PRODUCT GUIDE

UNINTERRUPTIBLE POWER SUPPLIES (UPS)

SLC ADAPT2

General index.

1. INTRODUCTION.

These specifications describe Salicru's **SLC ADAPT2** Uninterruptible Power Supply (UPS) series, comprised of UPS devices that can operate both independently and connected in parallel without the need for a shared central bypass. The **SLC ADAPT2** UPS series ensures optimum protection of any critical load, maintaining the AC voltage to the loads within the specified parameters without interruption during power failure, deterioration or fluctuation of the commercial power supply. They come in a wide range of models: from 10 to 90 kVA in a single cabinet and up to 450 kVA with up to five cabinets in parallel, thereby making it possible to adapt the models to suit the needs of the end user.

The **SLC ADAPT2** UPS series is designed and built in accordance with international standards (see section x).
Thanks to the technology used, including PWM (pulse width modulation), **SLC ADAPT2** UPS devices are compact, cool, silent and high-performance.

The **SLC ADAPT2** UPS series allows for expansion through the connection of additional modules with the same power in parallel within the same cabinet, in order to achieve redundancy (e.g. N+1) or increase the capacity of the system up to a maximum of 30 modules in parallel.

Consequently, this series has been designed to maximise the availability of critical loads and to ensure that your business is protected against any variations in voltage, frequency, electrical noise, cuts or dropouts that may occur in the power supply. This is the primary aim of the **SLC ADAPT2** series of UPS devices.

1.1. MAIN FEATURES.

- On-line double-conversion technology with modular architecture.
- 10, 15, 25 and 50 kVA modules with DSP control and PWM technology.
- 2-, 3-, 4-, 6-, 8-, 10- and 12- module systems (up to 600 kVA per system).
- Option of parallel/redundant operation up to 1500 kVA.
- Hot-pluggable and swappable plug & play modules.
- Input power factor >0.99.
- Input current distortion (THDi) <3%.
- Three-phase input/output voltages.
- Output power factor = 1.
- Control and management via LCD touchscreen and LEDs.
- Efficiency in On-line mode >95%.
- 99% performance when operating in Eco mode.
- Communication channels: USB (2), RS-232, RS-485 and relays.
- Smart slot for extended relays (2) and SNMP.
- Sleep mode to optimise system performance. (2)
- Improved return on investment (ROI).
- Compact format to save space.
- SLC Greenergy solution.

2. STANDARDS AND ENVIRONMENT.

2.1. STANDARDS.

The **SLC ADAPT2** UPS series is designed, manufactured and sold in accordance with the EN ISO 9001 Quality Management Standard. The marking indicates conformity with EC Directives through the application of the following standards:

- **2014/35/EU.** - Low-voltage safety.
- **2014/30/EU.** - Electromagnetic Compatibility (EMC).
- **2011/65/EU.** - Restriction of the use of hazardous substances in electrical and electronic equipment (RoHS).

  In accordance with the specifications of the harmonised standards. Reference standards:

- **EN-IEC 62040-1**. Uninterruptible power supplies (UPS). Part 1-1: General and safety requirements for UPS used in user access areas.
- **EN-IEC 60950-1**. Information technology equipment. Safety. Part 1: General requirements.
- **EN-IEC 62040-2**. Uninterruptible power supplies (UPS). Part 2: EMC requirements.
- **EN-IEC 62040-3**. Uninterruptible power supplies (UPS). Part 3: Methods for performance specification and test requirements.

The serie is also in accordance with the following seismic regulations:

- **IEC 60068-3-3:2019/COR1:2021.** Enrivonmental testing - Part 3-3: Supporting documentation and guidance - Seismic test methods for equipment.
- **UBC1997 Zone3 & Zone 4 Ip 1.5**: UBC seismic frame standard.

2.2. ENVIRONMENT.

This product has been designed to respect the environment and has been manufactured in accordance with the ISO 14001 standard.

2.2.1. Recycling of the device at the end of its useful life.

We undertake to use the services of authorised and regulatory-compliant companies to process all of the products when they are recovered at the end of their useful life (contact your distributor).

2.2.2. Packaging.

To recycle the packaging, please comply with any legal requirements in force.

2.2.3. Batteries.

Batteries pose a serious hazard to health and the environment. They must be disposed of in accordance with the laws in force.

3. PROTECTION.

The commercial power supply cannot guarantee 100% power continuity at all times. For this reason, operators must take measures to ensure the correct operation of their devices.
The consequences of these interruptions may vary:

- Equipment failure.
- Information loss (data, applications, etc.).
- Interruption of operation.
- And a long etc.

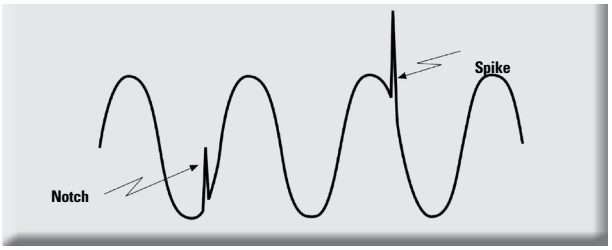
Despite the substantial improvement of the power supply in recent years, there is still an average of 300 minutes per year of poor quality supply (or lack thereof), which indicates that electrical problems are the main cause of the loss of information in Information Systems (45%), in comparison with problems like viruses (3%).

Some 93% of these problems could be avoided by using an Uninterruptible Power Supply (UPS).

In short, it represents a loss of availability and opportunity cost, which can lead to extremely high expenses.
Phenomena in the electricity grid that can result in the loss of information are listed below:

3.1. TRANSIENTS: SPIKES AND NOTCHES.

- **Spikes:** produced by the induction of atmospheric discharges (lightning) in overhead lines.
- **Notches**: produced by sudden variations of load or short circuit currents on line and transformer inductances.

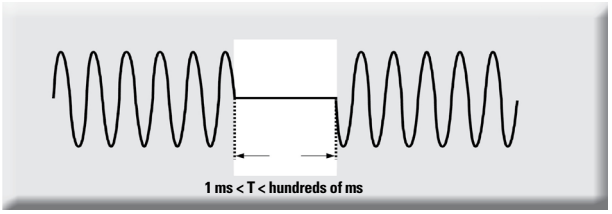


3.2. DROPOUTS.

Dropouts consist of pronounced or total drops in voltage that last for a few milliseconds.

They have two different causes:

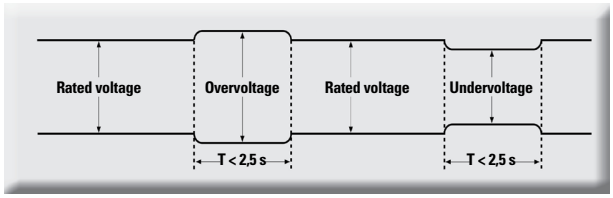
- Short circuits near the point of consumption, subsequently released by the corresponding protection.
- Supply interruptions caused by line switching.



3.3. TRANSIENT OVERVOLTAGES (SURGES) AND UNDERVOLTAGES (SAGS).

Transient overvoltages are short duration voltage increases due to momentary load decreases in networks with poor regulation (high impedance).

Transient undervoltages are short duration voltage drops due to momentary overloads in the network.



3.4. LONGDURATIONOVERVOLTAGESANDUNDERVOLTAGES.

Overvoltages of long duration have the same origin as transient overvoltages, but are more permanent in nature.

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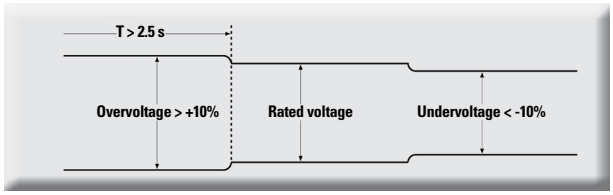
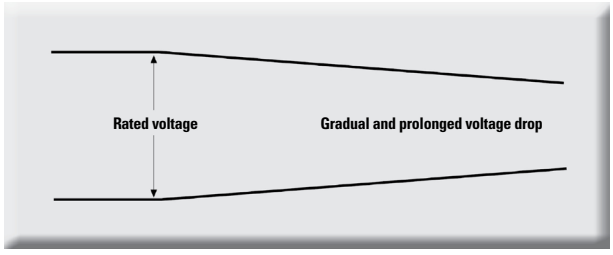


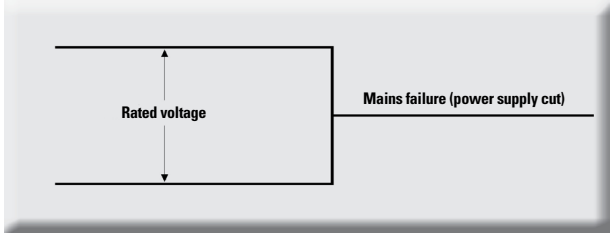
3.5. GRADUAL AND PROLONGED UNDERVOLTAGES (BROWNOUTS).

Brownouts are gradual drops in voltage lasting for several seconds, often ending in the total failure of the power supply. These occur when there are major disturbances to the operation of power plants and supply networks (e.g. lack of power, loss of synchronism, etc.).



3.6. SUPPLY FAILURES (BLACKOUTS).

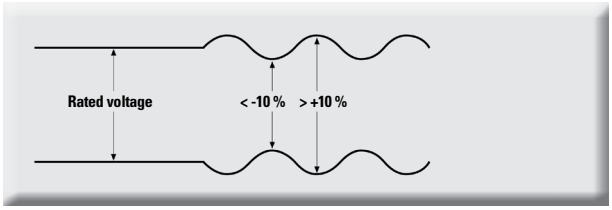
Total supply failures are generally due to the untimely activation of a distribution network protection system.



3.7. FLUCTUATIONS OR FLICKERS

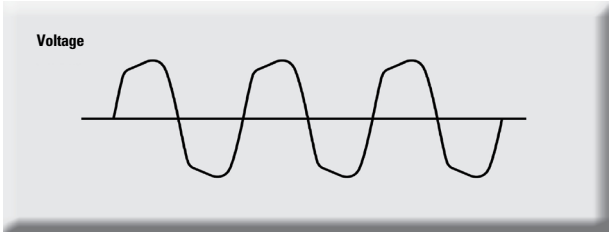
This consists of a modulation of the amplitude of the voltage value, which in lighting installations becomes visible to the human eye. They are usually the result of drops in pulsating voltage in power lines, caused by:

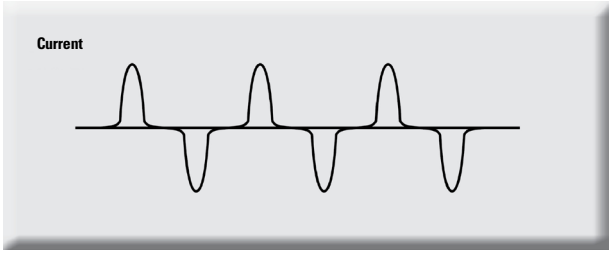
- Inertial resonances of large engines or alternators.
- Pulsating loads (pumps and piston compressors, etc.).
- Unstable regulators.



3.8. CURRENT AND/OR VOLTAGE HARMONICS

Certain receivers consume non-linear loads, i.e. harmonic currents. These currents produce drops in harmonic voltage that modify the sinusoidal voltage wave produced at the source (in power plant alternators).

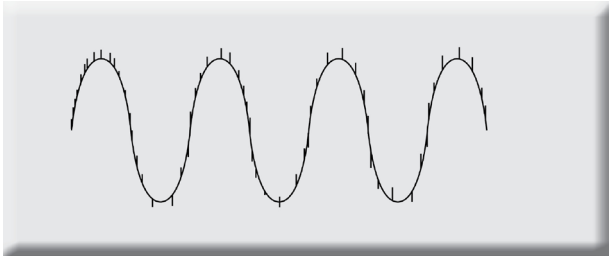




3.9. HIGH FREQUENCY DISTURBANCES.

These are high-frequency signals superimposed on the mains voltage. They can consist of signals of any defined frequency or broadband; stationary, burst or repetitive pulses.

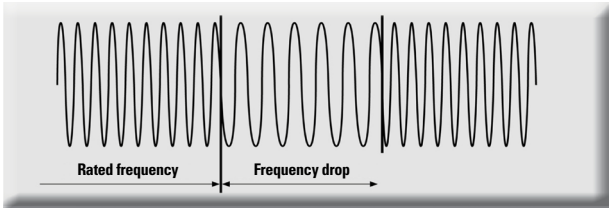
They are the result of unintended coupling of commercial networks with devices using high frequency or switching technologies. Depending on the type of coupling, they can be in common mode or differential mode.



3.10. FREQUENCY VARIATIONS.

Interconnected continental commercial networks (as are most in Europe) provide a virtually unchanging frequency that is very close to nominal. This is because it is controlled in a megasystem that includes a very large number of synchronous machines, with enormous global power and inertia that extends to infinity.

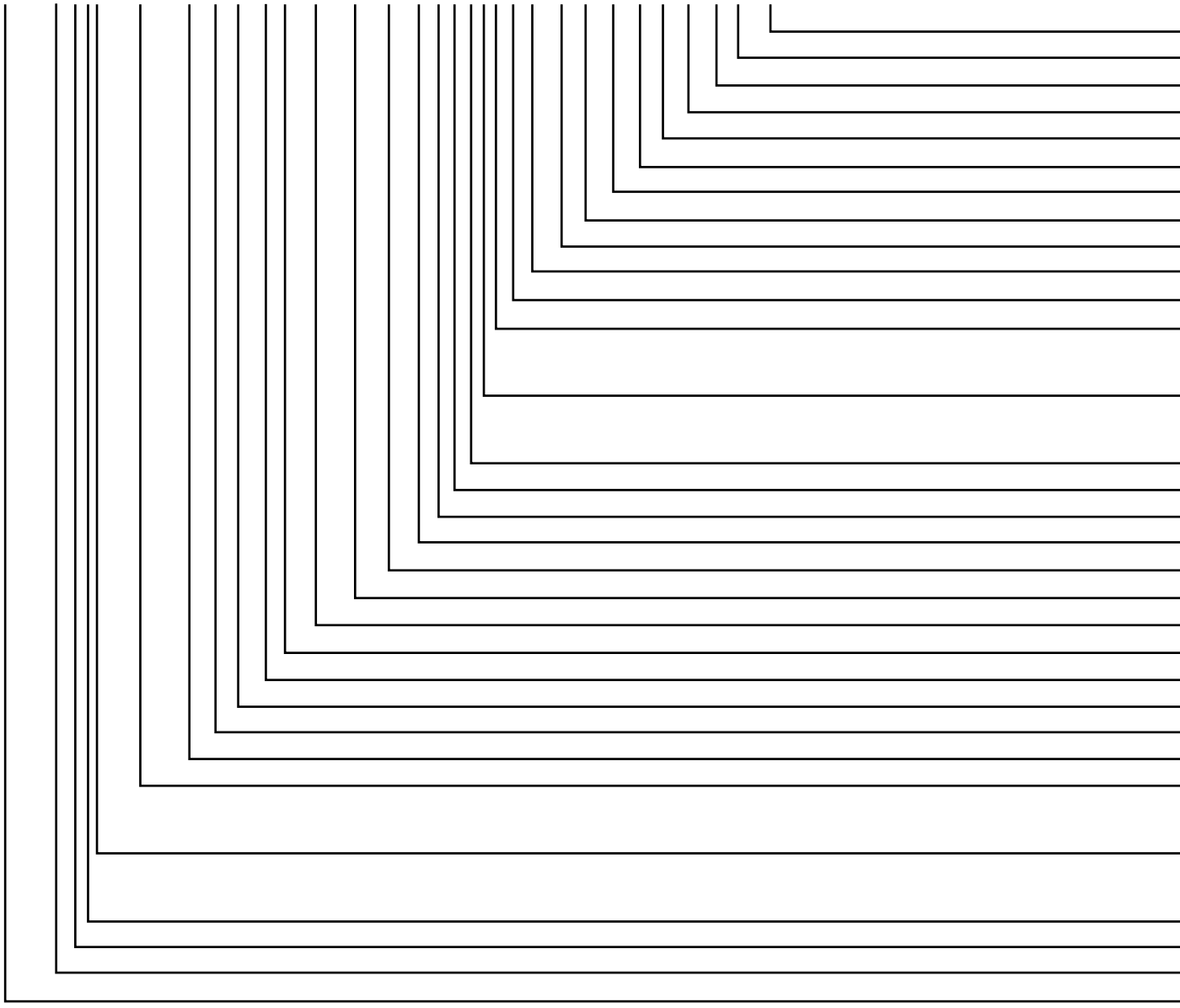
On the other hand, on many islands and other isolated areas, or in independent facilities with small power plants (or power generators), there are often significant variations in frequency. Variations are almost inevitable when there are connections or disconnections of power of comparable magnitude to the power of the whole system.



4. VERSIONS, NOMENCLATURE AND STRUCTURAL DIAGRAM.

4.1. NOMENCLATURE.

2 SLC-1+1/2B-ADAPT2 20 T1 D2 E3 0/F10H J43 DY1 B1 C D B L P Z SB RB DA CD W BF BA CO A EE666502



EE* Special customer specifications.
A Low voltage.
CO Certificate of origin.
BA Bacs.
BF Backfeed protection.
W Private-label.
CD Remote control.
DA Surge protector.
RB Relays to terminals.
SB Battery stack.
Z Tropicalised.
P Material needed to parallel subrack/cabinets.
Three-phase input/three-phase output device.
L Single-phase input/single-phase output device.
M Single-phase input/three-phase output device (independent bypass line must be included).
N Three-phase input/single-phase output devices (independent bypass line must be included).
B Independent bypass line (disregard in code description in devices M and N).
D Transient protection filter.
C Subrack mounted on box-type BATT MOD (batteries supplied factory mounted).
B1 Subrack/cabinet with external batteries.
DY1 Display language (see Table 6).
J43 IP (see Table 5).
F10H Batteries (see Table 2).
0/ Batteries not included.
E3 Wheels / Feet (see Table 3).
D2 Type of protection (see Table 2).
T1 Cables input / terminals position (see Table 1).
20 Total power of subrack.
ADAPT2 UPS Series.
Without cabinet / subrack format.
A AM262 900 x 640 x 1105.
B AM261 900 x 640 x 1615.
C AM263 900 x 640 x 2015.
2 Total number of slots in subrack/cabinet.
1 Number of redundant modules (disregard if none).
1 Number of modules installed in subrack/cabinet without taking into account redundancy.
2 Number of subracks/cabinets in parallel.

Table 1	
Cables / terminals input	
T0	Lower back (disregard in code description).
T1	Lower front
T2	Upper back
T3	Upper front
T4	Lower back terminals
T5	Upper back terminals
T6	Lower front terminals

Table 3	
Wheels / Feet	
E0	Feet of the same profile (disregard in code description).
E1	Seismic/Marine feet
E2	Rotating wheels
E3	Rotating front wheels
E4	Rotating back wheels

MB ADAPT2 3A-0/2x F10H Y 2 Q 100A W BF BA CO EE666502

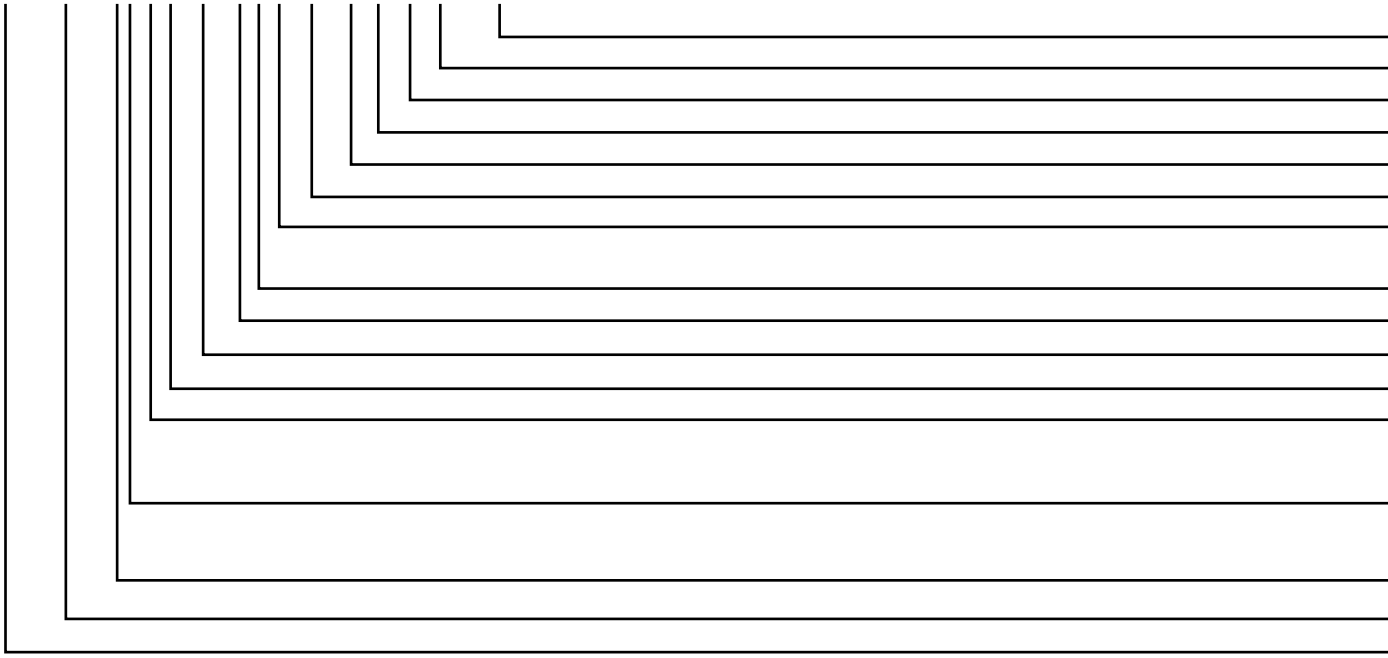


Table 2	
Protections / disconnectors	
D0	Without protections (disregard in code description)
D1	MCB IN/BAT/OUT/BM
D2	DISC IN/BAT/OUT/BM
D3	MCB IN/OUT/BM + BAT DISC
D4	MCB IN/OUT/BM + BAT DISC Sized for the maximum power of the subrack
D5	MCB IN/BAT/OUT/BM + INDIV. PROT. BAT. BRANCH
D6	MCB IN/BAT/OUT/BM + (INDIV. PROT. BAT. BRANCH + GENERAL DISC)
D7	DISC IN/BAT/OUT/BM + INDIV. PROT. BAT. BRANCH
D8	DISC IN/BAT/OUT/BM + (INDIV. PROT. BAT. BRANCH + GENERAL DISC)
D9	MCB IN/OUT/BM + BAT PF + INDIV. PROT. BAT. BRANCH
D10	MCB IN/OUT/BM + PF BAT + (INDIV. PROT. BAT. BRANCH + GENERAL DISC)
D11	DISC IN/OUT/BM + PF BAT + INDIV. PROT. BAT. BRANCH
D12	DISC IN/OUT/BM + PF BAT + (INDIV. PROT. BAT. BRANCH + GENERAL DISC)
D13	MCB IN/BAT/OUT/BM Sized for the maximum power of the subrack
D14	SECC IN/BAT/OUT/BM Sized for the maximum power of the subrack
D15	DISC IN/OUT/BM + BAT PF
D16	DISC IN/OUT/BM + BAT PF Sized for the maximum power of the subrack
D17	MCB IN/BAT/OUT/BM + INDIV. PROT. BAT. BRANCH Sized for the maximum power of the subrack
D18	MCB IN/BAT/OUT/BM + (INDIV. PROT. BAT. BRANCH + GENERAL DISC) Sized for the maximum power of the subrack
D19	SECC IN/BAT/OUT/BM + INDIV. PROT. BAT. BRANCH Sized for the maximum power of the subrack
D20	SECC IN/BAT/OUT/BM + (INDIV. PROT. BAT. BRANCH + GENERAL DISC) Sized for the maximum power of the subrack
D21	MCB IN/OUT/BM + BAT PF + INDIV. PROT. BAT. BRANCH Sized for the maximum power of the subrack
D22	MCB IN/OUT/BM + BAT PF + (INDIV. PROT. BAT. BRANCH + GENERAL DISC) Sized for the maximum power of the subrack
D23	SECC IN/OUT/BM + BAT PF + INDIV. PROT. BAT. BRANCH Sized for the maximum power of the subrack
D24	SECC IN/OUT/BM + BAT PF + (INDIV. PROT. BAT. BRANCH + GENERAL DISC) Sized for the maximum power of the subrack
D25	BAT MOD FUS (only for battery modules)
D26	BAT MOD MCB (only for battery modules)
D27	REDUNDANT BAT MOD FUS (only for battery modules)
D28	REDUNDANT BAT MOD MCB (only for battery modules)
D29	MCB IN/OUT/BM + BAT PF
D30	MCB IN/OUT/BM + BAT PF Sized for the maximum power of the subrack

EE* Special customer specifications.
CO Certificate of origin.
BA Bacs.
BF Backfeed protection.
W Private-label.
100A Protection size.
Q The individual protection of each branch has the total calibre discharge. If the Q is disregard, the calibre of the protection will be divided for the amount of branches. It only applies in devices with individual protection per branch of batteries.
2 It indicates the amount of protection needed depending on the branches. Disregard only if it's a single general branch.
Y 10Y Batteries.
F10H Batteries (see Table 4).
2x Number of parallel battery branches. Disregard for a single branch.
0/ Battery module without batteries, but with the necessary accessories to install them.
A AM262 900 x 640 x 1105.
B AM261 900 x 640 x 1615.
C AM263 900 x 640 x 2015.
D AM264 900 x 840 x 2015.
3 Cabinet quantity. Disregard if it is one.
ADAPT2 UPS Series.
MB Battery module.

Table 4

	Batteries 3-5Y	Batteries 10Y
	Without the letter "Y"	With the letter "Y"
F0	Without batteries (disregard in code description)	N/A
F1A	1x32AB314 4.5Ah	Not available
F1B	2x32AB314 4.5Ah	Not available
F1C	3x32AB314 4.5Ah	Not available
F1D	4x32AB314 4.5Ah	Not available
F1E	5x32AB314 4.5Ah	Not available
F1F	1x36AB314 4.5Ah	Not available
F1G	2x36AB314 4.5Ah	Not available
F1H	3x36AB314 4.5Ah	Not available
F1I	4x36AB314 4.5Ah	Not available
F1J	5x36AB314 4.5Ah	Not available
F1K	1x40AB314 4.5Ah	Not available
F1L	2x40AB314 4.5Ah	Not available
F1M	3x40AB314 4.5Ah	Not available
F1N	4x40AB314 4.5Ah	Not available
F1O	5x40AB314 4.5Ah	Not available
F1P	1x44AB314 4.5Ah	Not available
F1Q	2x44AB314 4.5Ah	Not available
F1R	3x44AB314 4.5Ah	Not available
F1S	4x44AB314 4.5Ah	Not available
F1T	5x44AB314 4.5Ah	Not available
F2A	1x32AB302 7Ah	1x32AB341 7Ah
F2B	2x32AB302 7Ah	2x32AB341 7Ah
F2C	3x32AB302 7Ah	3x32AB341 7Ah
F2D	4x32AB302 7Ah	4x32AB341 7Ah
F2E	5x32AB302 7Ah	5x32AB341 7Ah
F2F	1x36AB302 7Ah	1x36AB341 7Ah
F2G	2x36AB302 7Ah	2x36AB341 7Ah
F2H	3x36AB302 7Ah	3x36AB341 7Ah
F2I	4x36AB302 7Ah	4x36AB341 7Ah

Table 4		
	Batteries 3-5Y	Batteries 10Y
	Without the letter "Y"	With the letter "Y"
F2J	5x36AB302 7Ah	
F2K	1x40AB302 7Ah	1x40AB341 7Ah
F2L	2x40AB302 7Ah	2x40AB341 7Ah
F2M	3x40AB302 7Ah	3x40AB341 7Ah
F2N	4x40AB302 7Ah	4x40AB341 7Ah
F2O	5x40AB302 7Ah	5x40AB341 7Ah
F2P	1x44AB302 7Ah	1x44AB341 7Ah
F2Q	2x44AB302 7Ah	2x44AB341 7Ah
F2R	3x44AB302 7Ah	3x44AB341 7Ah
F2S	4x44AB302 7Ah	4x44AB341 7Ah
F2T	5x44AB302 7Ah	5x44AB341 7Ah
F3A	1x32AB265 9Ah	1x32AB315 9Ah
F3B	2x32AB265 9Ah	2x32AB315 9Ah
F3C	3x32AB265 9Ah	3x32AB315 9Ah
F3D	4x32AB265 9Ah	4x32AB315 9Ah
F3E	5x32AB265 9Ah	5x32AB315 9Ah
F3F	1x36AB265 9Ah	1x36AB315 9Ah
F3G	2x36AB265 9Ah	2x36AB315 9Ah
F3H	3x36AB265 9Ah	3x36AB315 9Ah
F3I	4x36AB265 9Ah	4x36AB315 9Ah
F3J	5x36AB265 9Ah	5x36AB315 9Ah
F3K	1x40AB265 9Ah	1x40AB315 9Ah
F3L	2x40AB265 9Ah	2x40AB315 9Ah
F3M	3x40AB265 9Ah	3x40AB315 9Ah
F3N	4x40AB265 9Ah	4x40AB315 9Ah
F3O	5x40AB265 9Ah	5x40AB315 9Ah
F3P	1x44AB265 9Ah	1x44AB315 9Ah
F3Q	2x44AB265 9Ah	2x44AB315 9Ah
F3R	3x44AB265 9Ah	3x44AB315 9Ah
F3S	4x44AB265 9Ah	4x44AB315 9Ah
F3T	5x44AB265 9Ah	5x44AB315 9Ah
F4A	1x32AB303 12Ah	1x32AB340 12Ah
F4B	2x32AB303 12Ah	2x32AB340 12Ah
F4C	3x32AB303 12Ah	3x32AB340 12Ah
F4D	4x32AB303 12Ah	4x32AB340 12Ah
F4E	5x32AB30312Ah	5x32AB34012Ah
F4F	1x36AB303 12Ah	1x36AB340 12Ah
F4G	2x36AB303 12Ah	2x36AB340 12Ah
F4H	3x36AB303 12Ah	3x36AB340 12Ah
F4I	4x36AB303 12Ah	4x36AB340 12Ah
F4J	5x36AB303 12Ah	5x36AB340 12Ah
F4K	1x40AB303 12Ah	1x40AB340 12Ah
F4L	2x40AB303 12Ah	2x40AB340 12Ah
F4M	3x40AB303 12Ah	3x40AB340 12Ah
F4N	4x40AB303 12Ah	4x40AB340 12Ah
F4O	5x40AB303 12Ah	5x40AB340 12Ah
F4P	1x44AB303 12Ah	1x44AB340 12Ah
F4Q	2x44AB303 12Ah	2x44AB340 12Ah

Table 4		
	Batteries 3-5Y	Batteries 10Y
	Without the letter "Y"	With the letter "Y"
F4R	3x44AB303 12Ah	3x44AB340 12Ah
F4S	4x44AB303 12Ah	4x44AB340 12Ah
F4T	5x44AB303 12Ah	5x44AB340 12Ah
F5A	1x32AB335 12HAh	1x32AB258 12HAh
F5B	2x32AB335 12HAh	2x32AB258 12HAh
F5C	3x32AB335 12HAh	3x32AB258 12HAh
F5D	4x32AB335 12HAh	4x32AB258 12HAh
F5E	5x32AB335 12HAh	5x32AB258 12HAh
F5F	1x36AB335 12HAh	1x36AB258 12HAh
F5G	2x36AB335 12HAh	2x36AB258 12HAh
F5H	3x36AB335 12HAh	3x36AB258 12HAh
F5I	4x36AB335 12HAh	4x36AB258 12HAh
F5J	5x36AB335 12HAh	5x36AB258 12HAh
F5K	1x40AB335 12HAh	1x40AB258 12HAh
F5L	2x40AB335 12HAh	2x40AB258 12HAh
F5M	3x40AB335 12HAh	3x40AB258 12HAh
F5N	4x40AB335 12HAh	4x40AB258 12HAh
F5O	5x40AB335 12HAh	5x40AB258 12HAh
F5P	1x44AB335 12HAh	1x44AB258 12HAh
F5Q	2x44AB335 12HAh	2x44AB258 12HAh
F5R	3x44AB335 12HAh	3x44AB258 12HAh
F5S	4x44AB335 12HAh	4x44AB258 12HAh
F5T	5x44AB335 12HAh	5x44AB258 12HAh
F6A	1x32AB155 26Ah	1x32AB338 26Ah
F6B	2x32AB155 26Ah	2x32AB338 26Ah
F6C	3x32AB155 26Ah	3x32AB338 26Ah
F6D	4x32AB155 26Ah	4x32AB338 26Ah
F6E	5x32AB155 26Ah	5x32AB338 26Ah
F6F	1x36AB155 26Ah	1x36AB338 26Ah
F6G	2x36AB155 26Ah	2x36AB338 26Ah
F6H	3x36AB155 26Ah	3x36AB338 26Ah
F6I	4x36AB155 26Ah	4x36AB338 26Ah
F6J	5x36AB155 26Ah	5x36AB338 26Ah
F6K	1x40AB155 26Ah	1x40AB338 26Ah
F6L	2x40AB155 26Ah	2x40AB338 26Ah
F6M	3x40AB155 26Ah	3x40AB338 26Ah
F6N	4x40AB155 26Ah	4x40AB338 26Ah
F6O	5x40AB155 26Ah	5x40AB338 26Ah
F6P	1x44AB155 26Ah	1x44AB338 26Ah
F6Q	2x44AB155 26Ah	2x44AB338 26Ah
F6R	3x44AB155 26Ah	3x44AB338 26Ah
F6S	4x44AB155 26Ah	4x44AB338 26Ah
F6T	5x44AB155 26Ah	5x44AB338 26Ah
F7A	1x32AB336 34Ah	not available
F7B	2x32AB336 34Ah	not available
F7C	3x32AB336 34Ah	not available
F7D	4x32AB336 34Ah	not available
F7E	5x32AB336 34Ah	not available
F7F	1x36AB336 34Ah	not available

Table 4		
	Batteries 3-5Y	Batteries 10Y
	Without the letter "Y"	With the letter "Y"
F7G	2x36AB336 34Ah	not available
F7H	3x36AB336 34Ah	not available
F7I	4x36AB336 34Ah	not available
F7J	5x36AB336 34Ah	not available
F7K	1x40AB336 34Ah	not available
F7L	2x40AB336 34Ah	not available
F7M	3x40AB336 34Ah	not available
F7N	4x40AB336 34Ah	not available
F7O	5x40AB336 34Ah	not available
F7P	1x44AB336 34Ah	not available
F7Q	2x44AB336 34Ah	not available
F7R	3x44AB336 34Ah	not available
F7S	4x44AB336 34Ah	not available
F7T	5x44AB336 34Ah	not available
F8A	1x32AB337 40Ah	N/A
F8B	2x32AB337 40Ah	N/A
F8C	3x32AB337 40Ah	N/A
F8D	4x32AB337 40Ah	N/A
F8E	5x32AB337 40Ah	N/A
F8F	1x36AB337 40Ah	N/A
F8G	2x36AB337 40Ah	N/A
F8H	3x36AB337 40Ah	N/A
F8I	4x36AB337 40Ah	N/A
F8J	5x36AB337 40Ah	N/A
F8K	1x40AB337 40Ah	N/A
F8L	2x40AB337 40Ah	N/A
F8M	3x40AB337 40Ah	N/A
F8N	4x40AB337 40Ah	N/A
F8O	5x40AB337 40Ah	N/A
F8P	1x44AB337 40Ah	N/A
F8Q	2x44AB337 40Ah	N/A
F8R	3x44AB337 40Ah	N/A
F8S	4x44AB337 40Ah	N/A
F8T	5x44AB337 40Ah	N/A
F9A	1x32AB257 56Ah	N/A
F9B	2x32AB257 56Ah	N/A
F9C	3x32AB257 56Ah	N/A
F9D	4x32AB257 56Ah	N/A
F9E	5x32AB257 56Ah	N/A
F9F	1x36AB257 56Ah	N/A
F9G	2x36AB257 56Ah	N/A
F9H	3x36AB257 56Ah	N/A
F9I	4x36AB257 56Ah	N/A
F9J	5x36AB257 56Ah	N/A
F9K	1x40AB257 56Ah	N/A
F9L	2x40AB257 56Ah	N/A
F9M	3x40AB257 56Ah	N/A
F9N	4x40AB257 56Ah	N/A
F9O	5x40AB257 56Ah	N/A

Table 4		
	Batteries 3-5Y	Batteries 10Y
	Without the letter "Y"	With the letter "Y"
F9P	1x44AB257 56Ah	N/A
F9Q	2x44AB257 56Ah	N/A
F9R	3x44AB257 56Ah	N/A
F9S	4x44AB257 56Ah	N/A
F9T	5x44AB257 56Ah	N/A
F10A	1x32AB247 69Ah	N/A
F10B	2x32AB247 69Ah	N/A
F10C	3x32AB247 69Ah	N/A
F10D	4x32AB247 69Ah	N/A
F10E	5x32AB247 69Ah	N/A
F10F	1x36AB247 69Ah	N/A
F10G	2x36AB247 69Ah	N/A
F10H	3x36AB247 69Ah	N/A
F10I	4x36AB247 69Ah	N/A
F10J	5x36AB247 69Ah	N/A
F10K	1x40AB247 69Ah	N/A
F10L	2x40AB247 69Ah	N/A
F10M	3x40AB247 69Ah	N/A
F10N	4x40AB247 69Ah	N/A
F10O	5x40AB247 69Ah	N/A
F10P	1x44AB247 69Ah	N/A
F10Q	2x44AB247 69Ah	N/A
F10R	3x44AB247 69Ah	N/A
F10S	4x44AB247 69Ah	N/A
F10T	5x44AB247 69Ah	N/A
F11A	1x32AB219 93Ah	N/A
F11B	2x32AB219 93Ah	N/A
F11C	3x32AB219 93Ah	N/A
F11D	4x32AB219 93Ah	N/A
F11E	5x32AB219 93Ah	N/A
F11F	1x36AB219 93Ah	N/A
F11G	2x36AB219 93Ah	N/A
F11H	3x36AB219 93Ah	N/A
F11I	4x36AB219 93Ah	N/A
F11J	5x36AB219 93Ah	N/A
F11K	1x40AB219 93Ah	N/A
F11L	2x40AB219 93Ah	N/A
F11M	3x40AB219 93Ah	N/A
F11N	4x40AB219 93Ah	N/A
F11O	5x40AB219 93Ah	N/A
F11P	1x44AB219 93Ah	N/A
F11Q	2x44AB219 93Ah	N/A
F11R	3x44AB219 93Ah	N/A
F11S	4x44AB219 93Ah	N/A
F11T	5x44AB219 93Ah	N/A
F12A	1x32AB317 105Ah	N/A
F12B	2x32AB317 105Ah	N/A
F12C	3x32AB317 105Ah	N/A
F12D	4x32AB317 105Ah	N/A

Table 4		
	Batteries 3-5Y	Batteries 10Y
	Without the letter "Y"	With the letter "Y"
F12E	5x32AB317 105Ah	N/A
F12F	1x36AB317 105Ah	N/A
F12G	2x36AB317 105Ah	N/A
F12H	3x36AB317 105Ah	N/A
F12I	4x36AB317 105Ah	N/A
F12J	5x36AB317 105Ah	N/A
F12K	1x40AB317 105Ah	N/A
F12L	2x40AB317 105Ah	N/A
F12M	3x40AB317 105Ah	N/A
F12N	4x40AB317 105Ah	N/A
F12O	5x40AB317 105Ah	N/A
F12P	1x44AB317 105Ah	N/A
F12Q	2x44AB317 105Ah	N/A
F12R	3x44AB317 105Ah	N/A
F12S	4x44AB317 105Ah	N/A
F12T	5x44AB317 105Ah	N/A

Table 5	
IP	
J0	IP20* (Disregard in code description)
J20	IP20 battery cabinet with open door
J21	IP21
J30	IP30
J31	IP31
J43	IP43

Table 6	
L	
LA	Spanish (Disregard in code description)
LE	English
LF	French
LC	Catalan
LP	Portuguese
LG	German

5. GENERAL DESCRIPTION OF THE DEVICE.

The **SLC ADAPT2** series of Uninterruptible Power Supply (UPS) devices is based on the VFI operating mode (independent voltage and frequency). These devices have been developed with IGBT double-conversion and DSP control technology, which provides significant installation and operation cost savings while offering maximum protection for the connected loads.

5.1. BLOCK DIAGRAM.

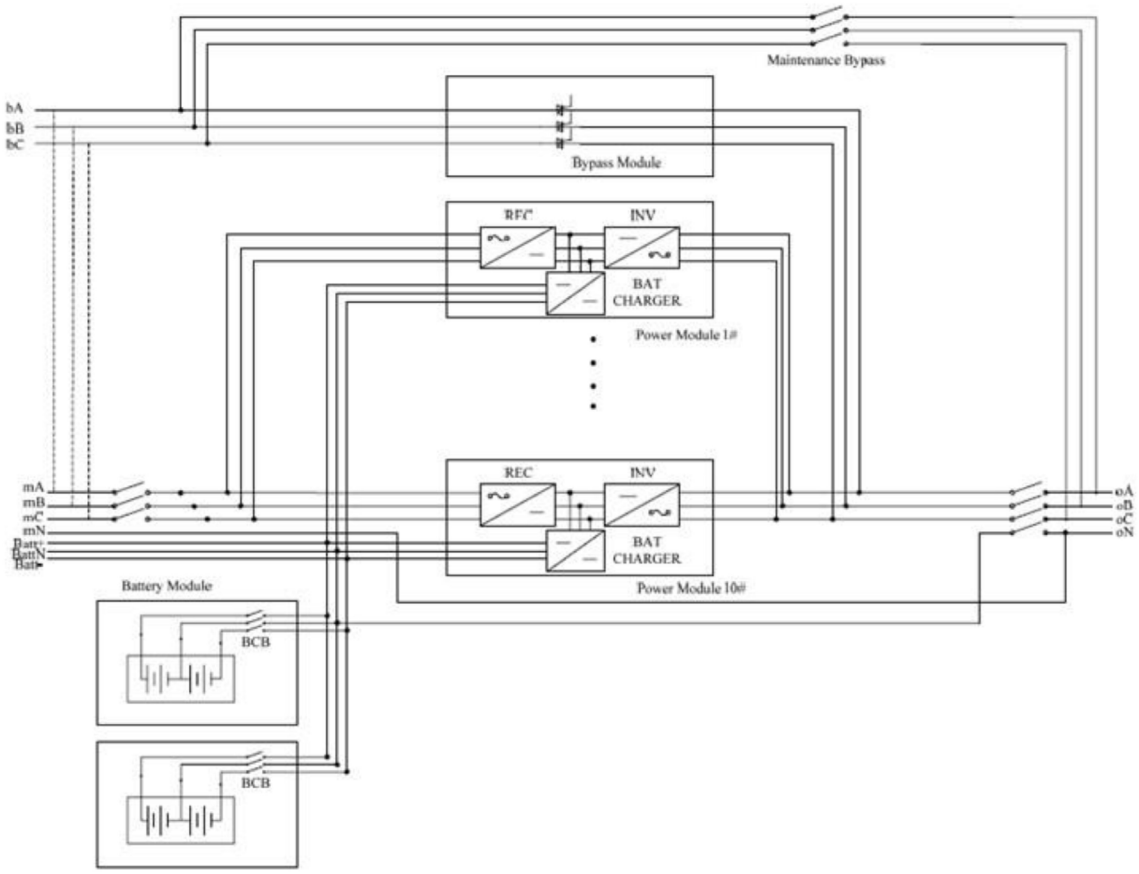


Fig. 1. Single-linepresentationoftheblockdiagramofan SLC ADAPT2 system.

6. OPERATING PRINCIPLE.

6.1. RECTIFIER.

The rectifier converts three-phase AC mains voltage into direct DC voltage. The following figure shows the simplified structure of the rectifier block and battery connection.

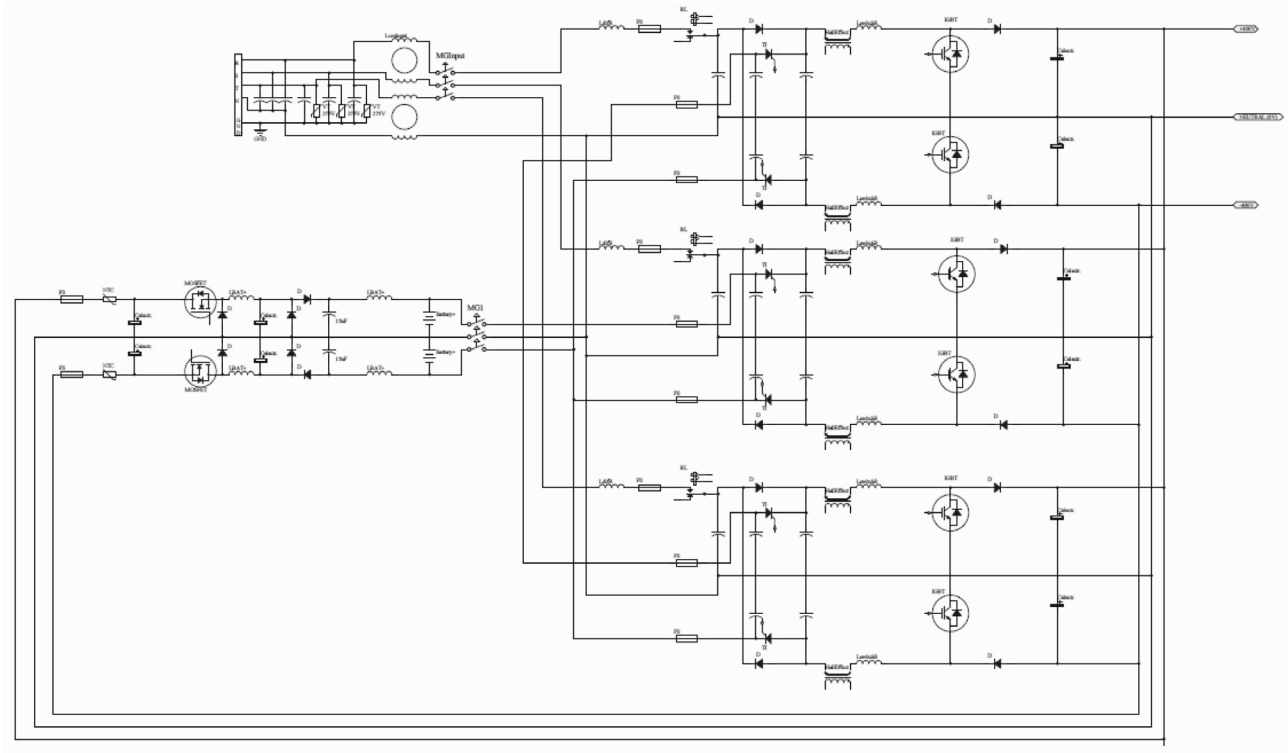


Fig. 2. Block diagram of the rectifier of one of the modules.

AC/DC conversion is carried out via three Vienna-type single-phase rectifiers.

The rectifier has two inputs: one for the AC source when operating with mains present, and a DC input for operation in battery mode.

The rectifier will convert the three-phase AC input voltage (3x380+N, 3x400+N or 3x415+N) to bus DC voltage. It can also be configured to accept 220+N, 230+N or 240+N single-phase inputs.

To ensure a reduced level of acoustic noise, the rectifier operates at a switching frequency of 40 kHz.

When operating with AC mains present, the rectifier-charger supplies energy to the battery charger while also supplying the inverter with a connected load of up to 100% of nominal power.

The rectifier is designed to be able to provide 120% of the active power required to supply the inverter. The additional 20% may only be used to supply the battery charger.

The performance of the rectifier in AC and DC mode is 0.97%. At the rectifier output, there is a DC filter that uses capacitors to reduce voltage ripples down to 1%.

The rectifier has a soft-start function for systems with 10, 15, 25 and 50 kVA modules, which limits the consumption at the rectifier input from 0% to 100% of the nominal power when the input voltage is restored after a network power cut. Additionally, the modules will have a sequential startup every 0/3/5/10 seconds.

Control logic is provided by a Digital Signal Processing (DSP) device, which is responsible for supplying DC voltage with minimal ripple for any input voltage value between the nominal value and -20%/+25% (-40%/+25% with 70% derating), any frequency between 45 and 65 Hz, and load variations from 0% to 100%.

The waveform of the input current is sinusoidal, with harmonic distortion (THDi) of <4% and an input power factor of >0.99.

6.2. INVERTER

The inverter converts the DC voltage coming from the rectifier or the battery into AC voltage, stabilised in value and frequency. The inverter has a full-bridge configuration with IGBT (Insulated Gate Bipolar Transistor), enabling it to operate with a high switching frequency (40 kHz).

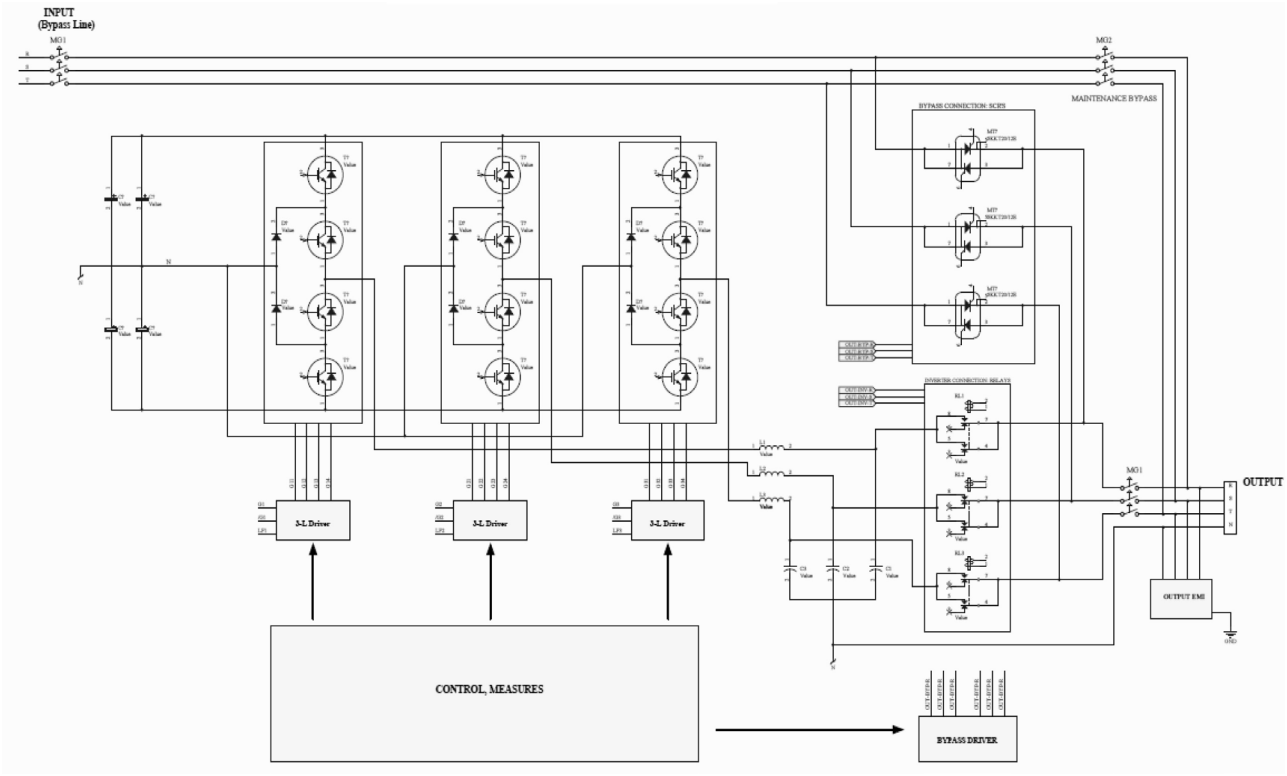


Fig. 3. Block diagram of the inverter of one of the modules.

The inverter will convert the DC bus voltage to three-phase AC output voltage at loads of 3x380+N, 3x400+N or 3x415+N. It can also be configured to provide a single-phase output voltage of 220+N, 230+N or 240+N.

It is designed with a three-level NPC (Neutral Point Clamped) IGBT topology that optimises performance, producing values of >97%.

The inverter controller has a Digital Signal Processor (DSP) that manages the signals in order to supply constant output voltage in accordance with specifications.

The waveform of the output voltage is sinusoidal, three-phase and free, with harmonic distortion of <1% with linear loads.

The accuracy of the inverter's output is ±1% under static conditions and ±1.5% under dynamic conditions.

The maximum output power of each inverter module is 10, 15, 25 or 50 kVA, with a power factor of 1.

All of the inverters are designed to permanently support 100% of the nominal load, and to be able to support occasional overloads produced in the output of the UPS. In the event that an overload is detected, the inverter will be able to support it as long as it does not exceed the following values:

- 110% for 60 minutes
- 125% for 10 minutes
- 150% for 60 seconds
- >150% for 200 milliseconds

If the above values are exceeded, the inverter will disconnect from the loads so that they can be transferred to the bypass line. Additionally, the inverter has a hardware-based current limiter, set to 310% of its nominal current.

The permitted crest factor is 3:1.

The inverter's control circuit makes it possible to synchronise the voltage generated by the inverter and the bypass line, provided it is within the nominal frequency range ±5Hz.

In the event that the frequency is outside of this range, or the device is operating in battery mode, the output frequency will be kept to within ±0.1% of its nominal value.

Additionally, each module has a hybrid bypass between the module itself and the monitoring and bypass module, thereby enabling loads to be connected even if the monitoring module is not.

The distribution of loads between the modules in the same system is governed by each of the modules via the parallel CAN bus.

6.3. BATTERY CHARGER

The battery charger comprises a DC/DC converter that adjusts the DC bus voltage to the voltage required to charge the batteries.

It is a Buck-type DC/DC converter that adjusts the DC bus voltage to a voltage of ±192 V DC, ±216 V DC, ±240 V DC or ±264 V DC, depending on the battery configuration.

The switching frequency of the IGBT is 40kHz.

All of the output parameters of the DC/DC converter are monitored via the Batt-watch function built into the power module itself.

The Batt-watch function ensures a voltage ripple at the battery terminal of ≤1% and a current ripple of ≤5%, and also regulates the batteries' charge level and charging current.

The charging current is adjusted to 20% of the batteries' capacity (0.2C) for standard configurations and for backup extensions of up to 30 minutes during device startup.

The Batt-watch function also makes it possible to set two voltage levels for charging the batteries: Float and fast charging, depending on the type of battery used: VRLA, AGM, Gel, NiCd or Lithium.

The battery charge curve is of the I/U type (constant current, constant voltage).

The battery charger allows for analogue temperature input in order to provide a compensated float voltage based on adjustable temperature from 0 to -5 mV/ºC/cell. It also allows for automatic and manual fast-charging cycles via the system control panel, as well as battery tests to check that the batteries are in good condition.

The battery voltage value can be adjusted in order to charge at one or two levels, thereby making it possible to charge sealed lead-acid batteries as well as open lead-acid and NiCd batteries.

The battery charge curve is of the I/U type with constant current and constant voltage, in accordance with DIN 41773.

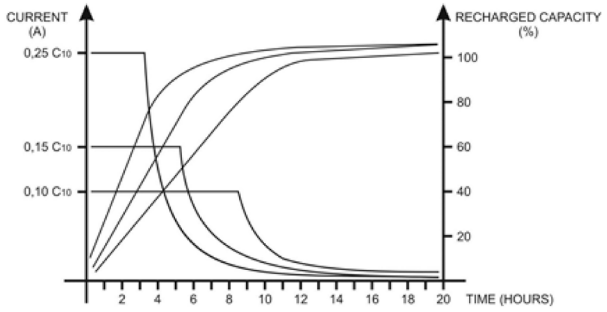


Fig. 4. Graph showing the charging voltage and current for batteries with a single voltage level.

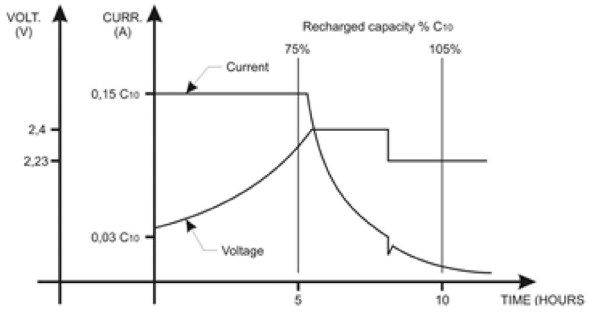


Fig. 5. Graph showing the charging voltage and current for batteries with two voltage levels.

6.3.1. Operation with non-linear loads.

A non-linear load is characterised by a high current peak in relation to its effective value which, under normal conditions, causes a distortion in the form of the inverter's output voltage.

The inverter controller on the **SLC ADAPT2** series is able to vary the width of the pulses generated in the output voltage, in line with the type of current waveform absorbed by the loads. With this feature the inverter is able to maintain an output THDv of less than 5% with waveforms with a crest factor of up to 3:1.

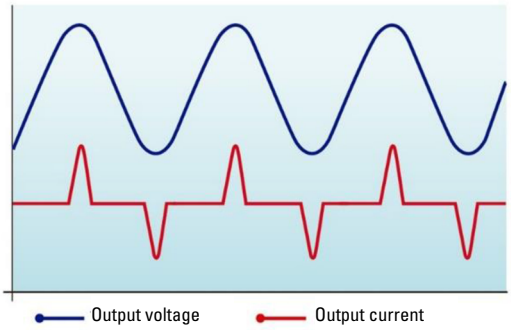


Fig. 6. Graph showing the progression of the output current and voltage with a non-linear load.

6.3.2. Overload.

The design of the inverters enables the permanent supply of 100% of their nominal capacity, while also enabling overloads of up to 110% for 60 minutes, 125% for 10 minutes and 150% for one minute. In the event of larger overloads, the inverter will be locked after 200 ms.

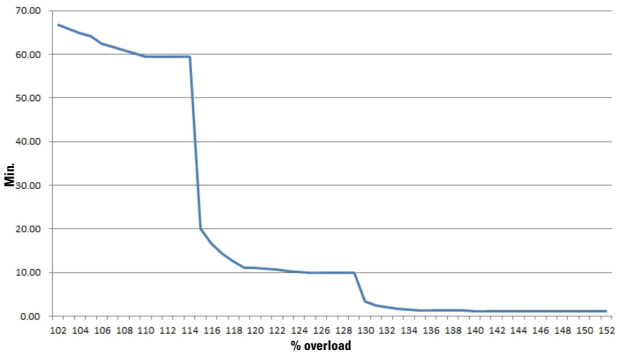


Fig. 7. Progression of the overload % vs time.

Therefore, during overloading, the inverter will supply the loads for the entirety of the specified time. When the maximum time

is exceeded, the loads will be transferred to the bypass line without interruption.

In the event that the bypass line is not available after the overload limit values have been reached, the inverter will be blocked to prevent irreversible damage to the internal components of the UPS. As soon as the bypass line is restored, the loads will be supplied by the auxiliary network.

6.4. STATIC BYPASS AND MONITORING MODULE.

The bypass and monitoring module supervises the correct operation of all of the components in the system. It enables external communication with the user and management of the process of transferring the loads to the bypass network.

The main components of the module are:

- Control panel.
- Communications.
- Hybrid bypass.

6.4.1. Control Panel.

The system has a general control panel at the front of the device, which is used to view the system status and parameters and to carry out the necessary actions involving the device.

This panel comprises the following elements:

6.4.1.1. Digital Display.

7" RGB LED touchscreen. For devices installed in a cabinet, the display is on the door. For devices arranged in subrack format, the display is on the bypass module itself.

The home screen displays the operating status of the UPS. The display is attached via plug-in connector to allow it to be replaced by maintenance personnel.

You can use the display to operate and control the UPS and to view measurements, parameters, the battery set and alarm log.

To this end, it incorporates a full menu, status bar and indication of active alarms.

It can store a minimum of 100 events for each UPS module installed and logs the exact date (day/month/year) and time (hour/minute) of each event.

The list of events should be ordered chronologically.

The display provides the following functions and information (among others):

Identifiers and description of system events:

No.	NAME OF ALARM
1	ALM_EPO
2	ALM_BYPASS_SEQUENCE_ERROR
3	ALM_BYPASS_SCR_FAIL_OPEN
4	ALM_BYPASS_SCR_FAIL_SHORTED
5	ALM_BYPASS_OVER_LOAD_TOUT
6	ALM_OUTPUT_SHORT_CIRCUIT
7	ALM_BATTERY_EOD
8	ALM_RECTIFIER_FAIL
9	ALM_INVERTER_FAIL
10	ALM_RECTIFIER_OVER_TEMP
11	ALM_FAN_FAIL
12	ALM_OUTPUT_OVER_LOAD
13	ALM_INVERTER_OVERLOAD_TOUT
14	ALM_INVERTER_OVER_TEMP
15	ALM_ON_UPS_INHIBITED
16	ALM_BATTERY_REVERSE
17	ALM_INVERTER_PROTECT
18	ALM_INPUT_NEUTRAL_LOST
19	ALM_BYPASS_FAN_FAIL
20	ALM_PARALLEL_CABLE_ERROR
21	ALM_REC_CAN_FAIL
22	ALM_INV_IO_CAN_FAIL
23	ALM_INV_DATA_CAN_FAIL
24	ALM_SYNC_PULSE_FAIL
25	ALM_BATTERY_VOLT_DETECT_FAIL
26	ALM_OUTPUT_VOLT_FAIL_R
27	ALM_OUTPUT_VOLT_FAIL_S
28	ALM_OUTPUT_VOLT_FAIL_T
29	ALM_INV_BRIDGE_FAIL
30	ALM_INPUT_CURR_UNBALANCE
31	ALM_REC_SOFT_START_FAIL
32	ALM_RELAY_CONNECT_FAIL
33	ALM_RELAY_SHORT_CIRCUIT
34	ALM_PWM_SYNC_FAIL
35	ALM_INPUT_OVER_CURR_TOUT
36	ALM_NO_INLET_TEMP_SENSOR
37	ALM_NO_OUTLET_TEMP_SENSOR
38	ALM_BYPASS_CAN_FAIL
39	ALM_FIRMWARE_ERROR
40	ALM_SYSTEM_SETTING_ERROR
41	ALM_MODULE_ID_DUPLICATE
42	ALM_INV_IGBT_OVERCURRENT
43	ALM_REDUNDANT_OVL_TOUT
44	ALM_NO_OUTPUT
45	ALM_MAINT_BYPASS

Table 1. Table of system alarms.

No.	NAME OF ALARM
1	WRN_BATTERY_NOT_CONNECTED
2	WRN_MODULE_ON_LESS
3	WRN_UTILITY_ABNORMAL
4	WRN_BYPASS_VOLT_ABNORMAL_R
5	WRN_BYPASS_VOLT_ABNORMAL_S
6	WRN_BYPASS_VOLT_ABNORMAL_T
7	WRN_BYPASS_MODULE_OVER_LOAD_R
8	WRN_BYPASS_MODULE_OVER_LOAD_S
9	WRN_BYPASS_MODULE_OVER_LOAD_T
10	WRN_BYP_FREQ_OVER_TRACK
11	WRN_EXCEED_TX_TIMES_LMT
12	WRN_BATTERY_VOLT_LOW
13	WRN_LOST_N_X_REDUNDANT
14	WRN_BATTERY_TEST_FAIL
15	WRN_BATTERY_MAINTENANCE_FAIL
16	WRN_AMBIENT_OVER_TEMP
17	WRN_INPUT_VOLT_DETECT_FAIL
18	WRN_OUTLET_TEMP_ERROR
19	WRN_DC_BUS_OVER_VOLT
20	WRN_INLET_OVER_TEMP
21	WRN_BATTERY_OVER_TEMP
22	WRN_BYPASS_FAN_EXPIRED
23	WRN_CAPACITOR_EXPIRED
24	WRN_FAN_EXPIRED
25	WRN_OUTLET_DELTA_TEMP
26	WRN_BATTERY_EXPIRED
27	WRN_DUST_FILTER_EXPIRED
28	WRN_BYPASS_OVER_TEMP
29	WRN_RTC_BATT_LOW

Table 2. Table of system warnings.

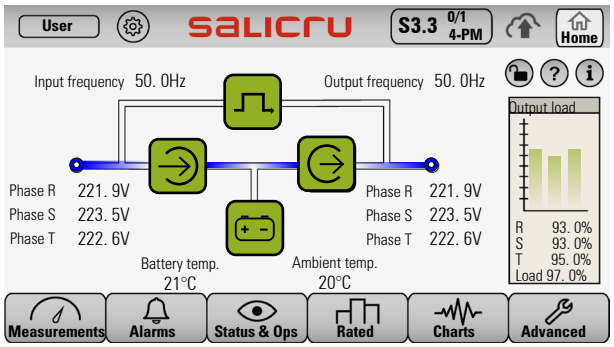


Fig. 8. Display for devices with 10 and 15 kVA modules.

List of Alarms:

This menu provides a list of system events and alarms, which are recorded via the device's own list of events.

At a minimum, these include the following:

- Normal operation.
- Operation in Bypass mode.
- System has no output voltage.
- Fast charging activated.
- Float charging activated.
- Battery discharge.
- Battery connected.
- Battery disconnected.
- Bypass switch activated.
- Bypass switch deactivated.
- EPO activated.
- Input power supply out of range.
- Incorrect Bypass voltage.
- Bypass failure.
- Bypass overload.
- Bypass overload time exceeded.
- Bypass frequency out of synchronism.
- No. of switches to bypass exceeded.
- Short circuit in output.
- End of battery discharge.
- Battery test passed.
- Battery maintenance OK.
- The "N" module is connected.
- The "N" module is disconnected.
- The "N" module rectifier has failed.
- The "N" module inverter has failed.
- The "N" module rectifier has an overtemperature.
- The "N" module rectifier has a fan failure.
- The "N" module is overloaded.
- The "N" module has exceeded the overload time.
- The "N" module inverter has an overtemperature.
- Transfer to inverter disabled.
- Manual transfer to Bypass.
- Manual transfer from Bypass to inverter.
- Low battery voltage.
- Reversed battery polarity.
- Inverter module protection.
- Power supply neutral failure.
- "N" module power supply disconnected.
- Bypass fan failure.
- "N" module manual stop.

6.4.2. Communications.

Each UPS module that makes up the system is comprised of a rectifier-charger block. Below are details of the different control and communications elements that the modular system requires.

6.4.2.1. Relay Output Port.

The system has a general alarm terminal block located at the front of the device, which is needed in order to be able to see the system's basic operating status at a glance.

It consists of four configurable relays, which by default correspond to the following indications:

- Maintenance bypass closed.
- Input voltage abnormal or batteries discharging.
- Battery disconnected or low.
- UPS bypassed.

In the general terminal block, each alarm will be supplied in line with normally open contact (NO) and normally closed contact (NC).

6.4.2.2. Input Port.

The system has a terminal block for digital inputs located on the front of the device.

It consists of four configurable terminals, which by default correspond to the following indications:

- Shutdown.
- Power generator input.
- Auxiliary contact input for the maintenance bypass switch.
- Auxiliary contact input for the output switch.

6.4.2.3. Communication Port.

- RS-232 and RS-485: The system has a port equipped with a SUB-DB9 connector for RS-232-type serial connections or RS-485-type parallel connections.
- USB: The system also has a USB communication port.

Additionally, the system is equipped with two communication slots for the addition (where required) of an SNMP network card or a potential-free contact expansion card.

6.4.3. Hybrid bypass.

The hybrid bypass included in the bypass and monitoring module is responsible for supplying loads via the bypass line when there is no voltage coming from the inverter or when the load has been manually or automatically transferred to the bypass line.

The distributed bypass has a wide input range, from +15% to -40%.

Its overload capacity allows for a permanent overload of 125% and up to 1000% for a period of one second.

Loads can be transferred to the bypass manually via the control panel as well as automatically.

6.5. MANUAL BYPASS.

The UPS system has a manual bypass switch built into the same cabinet as the power modules, thereby allowing maintenance and servicing to be carried out.

The manual bypass allows users to electrically isolate all of the components of the UPS. Optionally, a "make-before-break"-type external maintenance bypass can also be acquired.

7. OPERATING MODES

- Normal mode
- Battery mode
- Bypass mode
- Maintenance mode (or manual Bypass)
- ECO mode
- Auto-start mode
- Frequency converter mode
- LBS and parallel LBS modes
- Sleep and Deep Sleep modes
- Test mode (no load required)

7.1. NORMAL MODE.

In this mode, the power module inverters are continually supplying the loads. The rectifier/charger diverts power from the input to the battery module and the inverter simultaneously, thereby charging the batteries or maintaining their float status.

The figure below shows the flow of power for the different converters.

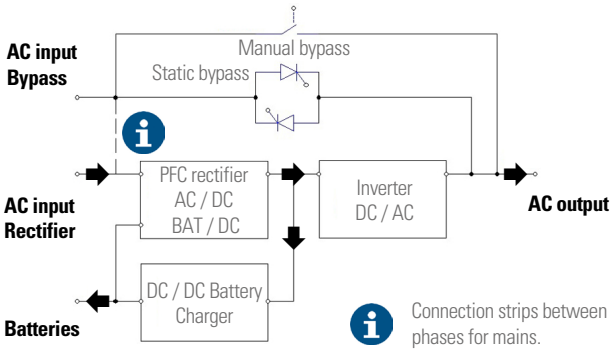


Fig. 9. Flowchart in Normal mode.

7.2. BATTERY MODE.

This mode is activated whenever there is an input failure. The inverter supplies power to the loads via the DC bus from the batteries. The transition to Battery mode is performed without any interruption to the system's loads.

When the input voltage returns, Normal mode is restored automatically, without the need for any manual intervention.

Thanks to the Cold Start function included on all models, the **SLC ADAPT2** series enables you to activate the inverter directly from the batteries, without any input voltage.

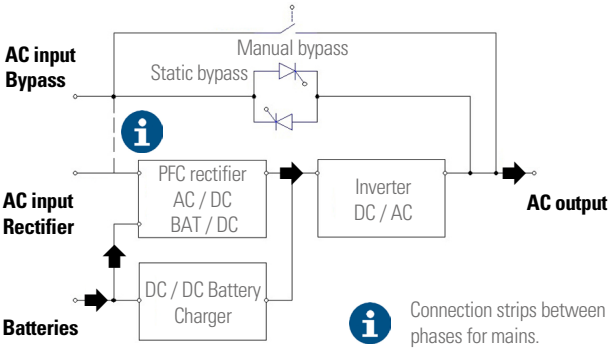


Fig. 10. Flowchart in Battery mode.

7.3. BYPASS MODE.

If the inverter overload capacity is exceeded in Normal mode, or in cases where the inverter cannot supply power to the loads for any reason, Bypass mode will be activated automatically without interrupting the service at the output. However, the transition will interrupt the output if the inverter is not synchronised with the bypass. This is done in order to prevent the appearance of current peaks as a result of the paralleling of unsynchronised AC power sources. The time of this interruption is programmable, with the typical value being less than ¾ of the input signal cycle (less than 15 ms for 50 Hz and 12.5 ms for 60 Hz).

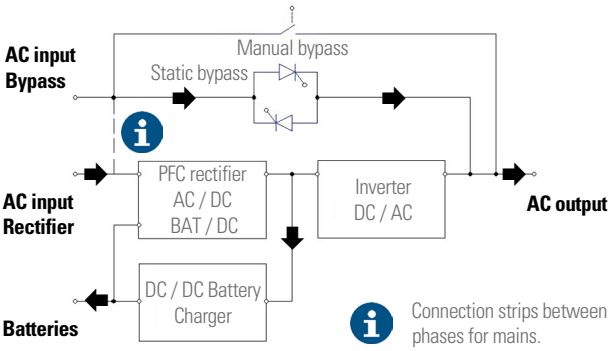


Fig. 11. Flowchart in Bypass mode.

7.4. MANUAL BYPASS OR MAINTENANCE MODE.

In manual bypass mode for preventive maintenance, breakdown or repair, the UPS will be shut down and the load(s) will be fed directly from the manual bypass line. Depending on whether the supply for this line comes from a utility company (same as the main network that supplies the rectifier or a second utility company) or from a generator, the quality of the supply will vary and, as a result, there may be incidents in the supply of the load or loads.

It is advisable to carry out from time to time a functionality test of the manual bypass to guarantee the correct operation in future maintenance or repair works.

When using the manual bypass disconnector to transfer the system to the maintenance bypass and subsequently return it to normal operation, you must follow the steps specified in the corresponding chapter of this document. The user will be solely responsible for any faults caused to the UPS, loads and/or installation as a result of incorrect actions.

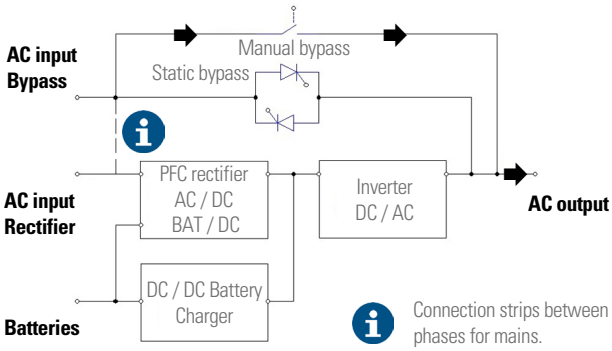


Fig. 12. Flowchart in Manual Bypass or Maintenance mode.

7.5. ECO MODE.

If you wish to improve the overall performance of the modular UPS system, you can select ECO mode, in which the flow of power is the same as in Bypass mode except that the inverter is on standby. When there is an input failure, the UPS will automatically switch to Battery mode and the inverter will begin to supply the loads with minimal interruption of service.

In this mode, you can achieve performance levels of up to 99%, with a retransfer time of 4-5 ms.

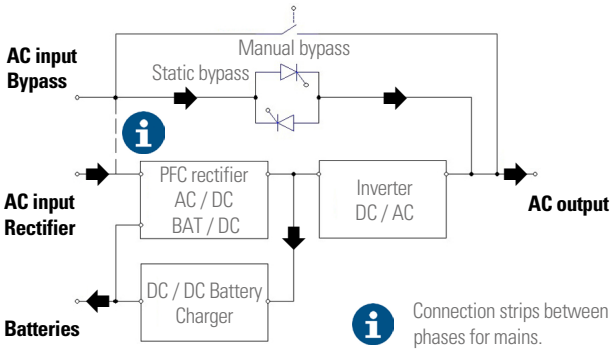


Fig. 13. Flowchart in Eco mode.

7.6. AUTO-START MODE.

When the UPS system is in Battery mode and reaches the end of its backup, the inverter will switch off. If the system is in Auto-start mode, it will start up automatically when input voltage is restored. This restart will occur after a time delay. However, this mode and the time delay can only be activated if you have the relevant user permissions.

7.7. FREQUENCY CONVERTER MODE.

This mode will set the output frequency at a fixed value (50 or 60 Hz) and will disable the bypass.

7.8. LBS AND PARALLEL LBS MODES.

LBS mode allows you to synchronise two separate UPS devices that are connected to an STS, thereby reducing transfer time.

Parallel LBS mode is the same concept, except with UPS devices connected to each other in parallel.

7.9. SLEEP AND DEEP SLEEP MODES.

To resolve UPS oversizing issues and increase system efficiency, one of the two available «Sleep» modes can be activated, at the factory or, later, by the **T.S.S.**: «Smart Sleep».

- Normal Sleep mode: The modules' inverter is activated but in standby, with its output disconnected from the load. This means the "sleeping" modules can be reconnected to the load in seconds, with no transfer time at all if the Bypass can supply the load during this time.
- Deep Sleep mode: All module power converters are completely off with their outputs disconnected from the load. Activation takes several minutes, with no transfer time at all if the Bypass can supply the load during this time.

"Cycling": Alternates idle and operational modules to ensure evenly distributed ageing.

7.10. TEST MODE (NO LOAD REQUIRED).

Energy flows through the rectifier, inverter and bypass and returns to the mains. The load percentage can be adjusted using software.

This mode allows you to test the UPS at 100% power while only consuming 5%, as the remaining 95% is recirculated through the device itself.

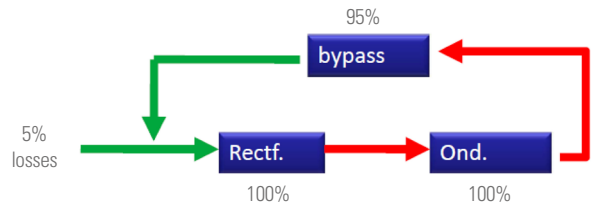


Fig. 14. Power flow in Test mode.

8. OPTIONS.

8.1. OPTIONS INCLUDED AS STANDARD (FACTORY SETTING OR BY **T.S.S**).

The following functions are included as standard on all devices; however, test software is required in order to activate them. For this reason, they must be requested in the order, or alternatively they can be adjusted by the **T.S.S.** that configures the device during startup.

- Eco mode.
- Double charging level.
- Soft start.
- Frequency converter.

8.1.1. Eco mode.

For loads less sensitive to fluctuations in the commercial network, these can be powered directly by the static bypass switch as long as this is within the acceptable voltage and frequency ranges. The inverter will be operating with the output disconnected, but maintaining its voltage and phase parameters the same as those of the bypass network. Thus, the only losses to occur will be those of the bypass itself plus those of the converters working at no load, thereby making it possible to achieve performance levels in excess of 99%.

In the event of a mains failure, the inverter will take over, powered by the batteries and connecting its output to the loads through the static bypass switch.

8.1.2. Double charging level.

This type of charging, as per DIN 71773, is habitually used for open lead-acid batteries or NiCd batteries with a wide voltage range.

In order to ensure the battery bank is the correct size, you must take into account the maximum voltage and current values for the rectifier-charger.

8.1.3. Soft start.

The rectifier soft-start ramp function allows users to modify the ramp of the DC voltage generated by the thyristor bridge and the value set for battery charging or float voltage. Together with the time delay to start the rectifier, this function makes it possible to reduce the disturbances caused by the UPS to the power generator that supplies it.

The ramp can be adjusted in accordance with the following range of values: 0/3/5/30 s.

8.1.4. Sequential start for parallel systems.

Sequential starting of the rectifiers is useful when various UPSs in parallel are supplied by the same power generator, as it prevents overloading of the generator during the restart of the rectifiers. The rectifiers will each start with the programmed delay. The sequential start can be adjusted in line with the following range of values: 1-300 s.

8.1.5. Frequency converter.

The frequency converter mode makes it possible to supply an output frequency of 60 Hz while the input frequency is 50 Hz, and vice versa. When this function is activated, the bypass is automatically disabled, since synchronisation between the two voltages is not possible.

8.2. OPTIONS AVAILABLE UPON REQUEST.

In addition, the ADAPT2 series can be supplied with other options that are not included as standard, thereby enabling users to adapt the devices to suit the most demanding needs.

- Parallel kit.
- Independent bypass line.
- Input and output autotransformers.
- Surge protector.
- SNMP card.
- Ambient temperature sensor.
- Battery cabinets.
- Battery protection in external wall box.
- Special colour.
- Back-feed protection.
- BPME (External Manual Bypass).

8.2.1. Parallel kit.

This option includes all of the elements needed to connect two or three cabinets in parallel.

8.2.2. Independent bypass line.

This option includes additional terminals to connect a different auxiliary network to the rectifier input, which will be used as a static bypass line.

8.2.3. Autotransformer for adjusting input/output voltage.

In the event that the input or output voltages are different to the devices' nominal voltages, we can supply autotransformers to adapt the output voltages to those required by the loads or to adapt the network voltages to the device's nominal input voltage.

If galvanic isolation is required, isolation transformers can also be supplied.

8.2.4. Surge protector.

The rectifier output can be protected against transient phenomena in the mains input by using an overvoltage suppressor, which will minimise any damage to the UPS in the event of transient phenomena that exceed the calibre of the suppressor.

8.2.5. SNMP card.

The device comes as standard with a slot for inserting an SNMP card for integrating the UPS into the customer's LAN or WAN computer network.

There are different types of SNMP cards available depending on the customer's needs. In all of them, the internal protocol of

the UPS is converted to SNMP (Simple Network Management Protocol) and it is possible to monitor the status and values of the UPS.

It is also possible to configure the SNMP card as RCCMD (Remote Console Command) to start the process of shutting down one or more PCs/servers when the UPS is reaching the end of its backup or has any kind of problem. To do this, a small software program is required on each PC. The SNMP card itself includes a licence. If more units are required, they can be purchased separately.

8.2.6. Ambient temperature sensor.

As an option, we can supply a sensor to monitor the ambient temperature in the room where the device is kept.

8.2.7. Battery cabinets.

When configured in blocks of 32/36/40/44 12 VDC units, the batteries are always supplied in an external cabinet with IP20 protection.

The batteries included as standard are VRLA (Valve Regulated Lead Acid). Upon request, we can supply other types (NiCd, gel, lithium, etc.).

The battery cabinets and batteries are shipped in separate packages and are assembled during installation. Please consult your distributor for assembly conditions.

The battery cabinets include protection with disconnector + fuses built into the battery cabinet itself.

Upon request, we can also supply battery sets with IP00 protection. Consult your distributor for more information.

The length of the battery cables is 3.5 m. Consult your distributor for different lengths.

8.2.8. Battery protection in external wall box.

As an optional extra, battery protection can be ordered in an external wall box. This option is particularly useful when the customer already has the batteries and only requires the protection.

This option does not include wiring between the UPS and the protection box or between the box and the battery set. Consult your distributor for more information.

8.2.9. Special colour.

The devices can be supplied with the covers painted in any RAL colour, on request and with modification of the delivery time.

8.2.10. Back-feed protection.

This option avoids the risk of a voltage return upstream due to a failure in the bypass thyristors. This option is always external to the device and must be supplied with the BPME.

8.2.11. BPME (External Manual Bypass).

The purpose of this option is to electrically isolate the device from the input and output networks without the need to cut off the power supply, so that maintenance or repair operations can be carried out without interrupting the power supply to the protected system, while at the same time avoiding unnecessary risks to technical personnel.

The basic difference between this option and the manual bypass integrated into the device's own enclosure consists of greater operability, since it allows total disconnection of the UPS from the installation.

9. INSTALLATION.

Compliance with all safety instructions in the user manual sent with the device is mandatory and the user is legally responsible for ensuring that they are observed. Read them carefully and follow the steps indicated in the order established. Local electrical regulations and different restrictions in the customer's location may invalidate some recommendations contained in the manuals. Where discrepancies exist, the user must comply with the relevant local regulations.

10. MECHANICAL CHARACTERISTICS.

10.1. MATERIALS.

All of the materials used in the manufacture of the **ADAPT2** series are at the cutting edge of production technology, are of high quality and have not been previously used (i.e. they are completely new), except where their use is required in order to carry out verification of the device. All device components are solid-state.

10.2. CABINET.

The rectifier, charger, batteries, inverter, distributed bypass, maintenance bypass, control panel, etc. are located inside a compartmentalised cabinet made from steel plate.

The **ADAPT2** series is mounted in self-supporting cabinets that offer IP20 protection degree as per the UNE 60529 standard. They are painted with epoxy-type paint in RAL 9005.

The cabinet ventilation is forced to ensure that all the components of the UPS are within the appropriate temperature ranges. The device is equipped with temperature sensors to monitor the most important temperature parameters. The **ADAPT2** series cabinet is structurally designed to be able to be transported by forklift.

The following tables provide the dimensions for all of the most commonly used devices.

SYSTEMS	CODE	NR MODULES (#)	POWER MODULE (VA/W)	MAXIMUM POWER (VA/W)	DIMENSIONS (F x W x H mm)	WEIGHT (Kg)
SLC-#2 ADAPT2 30	694RA000221	1 to 2 x 10 kVA/1 to 2 x 15 kVA	10000 / 10000 to 15000 / 15000	30000 / 30000	612 x 485 x 309	57
SLC-#3 ADAPT2 45	694RA000222	1 to 4 x 10 kVA/1 to 3 x 15 kVA	10000 / 10000 to 15000 / 15000	45000 / 45000	612 x 485 x 485	66
SLC-#6 ADAPT2 90	694RA000223	1 to 6 x 10 kVA/1 to 6 x 15 kVA	10000 / 10000 to 15000 / 15000	90000 / 90000	751 x 485 x 1033	100
SLC-#8 ADAPT2 200	694RA000249	1 to 8	25000 / 25000	200000 / 200000	916 x 482 x 1550	178
SLC-#12 ADAPT2 300	694RA000250	1 to 12	25000 / 25000	300000 / 300000	1100 x 650 x 2000	230
SLC-#10 ADAPT2 500	694RA000251	1 to 10	50000 / 50000	500000 / 500000	1100 x 1300 x 2000	945
SLC-#12 ADAPT2 600	694OQ000125	1 to 12	50000 / 50000	600000 / 600000	1100 x 1300 x 2000	945

10.3. WIRING.

The internal wiring of the device complies with EC marking regulations. All electrical connections are tightened to the required torque and marked with a visual indicator.

The wiring is arranged in flexible single-pole copper cable hoses, with a tightened terminal at each end and an anti-shear and non-release system.

The cables enter the cabinet through the lower section of the cabinet's front. Optionally, they can enter through the upper section.

11. COMMUNICATION PROTOCOLS

The communication protocol included as standard on all **ADAPT2** models is private and used for serial communication with the device's programming and control software.

The MODBUS protocol can also be supplied by RS-485 or by Ethernet connection, which allows the communication of the UPS with other devices. You can request the MODBUS map from your distributor.

12. APPLICATIONS.

The ADAPT2 series can be configured in different ways, depending on the installation and safety requirements.

12.1. TIER I.

This type of configuration has no redundancy in the power modules.

All of the modules are installed in a single cabinet. There is just one input network, which is shared by the rectifier and the bypass.

12.2. TIER II.

This type of configuration has an N+1 redundancy in the power modules.

All of the modules are installed in a single cabinet. There is just one input network, which is shared by the rectifier and the bypass.

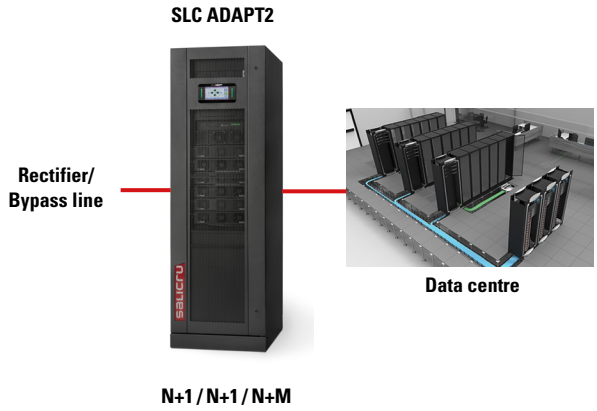


Fig. 15. Tier I / Tier II.

12.3. TIER III.

This type of configuration has an N+1 redundancy in the power modules.

All of the modules are installed in a single cabinet.

There is a separate line for the rectifier and another for the bypass.

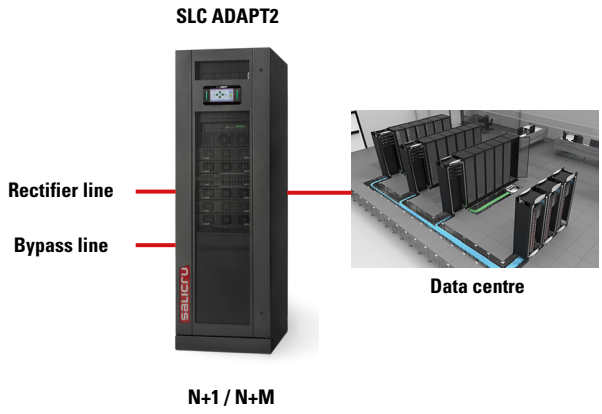


Fig. 16. Tier III.

12.4. TIER IV.

This configuration is formed of a minimum of two devices.

The configuration of the redundancy in the power modules of each device is N+1.

All of the modules are installed in separate cabinets.

There is a separate line for the rectifier and another for the bypass.

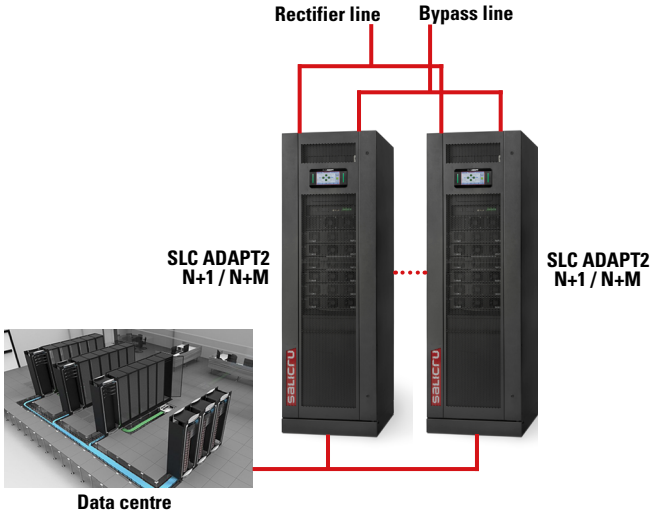


Fig. 17. Tier IV.

13. TECHNICAL SPECIFICATIONS.

13.1. TECHNICAL SPECIFICATIONS - RECTIFIER.

Parameter	Value
Type of network	3 phases + neutral + neutral earth shared with the bypass network
Rated voltages	380 / 400 / 415 VAC
Rated frequency	50/60 Hz
Input voltage range	-20% to +25% (10 kVA/15 kVA/50 kVA) at 100% load -40%[1] to +25% (10 kVA/15 kVA/50 kVA) at 75% load -20% to +25% (25 kVA) at 100% load -27%[2] to +25% (25 kVA) at 75% load
Input frequency range	45 to 65 Hz
Input power factor (PF)	>0.99%
Harmonic distortion (THDI)	<3% (with linear load)

Notes:
[1] Linear % load derating from -20% to -40%
[2] Linear % load derating from -20% to -27%

13.2. TECHNICAL SPECIFICATIONS - BATTERY CHARGER.

Parameter	Value
Rated voltage (charger)	±480 VDC
Battery voltage range	198 to 288 VDC
Equalising voltage	2.4 VDC (adjustable from 2.3 to 2.45 VDC/cell). Charge mode with constant voltage and current.
End of discharge voltage	1.65 VDC (adjustable from 1.6 to 1.75 VDC/cell) @ 0.6C discharge current. 1.75 VDC (adjustable from 1.65 to 1.8 VDC/cell) @ 0.15C discharge current.
Maximum charging current	Up to 20% of the active power of the module. (Can be set from 0 to 20% of capacity.)
Battery configuration	32/36/40 and 44 monoblocs of 12 VDC
Float voltage per cell	2.25 VDC (adjustable from 2.2 to 2.35 VDC/cell). Charge mode with constant voltage and current.
Temperature compensation	-3 mV/cell (adjustable from 0 to -5 mV).
Voltage ripple	≤1%
Power ripple	≤5%

13.3. TECHNICAL SPECIFICATIONS - INVERTER.

Parameter	Value
Type of network	3 phases + neutral + earth. (4 wires)
Rated voltages	380 / 400 / 415 VAC. (Adjustable.) 3 phases with neutral shared with the Bypass.
Rated frequency	50/60 Hz.
Total installed power	15-500 kVA
Number of modules installed	1-6
Module configuration	N – (N+n)
Overload	Up to 105% for 30 minutes. Up to 110% for 10 minutes. Up to 125% of the load for 1 minute. Up to 150% of the load for 30 seconds. >150% for 200 milliseconds
Maximum current limit	340% for 200 ms.
Operation with non-linear loads	100% of the load. (As per EN50091-3 (1.4.58 crest factor 3:1)
Neutral current	170% of nominal current.
Voltage accuracy	±1% (with balanced load) ±1.5% (with unbalanced load)
Transient phenomena response	±5%.
THDv	<1.5% (linear load) <5% (non-linear load)
Frequency synchronism range	±2 Hz (adjustable from ±1 to ±5 Hz)
Synchronous speed	1 Hz/s (adjustable from 0.5 to 5 Hz/s)
Output voltage range	±5%.

13.4. TECHNICAL SPECIFICATIONS - BYPASS.

Parameter	Value
Type of network	3 phases + neutral + neutral earth shared with the bypass network.
Rated voltages	380 / 400 / 415 VAC
Rated frequency	50/60 Hz
Overload	≤ 110%, permanent. ≤ 130% for 1 hour. ≤ 150% for 1 min. > 150%, for 5 s.
Neutral current	170% of nominal current
Switching time	≤1 ms.
Voltage tolerance range	+20% (adjustable to +10 / +15 / +20%) -20% (adjustable to -10 / -20 / -30%)
Frequency tolerance range	±10% (adjustable to ±2.5 / ±5 / ±10%)
Frequency synchronism range	±2 Hz (adjustable from ±1 to ±5 Hz)

13.5. SYSTEM PERFORMANCE SPECIFICATIONS.

Parameter	Value
Normal operation (double conversion)	95%
ECO mode operation	99%
Operation in battery mode (discharge)	95% Under circumstances of full load and with a linear load connected to the output.

13.6. GENERAL SYSTEM SPECIFICATIONS.

Parameter	Value
Operating temperature	0°C ÷ 40°C
Relative humidity	Up to 95% without condensation
Operating altitude	2,400 masl
Acoustic noise	<65 dB(A) / <72 dB(A) * depending on module
Redundancy	N+n
Module power	10, 15, 25 or 50 kVA
MTBF	250,000 h
MTTR	30 min.

REF. JN022F01 **REV.** F **CODE** 401*

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