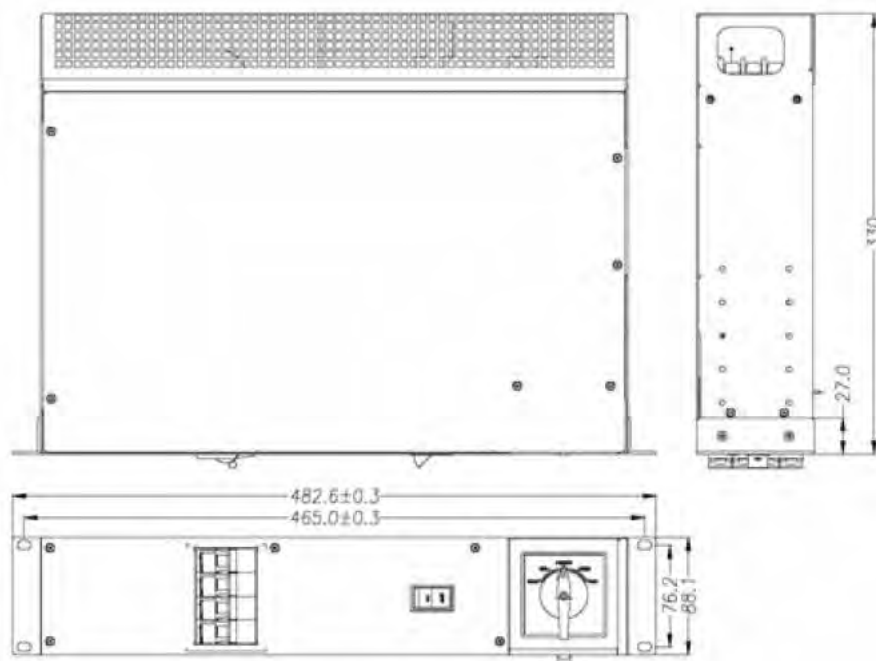


Figure 11. DPMBS2U shelf dimensions (mm)

## 1.4 Controller Module Specification

### 1.4.1 Input Specification

Item	Specification	Remarks
Nominal voltage	48Vdc	
Operating range	30Vdc -72Vdc	
Over Current Protection	2A Fuse	

### 1.4.2 Human Interface Specification

Item	Specification	Remarks
LCD	Resolution :Line * Array: 4 * 16	
LED Indicator	Green LED Red LED Yellow LED	
Function Keys	Enter Esc PgUp PgDn	
Buzzer	Alarm → Beeps continuously	Press ENTER to defeat

### 1.4.3 Alarm Mode

Alarm Type	Alarm Name / Description	Level
Inverter	Inverter fault / General Inverter Fault	Major
	Inv over load / Load in excess of 120% maximum	Observe
	Inv fan fault / Fan Locked	Major
	Inv power limit / Inverter in Power Limit	Major
	DC input abnormal / Input voltage outside limits	Major
	Inv low volt off / Inverter shut down due to low input volt	Major
	Inv Bus High / Internal Bus voltage above the maximum level	Critical
	Inv Bus Low / Internal Bus voltage under the minimum level	Critical
	Inv BusSoft fail / Internal Bus soft Start Failure	Critical
	Inv Output short / Output Short circuited	Critical
	Inv OPV Low / Output voltage low	Critical
	Inv OPV High / Output voltage high	Critical
	Inv Temp High / Internal Temperature too High	Critical
	NegPow Protect / DC reverse power protection activated	Critical
	SynPulse fault / Sync Pulse Fault	Critical
	SoftStart fail / Unit soft start failure	Critical
	EEPROM fail / Faulty EEPROM data read	Major
	Inv Temp High / Inverter Temperature above allowed limits	Critical



Alarm Type	Alarm Name / Description	Level
STS	Inv unavailable / Inverters switched off or removed	Major
	Main unavailable / Utility supply disconnected	Major
	Output overload / Output current above maximum	Major
	OP short circuit / Output short circuited	Critical
	K1 Relay open / back-feed relay open	Major
	STS SCR1 short / SCR1 short circuit – replace unit	Critical
	STS SCR2 short / SCR2 short circuit – replace unit	Critical
	INV Bypass Mode / Output directl on inverters, STS bypassed	Critical
	Over temperature / Internal temperature above maximum limit	Major
	MBS Abnormal / Maintenance Bypass Switch reports being in an 'invalid' position (MBP, MSS, NORMAL, ISS & IBP are all 'valid' positions)	Critical
	STS Fan Lock / Fans not running	Major
	STS Fault Mode / Unit running in fault mode	Critical
	STS EEPROM Fault / EEPROM read/write failure has occurred	Major
	SPS Power Fail / Control power failed	Critical
	Output Abnormal / Output outside normal limits	Critical
Controller	Inv lost / Inverters cannot be detected correctly	Critical
	STS lost / STS cannot be detected correctly	Critical
	DC input low / DC supply below 40V	Critical
	Cont temp high / Internal Temperature above 75C	Critical
	Cont eeprom fail / EEPROM read/write failure has occurred	Major
	DC input over / DC supply above 60V	Critical
	CAN Bus Off / CAN bus disabled	Critical

Note : The relationship between the alarm level and controller indication:

Alarm Level	Controller indication
Observe	Yellow Led On
Major	Red Led On
Critical	Red Led On and Buzzer Beeping continuously

### 1.4.4 Communications Interfaces

Item	Specification	Remarks
RS-232 × 1	Communicates with PC	Connects with Winpower
CAN Bus × 1	Communicates with Inverter and STS	Internal to system only
RS-485 × 2	Communicates with supervision / Battery supervision	For future enhancement
SNMP × 1	Communicates with PC	Alarm Traps only
Dry Contact × 5	Communicates with external Monitor	NO - Com - NC
USB × 1	Communicates with PC	Connects with Winpower

### 1.4.5 Mechanical Specification

Item	Specification	Remarks
Controller Dimensions W x H x D	2U x 1U x 6U (without optional interfaces) 3.15" (80mm) x 1.59" (40.5mm) x 10.63" (270mm)	Installed in Controller/STS shelf unit.
Weight	2.2lbs (1kg)	
Cooling & Ventilation	Natural cooling	

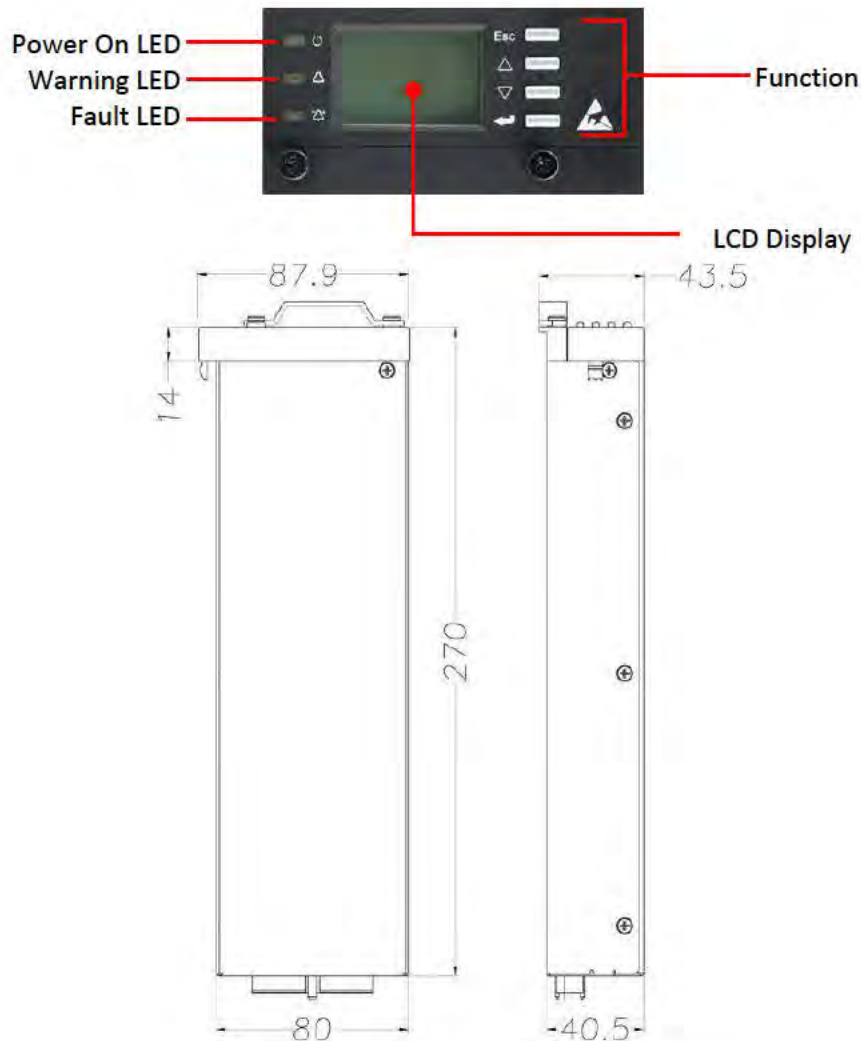


Figure 12. Controller module dimensions (mm)

### 1.4.6 Environmental Specification

Item	Specification
Operating temperature	-20°C (-4°F) to 70°C (158°F)
Storage temperature	-40°C (-40°F) to 85°C (185°F)
Operating humidity	90% RH (no condensing)
Operating Altitude	2000m



## 2. System Features

### Compact Design

Inverter power density up to 5.24W/in<sup>3</sup> (0.32W/cm<sup>3</sup>) for 1000VA, 7.87W/in<sup>3</sup> (0.48 W/cm<sup>3</sup>) for 1500VA.

### Modular design

System output capacity scaleable according to requirements.

### Parallel operation and N+1 redundancy

Inverters operate in true N+1 redundant mode with load sharing.

### Hot swappable

Inverter modules can be swapped in a live system.

### Reliability with optional STS module and MBS module

The STS increases system reliability by automatically switching between the Inverter output and the AC Utility, providing protection against interruptions caused by system or AC utility failure.

The MBS consists of a mechanical switch providing free maintenance for the safe removal of the STS module without load power interruptions.

### LCD & Led Indicator

The Controller LCD has two functions. It can display the status of the system and each module and it can be used to set the parameters of the system and the individual modules.

The LEDs indicate individual module status as described in the following table.

The LEDs are either ON, OFF or flashing at one of 6 rates:

Flash 1 – once per second with 50% duty


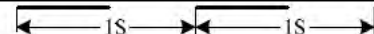



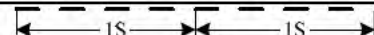

Flash 2 – once per second with 10% duty




Flash 3 – 2 times per second with 50% duty

Flash 4 – 4 times per second with 50% duty

Flash 5 – 4 times per second with 20% duty

Flash 6 – 5 times per second with 50% duty

Inverter Module LED Display			
Priority	Green LED	LED Signal	Status
<div> <div>Low</div> <div>↓</div> <div>High</div> </div>	Solid		Inverter operating normally
	Flash 1		Inverter is being interrogated by the controller
	Flash 2		One of the status as follows: 1) Power On Sequence. (see note) 2) Shut down remotely.
Priority	Yellow LED	LED Signal	Status
<div> <div>Low</div> <div>↓</div> <div>High</div> </div>	Flash 2		Power On (see note)
	Solid		Over Load (Load percent > 100%)
	Flash 4		DC input abnormal (Vin<=45V or Vin>=58 V)
	Flash 5		Inverter shut down due to super low /super high input (Vin<=VLVSD or Vin>=VHVSD)

Priority	Red LED	LED Signal	Status
<div style="display: flex; align-items: center;"> <div style="flex: 1; border-left: 1px solid black; border-right: 1px solid black; position: relative; margin: 0 10px;"> <div style="position: absolute; top: 0; right: 0;">Low</div> <div style="position: absolute; bottom: 0; right: 0;">High</div> <div style="position: absolute; top: 50%; left: 50%; transform: translate(-50%, -50%);">↓</div> </div> </div>	Flash 1		One of the alarms as follows: 1) EEPROM Fault; Inverter module cannot operate in parallel mode system, however, it can work in single mode system 2) Fan Fault Fan failed in operation
	Flash 4		One of the alarms as follows: 1) Internal DC Bus Over/Under/Unbalance/soft start fail; The inverter will shutdown. 2) Over Temperature. The inverter will shut down. In both cases Recycle the power or remove and reinsert the module to restart.
	Solid		One of the alarms as follows: 1) Input reverse polarity; The DC input voltage polarity is reversed. 2) Inverter output short circuit; When a short circuit occurs the inverter will shut down. 3) Abnormal output voltage; The inverter will shut down when output voltage is out of operating voltage range. 4) Negative Power Protection The inverter will shut down. 5) Overload fault. When the time of overload exceeds the defined time, the inverter will shut down. In all cases recycle the power or remove and reinsert the module to restart.

### Notes:

#### Power On Sequence:

When the inverter is in "Power On" mode, the green led and the yellow LED are blink synchronously.

#### Overload and overload fault:











When the overload fault alarm occurs the yellow and red LEDs turn on at the same time.

When an overload alarm occurs 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 condition.



STS Module LED Display			
Priority	Green LED	LED Signal	Status
<div style="display: flex; align-items: center;"> <div style="flex: 1; border-left: 1px solid black; margin-left: 5px; position: relative;"> <div style="position: absolute; top: 0; right: 0; width: 100%; height: 100%;"></div> <div style="position: absolute; top: 0; right: 0; width: 100%; height: 100%;"></div> </div> <div style="margin-left: 5px;">Low</div> </div>	Solid		STS operating normally
	Flash 1		Running mode not according to the setting priority. For example, STS operating in off-line mode, but the priority is set to on-line.
	Flash 3		STS operating in inverter bypass mode
<div style="display: flex; align-items: center;"> <div style="flex: 1; border-left: 1px solid black; margin-left: 5px; position: relative;"> <div style="position: absolute; top: 0; right: 0; width: 100%; height: 100%;"></div> <div style="position: absolute; top: 0; right: 0; width: 100%; height: 100%;"></div> </div> <div style="margin-left: 5px;">High</div> </div>			
Priority	Yellow LED	LED Signal	Status
<div style="display: flex; align-items: center;"> <div style="flex: 1; border-left: 1px solid black; margin-left: 5px; position: relative;"> <div style="position: absolute; top: 0; right: 0; width: 100%; height: 100%;"></div> <div style="position: absolute; top: 0; right: 0; width: 100%; height: 100%;"></div> </div> <div style="margin-left: 5px;">Low</div> </div>	Solid		Mains or Inverter abnormal
	Flash 3		If the status of the green LED is the same as the yellow LED, then the STS is in Inverter bypass mode, otherwise the Back-feed relay open
	Flash 6		STS Output abnormal
<div style="display: flex; align-items: center;"> <div style="flex: 1; border-left: 1px solid black; margin-left: 5px; position: relative;"> <div style="position: absolute; top: 0; right: 0; width: 100%; height: 100%;"></div> <div style="position: absolute; top: 0; right: 0; width: 100%; height: 100%;"></div> </div> <div style="margin-left: 5px;">High</div> </div>			
Priority	Red LED	LED Signal	Status
<div style="display: flex; align-items: center;"> <div style="flex: 1; border-left: 1px solid black; margin-left: 5px; position: relative;"> <div style="position: absolute; top: 0; right: 0; width: 100%; height: 100%;"></div> <div style="position: absolute; top: 0; right: 0; width: 100%; height: 100%;"></div> </div> <div style="margin-left: 5px;">Low</div> </div>	Flash 1		Fan lock or Can communication fail or EEPROM fault
	Flash 3		SCR short or auxiliary power supply fault
	Flash 6		MBS position abnormal
	Solid		STS Fault mode, maybe overload or over temperature or output short

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

### 2.1 Principal of Operation

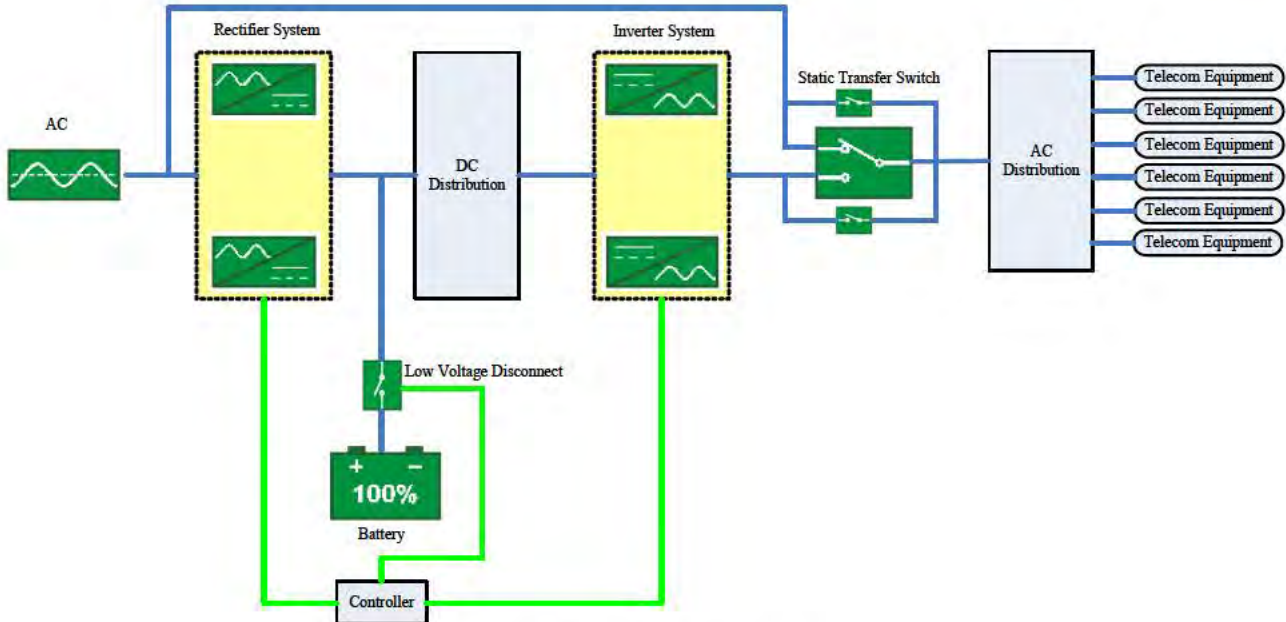


Figure 13. Telecom power system

The inverter system accepts 40.5 to 58VDC for normal operation; however it requires an input of at least 45VDC to start. This voltage is applied to the system through the BAT+ and BAT- input bus connections.

The system will supply nominal 120VAC or 230VAC to the loads.

### 2.2 Typical System Configuration



Figure 14. Typical system configuration



### 3. Installation

#### 3.1 Frame Assembly & Removal

This chapter provides details for mechanical fitment and electrical connections when installing the Gravitas SABRE Series inverter system.

Figures 15 and 16 below give a general overview of a typical system. The remainder of this section provides detailed information for each shelf type.

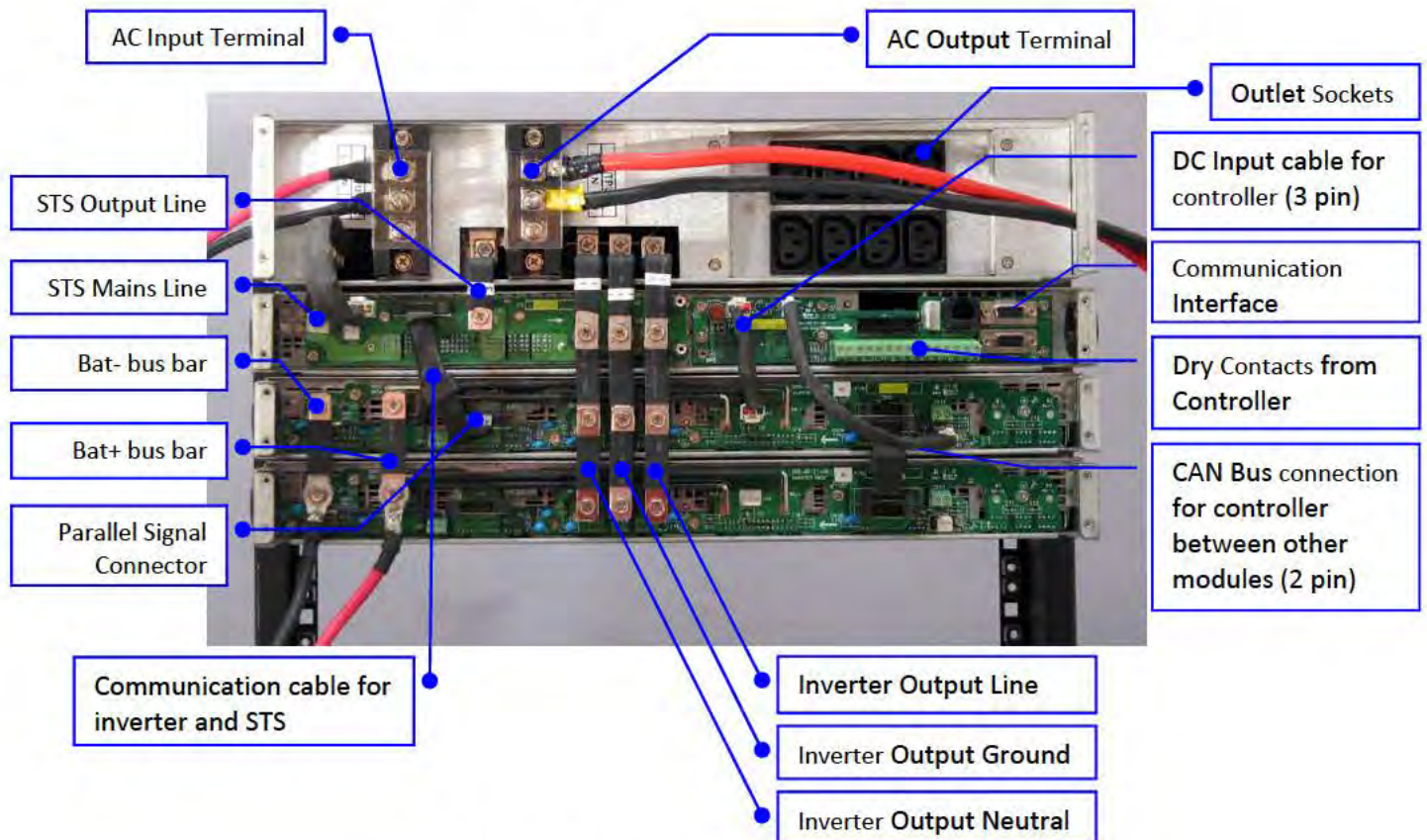


Figure 15. Electrical connections of inverter system

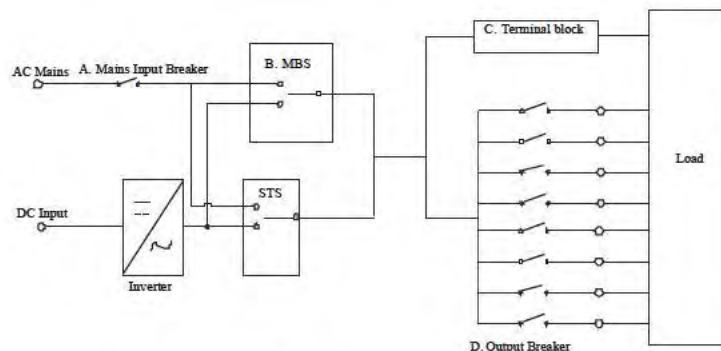


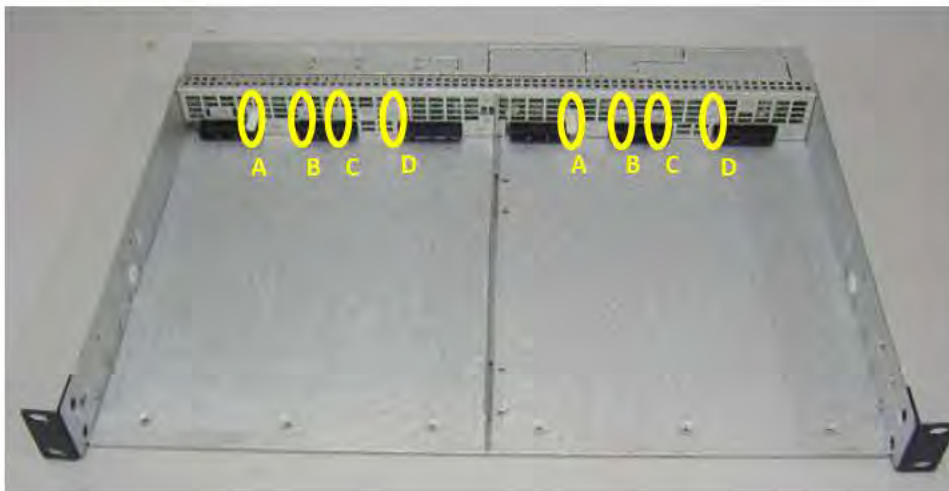
Figure 16. System block diagram



### 3.1.1 Inverter Chassis Assembly

- A. The inverter shelf is fitted as standard with 19-inch rack brackets. For 23-inch rack mounting, please exchange with the proper mounting brackets. There are four holes right above the three connectors of each inverter slot. Based on the modules to be used, insert the supplied nylon spacer to the corresponding hole.

**⚠ WARNING:** *The system will fail to operate normally when inverter modules of different type are inserted. Use the supplied nylon spacer for to ensure that only the desired model of inverter module can be inserted.*



Position A for INV1548

Position B for INV1548H

Position C for INV1048

Position D for INV1048H



- B. Place the inverter shelf in the equipment rack horizontally, and align the holes of the mounting brackets with those of the rack. Secure the inverter shelf in position with the four supplied crosshead type nickel screws as shown. Each inverter shelf holds maximum two inverter modules. Repeat Steps 1 & 2 to install the all required inverter shelves.



- C. An inverter shelf can be removed from the equipment rack by removing the retaining screws after all connections at the rear have been removed.

- D. All input and output connections are made through the knockouts, located in the top and the bottom of the rear cover as well as both side panels. Remove the rear cover to allow access to fit interconnecting bus bars and cables on inverter shelf backplane and connectors.

Determine which knockout to remove. Knockouts on the top and bottom are for shelf inter-connections. To remove a knockout, snip the side tabs and move plate up and down until rear tabs.



### 3.1.2 Controller/Interface/STS Chassis Assembly

This section covers only the 50A STS option. For details about the 100A STS option please see the separate manual.

- A. The controller/interface/STS chassis is fitted as standard with 19-inch rack brackets. For 23-inch rack mounting, please exchange with the proper mounting brackets. Place the shelf in the equipment rack horizontally immediately above the uppermost of the inverter shelves that have already been installed, and align the holes of the mounting brackets with those of the rack. Secure the chassis in position with the four crosshead type nickel screws as shown.

**NOTE:** *Each controller module or interface module will support a maximum 24 inverter modules.*



- B. All connections are made through the knockouts, located in the top and the bottom of rear cover as well as both side panels. Two separate rear covers are fitted to the controller/interface/STS shelf; as viewed from the rear, the cover on the right is for the controller/interface section and the cover on the left is for STS section. The corresponding rear cover can be removed for associated cabling.



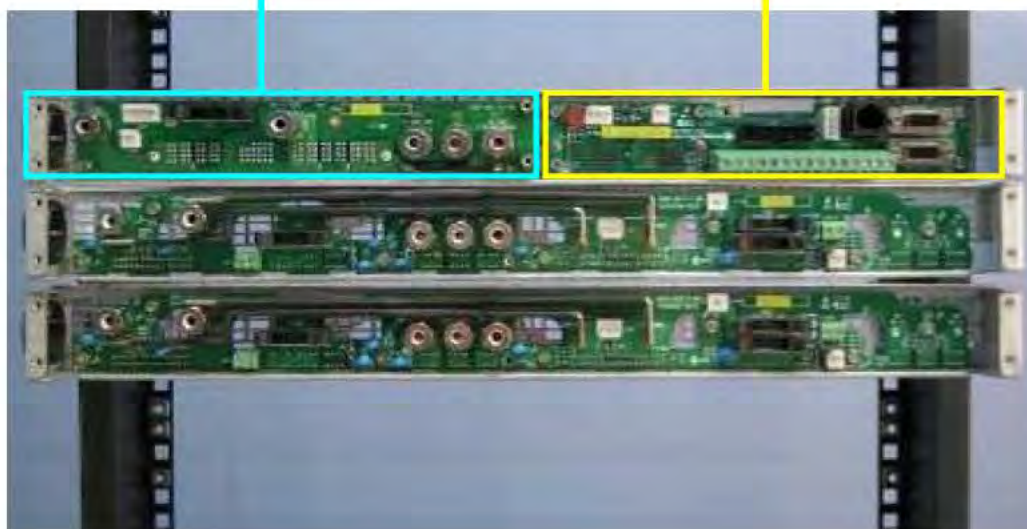
Remove the right rear cover and then remove the left cover to reveal of controller/interface backplane and connectors.

Determine which knockout to remove. Knockouts on the top and bottom are for shelf inter-connections. To remove a knockout, snip the side tabs and move plate up and down until rear tabs.



STS Section

Controller/Interface Section



### 3.1.3 Install the MBS/PDU

This section covers only the 50A MBS/PDU option. For details about the 100A MBS option please see the separate manual.

- A. The MBS/PDU is also fitted as standard with 19-inch rack brackets. For 23-inch rack mounting, please exchange with the proper mounting brackets. Place the MBSPDU in the equipment rack immediately on top of the controller/interface/STS chassis and align the holes of mounting brackets with those of the rack. Secure the MBSPDU in position with the four supplied crosshead type nickel screws as shown.



- B. All input and output connections are made through the knock outs, located in the top of rear cover and both side panels. Remove the rear cover to allow wiring and connection of bus bars using a crosshead screwdriver to reveal the MBSPDU PCB and connectors. Cut the rear cover with a diagonal cutter on the indicated line.





### 3.2 Electrical Connections

AT THE END OF THIS SECTION IS A SERIES OF DRAWINGS GIVING MORE DETAILED INFORMATION ABOUT A NUMBER OF TYPICAL SYSTEM CONFIGURATIONS. IT IS IMPORTANT THAT YOU CAREFULLY READ THIS SECTION AND THEN REVIEW THE DRAWING MOST RELEVANT TO YOUR SYSTEM CONFIGURATION BEFORE STARTING TO MAKE ELECTRICAL CONNECTIONS.

**⚠ CAUTION:** Ensure that all the power sources are OFF during wiring. Disconnect battery cables the 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 up to a maximum of 100A total output current capacity. This is done by connecting all outputs (Line, Neutral and Ground) in parallel. When paralleled 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

**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.

#### Recommend Wire Size vs. Current

Shelf QTY (2 x 1000VA inverters/shelf)	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	46.0A	18.2A	8.7A	#8/0 AWG	#14/0 AWG	#16/0 AWG
2	92.0A	36.4A	17.4A	#4/0 AWG	#10/0 AWG	#14/0 AWG
3	138.0A	54.5A	26.1A	#6/0 AWG * 2	#8/0 AWG	#10/0 AWG
4	184.0A	72.7A	34.8A	#4/0 AWG * 2	#6/0 AWG	#10/0 AWG
5	230.0A	90.9A	43.5A		#4/0 AWG	#8/0 AWG
6	276.0A	109.1A	52.2A	#2/0 AWG * 2	#3/0 AWG	#8/0 AWG
Shelf QTY (2 x 1500VA inverters/shelf)	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	#6/0 AWG	#12/0 AWG	#16/0 AWG
2	137.9A	54.5A	26.1A	#2/0 AWG	#8/0 AWG	#12/0 AWG
3	206.9A	81.8A	39.1A	#4/0 AWG * 2	#6/0 AWG	#10/0 AWG
4	275.9A	109.1A	52.2A	#2/0 AWG * 2	#4/0 AWG	#8/0 AWG
5	344.8A	136.4A	65.2A		#2/0 AWG	#6/0 AWG
6	413.8A	163.6A	78.3A		#2/0 AWG	#6/0 AWG

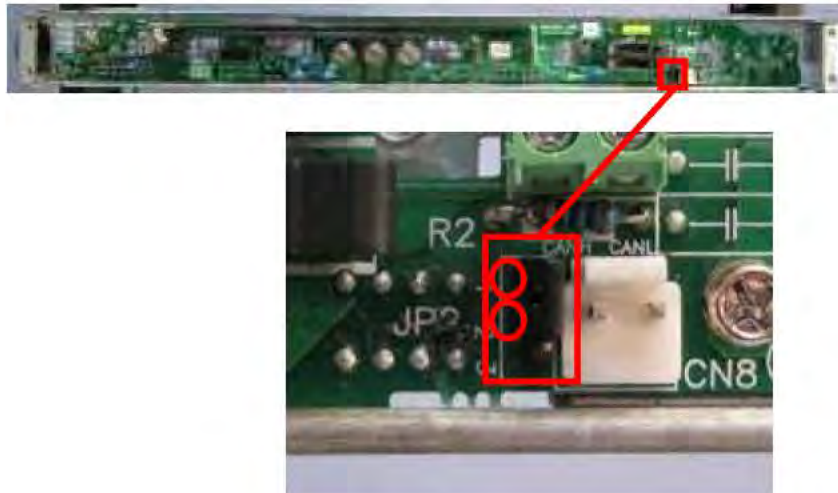
Remarks: 1. Total Power Rating (VA, W) = No. of shelf × Inverter module power rating (VA, W) \* 2  
 2. I/P current = Total power rating (W) ÷ 0.87 ÷ 40  
 3. O/P current = Total power rating (VA) ÷ AC voltage

**IT IS STRONGLY RECOMMENDED THAT EACH INVERTER SHELF IS PROVIDED WITH DC POWER INDIVIDUALLY VIA A SUITABLE CIRCUIT BREAKER. UNDER NO CIRCUMSTANCES SHOULD MORE THAN TWO INVERTER SHELVES HAVE THEIR DC INPUTS BUSED TOGETHER.**



### 3.2.1 Single-Shelf Wiring

- A. In the inverter shelf accessory package you will find a small jumper. When only ONE inverter chassis is to be used in the system, insert the jumper to PIN 1 & 2 of Connector JP2.



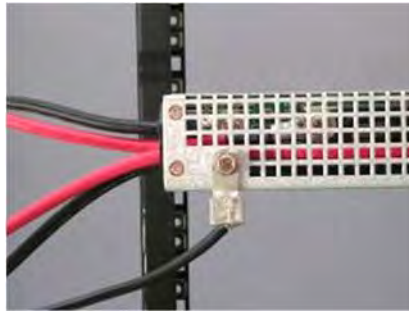
- B. The Negative (BAT-) and Positive (BAT+) DC input terminal studs are located at the left side of the backplane. In consideration of the power rating and distance from the DC source, choose appropriate gauge wire according to the table above, taking into account local wiring regulations. Thread the DC battery cables through left-side panel knock-out, place the hole of the terminating lug over the DC input stud and secure the connection with two supplied cross hex-washer type nickel screws and washers as shown. Connect the other end of battery cables to the DC source.

**⚠ WARNING:** The DC source voltage should be between 45V and 58 V

**⚠ CAUTION:** Reverse polarity connections may damage the unit and void the warranty. Ensure correct polarity (positive to positive, negative to negative) before completing connections between the DC source and the inverter shelf.



- C. The central three studs on the backplane are the AC output terminals. AC neutral, ground and AC line are marked UC3, UC4 and UC5 respectively. Depending on the AC output voltage choose appropriate gauge wire according to the above table. Place the hole of the terminating lug over the DC input stud and secure the connection with two supplied cross hex-washer type nickel screws and washers as shown. Connect the other end of wires to the load.



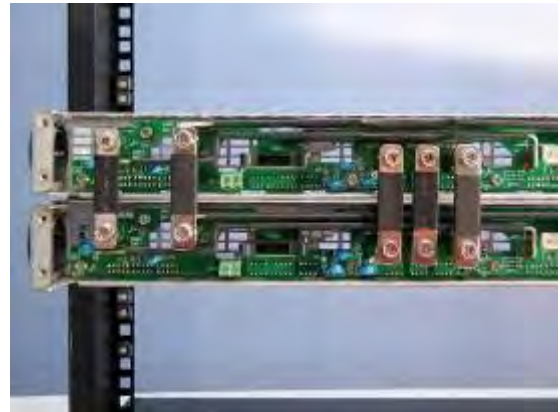
The AC Ground stud (UC4) is intended for inter-connection with additional shelves. For system grounding connect the ground wire to the ground terminal on the rear cover with the supplied cross hex-washer type nickel screw as shown.

### 3.2.2 Multi-shelf Wiring

- A. CN20 and CN21 on the inverter shelf backplane are parallel connectors for inverter synchronization. The upper port is used to connect to the inverter shelf above, and the lower port is used to connect to the inverter shelf below. Use the flat communication cable supplied to connect all inverter shelves in the system.



- B. Use the supplied bus bars to connect the AC neutral (UC3), AC ground (UC4) and AC line (UC5) studs of all inverter shelves in the system together with cross hex-washer type nickel screws and washers.
- C. For systems with only two inverter shelves it is acceptable to similarly interconnect the DC input (BAT+) and (BAT-) studs respectively if external conditions dictate that it is not possible to provide separate feeds from the DC source.



**⚠ CAUTION:** Be sure that no jumper is inserted into the JP2 connector of any of the inverter shelves.

- D. Choose appropriate gauge wire with consideration of the total input current of the whole inverter system, distance from the battery, and local wiring regulations. Thread the battery cables through the left-side panel knockout, and attach one battery cable to one DC negative input stud (BAT-) and the other to one DC positive input stud (BAT+). Secure the connections with the supplied cross hex-washer type nickel screws and washers as shown. Install the other end of cables to the 48V DC source.

**⚠ WARNING:** The DC source voltage should be between 45V and 58 V

**⚠ CAUTION:** Reverse polarity connections may damage the unit and void the warranty. Ensure correct polarity (positive to positive, negative to negative) before completing connections between the DC source and the inverter shelf.

**NOTE:** SABRE inverter modules allow a maximum 24 parallel connected units for higher power capacity.

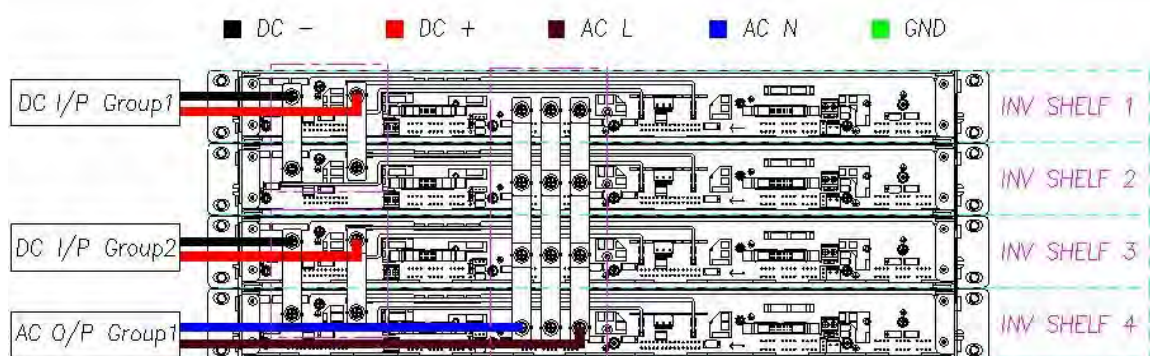


Figure 17. Multiple Inverter Shelves Wiring Mechanism



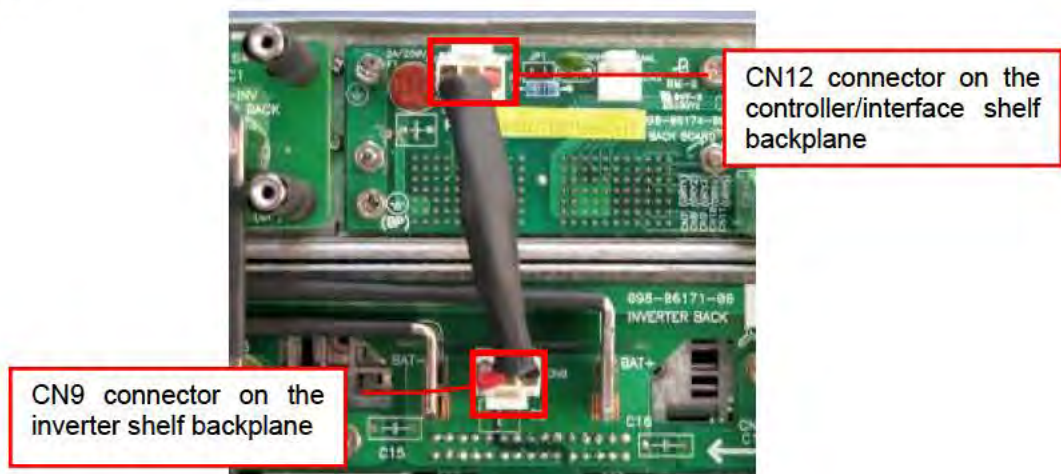


Depending on the AC output voltage choose appropriate gauge wire according to the above table. Place the hole of the terminating lug over the DC input stud and secure the connection with two supplied cross hex-washer type nickel screws and washers as shown. Connect the other end of wires to the load.

The AC Ground stud (UC4) is intended for inter-connection with additional shelves. For system grounding connect the ground wire to the ground terminal on the rear cover with the supplied cross hex-washer type nickel screw as shown.

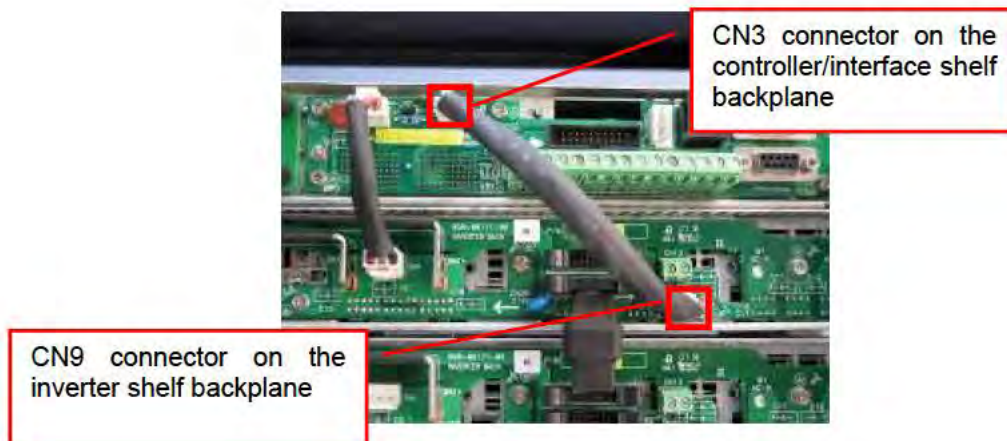
### 3.2.3 Wiring Incorporating Controller/Interface/STS Shelf – Controller/Interface Section

- A. The controller module and interface module are powered from the DC supply on the inverter shelves. Securely plug one end of the supplied 3-pin power cable to CN12 power jack on the controller/interface/STS shelf backplane, and the other end to CN9 power jack on the inverter shelf backplane.



- B. Connectors CN3 on the controller/interface shelf backplane and CN8 on the inverter shelf backplane are for data transfer between the controller/interface modules and the inverters. Use the supplied signal cable to join the two connectors together as shown below.



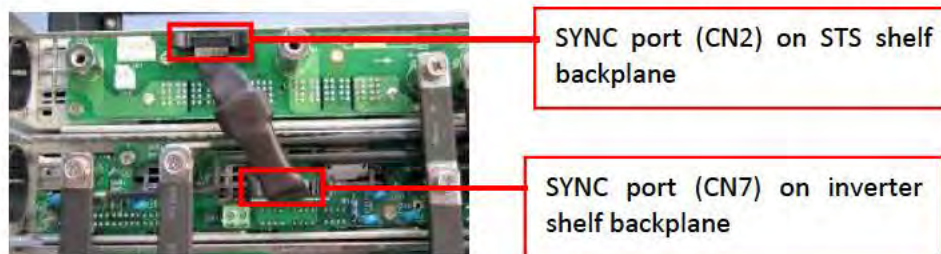


For details about the various communications and hardware alarm connections available on the inverter system see section 3.2.6.

### 3.2.4 Wiring Incorporating with Controller/Interface/STS Shelf – STS Section

This section covers only the 50A STS option. For details about the 100A STS option please see the separate manual.

- A. Locate connector CN2 on the rear panel of the STS Shelf and connector CN7 on the rear panel of the inverter shelf. Connect these with the supplied STS signal cable as shown below.



- B. Connect AC BUS of Controller/Interface/STS shelf to the AC BUS connector of the top inverter shelf. Then connect the AC BUS connectors between the inverter shelves using the supplied hardware.



- C. Connect the supplied "Short Jumper" to connector CN1 on the backplane PCB of the controller/interface/STS backplane.



"Short Jumper"



MBS parallel signal port (CN1) on controller/interface/STS shelf backplane.

### D. Connect DC INPUT Wires

Place 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.

### E. Connect AC OUTPUT Wires

**⚠ CAUTION:** To connect the AC output wires to the system, only one AC line and AC Neutral are necessary to be connected either to STS shelf or the Inverter shelf.

Connect AC line to UC4 (AC-L OUT) on STS/controller shelf. Connect AC neutral to UC3 (AC-N) on STS/controller shelf.

Fix the back cover onto STS/controller shelf.



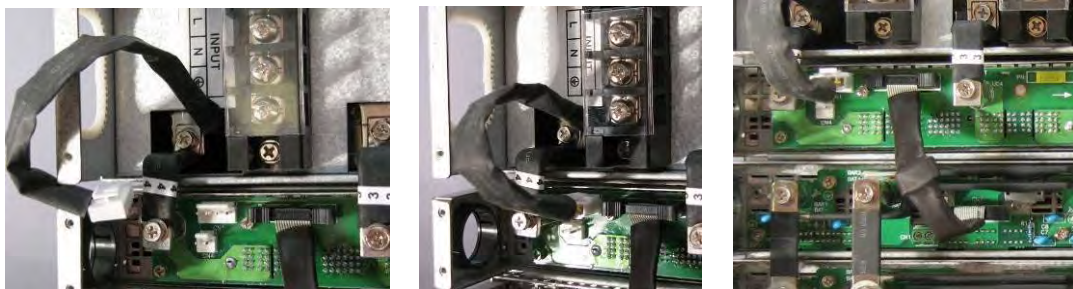


### 3.2.5 Wiring with the MBS/PDU Module

This section covers only the 50A MBS/PDU option. For details about the 100A MBS option please see the separate manual.

#### A. Connect Signal Cable between MBS, STS and Inverter Chassis

Connect the 4 pin MBS cable to CN1 connector CN1 on the backplane PCB of the controller/interface/STS chassis. Then connect one end of STS/Inverter signal cable to connector CN2 on the backplane PCB of the controller/interface/STS chassis. Connect the other end to CN7 connector CN7 on the backplane PCB of the inverter chassis as shown below:



#### B. Connect Bus Bar

Connect the 5 bus bars supplied with MBSPDU to UC3, UC2 and UC1 on STS backplane PCB and the corresponding connections on the MBSPDU as shown below:

- 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 x1 for UC5 (AC input L)

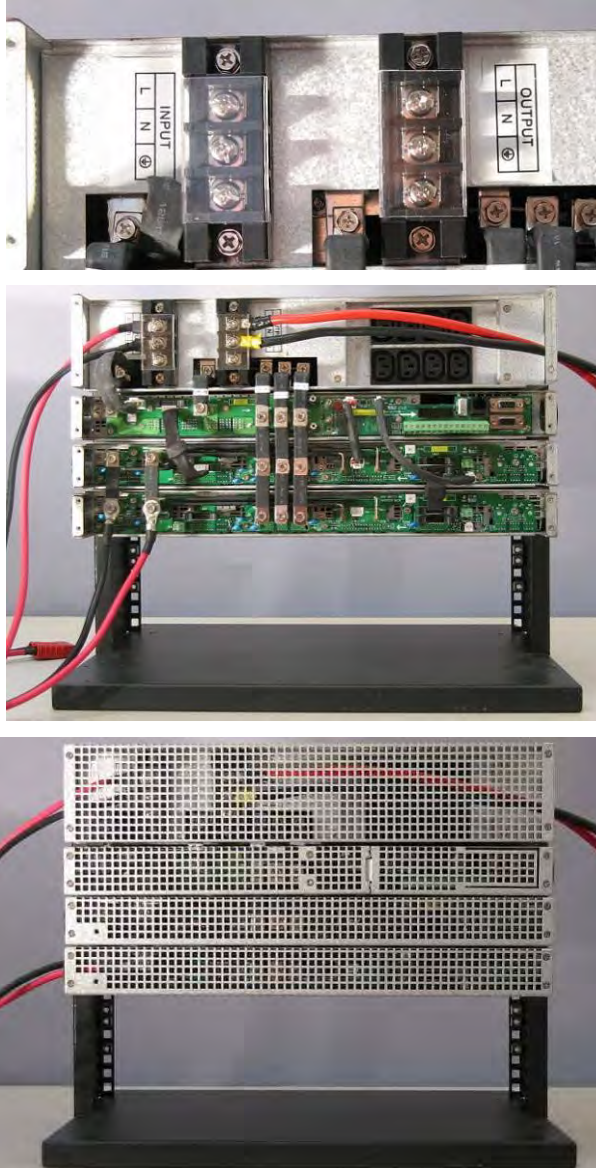


#### C. Connect DC INPUT Wires

Place 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.

**D. Connect AC OUTPUT Wires**

Connect the AC input to the terminals on the back left of MBSPDU according to the position of the white labels. Connect AC output to the terminal on the back right of MBSPDU according to the label. Fix the back cover to the STS/controller shelf.



Note that systems incorporating the 1U PDU rather than the 2U MBS/PDU do not need the signal cable and that the “short jumper” should be installed into CN1 on the STS/controller/interface shelf as described in section 3.2.4.

For details of the AC connections see the appropriate system setup drawings in section 3.4.



### 3.2.6 Communications & Hardware Alarm Connections

#### 3.2.6.1 Communications Connections

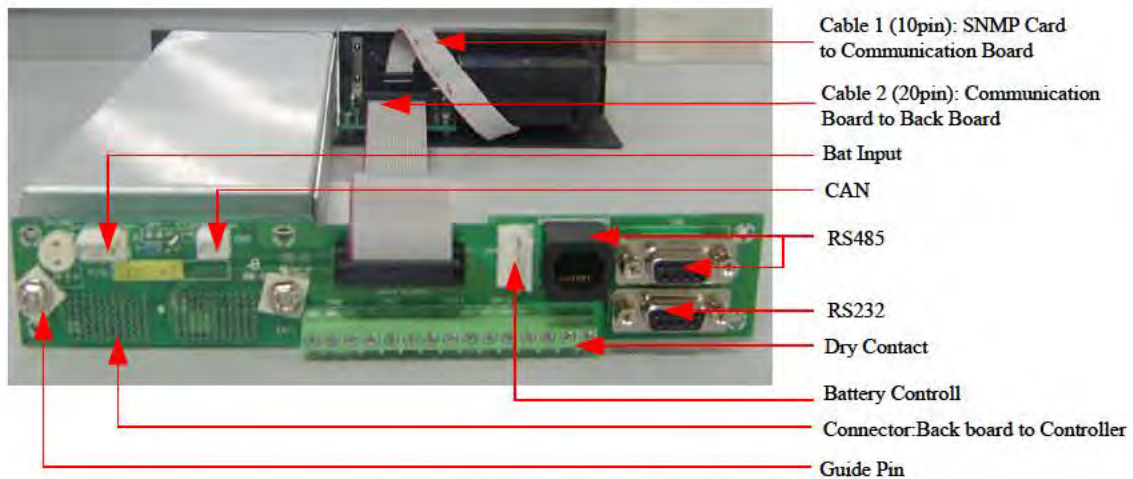
- RS-232
- RS-485
- SNMP (Optional)
- USB

A. Communications interfaces on the front plate of the Communications Interface option module.



**Figure 18. Communications interfaces on the front plate of the controller**

B. Communications interfaces on the rear of the controller shelf



**Figure 19. Communications interfaces on the rear of the controller**

### 3.2.6.2 Hardware Alarm Connections

#### A. Dry Contact connection on STS/Controller shelf backplane

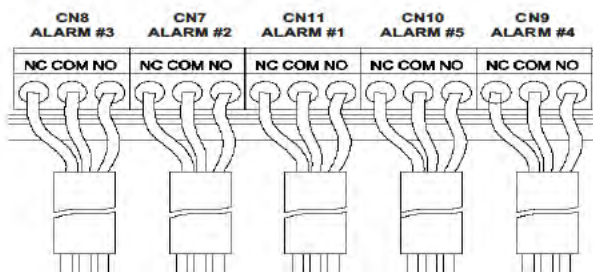


Figure 20. Dry Contact Connection Details

Each dry contact relay has normally open, normally closed and common connections. The following table shows the factory default settings for these alarms.

Dry Contact #	Alarm Source / Setting	Dry Contact Normal Status	SNMP OPTION
Dry Contact 1	INV / Inverter over load	Normally Open	Bit 1
Dry Contact 2	STS / Inv unavailable	Normally Open	Bit 2
Dry Contact 3	INV / Inv fan fault	Normally Open	Bit 3
Dry Contact 4	STS / STS fan lock	Normally Open	Bit 4
Dry Contact 5	INV / Inv power limit	Normally Open	Bit 5

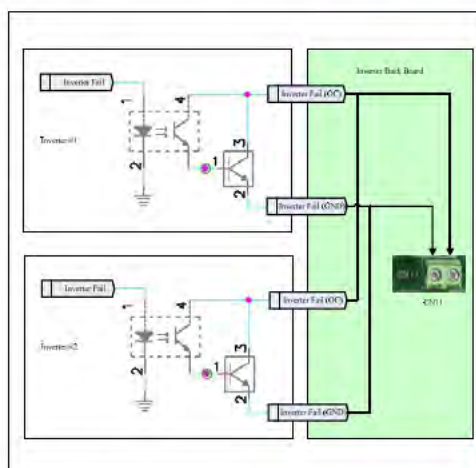
**NOTE THAT WHEN THE SNMP ALARM TRAP OPTION IS FITTED THE DRY CONTACT ALARMS ARE USED INTERNALLY AND NO LONGER AVAILABLE FOR USER CONNECTION.**

For details about setting up and operating the SNMP option, see the separate Manual available on our WEB site.

#### B. Inverter Shelf Alarms

CN11 on the inverter shelf backplane provides an alarm output specifically relating to the condition of the inverters installed in the shelf. The following table details the 'logic' state on this connector under the four possible conditions.

Inverter #1	Inverter #2	Status
Normal	Normal	High impedance
Fault	Normal	Low impedance
Normal	Fault	Low impedance
Fault	Fault	Low impedance



### 3.3 Controller Dry Contact Programming

Programing the controller dry contacts will depend on the revision of firmware installed in the controller.

Controllers with firmware revision 0.05 or later allow programing of up to 10 alarm parameters for each of the 5 available relays while controllers with earlier firmware revisions allow only one parameter.

A. Settings→System→Dry contact Press 'Enter' entry the follow menu

D	r	y	C	o	n	t	:	1	↑						
A	l	a	r	m		T	y	p	e	:	I	N	V		
A	l	a	r	m		N	O	:	0	2					
I	n	v			o	v	e	r			I	o	a	d	

B. Press 'Up' or 'Down' to select the dry contact, then enter the menu to set the alarm mode of the dry contact.

<input checked="" type="radio"/>	I	n	v												
<input type="radio"/>	S	T	S												
<input type="radio"/>	C	o	n	t											
<input type="radio"/>	S	m	r												

A	l	a	r	m		T	y	p	e	:	I	n	v		
A	l	a	r	m		N	o	:	0	1	↑				
I	n	v			f	a	u	I	t						

Press the "▽" or "△" keys to select alarm mode of the dry contact relay outputs.

The following table lists the possible alarm conditions that can be programed:

No.	Inverter	No.	Static Transfer Switch
01	Inverter fault	01	Inv unavailable
02	Inverter over load	02	Main unavailable
03	Inv fan fault	03	Output overload
04	Inv power limit	04	OP short circuit
05	DC input Abnormal	05	K1 relay open
06	Inv low volt off	06	STS SCR1 short
07	Inv lost	07	STS SCR2 short
		08	Inv Bypass Mode
No.	Controller	09	Over temperature
01	DC input low	10	MBS abnormal
02	Cont temp high	11	STS fan lock
03	Cont eeprom fail	12	STS Fault Mode
04	DC input over	13	STS eeprom fault
05	CAN Bus Off	14	SPS Power Fail
06	DC removed		

### 3.4 System Interconnectivity

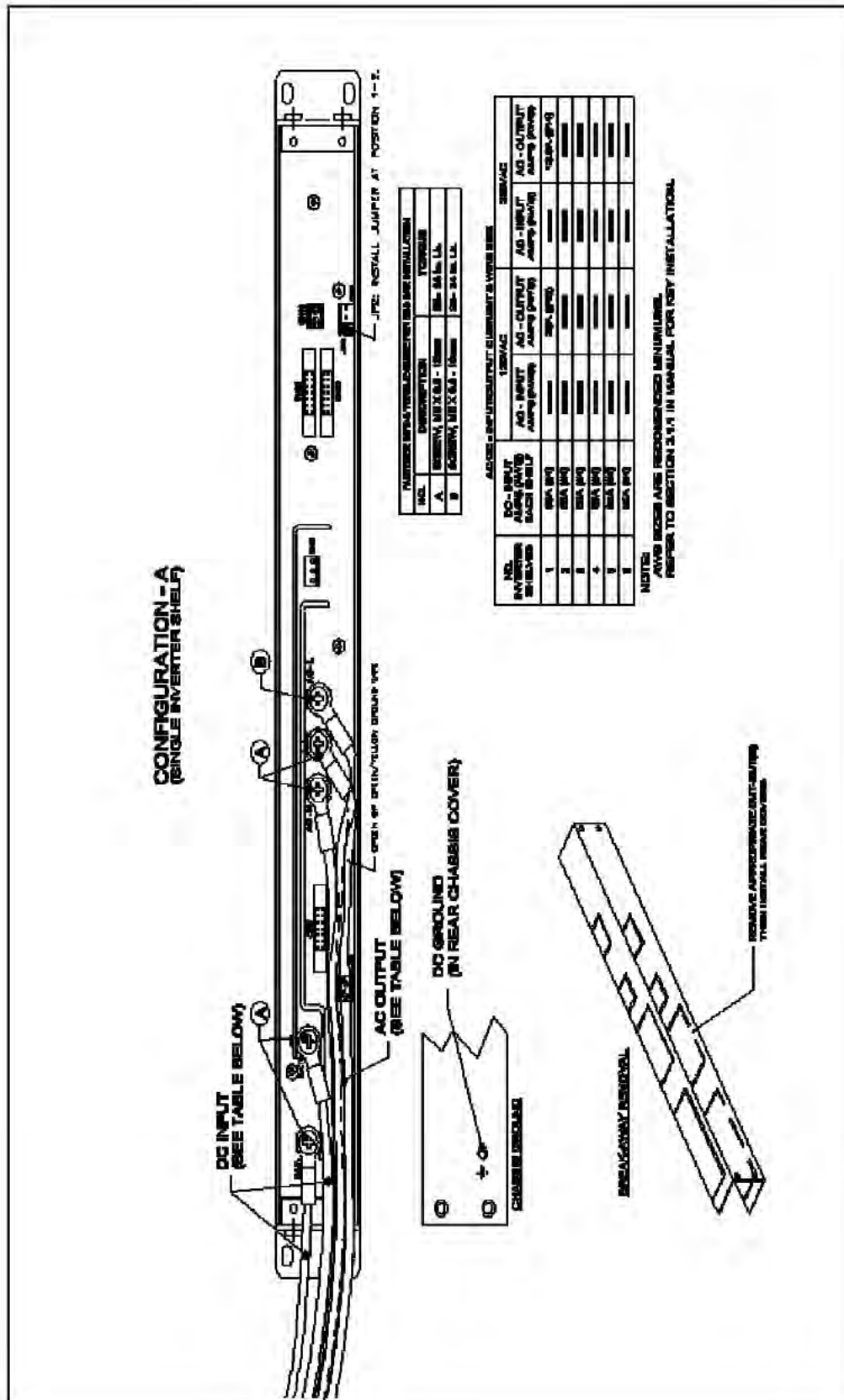
This section should be read in conjunction with sections 3.1 to ensure that all the system shelves are properly installed in the 19" or 23" rack. It is important to install the inverter shelf keying plugs properly as shown before the shelves are fixed in place.

There are 9 basic system configurations and 4 modified wiring/bus configurations to allow use without an STS module but with a controller and communications interface:

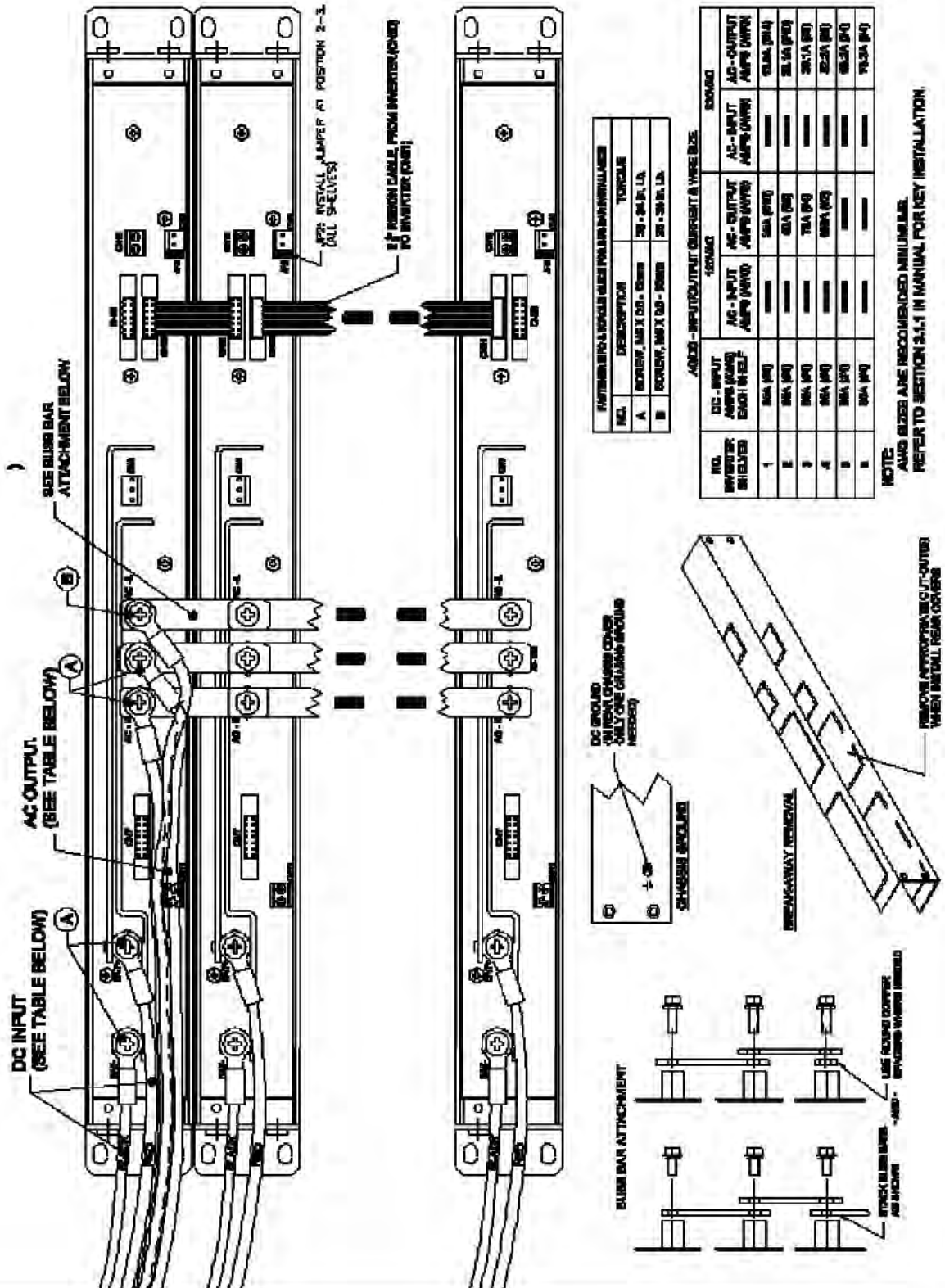
- Config. A - Single Inverter Shelf
- Config. B - Multiple Inverter Shelves
- Config. C - Multiple Inverter Shelves with AC Distribution
- Config. D1 - Inverter Shelves with 1U Controller & Comms Shelf – with 50A STS
- Config. D2 - Inverter Shelves with 1U Controller & Comms shelf – without STS
- Config. E1 - Inverter Shelves with 2U Controller & Comms Shelf – with 100A STS
- Config. E2 - Inverter Shelves with 2U Controller & Comms Shelf – without STS
- Config. F1 - Inverter Shelves with 1U Controller & Comms Shelf plus 1U AC Distribution – with 50A STS
- Config. F2 - Inverter Shelves with 1U Controller & Comms Shelf plus 1U AC Distribution – without STS
- Config. G1 - Inverter Shelves with 2U Controller & Comms Shelf plus 1U AC Distribution – with 100A STS
- Config. G2 - Inverter Shelves with 2U Controller & Comms Shelf plus 1U AC Distribution – without STS
- Config. H - Full System with 50A STS
- Config. J - Full System with 100A STS



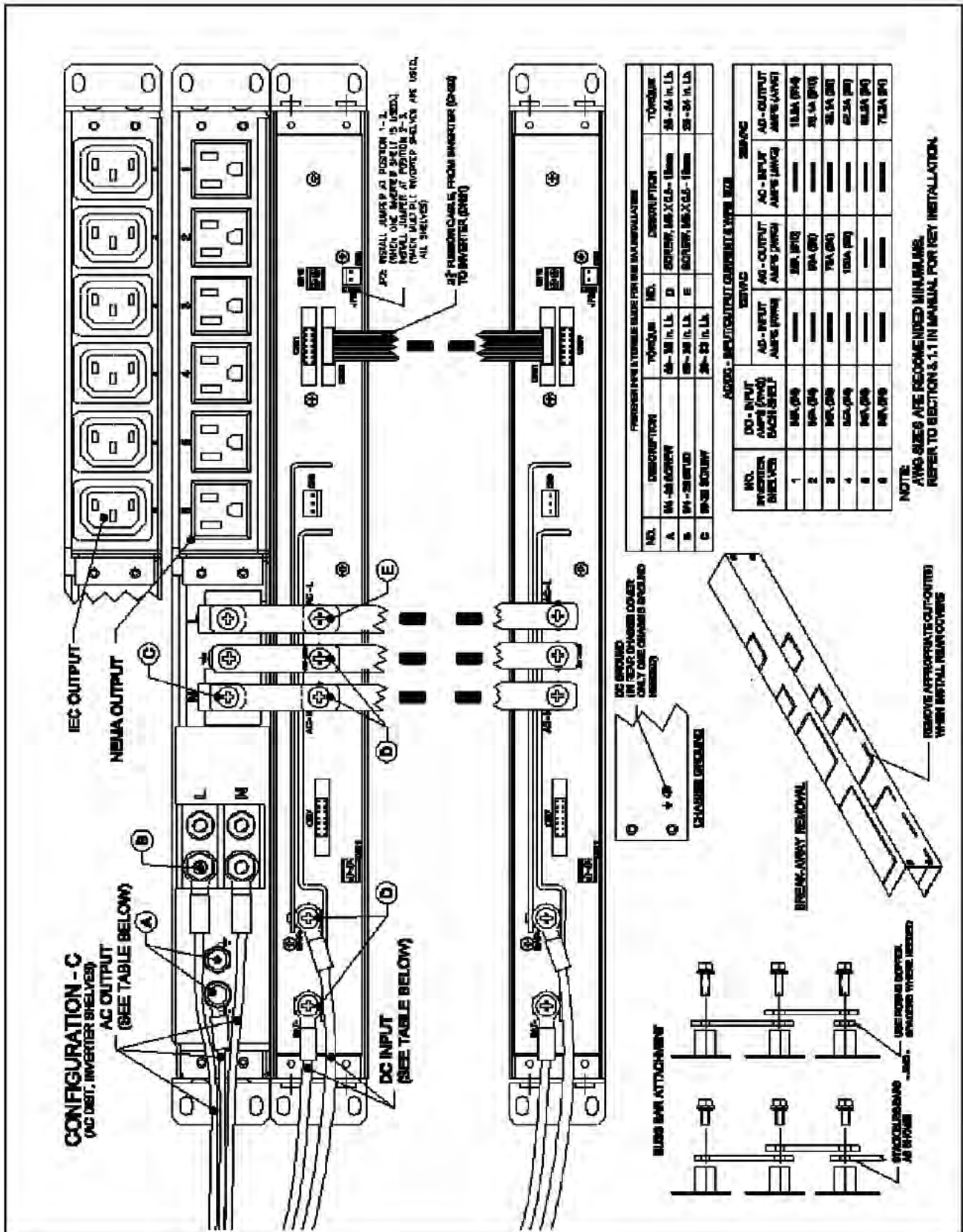
### 3.4.1 A - Single Inverter Shelf



### 3.4.2 B - Multiple Inverter Shelves

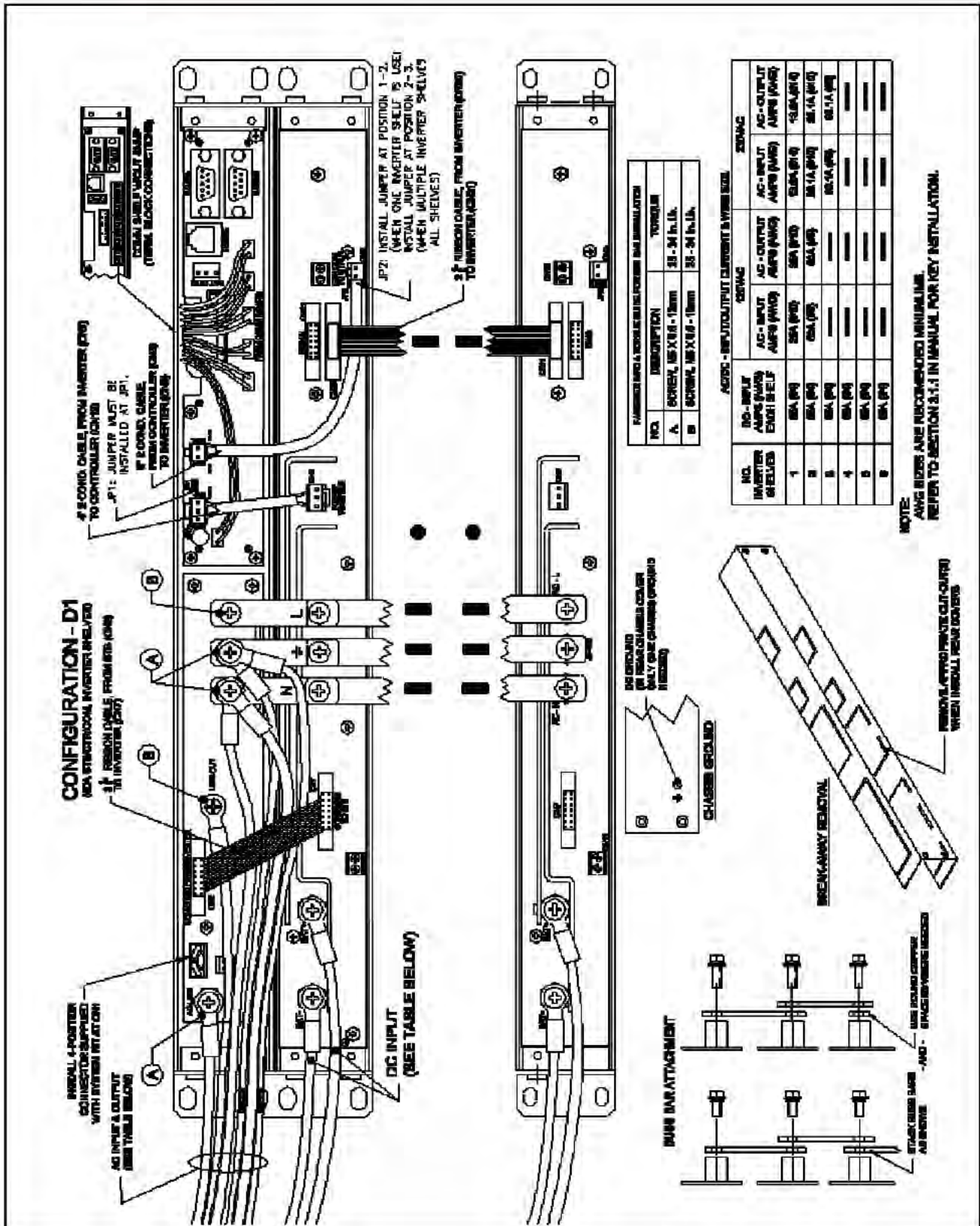


### 3.4.3 C - Multiple Inverter Shelves with AC Distribution



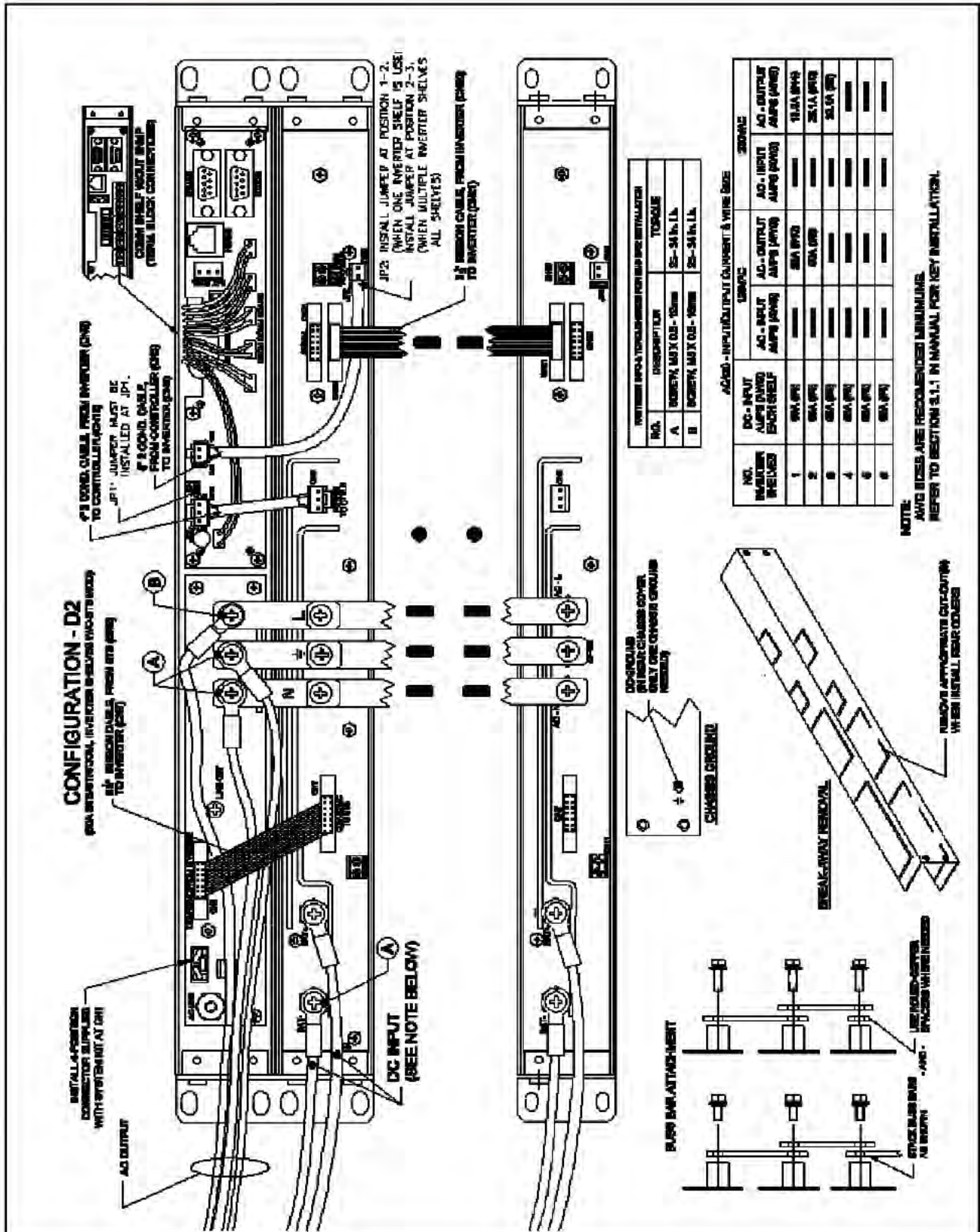


### 3.4.4 D1 - Inverter Shelves with 1U Controller & Comms Shelf with 50A STS

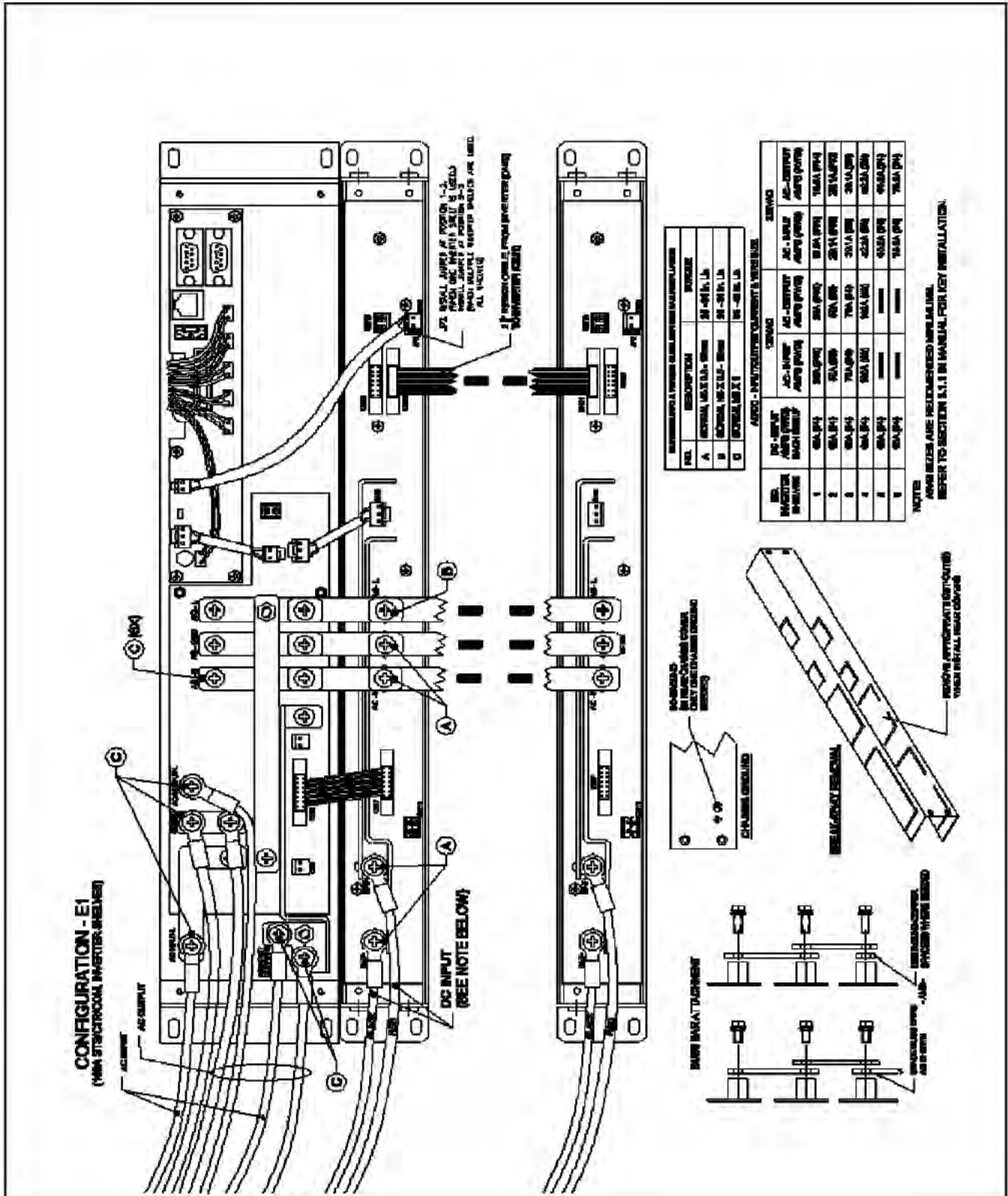




### 3.4.5 D2 - Inverter Shelves with 1U Controller & Comms shelf without STS

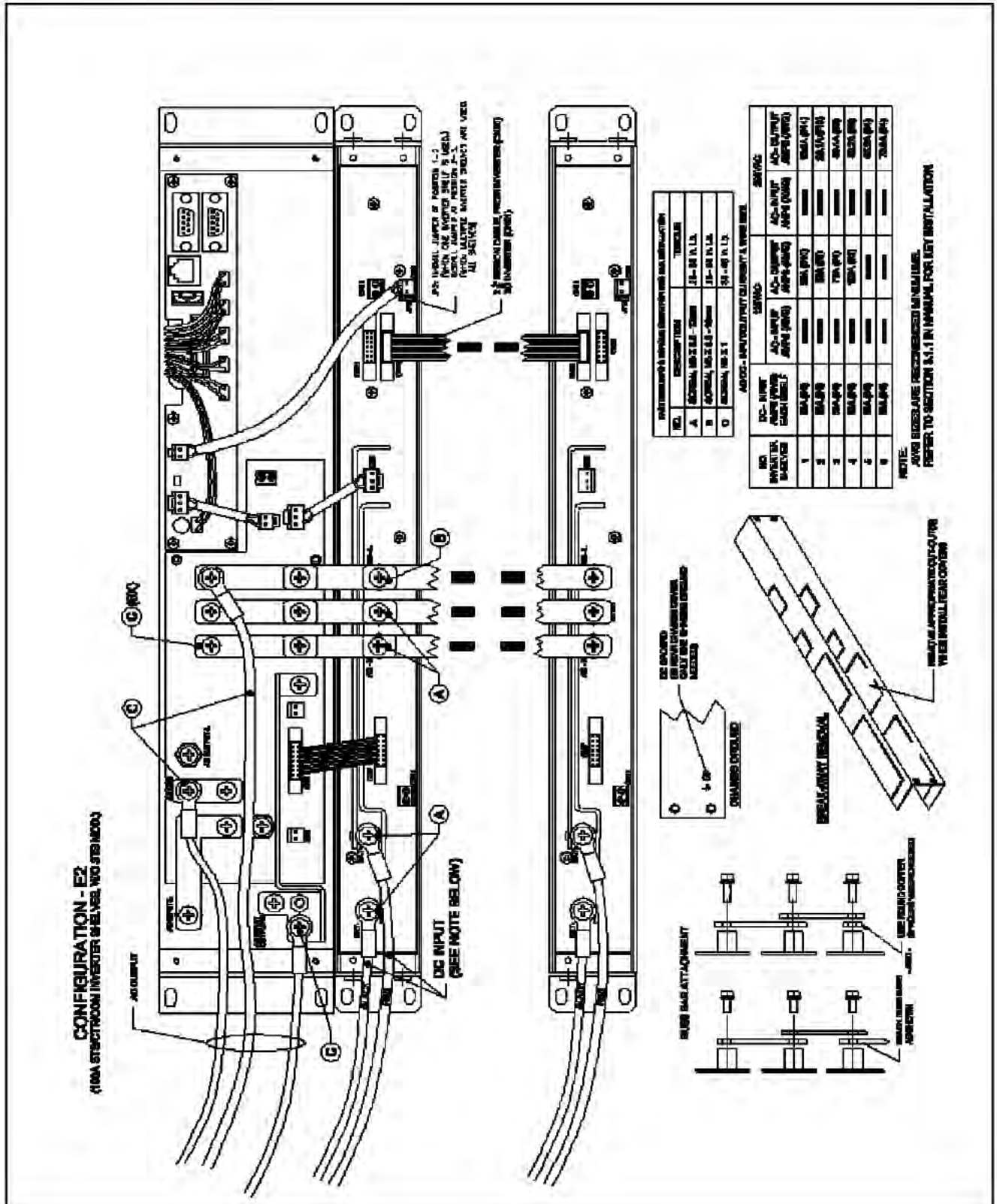


### 3.4.6 E1 - Inverter Shelves with 2U Controller & Comms Shelf with 100A STS



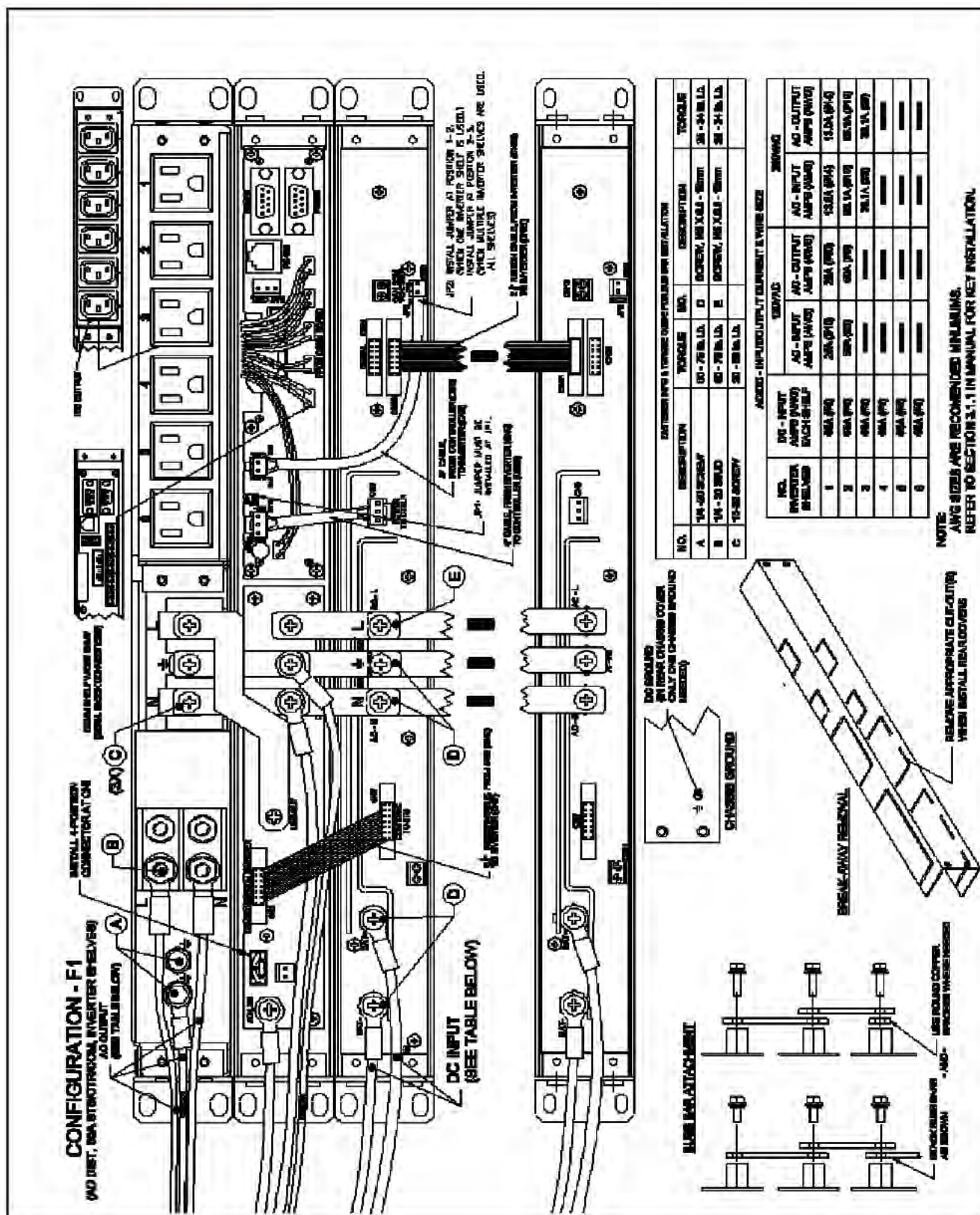


### 3.4.7 E2 - Inverter Shelves with 2U Controller & Comms Shelf without STS

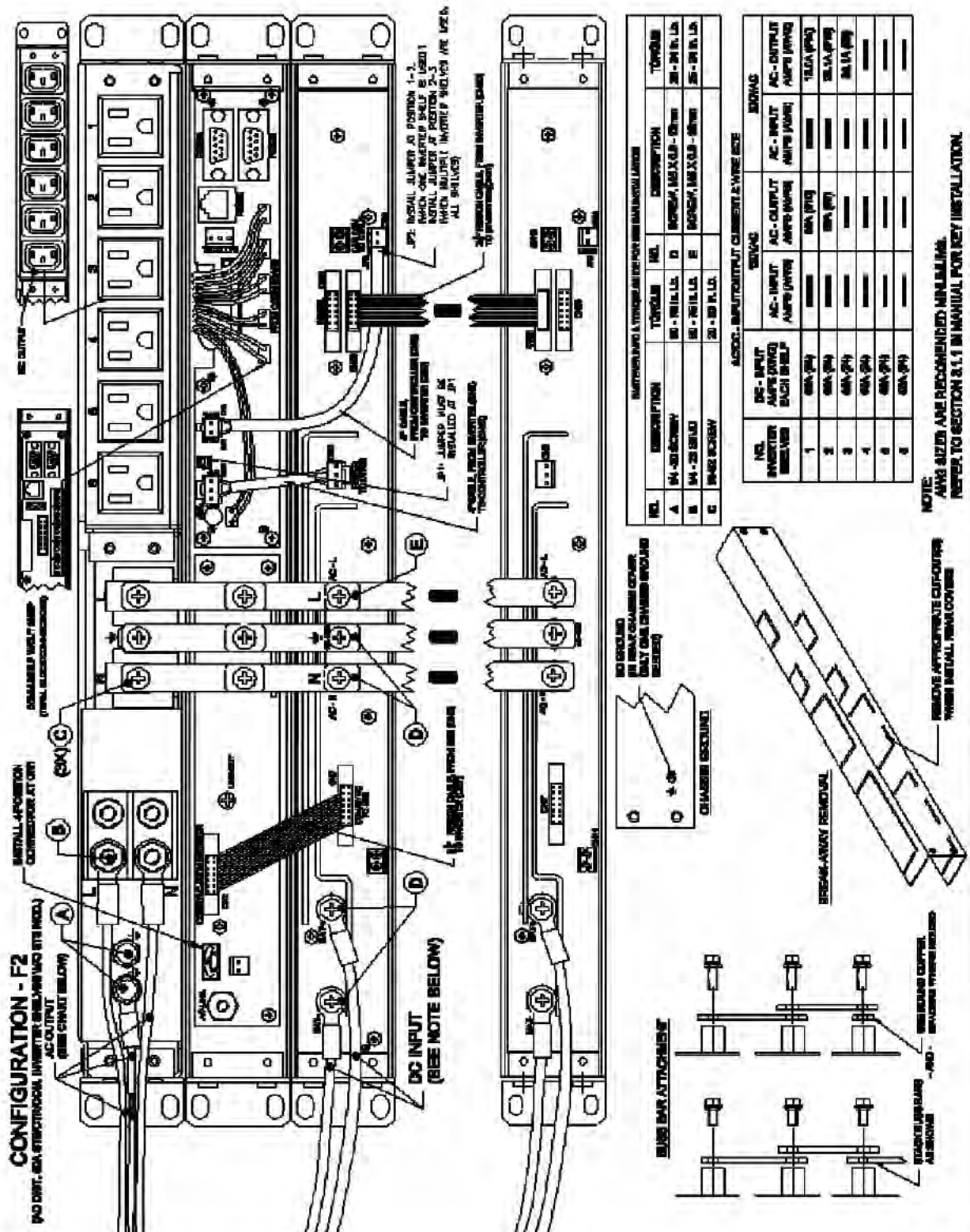




### 3.4.8 F1 - Inverter Shelves with 1U Controller & Comms Shelf plus 1U AC Distribution with 50A STS

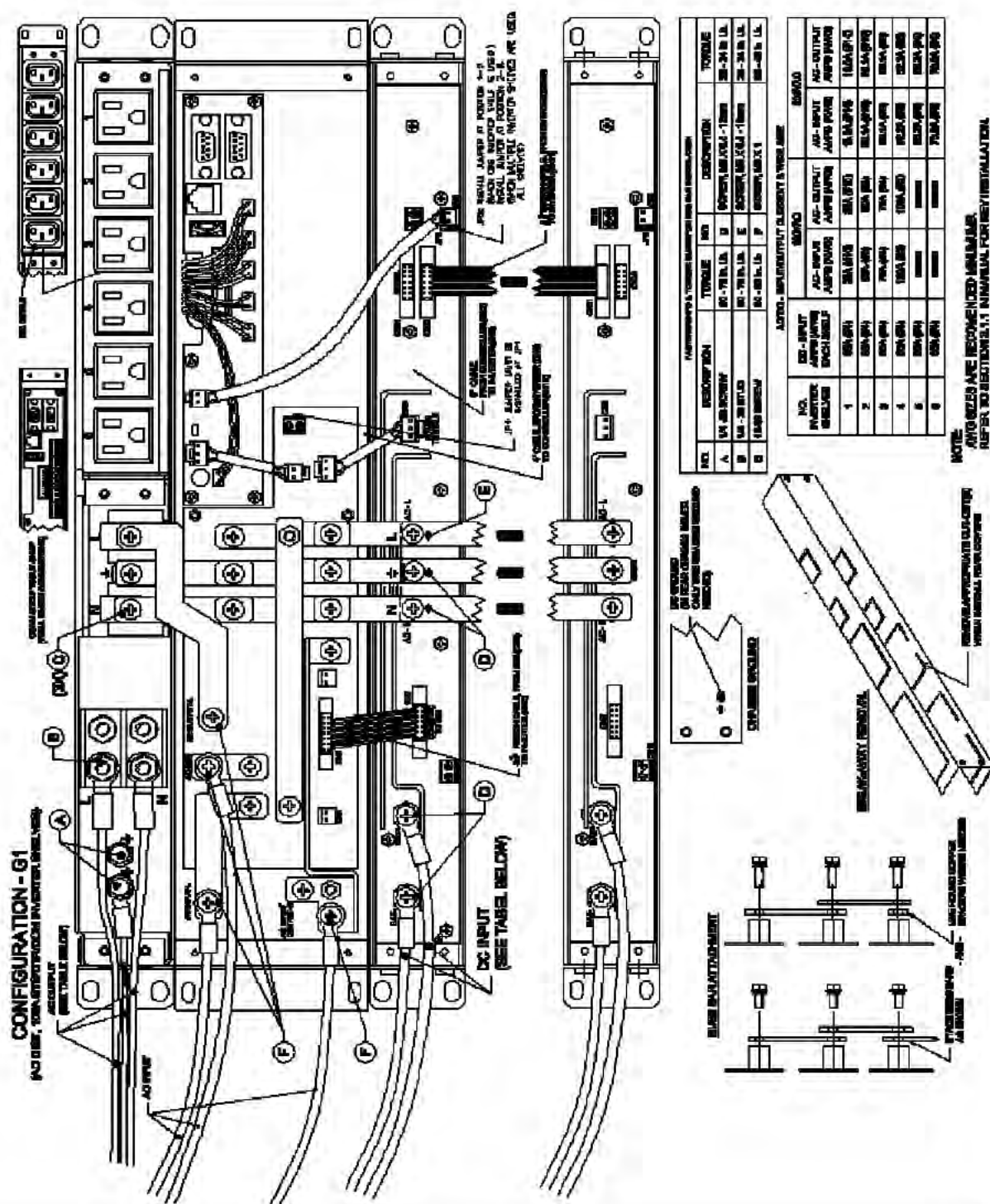


### 3.4.9 F2 - Inverter Shelves with 1U Controller & Comms Shelf plus 1U AC Distribution without STS



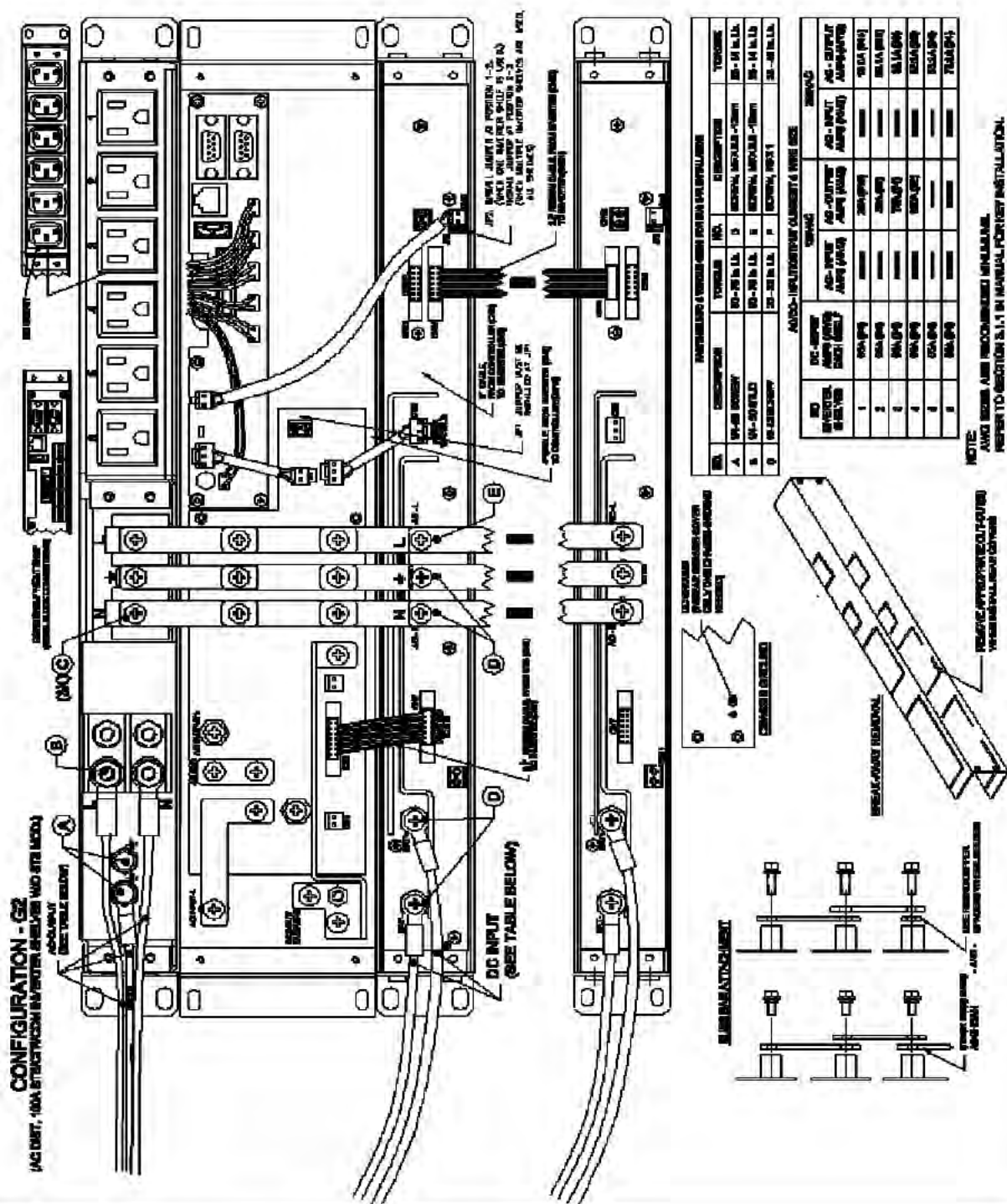


#### 3.4.10 G1 - Inverter Shelves with 2U Controller & Comms Shelf plus 1U AC Distribution with 100A STS

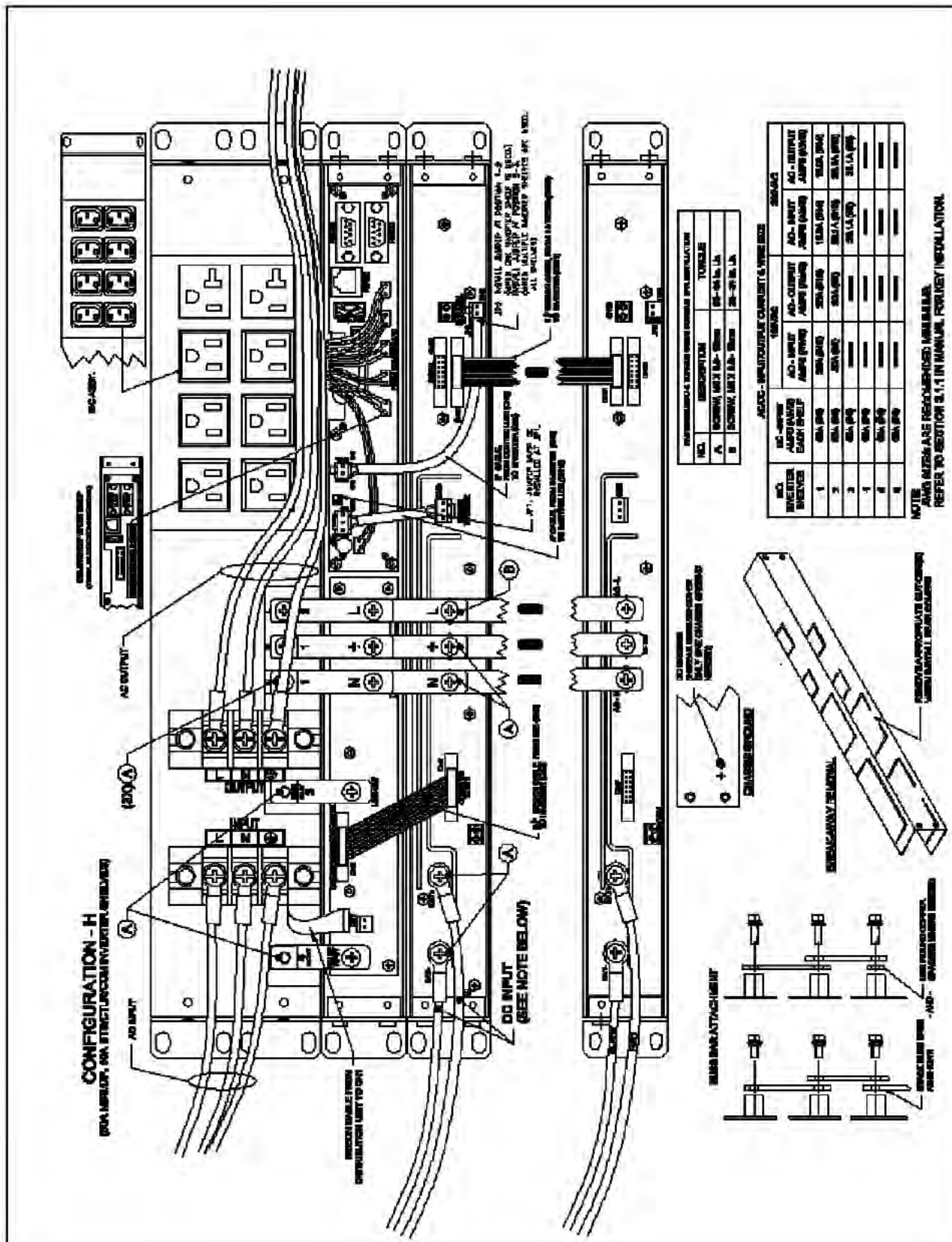




#### 3.4.11 G2 - Inverter Shelves with 2U Controller & Comms Shelf plus 1U AC Distribution without STS

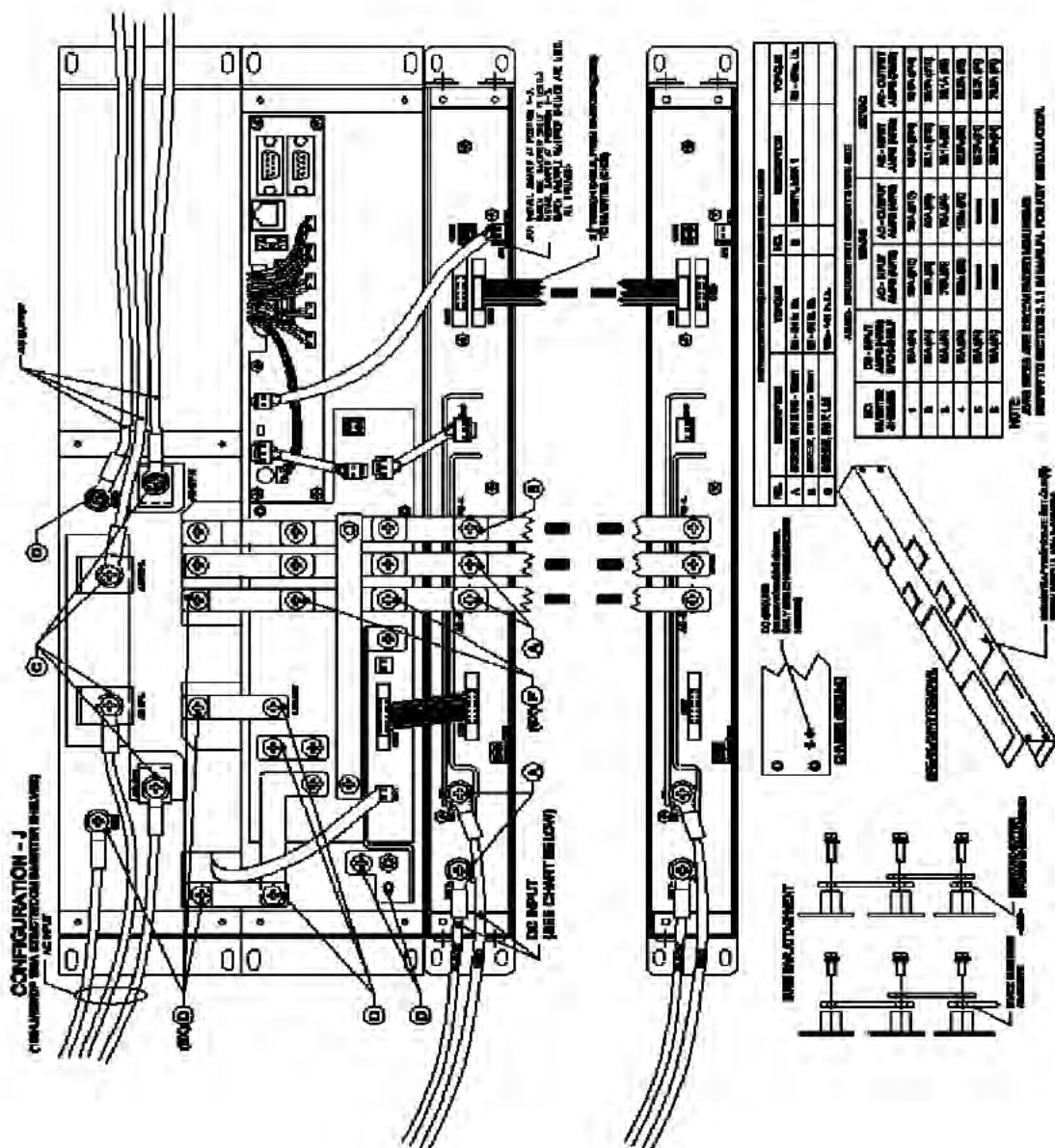


### 3.4.12 H-Full System with 50A STS





### 3.4.13 I - Full System with 100A STS





## 4. Module Installation & Removal

### Installation Equipment

Before installing the Inverter system, ensure the product received contains the components specified when it was ordered. Contact UNIPOWER Telecom immediately if there is a question about the configuration of the system.

### Installation Tools

The tools necessary to install and test the Gravitas SABRE Series Inverter system include cross-head screwdrivers, torque wrenches, a ratcheting wrench set, wire cutters, etc. No unusual tools are required.

#### 4.1 Inverter Shelf & Inverter Module Installation and Removal

NOTE THAT IT IS ESSENTIAL TO SHUT DOWN AND ISOLATE THE SYSTEM FROM ALL AC AND DC SOURCES.

##### 4.1.1 Inverter shelf Installation

When adding or installing inverter shelves to an existing system, proceed as follows referring to Figure 20.

- A. Decide where the inverter shelf will be added or installed in the cabinet.
- B. Insert the shelf.
- C. Secure the shelf with the retaining screws.

##### 4.1.2 Inverter shelf Removal

- A. Determine which inverter shelf needs to be removed.
- B. Remove the retaining screws.
- C. Remove the shelf from the cabinet.



Figure 21. Install and remove inverter shelf

### 4.2 Inverter Module Installation & Removal

#### 4.2.1 Inverter Module Installation

When installing Inverter modules in a working system proceed as follows referring to Figure 21.

It is not necessary to shut down the system.

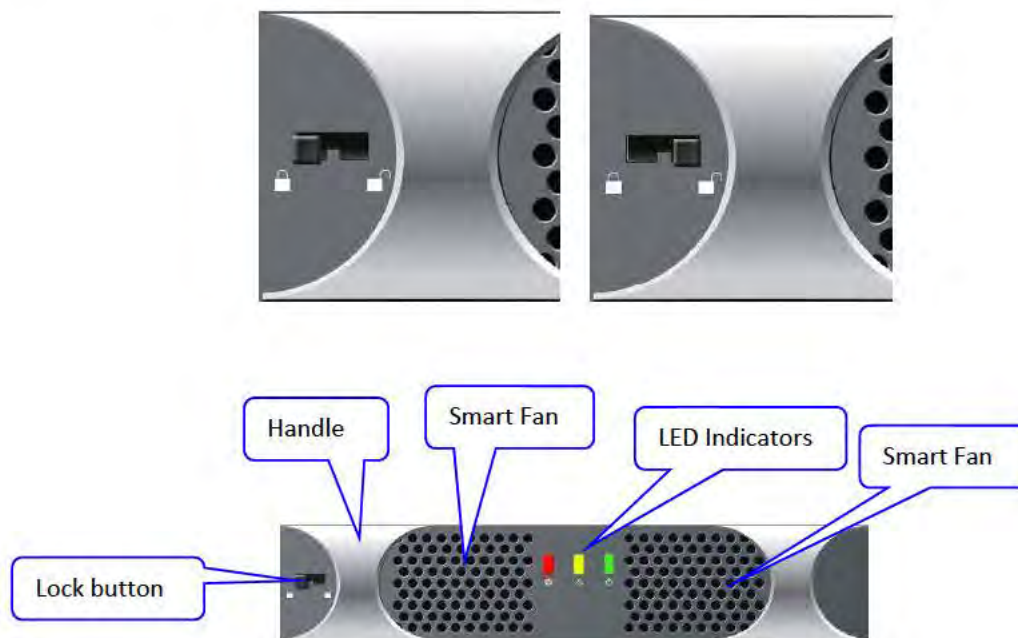
- A. Decide where the inverter module will be installed.  
Before installing a new inverter module, remove the dummy plate if there is any covered the selected slot.
- B. Set the lock switch to the unlock position. Insert the inverter module into the inverter shelf.
- C. Push on the front of the module until it is fully home. Secure the module to the shelf by setting the lock switch to the lock position.

#### 4.2.2 Inverter Module Removal

When removing Inverter modules in a working system proceed as follows referring to Figure 21.

It is not necessary to shut down the system.

- A. Determine which inverter module needs to be removed.
- B. Switch the lock switch to the unlock position.
- C. Pull out the module out from the shelf with handles.
- D. Once the inverter module is removed, recommend to replace with a dummy plate to avoid exposure to a hazardous voltage, or install a replacement inverter module.



**Figure 22. Install and remove inverter module**



### 4.3 STS/Controller Shelf, STS Module, Communications Module & Controller Module Installation and Removal

NOTE THAT IT IS ESSENTIAL TO SHUT DOWN AND ISOLATE THE SYSTEM FROM ALL AC AND DC SOURCES.

#### 4.3.1 STS/Controller shelf installation

When installing the STS shelf to a system, proceed as follows referring to Figure 22.

- A. Insert the shelf at the STS shelf position.
- B. Secure the shelf with the retaining screw.

#### 4.3.2 STS/Controller shelf removal

Referring to Figure 22.

- A. Remove the retaining screws.
- B. Remove the shelf from the cabinet.



**Figure 23. Install and remove STS/controller module/communications interface shelf**



### 4.3.3 Communication Interface module Installation

When installing the Communication Interface Module to a working system proceed as follows referring to Figure 23.

It is essential to shut down the system.

- A. Remove the dummy plate where the Communication Interface Module will be inserted.
- B. Loosen the retaining screw.
- C. Connect the cable to the communication board.
- D. Insert the Communication Interface Module into the shelf.
- E. Secure the module to the shelf with the retaining screw.

### 4.3.4 Communication Interface module Removal

Referring to Figure 23.

- A. Loosen the retaining screw.
- B. Remove the Communication Interface Module from the shelf.
- C. Insert a dummy plate to avoid exposure to hazardous voltages.



Figure 24. Installing and remove the communication interface module

NOTE THAT THE COMMUNICATIONS MODULE IS PRE-INSTALLED WHEN THE SNMP/ETHERNET OPTION IS FITTED AND MUST NOT BE REMOVED UNLESS FAULTY.

### 4.3.5 STS Module Installation

When installing the STS module into a working system, proceed as follows.

There is no need to power down the system when an MBS Unit is also installed.

- A. **WARNING:** Ensure that the Maintenance Bypass Switch is set to the MBP or the IBP position (as determined by mains and inverter output status position) otherwise it will damage the STS module frame due to the mechanical interlock. Refer to Figures 24 and 25.
- B. Remove the dummy plates where the STS module will be inserted.
- C. Insert the STS module into the STS/Controller shelf.
- D. Push on the front of the module until it is fully home. Secure the module to the shelf by setting the lock switch to the lock position.

### 4.3.6 STS Module Removal

- A. **WARNING:** Ensure that the Maintenance Bypass Switch is set to the MBP or the IBP position (as determined by mains and inverter output status position) otherwise it will damage the STS module frame due to the mechanical interlock. . Refer to Figure 24 and 25.
- B. Set the lock switch at the unlock position.
- C. Remove the module from the shelf by pulling on the handle.
- D. Once the STS Module is removed, replace with a dummy plate to avoid exposure to a hazardous voltages or replace with a new module.



Figure 25. MBS position when installing or removing the STS module



Figure 26. Installing and removing the STS module



### 4.3.7 Controller Installation

When installing the controller module to a working system, proceed as follows. Refer to Figure 26.

There is no need to power down the system.

- A. When adding a controller module, remove the dummy plate where the controller module will be inserted.
- B. Loosen the retaining screw.
- C. Insert the controller module into the controller shelf.
- D. Push on the front of the module until it is fully home. Secure the module to the shelf with the retaining screw.

### 4.3.8 Controller Module Removal

When removing the controller module from a working system, proceed as follows. Refer to Figure 26.

There is no need to power down the system.

- A. Loosen the retaining screw.
- B. Remove the module from the shelf.
- C. Once the controller Module is removed, replace with a dummy plate or another controller to avoid exposure to hazardous voltages.

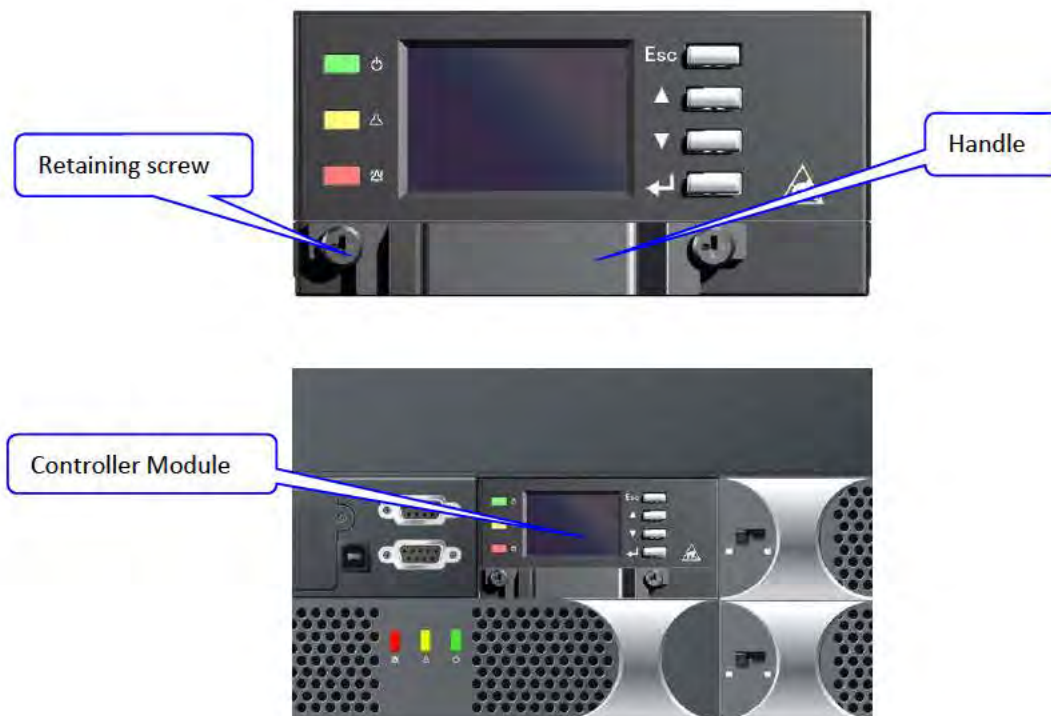


Figure 27. Installation and removal of the controller module



### 4.4 Inverter system Rear Installation and Removal

Refer to section 3.1 of this manual for detailed information about connecting up a range of different system configuration.

#### 4.4.1 Inverter system Rear Installation

Inverter system rear installation is carried out once the MBS & AC distribution unit, STS/Controller Shelf and Inverter shelves have been installed in the cabinet along with the individual plug-in modules and the Communications Interface Module if this has also been specified.

- A. **Bus bar installation**  
Install the Mains Input bus bar, Mains Output bus bar, Battery Input+ bus bar, Battery Input- bus bar, Inverter Output Neutral, Line & Ground bus bars with the supplied retaining screws. All necessary parts are supplied as a kit with each shelf.
- B. **Cable Installation**  
Install the Signal cable, Controller Can Bus cable and Controller Input cable as required.
- C. **Communication Interface connection**  
Connect the communication cable between the PC and rear communication interface.
- D. **Rear Cover Installation**  
Install the rear safety covers.

#### 4.4.2 Inverter system Rear Removal

Remove the rear cover then remove the bus bars & signal cables.

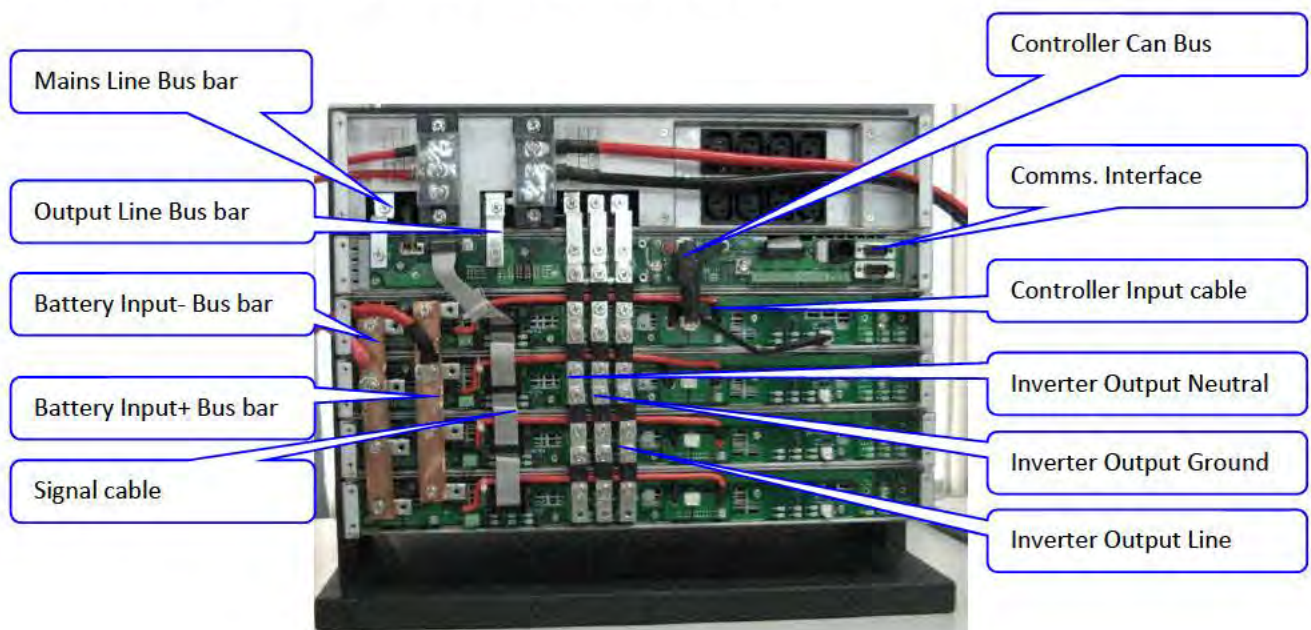


Figure 28. Rear installation and removal of inverter system

## 5. Operation

### 5.1 Start-up Guide

This section defines a series of steps recommended for bringing the system up into a normal operating mode.

- A. Remove all shelf rear covers.
- B. Verify that all shelf interconnections have been properly made according to the applicable configuration drawing in section 3.4, "System Interconnectivity".
- C. Make sure that all AC and DC power inputs are disconnected when making input and output connections.
- D. Make DC input connections to the inverter shelves using the recommended minimum wire size. Ensure that the utility AC input (if used) Line, Neutral and Ground are properly connected to the L-In, N-In and GND of the STS/controller/interface shelf or the input Terminals on the MBS/PDU.
- E. With all power inputs still "off", plug in all system modules with the exception of the inverter modules. Then, externally connect all 48VDC inputs to the system inverter shelves. Now plug in one inverter module into anyone of the inverter slots. The load should be zero for these initial tests. The system is now powered up and should be providing an AC output. Verify that the AC voltage and frequency are correct to specification.

It is important to know that the 48V source for powering the STS/controller/interface shelf is provided from the 48V input to the top most inverter shelf. If the DC feed to this top shelf is opened for any reason the controller and communications modules will cease to function.

- F. The remaining inverter modules should be inserted one-by-one to allow full system capacity.
- G. Load should be added also to verify that modules are properly sharing and synchronized.
- H. Now it is important to verify that in those applications using the STS, that this unit is able to automatically transfer the load between the AC utility source and the inverter source. This is covered elsewhere in this manual.

### 5.2 Status Monitoring

When the controller module is properly installed with power on, the LCD screen is lit and displaying “Waiting” during self-diagnosis. After a few seconds general system status is shown as follows.



Figure 29. Controller power start page

Pressing the “←” key will bring up the “Main Menu” as follows, then the “STATUS” and “SETTINGS” menus can be selected by pressing “▽” or “△” and then the “←” key.



Figure 30. Controller main menu

The following tables give details of available status parameters for the inverter, STS and controller modules respectively.

#### Inverter Status

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

#### STS Status



Address	STS module location
Serial No	Serial number of 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 current 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 in percentage (%)
Temperature	STS internal temperature in Celsius (°C)
Run Time	STS total running time in hour (H)
Priority	STS output priority (On-line/Off-line)
HW Rev	Hardware version of STS module
SW Rev	Software version of STS module

### Controller Status

Hardware Version	Hardware version of controller module
Firmware Version	Software version of controller module
Input vol	DC input voltage of controller module in Volt (V)
Temperature	Controller temperature in Celsius (°C)

### Alarm Log

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

### Alarm History

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

### 5.3 Parameter Setting

The SABRE inverter system allows some parameters to be set through the controller module. Use the  $\nabla$  key and the  $\leftarrow$  key to select SETTING at which point a 4-digit numeric password is requested. Use the  $\Delta$  key to increase number, and the  $\nabla$  key to decrease number. For instance, press the  $\Delta$  key once for 1, twice for 2, three times for 3, etc. Press  $\leftarrow$  to validate each digit of the password once the desired number is selected. The factory default password is 1234. No setting modification can be executed if a wrong password is entered.



Figure 31. Input password

The SETTING section is divided into two categories: MODULE and SYSTEM. The parameters of individual modules can be modified or adjusted under MODULE while system related setups can be done under SYSTEM. Sections 5.3.1 to 5.4.3 refers to the detailed setup procedures.

#### 5.3.1 Password Setting

A new password can be set in the SYSTEM option under SETTING. Press the  $\leftarrow$  key to enter the SETTING PASSWORD menu for resetting password.

Use the  $\Delta$  and  $\nabla$  keys to enter in new password. Press  $\leftarrow$  to validate each digit of the new password once the desired number is selected.


After the new 4-digit password has been input, the system asks for the new password to be re-keyed as confirmation. Repeat Step 2 to key in the new password again. Once the password is successfully changed "DONE" will appear on the screen.

#### 5.3.2 System Parameter Settings

The following table provides a list of available settings for the system

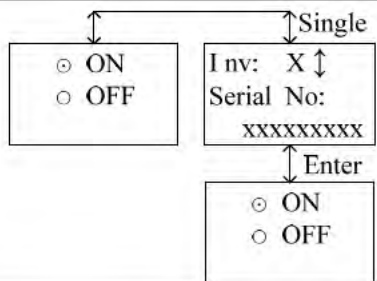
Parameter	Specification
BaudRate: Baud rate of COM port	Selectable at 1) 2400bps, 2) 4800bps and 3) 9600bps
RS422 Addr: RS422 address	RS422 communication protocol
Keypad tones: activation or de-activation of the audible alarm	Selectable to 1) Enable or 2) Disable
Time&Date: Time and Date displayed on 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	Firstly select system type (230V-50Hz or 120V-60Hz)



	Push  to reset to the default values Push Esc to cancel resetting to the default value (Please refer to Appendix A)
Drycontact: Dry contact setting	Refer to 3.4.3 Dry Contact Setting
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

### 5.3.3 Inverter Parameter Programming

The following table provides a list of available settings for the inverters

Parameter	Setting Option
Output volt: Inverter output voltage	For 230Vac output, selectable to: 1) 208 Vac ; 2) 220 Vac ; 3) 230 Vac ; 4) 240 Vac For 110 output, selectable to: 1) 110Vac ; 2) 115Vac ; 3) 120Vac
Output Freq.: Inverter output frequency	Selectable at 1) 50Hz and 2) 60Hz
OPV HL: High loss of inverter output voltage	For Output voltage = 208V, adjustable between 220V and 240V For Output voltage = 220V, adjustable between 233V and 252V For Output voltage = 230V, adjustable between 244V and 264V For Output voltage = 240V, adjustable between 254V and 276V For Output voltage = 110V, adjustable between 117V and 127V For Output voltage = 115V, adjustable between 122V and 132V For Output voltage = 120V, adjustable between 127V and 138V
OPV LL: Low loss of inverter output voltage	For Output voltage = 208V, adjustable between 176V and 198V For Output voltage = 220V, adjustable between 176V and 209V For Output voltage = 230V, adjustable between 185V and 218V For Output voltage = 240V, adjustable between 193V and 228V For Output voltage = 110V, adjustable between 89V and 105V For Output voltage = 115V, adjustable between 93V and 110V For Output voltage = 120V, adjustable between 100V and 114V
IPV LVSD: the maximum input voltage for normal operation	Adjustable between 39V and 44V
IPV HVSD : the minimum input voltage for normal operation	Adjustable between 59V to 61V
Power Limited: inverter output power capacity limiting	Adjustable between 50% and 100%
Fan Speed: fan speed level of inverter module	Selectable to 1) Normal or 2) Full
Inverter On/off: setting all/single inverter turn ON or OFF	<div> <div>           1. All -&gt;ON/OFF            2. Single            Serial No:            XXXXXXXXXX            ON            OF         </div> <div>  <pre> graph TD     A[All ON/OFF] --&gt; B[Inv: X Serial No: XXXXXXXXXX]     B --&gt; C[ON/OFF]           </pre> </div> </div>




### 5.3.4 STS Parameter Settings

The following table provides a list of available settings for the STS

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 to 1) On line or 2) Off line
Fan speed	Normal speed / Full speed



Note that in the above “On line” means that the inverters will normally feed to the load and “Off line” means that the inverters will normally be in standby while the AC utility supply is feed to the load.

### 5.3.5 Dry Contact Alarm Settings




To clear the alarm history navigate to the “CLEAR” menu then push  to clear the alarm history. This action is not reversible.

Set alarm mode of each dry contact as follows:


**Step 1** Select which dry contact should be used

In the “Setting” menu, select “system” select “Dry contact”, Select “Dry contact #” by pressing the  or  buttons.





**Step 2** Select which module type the dry contact will apply to

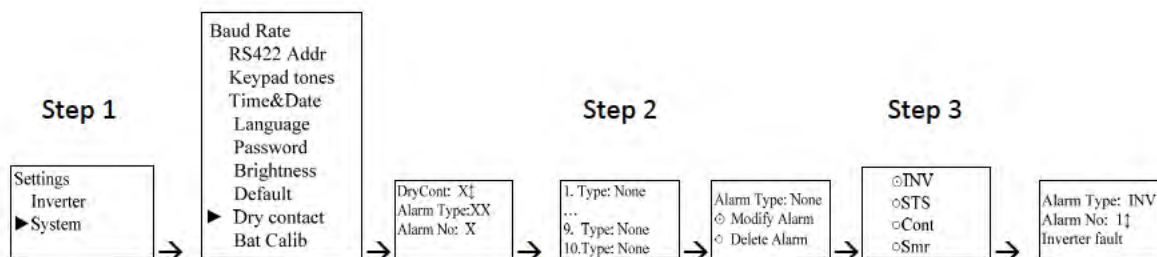
Press  to the Alarm “Type” to select which module alarm for this Dry contact by pressing the  or  keys.

(Note that controllers with firmware revision 0.05 or later allow each dry contact to be programed to alarm on up to 10 different fault conditions. Earlier firmware revisions allow selecting only one condition for each dry contact.)


Press  to the “Alarm Modify or Delete”.

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

Press  to select the Alarm class “INV or Cont” (choose to show Inverter or Controller alarm), then press  to select “Alarm No” to decide the alarm mode of the module by pressing the  or  keys.



The alarm mode can be programmed as the follows:

1. Selecting the alarm mode
2. Press  to confirm the selected alarm mode
3. The new setting will be effective in 5 seconds

No.	Inverter	Meaning
01	Inverter fault	Inverter has no output
02	Inverter over load	Inverter loaded to >105% nominal maximum
03	Inverter fan fault	Inverter fan failed
04	Inverter power limit	Inverter running in power limit
05	Inverter input abnormal	DC input <45V or >58V
06	Inverter low volt off	DC input <40V or >60V
07	Inv lost	Controller cannot communicate with inverter module

No.	Controller	Meaning
01	DC input low	DC input <40V
02	Cont temp high	Controller ambient >75°C
03	Cont eeprom fail	Eeprom read or write error detected
04	DC input over	DC input >60V
05	CAN Bus Off	CAN communications error detected
06	DC removed	DC supply removed from controller

No.	Static Transfer Switch	
01	Inverter unavailable	No output from the inverters
02	Main unavailable	Utility AC not present
03	Output overload	STS loaded to >120% nominal maximum
04	OP short circuit	STS output short circuited
05	K1 relay open	Backfeed relay open circuit
06	STS SCR1 short	SCR1 short circuit (replace STS module)
07	STS SCR2 short	SCR2 short circuit (replace STS module)
08	INV Bypass Mode	Internal heatsink temperature >85°C, STS providing power to load via internal bypass relay
09	Over temperature	Internal heatsink temperature >90°C
10	MBS Abnormal	MBS in abnormal position (Valid position at MBP, MSS, NORMAL, ISS or IBP not detected)
11	STS Fan Lock	STS fan failure
12	STS Fault Mode	No output from STS
13	STS Eeprom fault	Eeprom read or write error detected
14	STS Power Fail	Internal PSU faulty (replace STS module)
15	STS MBS Bypass	MBS switched to bypass mode
16	STS Output	Output voltage outside normal limits

## 6. Remote System Management

SABRE Inverter Systems are compatible with the industry standard WinPower, a powerful software monitoring package which supports stand-alone computers and network (including LAN & WAN) connected computers.

With WinPower the user can monitor and configure the inverter system in real time on any computer in the same LAN network or, when the Xport network module is installed, from any computer over a WAN provided that the IP address of the Xport module is 'visible' to the computer hosting WinPower.

### Features of WinPower Software:

- Monitoring of each module in the SABRE system in real time.
- Provides a panoramic view of all the related information: information of utility power, system status, STS status
- Auto search function with any SABRE system on the LAN.
- Security protection function: Password Management.
- Simple installation.

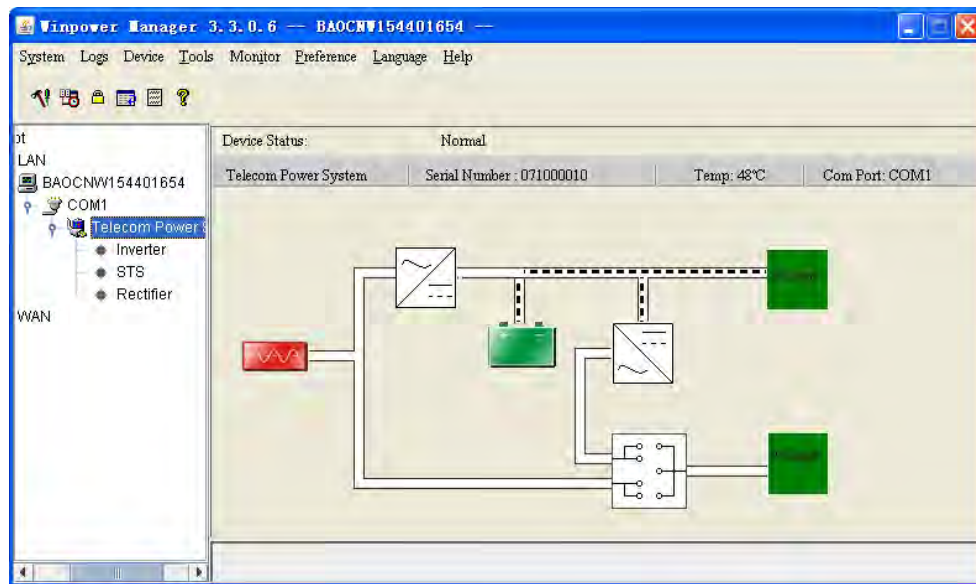


Figure 32. Winpower system view

When the Xport option is not installed it is necessary to connect your computer serial port to the RS232 port of controller chassis backplane or the RS232 port in the front panel of interface module using a serial RS232 "straight through" cable. Alternatively, a USB cable can be connected to the computer and the USB port of controller.

For details on installation and use of WinPower please see the separate User Manual which can be downloaded from the UNIPOWER WEB site at <http://www.unipowerco.com/pdf/winpower-man.pdf>.

The WinPower installation package can be downloaded from the UNIPOWER WEB site at: <http://www.unipowerco.com/winpower/winpower.exe>.



## **7. Hot Swap Operation**

### **7.1 Inverter module**

- A. Locate the lock switch at the unlock position.
- B. Install or remove the Inverter module from the shelf.

### **7.2 STS module**

- A. **WARNING:** Ensure that the Maintenance Bypass Switch is set to the MBP or the IBP position (as determined by mains and inverter output status position) otherwise it will damage the STS module frame due to the mechanical interlock. . Refer to Figure 28.
- B. Set the lock button at the unlock position.
- C. Install or remove the STS module from the shelf.

### **7.3 Controller module**

- A. Loosen the retaining screw.
- B. Install or remove the Controller module from the shelf.

## 8. Maintenance and Troubleshooting

### 8.1 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.

1. Using a suitable vacuum cleaner remove dust and other debris paying particular attention to air ventilation slots and cooling fan blades.
2. Check cooling fan performance. If any fan is running too slowly or has stopped it may need replacing.
3. Remove each hot swap inverter and STS module in turn and check the gold edge connector for oxidation or dirt. Clean as necessary and then replace the module.

**IMPORTANT NOTE – The above can only be carried out on a running system as follows:**

- 3.1. For systems with a Maintenance Bypass module, the system must be switched to the Mains Bypass (P1) or Inverter Maintenance (P2) position before removing any modules. The STS can only be removed in position P1 while the Inverter modules should be removed in position P2. (see page 13 for a fuller explanation.)
- 3.2. For systems without a Maintenance Bypass module, only Inverter modules may be removed when operating in an N+1 configuration where the system load is <N. The STS module may not be removed.
4. Check all system cabling for oxidation or dirt.
5. Check that all parameters in the Status Menu are correct for the inverters and STS.
6. Check for and record any History Alarms and then clear the history status.

### 8.2 Trouble-shooting Guide

If the system fails to operate properly after having the installation and setup of the system thoroughly re-examined, use the troubleshooting table to determine the probable cause(s) and solution(s) to resolve error conditions. For unlisted error conditions, please contact your local dealer for technical assistances.











#### 8.2.1 Troubleshooting Inverter Modules


Error Condition	Possible Cause	Recommendation
Inverter module cannot be properly inserted	Mis-position of nylon spacer	Refer to Section 2.4 to insert the nylon spacer to correct position.
	Insertion of non-inverter module	Check if the inserted module is not inverter module. Inverter shelf holds only inverter modules.

No AC output and all LEDs off.	Lack of input power	Check if input cables are all firmly connected to power source. Check if power source is not yet switched on, or is low in power
	Mis-match of inverter modules	Check if inserted inverter modules are with different specifications.
No AC output. Both green and yellow LEDs flicker.	Inverter self-diagnosis	Inverter self-diagnosis takes few seconds. LED turns to a solid green light after the completion of self-diagnosis
No AC output. Both yellow and red LEDs are lit.	Load exceeds 125%	Check and reduce the load no higher than 100% of the total power rating.
No AC output, Red LED is lit.	1. Input wiring is reversely connected (i.e. reverse polarity)	Check if input cables are connected to correct 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 Blinks fast	1. Inverter fails to soft start	Reboot the inverter system by switching on and on the input power source.
	2. Inverter temperature rises beyond the temperature limit.	Leave inverter idle to cool down for few minutes.
AC output exists with yellow led is flickering;	Input voltage is out of operating range.	Ensure input voltage is between 45V and 58 V. Check if any battery or DC
AC output exists with yellow led light;	Load is over 100% but below 125%.	Reduce the load no higher than 100% of the total power rating.
Inverter continuously delivers power, but with red LED flicker slowly.	Failure of EEPROM	Reboot the inverter system by switching on and on the input power source.
	Fans failure.	Check if the fans are locked or fail to work. If fan is locked, remove the lock cause; if fan fail to work, change the fan.



### Inverter LED Indicator Display

Inverter Module LED display status			
Priority	Green LED	LED Signal	Status
<div> <div>Low</div> <div>↓</div> <div>High</div> </div>	Solid		Inverter work normally
	Blink (slow)		Inverter is being inquired
	Blink (Intermittent (Slow))		One of the status as follows: 1) Power On. Details refer to note. 2) Shut down remotely.
Priority	Yellow LED	LED Signal	Status
<div> <div>Low</div> <div>↓</div> <div>High</div> </div>	Blink (Intermittent (Slow))		Power On Details refer to note.
	Solid		Over Load (Load percent > 105%)
	Blink (Fast)		DC input abnormal ( $V_{in} \leq 45V$ or $V_{in} \geq 58V$ )
	Blink (Intermittent (Fast))		Inverter shut down due to super low /super high input ( $V_{in} \leq V_{LVSD}$ or $V_{in} \geq V_{HVSD}$ )
Priority	Red LED	LED Signal	Status
<div> <div>Low</div> <div>↓</div> <div>High</div> </div>	Blink (Slow)		One of the alarms as follows: 1) EEPROM Fault; The inverter cannot work in parallel mode system, however, it can work in single mode system 2) Inverter Fan Fault; Fan fails in operation
	Blink (Slowest)		Compatibility protection The inverter will shut down. It cannot restart automatically.
	Blink (Fast)		One of the alarms as follows: 1) Internal DC Bus Over/Under/Unbalance/soft start fail; The inverter will shut down. It cannot restart automatically. 2) Temperature High. The inverter will shut down. It cannot restart automatically.

	Solid		<p>One of the alarms as follows:</p> <ol style="list-style-type: none"> <li>1) Input reverse polarity; The DC input voltage polarity is reverse.</li> <li>2) Inverter output Short circuit; When short circuit happens, inverter will shut down. Manual restart is required.</li> <li>3) Abnormal output voltage; The inverter will shut down when output voltage is out of operating voltage range. It cannot restart automatically.</li> <li>4) Negative Power Protection The inverter will shut down. It cannot restart automatically.</li> </ol>
			<ol style="list-style-type: none"> <li>5) Overload fault. When the time of overload protection exceeds the defined time, the inverter will shut down. The inverter should automatically restart.</li> </ol>

### Note 1

**Power On:** When the 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 an overload fault alarm occurred, the yellow LED and red LED turn on at the same time while the overload alarm occurs, 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.

### Note 2

**Inverter auto restart condition:** The system must include an STS and inverter. The STS firmware version must not be less than 0.03, inverter firmware is not less than 0.06. Without these two conditions, auto restart will not happen.

### 8.2.2 Troubleshooting the STS Module






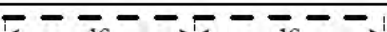




The following provides a guide to troubleshooting an STS module

Error Condition	Possible Cause	Recommendation
No AC output and all LEDs off	No input power	1. Check all input power and bus bar connections 2. Check if the inverter input or Mains AC are switched on
Priority "on line", STS AC output 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 "on line", STS AC output normal but with green LED flashing once per second	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 flashing once per second 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 the inverter and utility AC sources are abnormal	Check AC mains and inverter output
Priority is "off line", AC is normal from Mains and 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, green LED flashing once per second	STS AC input source is from inverter, utility has just returned from abnormal to normal status	Check AC Mains connection and status
No AC output, yellow LED flashing twice per second	The relay on the utility power side has failed open	Turn MBS to mains or inverter bypass mode, replace the STS
AC output normal, green LED on or flashing once second, yellow LED flashing twice per second	The relay on the utility power side has failed open	Turn MBS to mains or inverter bypass mode, replace the STS
AC output normal, green LED on, red LED flashing once per second	Fan failed	Turn MBS to mains or inverter bypass mode, replace the STS
AC output normal, green LED on, red LED flashing once per second	EEPROM FAULT EEPROM can't write or read data correctly	This will not influence the STS AC output. The alert will go off automatically after 10s later
AC output normal, green LED on, red LED flashing once per second	CAN communication error	Check the connection of CAN signal cables



AC output normal, green LED on, red LED flashing once per second	SCR short fault	Turn MBS to mains or inverter bypass mode, replace the STS
AC output normal, green LED on, red LED flashing once per second	Auxiliary Power Supply fault	Turn MBS to mains or inverter bypass mode, replace the STS
AC output normal, green LED on, red LED flashing five times per second	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 properly connected
AC output off, red LED on, other LEDs off	STS fault mode	Turn MBS to mains or inverter bypass mode, replace the STS
AC output off, red LED on, other LEDs off	Over temperature	Turn MBS to mains or inverter bypass mode, remove the STS, check if the ambient temperature is too high or if there's anything blocking the fan vent
AC output off, red LED on, other LEDs off	Over load	Decrease or remove the loads, then shut down or remove the STS module. Then re-connect and restart
AC output off, red LED on, other LEDs off	Output short	Decrease or remove the loads, then shut down or remove the STS module. Then re-connect and restart
AC output is normal, green and yellow LEDs flashing twice per second	Inverter bypass mode	STS internal temperature is too high. Check if anything is blocking the vent or if the system has been working in overload for long time.

### STS LED Indicator Display

STS Module Led display status			
Priority	Green LED	LED Signal	Status
<div style="display: flex; align-items: center;"> <div style="width: 20px; height: 20px; border: 1px solid black; margin-right: 5px;"></div> <div style="text-align: center;">             Low ↓ High           </div> </div>	Solid		STS working normally
	Blink(Slow)		Running mode not according to setting priority, for example, STS working in off-line mode, but the priority is on-line
	Blink(Fast)		STS working in Inverter bypass mode, (internal mode of STS)
Priority	Yellow LED	LED Signal	Status
<div style="display: flex; align-items: center;"> <div style="width: 20px; height: 20px; border: 1px solid black; margin-right: 5px;"></div> <div style="text-align: center;">             Low ↓ High           </div> </div>	Solid		Mains or Inverter abnormal
	Blink(Fast)		If the status of the green LED is the same as yellow LED, then it stands for Inverter bypass mode, otherwise it means the back-feed relay is open
	Blink(Fastest)		STS Output abnormal
Priority	Red LED	LED Signal	Status
<div style="display: flex; align-items: center;"> <div style="width: 20px; height: 20px; border: 1px solid black; margin-right: 5px;"></div> <div style="text-align: center;">             Low ↓ High           </div> </div>	Blink(Slow)		Fan lock or Can communication fail or EEPROM fault
	Blink(Fast)		SCR short or auxiliary power supply fault
	Blink(Fastest)		MBS position abnormal
	Solid		STS Fault mode, maybe overload or over temperature or output short

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

### Operating sequence Troubleshooting

Alarm Priority	LED Indicator Status		
Observe	Green: On	Yellow: On	Red: off
Major	Green: On	Yellow: off	Red: On
Critical	Green: On	Yellow: off	Red: On
	Buzzer sounding		

In the event that you are unable to rectify the fault using the above guide please contact technical support for assistance:

Tel: US - +1 954 346 2442 or UK - +44 1903 768200

Email: [customer.services@unipowerco.com](mailto:customer.services@unipowerco.com).

This document is believed to be correct at time of publication and UNIPOWER LLC accepts no responsibility for consequences from printing errors or inaccuracies. All specifications subject to change without notice.

## Appendix – 1 – Value & Alarm Code Tables, Controller Menu Trees

### A. Default Value Table

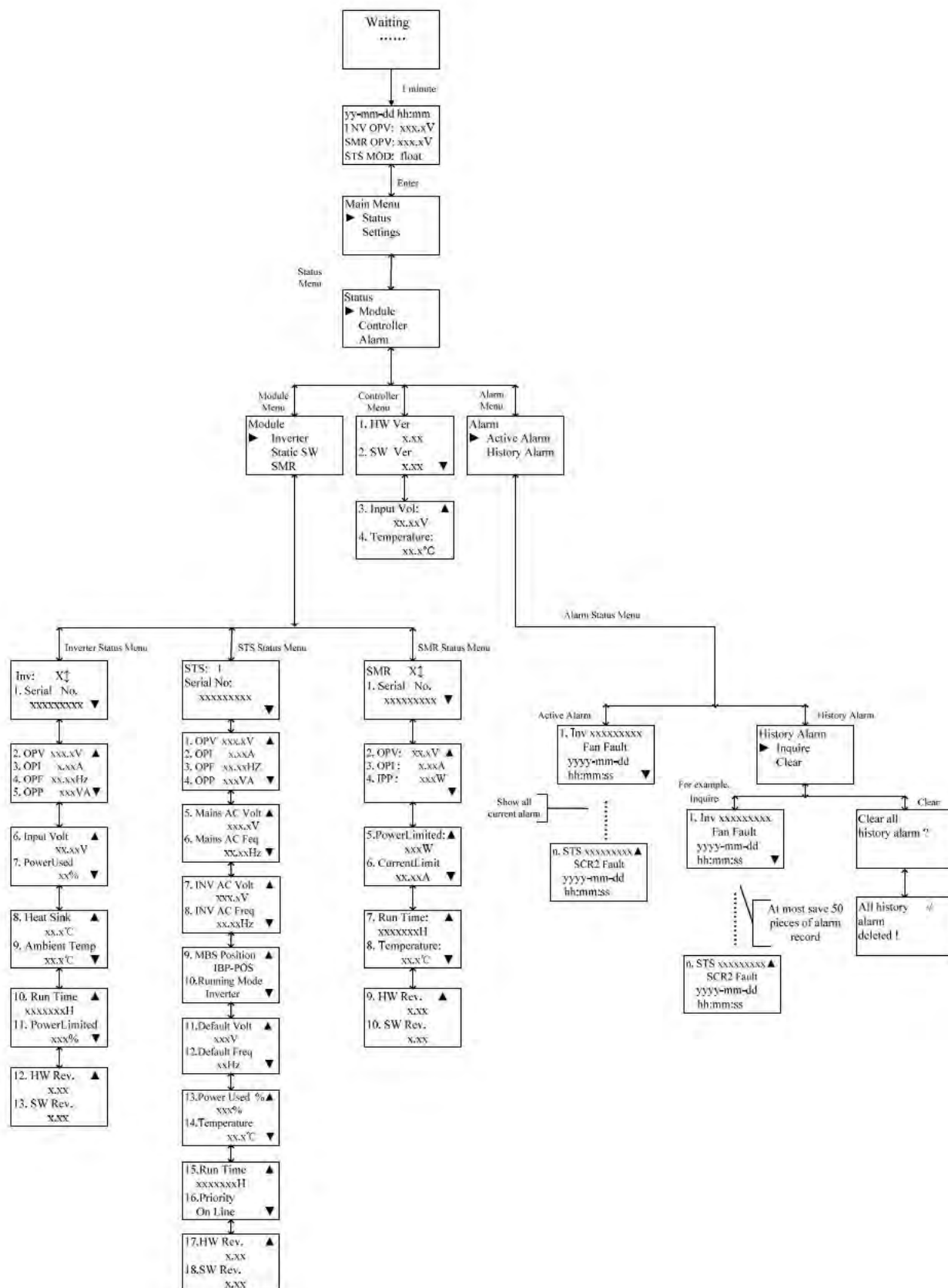
Controller	
STS priority	on-line
230Vac System	
Mains high loss volt:	264V
Mains low loss volt	185V
Inverter input highloss volt for STS	264V
Inverter input lowloss volt for STS	185V
Inverter output highloss volt	264V
Inverter output lowloss volt	185V
Inverter shut down due to low input volt	40V
Inverter shut down due to high input volt	60V
Inverter output volt	230V
Inverter output volt frequency	50Hz
Inverter output power limit	100%
120Vac System	
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	
RS232 communication baudrate	2400bps
RS422 communication baudrate	2400bps
RS422 for battery control baudrate	2400bps
RS422 address	9999
Button tone	On
LCD brightness value	45
Language	English
Password	1234
Drycon0 Alarmcode	Inverter over load
Drycon1 Alarmcode	Inverter unavailable
Drycon2 Alarmcode	Inverter fan fault
Drycon3 Alarmcode	STS fan fault
Drycon4 Alarmcode	Inverter power limit



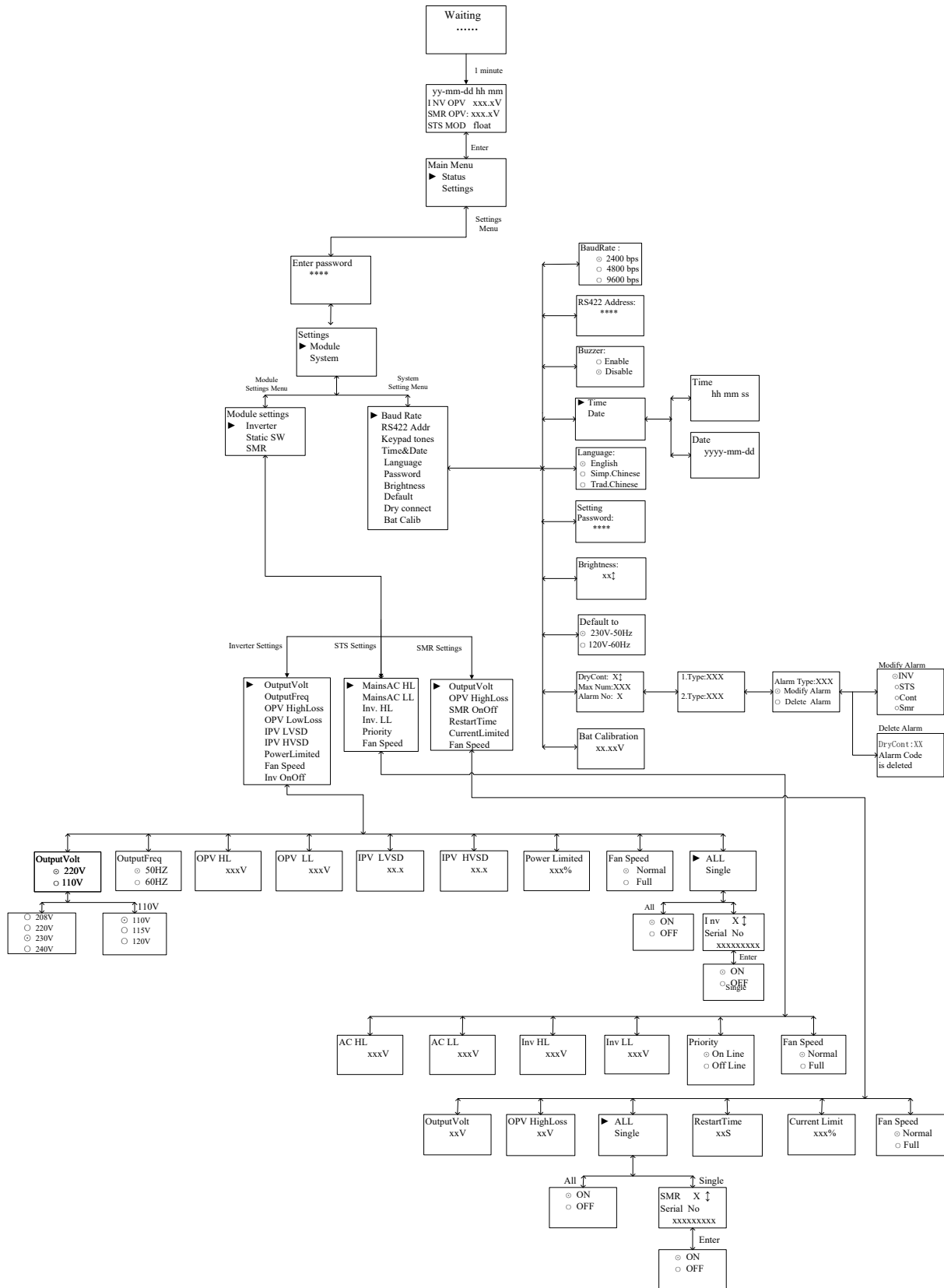
**B. Alarm Code Table**

Alarm Type	Alarm Name	Level	Remark
<b>Inverter</b>	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
	NegPow Protect	Critical	Inverter negative power protection
	SynPulse fault	Critical	Sync Pulse Fault
	SoftStart fail	Critical	Inverter soft start fail
	Eeprom fail	Major	Inverter EEPROM fault
	Inv Temp High	Critical	Inverter temperature high
<b>STS</b>	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 (Valid position at MBP, MSS, NORMAL, ISS or IBP not detected)
	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
<b>Controller</b>	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

### C. LCD Controller Display Tree: Status Menu



### D: LCD Controller Display Tree : Settings Menu





### Appendix – 2 – Revision History & Compatibility

The following table details the minimum hardware and software revisions that are required to provide all of the functions described in this manual.

Module	HW Rev.	FW Rev.	Description
DSC1048	2.00	0.05	Added "DC Removed" & "Inv. Lost" to dry contact alarm list.
		0.06	Enabled each dry contact to link to 10 separate alarm conditions. Performance improvements, no functional changes. (N.B. minor bug means that hardware will be reported as revision 2.04)
	2.5	0.08	Upgraded CPU, no functional changes from 0.05.
INV1048, INV1048H, INV1548H	0.00	0.07	Firmware upgrade to secure the system against shutdown in case an incorrect voltage inverter is installed. (Incorrect module will not enable.)
		0.08	Optimized CAN_ID Management.
	1.00	0.10	Upgraded CPU, no functional changes from 0.08.
INV1548	0.00	0.03	Firmware upgrade to secure the system against shutdown in case an incorrect voltage inverter is installed. (Incorrect module will not enable.)
		0.04	Optimized CAN_ID Management.
	1.00	0.06	Upgraded CPU, no functional changes from 0.04.
STS5048	0.04	0.03	Firmware change to implement Inverter auto-restart function following Inverter overload fault.
		0.04	Modify the logic for driving Back-feed relay. FW Revision update only, no functional changes.
	1.00	0.06	Upgraded CPU, no functional changes from 0.03.
STS100	0.00	0.02	Modify the logic for driving Back-feed relay.
	1.00	0.04	Upgraded CPU, no functional changes from 0.02.

#### Important notes:

1. Earlier Inverter module firmware revision had a bug that could, under certain circumstances, cause modules to shut down randomly. If this issue is being experienced the firmware can be updated using a special fixture to eliminate it.
2. DSC1048 controllers with firmware earlier than revision 0.05 can be updated via the RS232 port using a PC and Telnet software.

If you are experiencing issues or require the new alarm functions from the controller please contact UNIPOWER technical support.





**INSTALLATION & OPERATING MANUAL**  
**GRAVITAS SABRE SERIES**  
**100A STS & MBS**

**[WWW.UNIPOWERCO.COM](http://WWW.UNIPOWERCO.COM)**

Manual No. STS100-1

10/12 sabre\_sts100-man

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## 1. About this Manual

The purpose of this manual is to provide explanations and procedures for installing, operating, maintaining and troubleshooting the 100A Static Transfer Switch, associated rack-mount shelf and Maintenance Bypass Switch unit.

This manual should be read in conjunction with the manual for the complete SABRE Inverter System when installing and operating a system that incorporates the 100A STS, associated shelf and MBS unit.

This manual includes three chapters:

- Chapter 1 – **Introduction** contains a general description, features and specifications.
- Chapter 2 – **Installation and Operation** provides detailed installation and operating information for the module, shelf and MBS unit including wiring.
- Chapter 3 – **Maintenance and Troubleshooting** contains information about how to maintain and fault find the STS module.

## Important Safety Instructions


### Save these Instructions

This manual contains important instructions that must be followed during installation and maintenance.

### General

1. Before installing and using the STS module, shelf and MBS unit read all instructions and cautionary markings and all appropriate sections of this guide. Be sure to read all instructions and cautionary markings for any attached equipment.
2. This unit is designed for indoor use only. Do not expose any part of the system to rain, snow or spray.
3. To reduce the risk of fire hazard do not cover or obstruct any ventilation openings. Do not install the inverter system in a zero-clearance compartment.
4. Use only attachments recommended or sold by UNIPOWER. Doing otherwise may result in a risk of fire, electric shock or injury to persons.
5. To avoid 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 system with damaged or substandard wiring.
6. Do not operate the inverter system if it has received a sharp blow, been dropped, or otherwise damaged in any way.

### Wiring requirements

1. The inverter system is intended to be installed as part of a permanently grounded electrical system according to the US National Electrical Code ANSI/NFPA 70 (current edition). This specifies a single point ground for the inverter system.
2. The grounds on the inverter system are marked with the symbol: G/⊕
3. The AC voltage and current of the inverter system is marked with the symbol: L / N
4. The DC voltage and current of the inverter systems is marked with the symbol: 

## 2. Introduction

### 2.1 General Description

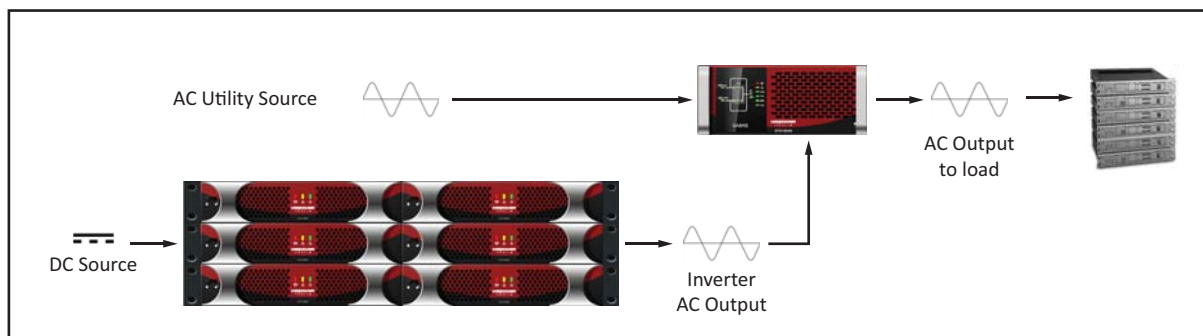
The STS (Static Transfer Switch) module increases system reliability by automatically switching between the inverter output and the AC mains. By setting up the priority of operation, users can change the system status to “online mode” or “offline mode”. The online mode will supply power to the load from the inverters. In case of an inverter failure or overload, the STS will switch the load to the AC utility. In offline mode the load is always connected to the AC utility and will switch to the inverters in the event of AC utility failure. The transfer time is less than 1/4 cycle which avoids any power interruption to the load. The reliable performance of the STS module provided maximum protection against possible damage or loss of service caused by power failure.



**Figure 1. STS100 Front Panel**

#### STS Module Features

- Small footprint & weight
- Universal input range
- Hot-swap replacement in shelf
- Back-feed protection
- Redundant fan design
- Fast transfer time, typically less than 1/4 cycle
- Lower audible noise <55dBA
- No-cross connect
- Maintenance bypass switch function (using MBS2U-100)
- Priority Setup through Controller



**Figure 2. STS Principal of Operation**



## 2.2 Electrical Specifications

Item	Specification
<b>DC Auxiliary Power Input</b>	
Voltage Range	40-60Vdc
<b>AC Input</b>	
Voltage Range	110/115/120 Vac: 89 to 138 Vac
	208/220/230/240 Vac: 176 to 276 Vac
Over voltage threshold	276 / 138 Vac
Under voltage threshold	176/ 89 Vac
Backfeed Protection	Comply with safety requirement
Redundant power supply design	Startup by priority source or alternative
<b>AC Output</b>	
Waveform	Sinusoidal
Nominal output voltage	Same as mains AC or the output of Inverter modules
Permissible frequency area	Max. +/-2.5% (Synchronize area of Inverter)
Transfer time	Typical 1/4cycle, 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)
	$I_{nom} = 100A$

### Notes:

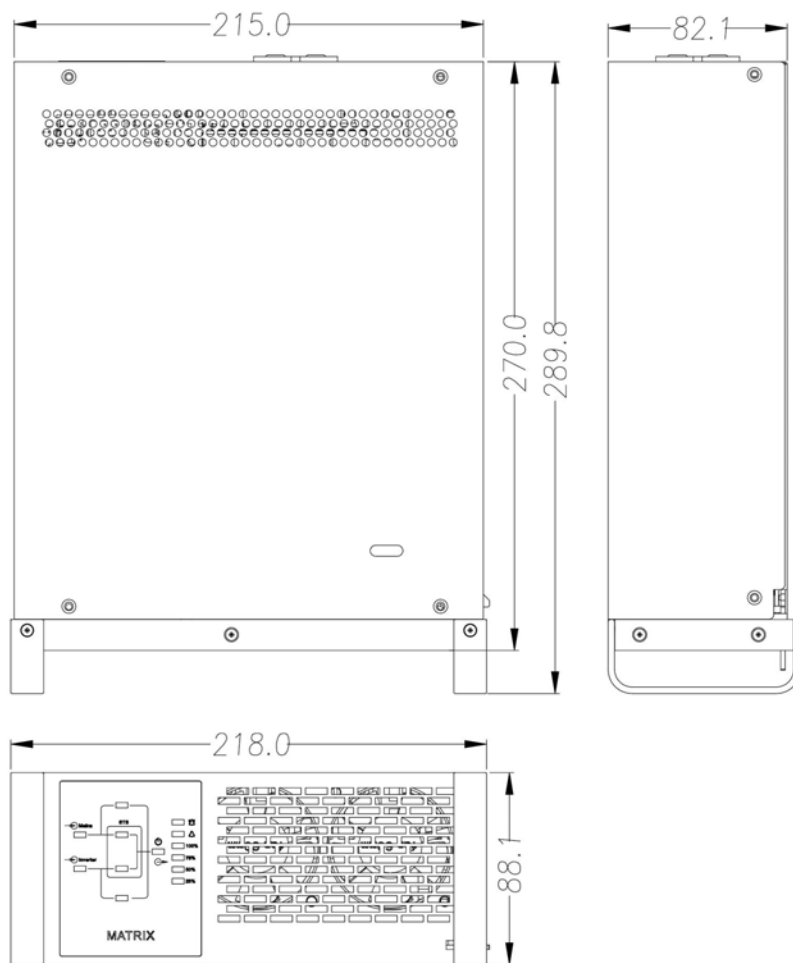
The input over/under voltage must be set by the controller. If no setting change is made the STS will adopt the widest range setting of over/under voltage in order to guarantee its performance. For 110/115/120Vac systems this range is 89Vac (under voltage point) to 138Vac (over voltage point). For 208/220/230/240Vac system this range is 176Vac (under voltage point) to 276Vac (over voltage point).

Once the STS has been set by the user using the controller it will retain the new setting unless:

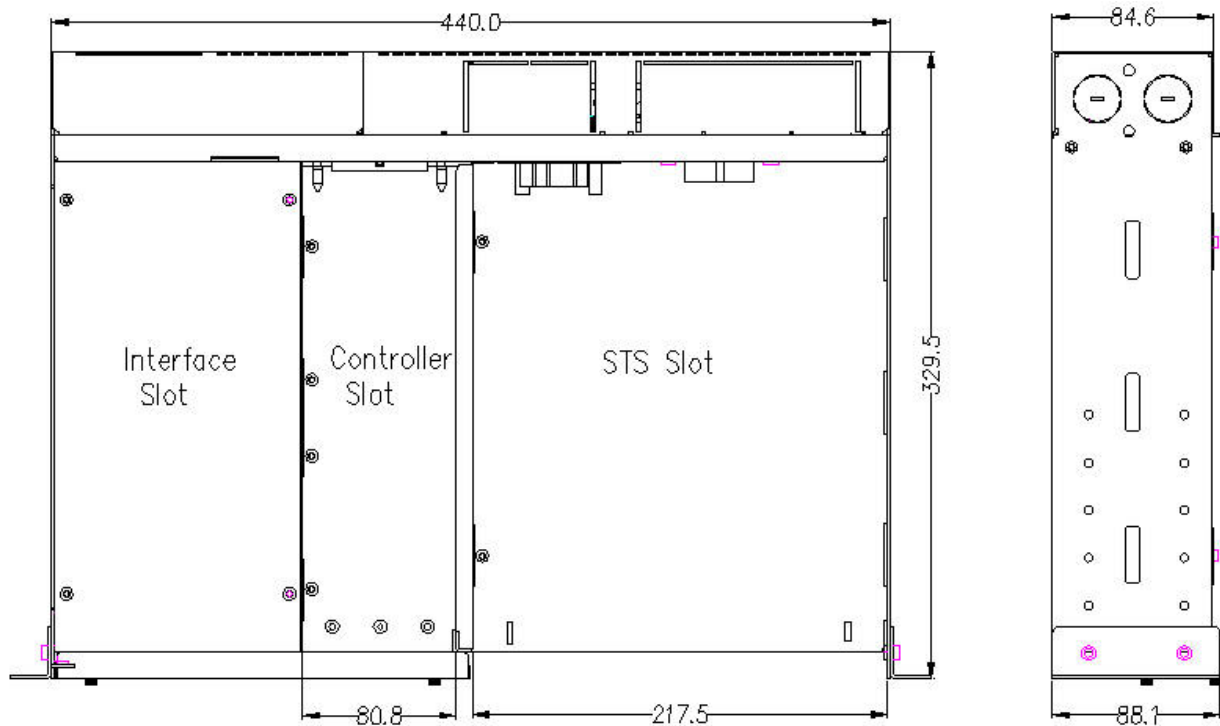
1. The user changes the setting again using the controller.
2. The source connected to the STS is changed from 120V (110/115/120) to 230V (208/220/230/240).
3. The source connected to the STS is changed from 230V (208/220/230/240) to 120V (110/115/120).

### 2.3 Physical Specifications

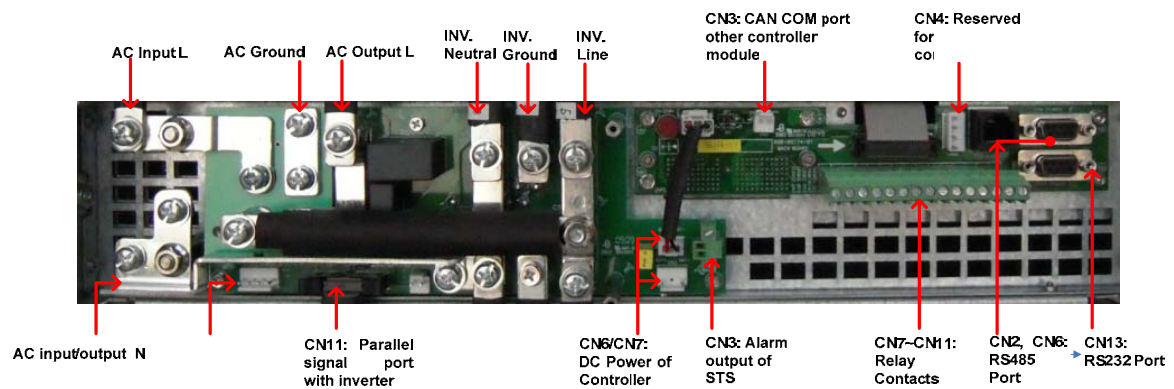
Mechanical	
STS module Dimension in mm (inches)	218(8.6)W x 88(3.46)H x 270(10.6)D
STS shelf Dimension in mm (inches)	483(19.0)W x 88.1(3.47)H x 330(13.0)D
Weight	7kg/15.4lbs
Hot swappable	The STS10048 is hot swappable only when the MBS is set to Mains Bypass or Inverter Bypass
Mechanical bypass switch requirement (MBS2U-100)	When the STS10048 is used with the MBS2U-100 mechanical Maintenance Bypass Switch module voltage free system maintenance is possible. The MBS interlocks with the STS module so that the STS module cannot be removed without the maintenance bypass being activated.
Forced cooling	2 Fans (replaceable)



**Figure 3. STS10048 Mechanical Outline**

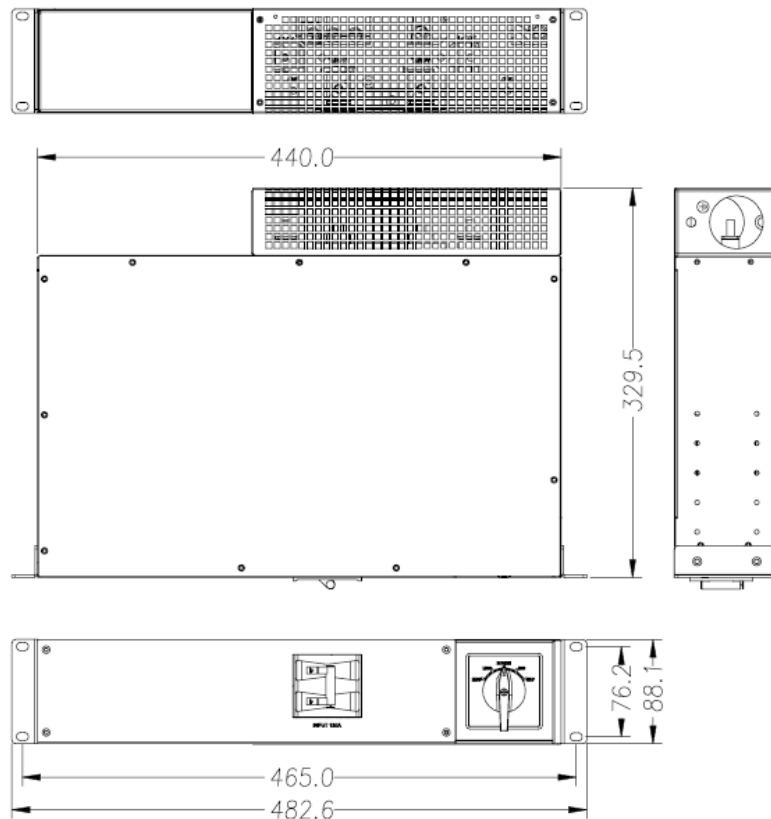


**Figure 4. INVR2UCS Shelf Outline**

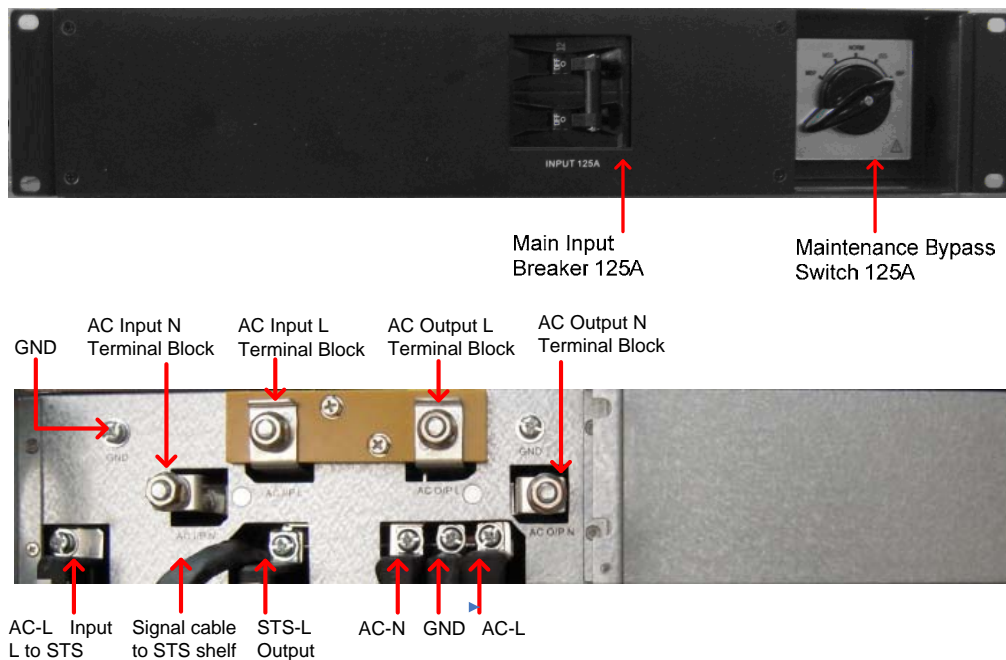


**Figure 5. INVR2UCS Rear View**





**Figure 6. MBS2U-100 Mechanical Dimensions**



**Figure 7. MBS2U-100 Front and Rear Views**

## 2.4 Environmental Specifications

Parameter	Specification
Noise	55 dB, ETS 300 753, class 3.1
Operating temperature	Operation temperature: -20°C to +50°C -20°C to +70°C with derated performance
Storage temperature	-30°C to +85°C
Operating humidity	95% RH (no condensing)
Operating Attitude	1500m

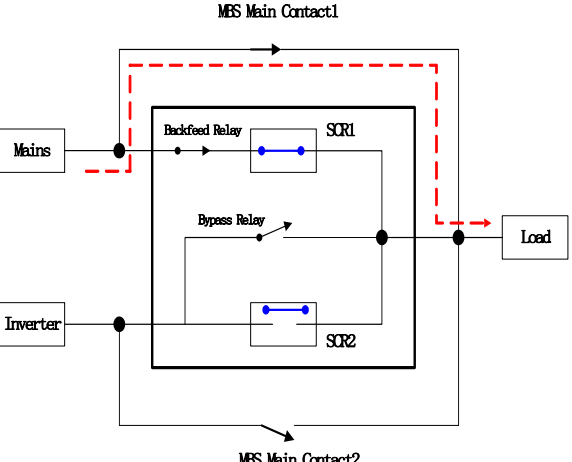
## 2.5 General Specification

Parameter	Specification
Certifications	UL
Safety	EN 62040-1-1 / IEC 62310-1/ UL-1778
EMC	EN55022 class B
MTBF	> 200,000 hours as per Telcordia SR-332.
RoHS	Compliant
Alarm relay	Dry contact alarm output

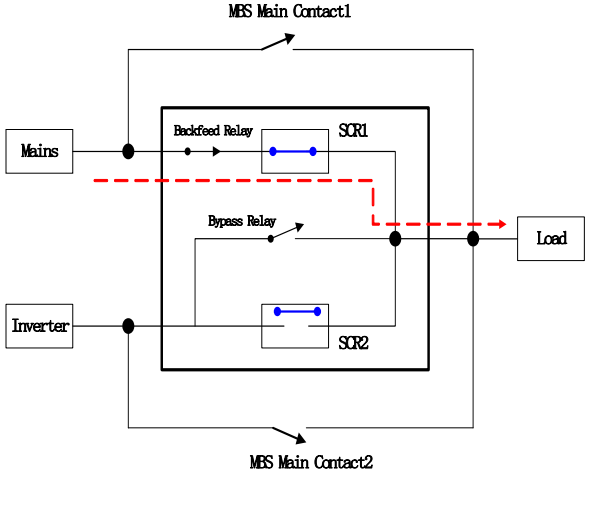
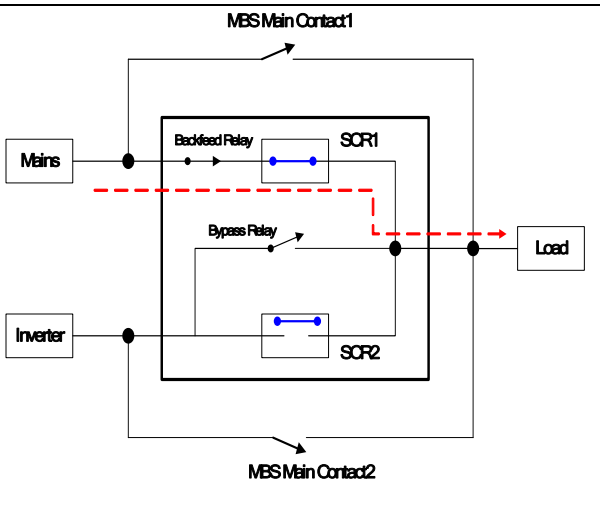
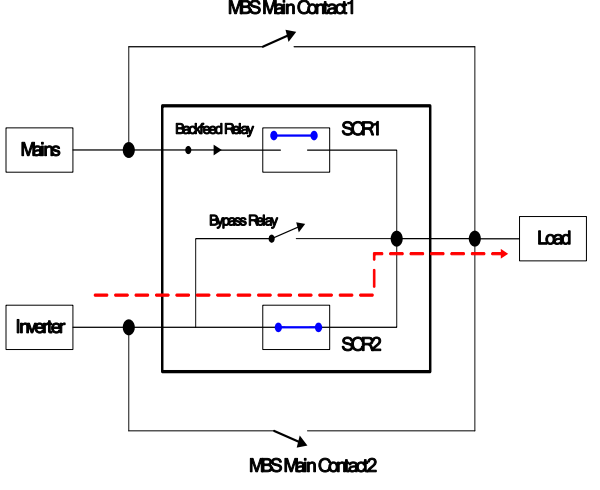
## 2.6 Protection Specification

### 2.6.1 Principles of Operation

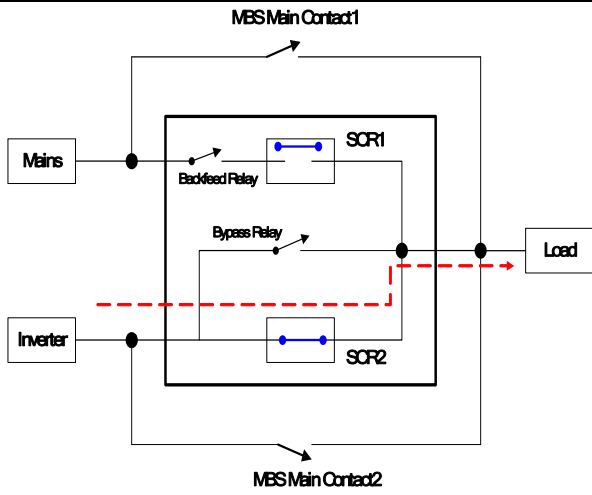
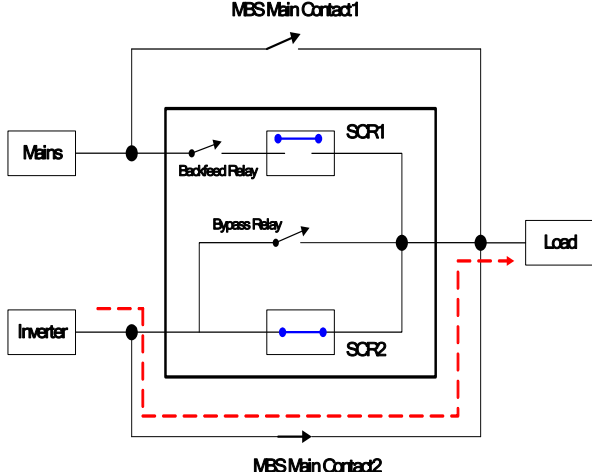
The operation mode of the STS is closely linked with the position of MBS. The MBS has two main contacts and three auxiliary contacts, signals generated by the three auxiliary contacts are passed to STS for position detection. Once an auxiliary contact is closed, the signal is logic 0, in reverse it will be logic 1. The combination of logic 0 and 1 can produce five valid position statuses.

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

**INSTALLATION & OPERATING MANUAL**

MBS Status	Schematic operation principle of STS	Description
<b>Inverter Maintenance (P2)</b>		<b>Inverter Maintenance</b> <ul style="list-style-type: none"> <li>• Mains AC powers the load through the static switch</li> <li>• Inverters are on, but do not provide any load power</li> <li>• Inverters can be removed from the system but the STS cannot</li> <li>• MBS can be switched from P2 to P1 and P3 position</li> <li>• SCR2 open, SCR1 and Back-feed Relay closed</li> <li>• When SCR2 short, the STS will keep the off-line mode</li> </ul>
<b>Normal Operation (P3)</b>		<b>Normal Operation:</b> <ol style="list-style-type: none"> <li><b>1. Mains priority</b> <ul style="list-style-type: none"> <li>• Mains AC powers the load through the static switch</li> <li>• MBS can be switched from P3 to P2 and P4 position</li> <li>• SCR2 open, SCR1 and Back-feed Relay closed</li> <li>• When the mains voltage or frequency is abnormal, and the inverter is normal, the STS transfers to on-line mode</li> <li>• When SCR2 is short, the STS will remain in off-line mode</li> </ul> </li> </ol>
		<ol style="list-style-type: none"> <li><b>2. Inverter priority</b> <ul style="list-style-type: none"> <li>• Inverter powers the load through the static switch</li> <li>• MBS can be switched from P3 to P2 and P4 position</li> <li>• SCR1 open, SCR2 and Back-feed Relay closed</li> <li>• When the inverters voltage or frequency is abnormal, and the mains is normal, the STS transfers to off-line mode</li> <li>• When SCR1 is short, the STS will keep the on-line mode and the Back-feed relay will open</li> </ul> </li> </ol>



MBS Status	Schematic operation principle of STS	Description
<b>Mains Maintenance (P4)</b>		<b>Mains Maintenance</b> <ul style="list-style-type: none"> <li>• Inverter powers the load through the STS</li> <li>• AC mains is disconnected from the system and the STS cannot be removed from the system</li> <li>• MBS can be switched from P4 to P3 and P5</li> <li>• Back-feed Relay and SCR1 open and SCR2 closed</li> </ul>
<b>Inverter Bypass (P5)</b>		<b>Inverter Bypass</b> <ul style="list-style-type: none"> <li>• Load is powered through the MBS by the inverters</li> <li>• STS can be removed from the system</li> <li>• MBS can only be switched from P5 to P4 position</li> <li>• Back-feed Relay and SCR1 open and SCR2 closed</li> </ul>

### 2.6.2 Voltage & Frequency Range

The STS module has two inputs and one output.

The two inputs are Mains input and Inverter input; the output is System output.

The STS will detect Mains voltage and Inverter voltage in order to decide system's supply mode when the system is running.

If both Mains and Inverter inputs are present, by default Mains has priority to decide the operational status of system; i.e. the STS will firstly consider Mains status to decide system's running voltage and frequency.

Following confirmation of voltage and frequency, the over/under voltage and over/under frequency is set as in the following tables.

Note that the STS can be set to 'online' or 'offline' priority using the controller.

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

	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

The STS will transfer to the auxiliary source if the priority input voltage exceeds a pre-set value.

The over/under voltage limit can be set through the controller as shown in the following table.

Users can set any value that is in the valid range. The STS won't accept data that outside the valid range.

The valid range is determined by the rated voltage sent to the STS by the inverter, such as 110V, 115V, 120V as shown in the table.

Adjustable range		120Vac			230Vac			
		110V	115V	120V	208V	220V	230V	240V
<b>Over volt</b>	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
<b>Under volt</b>	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

**Notes:**

If The STS has never had the over/under volt settings changed through the controller, then it will set the default value as shown in the table.

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 they are reset through the controller; unless the STS powers on with the Mains/Inverter voltage changed from 120V system to 230V system or 230V to 120V in which case it is reset to the default settings.

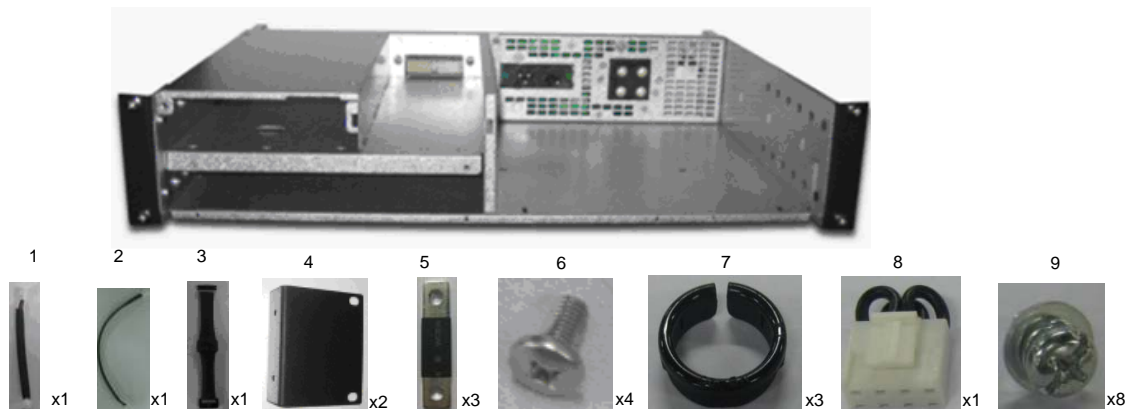
### 3. Installation and Operation

#### 3.1 Unpacking and Inspecting

Upon receiving the STS module or chassis, remove the unit from its packaging and inspect it for scratches, cracks, broken connectors or missing accessories. Your inverter chassis should ship with the following accessories. If any are missing or damage is discovered, repack the unit and return it to the supplier.



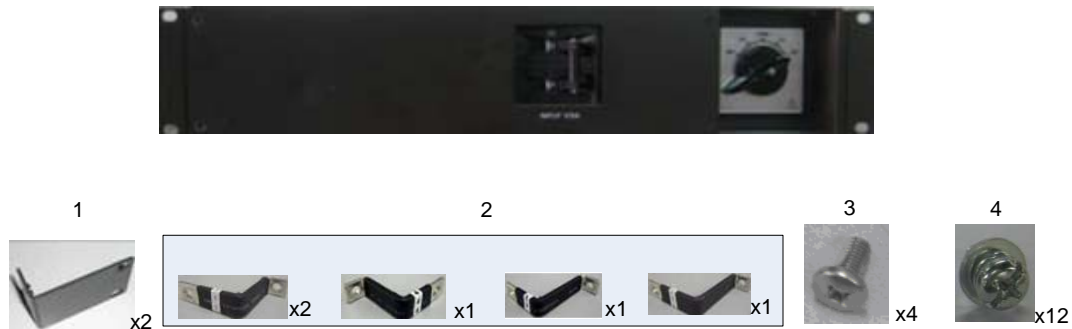
**Figure 8. Packing List for the STS10048 module**



**Figure 9. Packing List for the INVR2UCS Shelf**

1. 1 x CAN cable for controller
2. 1 x DC Power cable for controller
3. 1 x Communication cable
4. 2 x 23" mounting brackets
5. 3 x inter-connection bus bars
6. 4 x M6 screws for brackets
7. 3 x cable protection grommets
8. 1 x short jumper
9. 8 x M6 screws for bus bar



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**Figure 10. Packing List for the MBS2U-100 Maintenance Bypass Unit**

1. 2 x 23" mounting brackets
2. 5 x inter-connection bus bars
3. 4 x M6 screws for brackets
4. 12 x M6 screws for bus bar

### 3.2 Handling & Storage

If the STS module, shelf and MBS unit are going to be stored prior to installation, they should be placed in a cool, dry, well-ventilated location free from rain, splashing water, chemical agents, etc. The equipment should be stored in its original packing material until it is going to be installed.

The STS module can be removed from the shelf by drawing out the handle. Firstly, unscrew the steel bolt, then pull out the handle until the whole module has been removed. When the STS module has to be installed in the shelf, the bolt should be screwed in to lock it in place.

### 3.3 Location

The system is designed for installation in a protected environment. Factors to be considered in selecting a location include ventilation, temperature, humidity, and accessibility. Install the system in a clean, dry location with an unrestricted air flow and sufficient space for rear and front access. Maximum performance is available in ambient temperatures from -5°C to 50°C. Higher ambient temperatures will lead to a shorter lifetime unless the system capacity is appropriately derated. Gasses emanating from the battery can be corrosive and highly flammable, so isolate the system from the battery source as much as possible.

### 3.4 Frame Assembly

#### 3.4.1 Installing the controller/interface/STS chassis

1. The controller/interface/STS chassis is supplied as standard with the 19-inch rack-mount brackets fitted. For 23-inch rack mounting, these need to be exchanged with the proper mounting brackets. Place the controller/interface/STS shelf in the equipment rack horizontally immediately above the topmost inverter shelf and align the holes of mounting brackets with those of the rack. Secure the shelf in position with four of the supplied crosshead pan type nickel screws as shown below.

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2. All input and output connections are made through the knock outs located in the top of rear cover and both side panels. Remove the rear cover to commence wiring. Cut the rear cover with a diagonal cutter on the indicate line.



### 3.4.2 Installing the MBS unit

1. The MBS unit is also supplied as standard with the 19-inch rack-mount brackets fitted. For 23-inch rack mounting, these need to be exchange with the proper mounting brackets. Place the MBS unit in the equipment rack horizontally immediately above the controller/interface/STS shelf and align the holes of mounting brackets with those of the rack. Secure the shelf in position with four of the supplied crosshead pan type nickel screws as shown below.



2. All input and output connections are made through the knock outs, located in the top of the rear cover and both side panels. The rear cover must be removed to start wiring. Cut the rear cover with a diagonal cutter on the indicate line.



### 3.5 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 following table as a guide only. Ensure that the installation complies with the specific wiring regulations applicable to your country or area of jurisdiction.**

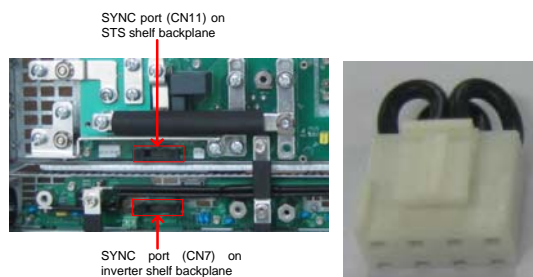
Shelf no. of 1000VA inverter cascaded	Input current Max.	AC output	Min. size of DC input wire Max.	AC output
1	46A	100A	#8/0 AWG	#2/0 AWG
2	92A		#4/0 AWG	
3	138A		#6/0 AWG * 2	
4	184A		#4/0 AWG * 2	
5	230A		#6/0 AWG * 3	
6	276A		#4/0 AWG * 3	
Shelf no. of 1500VA inverter cascaded	Input current Max.		Min. size of DC input wire Max.	
1	69A		#6/0 AWG	
2	137.9A		#2/0 AWG	
3	206.9A		#4/0 AWG * 2	
4	275.9A		#2/0 AWG * 2	
5	344.8A		#3/0 AWG * 3	
6	413.8A		#2/0 AWG * 3	

#### 3.5.1 Wiring the Inverter Shelf to the controller/interface/STS shelf

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

1. Locate connector CN11 on the rear panel of the STS Shelf and CN7 connector CN7 on the rear panel of the inverter shelf. Connect these two connectors with the supplied STS signal cable.

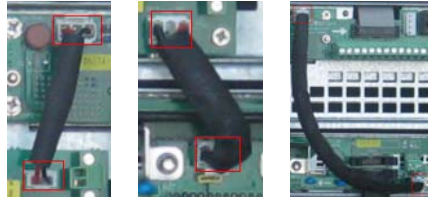
**NOTE:** the 4 pin short jumper should be installed in connector CN1 on the STS PCB if the MBS unit is not being used.



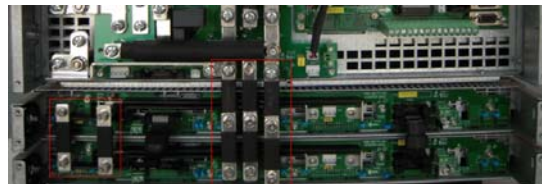


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2. Connect CN6 (STS PCB) to CN12 (Controller PCB) for controller DC power supply; Connect CN7 (STS PCB) to CN9 (Inverter shelf PCB) for STS DC power supply; Connect CN3 (Controller PCB) to CN8 (Inverter PCB) for CAN communications.



3. Connect the AC BUS bar of Controller/Interface/STS shelf to the AC BUS connector of the topmost inverter shelf.



4. Connect the DC input wires according to the instructions given in the main SABRE inverter system manual.

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 the STS shelf or the Inverter shelf.

Knock out the hole for cable on STS shelf and insert a cable protection grommet as shown.



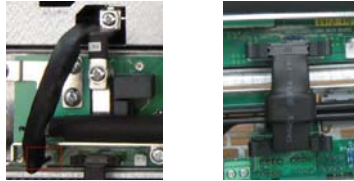
Connect AC Live to the (AC-L OUT) connector and AC Neutral to the (AC-N) connector on the controller/interface/STS shelf. Refit the rear cover and then wire the Ground cable to the rear cover.



### 3.5.2 Wiring the controller/interface/STS shelf to the MBS unit

1. Connect the Signal Cable between the MBS unit and the controller/interface STS shelf

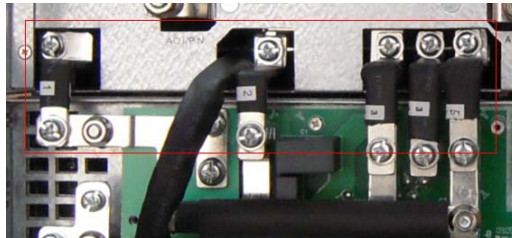
Connect the 4 pin MBS cable to connector CN1 on the PCB of the controller/interface/STS shelf. Then connect one end of STS/Inverter signal cable to connector CN11 on the backplane PCB of the controller/interface/STS shelf and connect the other end to connector CN7 on the backplane PCB of the inverter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



2. Connect Bus bar

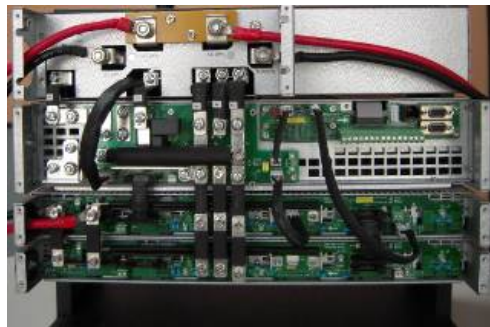
Connect the 5 bus bars supplied with the MBS unit to UC3, UC2 and UC1 on the STS backplane PCB to the corresponding connectors on the MBS unit as shown below:

- 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 the DC input wires according to the instructions given in the main SABRE inverter system manual.
4. Connect AC output/input/Ground Wires

Connect the AC input to the Terminals on the rear left of MBS unit according to the silkscreen. Refit the rear cover of the controller/interface/STS shelf.



### 3.6 STS Module Installation

To install the 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 displaced, turn the lock bolt left to the lock position.

At power on, the STS unit enters into a self-diagnostic mode. If everything is functioning correctly, the indicator will remain solid green, and the STS will detect and transfer the better quality power to the load.

Removed the module by pulling forward.

If the controller module and/or interface module are not installed fit the optional cover plates.

The optional cover plate comes into two parts. 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.



**⚠ CAUTION:** When installing the STS module with the MBS installed it is unnecessary to turn off the system.

To proceed set the Maintenance Bypass Switch to **MBP** or **IBP** (Determined by mains and inverter output status) as shown below.

Note that in all other positions a mechanical interlock prevents removal of the STS module and any attempt to do so could result in damage and a voided warranty.



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### 3.7 Installation Check

Before turning the system on, review Chapter 2 for instructions pertaining to your particular system.

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

1. DC input terminals have correct voltage polarity
2. Utility input terminals have correct voltage connections
3. AC output terminals voltage connections
4. Input conductor size correct
5. Output conductor size correct
6. Correct output voltage selected
7. Correct utility frequency selected

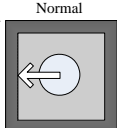
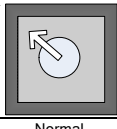
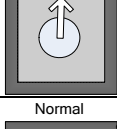
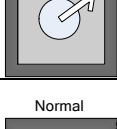

Use Troubleshooting Table in Chapter 4: Maintenance and Troubleshooting.

### 3.8 Operation

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

The MBS has two main connections and three auxiliary connections. The signals generated by the three auxiliary connections are passed to the DSP in the STS module for position detection. Once an auxiliary connection is closed, the signal generated is logic 0. In reverse, the signal will be logic 1. The combination of logic 0 and 1 provides 8 different status conditions of which five are valid. The following shows the five valid status conditions:

MBS Position (0—Low, 1—High)

	Contact Signal				
	SW1	SW2	SW3		
<b>P1</b>	0	1	1	Mains Bypass	
<b>P2</b>	0	0	1	Inverter Maintenance	
<b>P3</b>	0	0	0	Normal Operation	
<b>P4</b>	1	0	0	Mains Maintenance	
<b>P5</b>	1	1	0	Inverter Bypass	



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The STS Module will continuously detect the position of the MBS in order to decide the transfer action between the different modes.

When the STS is powered on it will interrogate whether the position of the MBS is valid. If the status is invalid it will assume the MBS is not correctly connected and will remain in a standby mode with the red LED blinking at 5Hz; at the same time an “MBS abnormal” alarm will be sent to the controller.

This condition will only be cleared when the STS detects a valid condition.

If the MBS is changed when the STS is operating with one of the five valid conditions, and this change happens between two adjacent positions, then the STS will transfer to a different mode based on the current status; otherwise the STS won't take any action.

For example, if the MBS is at P3, the STS will take action only when the MBS is turned to P2 or P4.

## 4. Maintenance and Troubleshooting

### 4.1 Preventative Maintenance

The following preventive maintenance routines should be considered as a minimum requirement. The installation and site may require additional preventive maintenance to ensure optimal performance from the system. These routines should be performed twice a year (more often if required). The technician or electrician performing preventive maintenance on the system must read and understand thoroughly this manual and be familiar with the indicators, controls, and operation of the system.

### 4.2 Troubleshooting Guide

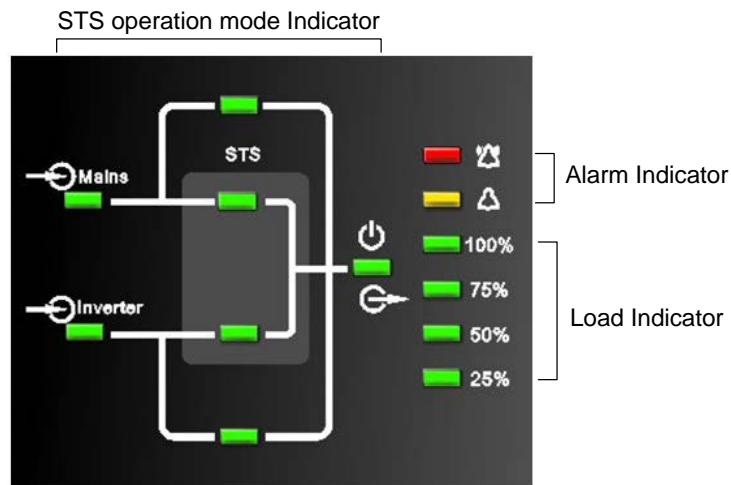
If the system fails to operate properly and the installation, setup, and operation have been checked, use the following table to determine the probable cause and obtain suggestions on how to proceed. Refer to the LED display status.

Error Condition	Possible Cause	Recommendation
No AC output and all LEDs 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 is in abnormal status	Check AC Mains connections and status
Priority is On line, STS AC output is normal but with green LED flashing once per second	STS AC input source is from utility, the inverter is in normal status; If the inverter goes from abnormal status back to normal, the STS will switch the line from utility to inverter	Please refer to inverter troubleshooting guide in the main system manual
Priority is On line, STS AC output is normal but with green LED flashing once per second and yellow LED on	STS AC input source is from utility, but inverter is in abnormal status	Please refer to inverter troubleshooting guide in the main system manual
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, but inverter is in abnormal status	Please refer to inverter troubleshooting guide in the main system manual
Priority is off line, AC is normal, but green LED flashing once per 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 on utility power side is broken and cannot close	Turn MBS to mains or inverter bypass mode, replace the STS module
No AC output, yellow LED flashing twice per second	The relay on utility power side is broken and cannot close	Turn MBS to mains or inverter bypass mode, replace the STS module

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AC output is normal, green LED is on, yellow LED flashing twice per second	The relay on utility power side is broken and cannot close	Turn MBS to mains or inverter bypass mode, replace the STS module
AC output is normal, green LED is on, red LED flashing once per second	Fan fails	Turn MBS to mains or inverter bypass mode, replace the STS Fan
AC output is normal, green LED is on, red LED flashing once per second	EEPROM FAULT EEPROM can't write or read data	This will not influence the STS AC output. The alert will go off automatically after 10s
AC output is normal, green LED is on, red LED flashing once per second	CAN communication error	Check the connection of CAN signal cables
AC output is normal, green LED is on, red LED flashing twice per second	SCR short fault	Turn MBS to mains or inverter bypass mode, replace the STS
AC output is normal, green LED is on, red LED flashing twice per second	Power Supply fault	Turn MBS to mains or inverter bypass mode, replace the STS
AC output is normal, green LED is on, red LED flashing five times per second	MBS provides 3 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 properly connected
AC output is off, red LED on, other LEDs off	STS fault mode	Turn MBS to mains or inverter bypass mode, replace the STS
AC output is off, red LED on, other LEDs off	Over temperature	Turn MBS to mains or inverter bypass mode, replace the STS, check if the environmental temperature too high or if there is anything blocking the vent
AC output is off, red LED on, other LEDs off	Over load	Decrease or remove the loads, then shut down or remove the STS module. Then reconnect it and restart
AC output is off, red LED on, other LEDs off	Output short	Decrease or remove the loads, then shut down or remove the STS module. Then reconnect it and restart
AC output is normal, green LED is on, red and yellow LEDs flashing twice per second	Inverter bypass mode	STS internal temperature is too high. Check if is anything blocking the vent or if it has been working in overload for long time

## STS LED Display



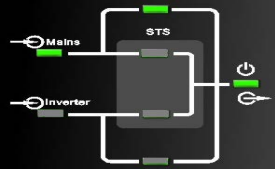
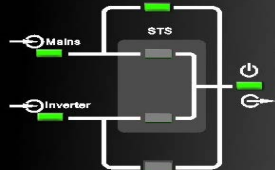
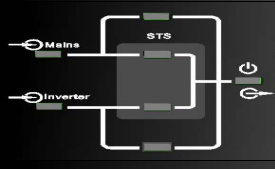
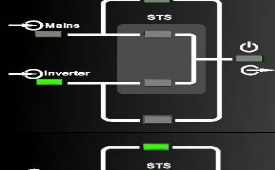



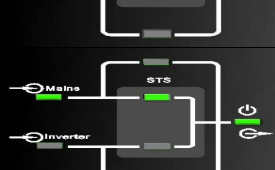


## Alarm led display status

STS Module Yellow and Red LED status			
Priority	Yellow LED	LED Signal	Status
<div> <div>Low</div> <div>↓</div> <div>High</div> </div>	Solid		Mains or Inverter abnormal
	Blink(Fast)		Back-feed relay open
	Blink (Fastest)		STS Output abnormal
Priority	Red LED	LED Signal	Status
<div> <div>Low</div> <div>↓</div> <div>High</div> </div>	Blink(Slow)		Fan lock or Can communication fail or EEPROM fault
	Blink(Fast)		SCR short
	Blink(Fastest)		MBS position abnormal
	Solid		STS Fault mode, maybe overload or over temperature or output short

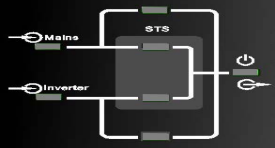











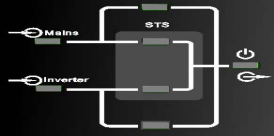
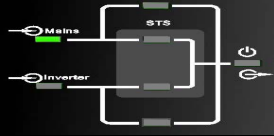




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STS operation mode display status

MBS position	LED Display	Status
<b>Mains Bypass (MBP)</b>		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.
<b>Inverter Maintenance (MSS)</b>		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.

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<b>Normal Operation (NORM)</b>			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.
			AC Mains is acceptable. Inverter output is acceptable.
<b>Mains Maintenance (ISS)</b>			AC Mains is unacceptable. Inverter output is acceptable.
			AC Mains is unacceptable. Inverter output is acceptable.
			AC Mains is acceptable. Inverter output is unacceptable.
			AC Mains is acceptable. Inverter output is acceptable.

<b>Inverter Bypass (IBP)</b>			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.

In the event that you are unable to rectify the fault using the above guide please contact technical support for assistance:

Tel: US - +1 954 346 2442 or UK - +44 1903 768200

Email: [Sales-NorthAmerica@unipowerco.com](mailto:Sales-NorthAmerica@unipowerco.com) or [Sales-Europe@unipowerco.com](mailto:Sales-Europe@unipowerco.com).

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## **SETUP & OPERATING MANUAL**

### **GRAVITAS SABRE SERIES MODULAR INVERTER SYSTEM SNMP ALARM OPTION**

**[WWW.UNIPOWERCO.COM](http://WWW.UNIPOWERCO.COM)**

Manual No. saber-snmp-2

sabre-snmp-man rev2-0416

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**Revision History**

<b>Rev.</b>	<b>Subject</b>	<b>Page</b>
A	First release	
1	New screenshot of default alarm programming	9
2	New branding	

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## 1 SNMP Option Description

The SNMP alarm trap module used in the UNIPOWER Telecom SABRE Series Inverter System adds the ability to send SNMP alarm traps over an Ethernet TCP/IP interface.

This module is installed into a special version of the 19” rack-mount shelf that houses the STS, controller and communications interface designated **INVR1U2CS-S**. This shelf is pre-configured with the IFC2000 communications module with the SNMP module installed.

The SNMP alarm module monitors the status of the five alarm relay outputs provided by the DSC2048 system controller and sends an alarm trap plus optional email message when one of these alarm conditions occurs.

The default alarms as shipped are:

Alarm 1 – Inverter Alarm #2 – Inverter Overload

Alarm 2 – STS Alarm #1 – Inverter Unavailable

Alarm 3 – Inverter Alarm #3 – Inverter Fan Fault

Alarm 4 – STS Alarm #7 – STS Fan Lock

Alarm 5 – Inverter Alarm #4 – Inverter Power Limit

These alarms can be reprogrammed to alternate alarm conditions and information about this can be found in the general SABRE Series Operating and Installation manual which can be found on our WEB site at:

<http://www.unipowerco.com/pdf/sabre-man.pdf>

Note that these alarm “names” are not programmed into the SNMP module by default; they are simply referred to as Alarm 1 through to Alarm 5.

The following sections of this manual describe the setup procedure for the SNMP option.



## 2 Sabre SNMP Module set up

The SNMP module is shipped preset with the following network configuration:

IP address: 192.168.0.200  
Subnet mask: 255.255.255.0

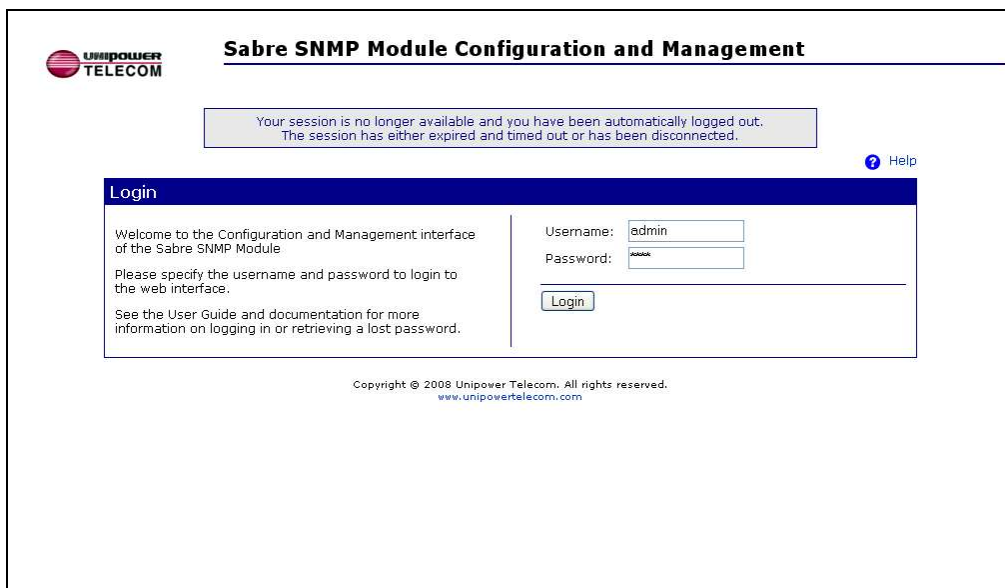
In order to connect with the module for the first time, a computer must be used with a compatible IP address range. For example: 192.168.0.1, subnet 255.255.255.0. It is suggested that the computer be directly connected to the module using an Ethernet crossover cable for the initial set up. The Sabre Inverter system should be running before attempting to connect. The SNMP module should have a yellow LED light showing on the front that indicates that a physical Ethernet connection has been made. The green LED will flash in response to Ethernet traffic.

To login to the module, the user must open a web browser and type the following into the address bar:

<http://192.168.0.200>

The login screen should then appear. If it does not then please recheck the computer network settings and ensure that the Ethernet cable is of a crossover type.

The log in screen should appear as below:



The screenshot shows the web interface for the Sabre SNMP Module. At the top left is the Unipower Telecom logo. The title is "Sabre SNMP Module Configuration and Management". Below the title is a message: "Your session is no longer available and you have been automatically logged out. The session has either expired and timed out or has been disconnected." To the right of this message is a "Help" link. Below the message is a "Login" section. The "Login" section has a blue header. Below the header, there is a welcome message: "Welcome to the Configuration and Management interface of the Sabre SNMP Module. Please specify the username and password to login to the web interface. See the User Guide and documentation for more information on logging in or retrieving a lost password." To the right of the welcome message are input fields for "Username:" (containing "admin") and "Password:" (containing "1234"). Below these fields is a "Login" button. At the bottom of the page is the copyright notice: "Copyright © 2008 Unipower Telecom. All rights reserved. www.unipowertelecom.com".

The default user name is 'admin' and the password '1234'. The password may be changed if desired in the *users* page.

Once logged in, the home page should appear:

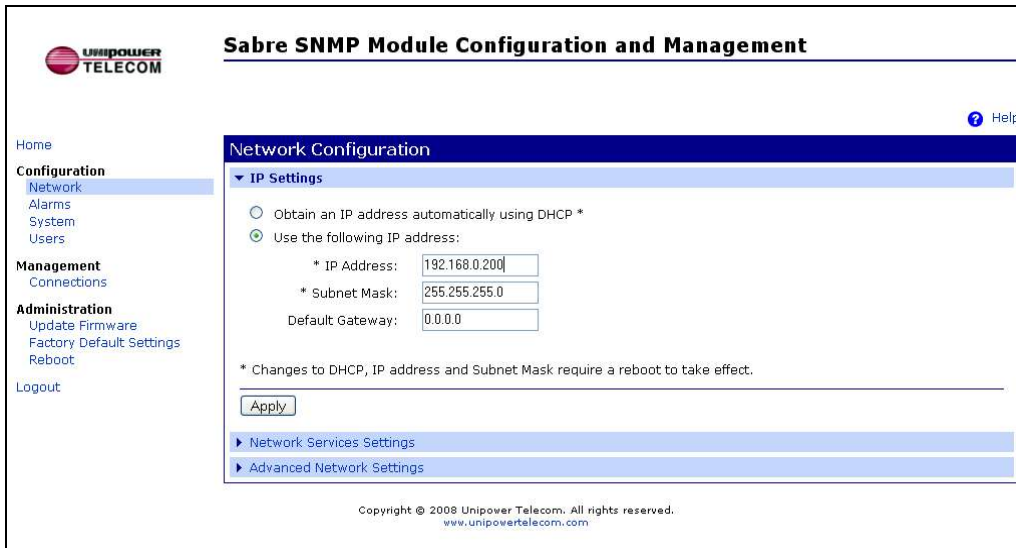


This page presents a number of menu options which are detailed on the following pages. The tutorial also mentions these as well as some other functions which are not available on this module.

## 2.1 Configuration

### Network – IP Settings

The first part of the configuration allows the user to change the IP address, subnet mask and gateway settings. The module may also be set to obtain these automatically if the services exist on the network by selecting the ‘Obtain an IP address automatically using DHCP\*’ button.



**Sabre SNMP Module Configuration and Management**

Home | Configuration | Network | Alarms | System | Users | Management | Connections | Administration | Update Firmware | Factory Default Settings | Reboot | Logout

**Network Configuration**

**IP Settings**

☐ Obtain an IP address automatically using DHCP \*  
☒ Use the following IP address:

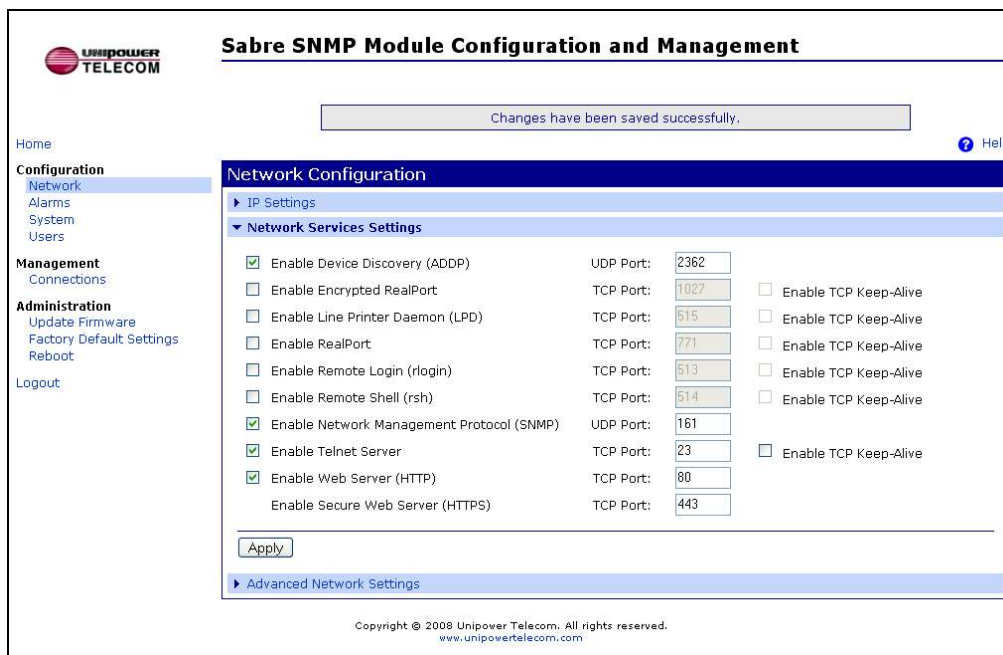
\* IP Address:   
 \* Subnet Mask:   
 Default Gateway:

\* Changes to DHCP, IP address and Subnet Mask require a reboot to take effect.

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### Network - Network Services Settings

This is the network services screen. From here the various servers can be enabled or disabled. It is suggested that only the telnet and SNMP servers be adjusted. Disabling the web server will deny access to the device for further set up. The other services should not be enabled as they are not used by this device.



**Sabre SNMP Module Configuration and Management**

Changes have been saved successfully.

Home | Configuration | Network | Alarms | System | Users | Management | Connections | Administration | Update Firmware | Factory Default Settings | Reboot | Logout

**Network Configuration**

**Network Services Settings**

<input checked="" type="checkbox"/> Enable Device Discovery (ADDP)	UDP Port: <input type="text" value="2362"/>	<input type="checkbox"/> Enable TCP Keep-Alive
<input type="checkbox"/> Enable Encrypted RealPort	TCP Port: <input type="text" value="1027"/>	<input type="checkbox"/> Enable TCP Keep-Alive
<input type="checkbox"/> Enable Line Printer Daemon (LPD)	TCP Port: <input type="text" value="515"/>	<input type="checkbox"/> Enable TCP Keep-Alive
<input type="checkbox"/> Enable RealPort	TCP Port: <input type="text" value="771"/>	<input type="checkbox"/> Enable TCP Keep-Alive
<input type="checkbox"/> Enable Remote Login (rlogin)	TCP Port: <input type="text" value="513"/>	<input type="checkbox"/> Enable TCP Keep-Alive
<input type="checkbox"/> Enable Remote Shell (rsh)	TCP Port: <input type="text" value="514"/>	<input type="checkbox"/> Enable TCP Keep-Alive
<input checked="" type="checkbox"/> Enable Network Management Protocol (SNMP)	UDP Port: <input type="text" value="161"/>	<input type="checkbox"/> Enable TCP Keep-Alive
<input checked="" type="checkbox"/> Enable Telnet Server	TCP Port: <input type="text" value="23"/>	<input type="checkbox"/> Enable TCP Keep-Alive
<input checked="" type="checkbox"/> Enable Web Server (HTTP)	TCP Port: <input type="text" value="80"/>	
<input type="checkbox"/> Enable Secure Web Server (HTTPS)	TCP Port: <input type="text" value="443"/>	

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## Network - Advanced Network Settings

This is the advanced network settings screen where further adjustments can be made to the network settings if required.



### Sabre SNMP Module Configuration and Management

[? Help](#)

Home

**Configuration**

- Network
- Alarms
- System
- Users

**Management**

- Connections

**Administration**

- Update Firmware
- Factory Default Settings
- Reboot

Logout

#### Network Configuration

- IP Settings
- Network Services Settings
- Advanced Network Settings**

The following settings are advanced settings used to fine tune the network connection and network interfaces. The default settings will typically work in most situations.

**IP Settings**

Host name:

☒ Enable AutoIP address assignment

**Ethernet Interface**

Speed:  Mode:

**TCP Keep-Alive Settings**

Idle Timeout:  hrs  mins  secs

Probe Interval:  secs Probe Count:

☒ Store extra byte in TCP Keep-Alive packets


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## Alarms – Alarms Configuration

From this page the alarm configuration can be adjusted. The Enable Alarm Notifications check box should remain checked as otherwise no notifications will be issued from either SNMP or email.

The email server IP address can be altered in the available text box. The 'From E-mail address' is usually required by mail servers in order to accept outgoing mail. These settings can be left unchanged if the email service is not required as that is disabled within each of the alarm condition configurations. Alarms for given conditions can be disabled by un-checking the check box associated with that alarm and then pressing Apply at the bottom of the screen. Further configuration of each alarm may be carried out by pressing on the blue text for each alarm.



### Sabre SNMP Module Configuration and Management

[Help](#)

- Home
- Configuration
  - Network
  - Alarms**
  - System
  - Users
- Management
  - Connections
- Administration
  - Update Firmware
  - Factory Default Settings
  - System Information
  - Reboot
- Logout

#### Alarms Configuration

##### Alarm Notification Settings

☒ Enable alarm notifications

Mail Server Address (SMTP):

From E-Mail Address:

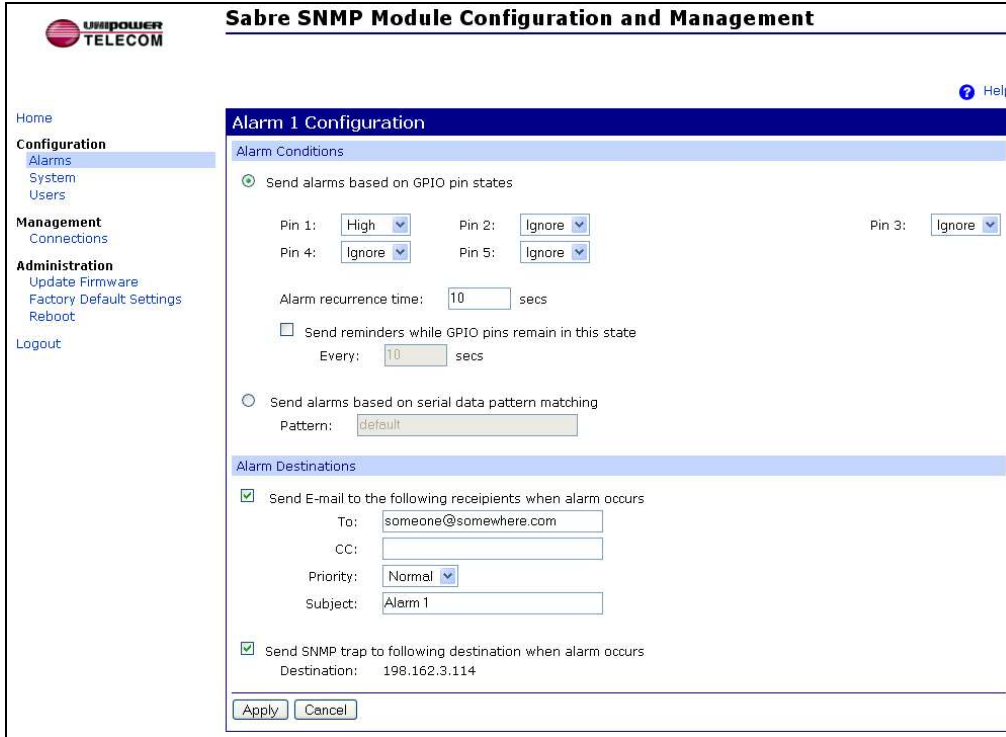
##### Alarm Conditions

Enable	Alarm	Type	Trigger	SNMP Trap	Send To	Email Subject
<input checked="" type="checkbox"/>	<a href="#">Alarm 1</a>	gpio	1 x x x x	enabled	someone@somewhere.com	Alarm 1 - cleared
<input checked="" type="checkbox"/>	<a href="#">Alarm 2</a>	gpio	x 1 x x x	enabled	someone@somewhere.com	Alarm 2 - cleared
<input checked="" type="checkbox"/>	<a href="#">Alarm 3</a>	gpio	x x 1 x x	enabled	someone@somewhere.com	Alarm 3 - cleared
<input checked="" type="checkbox"/>	<a href="#">Alarm 4</a>	gpio	x x x 1 x	enabled	someone@somewhere.com	Alarm 4 - cleared
<input checked="" type="checkbox"/>	<a href="#">Alarm 5</a>	gpio	x x x x 1	enabled	someone@somewhere.com	Alarm 5 - cleared
<input checked="" type="checkbox"/>	<a href="#">Alarm 6</a>	gpio	0 x x x x	enabled	someone@somewhere.com	Alarm 1 - activated
<input checked="" type="checkbox"/>	<a href="#">Alarm 7</a>	gpio	x 0 x x x	enabled	someone@somewhere.com	Alarm 2 - activated
<input checked="" type="checkbox"/>	<a href="#">Alarm 8</a>	gpio	x x 0 x x	enabled	someone@somewhere.com	Alarm 3 - activated
<input checked="" type="checkbox"/>	<a href="#">Alarm 9</a>	gpio	x x x 0 x	enabled	someone@somewhere.com	Alarm 4 - activated
<input checked="" type="checkbox"/>	<a href="#">Alarm 10</a>	gpio	x x x x 0	enabled	someone@somewhere.com	Alarm 5 - activated
<input type="checkbox"/>	<a href="#">Alarm 11</a>	gpio	x x x x x	disabled		

## Alarms – Individual Alarm Configuration

For each alarm condition, some configuration is possible. The only recommended changes are to adjust the email address and whether to send emails and/or snmp traps for this specific alarm. The alarm condition settings should not be adjusted.

The picture below shows an example of Alarm 1 configuration.



**Sabre SNMP Module Configuration and Management**

Home | Configuration | Alarms | System | Users | Management | Connections | Administration | Update Firmware | Factory Default Settings | Reboot | Logout

**Alarm 1 Configuration**

**Alarm Conditions**

☒ Send alarms based on GPIO pin states

Pin 1: High Pin 2: Ignore Pin 3: Ignore  
Pin 4: Ignore Pin 5: Ignore

Alarm recurrence time: 10 secs

☐ Send reminders while GPIO pins remain in this state  
Every: 10 secs

☐ Send alarms based on serial data pattern matching  
Pattern: default

**Alarm Destinations**

☒ Send E-mail to the following recipients when alarm occurs

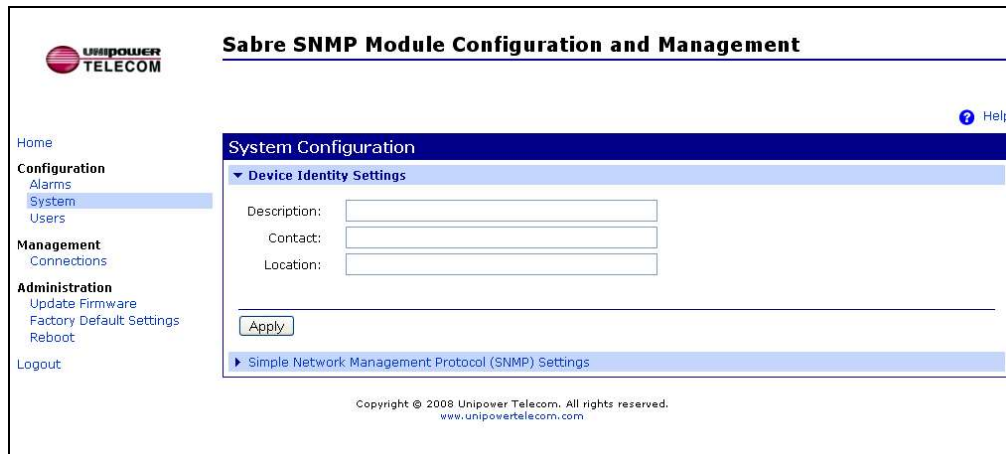
To: someone@somewhere.com  
CC:  
Priority: Normal  
Subject: Alarm 1

☒ Send SNMP trap to following destination when alarm occurs  
Destination: 198.162.3.114

Apply Cancel

## System Configuration – Device Identity Settings

On this page, the system identity, location and contact details may be entered. These are visible on the home page and are also accessible using SNMP.



**Sabre SNMP Module Configuration and Management**

Home | Configuration | Alarms | System | Users | Management | Connections | Administration | Update Firmware | Factory Default Settings | Reboot | Logout

**System Configuration**

**Device Identity Settings**

Description:  
Contact:  
Location:

Apply

**Simple Network Management Protocol (SNMP) Settings**

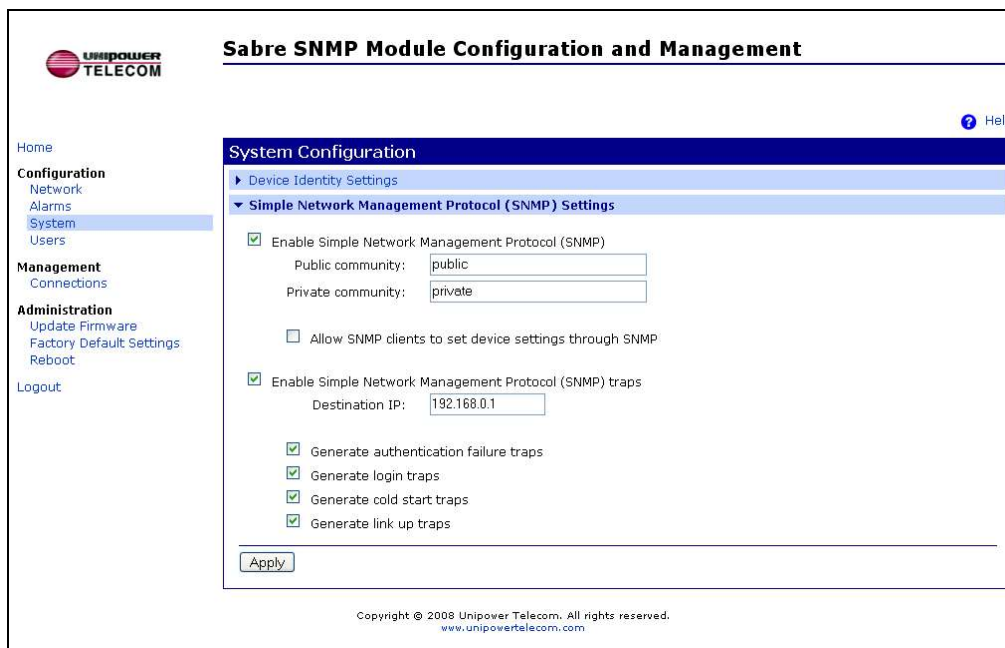
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## System Configuration – SNMP Settings

On this page, the SNMP settings may be adjusted. The check box at the top enables the SNMP otherwise it will not function. The two text boxes allow the community strings to be altered. The defaults for these are 'public' and 'private' respectively. There are certain parameters that can be set using the SNMP if desired. If this access is required, then the check box for this should be checked.

The next check box enables the module to send SNMP traps in response to alarm conditions. This box should be checked to allow this to work. The SNMP traps require an IP address for their destination. This is typically a network management station running SNMP management software. The address should be entered in the appropriate text box.

The remaining check boxes allow extra traps to be generated when conditions other than the alarms are present. Check these as required. The default is for all of these to be enabled. Please press Apply after making changes to allow these to take effect.



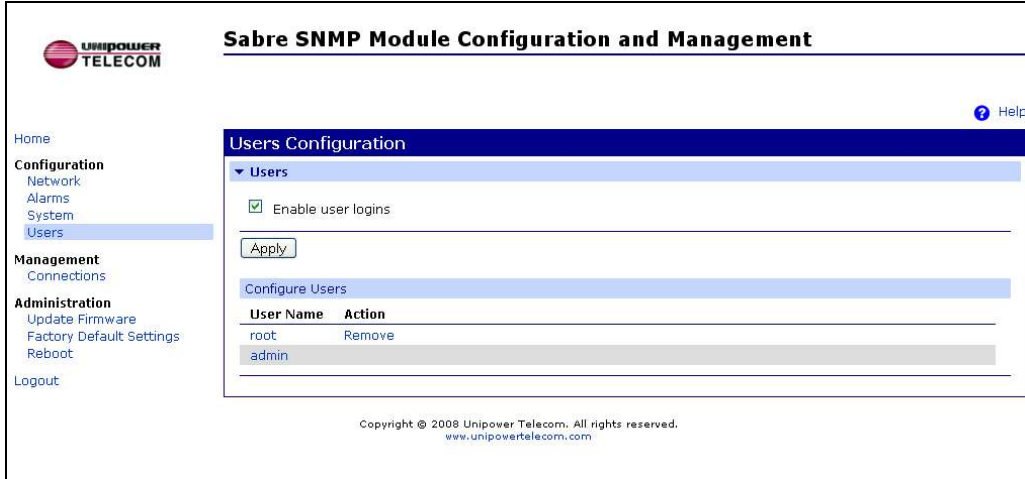
The screenshot shows the 'Sabre SNMP Module Configuration and Management' web interface. On the left is a navigation menu with sections: Configuration (Network, Alarms, System, Users), Management (Connections), Administration (Update Firmware, Factory Default Settings, Reboot), and Logout. The main content area is titled 'System Configuration' and contains two expandable sections: 'Device Identity Settings' and 'Simple Network Management Protocol (SNMP) Settings'. The 'Simple Network Management Protocol (SNMP) Settings' section is expanded, showing the following options:

- ☒ Enable Simple Network Management Protocol (SNMP)
  - Public community:
  - Private community:
- ☐ Allow SNMP clients to set device settings through SNMP
- ☒ Enable Simple Network Management Protocol (SNMP) traps
  - Destination IP:
- ☒ Generate authentication failure traps
- ☒ Generate login traps
- ☒ Generate cold start traps
- ☒ Generate link up traps

At the bottom of the configuration area is an 'Apply' button. The footer of the page contains the copyright notice: 'Copyright © 2008 Unipower Telecom. All rights reserved. www.unipowertelecom.com'.

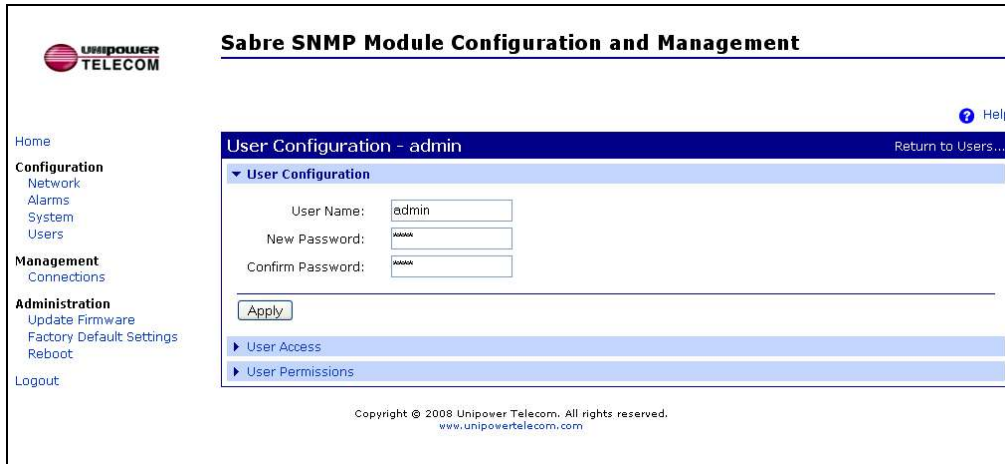
## Users – Users Configuration

This page is used to change the user password. Select the admin user name to go to the password screen. The root user may not be modified. The root user is for Unipower use only.



The screenshot shows the 'Users Configuration' page within the 'Sabre SNMP Module Configuration and Management' interface. The left sidebar contains navigation links: Home, Configuration (Network, Alarms, System, Users), Management (Connections), Administration (Update Firmware, Factory Default Settings, Reboot), and Logout. The main content area has a title bar 'Users Configuration' and a 'Help' icon. Below the title bar, there is a section 'Users' with a checkbox 'Enable user logins' and an 'Apply' button. A 'Configure Users' section contains a table with two rows: 'root' with a 'Remove' action, and 'admin'. At the bottom, there is a copyright notice: 'Copyright © 2008 Unipower Telecom. All rights reserved. www.unipowertelecom.com'.

On the User Configuration – admin screen, enter the new password in each of the text boxes and press apply to update the password. Keep careful note of this otherwise access will no longer be possible by the user.

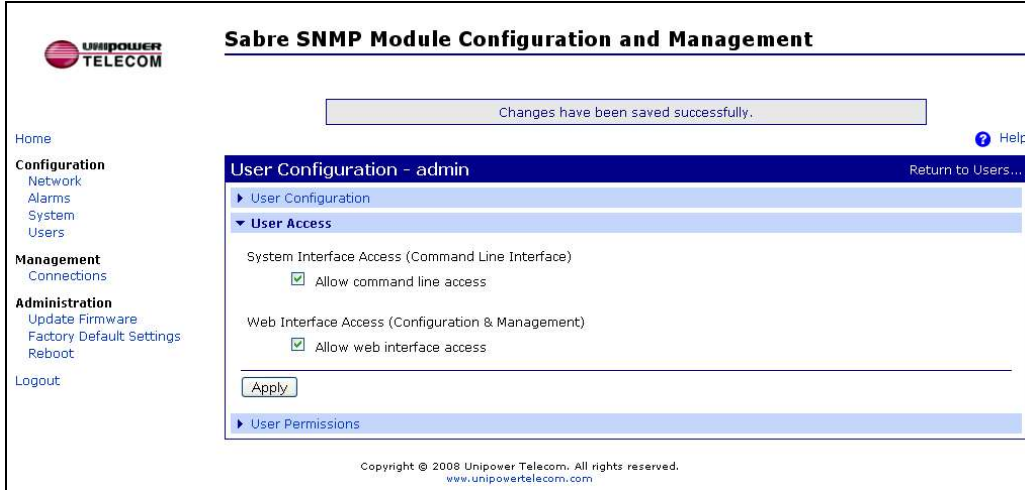


The screenshot shows the 'User Configuration - admin' page within the 'Sabre SNMP Module Configuration and Management' interface. The left sidebar is identical to the previous screenshot. The main content area has a title bar 'User Configuration - admin' and a 'Return to Users...' link. Below the title bar, there is a section 'User Configuration' with three text input fields: 'User Name' (containing 'admin'), 'New Password', and 'Confirm Password'. An 'Apply' button is located below these fields. Below the 'Apply' button, there are two expandable sections: 'User Access' and 'User Permissions'. At the bottom, there is a copyright notice: 'Copyright © 2008 Unipower Telecom. All rights reserved. www.unipowertelecom.com'.



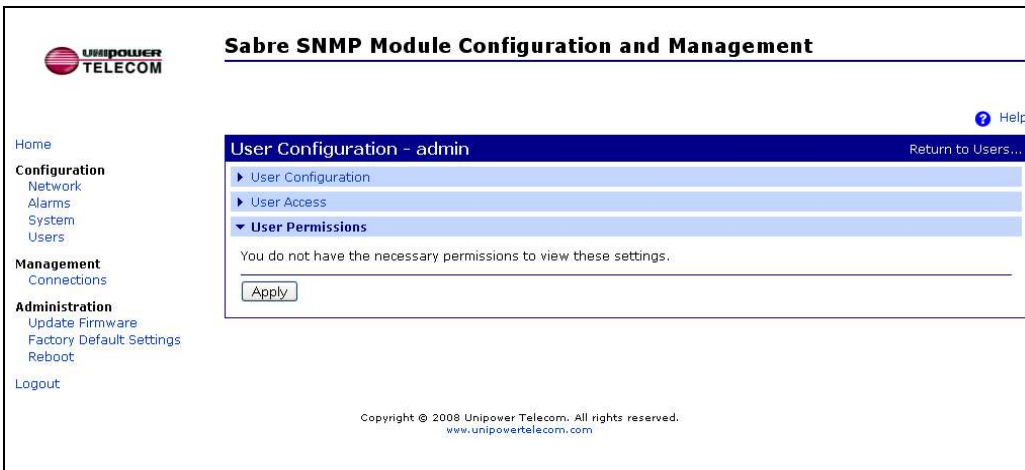
## Users – User Access

The user access screen may be used to limit access to the command line interface (telnet). It is not recommended to disable access to the web interface as otherwise no further configuration will be possible.



## Users – User Permissions

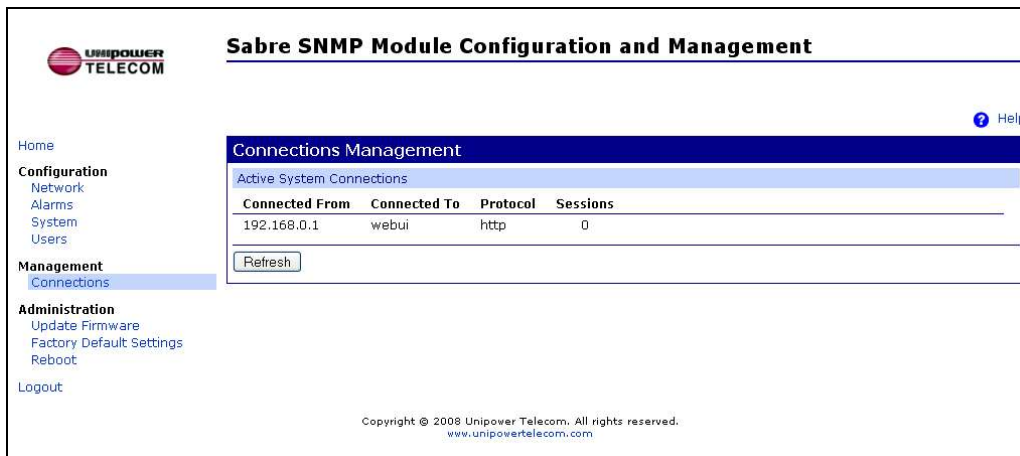
No changes are possible on this screen.



## 2.2 Management

### Connections Management

This page allows the user to view active connections.



**Sabre SNMP Module Configuration and Management**

Home

**Configuration**

- Network
- Alarms
- System
- Users

**Management**

- Connections**

**Administration**

- Update Firmware
- Factory Default Settings
- Reboot

Logout

**Connections Management**

Active System Connections

Connected From	Connected To	Protocol	Sessions
192.168.0.1	webui	http	0

Refresh

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## 2.3 Administration

### Update Firmware

This page allows the SNMP core device firmware to be updated.

**DO NOT ATTEMPT TO UPDATE THE FIRMWARE WITHOUT FIRST CONSULTING THE FACTORY**

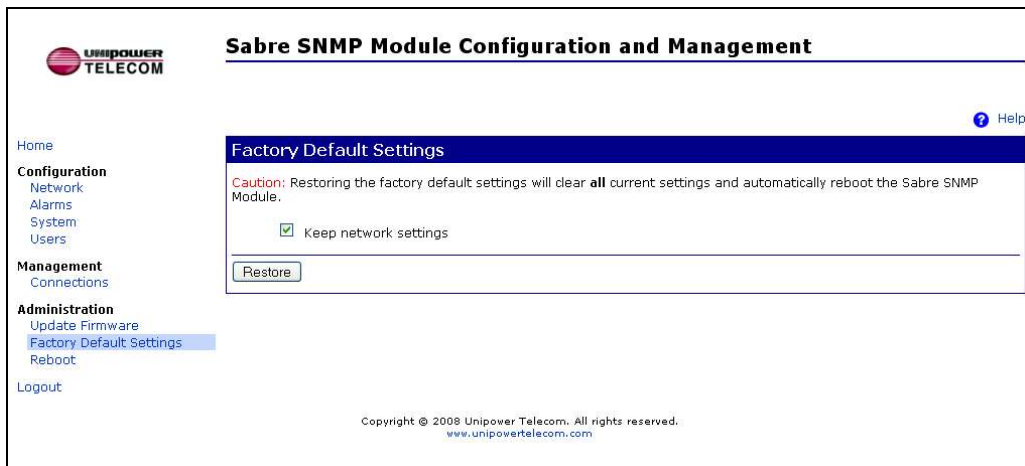


The screenshot shows the 'Sabre SNMP Module Configuration and Management' web interface. The left sidebar contains a navigation menu with sections: Home, Configuration (Network, Alarms, System, Users), Management (Connections), and Administration (Update Firmware, Factory Default Settings, Reboot, Logout). The 'Update Firmware' page is active, displaying a 'Caution' message about checking support site and release notes. It shows the current firmware version as 1.9.0.6 (Version 82000856\_F6 07/21/2006) and POST version as 1.1.3 (release\_82000867\_G). There is a 'Select Firmware' section with a text input field and a 'Browse...' button, followed by an 'Update' button. The footer contains copyright information for 2008 Unipower Telecom.

### Factory Defaults

If settings have been adjusted incorrectly, these can be restored to those that the device had when it left UNIPOWER.

Use the restore button to start this process. A reboot will occur.

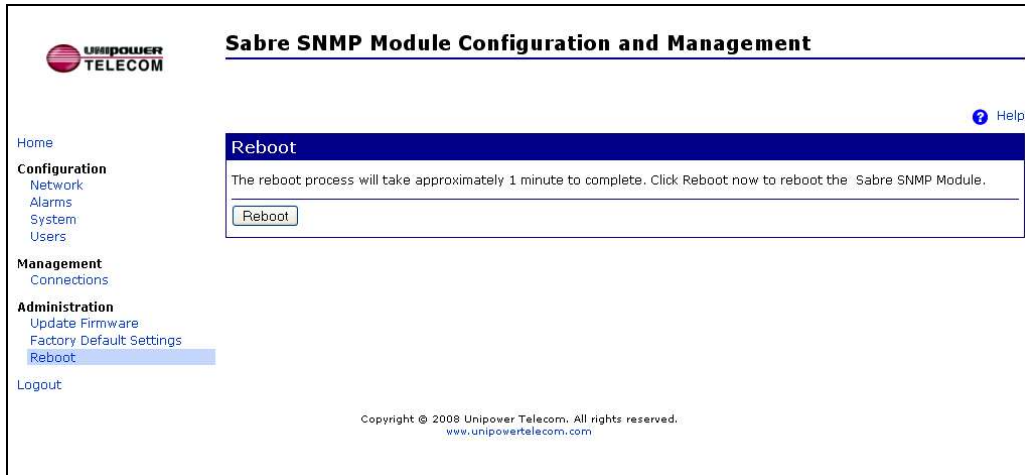


The screenshot shows the 'Sabre SNMP Module Configuration and Management' web interface. The left sidebar is the same as the previous screenshot. The 'Factory Default Settings' page is active, displaying a 'Caution' message about restoring factory default settings clearing all current settings and automatically rebooting the module. There is a checkbox labeled 'Keep network settings' which is checked. Below it is a 'Restore' button. The footer contains copyright information for 2008 Unipower Telecom.

## Reboot

Some settings such as the network settings may require a reboot.

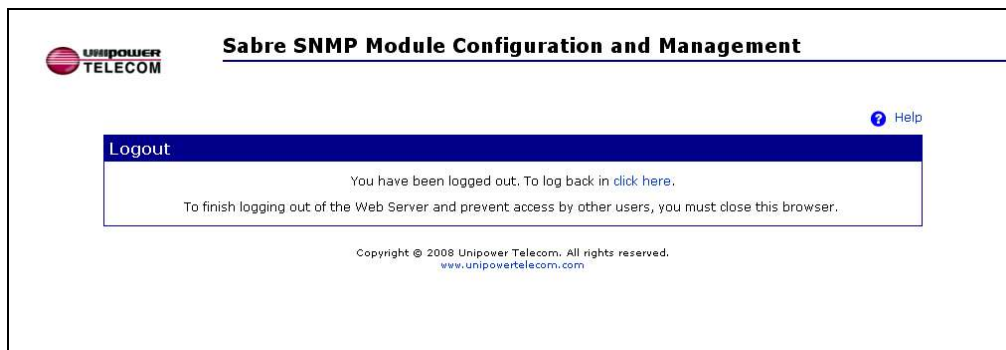
Use this function to perform that task.



## 2.4 Logout

The user should log out when all necessary changes have been made.

The screen below will appear to confirm that this has occurred.





### 3 Further SNMP information

The Sabre SNMP module supports SNMP version 1.

The following MIBs are required to be loaded into the SNMP browser in order to read the Sabre SNMP module status and correctly interpret the alarm traps:

RFC1213, MIB-II	Network Statistics
RFCs 1316, 1317	Port Statistics
DIGI-SMI	Enterprise MIB
DIGI-DEVICE-INFO-MIB	Enterprise MIB
DIGI-SERIAL-ALARM-TRAPS-MIB	Enterprise MIB

A MIB package containing the last three can be downloaded from the UNIPOWER WEB site at:

[http://www.unipowerco.com/MIB\\_files/SABRE\\_MIBS.exe](http://www.unipowerco.com/MIB_files/SABRE_MIBS.exe)

The first two are standard MIBs that should already be available to the SNMP browser.

For more information on the statistics available through the standard RFCs listed above, refer to the RFCs available on the IETF web site [www.ietf.org](http://www.ietf.org). For enterprise MIBs, refer to the description fields in the MIB text.





**USER MANUAL**  
**GRAVITAS SABRE SERIES**  
**WINPOWER PC SOFTWARE**

**[www.unipowerco.com](http://www.unipowerco.com)**

**Manual No. WINPOWER-3**  
winpower-man-rev3-0717.indd

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## Chapter 1 Winpower Introduction

### 1. Winpower profile

**Winpower** is a device monitoring software which supports either stand alone computers or network (including LAN & Internet) connected computers.

**Winpower** is used to monitor the intelligent device and safeguard computer systems from unexpected crash when power fails. With Winpower software, user can monitor and configure the device on any computer in the same LAN. With this software, one device can provide multiple computers in network with security protection simultaneously, including shutting down system in security, saving application data when AC fails.

**Winpower** can also be used to monitor the telecompower. With Winpower software, user can monitor and configure the telecompower on any computer in the same LAN.

### 2. Winpower Structure

**Winpower** is made up of three components: Agent, Monitor and TrayIcon.

**Note :** The concrete meaning of Agent refer to Appendix A — glossary explanation.

**Agent** is the core component of Winpower and runs as a system service on background.

Communicates with the device, logs events, notifies users of events, arranges actions according to user's requirement and impending shutdown when necessary. Also, Agent can be managed by Monitor.

**Monitor** is the user interface application of Winpower. Relying on Agent, it gathers real-time information and status of the device, server information and allows user to tailor the working parameters of the device. It can run on any computer on the LAN or stand alone computer.

**TrayIcon** is the management tool of Winpower. Only in Windows platform has this component.

It appears in Status Area of System task bar.

TrayIcon has two different icons for displaying current Agent status. The icons and

the related status refers to the following table 1-2-1:



 10:49 AM	Indicate the Agent is Stopped.
 10:48 AM	Indicate the Agent is Running.

Table 1-2-1

While user right clicks the Manager icon, a shortcut menu will popup. The menu items are listed below:



Diagram 1-2-1

The relationship between Agent and Monitor refers to the following Diagram 1-2-2

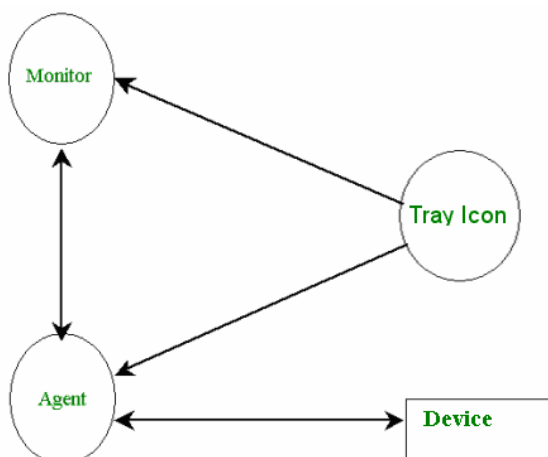


Diagram 1-2-2

### 3. Winpower Application Range

- ✓ Application of stand alone computers refers to the following Diagram 1-3-1 :



Diagram 1-3-1

- ✓ Application in the LAN refers to the following Diagram 1-3-2 :

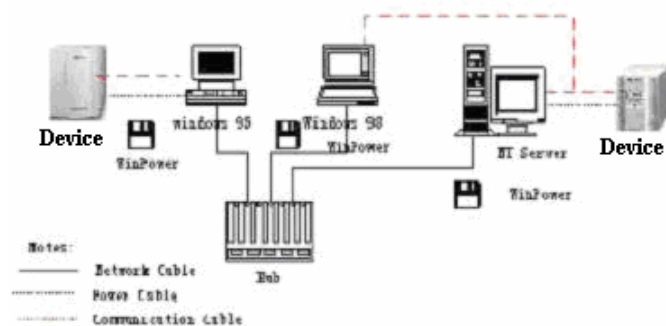


Diagram 1-3-2

✓ Application in the Internet refers to the following Diagram 1-3-3 :

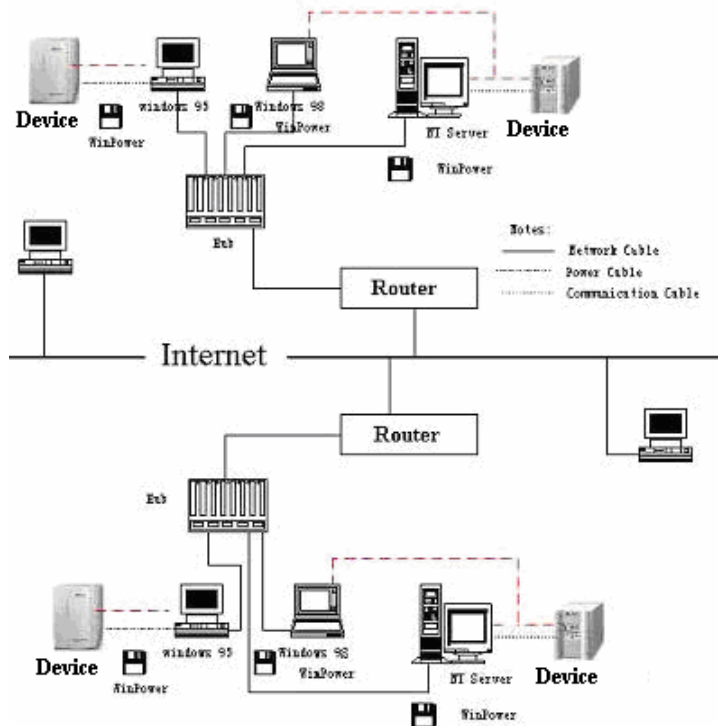


Diagram 1-3-3

#### 4. Winpower Functions & Advantages

- ✓ When Agent start, it will run continuously, protect your equipment in every moment.
- ✓ Uninstall easily and clearly with no trace. Never increase spending on system and is Green software.
- ✓ You can have a panoramic view of all the information. The information of utility power, device, loads and battery is shown on the same window and you can take in everything in a glance.
- ✓ With the function of auto searching and telecom monitoring any device in LAN.
- ✓ With the function of manual searching and telecom monitoring any device in Internet.
- ✓ With security protection function. The system administrator password can be set to prevent others from sabotaging. Only the system administrator can have the full access, other users can only view.
- ✓ With the function of data auto protection. It can close most of the running applications and save the related files.
- ✓ With the function of time turning on and off the device, which can give maximum protection to your computer system.
- ✓ With the function of network shutdown, which supply your network system maximum protection.
- ✓ With the function of data logging (including UTILITY POWER, device, LOAD and BATTERY) and event logging, so that the system administrator can carry out the device system daily maintenance.



- ✓ Flexible means of information transfer let you know the device status at any moment and at everywhere, never miss any one because of the change of time and place.
  - With the function of broadcasting messages to every users in the network.
  - With the function of sending messages via pager.
  - With the function of sending messages by EMAIL.
  - With the function of sending messages via mobile phone sending SMS.

## Chapter 2 Winpower Installation, Start & Uninstall

### 1. System Requirements

- 128 MB physical memory at least (256MB is recommended).
- 160 MB at least hard disk space.
- More than 256 colors and 800 \* 600 resolution or above display is recommended.
- The user is required to have the access of administrator.
- For Linux or Unix operating system, user must log in system with **“root”** account to carry out the installation. And need to reboot system after installation.
- TCP/IP protocol must be installed to support network management.
- An available communication port (RS-232 Serial Port or USB port) is needed while connecting to device with a special communication cable.

### Platforms supported by Winpower include the following:

Windows 7/8/10  
Windows 98  
Windows me  
Windows NT 4.0 (sp6)  
Windows 2000  
Windows 2003  
Windows XP  
Windows vista

### 2. Winpower Installation Steps

**Note: The installation must be started with “root” account in Linux and Unix systems! And after installation you must restart the system before running the Winpower!**

Enter the right directory of the CD according your platform type.

#### For GUI mode environment:

- ✓ Insert the Winpower CD, find out the operate system of your computer( such as Windows) in the CD directory, Refer to Diagram 2-2-1 below:

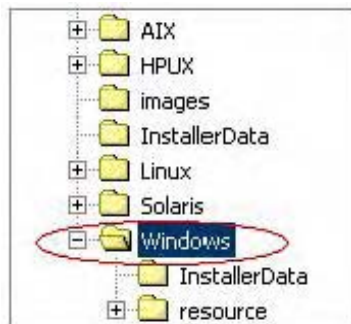


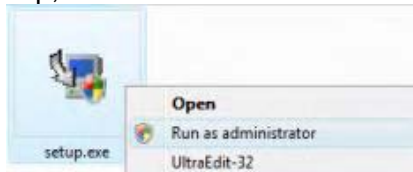
Diagram 2-2-1

For Windows platform, enter \Windows\Disk1\InstData\VM directory, run setup.exe to start the installation. Refer to the following diagram 2-2-2:



Diagram 2-2-2

**NOTICE:** For windows vista platform, enter \Windows\Disk1\InstData\VM directory, you should run setup.exe as administrator. Right click on the setup icon, then select “Run as administrator”. If a “user account control” dialog pops up, then select “Allow”.



For Mac OS X platform, enter \MacOSX\Disk1\InstData directory, double click the setup.app to start the installation. Refer to the following diagram 2-2-3-1:



Diagram 2-2-3-1

Click Lock Icon here .Refer to the following diagram 2-2-3-2



Diagram 2-2-3-2

Key in the Administrator account name and password here.Refer to the following diagram 2-2-3-3



Diagram 2-2-3-3

For other operating system, execute `./setup.bin` or `setup_console.bin`. Refer to the following diagram 2-2-4:

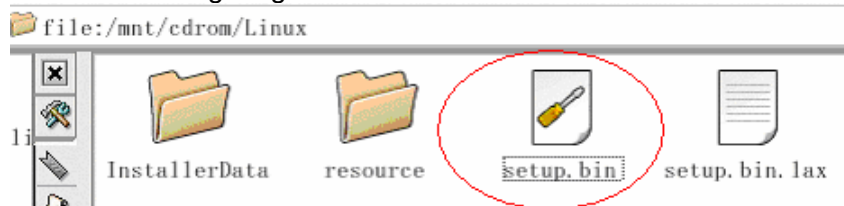


Diagram 2-2-4

Read the introduction Refer to the following diagram 2-2-5

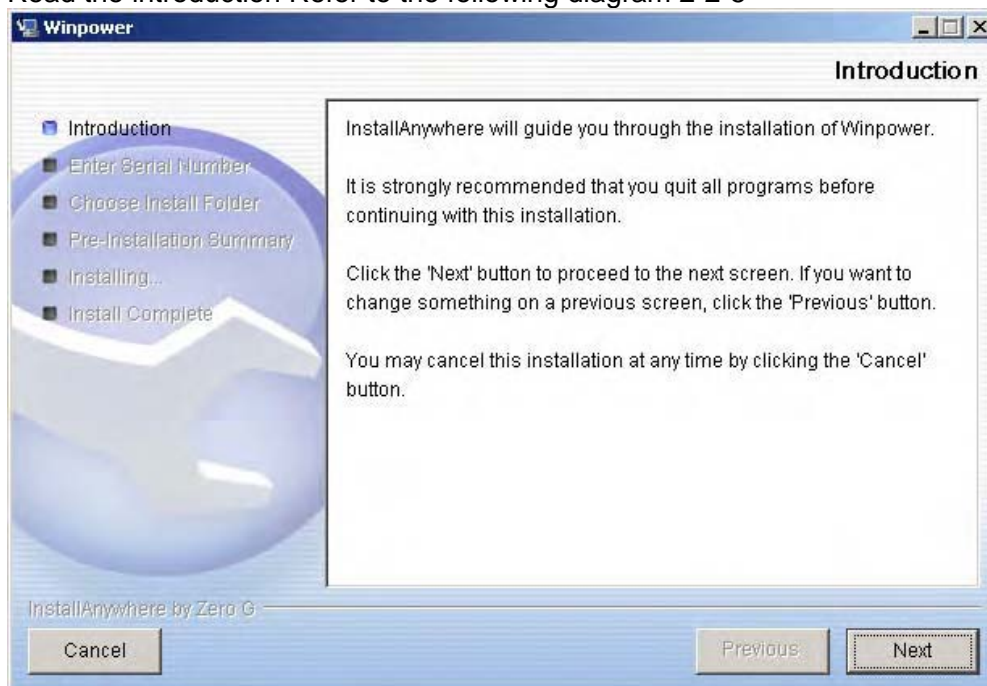




Diagram2-2-5

Click “Next”button ,and input the Serial Number, Refer to the following diagram 2-2-6

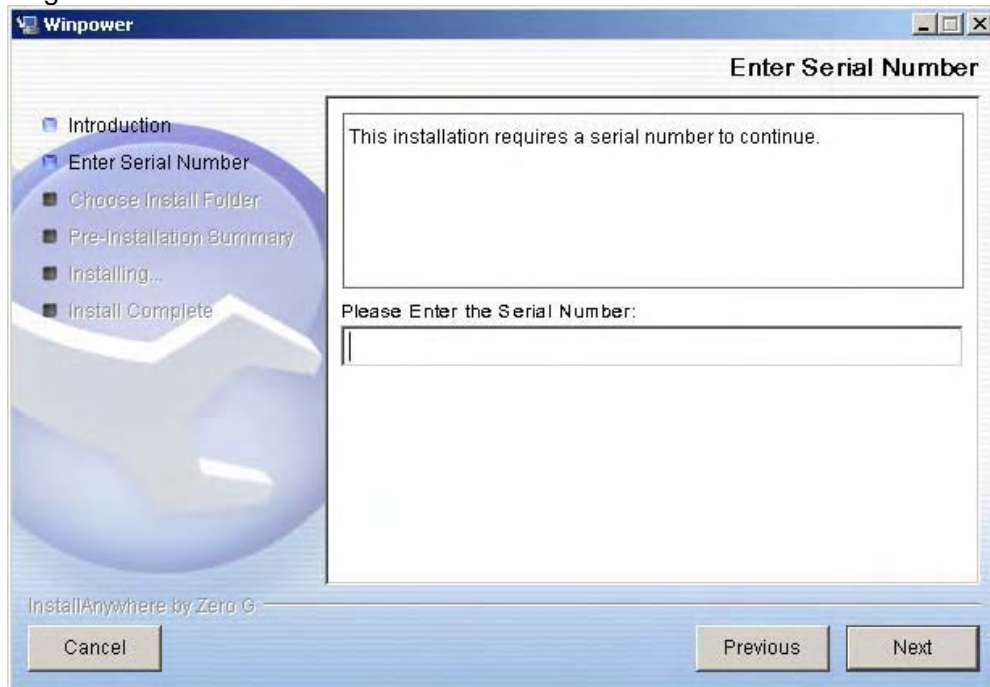


Diagram 2-2-6

Click “Next”button ,choose install folder , Refer to the following diagram 2-2-7

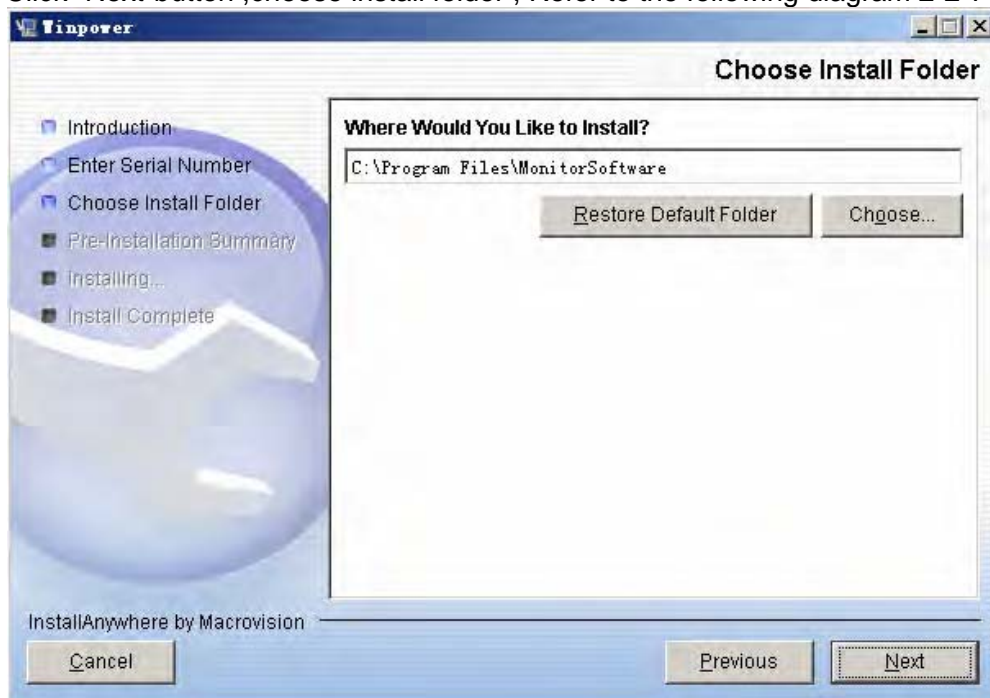


Diagram 2-2-7

Review the Pre-installation Summary, Refer to the following diagram 2-2-8



Diagram 2-2-8

Installing, Refer to the following diagram 2-2-9



Diagram 2-2-9

When the installation program is completed, click Done. Refer to the following diagram 2-2-10



Diagram 2-2-10

Clicking on the button “Done”. If the software is installed successful, “Winpower” application can be found in the Start menu\Programs\, refer to the following diagram 2-2-11.

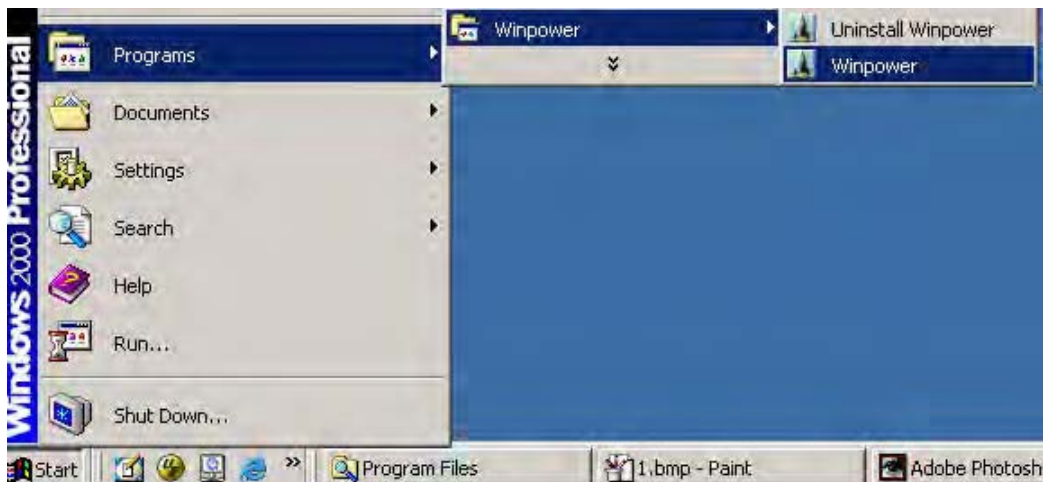


Diagram 2-2-11

**For console mode environment:**

1. Enter the directory according the system and run setup.bin or setup\_console.bin to start the installation program.

Note: For UnixWare platform, make sure JRE1.3.1 has been install in your system, then enter the /GenericUnix directory to start the setup.

2. Read the information provided, then press ENTER to continue the installation.
3. When the installation program is completed, click Done.  
Reboot the Linux and Unix system after installation.
4. The installation will set enviroment variables for Winpower in /etc/profile file.(details see 'Set environment variable' below)
5. Reboot the system in order to make this settings valid.

### 3. Start/Stop Winpower In Windows operating system

#### ✓ Start Agent:

Run the Winpower from Start\Program\Winpower will start the Traylcon and Agent. Refer to the Diagram 2-3-1 below :

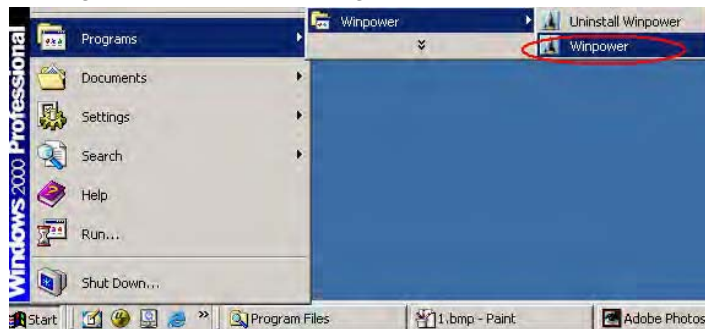


Diagram 2-3-1

The Agent can be start by the following 3 methods:

- 1) Run the Winpower from Start\Program\Winpower will start the Traylcon and Agent.refer to Diagram 2-3-1.
- 2) Right click the Agent icon showing on the bottom right corner of the display and select the 'Start Agent'item.refer to Diagram 2-3-2.



Diagram 2-3-2

- 3) For Windows operate system,Agent can be startup automatically when the computer startup.
  - 4) To start the Monitor, right click the Belkin APM Software tray icon, and select **Start Monitor**, or double click the icon.
- ✓ **Start Monitor:**  
**Method One:** Right click the Traylcon and select the "Start Monitor" menu item.refer to Diagram 2-3-3.





Diagram 2-3-3

✓ **Stop Agent:**

Right click the TrayIcon and select the "Stop Agent" menu item.  
Refer to the following diagram 2-3-4



Diagram 2-3-4

✓ **Exit:**

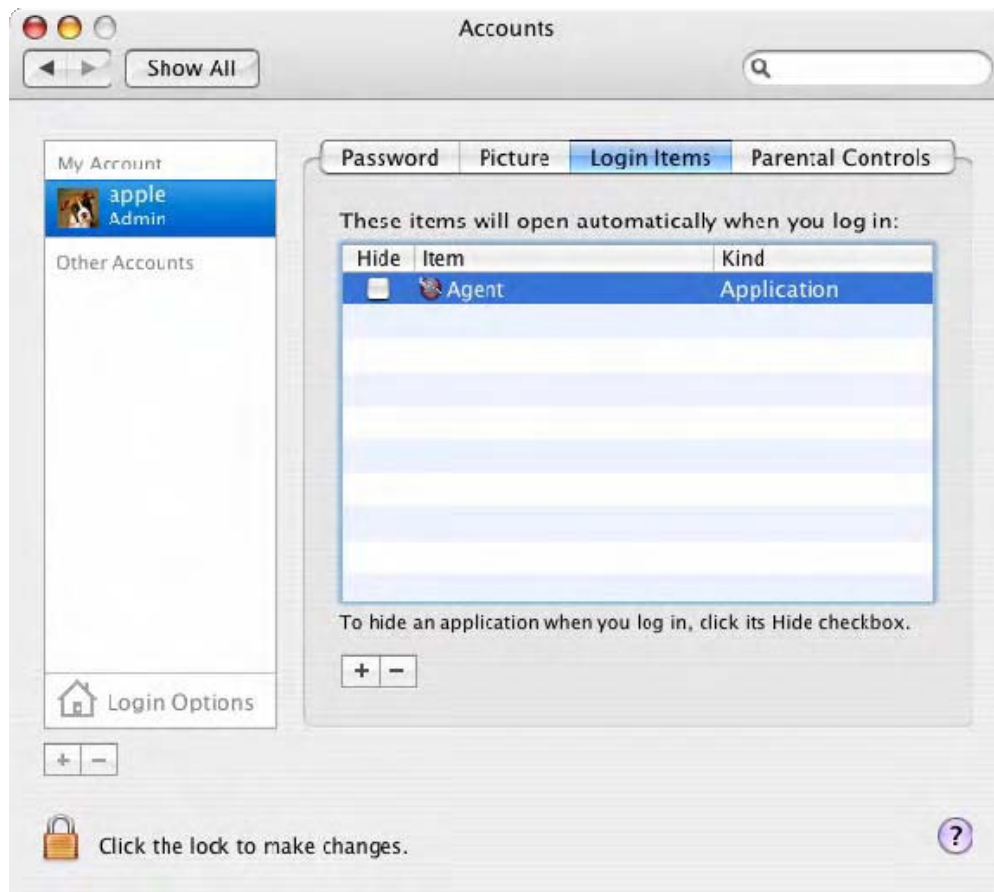
For vista OS, if you want to exit, right click the winpower Software tray icon, and select Exit. Once you exit it, you should restart the computer to start it automatically. But if you have administrator privilege, you can start it again without restart. There are two steps: the first to start the agent, open the "Services" from the "Start menu" > "Control Panel" > "Administrative tools", and find the service "winpowermonitor", right click on it, select "Start". The second to start Trayicon, click the winpower soft from Start menu > Program \ Winpower.

For other windows OS, to exit, right click the winpower Software tray icon, and select Exit .if you want to start Trayicon, just click the winpower soft from Start menu > Program \ Winpower.

**In Mac OS X**

**Set Agent to be auto started when System boot:**

Open "System Preferences -> Accounts -> Login items", click "+" icon to add the "Applications/Winpower/Agent" as Login auto start item.



### Start Agent:

You can double click the agent link in "Applications/Winpower" directory to start the Agent.

You can also start it in terminal by enter install directory and execute command:

enter /opt/monitorSoftware directory and execute command:  
./agent start

### Start Monitor:

Double click the executable monitor link in "Applications/Winpower" directory to start Monitor.

You can also start it in terminal by enter install directory and execute command:

/monitor

### Stop Agent:

Enter install directory and execute command:  
./agent stop

## In Linux and UnixWare:

### Start Agent:

enter /opt/MonitorSoftware directory and execute command:

/agent start

**Start Monitor:**

enter /opt/MonitorSoftware directory and execute command:  
/monitor

**Stop Agent:**

enter /opt/MonitorSoftware directory and execute command:  
./agent stop

#### 4. Uninstall Winpower

##### In Windows operating system

There are two kinds of methods for Uninstalling Winpower

- ✓ One is to click "Uninstall Winpower" icon in "Start/Program/Winpower" with left mouse button, refer to Diagram 2-4-1 below

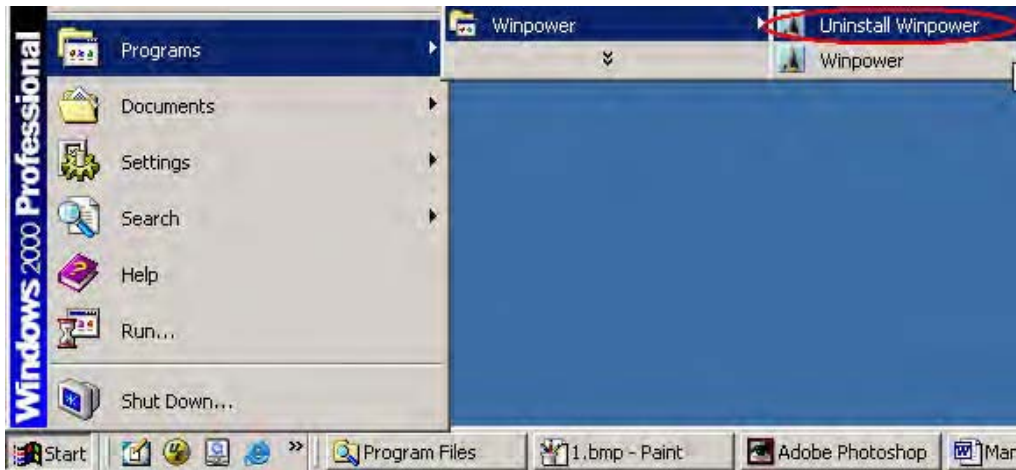


Diagram 2-4-1

**Notice:** in Vista, make sure you have administrator privilege, right click and select "Run as administrator".

- ✓ The other one is to left click "Control Panel"/"Add/Remove Program"/"Change/Remove(C)" button, see Diagram 2-4-2 below:



Diagram 2-4-2

Note: Before uninstall Winpower,your must stop all Winpower program first! Otherwise it can't be uninstall completely.

After left click, the Uninstall Program will pop up a dialog shown on Diagram 2-4-3 as below:



Diagram 2-4-3



Click the “Uninstall” button to begin to uninstall Winpower software, refer to the following diagram 2-4-4



Diagram 2-4-4

Click “Done” button and Winpower has been uninstalled completely. Refer to the following diagram 2-4-5

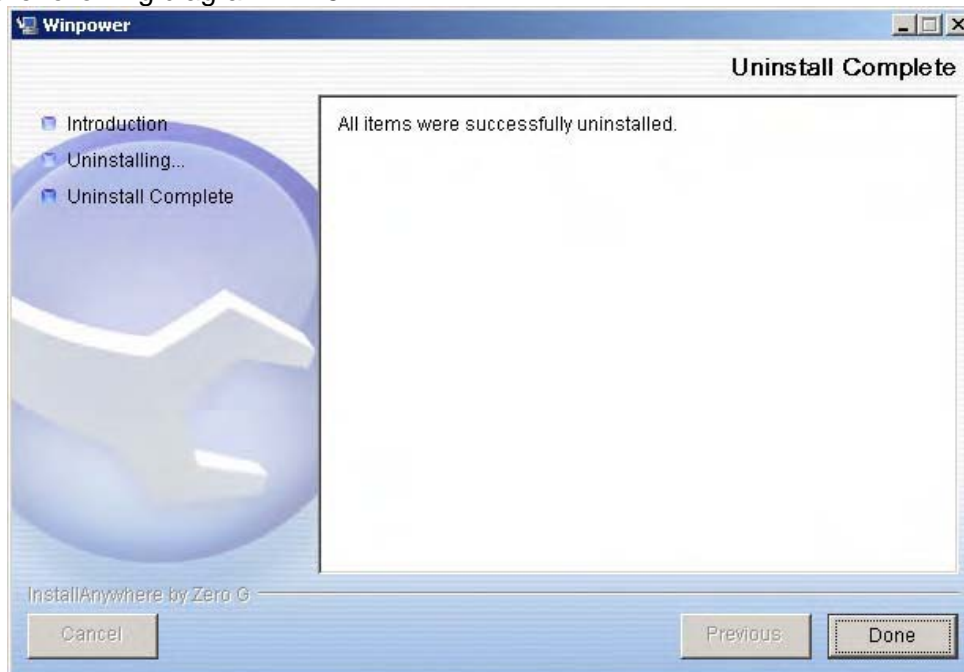


Diagram 2-4-5

Note: Before uninstall Winpower, you must stop all Winpower program first! Otherwise it can't be uninstalled completely.

## Chapter 3 Winpower User Interface

### 1. "Winpower Manager" window

Winpower Monitor shows "Winpower Manager" window which display a list of all Agents within the LAN.

There is a tree view on the left side of the window that displays a hierarchical list of items, such as 'Root', 'networks', the Agents, the COM port, USB port and the device. By clicking an item for Device, the user can expand or collapse the associated list of subitems, Refer to the following diagram 3-1-1:

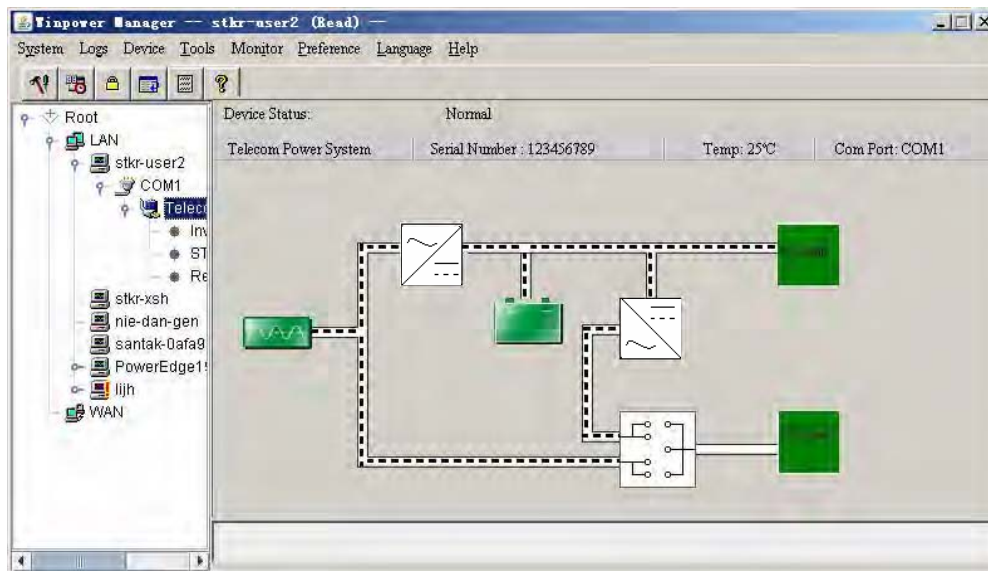


Diagram 3-1-1

If you select one of the device model from the List, details about it will be displayed on the right side, Refer to the following diagram 3-1-2



- 
- Vinpower Manager -- stkr-user2 --
- System Logs Device Tools Monitor Preference Language Help
- Root
- LAN
  - stkr-user2
    - COM1
    - Telecom Pow
      - Inverter
      - STS
      - Rectifier
    - stkr-xsh
    - nie-dan-gen
    - santak-0afa97b5
    - PowerEdge1900
    - lijh
    - WAN
- | Module a... | Rating O... | Rating I... | Output H... | Output L... | Rating o... | Rating o... | Module s... |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 0           | 221.0V      | 221.0V      | 221.0V      | 221.0V      | 1232VA      | 50.0Hz      | 100000011   |
| 1           | 220.0V      | 220.0V      | 220.0V      | 220.0V      | 1231VA      | 50.2Hz      | 100000001   |

Diagram3-1-2-1



## 2. Menu and Dialog

### 1) Auto Search Device

When user select " Auto Search Device " menu item from "System" Menu, Winpower will start searching for the device connect with the computer's serial port or USB port (for telecompower, the USB driver must be installed). See the following diagram 3-2-1-1 and diagram 3-2-1-2. Winpower can monitor not more than four COM ports and one USB port in a PC. Only in Windows 98/2000/2003/XP/Vista, Mac OS X and Linux(with kernel 2.6) can use the USB port. And for device 's USB communication only works with Windows 2000/XP/Vista and need install the usb driver at directory USB driver.



Diagram 3-2-1-1

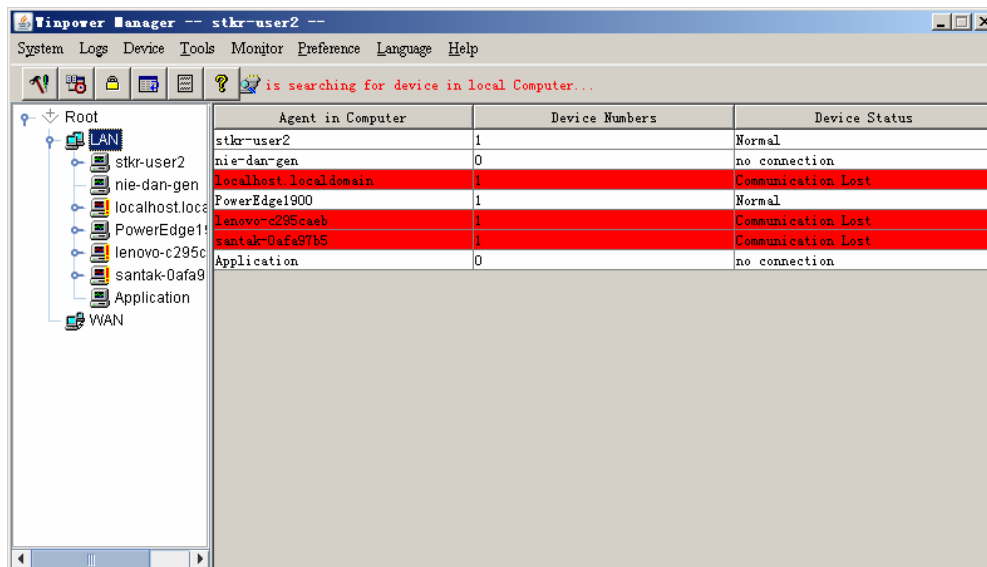


Diagram 3-2-1-2

By clicking the item in the tree view, user will get the information as below, see the following diagram 3-2-1-3:

- 1) All the computer running Winpower Agent on the LAN.
- 2) Device COM Port or USB Port.
- 3) the model type of device to which the Agent is connecting.

4) The Current Status of the Agent which user select in the tree view .

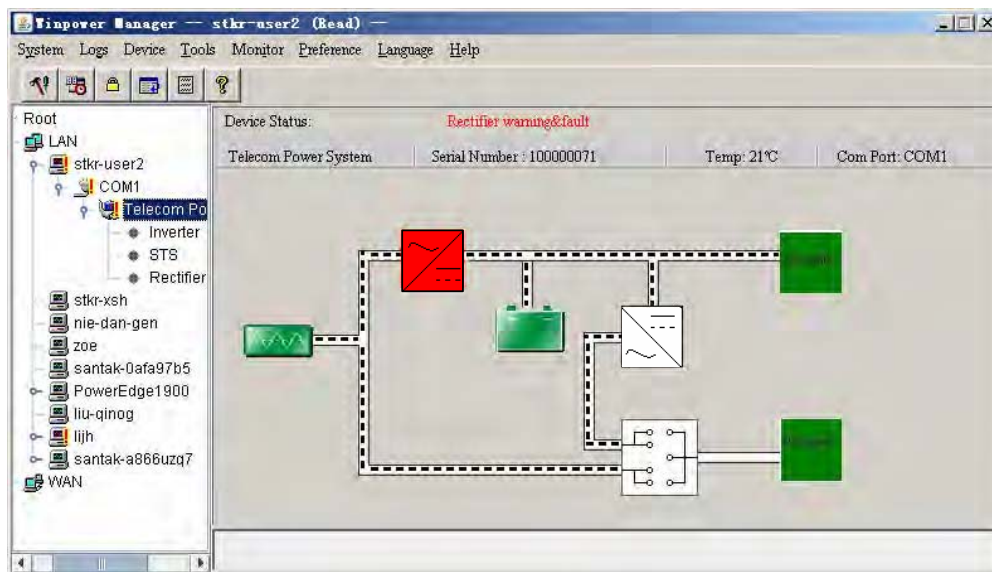


Diagram 3-2-1-3

### 2) "Administrator" Dialog

"Administrator" dialog can be opened by clicking "Act as Administrator" in the "System" menu. See the following diagram 3-2-2. Enter the administrator password in the edit box and then click "OK" button. If the password is not correct, the system will pop up a message dialog to prompt users that the user password is not correct. If the password is correct, users can get the administrator access right and set up the Agent.

Note :Initial password is "Administrator".



Diagram 3-2-2

### 3) "Administrator Password Settings" Dialog

"Administrator Password Settings" dialog can be opened from the "Modify Administrator Password" menu item of "System" menu. Refer to the following diagram 3-2-3:



Diagram 3-2-3

Administrator password only can be set by super user in local machine. If you are not a super user yet, the "Administrator" Dialog will pop up first for you to log on as administrator.

Users need to enter a new password in the "New Password" text box and reenter the new password in the "Confirm Password" text box. If the passwords are not consistent with each other, a message dialog will pop up to notify the users that the password is not correct and request the users to enter it once again. If the passwords are consistent with each other and the button "OK" is selected, the new password will be accepted by the system.

#### 4) "Event log Viewer" Dialog

"Event Log Viewer" Dialog will show when user selects "Event Log" menu item from "Logs" Menu or clicks buttons from toolbar, or clicks the "View log" button of event log in the "Record Setting" dialog, then the "Event Log" dialog will pop up. See the following Diagram 3-2-4. The dialog displays a list of history events.

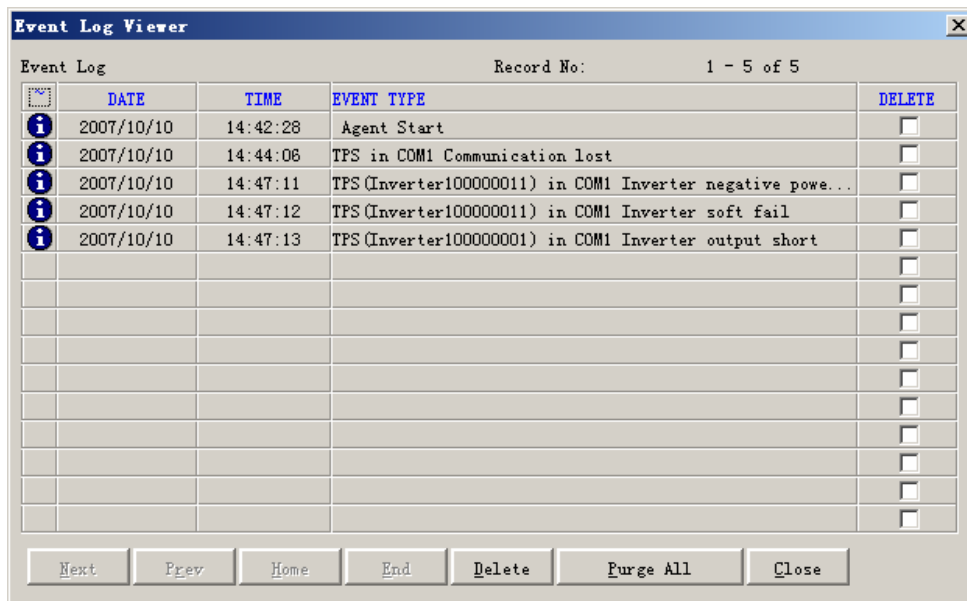


Diagram 3-2-4

User can select the check box “Delete” and click "Delete" button to remove the selected events.

Users can click “Close” button to close the dialog.

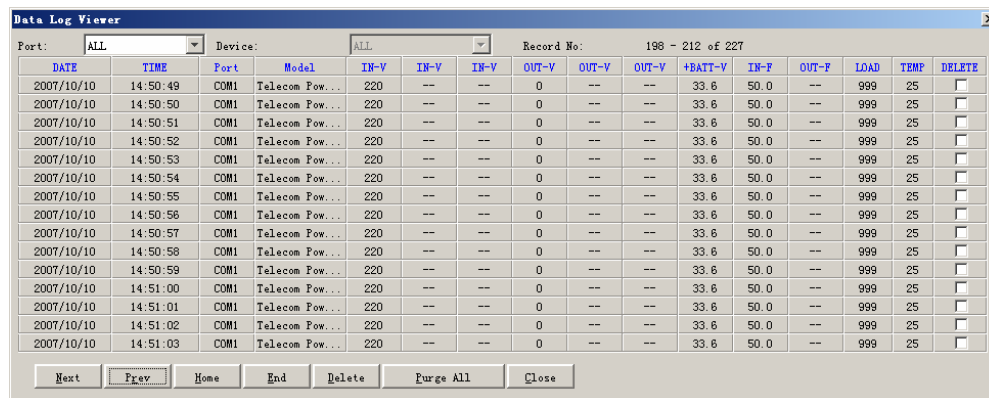
Users can click "Purge All" button to delete all of the events.

Note: If “Delete” and "Purge All" button is in invalid condition, which means your access right to the current Agent is “Read Only”, you can not carry out the operation. You may log in as super user through the “Act as Administrator” menu.

### 5) "Data log Viewer" Dialog

"Data Log Viewer" Dialog will popup when users select "Data Log" menu item from "Logs" Menu , or click buttons from toolbar or click “View log” button of data log in the “Record Setting” dialog. Refer to the following Diagram 3-2-5, the history data will appear in this dialog.

Users can click “Next”, “Prev”, “Home” and “End” button to display the data log.



DATE	TIME	Port	Model	IN-V	IN-Y	IN-V	OUT-V	OUT-Y	OUT-V	+BATT-V	IN-F	OUT-F	LOAD	TEMP	DELETE
2007/10/10	14:50:49	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:50:50	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:50:51	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:50:52	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:50:53	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:50:54	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:50:55	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:50:56	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:50:57	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:50:58	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:50:59	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:51:00	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:51:01	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:51:02	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:51:03	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>

Diagram 3-2-5

User can select the check box “Delete” and click "Delete" button to remove the selected data log.

Users can click “Close” button to close the dialog.

Users can click "Purge All" button to delete all of the data.

Note: If “Delete” and "Purge All" button is in invalid condition, which means your access right to the current Agent is “Read Only” and you cannot carry out these operations. You may log in as super user through the “Act as Administrator” menu.

### 6) “Record Setting” Dialog

“Record Setting” dialog can be opened from the “Record Setting” menu item of “Logs” menu. Refer to the following Diagram 3-2-6-1:



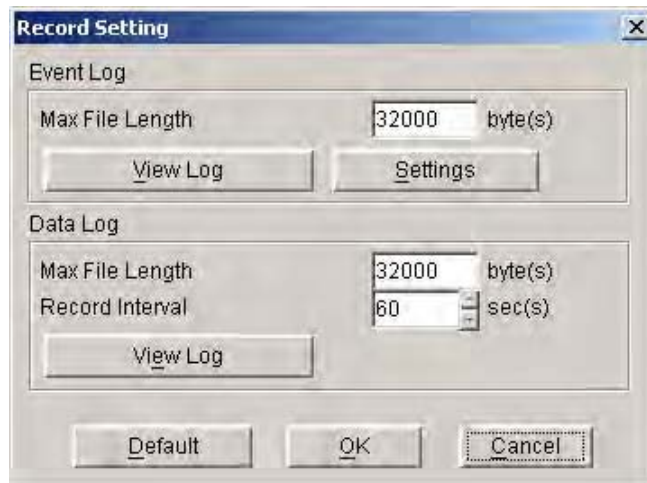


Diagram 3-2-6-1

The default value of the maximum file length of Event Log Viewer is 32KB  
(The maximum value is 1MB)

Click the “View Log” button of the event log in the “Record Setting” dialog  
(Refer to the following Diagram 3-2-6-2) to pop up the “Event Log Viewer”  
dialog (Refer to the following diagram 3-2-6-3)



Diagram 3-2-6-2

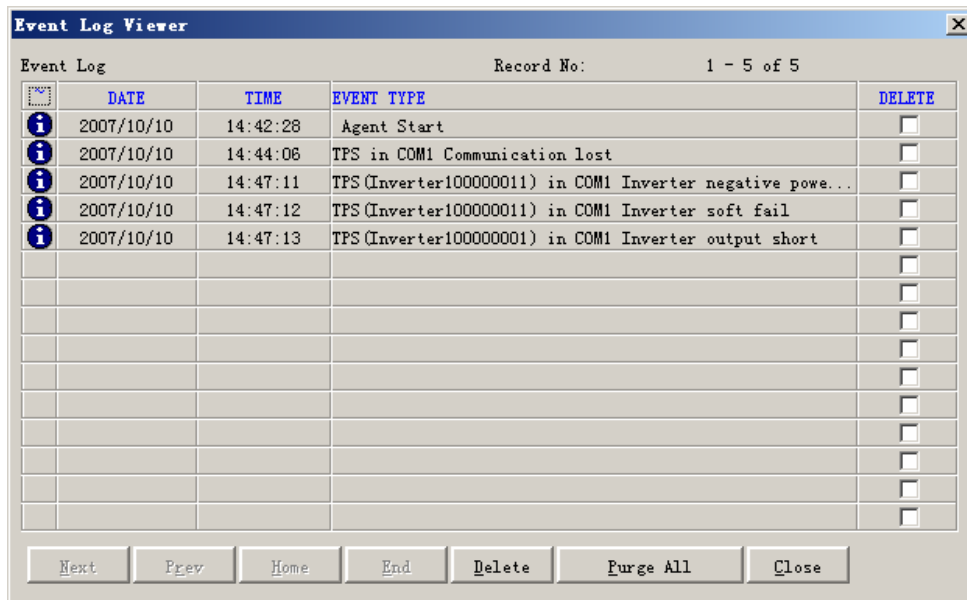


Diagram 3-2-6-3

Click the “Settings” button of the event log in the “Record Setting” dialog (Refer to the following diagram 3-2-6-4) to pop up the “Event Action” dialog, refer to the following diagram 3-2-6-5.

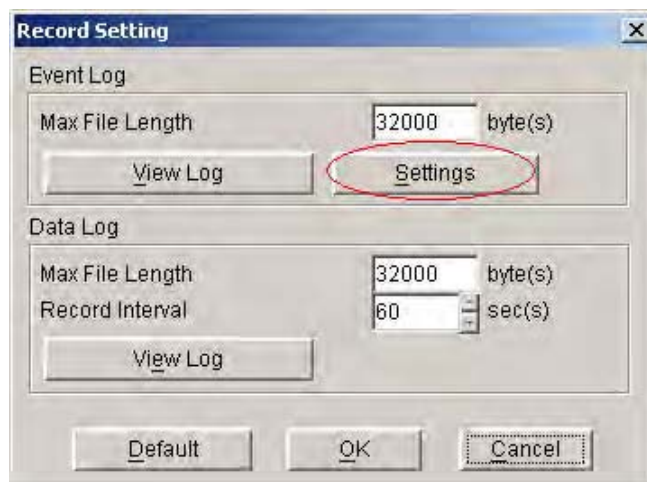


Diagram 3-2-6-4

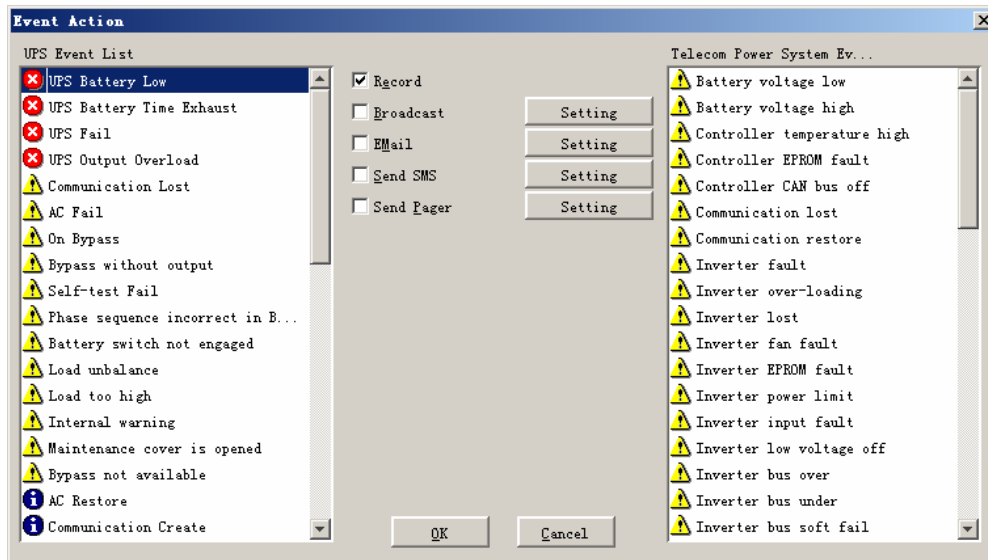


Diagram 3-2-6-5

The default value of the “Maximum file length” in the “Data Log Viewer” is 32KB (the maximum is 1MB).

The default value of record interval in the “Data Log Viewer” is 60 second (the maximum is 3600 second).

Click the “View Log” button of data log in the “Record Setting” dialog (refer to the following diagram 3-3-5-6) to pop up the “Data Log Viewer” dialog (refer to the following diagram 3-2-6-7).

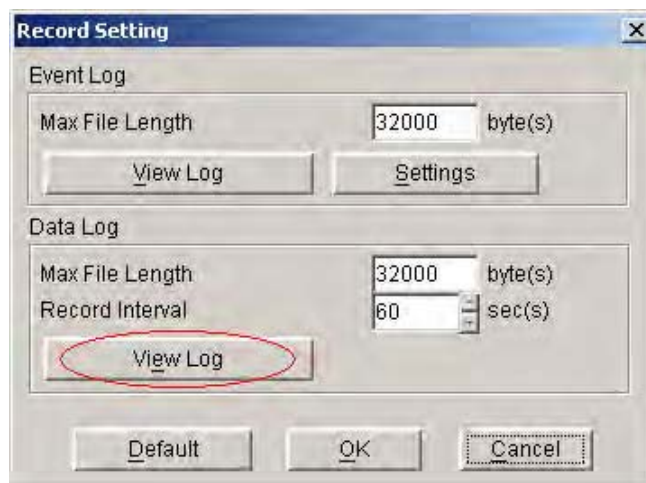


Diagram 3-2-6-6

**Data Log Viewer**

Port: **ALL** Device: **ALL** Record No: 50 - 64 of 64

DATE	TIME	Port	Model	IN-V	IN-V	IN-V	OUT-V	OUT-V	OUT-V	+BATT-V	IN-F	OUT-F	LOAD	TEMP	DELETE
2007/10/10	14:53:49	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:53:50	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:53:51	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:53:52	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:53:53	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:53:54	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:53:55	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:53:56	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:53:57	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:53:58	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:53:59	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:54:00	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:54:01	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:54:02	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>
2007/10/10	14:54:03	COM1	Telecom Pow...	220	--	--	0	--	--	33.6	50.0	--	999	25	<input type="checkbox"/>

Next Prev Home End Delete Purge All Close

Diagram 3-2-6-7

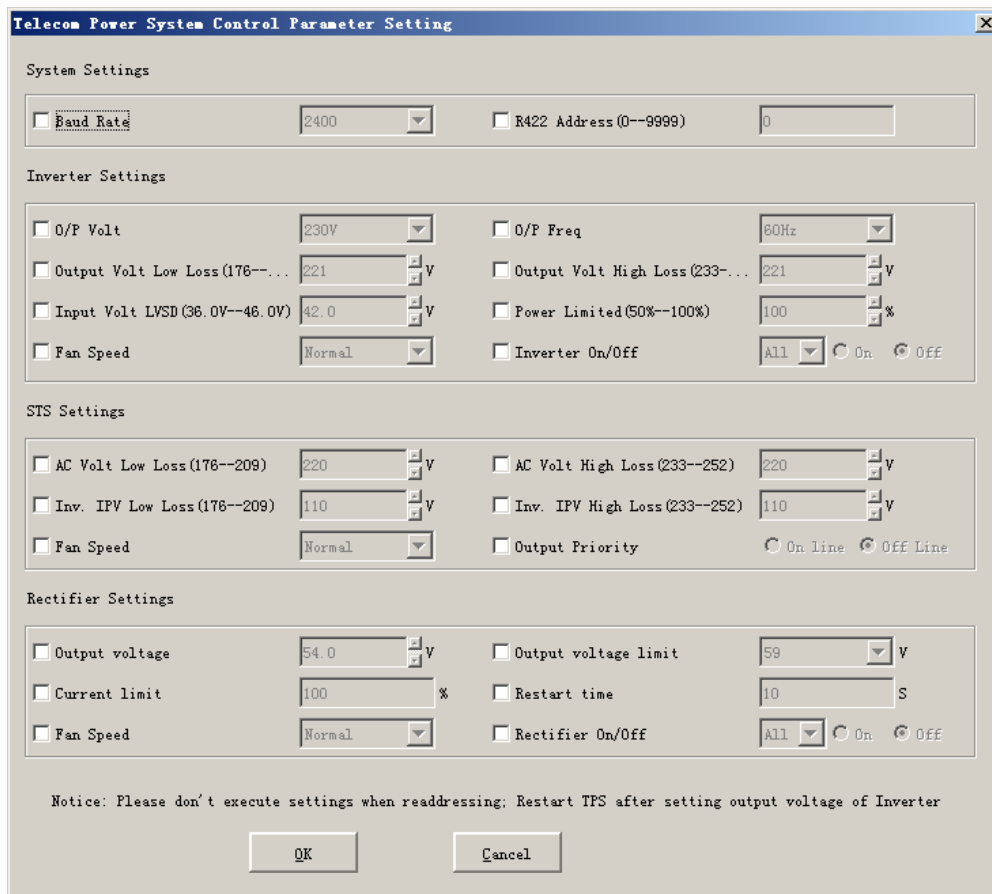
Note: Click "Default" button and the parameters in this page will become default. If the "OK" button is in invalid condition, which means your access right to the current Agent is "Read Only" and you cannot setup the parameters. You may log in as a super user through the "Act as Administrator" menu.

## 7) " Device Control Parameters" Dialog

" Device Control Parameters" Dialog will pop up when user select " Device Control Parameters" item from "Device" menu.

For device, Refer to the following diagram 3-2-7-1:





**Telecom Power System Control Parameter Setting**

**System Settings**

☐ Baud Rate: 2400 ☐ R422 Address (0--9999): 0

**Inverter Settings**

☐ O/P Volt: 230V ☐ O/P Freq: 60Hz

☐ Output Volt Low Loss (176--...): 221 V ☐ Output Volt High Loss (233--...): 221 V

☐ Input Volt LVSD (36.0V--46.0V): 42.0 V ☐ Power Limited (50%--100%): 100 %

☐ Fan Speed: Normal ☐ Inverter On/Off: All ☐ On ☒ Off

**STS Settings**

☐ AC Volt Low Loss (176--209): 220 V ☐ AC Volt High Loss (233--252): 220 V

☐ Inv. IPV Low Loss (176--209): 110 V ☐ Inv. IPV High Loss (233--252): 110 V

☐ Fan Speed: Normal ☐ Output Priority: ☐ On Line ☒ Off Line

**Rectifier Settings**

☐ Output voltage: 54.0 V ☐ Output voltage limit: 59 V

☐ Current limit: 100 % ☐ Restart time: 10 S

☐ Fan Speed: Normal ☐ Rectifier On/Off: All ☐ On ☒ Off

Notice: Please don't execute settings when readdressing; Restart TPS after setting output voltage of Inverter

OK Cancel

Diagram 3-2-7-1

Note: If the "OK" buttons are in invalid condition, which means that your access right to the current Agent is read only and you cannot carry out setup. You may log in as a super user via the "Act as Administrator" menu.

### 8) "Event Action" Dialog

"Event Action" dialog can be opened by clicking "Event Action" menu item in the "Device" menu or buttons in the toolbar. Refer to the following diagram 3-2-8. In the "Event Action" dialog, users can select which action to be carrying out when some events occur. For every event, the actions users can select including: Record, Broadcast, Email, Send SMS and Send Pager users. The UPS event list is on the left, and TPS event list is on the right.

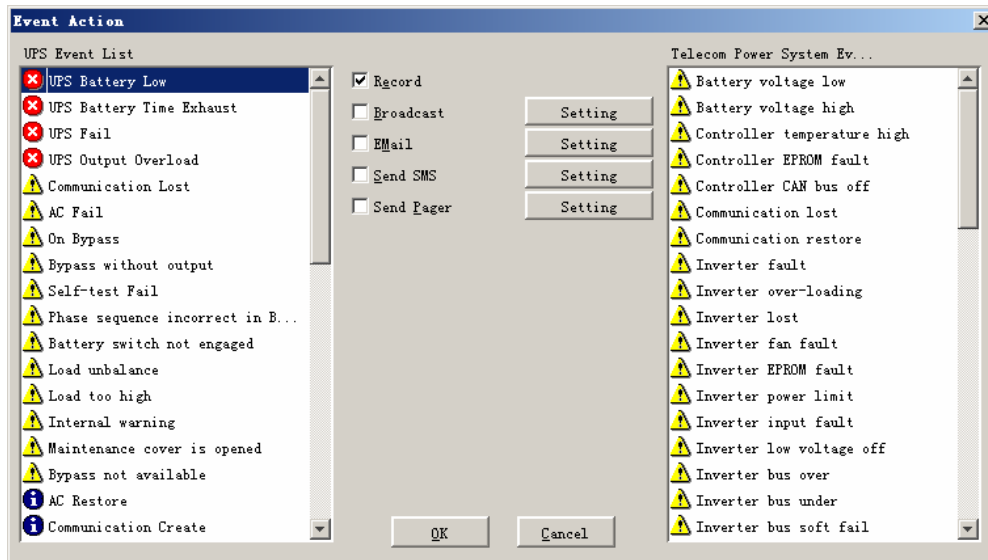


Diagram 3-2-8

Events are divided into three types of icons: Severity (red), Warning (yellow) and Message (blue).

### 9) "Broadcast Message Settings" Dialog

"Broadcast Message Settings" dialog can be opened from the "Broadcast Setting" menu item of "Tools" menu or click broadcast "Setting" button in "Event Action" Dialog. Refer to the following diagram 3-2-9:

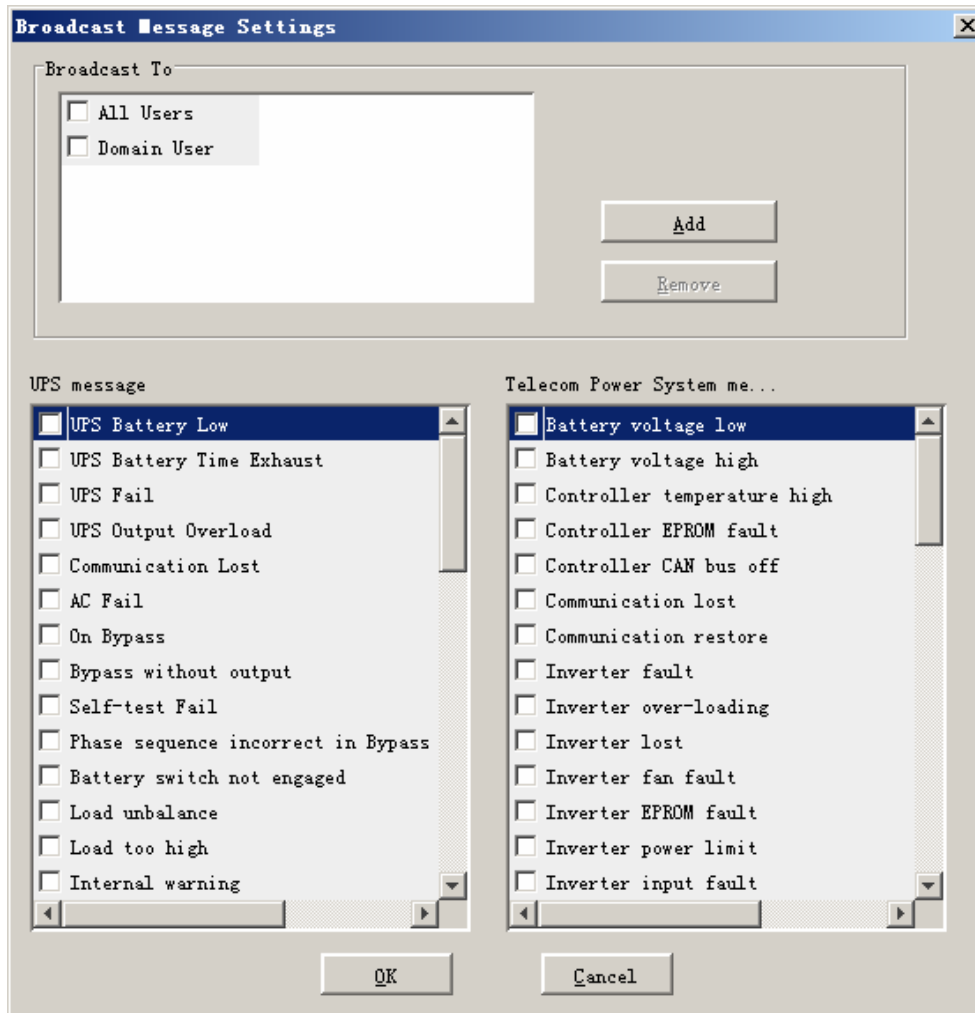


Diagram 3-2-9

"Broadcast To" list box list the users. The user item must be selected if it want to receive broadcast message. You can add and delete user items by click "Add" and "Remove" button (Note: the "All Users" and "Domain User" item can not be deleted). "All Users" means all computers in LAN. "Domain User" means computers in the same domain with local Agent.

"UPS message" and "TPS message" list box list the messages to be sent. You can select or unselect the message by click the message item.

Note: This settings only valid in Windows platform. If the "OK" button is in invalid condition, which means your access right to the current Agent is "Read Only" and you cannot carry out these operations. You may log in as a super user through the "Act as Administrator" menu.

Only in Windows platform can carry out broadcast function. To receive broadcast message, "Winpopup" in Windows95/98 and "Messenger Service" in Windows NT/2000 must be started.

### 10) "Email Settings" Dialog

"E-mail Settings" dialog can be opened from the "E-mail Setting" menu item of "Tools" menu or click E-mail "Setting" button in "Event Action" Dialog. Refer to the following diagram 3-2-10:

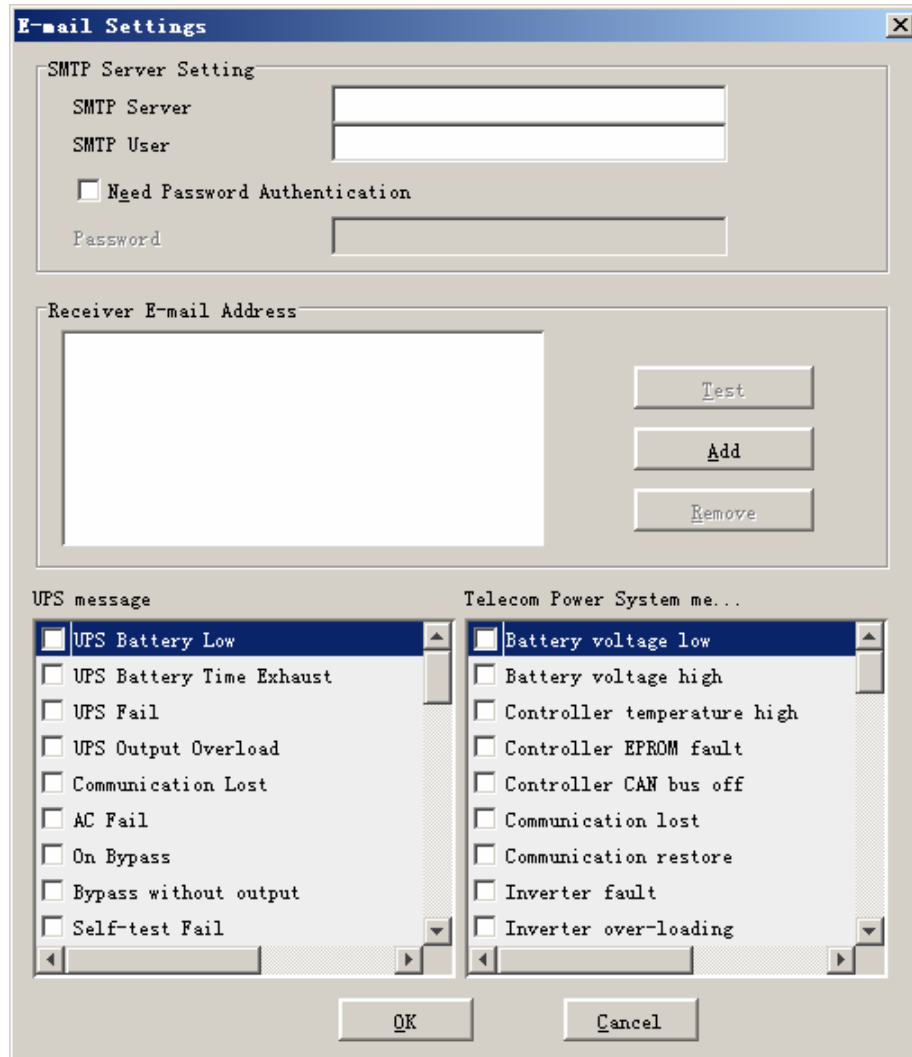


Diagram 3-2-10

The included items of the email parameter setting are shown in the following Table 3-2-15:

SMTP Server Name	This is the mail server, which is used to send emails to the appointed users. Enter the IP address of the SMTP mail server here. For example, smtp.163.com
SMTP Account Name	This is the account number for logging in the server. Enter the complete



	address format here. For example, yyy@163.com
Password	Input the SMTP account password in needed.

Table 3-2-10

“Receiver EMail Address” list box list the email addresses which will receive the email. Click "Add" button to add an email address item. Select an address item and click "Remove" button will delete this item. Selected an email address item and click the "Test" button will send a test email to this email address.

“UPS message” and “TPS message” list box list the messages to be sent. You can select or unselect the message by click the message item.

All of the SMTP parameter default value is naught, and it can only be setup in the local Agent. To send email to the appointed user, the SMTP server name or IP address must be set, or the email will not be sent out.

Note: If you want to send email via Internet, you must have a SMTP account number in the Internet. If the “OK” button is in invalid condition, which means that your access right to the current Agent is read only and you cannot carry out the parameter setting. You may log in as a super user through the “Act as Administrator” menu.

### 11) "SMS Setting" Dialog

“SMS Setting” dialog can be opened from the “SMS Setting” menu item of “Tools” menu or click Send SMS “Setting” button in “Event Action” Dialog. Refer to the following diagram 3-2-11:

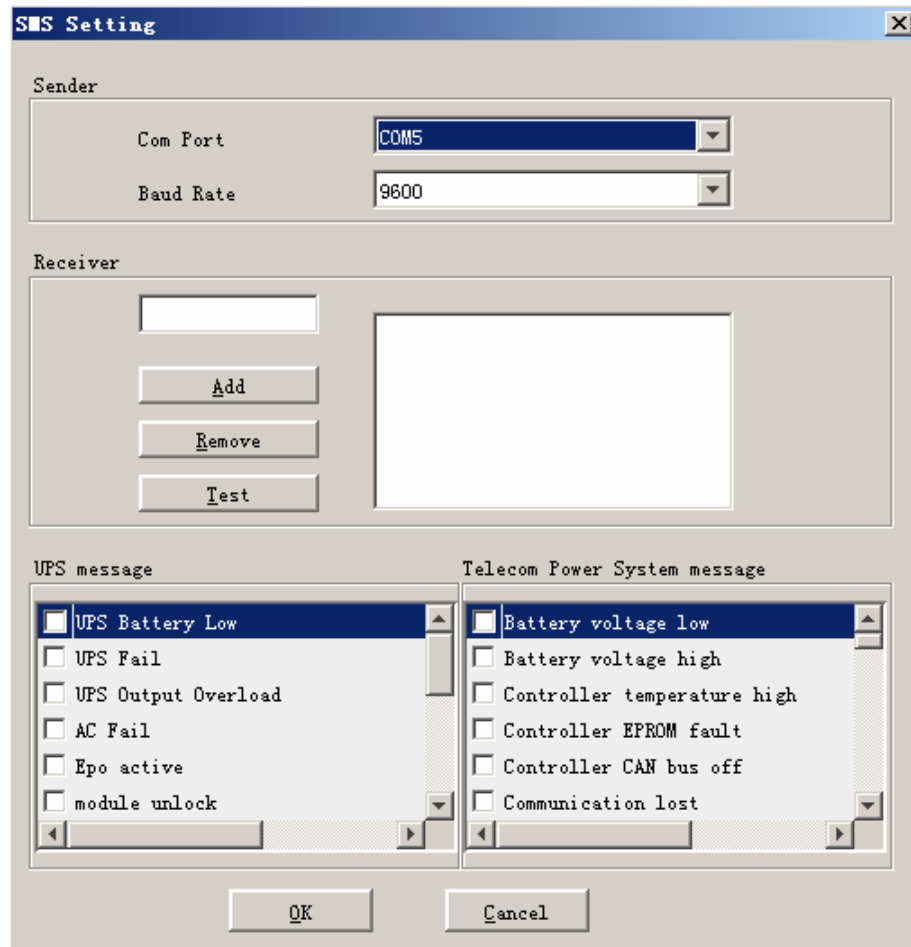


Diagram 3-2-11

Below is the use remark of SMS setting:

1. Sender

SMS is sent through GSM modem or mobile phone which connect with your computer. User should select COM port which is being used by GSM Modem or mobile phone. Then set baud Rate of this COM port.

2. Receiver: is the mobile phones numbers which can receive the SMS. It can be one or more. If the Event that you have selected occur Winpower will send the short message to the all phone numbers in the "Receiver" list.

3. UPS message and TPS message

User can select the events which need to inform by SMS.

**Note:** If the OK button is in invalid condition, which means your access right to the current Agent is "Read Only" and you cannot carry out these operations. You may log in as a super user through the "Act as Administrator" menu.

## 12) "Pager Setting" Dialog

"Pager Setting" dialog can be opened from the "Pager Setting" menu item of "Tools" menu or click SendPager "Setting" button in "Event Setting" Dialog. Refer to the following diagram 3-2-12:

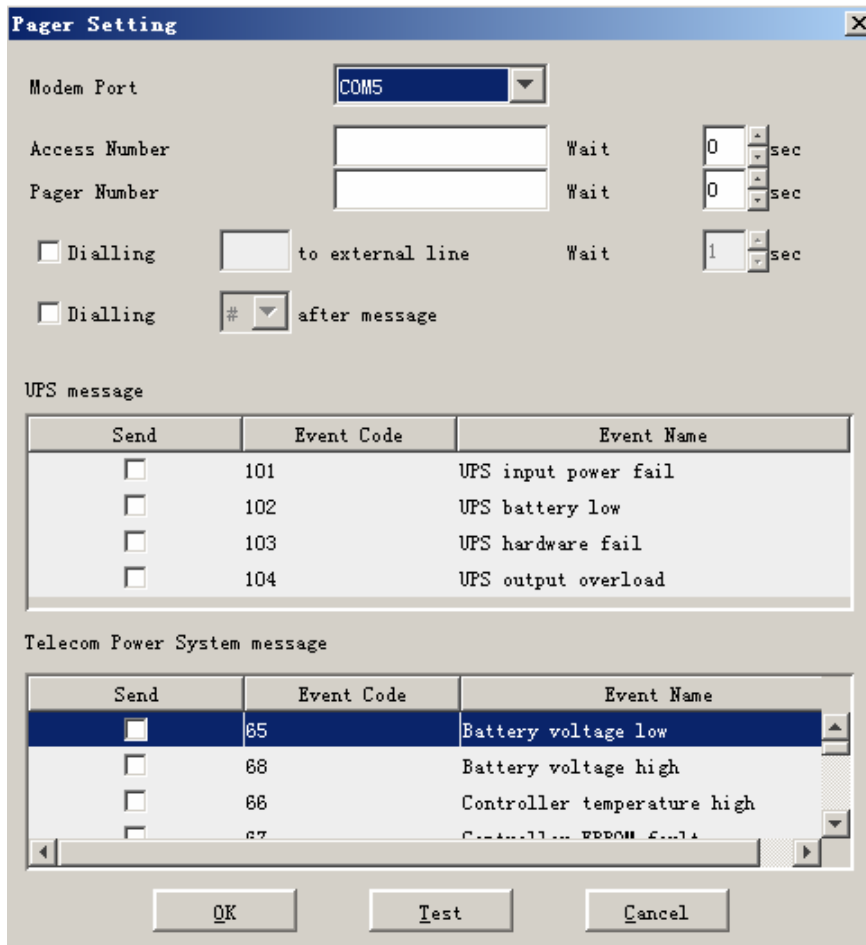


Diagram 3-2-12

To configure the pager parameters user must have full access. User can get full access by selecting "Administrator" menu item from "Setup" menu and providing right Agent Password in the popup dialog. See the following table 3-2-17:

Parameter	Description
Modem Port	Select COM port which is being used by Modem.
Access Number	For some pager service, a delay is needed between dialling access number and Pager Number.
Pager Number	For some pager service, a delay is needed

	between dialing pager number and message code.
dailing number to exterior line	For extension line, it is always necessary to dial a specified number and delay a specified time to access Exterior Line.
dailing number after message	For some pager service, need to dial a specified number to end message code.
Event Code	The event code is dialed as the message code and will be displayed on pager.

Table 3-2-12

Note: If the "OK" button is in invalid condition, which means your access right to the current Agent is "Read Only" and you cannot carry out these operations. You may log in as a super user through the "Act as Administrator" menu.

### 13) "Monitor Remote Device" Dialog

"Monitor Remote Device" Dialog will show when user select "Monitor Remote Device" menu item from "Monitor" menu. Refer to the following diagram 3-2-18-1:

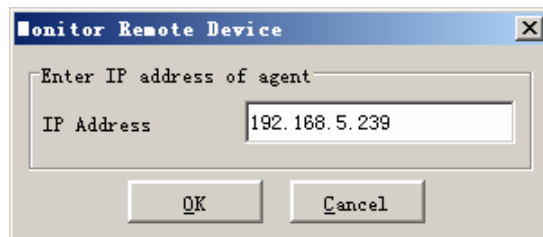


Diagram 3-2-13-1

Enter the IP address of an Agent to be monitored and press OK button. If this agent exist it's information will be displayed below the "WAN" node in the tree view of Manager window.

#### **Note:**

- 1) The maximum of remote agent can be monitored is 32.
- 2) If Winpower can't communicate with a remote agent in 6 minutes, this agent will be deleted automatically.
- 3) You can manually delete a remote agent by select this agent node below "WAN", then click the mouse right button to show a delete pop up menu, select "Delete" menu item to remove it. Refer to the following diagram 3-2-13-2:



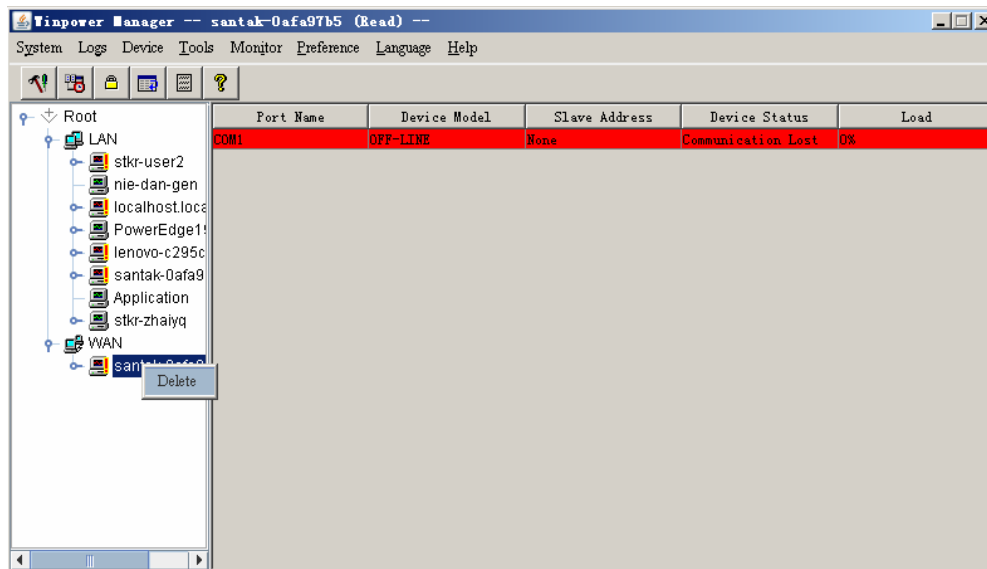


Diagram 3-2-13-2

#### 14) Bottom image

If you select the submenu “BottomImage” of the menu item “Preference”, you can change the bottom image of the interface. See diagram 3-2-14-1:

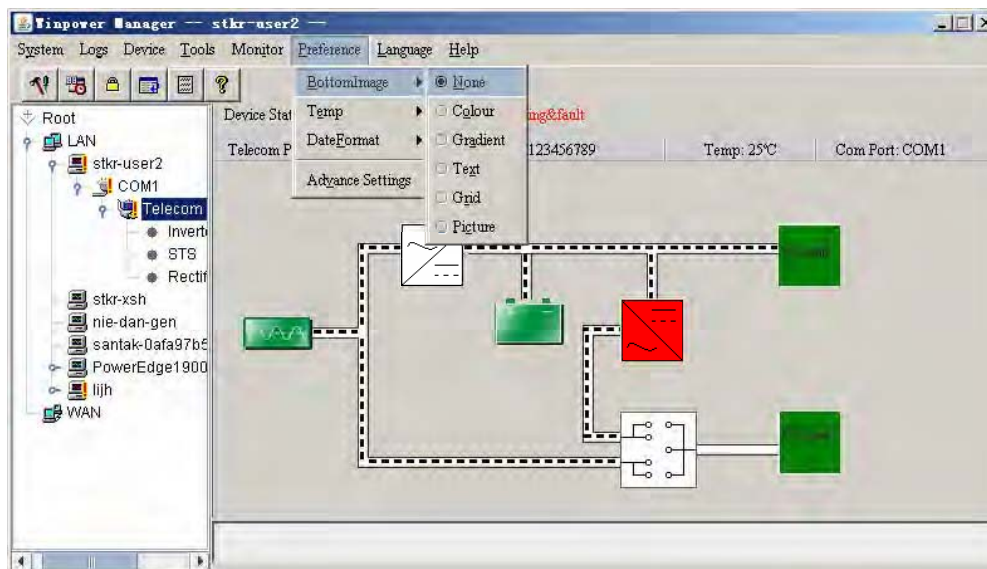


Diagram 3-2-14-1

#### 15) Temp

You can make the interface show the centigrade or Fahrenheit temperature by selecting the submenu “Temp” of the menu “Preference”. See diagram 3-2-15

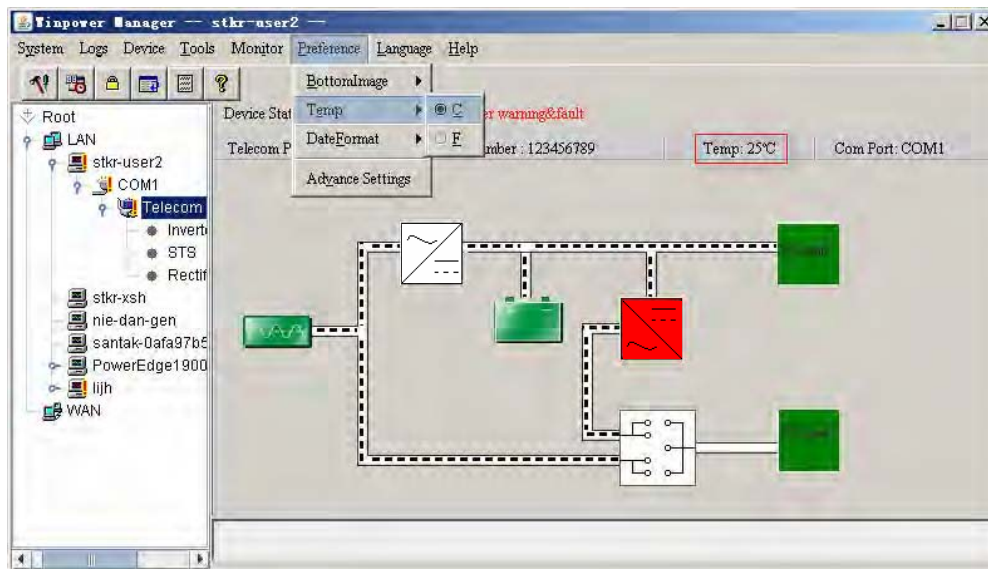


Diagram 3-2-15

### 16) Date Format

You can change the displayed date format by selecting the submenu "DateFormat" of the menu "Preference". The date is displayed with the format "Year/Month/Day", "Month/Day/Year" or "Day/Month/Year". See diagram 3-2-16-1:

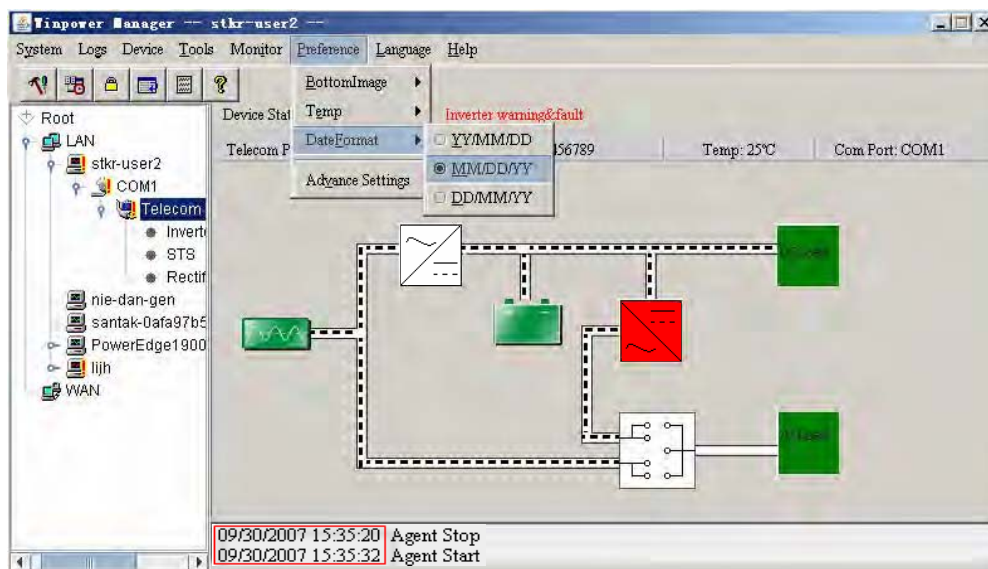


Diagram 3-2-16-1

### 17) Advance Settings

You can change the font, size, color and bottom image of the interface by selecting the submenu "Advance Settings" of the menu "Preference".

“Advance Settings” dialog consists of two views “General” and “BottomImage”.

In the “General” view:

You can change the color of general text, data and warn text by clicking the color you want.

Users can select font from the “Font” list. Refer to the following diagram 3-2-17-1:

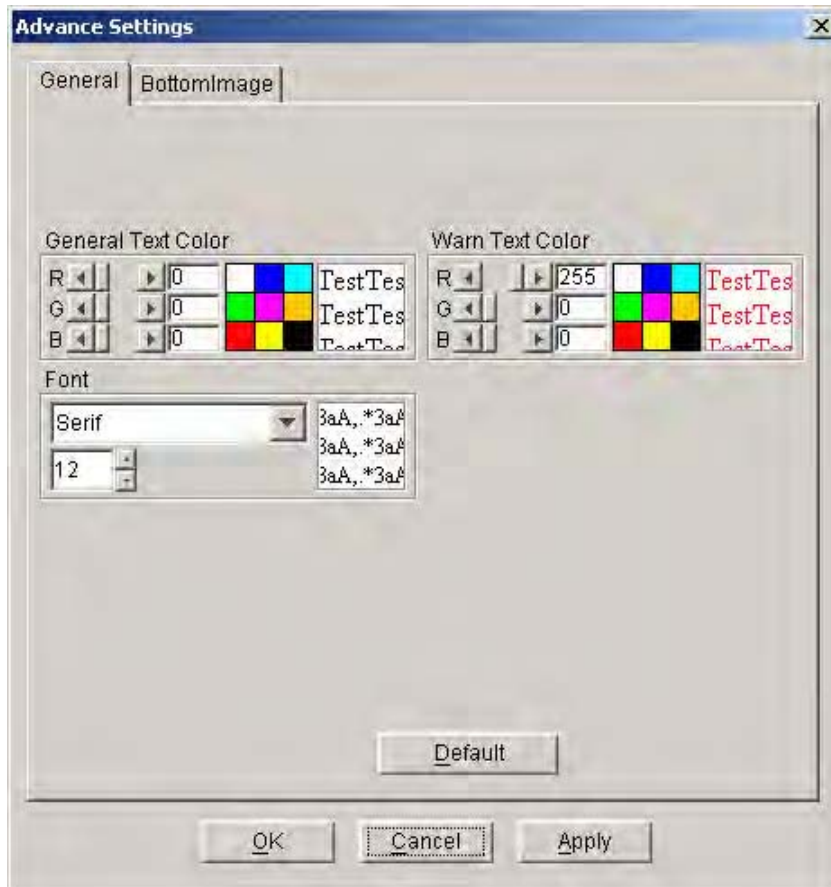


Diagram 3-2-17-1

Note: If you click “Default” button, the parameters in this view will be turned into default value.

If the “OK” button is in invalid condition, which means that your access right to the current Agent is Read Only and you cannot carry out the parameter setup. You may log in as a super user through the “Act as Administrator” menu.

In the “BottomImage” view:

If you click “None” box, the bottomimage of the interface is “background color”.

Users can select the color that they want by clicking “Color” box

Users can select the color and gradient direction that they want by clicking “Gradient” box

Users can select background color, character size and light and shade degree of background text by clicking “Text” box. The bottom image is the background that has the appointed text.

Users can select the background color, the grid offset, the grid size and the grid light and shade degree in the background by clicking “Grid” box, the bottom image of the interface is “Grid”.

Users can select the background pictures from the popped up list box by clicking the “Picture” box, the bottom image of the interface is “Picture”.

Refer to the following diagram 3-2-17-2

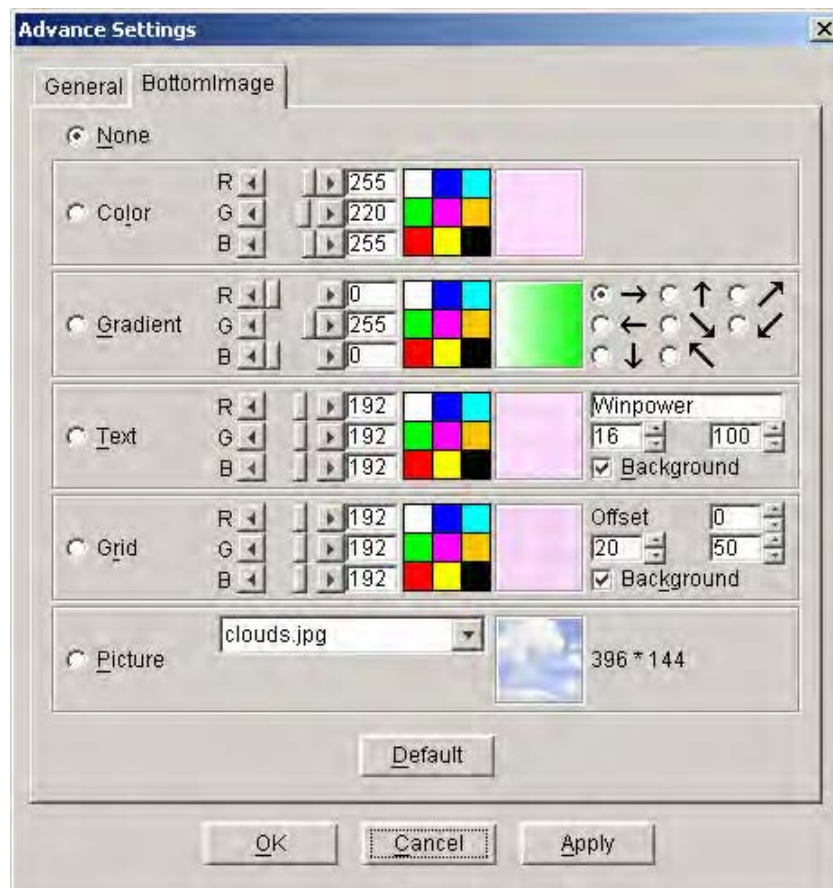


Diagram 3-2-17-2

Note: Click “Default” button, the parameters in this view will turn to default value. If the “OK” button is in invalid condition, which means that your access right to the current Agent is Read Only and you cannot carry out the parameter setup. You may log in as a super user via “Act as Administrator” menu.

### 18) Language menu

Users can select languages in the "Language" menu to make the interface display text in "Chinese(Traditional)", "Chinese(Simplified)", "English", "German", "French", "Italian", "Spanish", "Polish", "Turkish" or "Portuguese". Refer to the following diagram 3-2-18

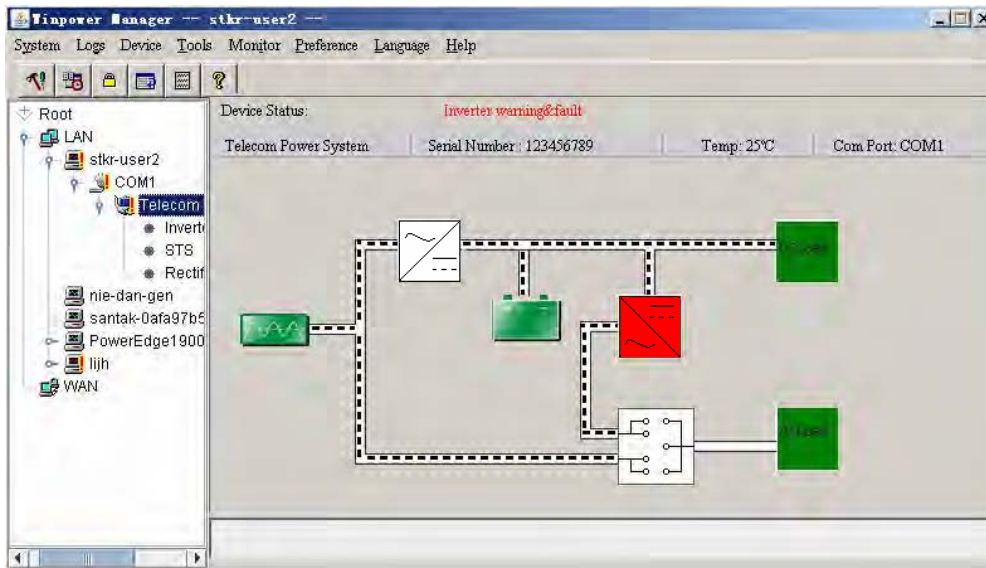


Diagram 3-2-18

### 19) "Communication Port Settings" Dialog

"Communication Port Settings" dialog can be opened from the "COM Port Setting" menu item of "System" menu.

For Linux and Unix platform, Winpower can't auto detect the Serial Port Devices. If the System has a Serial Port not be found in the default setting table, you must add it by manually in the "Communication Port Settings" dialog before using it. following Table following diagram 3-2-19:

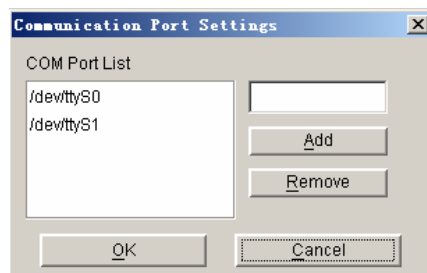


Diagram 3-2-19

The default Serial Port Devices setting: following Table following Table 3-2-219

Platform	Serial Port Devices
Linux	/dev/ttyS0 /dev/ttyS1.



Solaris	/dev/ttya /dev/ttyb
HP-UX	/dev/tty0p0 /dev/tty1p0 /dev/tty0p1 /dev/tty0p2
AIX	/dev/tty0 /dev/tty1
UnixWare	/dev/tty1A /dev/tty2A
Tru64	/dev/tty00 /dev/tty01
FreeBSD	/dev/ttyd0 /dev/ttyd1

Table 3-2-19

Note: If the "OK" button is in invalid condition, which means that your access right to the current Agent is read only and you cannot carry out the parameter setting. You may log on as a super user through the "System" menu.

## Chapter 4 How to do

### 1. How to realize the conversion of the appointed COM port?

When the PC with Winpower has multiple serial ports, Winpower can allow the users to change the current connected serial ports of the Device via “Auto search Device” menu. See the following Diagram 4-1-1:

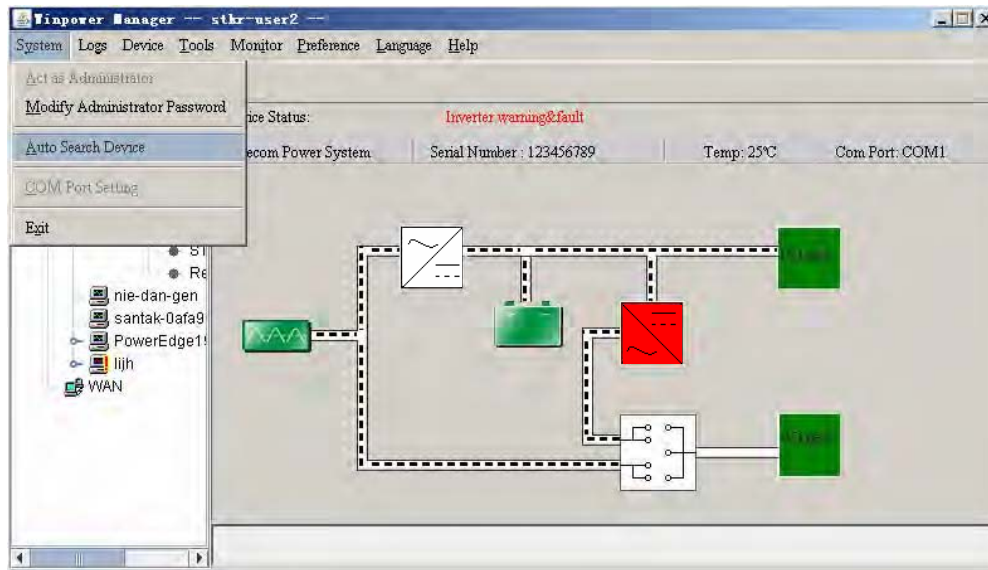


Diagram 4-1-1

There is a tree view in the left displays a hierarchical list of items , such as ‘Root’,‘networks’,the Agents,the COM port and the device models. By clicking an item, the user can expand or collapse the associated list of subitems, Refer to the following diagram 4-1-2:

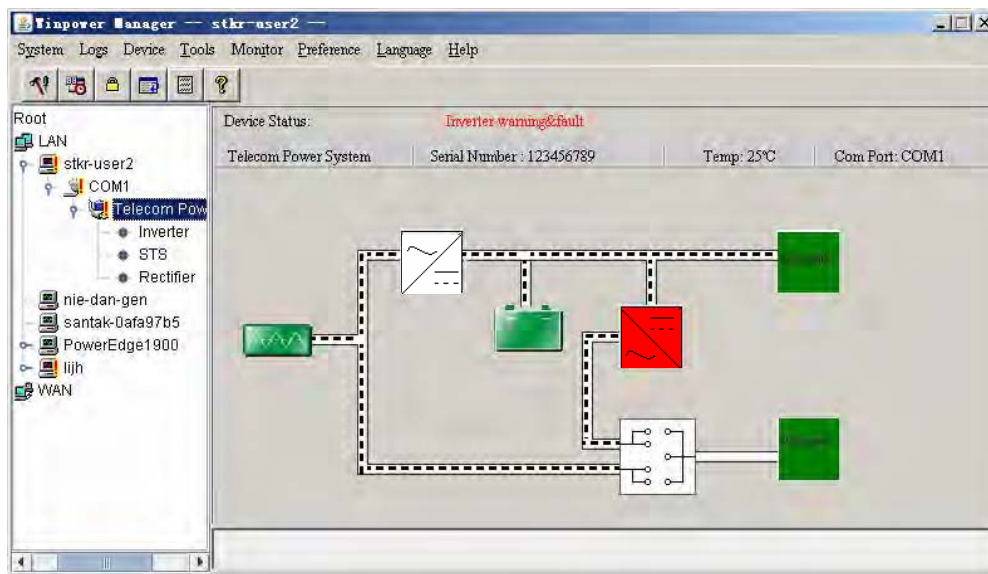


Diagram 4-1-2

When user select a device model , "Manager" Window will show details about the device in the right .

For Linux and Unix platform, Winpower can't auto detect the Serial Port Devices. If the System has a Serial Port not be found in the default setting table, you must add it by manually in the "Communication Port Settings" dialog before using it.

See the following Diagram 4-1-3:

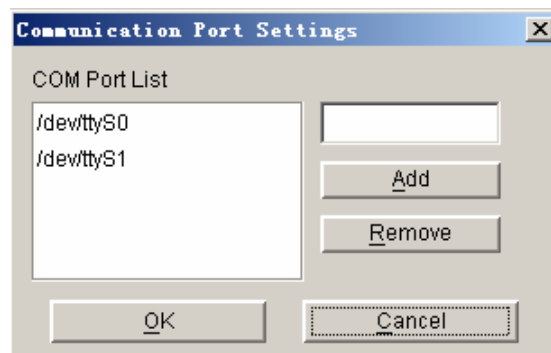


Diagram 4-1-3

The default Serial Port Devices setting: following Table following Table 4-1-1:

Platform	Serial Port Devices
Linux	/dev/ttyS0 /dev/ttyS1.
Solaris	/dev/ttya /dev/ttyb
HP-UX	/dev/tty0p0 /dev/tty1p0 /dev/tty0p1 /dev/tty0p2
AIX	/dev/tty0 /dev/tty1

UnixWare	/dev/tty1A /dev/tty2A
Tru64	/dev/tty00 /dev/tty01
FreeBSD	/dev/ttyd0 /dev/ttyd1

Table4-1-1

Note: For the first time start Agent it takes more time than later to communicate with the device. And the software will keep a record of device information. Next time, Winpower will start according to the last record. If device COM Port, device model or slave address being changed, user should click "Auto Search Device" menu item from "System" Menu and get correct device information.

## 2. How to realize broadcasting message in LAN

Winpower has the function of sending the event message to the customers in time via Windows message service. The concrete operation refers to the notes in Section 13 of Chapter 3 ("Broadcast Message Settings" Dialog) and Appendix B (Winpower Event Table). See the following diagram 4-2-1:

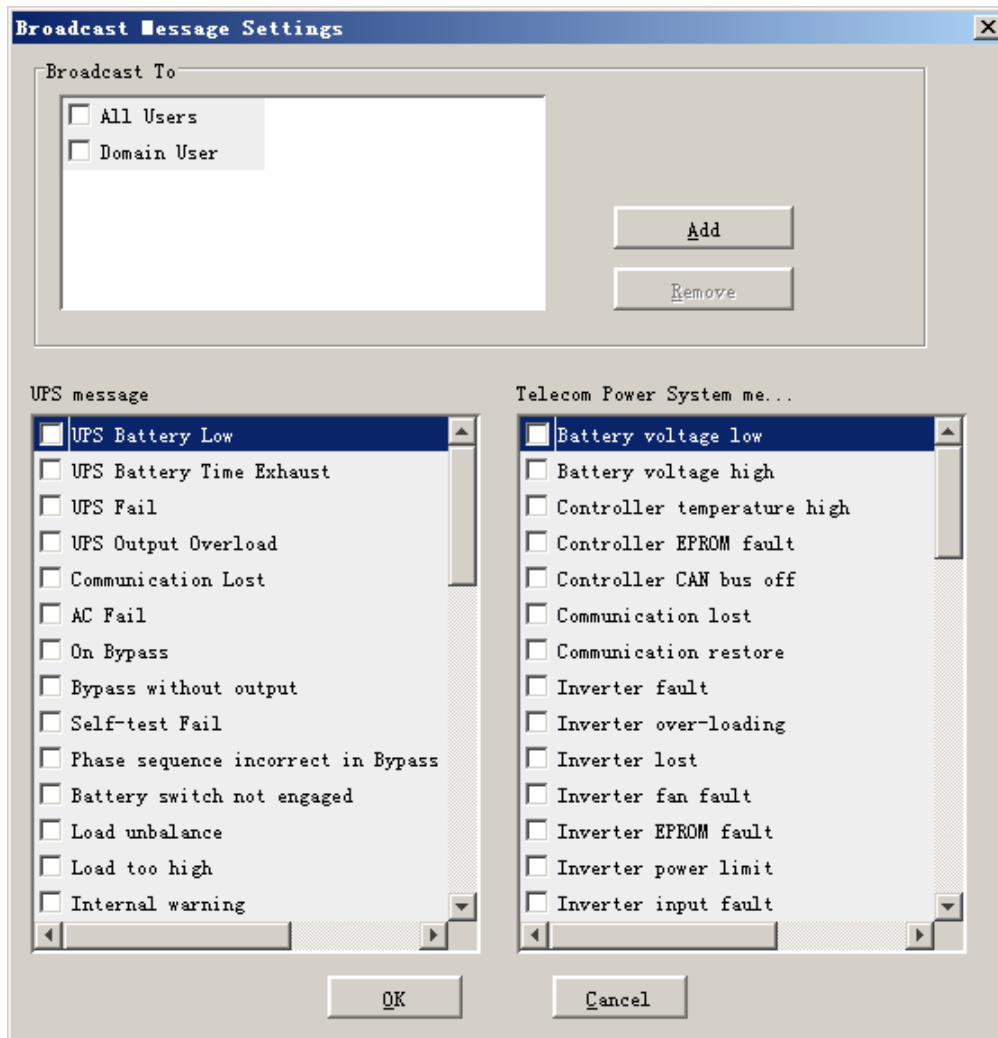


Diagram 4-2-1

With reference to the range of broadcasting, there are altogether three options: all users, Domain users and special users.

All users indicate that the message will be sent to all PCs that are in the same network with this PC, no matter whether it is in the same domain with it.

Domain users indicate that the message will be only sent to all PCs that are in the same NT domain with this PC.

Special users indicate that the message will only be sent to one or a group of defined users, but not others any more.

To realize this function, you should set up the “Add Brdoadcast User” dialog first, see the following diagram 4-2-2:





Diagram 4-2-2

In the above dialog, after setting up the information of users who will receive messages, select “OK” button to exit from the setup of special users. The names of the setup users will be displayed in the “Broadcast Message Settings” dialog. Select the events that will be sent to the users. After pressing the “OK” button, they will become effective. See the following diagram 4-2-3:

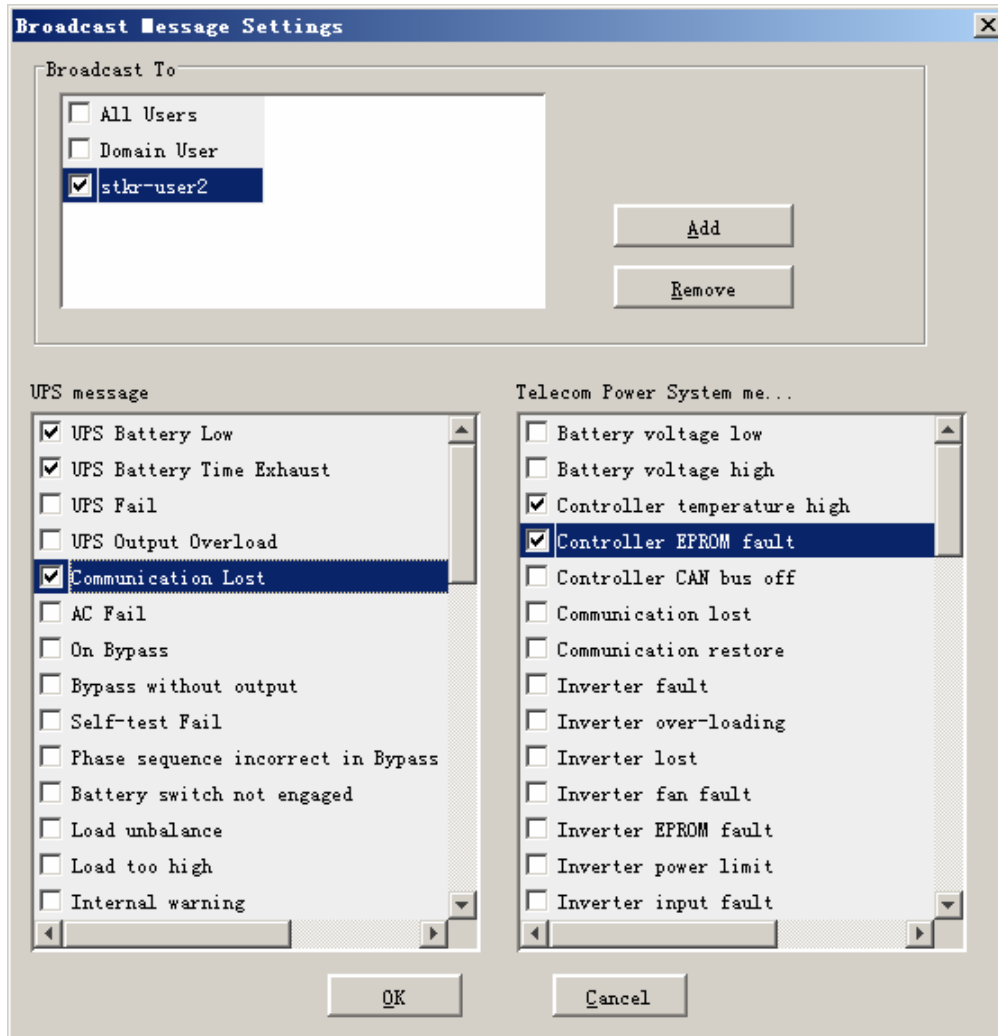


Diagram 4-2-3

Note: Only in Windows platform can carry out broadcast function. To receive broadcast message, "Winpopup" in Windows95/98 and "Messenger Service" in Windows NT/2000 must be started.

### 3. How to realize system administrator operation and password modifying realize

#### system administrator operation

Open "Act as Administrator" menu item from "System" menu to popup "Administrator" dialog. See the following diagram 4-3-1:



Diagram 4-3-1

Enter the system administrator password in the dialog and press the "OK" button to finish the setting. If the password is correct, you can get the access right of the administrator to set up the Agent. If the password is not correct, alert box will popup. See the following diagram 4-3-2:



Diagram 4-3-2

#### Modifying the system administrator password

Open the "Modify Administrator Password" menu from the "System" menu to popup the "Administrator Password Settings" dialog. This menu is valid within the local Agent. See the following diagram 4-3-3:



Diagram 4-3-3

Enter the new password in the “New Password” edit box; reenter it in the “confirm password” edit box. Press the “OK” button to finish the setting.

Note: If the “OK” button is in invalid condition, which indicates that the access right to the current Agent is “Read Only”, you cannot operate it. You may log in as a super user from “Act as Administrator” menu.

#### 4. How to realize sending event message by email

##### ✓ Precondition

When event occurs, the precondition for realizing sending message by email is to connect the computer with Winpower to the Internet.

##### ✓ Steps

Setup “EMail Service”: Open the “Email setting” menu item from the “Tools” menu to pop up the “Email Settings” dialog. Refer to the following diagram 4-4-1:

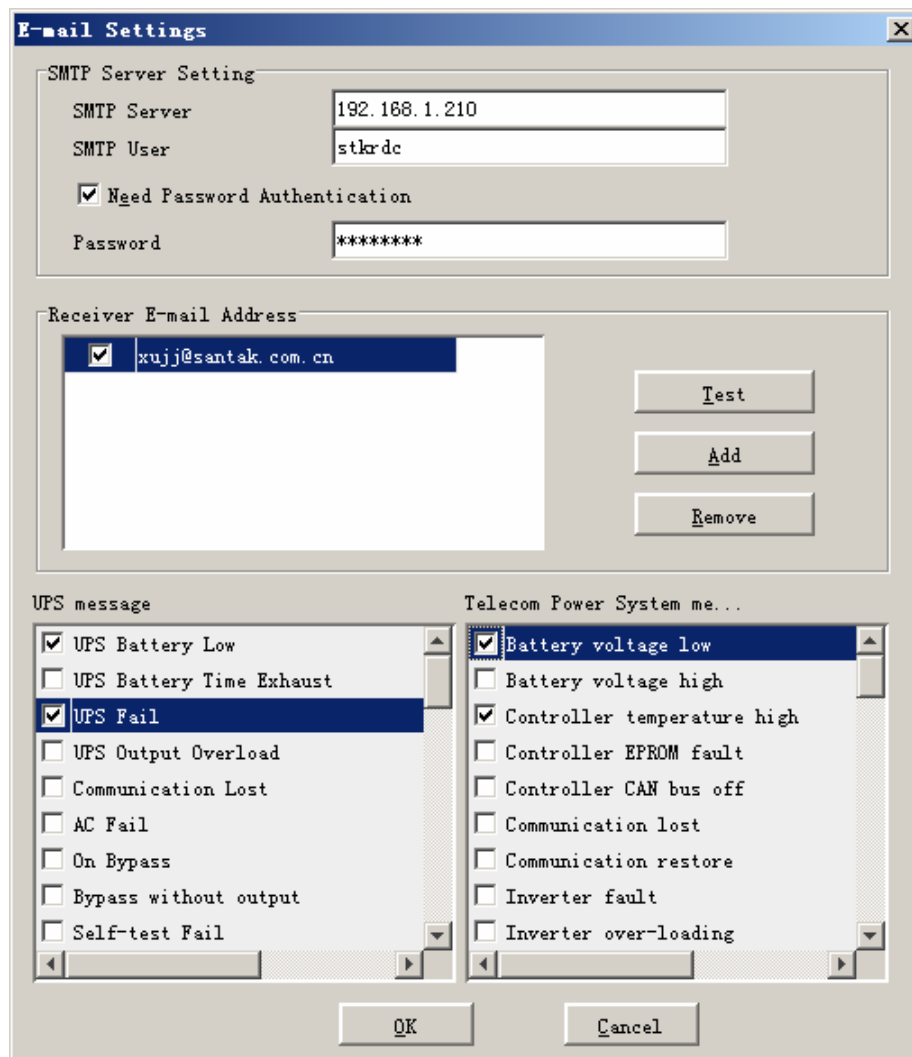


Diagram 4-4-1

SMTP Server is the SMTP server address; SMTP User is the account for logging in the server. If SMTP mail server need password authentication user should Input password.

Setup the Receiver EMail Address: Select the “Add” button from the “Email Settings” dialog, and then pop up “Add Receiver Email Address” dialog(Refer to the following diagram 4-4-2).

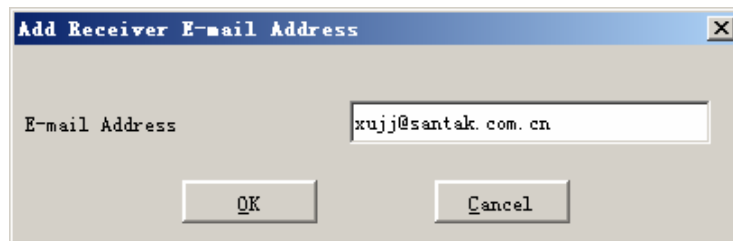


Diagram 4-4-2

Enter the “Email Address” in the “Add Receiver Email Address” dialog, then select “OK” button to save it and exit.

Completing Event Setting: Select one of the events from the “Send message”; then select the user that has been set up in the mail of “Receiver Email Address”. Finally select the “OK” button to save it and exit.

## 5. How to realize sending event messages by mobile phone

### ✓ Precondition

The precondition of sending messages by mobile phone is that the computers with Winpower must have at least one communication ports which is used to connect to GSM Modem or mobile phone.

### ✓ Events supported

For TPS, all events are supported.

### ✓ Steps

Setup “SMS”: Open the “SMS setting” menu item from the “Tools” menu to pop up the “SMS Setting” dialog. Refer to the following diagram 4-5-1:

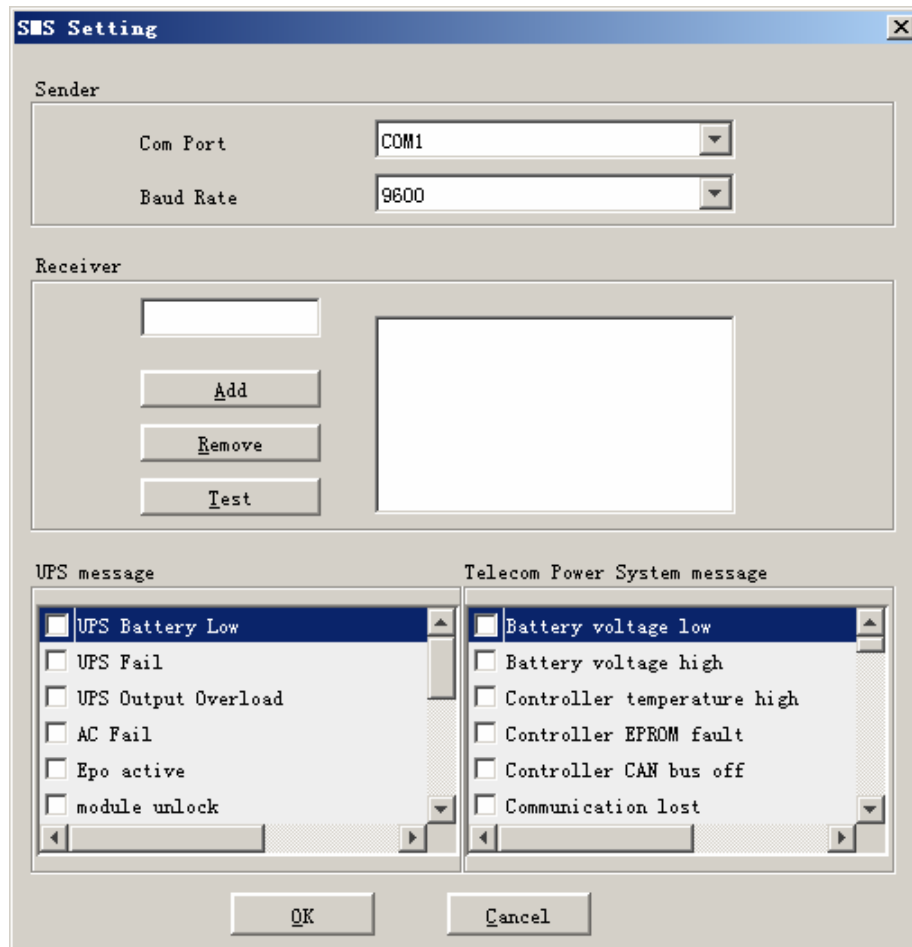


Diagram 4-5-1

Below is the use remark of SMS Setting: Refer to the following diagram 4-10-3.

1. Sender: SMS is sent through GSM modem or mobile phone which connect with your computer. User should select COM port which is being used by GSM Modem or mobile phone. Then set baud Rate of this COM port.
2. Receiver: is the mobile phones numbers which can receive the SMS. It can be one or more. If the Event that you have selected occur, Winpower will send the short message to the all phone numbers in the "Receiver" list.
3. Send message: Use can select the events which need to inform by SMS .

Finally select the "OK" button to save it and exit.

Another method to select Event Code:



Select one of the events (For example, AC Fail) from the “Event List”, which is on the left side of the “Event Action”; then select “Send SMS” on the right side. Finally select the “OK” button to save it and exit.

## 6. How to realize sending event messages by pager

### ✓ Precondition

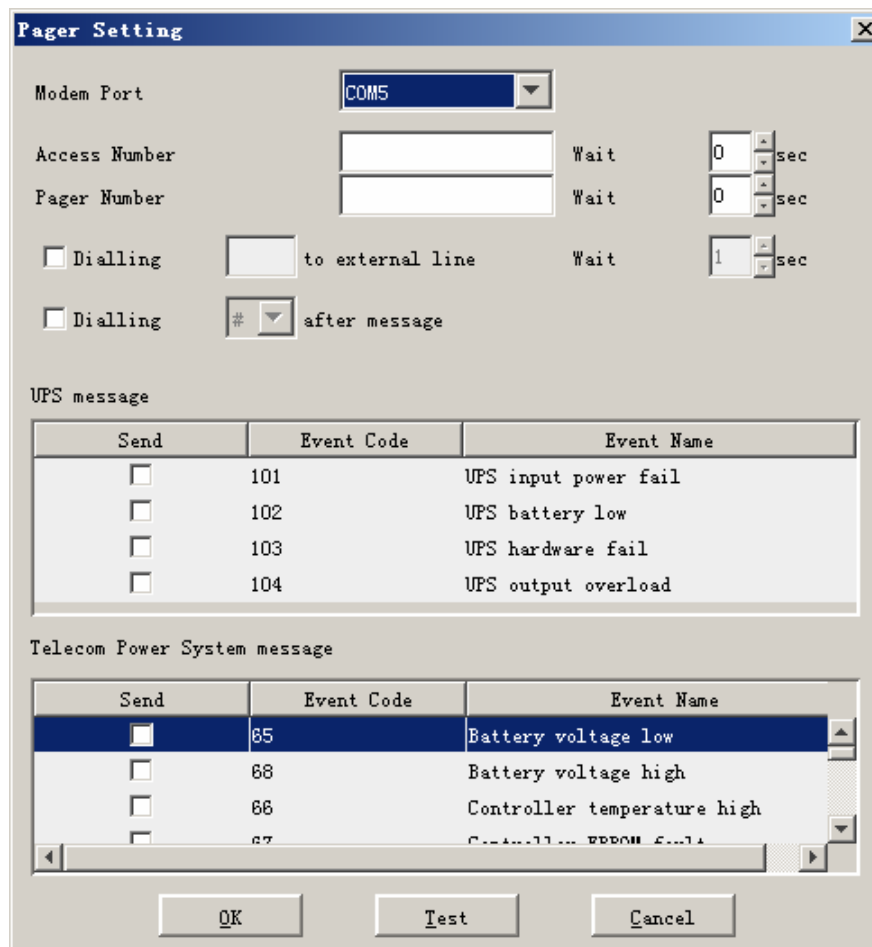
When event happens, the precondition of sending messages by pager is that the computers with Winpower must have at least one communication ports which is used to connect to MODEM.

### ✓ Events supported

For TPS, all events are supported.

### ✓ Steps

Setup “Pager”: open the “Pager setting” menu item from the “Tools” menu to pop up the “Pager Setting” dialog. Refer to the following diagram 4-6-1:



**Pager Setting**

Modem Port: COM5

Access Number: [ ] Wait: 0 sec

Pager Number: [ ] Wait: 0 sec

☐ Dialling [ ] to external line Wait: 1 sec

☐ Dialling # [ ] after message

**UPS message**

Send	Event Code	Event Name
<input type="checkbox"/>	101	UPS input power fail
<input type="checkbox"/>	102	UPS battery low
<input type="checkbox"/>	103	UPS hardware fail
<input type="checkbox"/>	104	UPS output overload

**Telecom Power System message**

Send	Event Code	Event Name
<input type="checkbox"/>	65	Battery voltage low
<input type="checkbox"/>	68	Battery voltage high
<input type="checkbox"/>	66	Controller temperature high
<input type="checkbox"/>	67	Controller temperature low

OK Test Cancel

Diagram 4-6-1

In the “Pager Setting” dialog, the parameters which can be setup is shown in the following Table 4-6

Parameter	Description
Modem Port	Select COM port which is being used by Modem.
Access Number	For some pager service, a delay is needed between dialing access number and message code.
Pager Number	For some pager service, a delay is needed between dialing pager number and message code.
dailing number to exterior line	For extension line, it is always necessary to dial a specified number and delay a specified time to access Exterior Line.
dailing number after message	For some pager service, need to dial a specified number to end message code.
Event Code	The event code is dialed as the message code and will be displayed on pager.

Table 4-6

If the exterior line phone number cannot be dialed directly, please fill in the switch number in the “Dailing to exterior line bar”. The waiting time after dial can be set according to what you need, generally 1 second.

“Access number” is the station number that the pager joined (which can only be auto station). The waiting time is the delay time between dialing paging station number and pager number, this delay time is decided by the paging station, for Liantong 192 auto station, the waiting time is 1 second.

“Pager Number” is the number of the pager that accepts the communication. The waiting time is the delay time between dialing pager number and message code (paging message content), the delay time is decided by the paging station, for Liangtong 192 auto station, the waiting time is 1second.

Select Event Code from the “Pager Setting” and select “OK” button to save it and exit.

Another method to select Event Code:

Select one of the events (For example, AC Fail) from the “Event List”, which is on the left side of the “Event Action”; then select “Send Pager” on the right side. Finally select the “OK” button to save it and exit.

## 7. How to realize telemonitoring any device in LAN within the same network

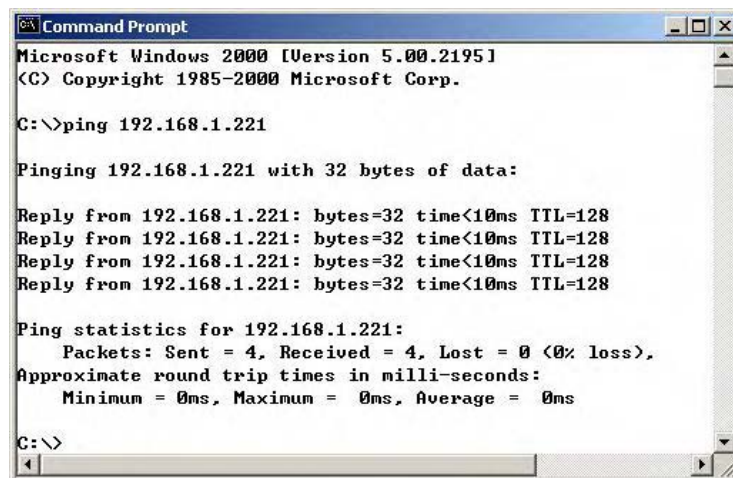
### ✓ Precondition

To realize telemonitoring any device in LAN within the same network, the computers being required to setup Winpower must have TCP/IP protocol in their communication protocol.

### ✓ Steps for realization

#### ➤ Keep network communication smooth

test with network command PING under command prompt window. For example, a computer named stkr-user2 in LAN, whose corresponding IP address is 192.168.1.221, and then you can finish the test with command ping 192.168.1.221. See the following Diagram 4-7-1: which indicates that the physical link of LAN is smooth.



```

Microsoft Windows [Version 5.00.2195]
(C) Copyright 1985-2000 Microsoft Corp.

C:\>ping 192.168.1.221

Pinging 192.168.1.221 with 32 bytes of data:

Reply from 192.168.1.221: bytes=32 time<10ms TTL=128
Reply from 192.168.1.221: bytes=32 time<10ms TTL=128
Reply from 192.168.1.221: bytes=32 time<10ms TTL=128
Reply from 192.168.1.221: bytes=32 time<10ms TTL=128

Ping statistics for 192.168.1.221:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
  
```

Diagram 4-7-1

#### ➤ Remote Control Permission Switch

This is a selectable menu item. User can open the submenu “Accept Remote Device” of the menu “Monitor” in the Winpower in the computer whose IP address is 192.168.1.221 .

Refer to the following diagram 4-7-2:

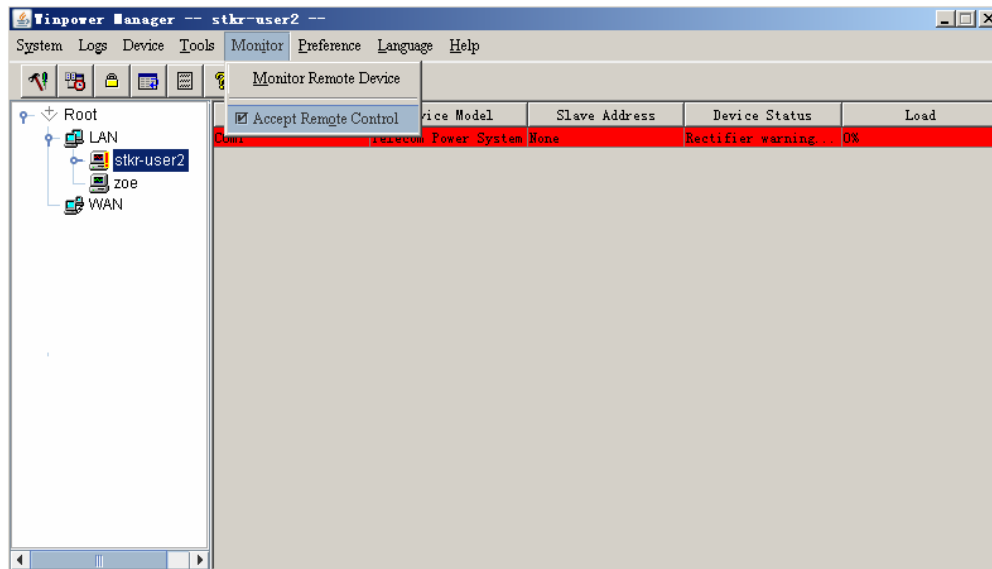


Diagram 4-7-2

➤ **Startup Monitor**

Refer to the following diagram 4-7-3:

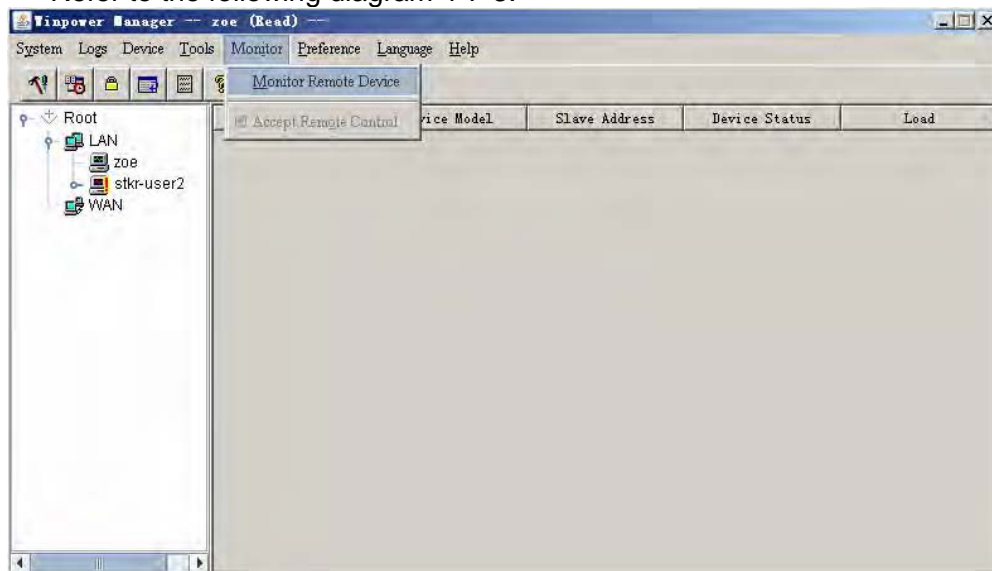


Diagram 4-7-3

➤ **Select the device you want to monitor**

Open the “Monitor Remote Device” menu item from the “Monitor” menu to pop up the “Monitor Remote Device” dialog. Refer to the following diagram 4-7-4:

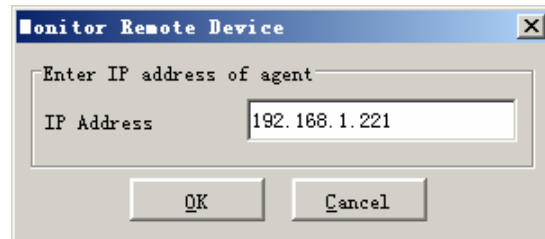


Diagram 4-7-4

User can enter a computer name or IP address in the popup "Monitor Remote Device" Dialog. Click on the "OK" button to finish the setting.

Now You can find the device in the WAN, Refer to the following diagram 4-7-5

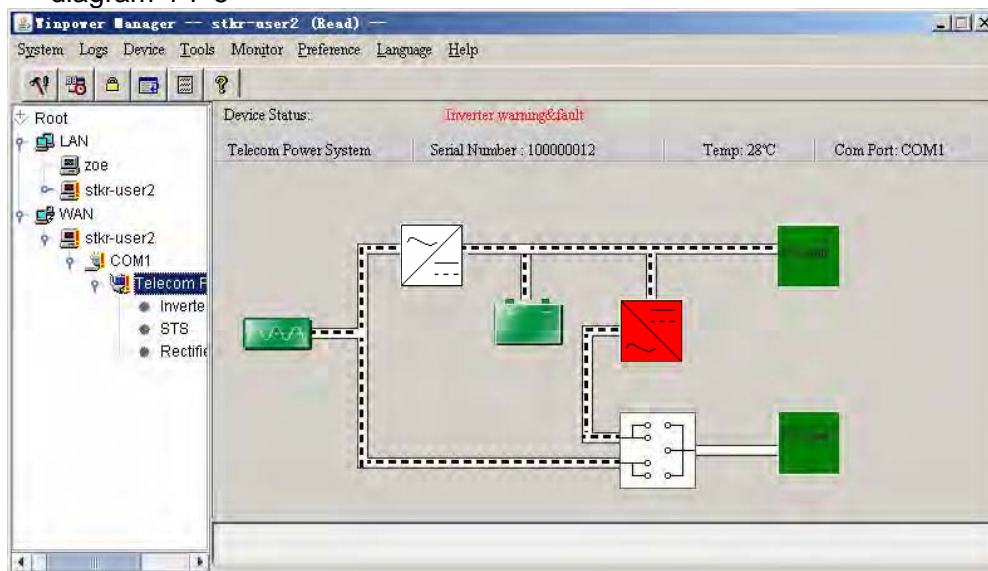


Diagram 4-7-5

You can select the device from the tree view on the left side of the window.

If the Remote Accept Control Permission Switch of the Agent is not on, you can only monitor but not control. Refer to the following diagram 4-7-6: The submenu "Act as Administrator" of the menu "System" is gray and cannot be selected. So if you do not log in as an administrator, you cannot control all of the operation, Refer to the following diagram 4-7-6.



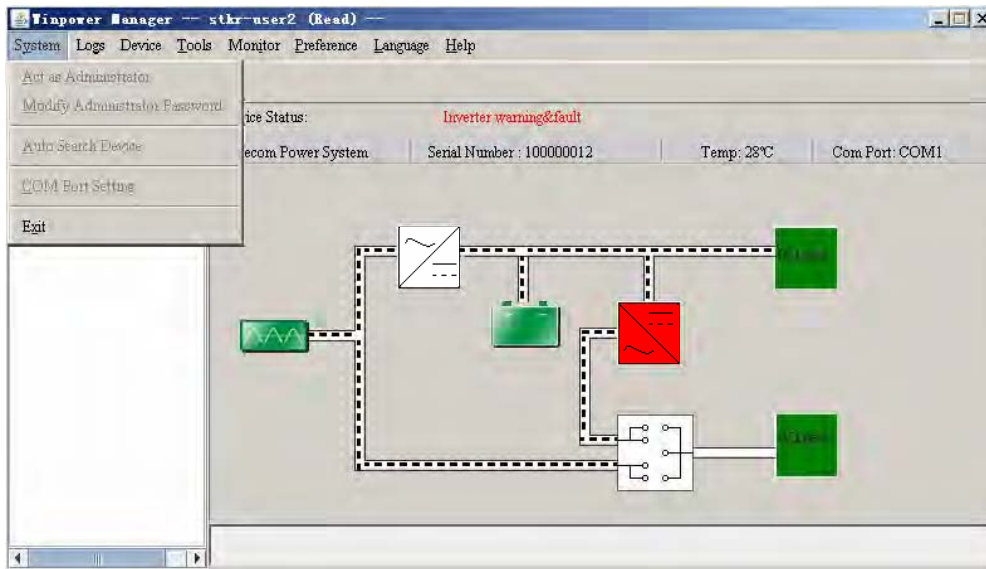


Diagram 4-7-6

If the Remote Control Permission Switch of the Agent is on, you can monitor and control this device. Refer to the following diagram 4-7-7: The submenu "Act as Administrator" of the menu "System" is black and can be selected. So after you log in as an Administrator, you can control all of the operation, Refer to the following diagram 4-7-7.

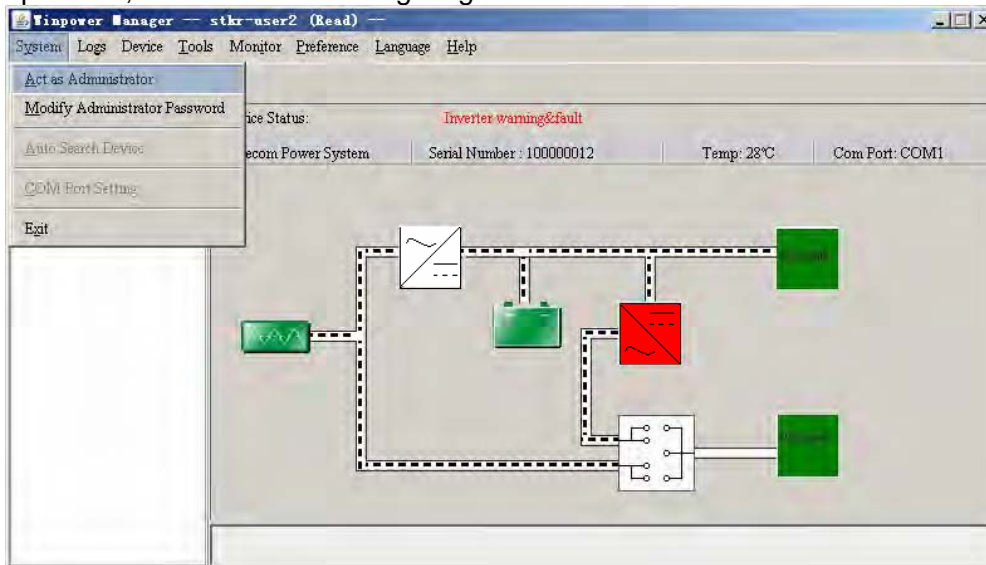
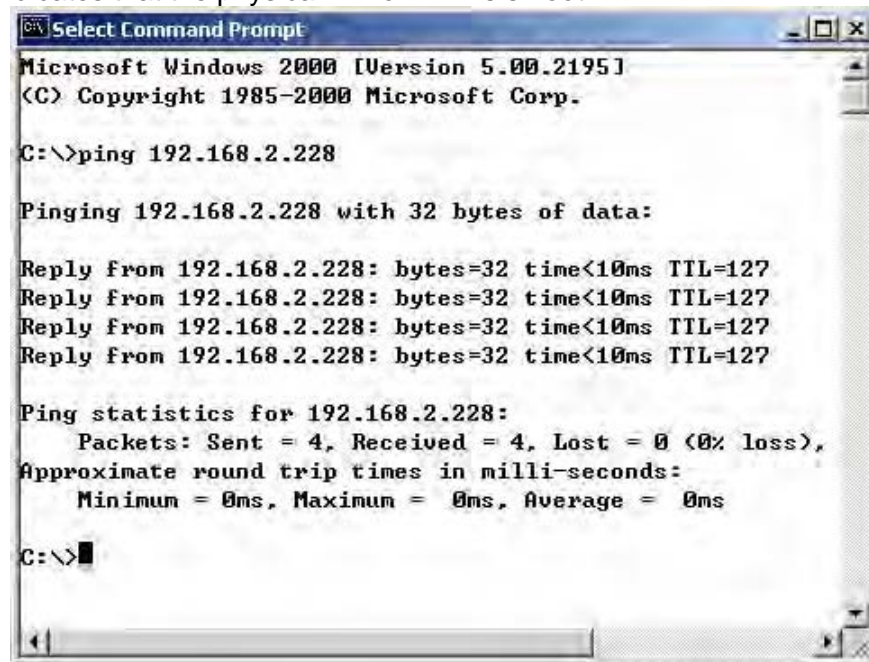


Diagram 4-7-7

## 8. How to realize remote control of any device in different network in LAN

- The computers being required to setup Winpower must setup TCP/IP protocol in the communication protocol.
- ✓ Steps for realization
- Keep the communication smooth:

test with network command PING under command prompt window. For example, a computer named stkr-user2 with IP address 192.168.2.228, you can test with command “ping 192.168.2.228”. See the following Diagram 4-8-1: which indicates that the physical link of LAN is smooth.



```

Select Command Prompt
Microsoft Windows [Version 5.00.2195]
(C) Copyright 1985-2000 Microsoft Corp.

C:\>ping 192.168.2.228

Pinging 192.168.2.228 with 32 bytes of data:

Reply from 192.168.2.228: bytes=32 time<10ms TTL=127
Reply from 192.168.2.228: bytes=32 time<10ms TTL=127
Reply from 192.168.2.228: bytes=32 time<10ms TTL=127
Reply from 192.168.2.228: bytes=32 time<10ms TTL=127

Ping statistics for 192.168.2.228:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>

```

Diagram 4-8-1

#### ➤ Remote Control Permission Switch

This is a selectable menu item. User can open the submenu “Accept Remote Device” of the menu “Monitor” in the Winpower in the computer whose IP address is 192.168.2.228 .

Refer to the following diagram 4-8-2:

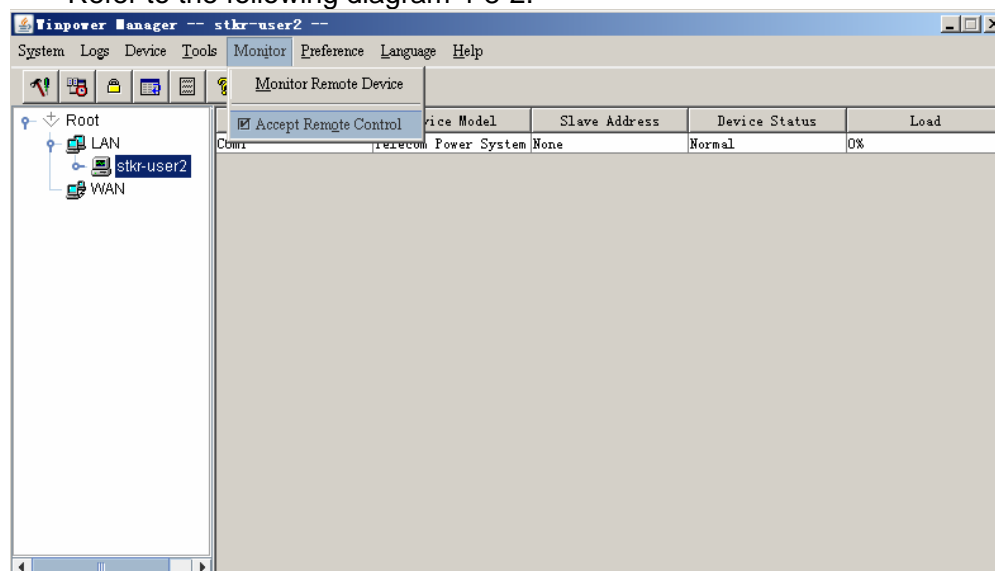


Diagram 4-8-2

➤ **Startup Monitor**

Refer to the following diagram 4-8-3:

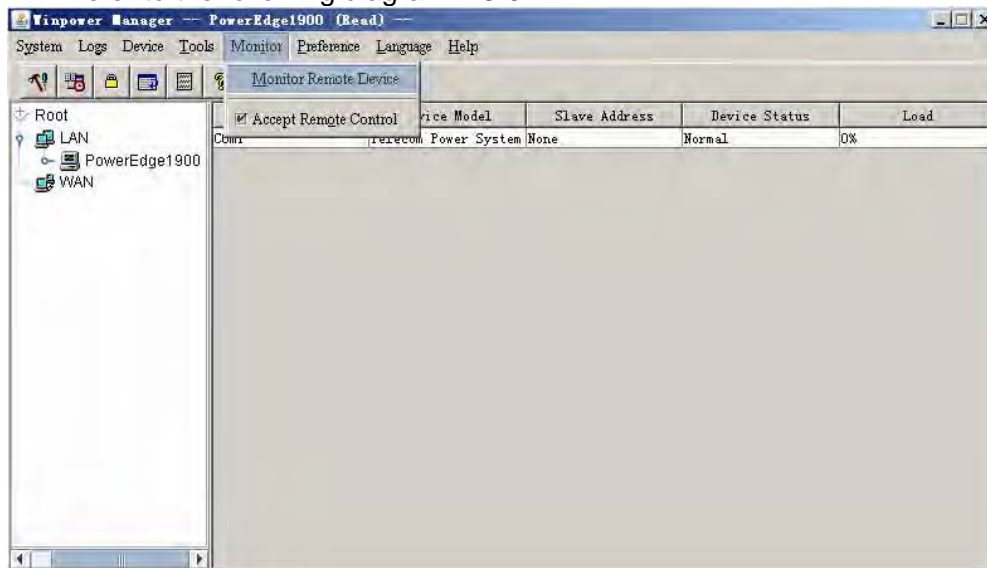


Diagram 4-8-3

➤ **Select the device you want to monitor**

Open the "Monitor Remote Device" menu item from the "Monitor" menu to pop up the "Monitor Remote Device" dialog. Refer to the following diagram 4-8-4:

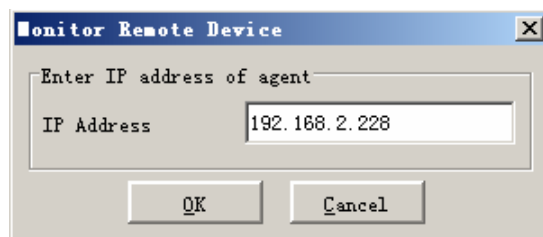


Diagram 4-8-4

User can enter a computer name or IP address in the popup "Monitor Remote Device" Dialog. Click on the "OK" button to finish the setting.

Now You can find the device in the WAN, Refer to the following diagram 4-8-5.

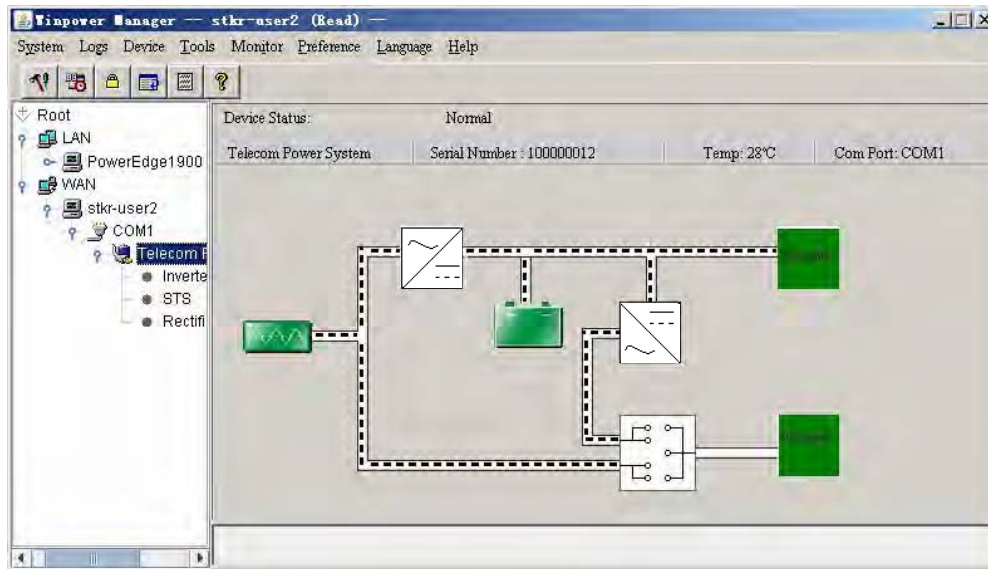


Diagram 4-8-5

If the Remote Control Permission switch of this Agent is not on, then you can only monitor but not control. See the following diagram 4-8-6.

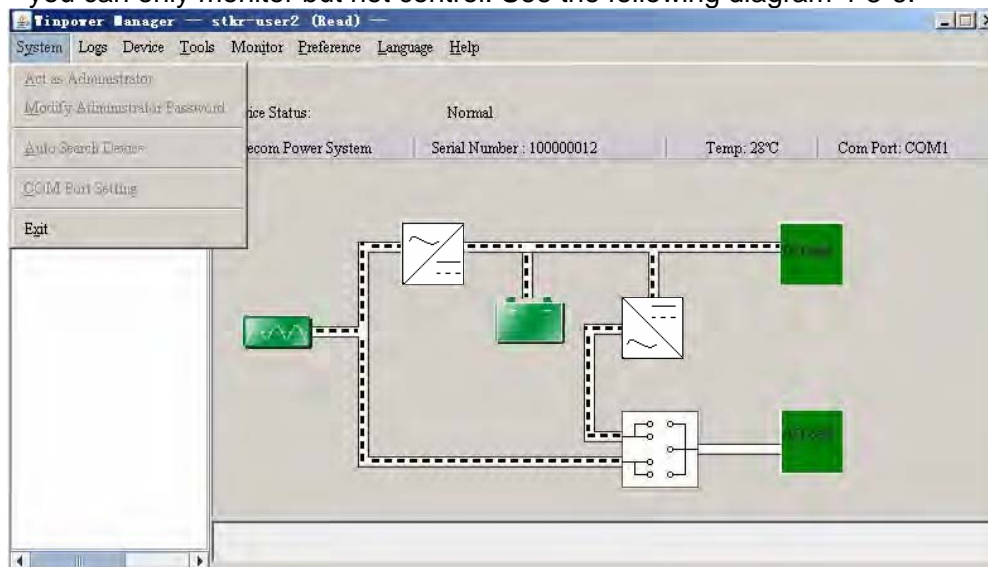


Diagram 4-8-6

If the Remote Control Permission Switch is on, then you can monitor and control this device. So after you login as a super user, you can control all of the operation, Refer to the following diagram 4-8-7.

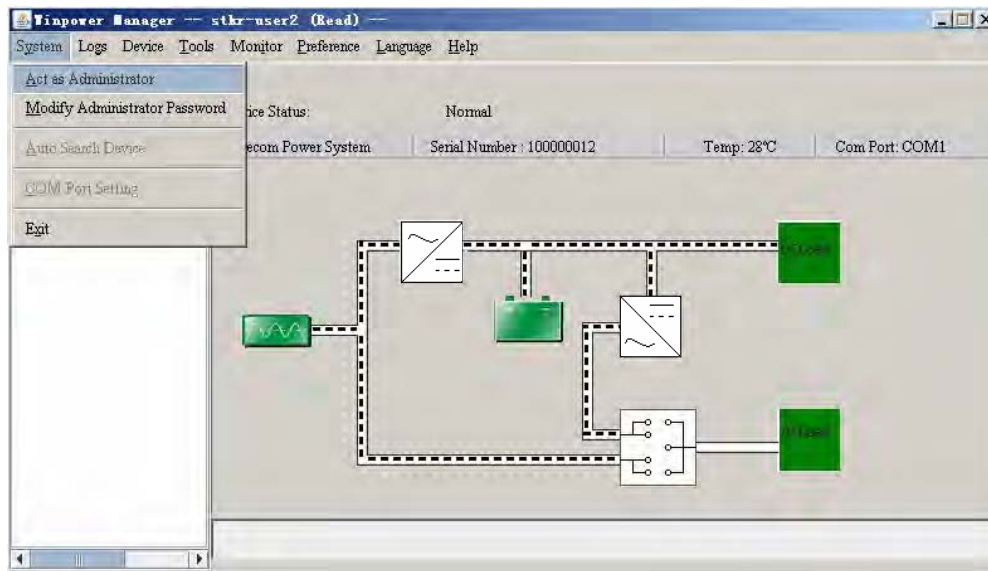


Diagram 4-8-7

## 9. How to realize the Remote Control of any one of the device in Internet

### ✓ Precondition

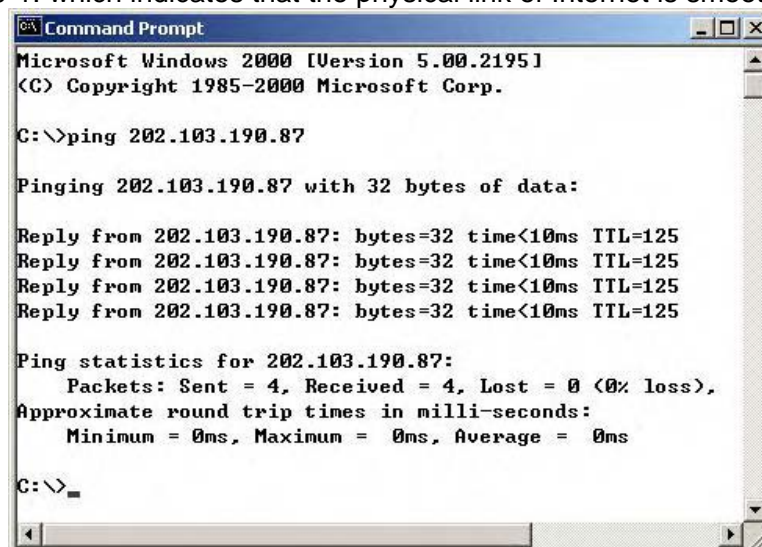
- The computers being required to setup Winpower must setup TCP/IP protocol in the communication protocol.
- The computer being required to setup Winpower has been connected to the Internet.

### ✓ Steps for realization

- **Keep the communication smooth**

test with network command PING under command prompt window.

For example, a computer named stkr-user2 in internet, whose corresponding IP address is 202.103.190.87, and then you can finish the test with command ping 202.103.190.87. See the following Diagram 4-9-1: which indicates that the physical link of Internet is smooth.



```

Microsoft Windows [Version 5.00.2195]
(C) Copyright 1985-2000 Microsoft Corp.

C:\>ping 202.103.190.87

Pinging 202.103.190.87 with 32 bytes of data:

Reply from 202.103.190.87: bytes=32 time<10ms TTL=125
Reply from 202.103.190.87: bytes=32 time<10ms TTL=125
Reply from 202.103.190.87: bytes=32 time<10ms TTL=125
Reply from 202.103.190.87: bytes=32 time<10ms TTL=125

Ping statistics for 202.103.190.87:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
  
```

Diagram 4-9-1



### ➤ Remote Control Permission Switch

This is a selectable menu item. User can open the submenu “Accept Remote Device” of the menu “Monitor” in the Winpower in the computer whose IP address is 202.103.190.87. Refer to the following diagram 4-9-2:

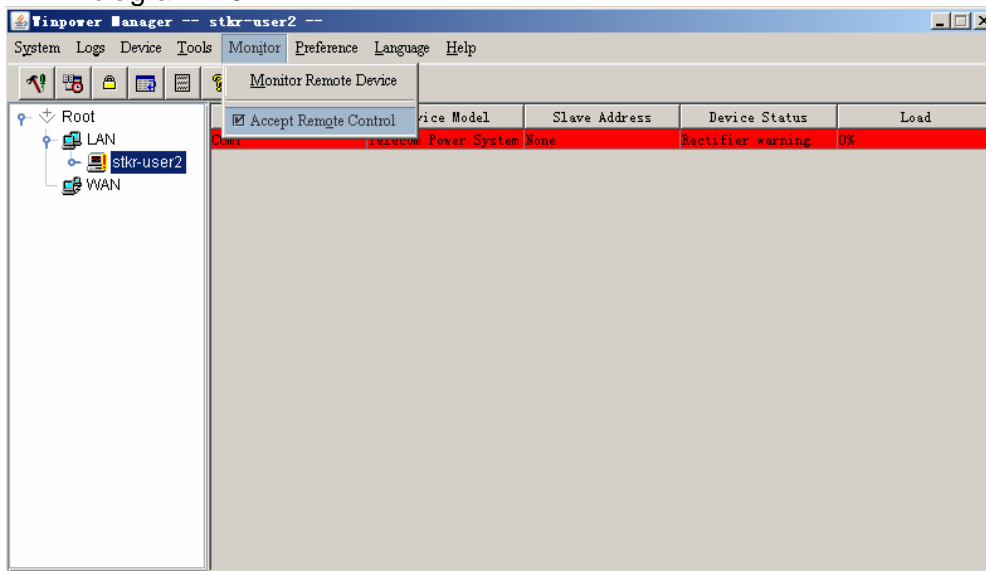


Diagram 4-9-2

### ➤ Startup Monitor

Refer to the following diagram 4-9-3:

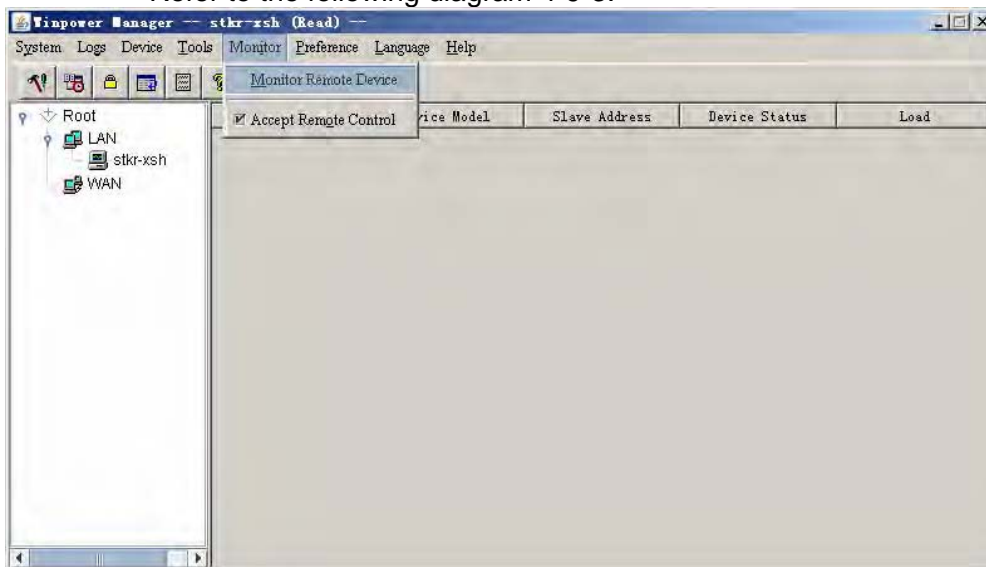


Diagram 4-9-3

### ➤ Select the device you want to monitor

Open the “Monitor Remote device” menu item from the “Monitor” menu to pop up the “Monitor Remote Device” dialog. Refer to the following diagram 4-9-4:

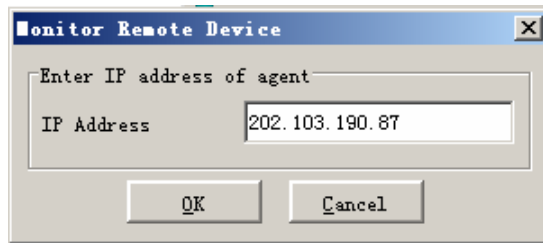


Diagram 4-9-4

User can enter a computer name or IP address in the popup "Monitor Remote Device " Dialog.click on the "OK" button to finish the setting.

Now you can find the device in the WAN, You can select the device from the tree view on the left side of the window. Refer to the following diagram 4-9-5.

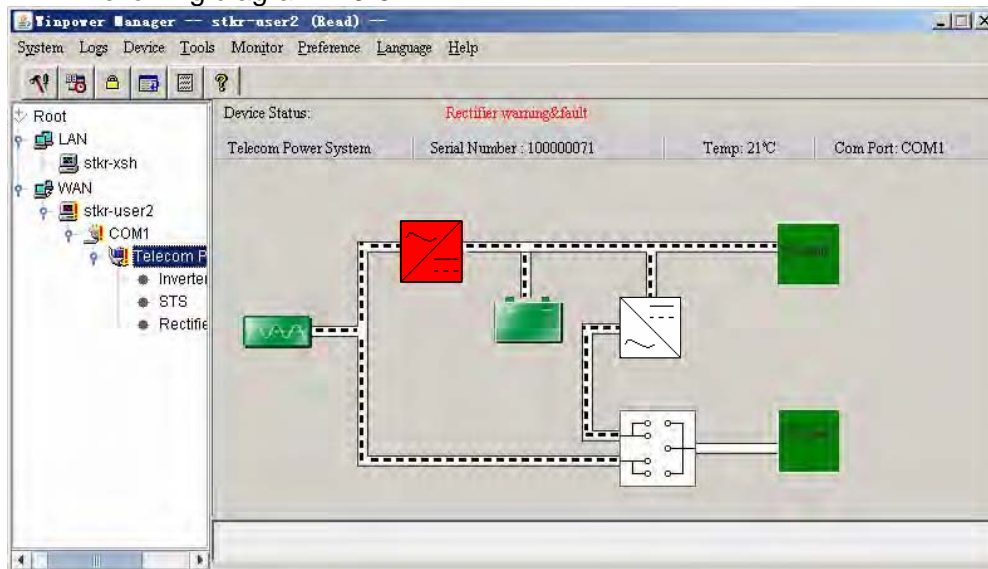


Diagram 4-9-5

If the Remote Control Permission switch of this Agent is not on, then you can only monitor but not control. See the following diagram 4-9-6.

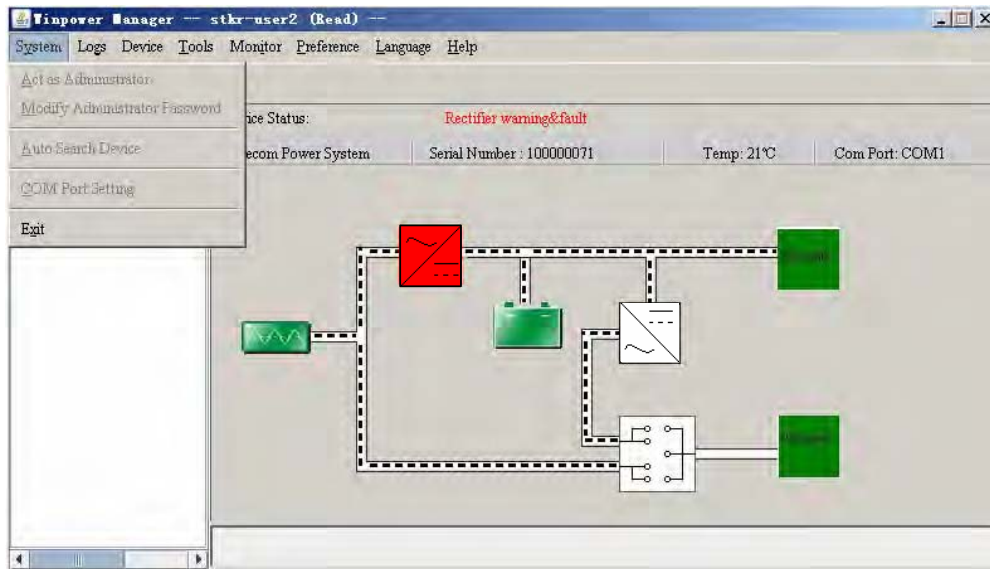


Diagram 4-9-6

If the Remote Control Permission Switch is on, then you can monitor and control this device. So after you login as a super user, you can control all of the operation, Refer to the following diagram 4-9-7.

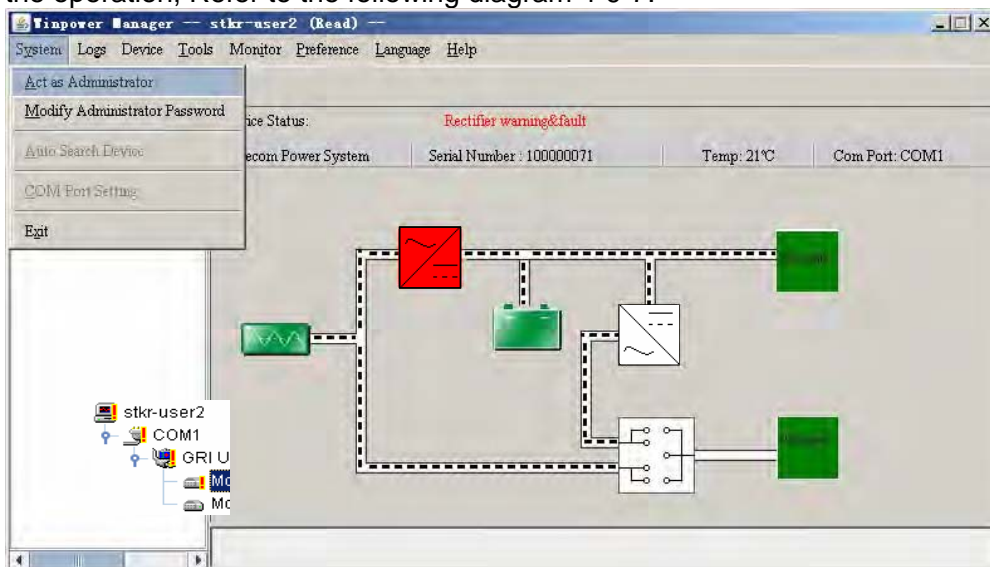


Diagram 4-9-7

## Appendix B---Winpower Event Table

Serial Number	Event Description	Type of Message	Remarks
1	UPS Battery Low	Serious	Can be set as no shutdown system through "Shutdown parameter"
2	UPS Battery Time Exhaust	Serious	Can set battery backup time through "Shutdown parameter"
3	UPS Fail	Serious	
4	UPS Output Overlad	Serious	Output load is more than 110%
6	Communication Lost	Warning	The connection of communication cable is not good, or communication port fault.
7	AC Fail	Warning	
8	On Bypass	Warning	UPS will be switched to bypass mode for the reason of overload, hardware fault and so on. Online UPS is also in bypass mode when it is off, at this time UPS has no protection function.
9	Bypass without output		
10	Self-test Fail	Warning	
11	Phase sequence incorrect in Bypass	Warning	Three-phase UPS support
12	Battery switch not engaged	Warning	Three-phase UPS support
13	Load unbalance	Warning	Three-phase UPS support
14	Load too high	Warning	
15	Internal warning	Warning	Three-phase UPS support
16	Maintain cover is open	Warning	
17	AC Restore	Information	.
18	Communication Create	Information	.
19	Agent Start	Information	.
20	Agent Stop	Information	.
21	System be shutdown	Information	.
22	System be Shutdown by Other Agent	Information	Set the Agent need to be in response to through "Shutdown parameter".
23	Special date Close UPS	Information	.
24	Weekly Close UPS	Information	.
25	Self-test Start	Information	Self-test begins immediately.
26	Self-test cancel	Information	.

27	Sel-test End	Information	.
28	Special date Self-test Start	Information	.
29	Special date Self-test Cancel	Information	.
30	Special date Self-test End	Information	.
31	Monthly Self-test Start	Information	.
32	Monthly Self-test Cancel	Information	.
33	Monthly Self-test End	Information	.

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**Appendix C - Revision Log**

Revision	Description	Issued by / Date
2	Updated to new branding	NF / 0916
3	Updated to include reference to Windows 7/8/10 Added appendix C - Revision Log	NF / 0717