



Static Transfer Switch



100 / 150 / 200 / 250 / 300 / 400 / 600 / 800 / 1000 A
3 POLE / 4 POLE

User Manual

No part of this manual may be reproduced, even partially, without express authorisation of the manufacturer.
Due to a policy of continuous improvement, the manufacturer reserves the right to modify the product described herein at any time without advance notice.

Protective equipment to be worn

No maintenance operations must be carried out on the device without wearing the Personal Protective Equipment (PPE) described below.

Personnel involved in the installation or maintenance of the equipment must not wear clothes with wide sleeves or laces, belts, bracelets or other items that may be dangerous, especially if they are metallic. Long hair must be tied in such a way as to ensure that it is not a hazard.

The following signs show the protective equipment that should be worn. The various items of PPE must be selected and sized according to the nature of the hazard (particularly electrical) posed by the equipment.

	Accident prevention footwear Use: always		Protective eyewear Use: always
	Protective clothing Use: always		Helmet Use: When there are suspended loads
	Work gloves Use: always		

Definition of “operator” and “specialized technician”

The professional figure responsible for accessing the equipment for ordinary maintenance purposes is defined with the term **operator**.

This definition covers personnel that know the operating and maintenance procedures for the equipment, and that have been:

1. trained to operate in accordance with the safety standards relating to the dangers that may arise where electrical voltage is present;
2. trained to use Personal Protective Equipment and to carry out basic first aid.

The professional figure responsible for the installation and start-up of the equipment, and for any extraordinary maintenance, is defined with the term **specialized technician**.

This definition covers personnel that, in addition to the requirements listed above for a general operator, must also:

1. have been suitably trained by the manufacturers or their representative.
2. be aware of installation, assembly, repair and service procedures, and have a specific technical qualification.
3. must have a background of technical training, or specific training relating to the procedures for the safe use and maintenance of the equipment.

Emergency interventions

The following information is of a general nature.

First aid interventions

Company regulations and traditional procedures should be followed for any first aid intervention that may be required.

Fire fighting measures



1. Do not use water to put out a fire, but only fire extinguishers that are suitable for use with electrical and electronic equipment.
2. If exposed to heat or fire, some products may release toxic fumes into the atmosphere. Always use a respirator when extinguishing a fire.

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Many thanks for choosing our product in order to protect your equipment

STS automatic static transfer switch (STS), is a device that enables automatic or manual transfer between two AC power supply sources, ensuring a transfer time of less than $\frac{1}{4}$ of a cycle.

The use of STS static transfer switches within an electrical distribution system provides a means of secure protection against any potential disruption of the power supply, due to interruptions of the supply source or failure of the distribution lines caused by environmental phenomena or human error.

The STS series is available in 100-150-200-250-300-400-600-800-1000 Ampere models; The range is available in three or four pole formats for either three-phase or three-phase plus neutral switching installations.

The STS provides a guaranteed means of switching between two alternative and independent power sources thus ensuring a continued supply of power to any critical load.

The switching can either be AUTOMATIC should the incoming supply fall outside the predefined window of operation (user-defined), or MANUAL should an operator want to force switching between the two input supply sources from the mimic display panel or via a remote connection.

ATTENTION

This manual contains instructions for the installation, start up and use of the product.

Read the manual carefully before installing the product.

The manual contains important information with regards to use of the device; therefore it must be read carefully and should be consulted before activating the STS.

All the installation and maintenance operations inside the device must be conducted exclusively by trained personnel.

Do not insert any objects in the ventilation slots or in any other openings.

To reduce the risk of electric shock, install the device in sites with controlled ambient temperature and relative humidity, free of open flames and corrosive substances.

The device has two power input lines. Even if only one of the sources is active, the voltage level inside the system is dangerous.

When the device is in manual BY-PASS status, the voltage level inside the system is dangerous.

SAFETY REGULATIONS

Always ensure that the ground connection is the first connection to be made during the installation of the system, this terminal is identified by the following symbol:



THE STS MUST NOT BE OPERATED WITHOUT A GROUND CONNECTION.

The STS must only be operated with all external and internal panels fastened as specified and with the front door closed.

Do not perform any maintenance activities inside the STS even if only one power source is connected to it.

For maintenance, close either the SW4-1 or SW4-2 by-pass switch and then open all of the other switches.

Always use a multimeter to check that no dangerous voltages are present inside.

STANDARDS AND COMPLIANCE

DESCRIPTION	YEAR	NORMS OF REFERENCE
General and safety requirements	2005	IEC 62310-1
Electromagnetic compatibility (EMC) requirements	2006	IEC 62310-2

Table no. 1

STORAGE

If the STS is not to be installed immediately, it must be stored in its original packing and be shielded from humidity and bad weather. The storage room must have the following characteristics:

Temperature: $-10^{\circ} \div +50^{\circ}\text{C}$
Relative humidity: 90% max

INSTALLATION ENVIRONMENT

Follow these recommendations when choosing the installation environment:

- avoid dusty areas
- confirm that the floor can support the weight of the STS
- avoid rooms that are too small and would prevent normal maintenance operations
- relative humidity at 20°C must not be greater than 90% non-condensing
- avoid placing the device in a position exposed to direct sunlight or hot air
- verify that the ambient temperature, with the STS in operation, is less than:
 - operating temperature: $0 \div +40^{\circ}\text{C}$
 - maximum temperature for 8 hours/day: $+ 40^{\circ}\text{C}$
 - average temperature over 24 hours: $+ 35^{\circ}\text{C}$

In order to maintain the temperature of the operating environment as specified above, it may be necessary to install a means of removing the heat dissipated by the STS.

PRELIMINARY OPERATIONS

PACKING CASE CHECK

When the STS is delivered confirm that the packing case has not been damaged during transportation. Be careful when removing the packing case to avoid scratching the STS cabinet. The device must be handled carefully: any knocks or falls may damage it.

CONTENTS CHECK

The following item must be included inside the packing case.

- **Operating Manual**
- **Test report**
- **STS MANAGER** software, CD-ROM with the Software for remote STS management
" STS Manager Software"
- **CC05** Cable

POSITIONING

The air used to cool the STS is drawn in through the grills located on the lower part of the front door and exits through the fan grills located on the top.

When positioning the STS keep in mind that:

- the space in front of the device should be free of obstacles for a distance of at least one metre to permit maintenance operations
- in the back part of the device should be a free space of at least 50 cm between the rear of the device and the wall to permit maintenance operations
- there should be a free space of at least 60 cm between the top of the device and the ceiling to permit proper dissipation of exhaust air from the fans

Cable entry is positioned at the bottom of the STS through an opening in the cabinet base.
It is also possible to install the input and output cables from above by locating the cables in a vertical channel.
The power and communications cables must all be connected from the front of the cabinet.
channel.

PRELIMINARY INFORMATION

MODEL	STS X100	STS X150	STS X200	STS X250	STS X300	STS X400	STS X600	STS X800	STS X1000
Nominal current	100A	150A	200A	250A	300A	400A	600A	800A	1000A
Operating temperature	0 – 40° C								
Max. installation height	1000m at nominal current rating								
Dimensions WxDxH	685x530x1500 mm			685x580x1770 mm			915x735x1905	1400x850x1905	
Weight STS 3 pole	145Kg	165Kg	195Kg	205Kg	230Kg	255Kg	340Kg	-	-
Weight STS 4 pole	175Kg	190Kg	205Kg	235Kg	240Kg	340Kg	375Kg	525Kg	605Kg
Protection level	IP20								
Cables inlet	Underneath(front) / Top entry(optional)								
Communication	RS232 standard – STS NET TCP/IP option								
Swift transfer	Available - Standard								
LCD panel and mimic	Available - Standard								
Backfeed protection	Available - Standard								
Software management	Available - Standard								
Dry contact outputs	Available - Standard								
EPO input	Available – Standard (NC)								

Table no. 2

The letter <X> indicates whether the STS is a 3-pole or 4-pole model (3 = 3-pole, 4 = 4-pole).

ELECTROMAGNETIC COMPATIBILITY

This static transfer switch (STS) complies with class C2 specifications (conforming to EN62040-2: STS – EMC requirements).

This product has been designed for professional use in industrial and commercial environments.

ELECTRICAL CONNECTIONS

General electrical connection diagram of the system:

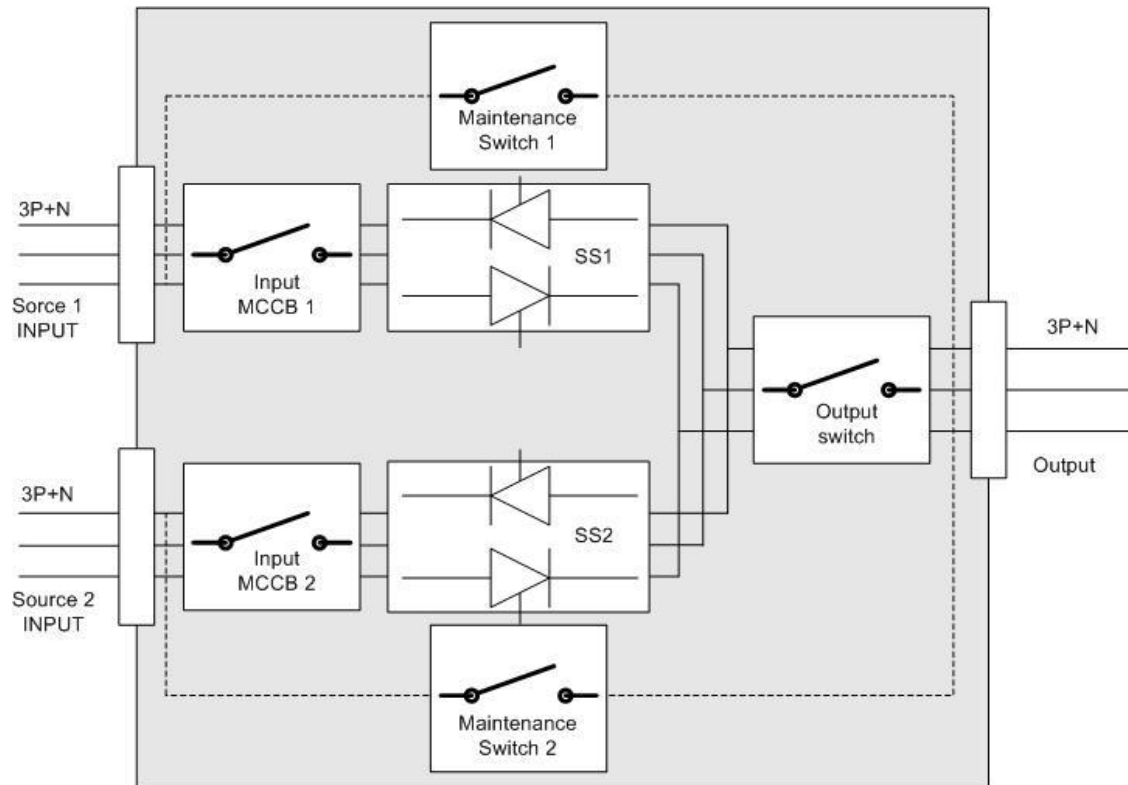


Figure no. 1

In the 3-pole model, only the three phases are switched whilst the neutral line is connected directly to the output.

In the 4-pole model there are four wires to connect to the input/output (3 phases plus neutral).

In the 4-pole model the neutral line is also switched.

CABLE CROSS SECTION

The cross section of the various STS input and output cables are specified in the table below. These are the recommended cable size by the manufacturer.

MODEL 3 Pole	MODEL 4 Pole	Cable Phase	Cable Neutral	Cable Earth/Ground
STS 100A 3 Pole	STS 100A 4 Pole	35 mm ²	50 mm ²	16 mm ²
STS 150A 3 Pole	STS 150A 4 Pole	50 mm ²	70 mm ²	25 mm ²
STS 200A 3 Pole	STS 200A 4 Pole	70 mm ²	95 mm ²	35 mm ²
STS 250A 3 Pole	STS 250A 4 Pole	95 mm ²	120 mm ²	50 mm ²
STS 300A 3 Pole	STS 300A 4 Pole	120 mm ²	150 mm ²	70 mm ²
STS 400A 3 Pole	STS 400A 4 Pole	150 mm ²	185 mm ²	70 mm ²
STS 600A 3 Pole	STS 600A 4 Pole	185 mm ²	240 mm ²	95 mm ²
STS 800A 3 Pole	STS 800A 4 Pole	2x150 mm ²	2x185 mm ²	120 mm ²
STS 1000A 3 Pole	STS 1000A 4 Pole	2x185 mm ²	2x240 mm ²	150 mm ²

Table no. 3

ALWAYS CONNECT THE NEUTRAL LINE

NOTE: The cross section of the neutral cable should be larger than the phase cables.
The earth / ground cable must be sized to 50% of the phase cables, as specified in CEI EN 62310-1.

FRONT INTERNAL VIEW OF THE STS

3 POLE

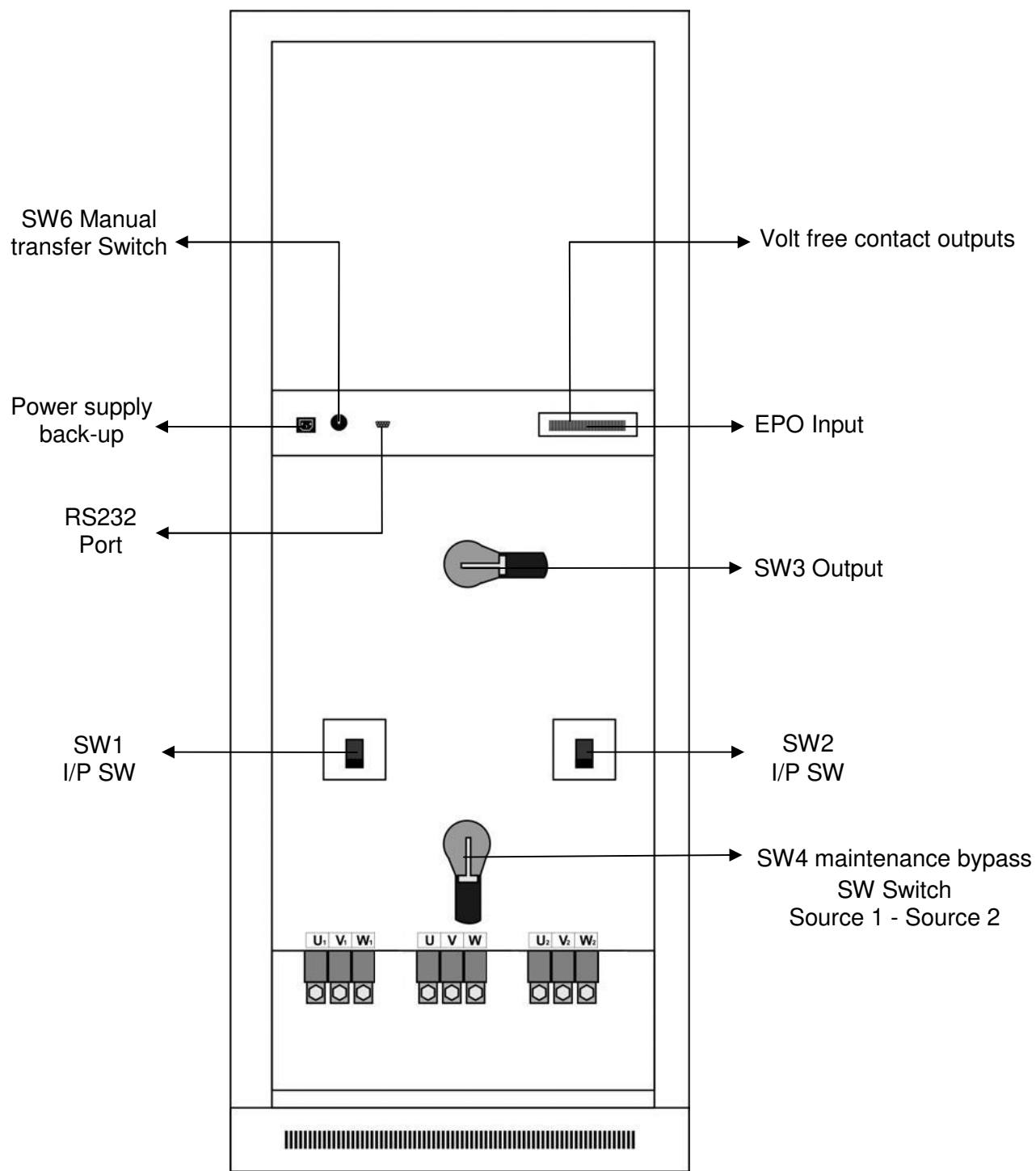


Figure no. 2 a - 100 / 150 / 200 / 250 / 300 / 400A / 600A / 800A / 1000A

4 POLE

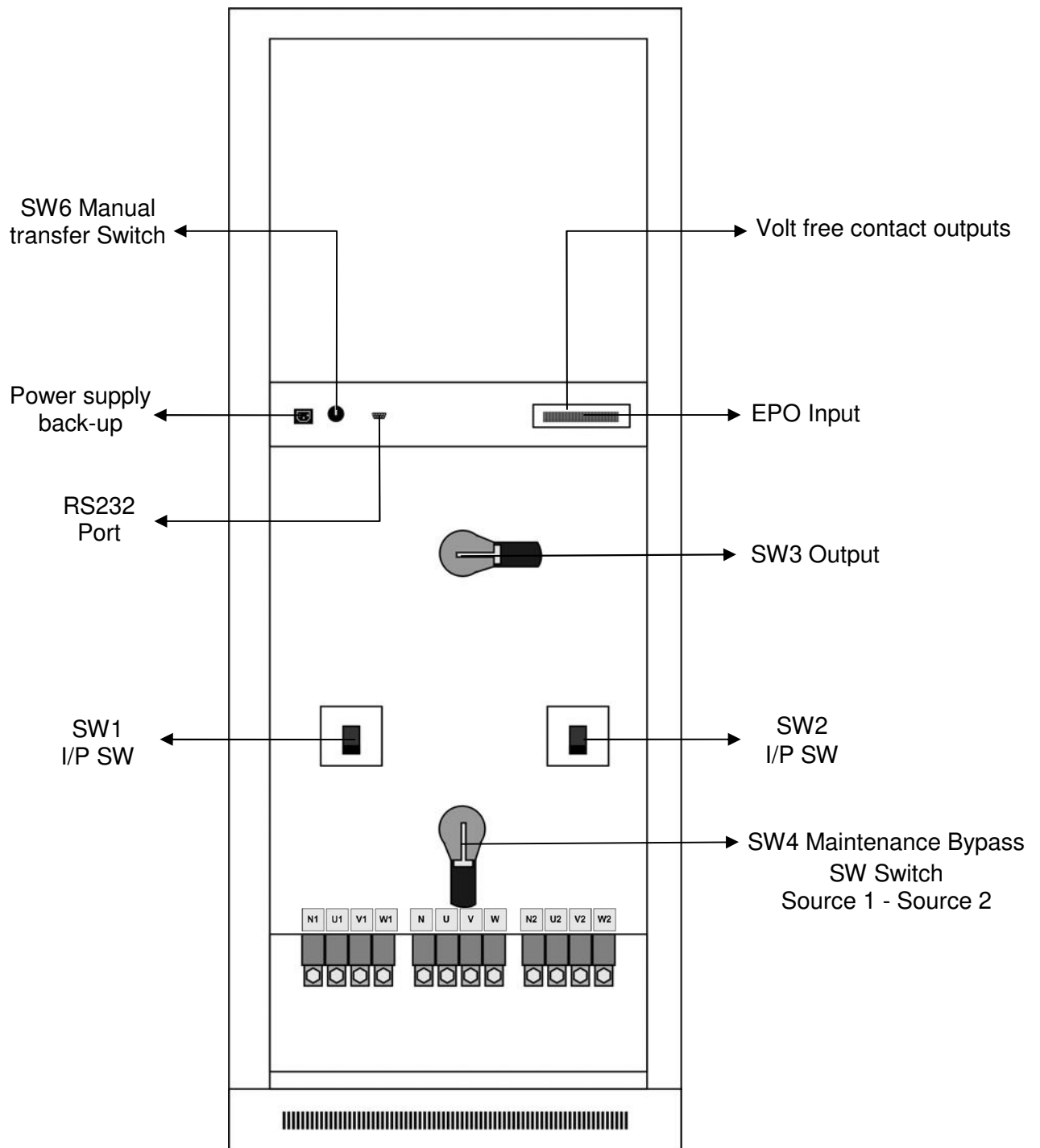


Figure no. 2 b - 100 / 150 / 200 / 250 / 300 / 400A / 600A / 800A / 1000A

CONNECTION PROCEDURE

1. Open the front door of the STS and remove the metal panel at the bottom of the cabinet to access the connection terminals and the ground bus bar.
2. Before making any connections verify that all the STS switches are open and, therefore, in OFF position (SW1, SW2, SW3 and SW4).
3. The first operation must be to connect the ground cable to the BUS BAR identified with the following symbol:

N.B.: THE STS MUST NEVER BE OPERATED WITHOUT A GROUND CONNECTION.

SOURCE 1 INPUT CONNECTION

4. Connect the power source cable to input 1 at the terminals identified as U1-V1-W1.
The neutral wire must be connected to terminal N1, if present, or to the copper bus bar identified as NEUTRAL. Confirm that the phase rotation is correct.

SOURCE 2 INPUT CONNECTION

5. Connect the power source cable to input 2 at the terminals identified as U2-V2-W2.
The neutral wire must be connected to terminal N1, if present, or to the copper bus bar identified as NEUTRAL. Confirm that the phase rotation is correct.

OUTPUT CONNECTION

6. Connect the output cable to the terminals identified as U-V-W.
The neutral wire must be connected to terminal N, if present, or to the copper bus bar identified as NEUTRAL. Confirm that the phase rotation is correct.
7. Confirm that the individual phases of the two power sources, U1-U2, V1-V2 and W1-W2, follow the same rotation.
8. Replace the previously removed panel to cover the terminals.

3-POLE POWER SOURCE CONNECTION

The input and output terminals of the three-pole STS are illustrated in the figures below:

100A-150A-200A-250A-300A-400A-600A-800A-1000A

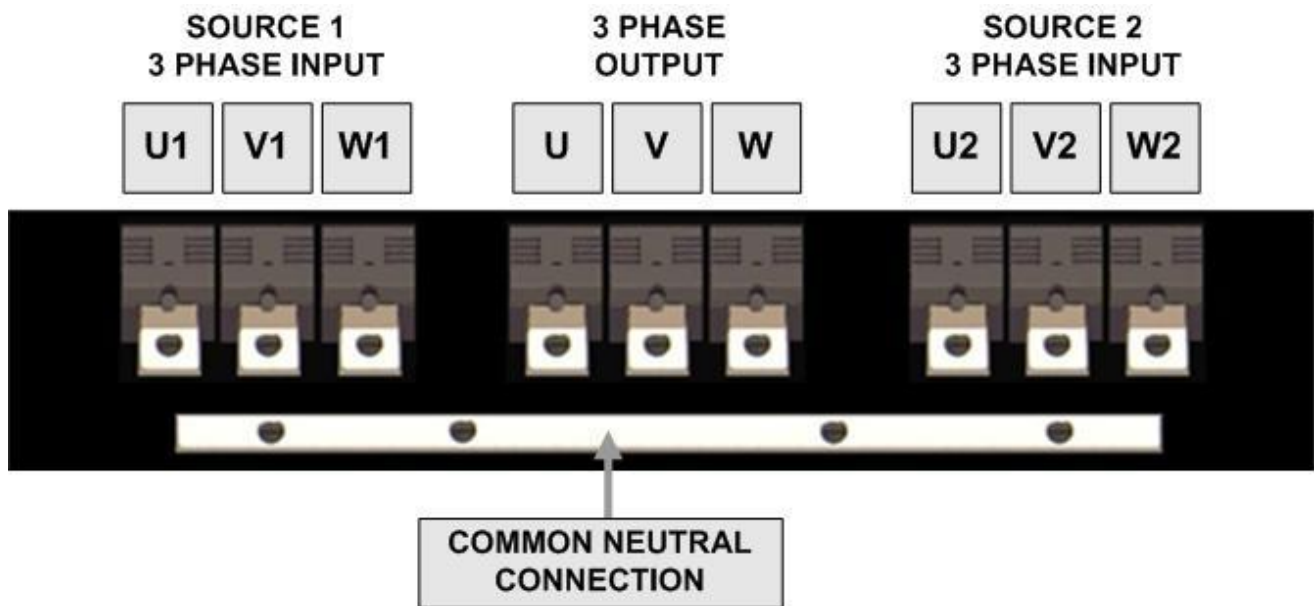
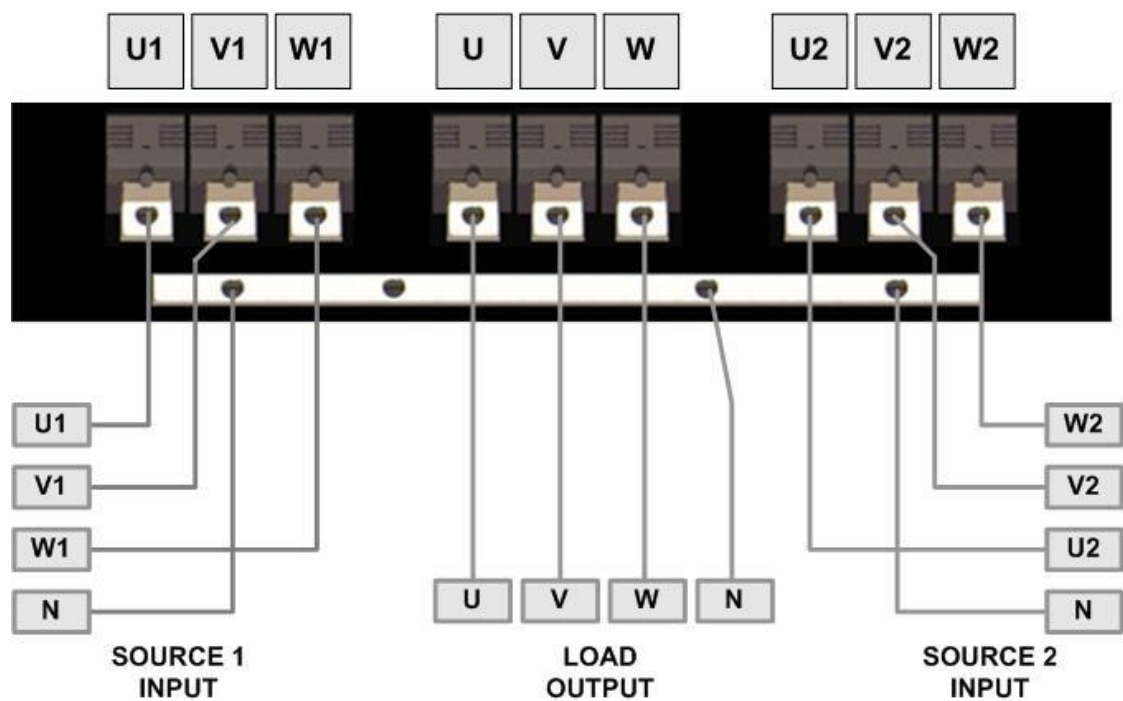


Figure no. 3



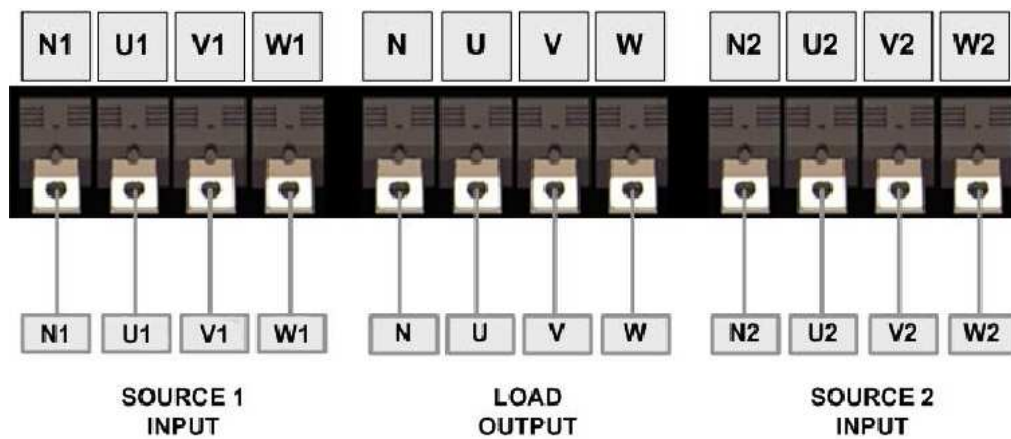
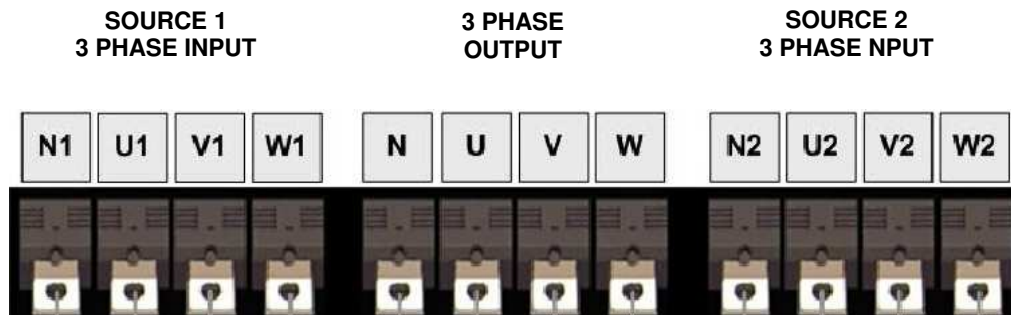
INPUT AND OUTPUT NEUTRALS CONNECTED TO EACH OTHER

Figure no. 4

4-POLE POWER SOURCE CONNECTION

The input and output terminals of the four-pole STS are illustrated in the figures below:
The neutral line of the two input power sources are completely isolated from the output neutral line.

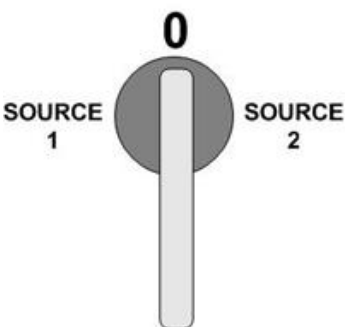
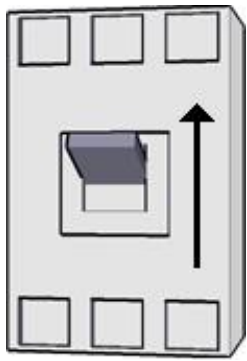
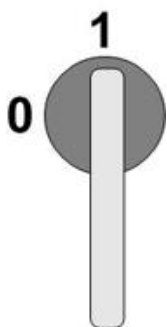
100A-150A-200A-250A-300A-400A-600A-800A-1000A



OUTPUT NEUTRAL IS CONNECTED TO CURRENT SOURCE NEUTRAL

INITIAL SWITCH-ON PROCEDURE

- Verify that all switches are in OFF position
 - SW1 – MCCB input 1 in the OFF position
 - SW2 – MCCB input 2 in the OFF position
 - SW3 – MCCB output in the OFF position
 - SW4 – MCCB by-pass switch for maintenance in the central position (0) with the safety lock
 - SW6 – manual transfer switch in the central position (AUTO)
1. Connect the supply to input 1 and confirm that the voltage is correct at terminal connections
 2. Connect the supply to input 2 and confirm that the voltage is correct at terminal connections
 3. Confirm that each of the three phases of the two input power sources follow the same rotation

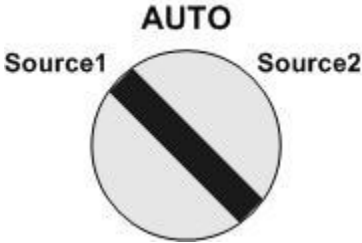
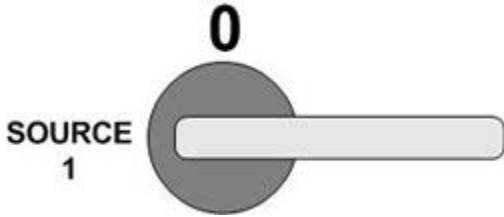
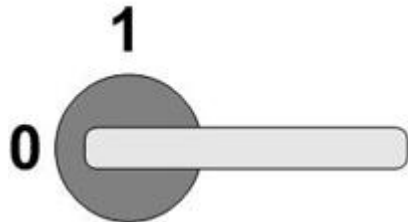
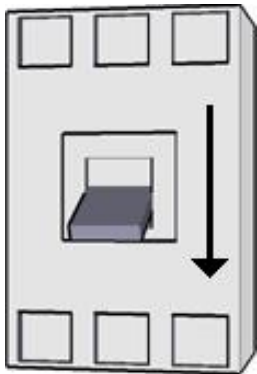
<p>1- Confirm that the maintenance bypass switch (SW4) is in the 0 position (central position)</p> 	<p>2- Turn on the input switches (1 position) SW1 and SW2. The STS control circuits will be energized and begin operation.</p> 
<p>3- Select your "PREFERRED" source. (Default factory setting is Source 1). You can change your selection using the OPTIONS MENU</p>	<p>4- Check via the mimic diagram located on the control panel, that the static switch of the preferred source is turned on (either SS1 or SS2).</p>
<p>5- Switch on the output switch SW3, to apply power to the load connected to the output of the STS</p> 	<p>6- Confirm that there are no alarms on the LCD display panel</p>
<p>7- The Static Transfer Switch is now operating normally</p>	

OPERATIONAL TESTING:

When the STS is operating normally, it is possible to simulate supply outages by using the STS input switches, or by using the switches located upstream from the STS.
During this process confirm that the load switches from one source to the other smoothly and that no disruption to the connected load occurs.

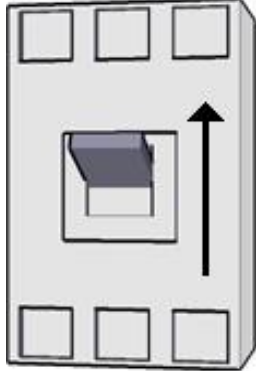
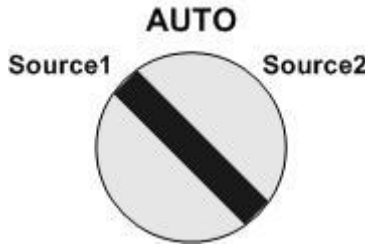
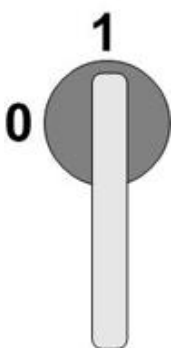
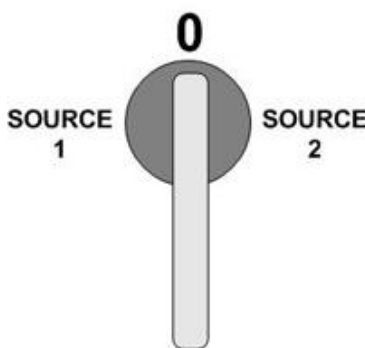
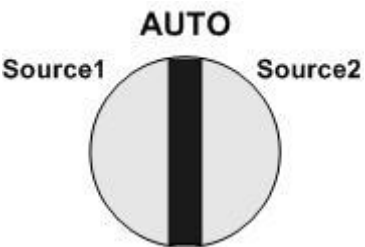
MANUAL BY-PASS PROCEDURE FOR MAINTENANCE

When the STS is operating normally it is possible to execute a manual by-pass for maintenance without creating any type of disruption to the load. In order to do this follow the steps illustrated below.

<p>1- Select the input source which is going to supply the load during maintenance, and turn the manual XFER switch SW6 to this selected source (either Source 1 or Source 2)</p> 	<p>2- Confirm on the mimic diagram that the load has been switched to the source selected by the manual XFER switch SW6</p>
<p>3- Switch the Maintenance Bypass Switch (SW4) to the selected source for maintenance. Confirm that the maintenance bypass message is displayed on the LCD panel</p> 	<p>4- Switch off the output switch SW3. This switch disconnects the static transfer switches SS1 and SS2 from the STS output, the load will continue to be supplied via the maintenance bypass line</p> 
<p>5- Switch off the input switches SW1 and SW2</p> 	<p>6- Following these operations the power section of the STS will be isolated from any hazardous voltages, and therefore will be ready for maintenance.</p> <p>NOTE: The input/output terminals of SW4 will remain live and therefore must be considered hazardous!</p>

PROCEDURE FOR RETURN TO NORMAL OPERATION FROM MAINTENANCE BY-PASS

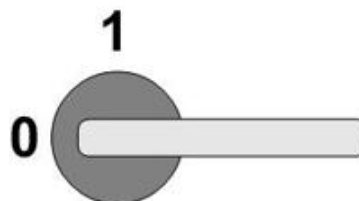
It is possible to return to normal operation, from the maintenance by-pass mode, without causing any disruption to the load. In order to do this follow the steps illustrated below.

<p>1- Switch on input switches SW1 and SW2</p> 	<p>2- Confirm that the manual XFER switch SW6 is in the maintenance source position, and ensure that the corresponding static switch (either SS1 or SS2) is turned on</p> 
<p>3- Switch on the output switch SW3</p> 	<p>4- Switch the maintenance bypass switch SW4 to "0", and lock it again</p> 
<p>5- Switch the manual XFER switch SW6 to the "AUTO" position</p> 	<p>6- Confirm that there are no alarms on the LCD display, if no alarms are present then the unit is in normal operation mode</p>

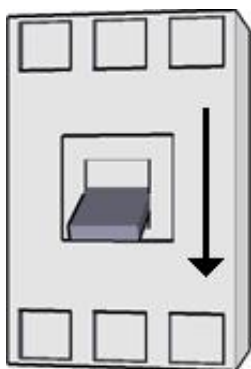
SHUT DOWN PROCEDURE

1- Switch off all of the loads which are connected to STS output

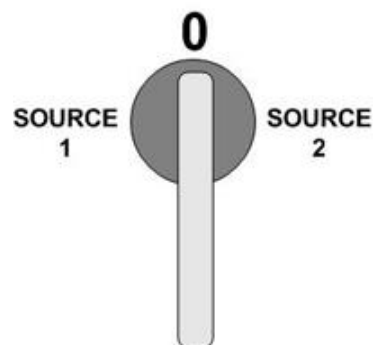
2- Switch off the output switch SW3



3- Switch off the input switches SW1 and SW2



4- Confirm that the Maintenance Bypass Switch SW4 is in the "0" position



5- The STS has now been completely isolated from all power sources and is therefore shut down.

REMOTE COMMUNICATIONS AND COMMANDS

Open the cabinet door to access the interface cards.

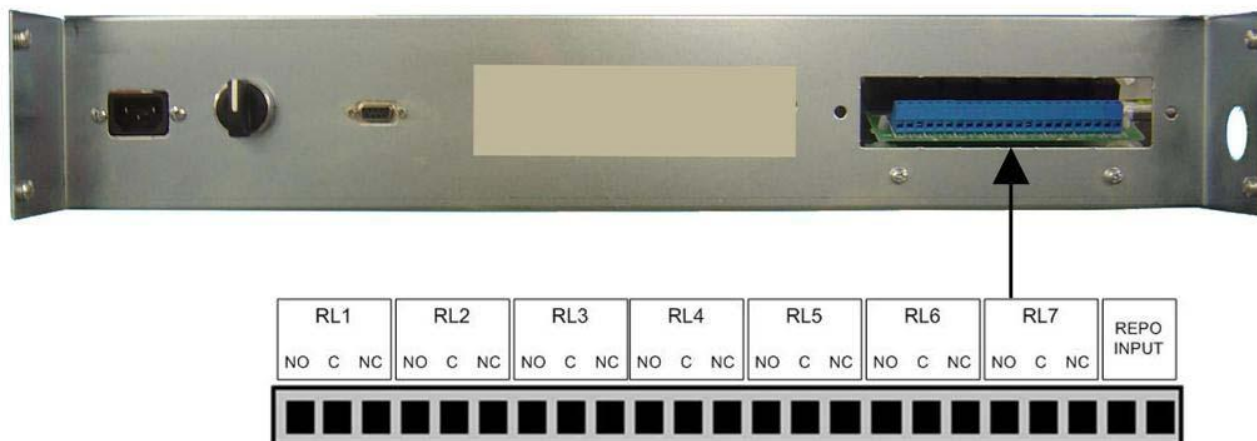


Figure no. 7

VOLT FREE CONTACT OUTPUT	
Relays 1	User programmable (default set up A1: S1 NOT OK)
Relays 2	User programmable (default set up A2: S2 NOT OK)
Relays 3	User programmable (default set up A3: SYNC NOT OK)
Relays 4	User programmable (default set up COMMON ALARM)
Relays 5	Load is on the PREFERRED source
Relays 6	BACKFD.TRIP1 (2 seconds)
Relays 7	BACKFD.TRIP2 (2 seconds)
INPUT CONTACT	
Emergency Power Off	If the user presses the external Emergency Power Off switch for more then 2 seconds STS shutdowns the output (NC contact)

Table no. 4

The RL1, RL2, RL3 and RL4 alarm relays are programmable by the user; the alarms shown in the following table can be assigned to each relay.

It is possible to program the relays instead of using the default settings, their functions can be modified in the ADJUST MENU.

► **RELAY FUNCTION TABLE**

COMMON ALARM	
A1	S1 NOT OK
A2	S2 NOT OK
A3	SYNC NOT OK
A4	OVERLOAD
A5	NSYNC INHIBIT
A6	XFER INHIBIT
A7	OUT NOT OK S1
A8	OUT NOT OK S2
A9	SUPPLY1 FAIL
A10	SUPPLY2 FAIL
A11	OVERTEMP.
A12	MAN.XFER.S1
A13	MAN XFER.S2
A16	OUT SW OFF
A17	IN.SW.1 OFF
A18	IN.SW.2 OFF
A19	S1 BLACKOUT
A20	S1 BLACKOUT
A21	S1 FREQ FAIL
A22	S2 FREQ FAIL
A23	S1 BAL FAIL
A24	S2 BAL FAIL
A25	ROTATE PH S1
A26	ROTATE PH S2

Table no. 5

EXTERNAL EPO

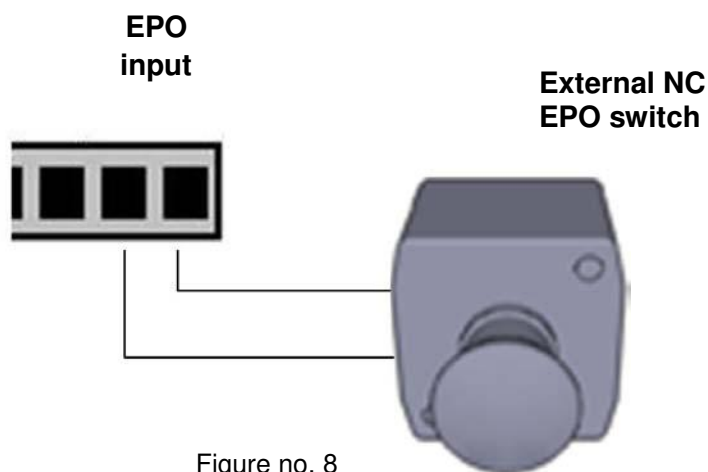


Figure no. 8

The EPO (Emergency Power Off) contact should normally be closed. If the user intervenes by opening this contact, the STS will perform the shut down procedure and switch off the output.

The STS remains in stand-by status until the EPO contact is restored; the alarm has to be reset by opening and then closing the two automatic input switches SW1 and SW2.

COMMUNICATIONS INTERFACE

Different kinds of communications interface are available:

- Serial Communication via RS232
- RS232 Duplexer ML100 (optional)
- STS NET TCP/IP Ethernet Card (optional)

For communications over greater distances RS485 is also available

RS232 hardware	
Baud rate	2400 baud
connection	3 wire (RX,TX,GND)
Bits	8 bits
Parity	none
flow	none
Stop bit	1

RS232 CONNECTION TO PC

To connect the STS with a PC via RS232 it is necessary to use the CC05 cable provided with the STS. It is also essential to have installed the STS MANAGER program (located in the STS door pocket inside the CD ROM) on the PC.



Figure no. 9

Note:

- The CC05 cable is not a standard RS232 cable
- The maximum length of the cable for an RS232 connection is 25 m.

RS232 Pinouts

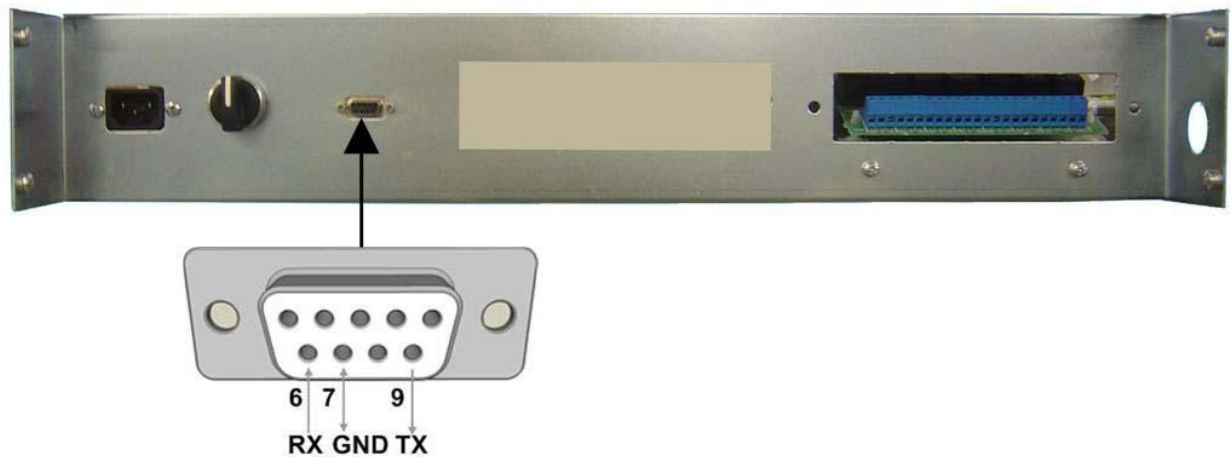


Figure no. 10

Security of the RS232 serial port

The serial port of the STS interacts with the PC so that the PC can transmit all commands to the STS. To prevent unauthorised access to the STS two levels of security measures are available:

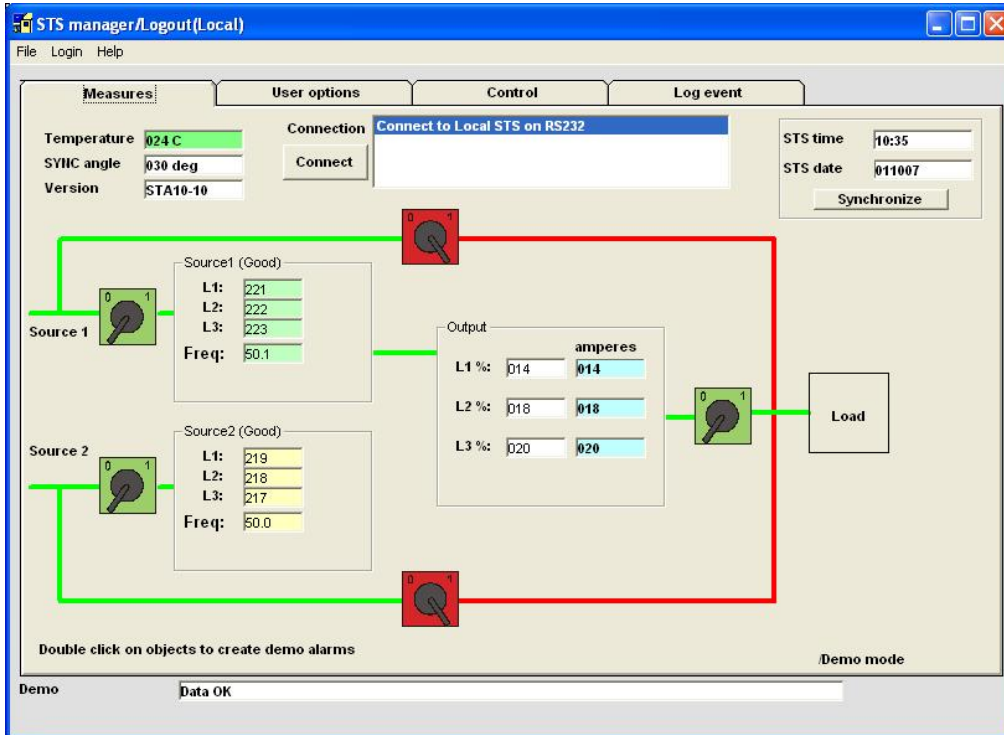
- 1) The user can enable or disable the RS232 serial port from the OPTIONS MENU. If the remote control is disabled (OFF), the STS will ignore commands sent through the serial port.
- 2) A password is required to connect the PC to the STS (USER LOGIN). If the password sent to the STS is correct, LOGIN status will last for a period of 2 minutes. During this interval the RS232 serial port will be active and it will be possible to send control commands from the PC to the STS. When two minutes have lapsed, the serial port will be disabled and it will therefore be necessary to LOGIN again.

Default user login is: 0000

STS MANAGER SOFTWARE

The STS MANAGER programme makes it possible to monitor and control the static transfer switch from a PC.

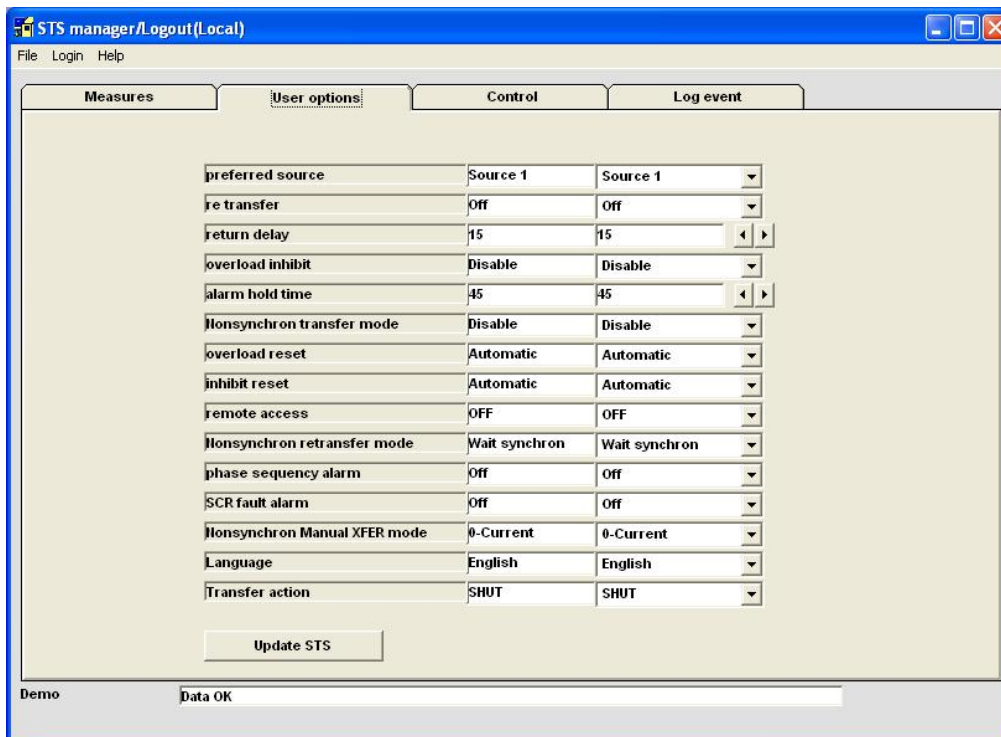
This programme includes 4 different menus: MEASURES – USER OPTIONS – CONTROL – LOG EVENT.



MEASURES

menu: it is possible to monitor the status of the STS and to verify its operational condition. Numerous parameters can be controlled, including the voltage and frequency of the input sources and output current to loads.

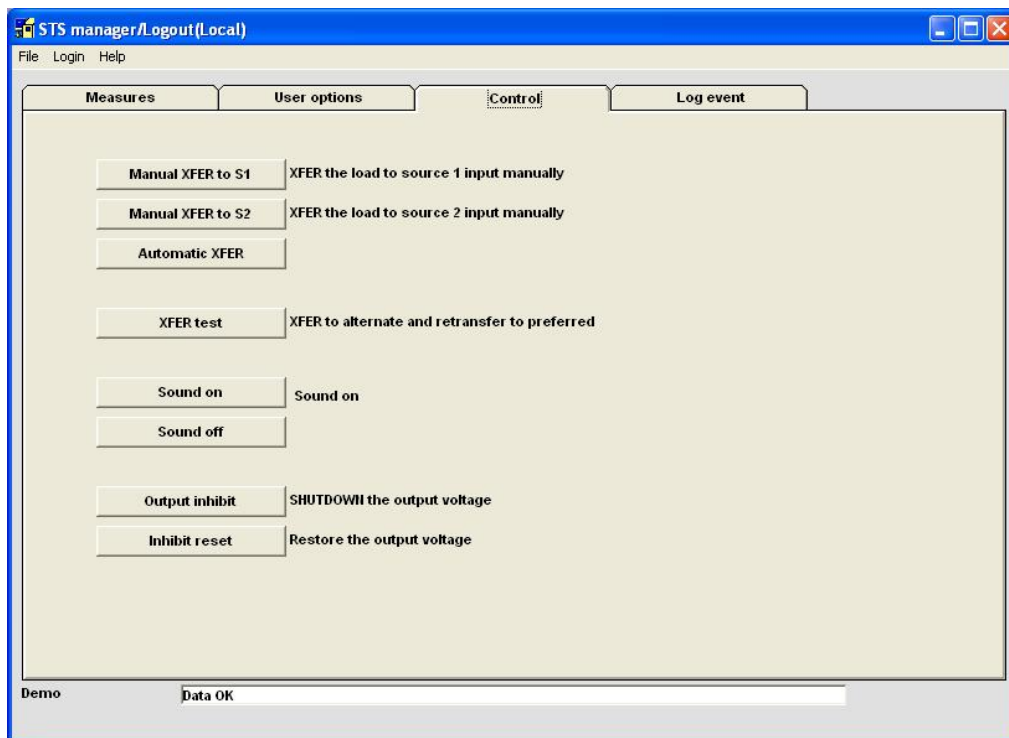
Figure no. 11



USER OPTIONS

menu: the user can modify some settings of the STS, such as the priority source setting and the various methods of communications depending on the various situations of synchronous or asynchronous sources.

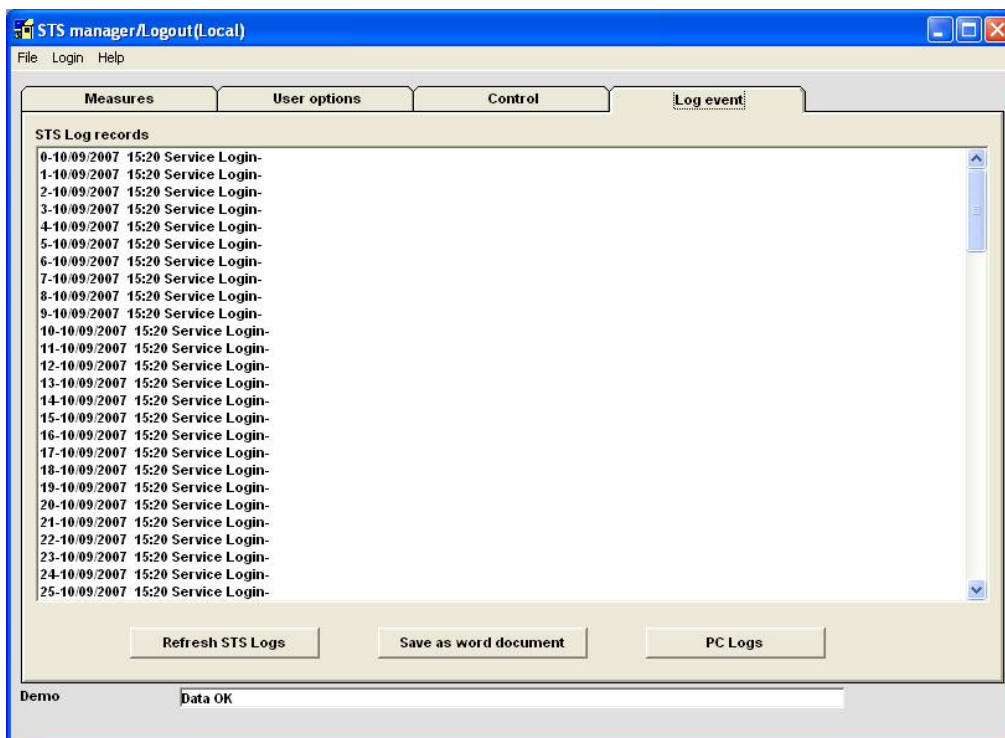
Figure no. 12



CONTROL menu:

the user can perform manual or automatic switching from the preferred source to the alternative source and vice versa as well as send other auxiliary commands.

Figure no. 13



LOG EVENT

menu: all events logged by the STS can be viewed. Through the button "SAVE AS WORD DOCUMENT" it is possible to save the logged events in word format, in order for them to be examined later.

Figure no. 14

OPTIONAL RS232 DUPLEXER

If two independent RS232 serial ports are required a duplex adaptor may be inserted, on request, to allow a double serial connection as shown in the figure below.

RS232 Connection 1 and connection 2 both require a CC05 cable to communicate with the remote terminal.

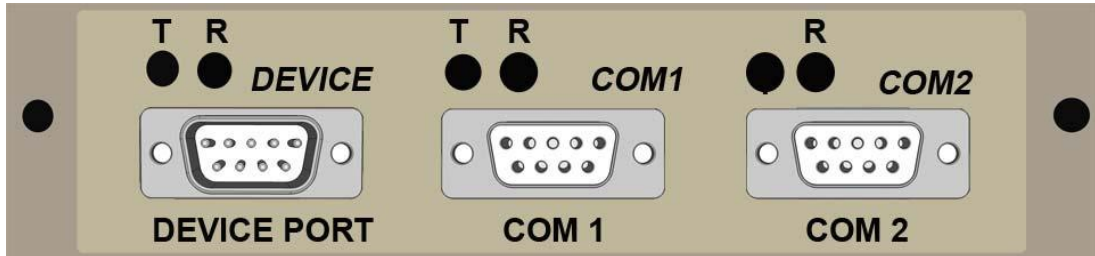


Figure no. 15

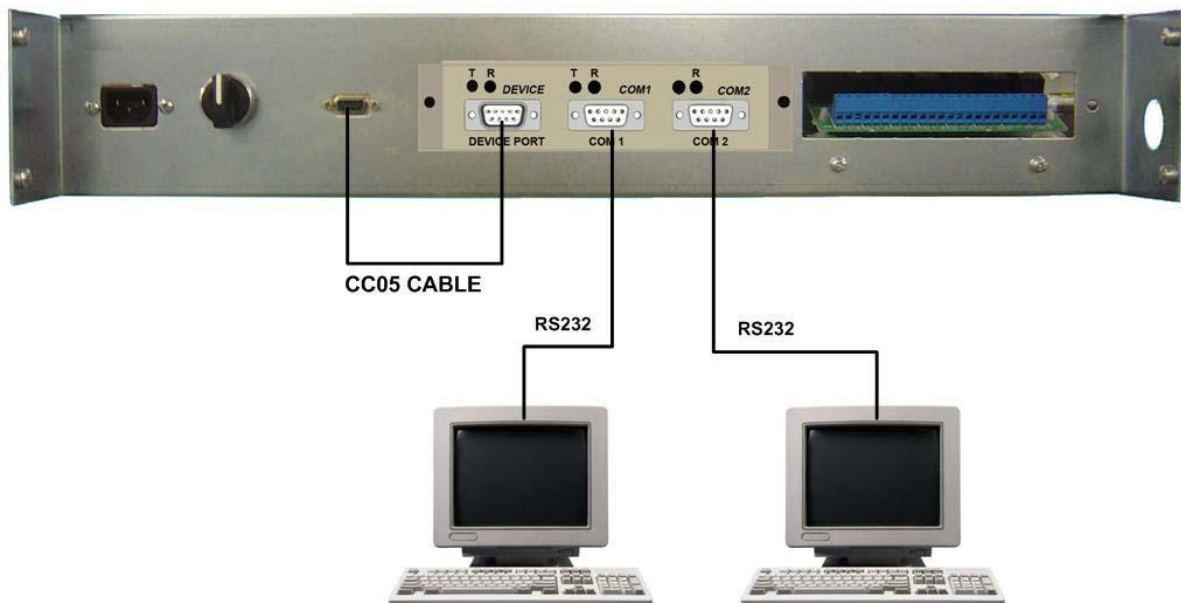


Figure no. 16

OPTIONAL STS NET (TCP/IP)

If a TCP/IP connection is required in addition to the RS232 serial port, an adaptor may be inserted, on request, to allow ETHERNET NETWORK connection as shown in the figure below.

The RS232 Connection requires a CC05 cable to communicate with the remote terminal.

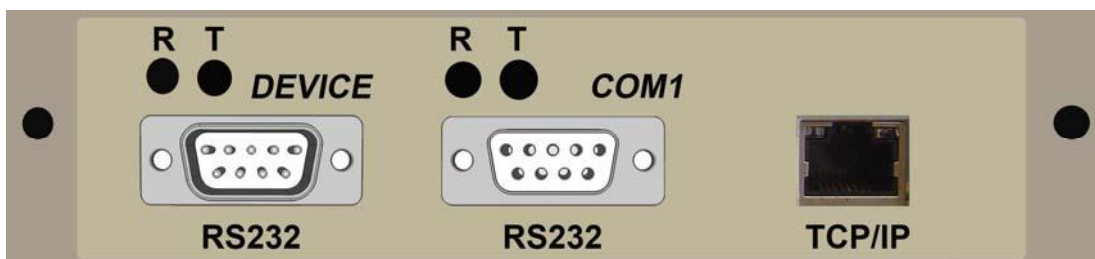


Figure no. 17

Connection of the RS232 serial port and TCP/IP network

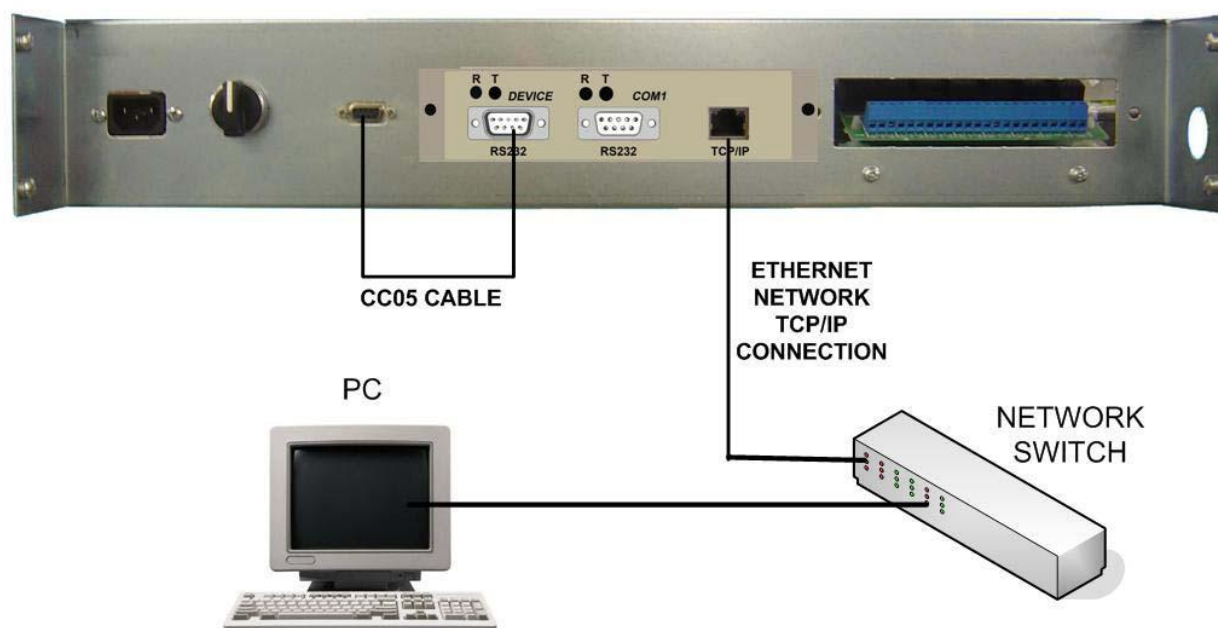


Figure no. 18

The STS Manager software supports both RS232 serial connections and TCP/IP Ethernet network connections.

OPTIONAL POWER INPUT

An external power source is required to power the system logic in the event that both input sources are not available simultaneously; this enables access to the mimic display panel and event log. This isolated input supplies the control logic of the system, and the minimum power that will be drawn will be 150W

The external power supply connector is located on the panel behind the door of the STS and is an IEC320 C14 plug type.

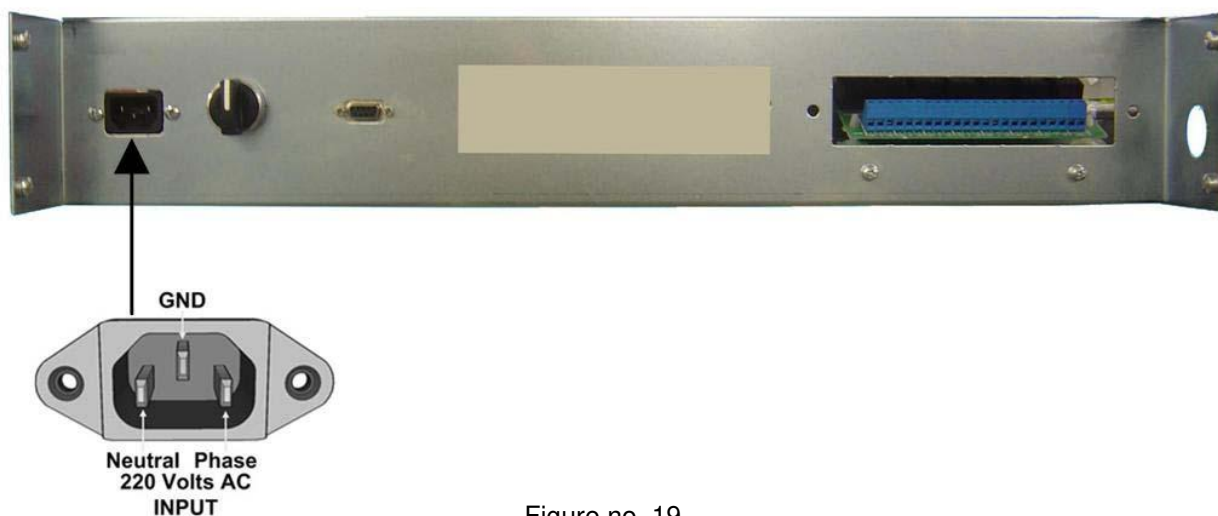


Figure no. 19

DESCRIPTION OF STS OPERATIONS

BLOCK DIAGRAM

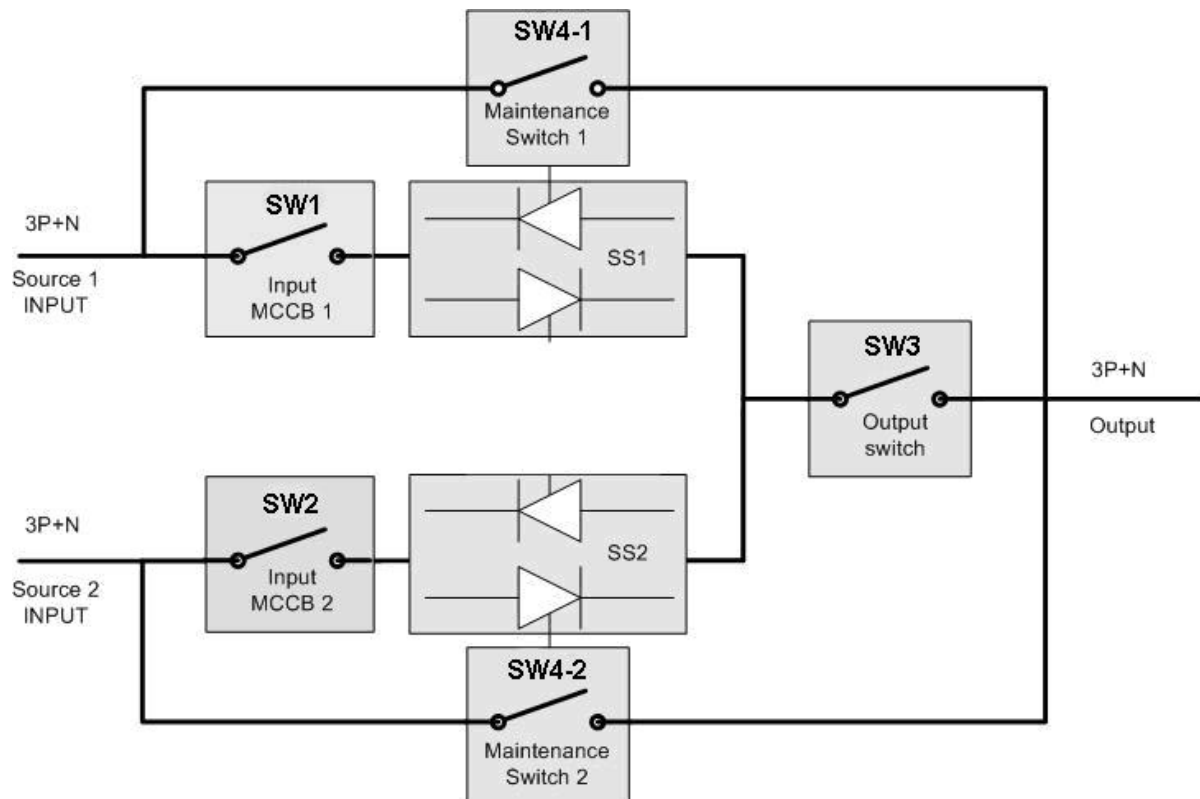


Figure no. 20

SW1	Source 1 input circuit breaker (MCCB)	This switch is a thermally and magnetic protected type and switches off source 1 input
SW2	Source 2 input circuit breaker (MCCB)	This switch is a thermally and magnetic protected type and switches off source 2 input
SW3	Output switch	This switch isolates the output from the STS. During maintenance the position of this switch must be OFF.
SW4-1	Mechanical bypass switch to source 1	During maintenance this switch connects Source 1 input directly to the STS output
SW4-2	Mechanical bypass switch to source 2	During maintenance this switch connects Source 2 input directly to the STS output
SS1	Static transfer SCR circuit to source 1	This static switch contains SCR's and snubber components and is driven by a driver circuit which is controlled by the microprocessor.
SS2	Static transfer SCR circuit to source 2	This static switch contains SCR's and snubber components and is driven by a driver circuit which is controlled by the microprocessor.

Table no. 6

The by-pass switch (SW4) is a 4-pole switch with three positions:

1	Maintenance bypass to source1
0	Automatic operation
2	Maintenance bypass to source2

The MCCB input switches SW1 and SW2 have thermal protection against overloads and magnetic protection against short circuits on the output.

DESCRIPTION OF THE SYSTEM

The static transfer system provides a guaranteed means of switching between two alternative and independent power sources thus ensuring a continued supply of power to any critical load. The switching can either be AUTOMATIC should the incoming supply fall outside the predefined window of operation (user-defined), or MANUAL should an operator want to force switching between the two input supply sources from the mimic display panel or via a remote connection.

In the event of a failure of the source supplying the connected load, the load is automatically transferred to the other available source.

The system provides following:

- Complete independence of two power sources and their respective distribution networks
- Redundancy for existing electrical equipment
- Separation of applications to avoid disruption caused by faults and failures.

For this reason the STS has redundant power circuits, with 2 power supply cards installed inside the STS. The power supply cards are connected separately to all of the control cards, there means that the power supply cards can be hot swapped, without disrupting the connected load.

The transfer between the two input power sources is always performed using a **Break-Before-Make (BBM)** mode to guarantee complete separation between the two different sources, thus ensuring that they will never be connected in parallel.

The STS is composed of two sets of SCR static switches, each of which is connected to a three-phase input source. One of the two sources can be configured as the PREFERRED source (PS), and the other as an ALTERNATIVE source (AS).

The output from each of the static switches is common and forms the device output.

Whenever the parameters of the source powering the load fall outside of the user-defined tolerances, either voltage or frequency, the STS will automatically transfer the load onto the other source.

The transfer is completed with a maximum interval of one quarter of a cycle.

When operating in a Priority line mode, the user selects the input supply to which the STS will transfer the load whenever its parameters are within the limits as defined by the user.

In order to keep transfers between the two sources to a minimum, the re-transfer onto the priority line once it returns to within the accepted tolerance range can be inhibited, with the load being powered from the secondary power source for as long as this source is considered to be good.

The STS will handle both sources as being equally acceptable as long as their parameters are inside the limits of acceptable values, and therefore will not implement transfer back to a priority line.

The STS is available in three-pole and four-pole versions: the number of poles indicates whether the neutral conductor is switched together with the phases (four-pole) or if the neutral line remains un-switched (three-pole).

In either case, the neutral line (or lines) must always be connected to the STS (one for each source). In the three-pole STS the neutral lines of the two sources are always connected together.

In the four-pole models, the neutral conductor is switched using an overlapping method **Make-Before-Break (MBB)** to prevent any voltage imbalance that could damage the connected loads.

The user can also execute a manual transfer from one power source to the other by means of the appropriate command (SW6 switch).

Automatic Transfer Mode :

The STS constantly monitors the voltage and frequency of both input sources.

When the two sources are in synchronisation if the source powering the load goes out of tolerance (with respect to voltage or frequency), the STS automatically transfers the load onto the alternative power source in less than 5msec.

If the two sources are not in synchronisation, the transfer may take place in one of three different ways which can be configured by the user via the **OPTIONS MENU**:

- 1) **NSYNC.TR:0-curr. (zero current mode)**: the transfer takes place when the output current goes to zero (method used for synchronised switching) with a maximum transfer time of approx. 10msec.
- 2) **NSYNC.TR:DELAY (delay time mode)**: the transfer takes place after a delay that can be configured by the user, (default value is 24 msec) during this period the load is not powered
- 3) **NSYNC.TR:DISABLE (disable mode)**: the transfer is inhibited for asynchronous sources

Re-Transfer Mode :

SYNCHRONISED RE-TRANSFER:

If the user selects one of the two sources as the preferred source, the selected source is shown by the corresponding LED (L1 or L2 on the mimic display panel). The preferred source selected powers the load continuously provided it remains within the tolerance range.

A failure in the preferred source causes the load to be transferred onto the alternative power source.

The re-transfer takes place in “**0-curr** “(zero current mode), this is when the load current goes to zero.

UN-SYNCHRONISED RE-TRANSFER:

If the two sources are not synchronised, the user can configure the method used for the re-transfer onto the preferred source. This can be selected via the **OPTIONS MENU**:

- 1) **RET.MOD:0-curr. (zero current mode)**: re-transfer takes place in any case when the load current goes to zero
- 2) **RET.MOD:WAIT SYNC (wait synchron mode)**: the STS waits until the two sources are in sync before effecting the re-transfer. The two sources have to remain in sync for 30 msec. at least
- 3) **RET.MOD:DELAY (delay time mode)**: the re-transfer takes place after a delay that can be set by the user (default value is 24 msec.) during this period the load is not powered
- 4) **RET.MOD:SWIFT (Swift mode)**: the STS retransfers the load to the preferred source when the current of the two sources goes to zero at the same time; if this does not occur, the load is not re-transferred

The number of times the load is switched between the two sources can be limited by inhibiting the re-transfer onto the preferred source. The re-transfer option can be enabled or disabled from the menu **OPTIONS MENU / R-XFER**: (ON or OFF).

When the values of the preferred source return to normal condition, the load is automatically re-transferred onto the preferred source after a delay (re-transfer delay time default value 16 sec.) from 16 to 127 sec. which can be configured by the user from the **OPTIONS MENU**. (**D.R-XFER** parameter)

MANUAL Transfer Mode (SW6 Switch):

A manual transfer may be performed from the mimic display panel, or by means of the selector switch SW6 located behind the front panel. During normal operation of the STS, selector switch SW6 must be in the AUTO position.

Manual transfer can be performed using two different methods which can be selected by the user via the **OPTIONS MENU**:

- 1) **MAN.XFER:0-curr. (zero current mode):** the transfer takes place when the output current goes to zero
- 2) **MAN.XFER:SWIFT (Swift transfer mode):** on activation of a manual transfer, the STS monitors the two sources for 30 seconds. If within this period the two sources are in phase with each other, the STS transfers the load in sync using the zero-current method. If during this period the two sources are never in sync, no switching takes place and the command has to be entered again



Figure no. 21

ELECTRICAL DATA

INPUT	
Input voltage	180-264 Vac 3 Phase + Neutral (230Vac is the default nominal input voltage)
Input voltage – error window	Adjustable VOLT_L and VOLT_H shown in the ADJUST MENU Default -10 + 10% (208-250Vac)
Input voltage distortion	Less than 15%
Fast input voltage error window	Adjustable OUTAGE shown in the ADJUST MENU Default 2,5 msec.
Phase balance error sense offset	Adjustable AL-BAL1 and AL-BAL2 show in the ADJUST MENU
Input frequency	50Hz to 60Hz
Input frequency error window	Adjustable FREQ-L and FREQ-H show in the ADJUST MENU

Table no. 7

OUTPUT	
Output voltage	Same as input
Output frequency	Same as input
Phase rated current	100-150-200-250-300-400-600-800-1000 amperes per phase (according to models)
Short circuit	Over 200% of the nominal current
Load crest factor	Up to 3
Type of transfer	Break Before Make
Synchronised transfer time	max 4msec in zero current mode (mode adjustable show in the ADJUST MENU)
Non synchronised transfer time	max 10msec in zero current mode (mode adjustable show in the ADJUST MENU)

Table no. 8

CONTROL PANEL FUNCTIONS

The front door of the STS has a control panel with a 2x16 alphanumeric character LCD display, a mimic panel with LEDs to show the status of the Static Switch and a keyboard to control the various menus and submenus. A diagram of the control panel is illustrated below in order to simplify the description of the LEDs and keyboard functions.

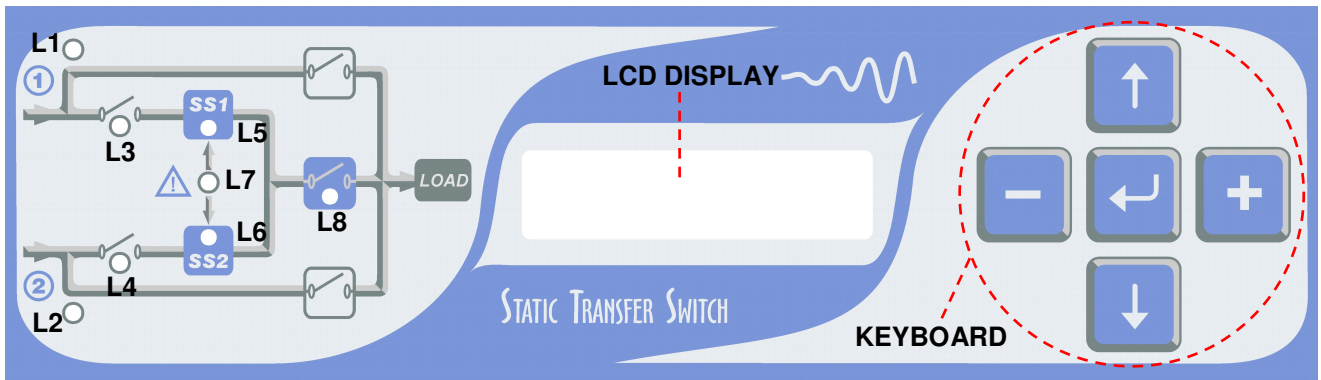


Figure no. 22

L1	Source 1 preferred lamp	Yellow Led
L2	Source 2 preferred lamp	Yellow Led
L3	Source 1 input monitor lamp	Green Led
L4	Source 2 input monitor lamp	Green Led
L5	Source 1 static switch on lamp SS1 static switch on	Green Led
L6	Source 2 static switch on lamp SS2 static switch on	Green Led
L7	Alarm monitoring lamp	Red Led
L8	Output monitor lamp	Green Led






Table no. 9

L1	Source 1 preferred lamp (priority)	On : source 1 is the preferred source
		Off : source 1 is the alternate source
L2	Source 2 preferred lamp (priority)	On : source 2 is the preferred source
		Off : source 2 is the alternate source
L3	Source 1 input monitor lamp	On : source 1 input is OK
		Off : source 1 input failed
L4	Source 2 input monitor lamp	On : source 2 input is OK
		Off : source 2 input failed
L5	Source 1 static switch on lamp	On : SS1 SCRs turned on
		Off : SS1 SCRs turned off
L6	Source 2 static switch on lamp	On : SS2 SCRs turned on
		Off : SS2 SCRs turned off
L8	Output monitoring lamp	On : output normal
		Off : output switch off
		Flashing : output voltage inhibit
L7	Alarm monitoring lamp	Flashing : an alarm has occurred
		Off : there is no alarm on STS

Table no. 10

If one or more alarms are activated, LED L7 lights up and an acoustic alarm sounds, whilst the display shows the details regarding the fault that has been detected.

BUTTONS (Keyboard)

-  **ENTER** : key used to confirm a selection or enter the submenus
-  **UP** : key used to scroll up the menus
-  **DOWN** : key used to scroll down the menus
-  **RIGHT** : Increases the currently monitored data
-  **LEFT** : Decreases the currently monitored data

MENU FUNCTIONS

Main Functions:

The display has two lines; the first line shows the status of the STS and the parameters measured and it is also possible to scroll through the MAIN MENU, whilst the second line of the display shows any alarm messages.



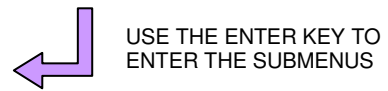
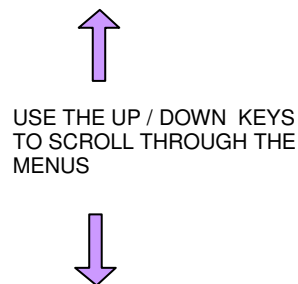
The functions of the LCD panel are structured in a 2-level format::


- 1 MAIN MENU
- 2 SUB MENU

The **MAIN MENU** is shown below:

- STATUS MESSAGES LEVEL -

- ☐ MEASURES MENU
- ☐ COMMAND MENU
- ☐ ALARM MENU
- ☐ OPTIONS MENU
- ☐ TIME MENU
- ☐ INFORMATION MENU
- ☐ ADJUST MENU
- ☐ SERVICE PASSWORD
- ☐ USER PASSWORD



The UP and DOWN keys can be used to scroll through the main menu in the sequence shown above. The ENTER key, represented by the symbol , is used to enter the **SECONDARY MENU OR SUBMENU**. The functions of the **SUBMENUS** are shown below with the meaning of each item or command.

STATUS MESSAGES LEVEL

This group of messages provides the user with general information on the status of the device. The following messages may be displayed:

ON PREFERRED: this message indicates that the source selected as preferred is switched onto the STS output (the load is being supplied by the preferred source)

ON ALTERNATIVE: this message indicates that the non preferred (alternative) source is switched onto the STS output.

Possible causes of this message include: preferred source outside the limits and therefore not suitable, or a manual transfer has been carried out onto the alternative power source

MANUAL XFER: this message indicates that the load has been manually switched

MANUAL BP S1: this message indicates that the load is connected directly to source 1 via the bypass switch

MANUAL BP S2: this message indicates that the load is connected directly to source 2 via the bypass switch

OUTPUT INHIBIT: this message indicates that no voltage is present on the STS output.

Possible causes of this message include: both input sources source 1 and source 2 are outside the specified limits, or transfer with asynchronous mains is disabled

EMERGENCY STOP: this message indicates that the EPO (Emergency Power Off) command has been given and the STS output has been switched off. To reset the STS, both automatic input switches SW1 and SW2 have to be opened and then closed

OVERLOAD INHIBIT: this message indicates that an extended overload has occurred in output and activated the overload protection, therefore the STS output is currently off until the alarm is reset. This is only possible if the overload sensor is enabled, otherwise the output would not be opened.

► MEASURES MENU

This menu is used to monitor and control all the STS parameters and measurements. The STS can provide the following data:

S1: 230 225 235	- Phase-neutral voltage of the input source S1
S2: 230 225 235	- Phase-neutral voltage of the input source S2
LD%: 045 050 060%	- Percentage of the load on the output for each phase U,V,W
OPI: 090 100 120°	- Value of the STS output current for each phase
TEMP: 030 C°	- STS heat sink temperature
S1-FREQ: 50,0 Hz	- Frequency of source S1
S2-FREQ: 50,1 Hz	- Frequency of source S2
SYNC.ANG: 001 Deg	- Phase difference between the two input sources; this value is expressed in angular degrees
PS 1=OK 2=OK	- Value of the direct voltages being output by the two redundant power supplies inside the STS. If the value is OK , the power supplies are working correctly. If the value is N.OK , it is necessary to replace the faulty power supply.

► **COMMAND MENU**

The following commands are available in this menu:

S1=< 045 XFER >=S2

This command can be used for manual switching from one source to the other and vice versa

LEFT BUTTON	Manual transfer to source 1
ENTER BUTTON	Automatic transfer (STS decides and tries to stay on preferred source)
RIGHT BUTTON	Manual transfer to source 1

If the Swift transfer method has been selected and the user decides to carry out a manual transfer from one source to the other, the STS waits until the two sources are in phase with each other before switching. While waiting for the sources to synchronise, a number (e.g. 045) is displayed, indicating the difference in angular degrees between the two sources. This number flashes on and off and an intermittent acoustic signal sounds. If the transfer does not take place within 30 seconds from the command, the transfer is inhibited and the transfer command will have to be entered again.

ENT: XFER TEST :

This command is used to perform a transfer test.

Press the ENTER key to switch the load from the preferred source to the alternative power source. The STS remains on the alternative power source for a pre-set time (re-transfer delay) set via the ADJUST MENU, and then the load is switched back onto the preferred source again.

ENT: INHIBIT RES :

If for any reason the STS output has been inhibited, the STS can be reset by pressing the ENTER key. This function resets all the alarms.

ENT: SOUND ON/OFF :

This command is used to enable / disable the acoustic alarm (buzzer).

RELAY TEST:

This submenu is used to test the 5 output interface relays.

The number of relays to be tested can be changed by pressing the LEFT or RIGHT keys. The table below shows the function according to each number set.

RELAY TEST : 000	Relay test disabled; relays will function normally
RELAY TEST : 001	Relay 1 is activated
RELAY TEST : 002	Relay 2 is activated
RELAY TEST : 003	Relay 3 is activated
RELAY TEST : 004	Relay 4 is activated
RELAY TEST : 005	Relay 5 is activated

Table no. 11

ENT: LED TEST

Press the ENTER key to test that all the mimic panel LEDs are working properly.

All the LEDs should remain on for 2 seconds and then return to normal operation.

ENT: LOGOUT

Press the ENTER key to start the LOG-OUT procedure, which cancels all access connections (LOG-IN). Each access password is active for 3 minutes after which the LOG-OUT procedure is automatically started.

► **ALARMS MENU**

The STS is provided with a real time clock which records all events and alarms according to date of occurrence. All the events and alarms can be seen in the order in which they occurred.

000>191007 10:30:

This shows that the last alarm recorded was on 19/10/2007 at 10.30 and the number of the event is 000.

The second line of the display shows the alarms recorded on that date.

Press the LEFT or RIGHT keys to scroll through the events from 000 up to 127; event 000 is the last event that occurred whilst event 127 is the first, and therefore the oldest.

ENT: CLEAR LOG

If the ENTER key is pressed with this message, all the events recorded in the memory will be deleted.

S1 CODE: 000

This message shows the alarm codes specific to Source 1.

The numbers are arranged as Bitmaps and have the following meanings:

CODE	DESCRIPTION
Code : 000	No alarm on Source 1, source normal
Code : 001	Source 1 input voltage out of tolerance
Code : 002	Source 1 phase sequence bad
Code : 004	Source 1 back-feed tripped
Code : 008	Source 1 black-out sense
Code : 016	Source 1 phase balance bad
Code : 032	Source 1 frequency is out of tolerance
Code : 064	Source 1 input switch is off
Code : 128	phase or alternative loss on S1

Table no. 12

S2 CODE: 000

This message shows the alarm codes specific to Source 2.

The numbers are arranged as Bitmaps and have the following meanings:

CODE	DESCRIPTION
Code : 000	No alarm on Source 2, source normal
Code : 001	Source 2 input voltage out of tolerance
Code : 002	Source 2 phase sequence bad
Code : 004	Source 2 back-feed tripped
Code : 008	Source 2 black-out sense
Code : 016	Source 2 phase balance bad
Code : 032	Source 2 frequency is out of tolerance
Code : 064	Source 2 input switch is off
Code : 128	phase or alternative loss on S2

Table no. 13

► **OPTIONS MENU**

This menu contains operating modes and user-configurable parameters. A **USER PASSWORD** is required to enter the **OPTIONS MENU**, so as to protect these parameters. The default value of **USER PSW** is **0000**. The following parameters are configurable.

PREFERRED: Source 1 or 2

The + or – keys are used to select one of the two input sources as the preferred source.

In normal operating conditions, if a preference is assigned to one of the two sources, the STS powers the load from the preferred source, considering it as the preferred source. If the preferred source is good, the load is always powered from that source. If at any time that source goes out of the accepted range, and is therefore no longer good, the STS transfers the load onto the alternative power source.

R-XFER: (ON or OFF)

The + or – keys are used to decide whether to enable or disable the re-transfer.

After switching has occurred for any reason, the user can decide whether to re-transfer the load back onto the preferred source or to remain in that situation until the alternative power source returns within the accepted range.

If re-transfer is enabled, this takes place after a delay set by the user (REX-DELAY from 016 to 127 sec).

D.R-XFER: 016 sec (how long the STS stays on the alternative source)

This submenu can be used to set the time of the delay before re-transferring from the alternative mains supply to the one selected as the preferred source. The + or – keys can be used to increase or decrease the interval of time before a re-transfer. The interval of time can be set from 016 to 127 seconds.

OVLOAD: (ENABLE or DISABLE)

The user can select the kind of behaviour to be followed by the STS in an overload condition.

ENABLE: in this configuration the electronic overload control is enabled.

The STS powers the load with a specific overload current value for a specific period of time only, according to the overload value, after which the SCR opens and the load is switched off.

DISABLE: in this configuration the electronic overload control is disabled, thus the STS continues to power the load with any current value.

The current value is limited exclusively by the magneto-thermal switch (MCCB) on the input.

AL HOLD: 010 sec

The + or – keys can be used to increase or decrease the duration of an alarm from a minimum of 8 sec to a maximum of 64 sec. (default value 10 sec.)

NSYNC.TR: (0-curr, Delay, Disable)

The user can select the kind of behaviour to be followed by the STS in the event of a transfer with the two input sources out of sync.

If the two sources are not synchronised, the transfer can take place in three different user configurable ways:

- **0 CURR. (transfer with zero current):** the transfer takes place when the output current goes to zero (method used for synchronised switching).

- **DELAY (transfer with delay time):** the transfer can only take place after a safety delay time that can be set by the user, during this period the load is not powered.

The time delay can be set via the ADJUST MENU described below (from 20 to 255msec) default value 24msec.

- **DISABLE (transfer disabled):** the transfer is not performed for non-synchronised sources.

If the preferred source goes out of the accepted limits while the two sources are not synchronised, the STS will not perform the transfer and the load will be lost.

OVL.RESET: (AUTO or MANUAL)

After an overload with the electronic control enabled, which thus causes the SCRs to open and the subsequent loss of the load, the user can decide to automatically or manually reset the overload alarm.

AUTO the overload alarm is automatically reset and at the end of the “alarm hold time” the STS goes back to powering the load.

MANUAL the STS no longer powers the load until the overload alarm is manually reset via command ENTR-INHIBIT RST from the COMMANDS MENU.

INH.RESET: (AUTO or MANUAL)

After an alarm causing the SCRs to open and the subsequent loss of power to the load, the user can decide to automatically or manually reset the alarm.

AUTO the alarm is automatically reset and at the end of the “alarm hold time” the STS goes back to powering the load.

MANUAL It is manually reset via command ENTR-INHIBIT RST from the COMMANDS MENU.

REMOTE: (ON or OFF)

This function is used to enable / disable the remote control of the STS via the serial port.

RET.MODE: (0-curr, Wait Sync, Delay, Swift)

The user can select the kind of behaviour to be followed by the STS for the re-transfer onto the preferred source with the two sources out of sync.

If the two sources are not synchronised, the transfer can take place in four different user configurable ways:

- **0 CURR (re-transfer with zero current)**: the re-transfer takes place in any case when the load current goes to zero.
- **WAIT SYNC (wait for synchronisation)**: the STS waits until the two sources are in sync before effecting the re-transfer, using zero current mode. If the sources never synchronise, the STS remains on the alternative power source.
- **DELAY (re-transfer delay time)**: the re-transfer can only take place after a delay that can be set by the user; during this period the load is not powered. The delay time can be set via the ADJUST MENU described below (from 20 to 255 msec).
- **SWIFT (Swift re-transfer mode)**: the STS re-transfers the load onto the preferred source when the two sources are in sync; if this does not occur, the load is not re-transferred.

Ph-cyclic AL: (ON or OFF)

This function is used to enable / disable the control of the phase sequence of the two input sources.

SCR ALARM: (ON or OFF)

This option enables or disables the control of the thyristor status.

MAN.XFER: (0-curr, Swift)

This function can be used to determine the behaviour to be followed by the STS for the manual transfer from one source to the other. The following options can be selected:

- **0 CURR (manual transfer with zero current)**: manual transfer takes place in any case when the load current goes to zero.
- **SWIFT (swift manual transfer mode)**: the STS transfers the load onto the preferred source when the two sources are in sync; if this does not occur, the load is not transferred.

LANGUAGE : ENGLISH / ITALIAN

Determines LCD panel language. Default language is English

XFER ACTION: (SHUT or STAY)

This function determines the behaviour to be followed by the STS when the single good source available exceeds the tolerance range excepted by the STS. The following options can be selected:

- **SHUT**: STS inhibits the power supply to the load thus avoiding supplying a voltage that is not suitable for the load and thus cause damage to it.
- **STAY**: with this setting the output voltage is not interrupted, but the source remains supplied to the load even if out of tolerance.

OPTION MENU - DEFAULT PARAMETERS

PARAMETERS	CONFIGURATIONS AVAILABLES	DEFAULT
PREFERRED	Source 1 or 2	<i>Source 1</i>
R-XFER	ON / OFF	<i>ON</i>
D.R-XFER	16 ÷ 127 sec.	<i>16 sec.</i>
OVLOAD	Enable / Disable	<i>Disable</i>
AL HOLD	8 ÷ 64 sec.	<i>10 sec.</i>
NSYNC. TR	0 current, delay, disable	<i>0 current</i>
OVL. RESET	auto – manual	<i>Automatic</i>
INH. RESET	auto – manual	<i>Manual</i>
REMOTE	ON / OFF	<i>ON</i>
RET. MODE	0 current, wait synchro, delay, swift	<i>Swift</i>
Ph-cyclic AL	ON / OFF	<i>ON</i>
SCR ALARM	ON / OFF	<i>ON</i>
MAN. XFER	0 current, swift	<i>Swift</i>
LANGUAGE	ENGLISH / ITALIAN	<i>ENGLISH</i>
XFER ACTION	SHUT / STAY	<i>Shut</i>
USER PSW		<i>0000</i>

Table no. 14

► **TIME MENU**

This menu can be used to set the date and time of the STS real time clock.

TIME: 10:30	Current time on the RTC
DATE: 19-10-2007	Current date on the RTC
SET HOURS: 10	Press the LEFT or RIGHT key to change the hour
SET MINS: 30	Press the LEFT or RIGHT key to change the minutes
SET DAY: 19	Press the LEFT or RIGHT key to change the day
SET MONTH: 10	Press the LEFT or RIGHT key to change the month
SET YEAR: 2007	Press the LEFT or RIGHT key to change the year
ENT: UPDATE	Press the ENTER key to update date and time
ENT: EXIT	Press the ENTER key to exit the TIME MENU

► **INFORMATION MENU**

This menu contains information on the status and the transmission of STS data.

RS232 receive: OK receive via RS232 is active

RS232 receive: --- receive via RS232 is not active

This message indicates that the STS is connected to a PC via serial communication.

This may help the user with regards to any losses of communication.

VERSION: STA10-XX

This message indicates the Version of the control software.

► **ADJUST MENU**

A **SERVICE PASSWORD** is required for access to the **ADJUST MENU** in order to protect certain parameter setting. (see SERVICE PASSWORD paragraph)

This menu has been created exclusively for the support service and to adjust certain parameters.

These parameters can be accessed in 2 different ways:

- by entering the service password from mimic panel
- by entering the password from a PC connected via RS232

ADJUST MENU AND DEFAULT PARAMETERS

PARAMETER	RANGE	DEFAULT
S1- (L1-L2-L3) Source 1 L1-L2-L3 input voltage measurement calibration	0 - 255	187
S2- (L1-L2-L3) Source 2 L1-L2-L3 input voltage measurement calibration	0 - 255	187
PSP1/2 PSP1/2 power supply voltage DC calibration	0 - 255	190
LOAD1/2/3 Load L1/L2/L3 output load calibration	0 - 255	215
TEMP Temperature and calibration offset (1 degree step)	0 - 255	141
PH-BAL1/2 Source 1/2 phase balance alarm level adjustment	0 - 255	000 (0 disable)
SYNC-H Analog synchron high limit alarm level adjustment	0 - 255	145
SYNC-L Analog synchron low limit alarm level adjustment	0 - 255	110
SYNC-ANG Digital synchron alarm level window adjustment (1 degree steps)	0 - 255	020
VOLT-L Input AC voltage low alarm level adjustment (2 volts steps)	0 - 510	208 Vac
VOLT-H Input AC voltage high alarm level adjustment (2 volts steps)	0 - 510	254 Vac
OUTAGE Black-out window alarm level adjustment (0.1 millisecond steps)	0 - 25.5	2,5 msec
NSY-DEAD Short non synchron dead time (1 millisecond steps)	20 - 255	24 msec
NSY-LONG Long non synchron dead time (0.1 second steps)	0 - 25.5	000
FREQ-L Input frequency low alarm level (0,4 Hertz steps)	0 - 99	46 Hz
FREQ-H Input frequency high alarm level (0,4 Hertz steps)	0 - 99	54 Hz
SUPP-LOW DC power supply low alarm level adjustment (0.1 volt steps) For PSP1 and PSP2	0 - 25.5	12,5 Vdc
CUR. MULT : XXX Current multiplier (allows the calibration of the output Current according to the rating of the STS)	-	See NOTE 1
ENT-TRIP SW1 Test trip MCCB Source 1	-	/
ENT-TRIP SW2 Test trip MCCB Source 2	-	/
BACKFEED	-	001 002
SER. PSW : XXXX		XXXX
RL1 : programmable relay from A1 to A26		A1
RL2 : programmable relay from A1 to A26		A2
RL3 : programmable relay from A1 to A26		A3
RL4 : programmable relay from A1 to A26		Common Alarm
ENTER : DEFAULT If you press the ENTER button all adjustments will be set to factory default values		
ENTER : EXIT If you press the ENTER button the STS returns to main MENU		

Table no. 15

NOTE 1

100A STS value = 001
 150A STS value = 000
 200A STS value = 002
 250A STS value = 005
 300A STS value = 003
 400A STS value = 004

► ***SERVICE PASSWORD***

The Adjust menu function requires a service password which is a 4 digit numerical code. The service personnel for the STS unit should know the service password, therefore only authorised and well trained engineers could access this menu.

► ***USER PASSWORD***

FACTORY SETTING : 0000

The user password is a 4 digit numerical code.

The options menu function requires the user password

Once this menu is entered the **USR.PSW: 0000** message is shown, one of characters will be flashing, this character can be changed by pressing the up and down buttons accordingly.

The left and right buttons change the cursor position.

Once the correct user password has been input press the **ENTER** button. If the password is correct, the **USER LOGIN** message will be shown on the second line of the LCD.

The user password can be changed by the users during login status.

TROUBLESHOOTING

Only authorised persons can repair the device.

In the event of a failure or persistent problems the unit should be shut down.

Control the unit as follows. Be prepared to answer these questions before calling for technical assistance:

1. First, take note of the AXX error code which will be displayed on the second line of the LCD panel
2. Has the installation procedure been completed? Did the failure or problem occur during installation?
3. Was there a blackout just after or before the STS malfunctioned?
4. What is the status of indicators? (see alarms and alarm codes)
5. Check the registered events and their date and time
6. Have there been any recent changes to critical applications connected to the STS?
7. Is the device in overload status? Remove the load from the device and re-start it.
8. Check the two power sources, their voltages and synchronisation at entry to the STS
9. Have the connections been made in the correct phase rotation?
10. If the load is not powered and there is no indication of STS failure, check the distribution of the load, circuit breakers, switches and cabling.
11. If the STS displays a temperature alarm, check the ventilation grills and outlets of the STS.

