General Electric STS - расширенная брошюра на продукцию. Юниджет

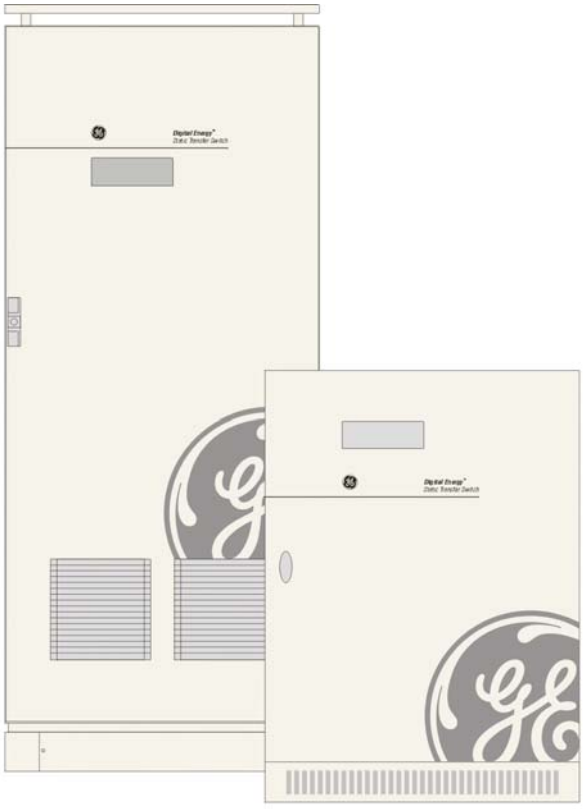
Постоянная ссылка на страницу: https://www.uni-jet.com/catalog/staticheskie-avr/general-electric-digital-energy-sts.html

GE Consumer & Industrial
Power Protection

Product description

Digital Energy™ STS Static Transfer Switch

230 / 400 Volt, 25-1000A



GE imagination at work

Certified
Quality System
ISO 9001
Reg.No.CSQ 9130.GELE

Contents:

1 - Introduction

1.1 Application

The **GE (General Electric) Digital Energy™** Static Transfer Switches (STS) are designed to transfer supply between independent AC power sources. Unlike traditional automatic transfer switches (ATS), STS provides 20 times faster load transfer (typically 1/4 of a cycle), which ensures the uninterrupted operation of even the most sensitive electronic equipment. Load retransfer to the preferred input source is virtually instantaneous (typically 100 ms).
The basic applications of STS are in automatic systems for power industry, power supply systems for petrochemical industry, computer and telecommunication centers, automatic and security systems of 'intelligent' buildings as well as other equipment which is highly sensitive on supply interruption.
It's high overload capacity and transfer algorithm enables rapid fuse blow during short-circuits. In consequence voltage immediately returns to normal value to supply other loads. The built-in transient voltage surge suppression system for SCR switches provides additional protection against damage to supplied devices.

Device name STS-400-63-3P-RM:
STS - nominal voltage - nominal current - number of poles - rack-mounted

1.2 Standard features

- Ability to create systems with redundancy (switching between independent electrical supply lines, various UPS devices and generators)
- Short transfer time (typically 3 ms after line failure)
- Elimination of voltage swells, sags and interruptions on loads (switch-over)
- Protection against voltage variations out of range
- Switches are controlled by Fail-Safe CMOS Logic
- Internal redundancy for power supply systems and SCR drivers (eliminating failures in single points)
- Easy to install and operate
- Low MTTR (mean time to repair)
- Bypass switches to provide continuous non-break operation during STS maintenance
- Remote switching of power sources
- Status indication for power supply system and STS

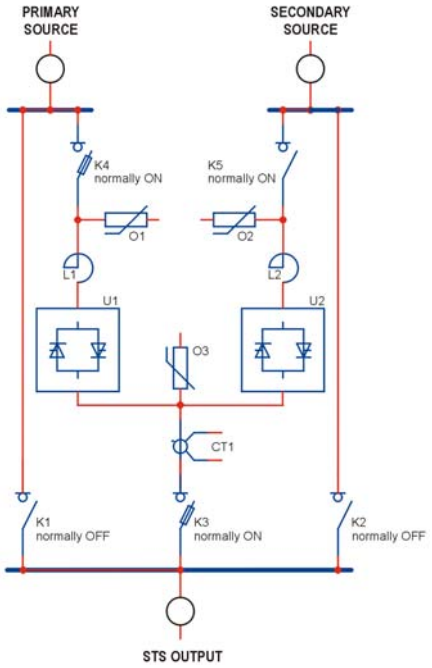


*Figure 1. Single line diagram of the **Digital Energy™ STS** with maintenance bypasses*

1.3 Standards

The quality system has an ISO 9001:2000 certificate, which covers research and development, design, production and servicing of industrial electronic products.

European standards	
Standards	**Description**
EN 50178	Electronic Equipment for Use in Power Installations.
IEC 60146-1-2	General Requirements and Line Commutated Converters.
IEC 60529	Degrees of Protection Provided by Enclosures (IP Code).
EN 50091-2	Electromagnetic Compatibility Requirements.
EN 55022	Limits and methods of radio disturbance characteristics of information technology equipment (CISPR 22:1993).
EN 60555-2	Disturbances in supply systems caused by household appliances and similar electrical equipment- Part 2: Harmonics.
EN 60555-3	Disturbances in supply systems caused by household appliances and similar electrical equipment- Part 3: Voltage fluctuations.

2 - Functional explanation

2.1 Operating modes

Static Transfer Switches are designed for operation in three modes:
preferred source mode – selected preferred source supplies the load. The load is transferred to the other source if the voltage of the preferred source is beyond the acceptable range.
automatic retransferring mode – after transferring triggered by disturbances in the preferred line, the load is transferred to the preferred line again with a delay which is set by dipswitches, only if the preferred line is healthy.
manual mode – connections are set manually (not automatically).

2.2 Block diagrams

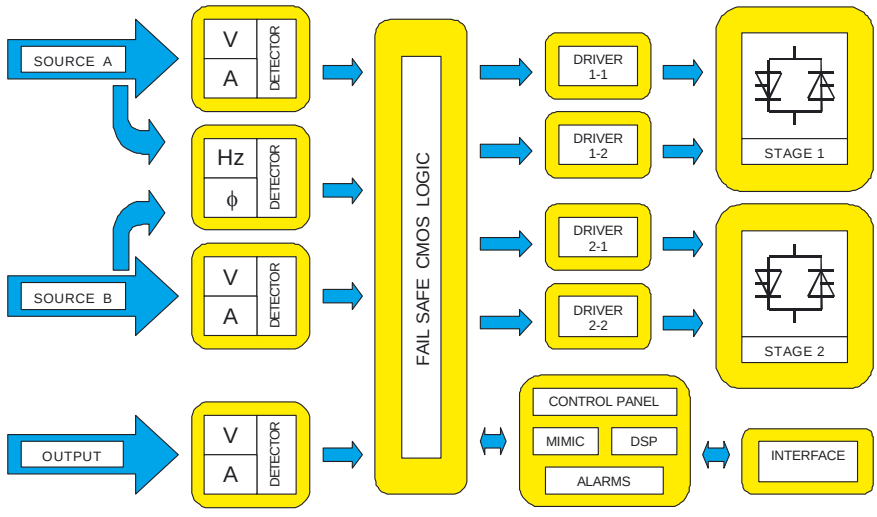


Figure 2. Block diagram of the Digital Energy™ STS control unit

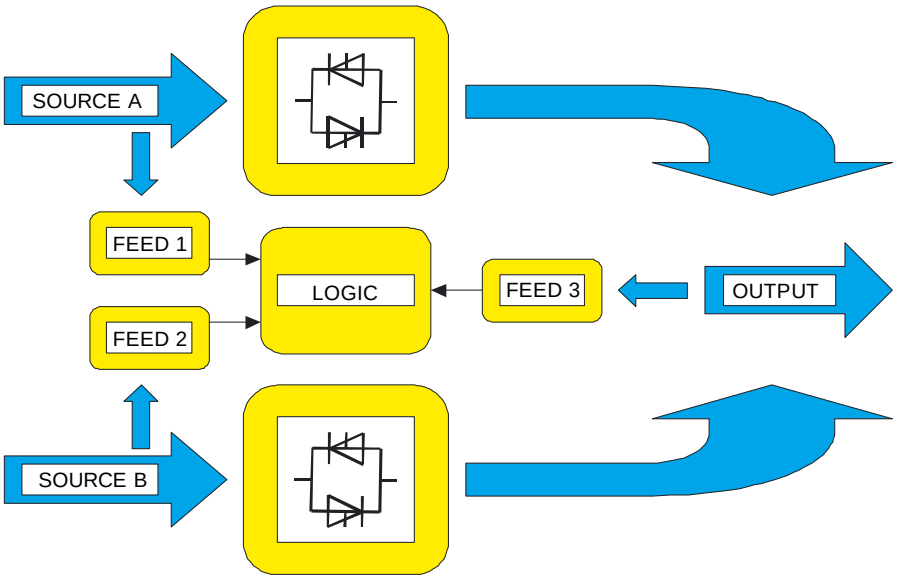


Figure 3. Internal supply redundancy system concept

2.3 Schematic diagrams

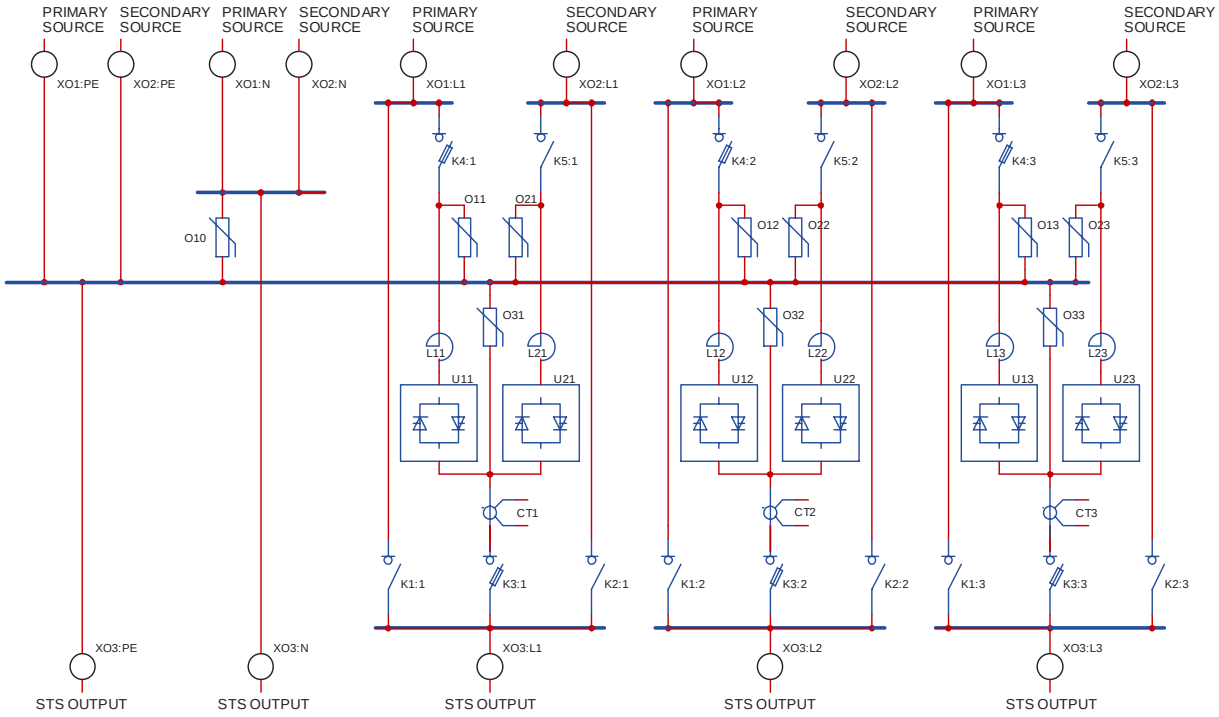


Figure 4. Power stage circuit of 3-phase 3-pole SST

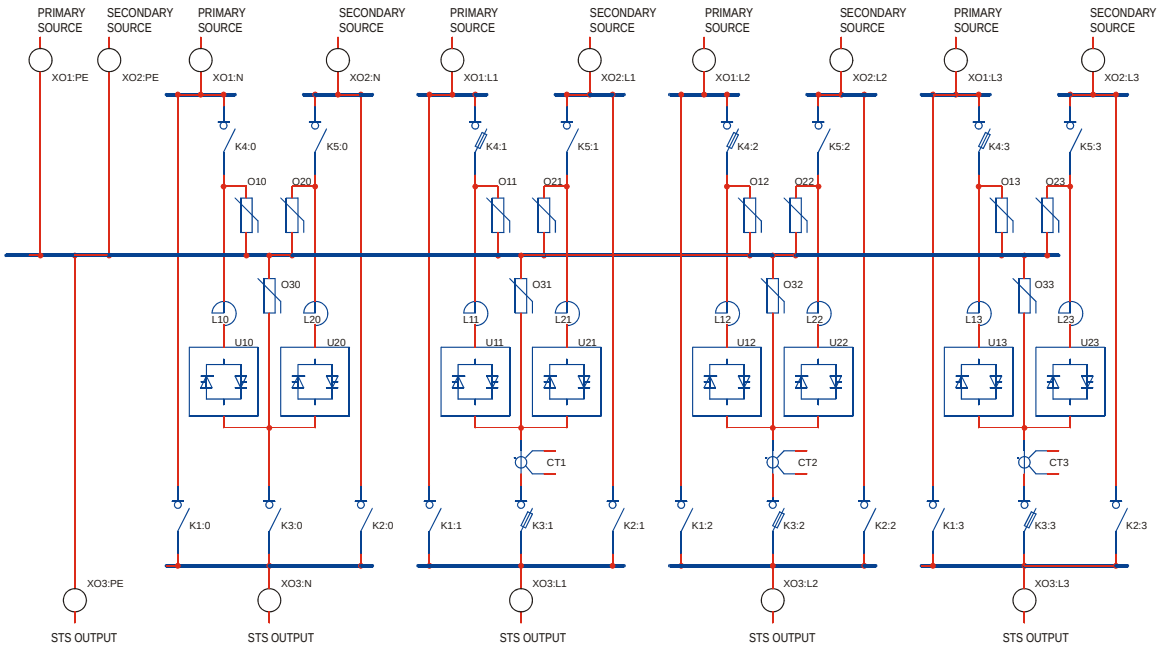


Figure 5. Power stage circuit of 3-phase 4-pole SST

2.4 Principle of operation

The Static Transfer Switch consists of two bi-directional thyristor switches (2 for each phase) equipped with control and protection system. The 4-pole models have an additional neutral line switch. The control system is based on the fail-safe CMOS logic. Input source and output line are protected by transient voltage surge suppression varistors. After failure of the preferred source, the STS checks the state of the alternate power source and transfers the load to the source that provides power of better quality.
Many modes of operation and many additional settings are provided to meet site-specific requirements.

Transfer may be triggered by:

- Disturbance of preferred source voltage
- Overcurrent in source
- Manual change of preferred source
- Remote change of preferred source

Transfer is not allowed in the event of:

- Incorrect voltage in the alternate source
- Excess output current (in load dedicated STS installation)

Transfer is delayed in the event of:

- No synchronization between preferred and alternate source
- Exceeding of the phase shift limit between the two sources.

With both sources correct and synchronized (phase error within the acceptable range), manual or remote transfer is performed in less than 200 µs. Transfers initiated by fault conditions on the preferred source depend on the status of the alternate source. For synchronized power sources with a phase error within the limits, switching to an alternate source is obtained within 6 ms delay. Lack of synchronization causes delay before transfer. It is possible to set delay time with dipswitches (11 ms, 15 ms, 23 ms or 48 ms). The total transfer time is equal to the sum of 2 ms detection time and the alternate source thyristor delay time (so 13, 17, 25 or 50 ms respectively).

The 4-pole STS has an additional neutral line switch. The capacity of this neutral line is rated to 200% of phase line load capacity.

Internal mechanical bypasses enable correct servicing. Transfer to maintenance mode is performed without interrupting the load. On some models the maintenance bypass is equipped with mechanical interlocks to avoid short circuit during manipulation.
Internal redundancy for power supply systems and for cooling systems, with internal system monitoring ensure extremely high reliability of the STS.

3 - External description

3.1 Design

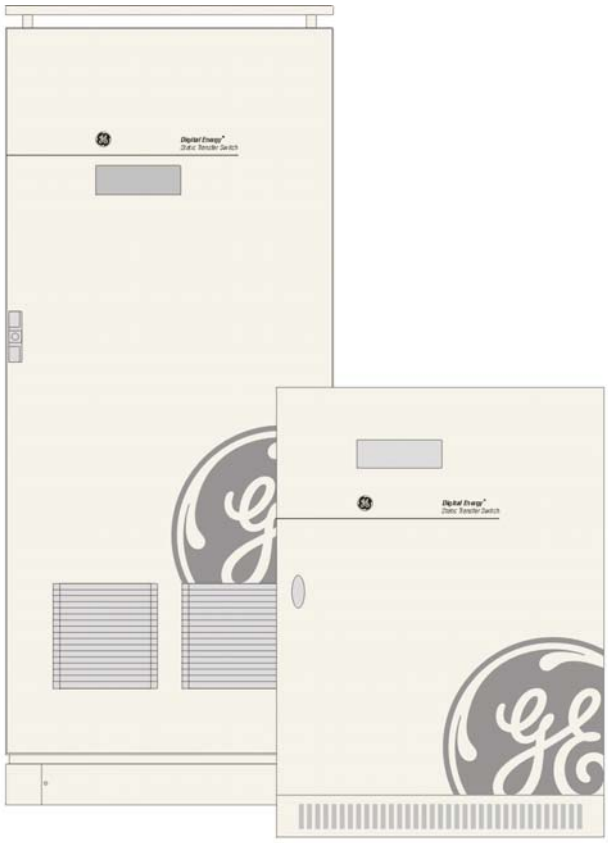


Figure 6 Two examples:
150-250 3-pole (1900x800x500mm) and 25-100A 3-pole (1100x800x400mm)

3.2 Control panel

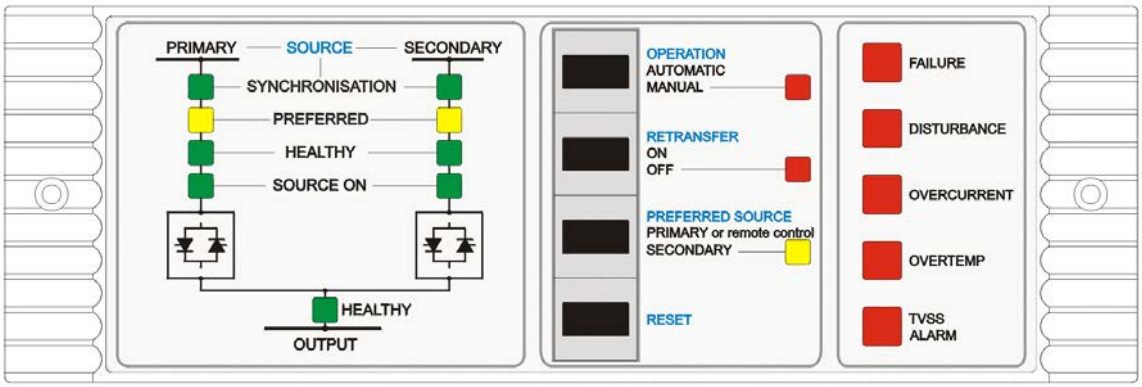


Figure 7 Control panel

4 - Configurations

4.1 STS sets for power distribution unit (PDU)

The STS is placed between the preferred and alternate source at one side, and the PDU at the other side. In case the preferred source is out of limits the STS will transfer the load (PDU) to the healthy alternate source.

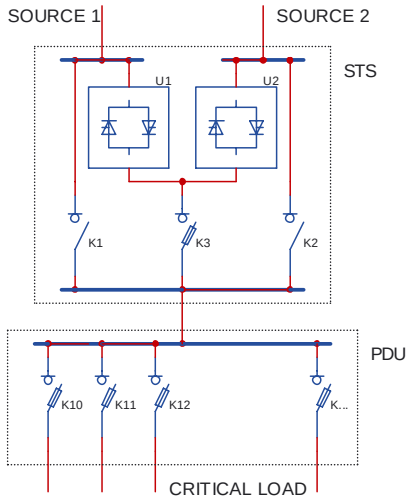


Figure 8 STS set for power distribution unit

4.2 Two-STS set for two-section power distribution unit with a tiebreaker

Two-STS set for two-section power distribution unit with a tiebreaker allows independent operation of two STS-PDU section sets. It is possible to transfer both sections to one STS unit without interruption. The tiebreaker is switched on after prior maintenance-related transfer of both STS units to one of the power sources. When one of the STS units is switched off, the remaining STS provides independent redundancy power for the two PDU sections.

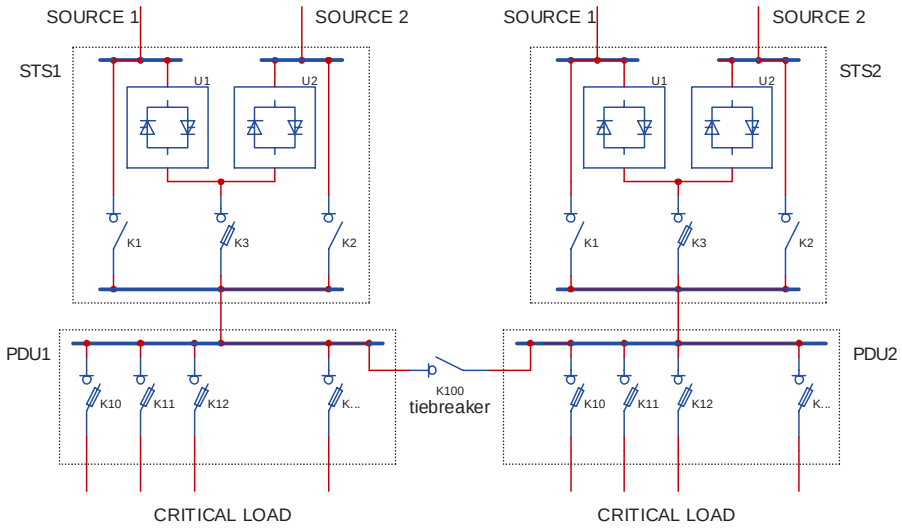


Figure 9 Two-STS set for two-section power distribution unit with tiebreaker

4.3 STS set for voltage inverters

Independent voltage inverters with limited output current are susceptible to short-circuits and overloads caused by sags and outages in the output current. An additional bypass provided by the STS unit eliminates voltage outages. Transfer to the redundant source is triggered by faulty operation of the inverter, for example when the voltage or current value is not within the acceptable range.

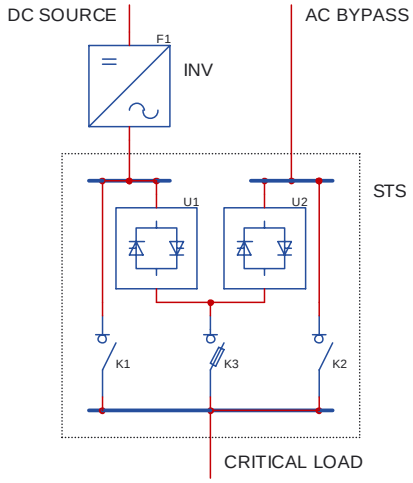


Figure 10 STS set for voltage inverters

4.4 Local STS installation with dual AC power system

Conventional power systems are susceptible to voltage outages which are transferred to all loads. This phenomenon is seen especially in systems with a low current limitation, for example in UPS systems. The dual AC power system eliminates voltage outage effects. Transfer of local STS units to a redundant source is triggered by faulty operation of the preferred source, for example when the voltage exceeds the acceptable range. Transfer is not performed if an overcurrent in the load occurs. The faulty load is disconnected from the system by its STS unit (it keeps running on the disrupted line while the remaining STS units perform transfers to the healthy power source). This installation is highly recommended for complex power supply networks.

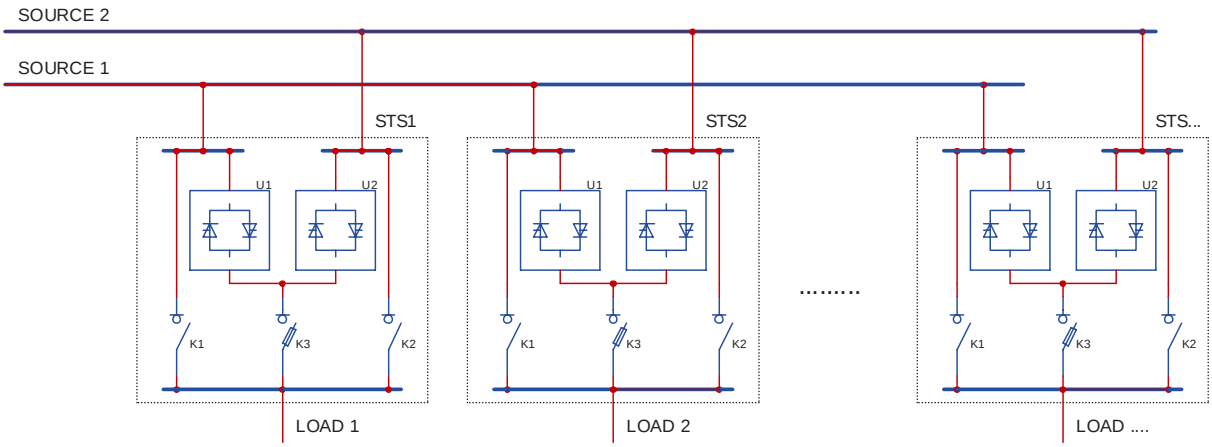


Figure 11 Local STS installation with a dual AC power system

4.5 UPS supply system with redundancy

UPS supply system with redundancy and with disconnection ability for one line are power supply systems frequently used in computer centers. It enables proper mating of different UPS devices and provides continuous non-stop operation even during periods of scheduled maintenance. It eliminates any single point of failure. UPS synchronization is required.

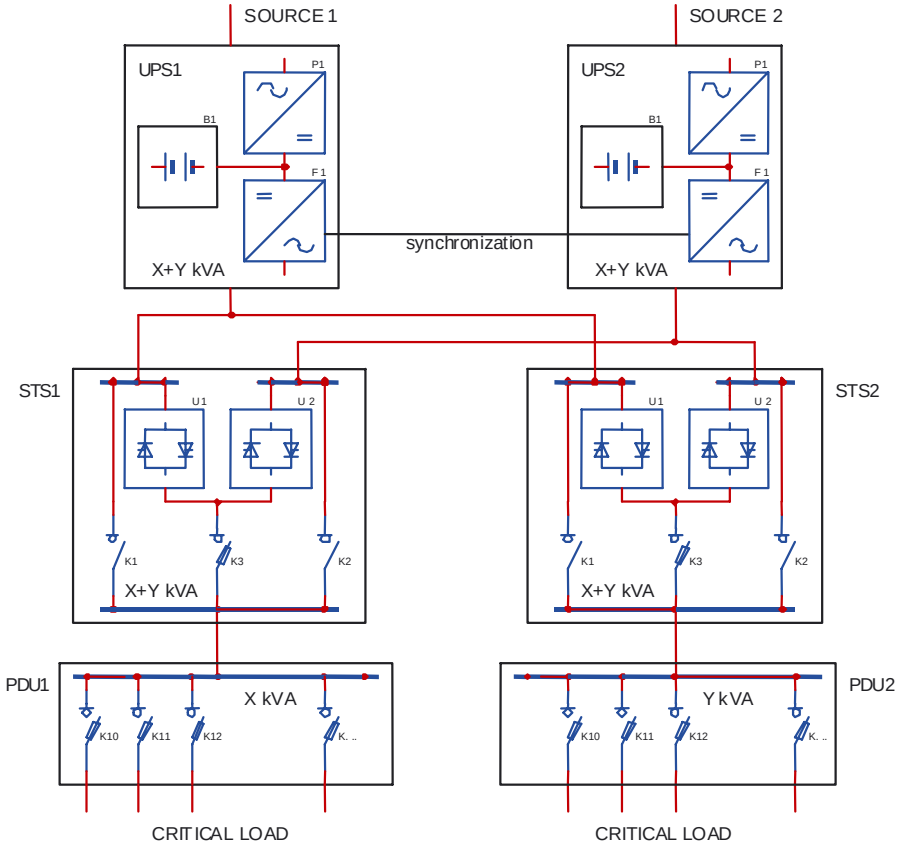
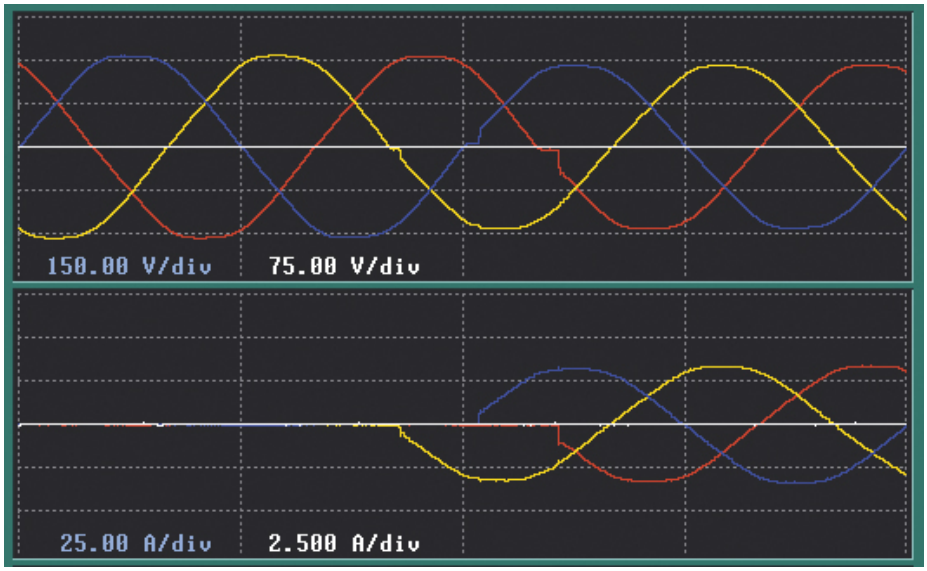


Figure 12 UPS-powered installation providing a redundant supply to the load

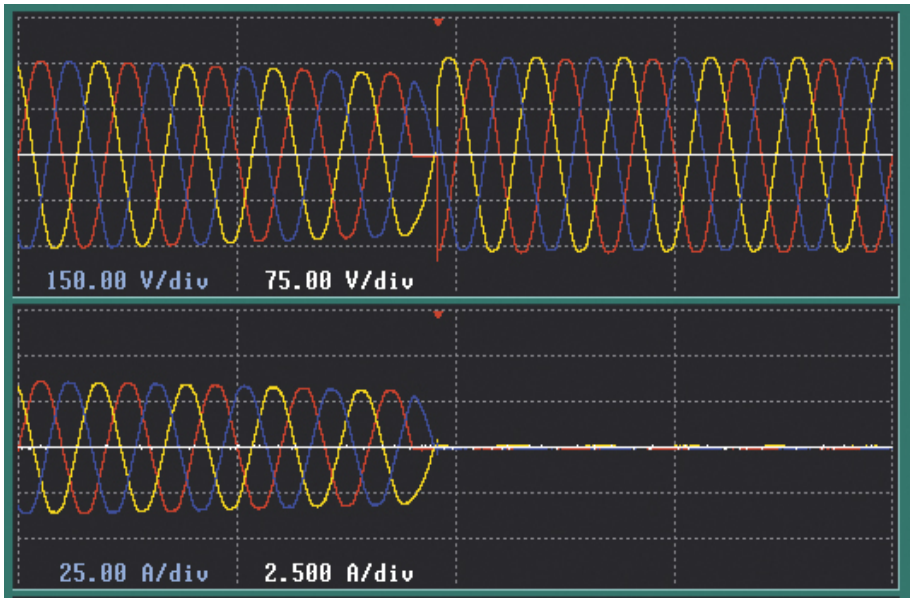
5 - Oscillograms



OUTPUT VOLTAGES

SECONDARY SOURCE CURRENTS

Figure 13. Transfer to redundant power source initiated by change of preferred input source



OUTPUT VOLTAGES

PRIMARY SOURCE CURRENTS

Figure 14. Transfer to redundant power source caused by power sag on preferred input source. (4 pole)

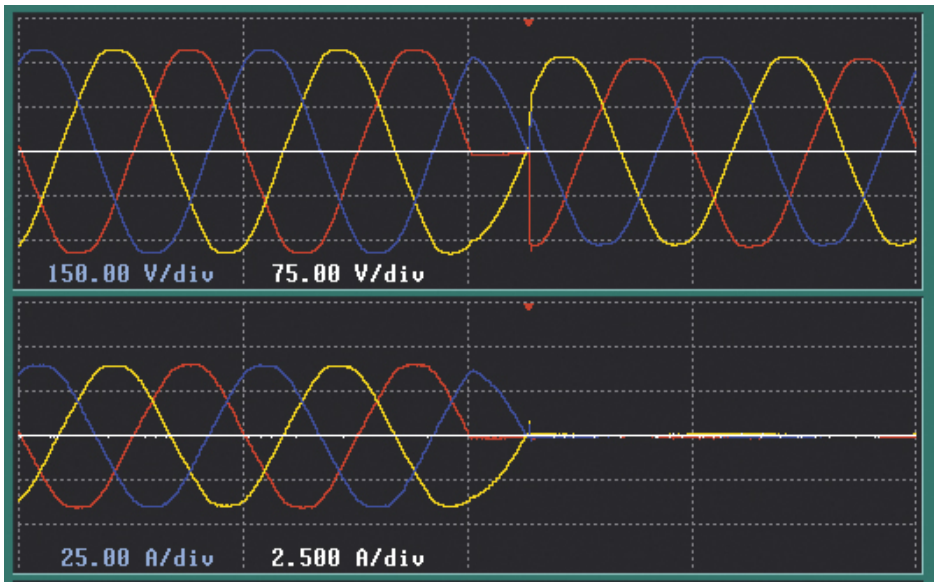


Figure 15. Transfer to redundant power source caused by power swell on preferred input source. (4 pole)

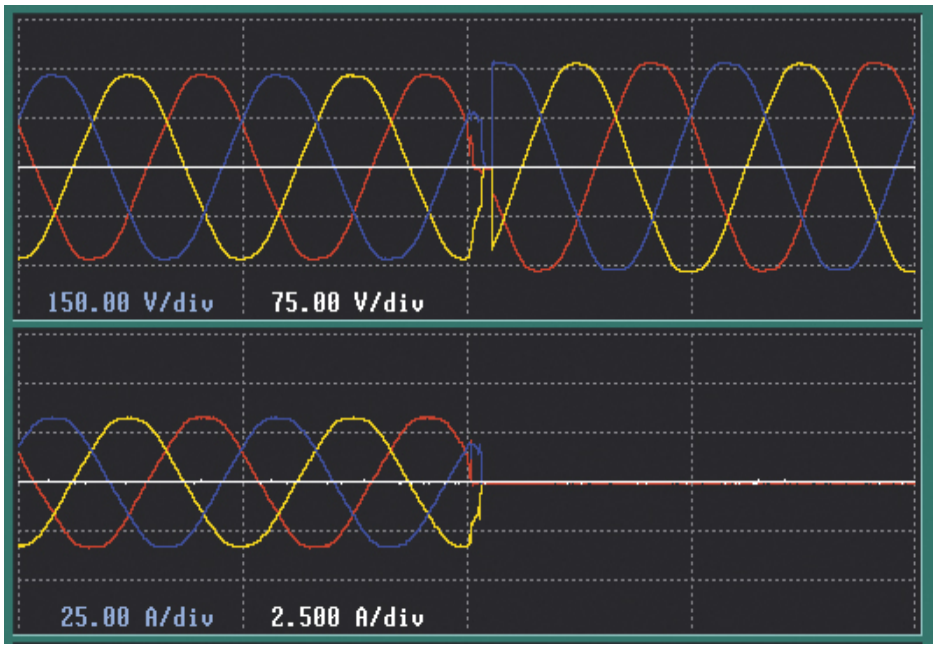


Figure 16. Transfer to redundant power source initiated by power interruption on preferred input source. (4 pole)

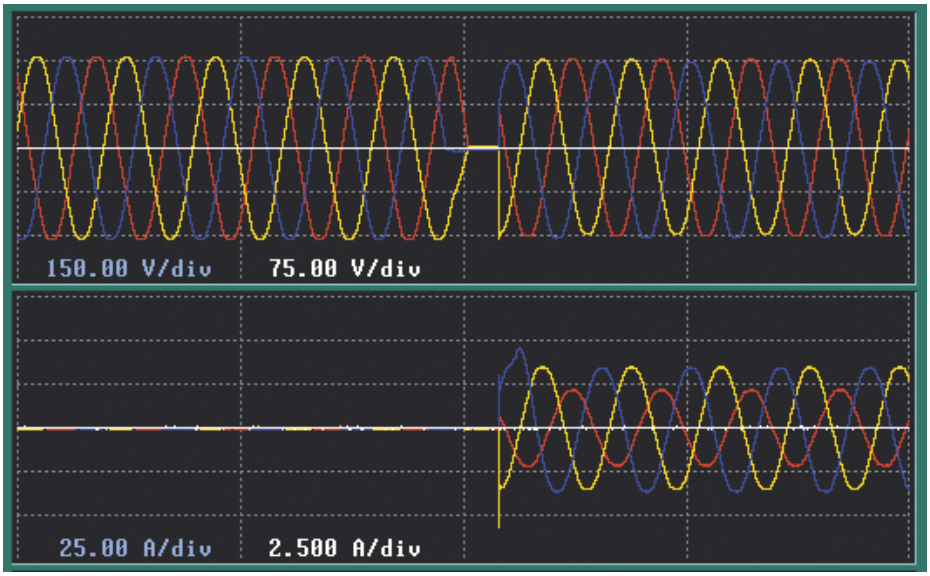


Figure 17. Transfer to redundant unsynchronized power source initiated by change of preferred input source – asymmetrical load. (4 pole)

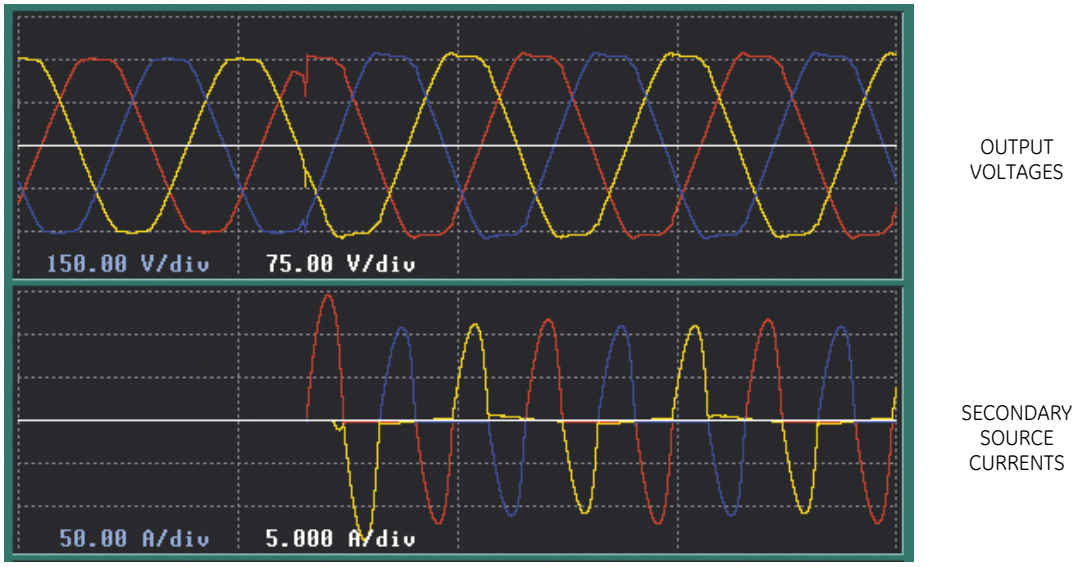


Figure 18. Transfer to redundant synchronized power source – computer load. (4 pole)

6 - Specifications

Power supply		
Nominal input voltage	3×400 V	
Acceptable voltage range	-25 % ÷ +20 %	Operation
Frequency	50 Hz	
Frequency tolerance	-9 % ÷ +6 %	
Transient voltage surge suppression level	<1.5 kV	For Iimp 15 kA 8/20us
	<1.0 kV	For Iimp 5 kA 8/20us
Dielectric strength test	AC 2 kV 60 s	
Efficiency	>99 %	for cos(Φ) > 0,8
Output		
Nominal output current	25 A, 40 A 63 A, 100 A 150 A, 250 A 400 A, 630 A	Available configurations: 3-phases 3-poles 3-phases 4-poles (neutral line switch)
Crest factor	3.5	
Power factor cos (Φ)	0.5 ÷ 1	Inductive, capacitive
Transient voltage surge suppression level	<1.5 kV	For Iimp 15 kA 8/20ms
	<1.0 kV	For Iimp 5 kA 8/20ms
Overload capacity	125 %	t = 1 h
	400 %	t = 5 s
	800 %	t = 0.4 s
	1000 %	t = 0.2 s
	1500 %	t = 20 ms
Short-circuit strength of thyristor switches	3 200 A / 20 ms	In=25, 40, 63 A
	8 000 A / 20 ms	In=100, 150 A
	15 000 A / 20 ms	In=250 A
	25 500 A / 20 ms	In=400 A
	39 000 A / 20 ms	In=630 A
Fuse interrupting capacity	50 kA	
Switching		
Selection of preferred input source	L1 / L2	With or without retransfer after restoring preferred input source power
Remote selection of preferred input source	L1 / L2	Two-state input for L1 / L2 source
Setting range for upper input voltage limit	-8 % ÷ -24 % by 4 %	Switching to alternative source on exceeding the limit Setting by DIPSWITCH
Setting range for lower input voltage limit	6 % ÷ 20 % by 4 %	
Phase error limit for synchronized lines	±8° ÷ ±24° by 4°	
Switching interlock for output over current	3 In 6 In 9 In no interlock	If instantaneous current value is larger than set level, transfer is not preformed. Setting by DIPSWITCH
Manual transfer time for synchronized lines of a phase error within the limits	< 0.2 ms	
Automatic transfer time for synchronized lines of a phase error within the limits	< 6 ms, typical: 3ms	
Manual or automatic transfer time for not synchronized lines	12 ms 17 ms 25 ms 50 ms	Setting by DIPSWITCH
Retransfer time	1 s 8 s 25 s	Setting by DIPSWITCH (both lines healthy)
Alarms		
Failure Alarm	Relay	Overload

		Overtemperature Fuse failure Internal STS failure
Disturbance Alarm	Relay	Primary source not healthy Secondary source not healthy Lack of synchronization Transient voltage surge suppression alarm Manual control ON Automatic retransfer switched OFF
Manual ON	Relay	Service operation
Retransfer OFF	Relay	Retransfer to preferred source is not perform
Primary source OK.	Relay	Indicating if primary source is healthy
Secondary source OK.	Relay	Indicating if secondary source is healthy
Primary line ON.	Relay	Indicating if primary source is active
Secondary line ON.	Relay	Indicating if secondary source is active
Alarm connectors parameters		
Max operating voltage	300 V= or 250 V~	
Max load capacity	4 A for 220 V~	
	0.3 A for 220 V=	
Ambient conditions (storage and operation)		
Operating temperature	0÷40 °C	
Storage temperature	0÷55 °C	
Relative humidity (non-condensing)	max 95 %	
Installation Site Altitude	< 1000 m	above 1000m: 5% derating per 500m, max. 3000m
Air cooling	Natural convection	For In=25, 40, 63 A
	Forced cooling with redundant fans	For In=100, 150, 250, 400, 630 A
EMC	Class B	EN55022, EN60555-2, EN60555-3
Enclosure		
Degree of protection	IP20	
Dimensions (H × W × D)	See detailed information table	

Types of Static Transfer Switches

Type	Nominal Current	Dimensions (mm)			Bypass interlock
		H	W	D	
3-POLE					
STS-400-25-3	25A	1100	800	400	X
STS-400-40-3	40A	1100	800	400	X
STS-400-63-3	63A	1100	800	400	X
STS-400-100-3	100A	1100	800	400	X
STS-400-150-3	150A	1900	800	500	-
STS-400-250-3	250A	1900	800	500	-
STS-400-400-3	400A	1900	1200	500	-
STS-400-630-3	630A	2100	1200	600	-
STS-400-800-3	800A	2300	1600	800	-
STS-400-1000-3	1000A	2300	1600	800	-
3-POLE 19 inch rackmount					
STS-400-25-3-RM	25A	710	483	465	X
STS-400-40-3-RM	40A	710	483	465	X
STS-400-63-3-RM	63A	710	483	465	X
STS-400-100-3-RM	100A	710	483	465	X
4-POLE					
STS-400-25-4	25A	1100	800	400	X
STS-400-40-4	40A	1100	800	400	X
STS-400-63-4	63A	1100	800	400	X
STS-400-100-4	100A	1900	800	500	-
STS-400-150-4	150A	1900	1200	500	-
STS-400-250-4	250A	1900	1200	500	-
STS-400-400-4	400A	2100	1200	600	-
STS-400-630-4	630A	2300	1200	600	-
STS-400-800-4	800A	2300	1600	800	-
STS-400-1000-4	1000A	2300	1600	800	-
4-POLE 19 inch rackmount					
STS-400-25-4-RM	25A	710	483	465	X
STS-400-40-4-RM	40A	710	483	465	X
STS-400-63-4-RM	63A	710	483	465	X

Subject to change without prior notice

A product by:

GE Consumer & Industrial SA
General Electric Company
CH – 6595 Riazzino (Locarno)
Switzerland
T +41 (0)91 / 850 51 51
F +41 (0)91 / 850 51 44
E gedeinfo@ge.com

www.gedigitalenergy.com