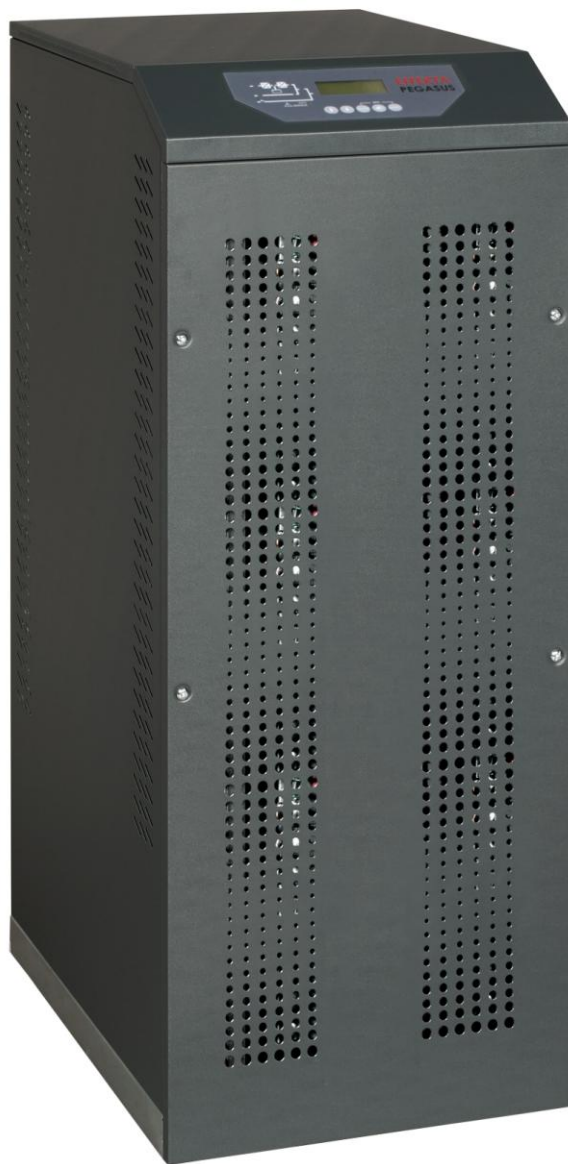


EFFEKTA®

OPERATING MANUAL UPS



PEGASUS II 10–20–30–40 kVA

Rev.A 05/15/2012

WARNING: This is a Class A-UPS Product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take additional measures.

OPERATING MANUAL UPS

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Thank you for choosing an EFFEKTA® product. This section of the manual contains indications regarding the symbols used in the UPS documentation as well as basic information about the product, including the factory warranty terms.

1 CONVENTIONS USED

The following symbols have been used to indicate potential dangers and to highlight useful information, so as to minimize the risks to persons and property.



HAZARD

“HAZARD” statements contain characteristics and basic instructions for the safety of persons. Non-compliance with such indications may cause serious injury or death.



WARNING

“WARNING” statements contain characteristics and basic instructions for the safety of persons. Non-compliance with such indications may cause injury.



CAUTION

“CAUTION” statements contain characteristics and important instructions for the safety of things. Non-compliance with such indications may cause damage to materials.



NOTE

“NOTE” statements contain characteristics and important instructions for the use of the device and for its optimal operation.

2 DOCUMENTATION NOTES



Storing documentation

This manual and any other supporting technical documentation relating to the product must be stored and made accessible to personnel in the immediate vicinity of the UPS.



Further information

In the event that the information provided in this manual is not sufficiently exhaustive, please contact the manufacturer of the device, whose details are available in the "Contacts" section.

3 CONTACTS

For any information about the UPS systems manufactured by EFFEKTA®, please contact:

EFFEKTA Regeltechnik GmbH

Rheinwaldstr. 34

78628 Rottweil

Germany

Tel. +49 (0) 741 17451 0

Fax +49 (0) 741 17451 22

www. effekta.com

info@effekta.com

For help with technical problems or for information concerning device use and maintenance, please contact the technical help service by phoning the above-indicated telephone number, specifying the following data:

- Type of device and its nominal power
- Serial number
- Error code, if applicable.

4 FACTORY WARRANTY

The factory warranty provided by EFFKTA® is called “Green Base Warranty” and is subject to the terms indicated below.

Validity

- a) The present warranty terms only apply to the UPS systems manufactured by EFFKTA® and to their storage batteries, when supplied by EFFKTA®.

Duration

- a) The factory warranty provided by EFFKTA® has a validity of 12 (twelve) months from the startup date of the UPS. The warranty expires at the latest 18 (eighteen) months from the purchasing date (invoicing).

General conditions

- b) The execution of one or more repairs within the warranty time will not alter the original expiry of the warranty.
- c) If a unit is faulty and/or damaged within the time frame covered by the warranty, it will be repaired or replaced with an equivalent or similar product.

Costs

- a) The warranty covers all the costs resulting from repairs and/or spares to restore the correct operation of the product covered by our factory warranty.
- b) All other costs, particularly shipping costs, travel and accommodation costs for the service personnel of EFFKTA® for on-site repairs, as well as costs for the customer's own employees, will not be covered by the factory warranty and will be charged to the end customer.
- c) In case of service performed following a call made by mistake, or in case our technicians incur extra time and/or costs due to the site inaccessibility or due to work interruptions required by the customer, such costs will be invoiced in accordance with ANIE rates CLASS III COLUMN B.

Modes required

- a) In the event of a fault covered by the warranty, the customer shall notify EFFKTA® in writing of the occurred fault, providing a short description of the fault.
- b) The customer shall also provide documents showing the validity of the warranty (receipt/purchasing invoice with serial number of the product – report indicating the start-up date).

Service at the installation site

- a) During preventive maintenance visits or emergency service, access shall be ensured to the installation site, and the device shall be made available in order to ensure maintenance or repair with no waiting time.
- b) During the intervention, the customer's representative must attend service operations at the installation site, so that he/she may operate the control devices outside the equipment.
- c) In case entry permits are necessary in order to enter the installation site, EFFKTA® must be notified of the time necessary to obtain the documentation required, if any.
- d) In case of customer's non-compliance, EFFKTA® reserves the right to refuse warranty service. EFFKTA® will not accept any product returned for repair or replacement without prior agreement.

Exclusions

- a) Our warranty does not cover the products which are faulty or damaged due to:
- Transport,
 - Installation or start-up defects caused by the customer's non-compliance with the installation and use instructions provided by EFFKTA®.
 - Tampering, alterations or repair attempts made without the specific written approval by EFFKTA®.
 - Damage caused by work done by personnel not authorized by EFFKTA®.
 - Damage to the device caused by improper use, negligence, voluntary damage or use of the device beyond the allowed limits;
 - Damage caused by external factors such as dirt, fire, flooding, failed operation of the air conditioning system, etc.;
 - Non-compliance with applicable safety standards;
 - Force majeure (e.g. lightning, surges, natural disasters, fire, acts of war, riots, etc.);
 - Fall or displacement due to incorrect installation;
 - Ordinary wear caused by proper and continuous use of the device.
- b) Protective devices inside the units (fuses and dischargers) are also excluded from the warranty, unless the failure is due to component faults.

Responsibility

- a) In no event shall EFFKTA® be liable for direct or indirect damage, or any damage whatsoever connected with the execution of warranty services (e.g. possible voltage interruptions during the repair period or assembly and dismantling costs), except for the cases provided for by mandatory laws.
- b) The present warranty terms do not affect the purchaser's mandatory rights as by law.

5 LIMITATION OF LIABILITY

All the information contained in the present documentation is the exclusive property of EFFKTA®. Written consent by EFFKTA® is required in order to wholly or partially publish or disclose this information.

- The present manual constitutes an integral part of the product technical support documentation. Read the warnings with attention, as they give important instructions concerning safe usage.
- The equipment must be destined exclusively for the use for which it was expressly designed. Any other use is considered improper and therefore hazardous. The manufacturer cannot be held responsible for possible damage arising from improper, erroneous or unreasonable usage.
- EFFKTA® assumes responsibility for the equipment in its original configuration.
- Any intervention that alters the structure or the operating cycle of the equipment must be carried out and authorized directly by EFFKTA®.
- EFFKTA® will not be held responsible for the consequences arising from the use of non-original spare parts.
- EFFKTA® reserves the right to make technical modifications to the present manual and to the equipment without prior warning. Whenever typographical or other errors are found, the corrections will be included in new versions of the manual.
- EFFKTA® assumes responsibility for the information given in the original version of the manual in Italian language.

INSTALLATION AND START-UP OF UPS PEGASUS II 10-40KVA

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1 SCOPE

The instructions contained in the operating manual are applicable to the whole production range of PEGASUS II UPS systems, as indicated below.

- PEGASUS II 10kVA 3/1
- PEGASUS II 15kVA 3/1
- PEGASUS II 20kVA 3/1
- PEGASUS II 10kVA 3/3
- PEGASUS II 15kVA 3/3
- PEGASUS II 20kVA 3/3
- PEGASUS II 30kVA 3/3
- PEGASUS II 40kVA 3/3



Storing documentation

This manual and any other supporting technical documentation relating to the product must be stored and made accessible to personnel in the immediate vicinity of the UPS.



Further information

In the event that the information provided in this manual is not sufficiently exhaustive, please contact the manufacturer of the device, whose details are available in the "Contacts" section.

2 SAFETY RULES AND WARNINGS

2.1 UPS USE

Congratulations on choosing a product from EFFEKTA® for the safety of your equipment. To obtain the best performance from your PEGASUS II UPS system (Uninterruptible Power Supply), we suggest that you take your time to read the following manual.

The purpose of this manual is to give a short description of the parts composing the UPS and to guide the installer or the user through the installation of the unit in its using environment.

The installer or the user must read and correctly perform the instructions included in the present manual, with particular reference to the requirements regarding safety, in compliance with the current regulations.



Read the technical documentation

Before installing and using the device, make sure you have read and understood all the instructions contained in the present manual and in the technical supporting documentation.

2.2 PEGASUS II RATING

UPS PEGASUS II is provided with an identification plate containing the operation ratings. The plate is fixed outside, on the rear of UPS.

UPS		15kVA 3Φ+N	
RETE 1 - MAINS 1 - NETZ 1		3Φ+N	
Uin (Vac)		400	-20/+15%**
Iin (A)		19*	
Frequenza - Frequency - Frequenz		50÷60Hz	+/-5%
RETE 2 - MAINS 2 - NETZ 2		\	
Uin (Vac)			+/-10%**
Iin (A)		26**	
Frequenza - Frequency - Frequenz		\	
USCITA - OUTPUT - AUSGANG		3Φ+N	
Uout (Vac)		380-400-415	
Iout (A)		17**	
Frequenza - Frequency - Frequenz		50÷60Hz	
Potenza - Power rating - Leistung		15kVA 3Φ+N	12kW
(* : nominal value without overload @ 400V)		(** : @400V)	
Articolo - Code - Code		ASD95_20	
N° Serie - Serial number - Seriennummer		EI5M22002	
			
Numero unità-Unit number-Stück :		1/1	
		275	kg
	Made in EU	According to ISO9001:2008 ISO14001	

Picture 1 – Rating plate of PEGASUS II



Check the technical characteristics

Before carrying out any installation or start-up operation on the UPS, make sure its technical characteristics are compatible with the AC supply line and with the output loads.

2.3 SPECIAL SAFETY WARNINGS

2.3.1 General warnings

UPS PEGASUS II is provided with various stickers with indications regarding specific dangers. These stickers must be always well visible and replaced in case they are damaged.

The present documentation must be always available in proximity to the device. In case of loss we recommend to request a copy to the manufacturer, whose details are available in the "Contacts" section.

2.3.2 Personnel

Any operation on UPS PEGASUS II must be carried out by qualified personnel.

By qualified and trained person we mean someone skilled in assembling, installing, starting up and checking the correct operation of the product, who is qualified to perform his/her job and has entirely read and understood this manual, especially the part regarding safety. Such training and qualification shall be considered as such, only when certified by the manufacturer.

2.3.3 Transport and handling

Avoid bending or deforming the components and altering the insulation distances while transporting and handling the product.



Undistributed weight

The weight of the UPS is not uniformly distributed. Pay attention when lifting.

Please inspect the device before installing it. In case any damage is noticed from the conditions of the package and/or from the outside appearance of the equipment, contact the shipping company or your dealer immediately. The damage statement must be made within 6 days from receipt of the product and must be notified to the shipping carrier directly. Should the product need to be returned to the manufacturer, please use the original package.



Injury hazard due to mechanical damage

Mechanical damage to the electrical components constitutes a serious danger to persons and property. In case of doubt regarding the non-integrity of the package or of the product contained therein, contact the manufacturer before carrying out the installation and/or the start-up.

2.3.4 Installation

The product must be installed in strict compliance with the instructions contained in the technical back-up documentation, including the present safety instructions. In particular, the following points must be taken into account:

- The product must be placed on a base suitable to carry its weight and to ensure its vertical position;
- The UPS must be installed in a room with restricted access, according to standard IEC EN62040-1-2;
- Never install the equipment near liquids or in an excessively damp environment;
- Never let a liquid or foreign body penetrate inside the device;
- Never block the ventilation grates;
- Never expose the device to direct sunlight or place it near a source of heat.



Special environmental conditions

UPS PEGASUS II is designed for normal climatic and environmental operating conditions as defined in the technical specification: altitude, ambient operating temperature, relative humidity and environmental transport and storage conditions. It is necessary to implement specific protective measures in case of unusual conditions:

- harmful smoke, dust, abrasive dust;
- humidity, vapour, salt air, bad weather or dripping;
- explosive dust and gas mixture;
- extreme temperature variations;
- bad ventilation;
- conductive or radiant heat from other sources;
- strong electromagnetic fields;
- radioactive levels higher than those of the natural environment;
- fungus, insects, vermin.



Use authorized personnel only

All transport, installation and start-up operations must be carried out by qualified and trained personnel.

The installation of UPS PEGASUS II must be carried out by authorized personnel, in compliance with national and local regulations.

**Do not modify the device**

Do not modify the device in any way: this may result in damage to the equipment itself as well as to objects and persons. Maintenance and repair must be carried out by authorized personnel only. Contact the manufacturer for details of the nearest service centre.

2.3.5 Electrical connection

The UPS connection to the AC power must be carried out in compliance with the current regulations.

Make sure the indications specified on the identification plate correspond to the AC power system and to the actual electrical consumption of all of the equipment connected.

**Check the conformity of the documentation**

The UPS must be installed according to the requirements of HD 384.4.42 S1/A2 and in compliance with standard IEC 60364-4-482 – Chapter 482: protection against fire.

Before connecting the unit to the distribution network, make sure you have received the approval of the electrical power distribution Authority, so as provided for by the current national regulations.

All the electrical connections must be carried out by authorized personnel. Before connecting the device make sure that:

- the connection cable to the AC line is properly protected;
- the nominal voltages, the frequency and the phase rotation of the AC supply are respected;
- the polarities of the DC cables coming from the battery have been checked;
- no leakage current to earth is present.

The device is connected to the following voltage supplies:

- DC battery voltage;
- AC mains voltage;
- AC bypass voltage.

**Injury hazard due to electric shock!**

The device is subject to high voltages, thus all safety instructions must be scrupulously adhered to before performing any operation on UPS PEGASUS II:

- Isolate the battery via DC circuit breakers before connecting it to the UPS;
- Connect the ground cable to the relevant bar before carrying out any other connection inside the device.

**Injury hazard due to electric shock!**

If primary power isolators are installed in an area other than the UPS one, you must stick the following warning label on the UPS. "ISOLATE THE UNINTERRUPTIBLE POWER SUPPLY (UPS) BEFORE WORKING ON THIS CIRCUIT"

2.3.6 Operation

The installations to which the UPS systems belong must comply with all the current safety standards (technical equipment and accident-prevention regulations). The device can be started, operated and disconnected only by authorized personnel.

The settings can only be changed using the original interface software.

**Injury hazard due to electric shock!**

During operation, UPS PEGASUS II converts power characterized by high voltages and currents.

- All the doors and the covers must remain closed.

**Injury hazard due to contact with toxic substances**

The battery supplied with the UPS contains small amounts of toxic materials. To avoid accidents, the directives listed below must be observed:

- Never operate the UPS if the ambient temperature and relative humidity are higher than the levels specified in the technical documentation.
- Never burn the battery (risk of explosion).
- Do not attempt to open the battery (the electrolyte is dangerous for the eyes and skin).

Comply with all applicable regulations for the disposal of the battery.

2.3.7 Maintenance

Service and repairs must be carried out by skilled and authorized personnel. Before carrying out any maintenance operation, UPS PEGASUS II must be disconnected from AC and DC supply sources.

The device is provided with internal isolators which allow to isolate the internal power circuits. However the voltages of the supply sources are present on the terminals. To isolate the device completely, provide external circuit breakers on the lines.

The device contains dangerous voltages even after shutdown and disconnection from the supply sources, due to the internal capacitors which discharge slowly. Thus we recommend to wait at least 5 minutes before opening the device doors.



Injury hazard due to electric shock!

Any operation must be carried out only when voltage is absent and in compliance with safety directives.

- Make sure the battery circuit breaker that may be placed near the battery has been opened.
- Isolate the device completely by operating the external circuit breakers.
- Wait at least 5 minutes in order to allow the capacitors to discharge.

After switching off and disconnecting the device there still might be very hot components (magnetic parts, heat sinks); therefore we recommend to use protective gloves.



High temperature of components

It is strongly recommended to use protective gloves due to the high temperatures that may be reached during the operation.

2.3.8 Storage

If the product is stored prior to installation, it should remain stored in its original package in a dry place with a temperature ranging from -10°C to +45°C.



Special environmental conditions

It is necessary to implement specific protective measures in case of unusual environmental conditions:

- harmful smoke, dust, abrasive dust;
 - humidity, vapour, salt air, bad weather or dripping;
 - explosive dust and gas mixture;
 - extreme temperature variations;
 - bad ventilation;
 - conductive or radiant heat from other sources;
 - fungus, insects, vermin.
-

2.4 ENVIRONMENTAL PROTECTION

2.4.1 Recycling of packing materials

Packing materials must be recycled or disposed of in compliance with applicable local and national laws and regulations.

2.4.2 Device disposal

At the end of their product life, the materials composing the device must be recycled or disposed of in compliance with the current local and national laws and regulations.

3 INSTALLATION

3.1 RECEIPT OF THE UPS

Please inspect the device before installing it. In case any damage is noticed from the conditions of the package and/or from the outside appearance of the equipment, contact the shipping company or your dealer immediately. The damage statement must be made within 6 days from receipt of the product and must be notified to the shipping carrier directly. Should the product need to be returned to the manufacturer, please use the original package.



Danger to persons due to transport damages

Mechanical damage to the electrical components constitutes a serious danger to persons and property. In case of doubt regarding the non-integrity of the package or of the product contained therein, contact the manufacturer before carrying out the installation and/or the start-up.

3.1.1 Storage

The package normally ensures protection from humidity and possible damages during transport. Do not store the UPS outdoor.



Risk of damage due to inappropriate storage

- For the environmental storage conditions, refer to the indications given for the installation of the device.
 - The device must only be stored in rooms protected from dust and humidity.
 - The device cannot be stored outdoor.
-

3.2 HANDLING OF THE UPS

The UPS is packed on a pallet. It is handled from the transport vehicle to the installation (or storage) place via a fork lift.



The device has a heavy weight

- Avoid turnover during the transport of the UPS.
 - Cabinets must always be handled in upright position.
 - During loading and unloading operations, always respect the indications regarding the device barycentre marked on the package.
-

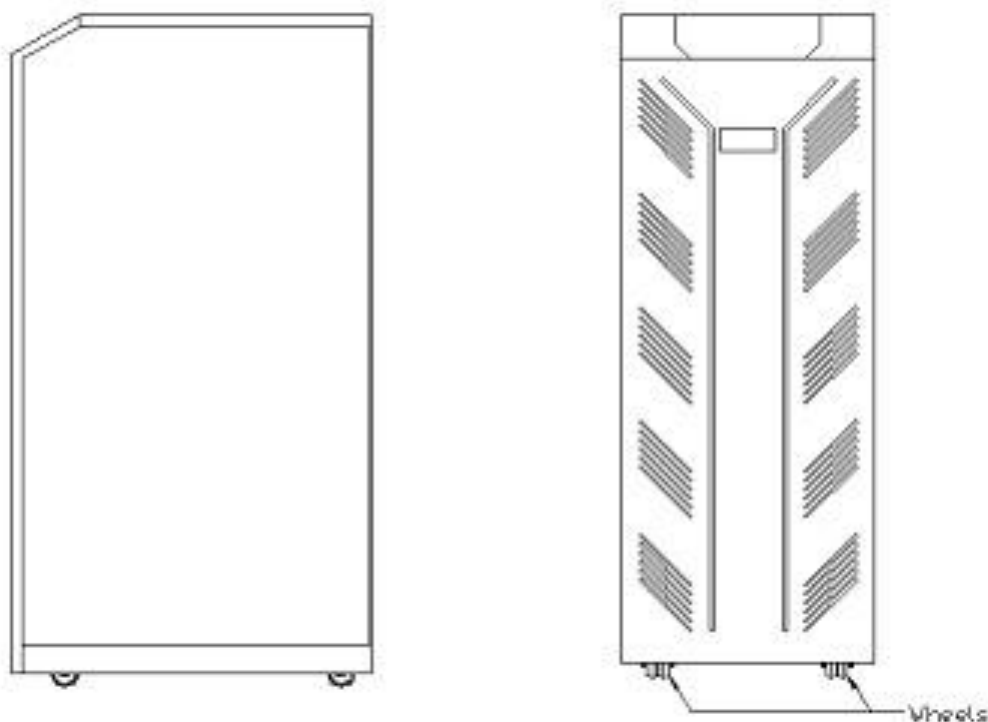
Before positioning the UPS, in order to avoid risks of turnover, it's recommended to move the system on the wood pallet on which the UPS is fixed.

Before the positioning in the final location, remove the UPS from the pallet.



Handling of the UPS

The UPS PEGASUS II can be handled by means of the four wheels fixed on the bottom.



Picture 2 – Handling of UPS PEGASUS II

3.3 POSITIONING AND INSTALLATION

UPS PEGASUS II must be installed indoor, in a clean and dry room, preferably without dust or humidity infiltrations. For the environmental conditions in the place of installation, in compliance with the current legislation, please refer to the “Overall dimensions, minimum distances from the walls and ventilation” section.

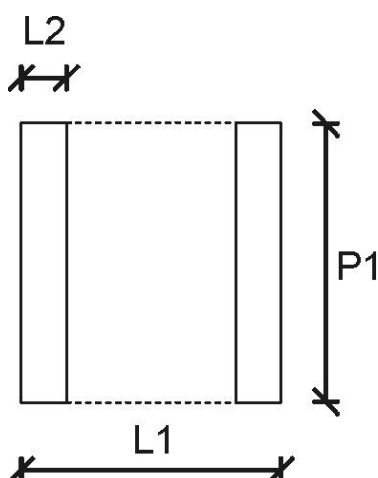


Special environmental conditions

It is necessary to implement specific protective measures in case of unusual environmental conditions:

- harmful smoke, dust, abrasive dust;
 - humidity, vapour, salt air, bad weather or dripping;
 - explosive dust and gas mixture;
 - extreme temperature variations;
 - bad ventilation;
 - conductive or radiant heat from other sources;
 - fungus, insects, vermin.
-

3.3.1 Base plan, static load and weights



Picture 3 – Base plan

Power (kVA)	10	15	20	30	40
	3/1 / 3/3				
L1 (mm)	450				
P1 (mm)	640				
L2(mm)	-				

The supporting base of the UPS must be designed to carry the UPS weight and to ensure its steady and safe support.

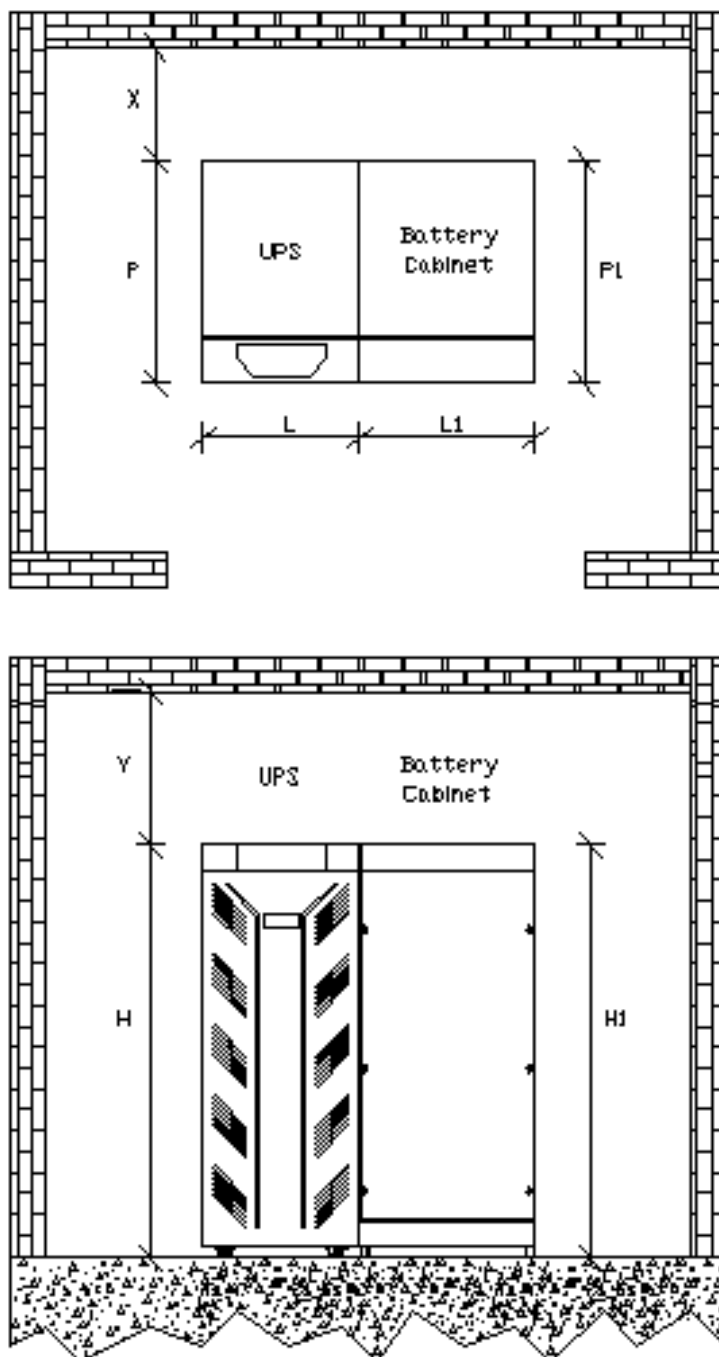
Its carrying capacity must be adequate to the static loads indicated in the table below.

Power (kVA)	10	15	20	30	40
	3/1 / 3/3			3/3	
Weight without battery (kg)	100	110		140	
Weight with battery (Max) (kg)	285	275		-	
Static load without battery (kg/m ²)	347	381		486	
Static load with battery (Max) (kg/m ²)	989	954		-	

3.3.2 Overall dimensions, minimum distances from the walls and ventilation

The UPS must be so installed as to ensure its serviceability and to allow a correct air flow as much as possible.

With regard to the minimum distances from the walls, for all of the UPS sizes the same installation conditions apply as indicated in the table below.



Picture 4 – Minimum distances from the walls

Power (kVA)	10	15	20	30	40
	3/1 / 3/3			3/3	
L - mm	450				
P - mm	670				
H - mm	1200				
X (min.) - mm	50			100	
Y (min.) - mm	500				
ADD. CABINET	COD. AS553				
L1 - mm	503				
P1 - mm	647				
H1 - mm	1200				

The table below shows the air volume required for an optimal ventilation and cooling of the UPS.

Power (kVA)	10	15	20	30	40
	3/1 / 3/3			3/3	
Air volume (m ³ /h)	500		600	800	900

3.3.3 Environmental installation conditions

The air is classified by the EN 60721-3-3 standard (Classification of environmental parameters and their severities – Stationary use at weather-protected locations) based on climatic and biological conditions as well as on mechanically and chemically active substances.

Therefore the place of installation must meet specific requirements to ensure compliance with the conditions for which the UPS was designed.

➤ Climatic conditions according to the technical specification of PEGASUS II

Environmental parameter	
Minimum operating temperature (°C)	– 10
Maximum operating temperature (°C)	+ 40
Minimum relative humidity (%)	5
Maximum relative humidity (%)	95
Condensation	NO
Rainfall with wind (rain, snow, hail, etc.)	NO
Water with an origin other than rain	NO
Ice formation	NO

➤ Classification of biological conditions (EN 60721-3-3)

Environmental parameter	Class		
	3B1	3B2	3B3
a) Flora	NO	Presence of mildew, fungus, etc.	Presence of mildew, fungus, etc.
b) Fauna	NO	Presence of rodents and other animals that are harmful to products, excluding termites	Presence of rodents and other animals that are harmful to products, including termites

➤ Classification of mechanically active substances (EN 60721-3-3)

Environmental parameter	Class			
	3S1	3S2	3S3	3S4
a) Sand [mg/m ³]	No	30	300	3000
b) Dust (suspension) [mg/m ³]	0,01	0,2	0,4	4,0
c) Dust (sedimentation) [mg/(m ² ·h)]	0,4	1,5	15	40
Places where precautions have been taken to minimize the presence of dust. Places away from dust sources	X			
Places without any special precaution to minimize the presence of sand or dust, however not in proximity to sand or dust sources		X		
Places in proximity to sand or dust sources			X	
Places in proximity to working processes that generate sand or dust, or in geographic areas having a high proportion of sand brought by the wind or of dust suspended in the air				X

➤ **Classification of chemically active substances (EN 60721-3-3)**

Environmental parameter	Class					
	3C1R	3C1L	3C1	3C2	3C3	3C4
a) Sea salt	No	No	No	Salt fog	Salt fog	Salt fog
b) Sulphur dioxide [mg/m ³]	0,01	0,1	0,1	1,0	10	40
c) Hydrogen sulphide [mg/m ³]	0,0015	0,01	0,01	0,5	10	70
d) Chlorine [mg/m ³]	0,001	0,01	0,1	0,3	1,0	3,0
e) Hydrochloric acid [mg/m ³]	0,001	0,01	0,1	0,5	5,0	5,0
f) Hydrofluoric acid [mg/m ³]	0,001	0,003	0,003	0,03	2,0	2,0
g) Ammonia [mg/m ³]	0,03	0,3	0,3	3,0	35	175
h) Ozone [mg/m ³]	0,004	0,01	0,01	0,1	0,3	2,0
i) Nitric oxide (expressed in equivalent values of nitrogen dioxide) [mg/m ³]	0,01	0,1	0,1	1,0	9,0	20
Places where atmosphere is strictly monitored and regulated ("clean spaces" category)	X					
Places where atmosphere is permanently monitored		X				
Places located in rural and urban regions where industrial activities are few and where traffic is moderate			X			
Places located in urban regions with industrial activities and/or considerable traffic				X		
Places in proximity to industrial sources with chemical emissions					X	
Places located in industrial installations. Emissions of highly concentrated chemical pollutants						X

UPS PEGASUS II is designed to be installed in an environment that meets the following classifications.

K	Climatic conditions	In accordance with the technical specification
B	Biological conditions	3B1 (EN 60721-3-3)
C	Chemically active substances	3C2 (EN 60721-3-3)
S	Mechanically active substances	3S2 (EN 60721-3-3)

In the event that the environmental conditions of the installation room do not comply with the specified requirements, additional precautions must be taken to reduce excessive values to the specified limits.

4 ELECTRICAL CONNECTION

The electrical connection is part of the work which is normally provided by the company that carries out the product installation. For this reason, the UPS manufacturer shall not be held responsible for any damages due to wrong connections.



Use qualified personnel only

All the operations related to the electric connection must be carried out by qualified and trained personnel.



Work in compliance with the local standards

The installation of UPS PEGASUS II must be carried out in compliance with national and local regulations.



Connection of ground cable

The grounding of the UPS via the relevant terminal is mandatory. It is strongly recommended to connect the ground terminal as first terminal.

The electrical connection is part of the work which is normally provided by the company that carries out the electrical installation and not by the UPS manufacturer. For this reason, the following recommendations are only an indication, as the UPS manufacturer is not responsible for the electrical installation. In any case we recommend to carry out the installation and the electrical input and output connections in compliance with the local standards.

Cables must be selected bearing in mind technical, financial and safety aspects. The selection and the sizing of cables from a technical viewpoint depend on the voltage, on the current absorbed by the UPS, on the bypass line and on the batteries, on the ambient temperature and on the voltage drop. Finally, the kind of cable laying must be taken into particular consideration.

For more explanations regarding the selection and the sizing of cables, please refer to the relevant IEC standards, in particular to IEC 64-8 standard.

“Short-circuit currents” (very high currents with a short duration) and “overload currents” (relatively high currents with a long duration) are among the main causes of cable damage. The protection systems normally used to protect the cables are: thermal magnetic circuit breakers or fuses. Protection circuit breakers must be selected according to the maximum short-circuit current (max I_{sc}) that is needed to determine the breaking power of automatic circuit breakers, and to the minimum current (min I_{sc}) that is needed to determine the maximum length of the line protected. The protection against short-circuit must operate on the line before any thermal and electrothermal effects of the overcurrents may damage the cable and relevant connections.

During the electrical installation take particular care to respect the phase rotation.

- UPS up to 20 kVA

The terminal boards are placed on the rear of the UPS, under the breakers. To access the terminals remove the protection, removing the fixing bolts.

- UPS 30-40 kVA

The terminal boards are placed on the front of the UPS. To access the terminals remove the front panel, removing the fixing bolts.



Mains connection

The connection to the mains must be carried out with protection fuses between the mains and the UPS.

The use of differential protection devices in the line supplying the UPS is inadvisable. The leakage current to ground due to the RFI filters is rather high and it can cause spurious tripping of the protection device.

According to IEC EN62040-1 standard, in order to take into account the UPS' leakage current, residual current devices having adjustable threshold can be used.


Mains connection

Include an appropriate and readily accessible disconnect device in the fixing wire connecting the UPS to the mains.

To protect the output against electrical shock, use the following residual current devices:

PEGASUS II 3/3: DEVICE AS TYPE B (IEC/TR 60755/A2)

PEGASUS II 3/1: DEVICE AS TYPE A (IEC 61081-1 or IEC 61091-1)

Electrical connection data

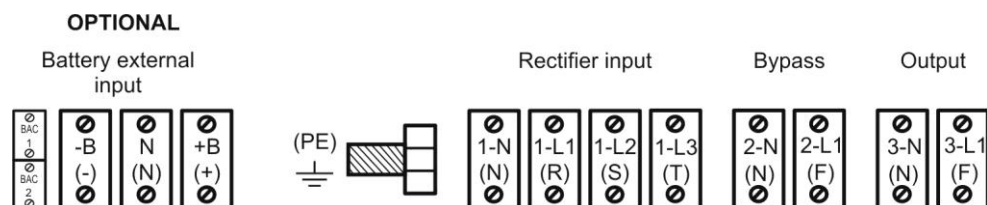
Power (kVA)		10	15	20
		3/1		
Input Fuses (A)	Rectifier	3x25	3x32	3x32
	Bypass	1x80	1x110	1x150
Input cables (mm ²)	Rectifier	3x6	3x10	3x10
	Bypass	2x16	2x25	2x35
Output cables (mm ²)		2x16	2x25	2x35
Battery cables (mm ²)		3x6	3x6	3x6

Electrical connection data

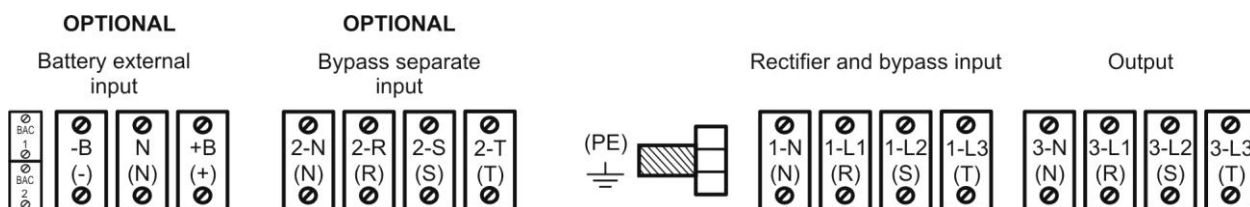
Potenza (kVA)		10	15	20	30	40
		3/3				
Input Fuses (A)	Rectifier	3x25	3x32	3x32	3x70	3x70
	Bypass	-	-	-	-	-
Input cables (mm ²)	Rectifier	4x6	4x6	4x10	4x25	4x25
	Bypass	-	-	-	-	-
Output cables (mm ²)		4x6	4x6	4x10	4x25	4x25
Battery cables (mm ²)		3x6	3x6	3x6	3x16	3x16

4.1 TERMINAL BOARDS

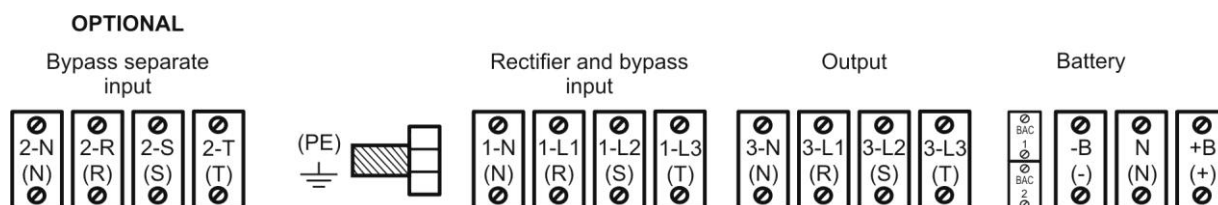
UPS PEGASUS II is provided with terminal boards for the connection of power cables and of auxiliary connections.



Picture 5 – Terminal board PEGASUS II 3/1 10-15-20kVA



Picture 6 – Terminal board PEGASUS II 3/3 10-15-20kVA



Picture 7 – Terminal board PEGASUS II 3/3 30-40kVA

4.2 CONNECTION OF POWER CABLES

For the electric connection of UPS PEGASUS II, connect the following cables:

- DC supply from the battery;
- AC supply from the rectifier and bypass supply mains;
- AC output to the loads.



Injury hazard due to electric shock!

Very high voltages are present at the ends of the cables coming from the battery:

- Isolate the battery via DC circuit breakers before connecting it to the UPS;
 - Connect the ground cable to the relevant bar before carrying out any other connection inside the device.
-



Risk of damages to the device due to insufficient insulation

- The cables must be protected from short-circuits and leakage currents to earth;
 - The connection points must be hermetically sealed to prevent the air from being sucked through the cable passage.
-



Risk of damages to the device due to incorrect wiring

To connect the device, follow the electrical drawing scrupulously and respect the polarity of cables.

4.3 BATTERY



Batteries installation

For battery installation please respect the prescriptions of the EN62040-1 standard, paragraph 4.5.

To obtain the battery life indicated by the battery manufacturer, the operating temperature must remain between 0 and 25 °C. However, although the battery can operate up to 40 °C, there will be a significant reduction of the battery life.

To avoid the formation of any kind of potentially explosive hydrogen and oxygen mixture, suitable ventilation must be provided where the battery are installed (see EN62040-1 annex N).

The batteries can be internal or external, however, it is recommended to install them when the UPS is capable of charging them. Please remember that, if the battery is not charged for periods over 2-3 months they can be subject to irreparable damage.



Internal batteries

The PEGASUS II 3/1 and 3/3 from 10 kVA to 20 kVA, have internal batteries.

Servicing of batteries should performed by qualified personnel only.

Replace the batteries with the same number of block and capacity.

Replace only with original type.

CAUTION: do not dispose of batteries in fire. The battery may explode.

CAUTION: do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.

CAUTION: do not dump the exhausted batteries in the environment.

4.3.1 Battery connection and positioning

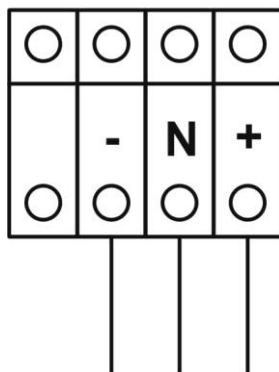


Battery voltage

After the battery installation, **before closing BCB**, check the battery voltage on the BCB circuit breaker.

In case of not directly supplied cabling, please connect the cables to the battery breaker (BCB) as shown in the below picture.

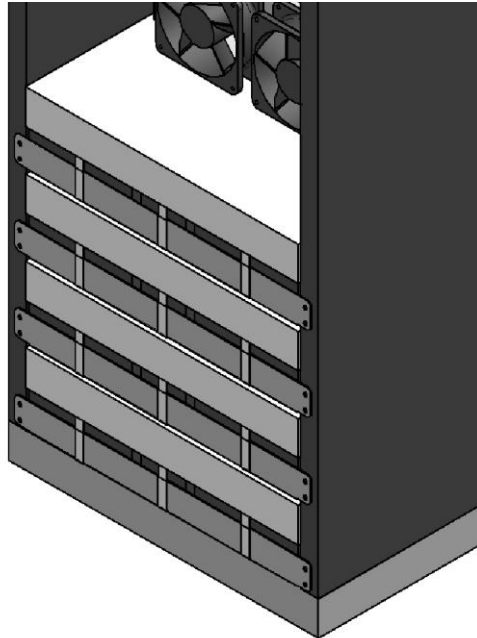
BCB fuseholder



Picture 8 –Cabling of BCB fuse holder

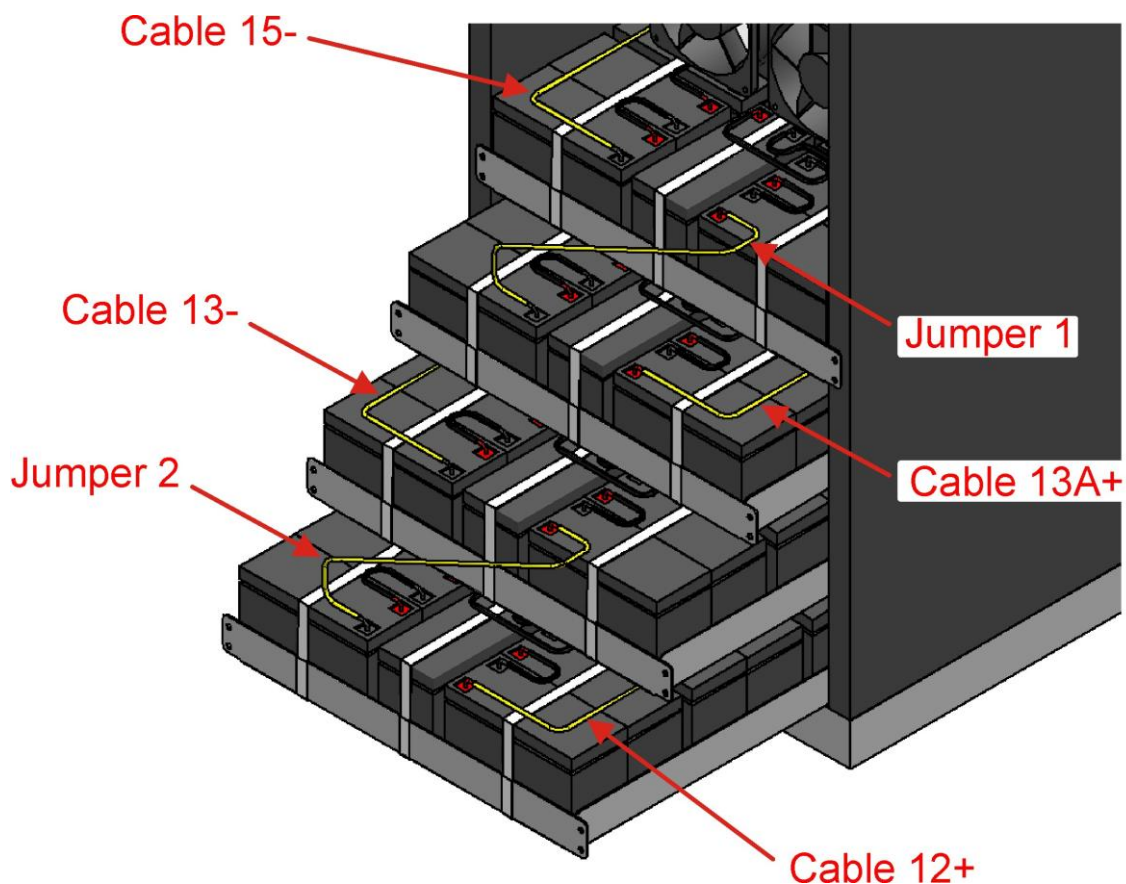
4.3.1.1 3,3Ah 12V battery connection and positioning – PEGASUS II 10kVA

- 1) Remove the four screws to open the front cover and access the battery trays.
- 2) Remove the cardboard cover protection from the batteries, see picture 9.



Picture 9 – Cardboard 3,3Ah battery protection

- 3) Connect the wires as shown on the picture 10.



Picture 10 – 3,3Ah battery connection



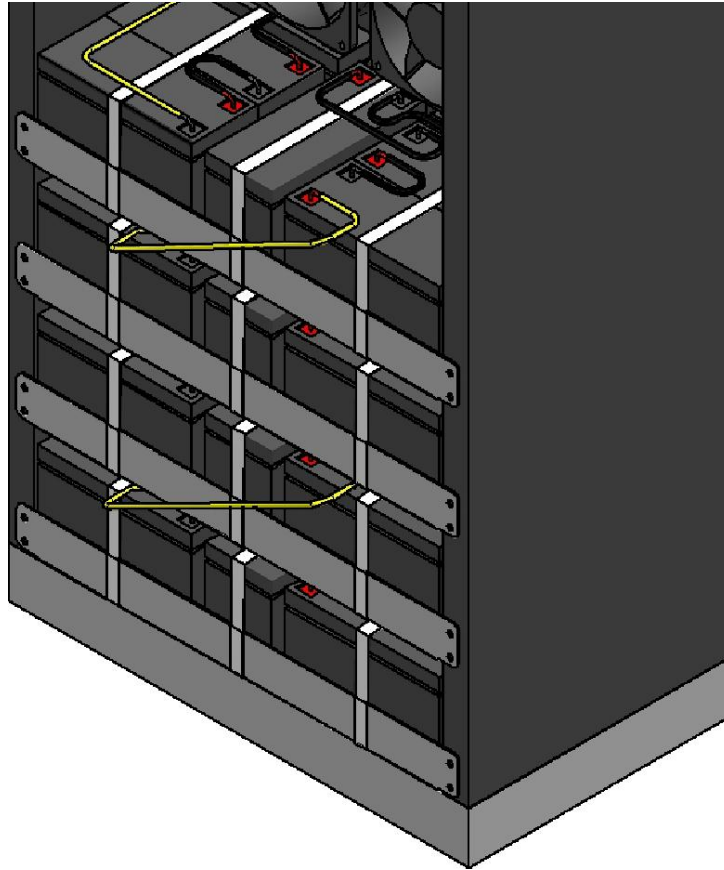
Colour cables

The cable terminations, for the connection to the battery trays, are marked with BLACK PVC-sleeve for the connection to the negative pole and with RED PVC-sleeve for the connection to the positive pole.

The termination of the cable **13-** will be marked with BLACK PVC-sleeve and that of the cable **13A+** with RED pvc-sleeve.

The termination of the cable **15-** will be marked with BLACK PVC-sleeve and that of the cable **12+** with RED pvc-sleeve.

After the connection re-insert the battery trays as shown in pictures 11.

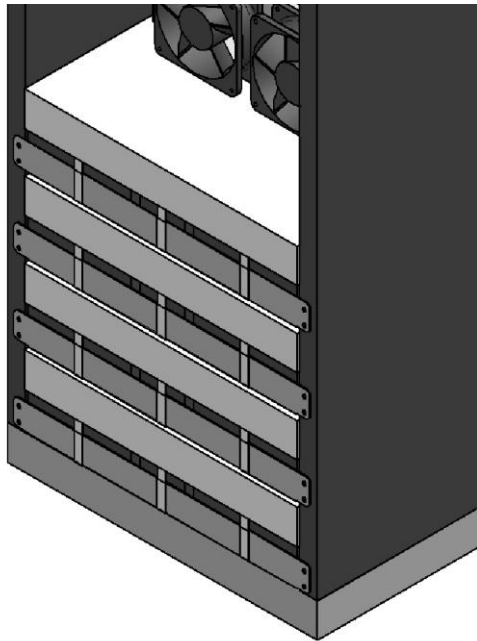


Picture 11 – 3,3Ah battery connected

Put back and fix the front cover with the four screws.

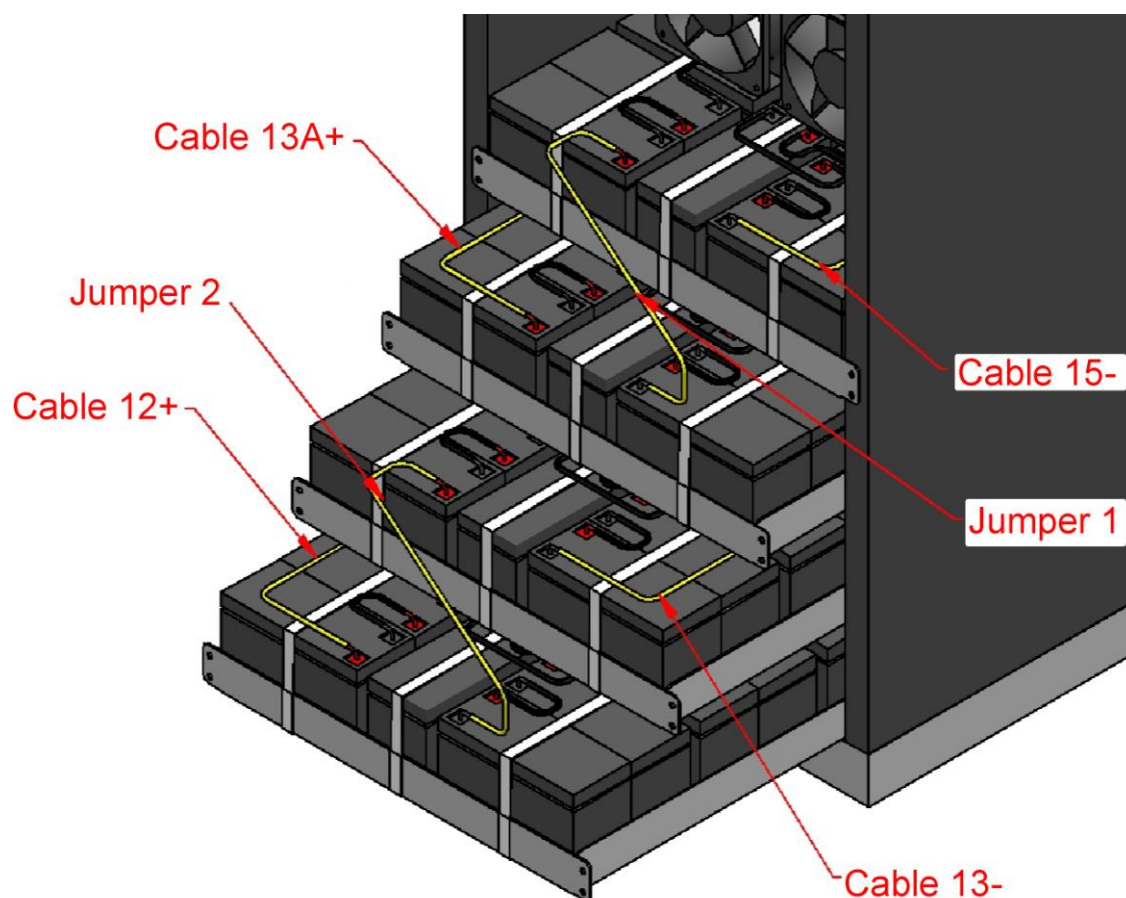
4.3.1.2 7Ah / 9Ah 12V battery connection and positioning– PEGASUS II 10-15-20kVA

- 1) Remove the four screws to open the front cover and access the battery trays.
- 2) Remove the cardboard cover protection from the batteries, see picture 12.



Picture 12 – Cardboard 7Ah/9Ah battery protection

- 3) Connect the wires as shown on the picture 13.



Picture 13 – 7Ah/9Ah battery connection



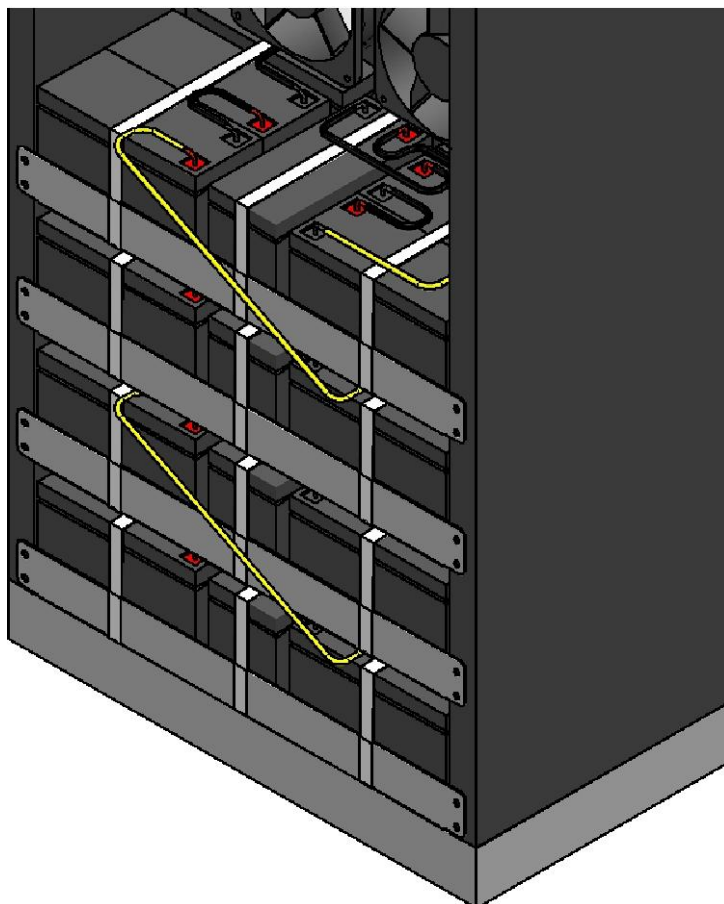
Colour cables

The cable terminations, for the connection to the battery trays, are marked with BLACK PVC-sleeve for the connection to the negative pole and with RED PVC-sleeve for the connection to the positive pole.

The termination of the cable **13-** will be marked with BLACK PVC-sleeve and that of the cable **13A+** with RED pvc-sleeve.

The termination of the cable **15-** will be marked with BLACK PVC-sleeve and that of the cable **12+** with RED pvc-sleeve.

After the connection re-insert the battery trays as shown in picture 14.

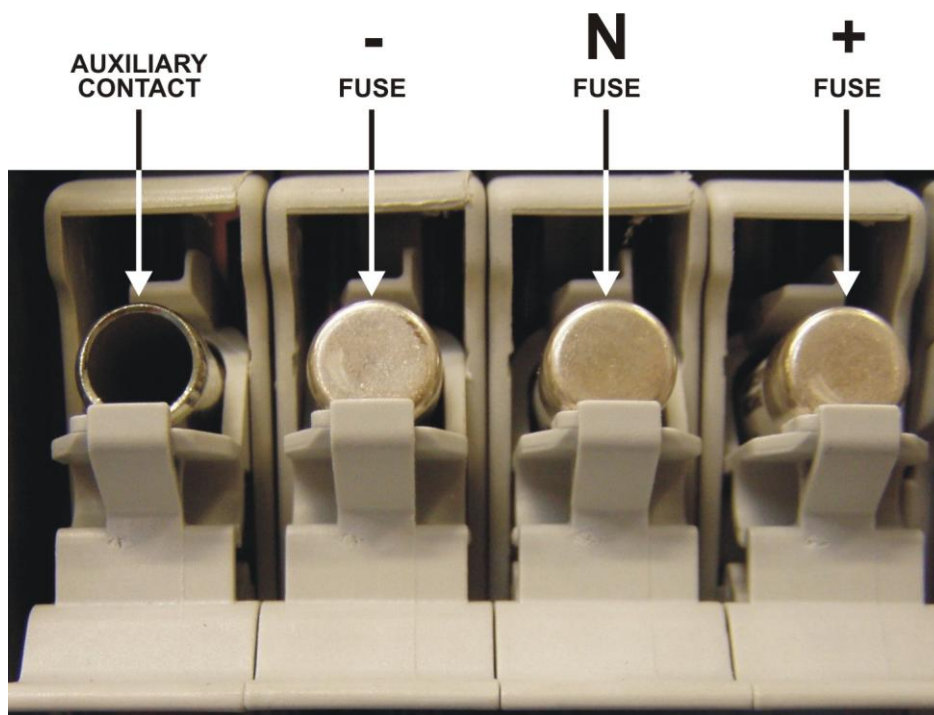


Picture 14 – 7Ah/9Ah battery connected

Put back and fix the front cover with the four screws.

4.4 FUSES POSITIONING BCB – PEGASUS II 10-15-20KVA

After that the battery is correctly connected, insert the fuses and the auxiliary contact on the fuseholder (BCB), as shown in the picture 15.



Picture 15 – Fuses positioning on the fuseholder BCB



Battery voltage

After the battery installation, **before closing BCB**, check the battery voltage on the BCB circuit breaker.

In case of not directly supplied cabling, please connect the cables to the battery breaker (BCB) as shown in the below picture.

4.5 AS553 EXTERNAL BATTERY

The battery cabinet can be used to increase the autonomy of the UPS "PEGASUS II 10-15-20kVA" line for which the battery is installed internally on the standard configuration.



Internal battery

With the external battery the internal battery is never present.

The battery cabinet is necessary for the UPS 30-40kVA.

The battery cabinet is composed of one string of 60 monoblocks 30+30 or is composed of two strings in parallel, each composed of 60 monoblocks 30+30.

Each monoblock is composed of 6 cells.

The size of the monoblocks can be 7Ah, 9Ah or 12Ah.

- AS553 for 7Ah, 9Ah and 12Ah battery blocks.

The battery circuit breaker and the battery fuses are installed inside the external battery cabinet, see picture 21.

Concerning the installation of the external battery cabinet, refer to the details given in paragraph 4.3.



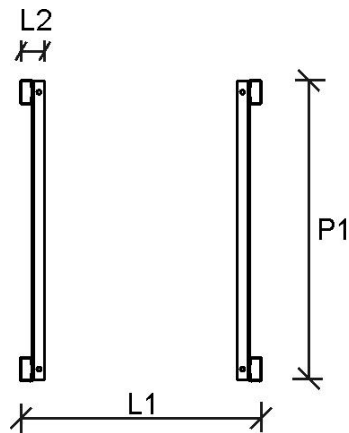
Cabinet balanced

In order to maintain the cabinet balanced, extract only one tray at a time.

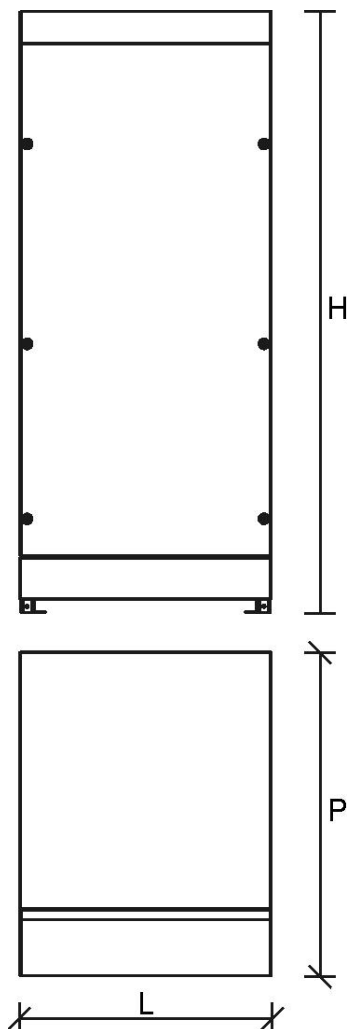
Before accessing the fuses, removing the protection, make sure that no voltage is present.

4.5.1 Dimensions and weights

The dimensions and weights of the external battery cabinet are indicates here under.



Picture 16 – Base plan of the external battery cabinet



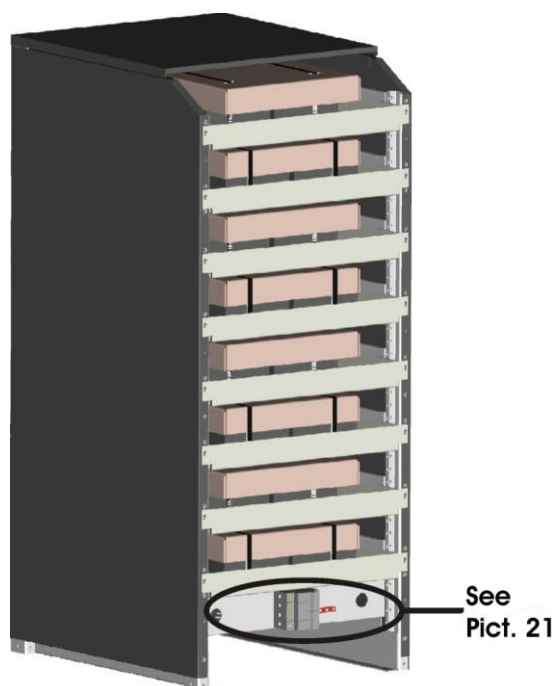
Picture 17 – Dimensions of the external battery cabinet

Cabinet	AS553
L (mm)	503
P (mm)	647
H (mm)	1200
L1 (mm)	500
P1 (mm)	625
L2 (mm)	50

Cabinet AS553	120 x 7Ah	120 x 9Ah	120 x 12Ah	60 x 12Ah
Weight without battery (kg)	120	120	120	120
Weight with battery (kg)	408	459	645	385
Static load with battery (kg/m ²)	1255	1412	1984	1184

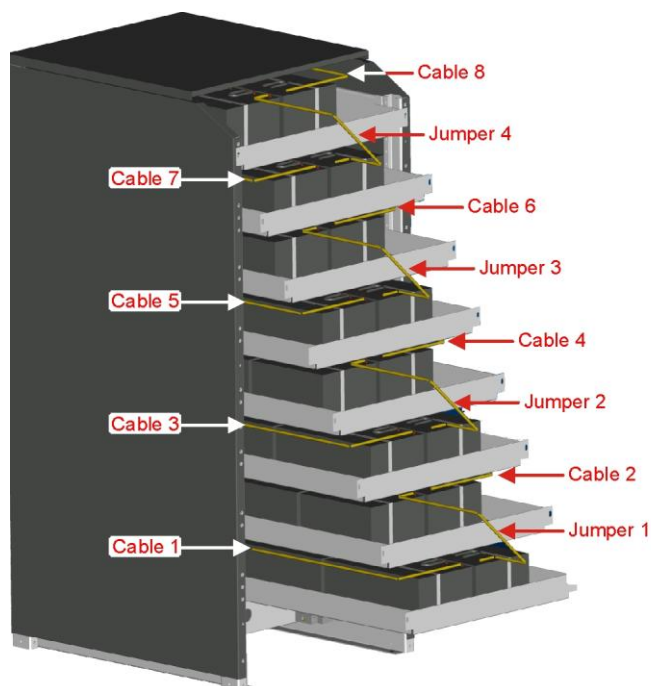
4.5.2 7Ah/9Ah/12Ah 12V battery connection and positioning 120 elements.

- 1) Remove the six screws to open the front cover and access the battery trays.
- 2) Remove the cardboard cover protection from the batteries, see picture 18.



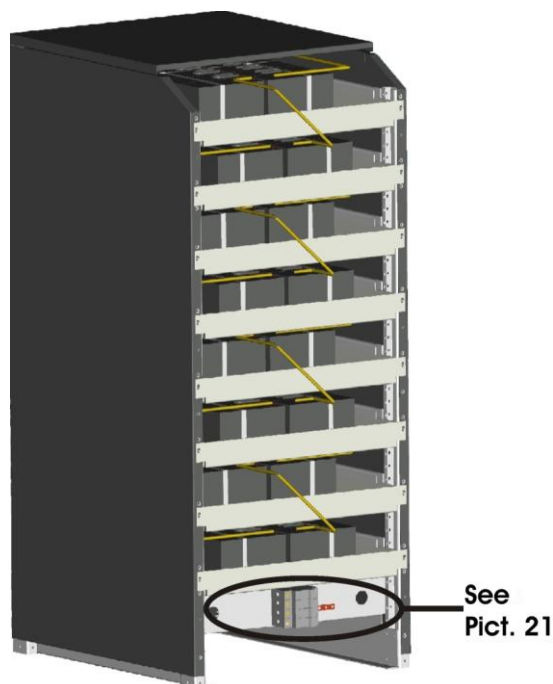
Picture 18 – Cardboard 7Ah/9Ah/12Ah battery protection

- 3) Connect the wires as shown on the picture 19.



Picture 19 – 7Ah/9Ah/12Ah battery connection

- 4) After the connection re-insert the battery trays as shown in picture 20.



Picture 20 – 7Ah/9Ah/12Ah battery connected

Put back and fix the front cover with the six screws.



Battery voltage

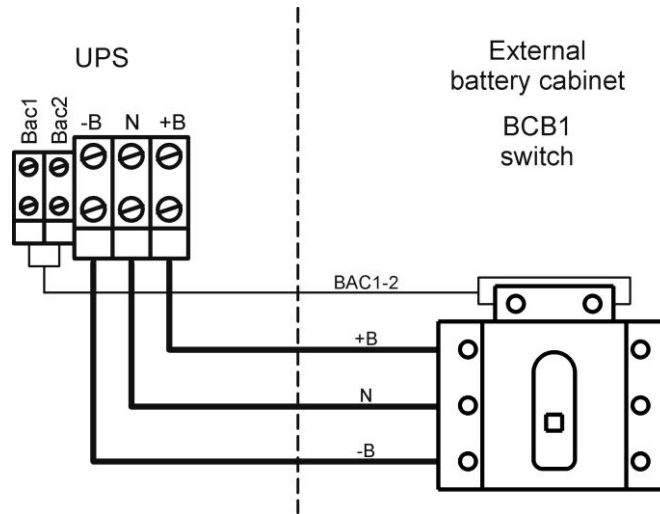
After the battery installation, **before closing BCB**, check the battery voltage on the BCB circuit breaker and connect battery cabinet to the UPS as indicated on 4.5.3 paragraph.



Picture 21 – Battery circuit breaker and fuses

4.5.3 Connections

The following picture shows the electrical connection between the UPS and the external battery cabinet.



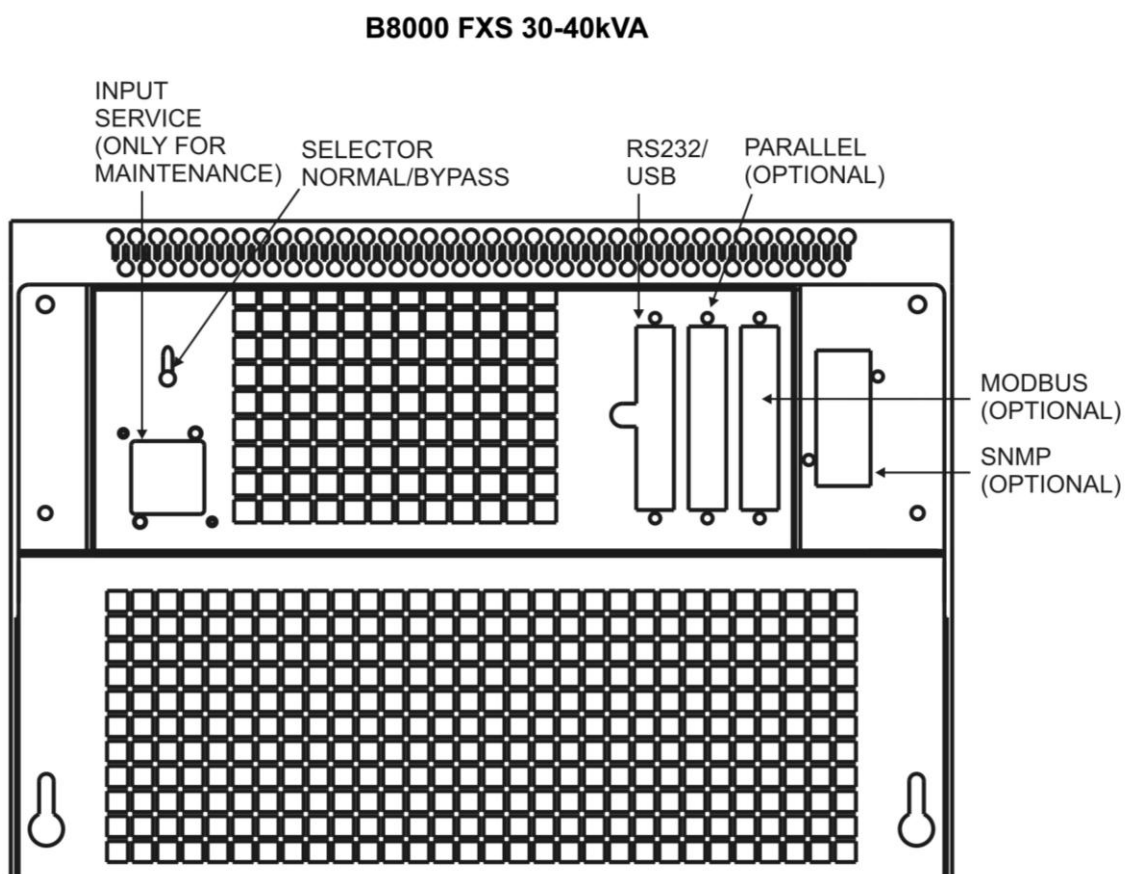
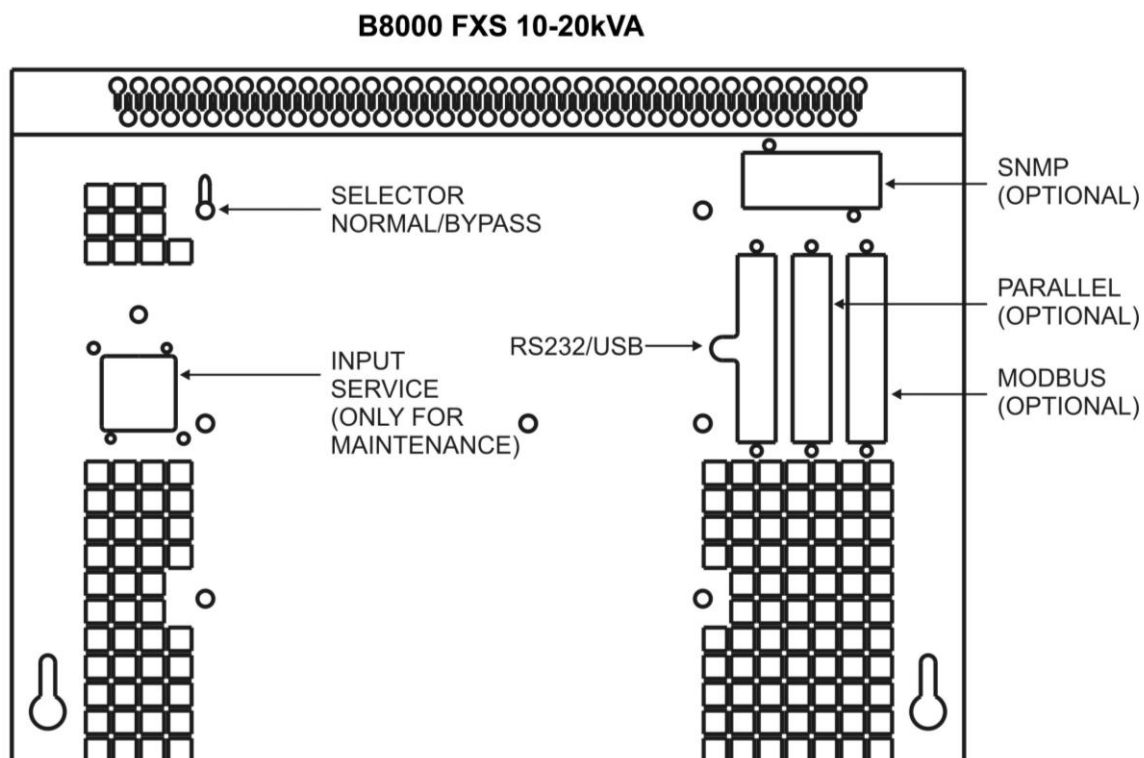
Picture 22 – Battery cabinet and UPS connections

For the connection above mentioned you can use the cables supplied in the battery cabinet.

4.6 SERIAL INTERFACES

The UPS is provided with serial interfaces for the external communication of the operating status and parameters.

- RS232/USB: is used for connection to the proprietary programming and control software.
- MODBUS (OPTIONAL): is used for the transmission of data to the outside via MODBUS protocol (RS485) with terminals.
- PARALLEL (OPTIONAL): is used for communication between paralleled UPS units.
- SNMP (OPTIONAL): is used for the external transmission of data via LAN.
- NORMAL/BYPASS SELECTOR: switch the load on bypass.
- INPUT SERVICE: is used only for maintenance



Picture 23 – Interfaces of UPS PEGASUS II

4.7 RELAY CARD CONNECTION (OPTIONAL)

UPS PEGASUS II, in its full configuration, is provided with a relay card for repeating alarms and operating statuses remotely. Its electric connection is carried out directly on the terminals located on the card.



Picture 24 – Relay card

Relay	Alarms/Status	Status	M1		Led	
			Pins	Status in normal operation	Name	Status in normal operation
RL1	Alarm = A30 COMMON ALARM	Not energized if alarm is present	2-3	Closed	DL1	On
			1-2	Open		
RL2	Alarm = A1 MAINS FAULT	Not energized if alarm is present	5-6	Closed	DL2	On
			4-5	Open		
RL3	Alarm = A9 BATTERY AUT END	Not energized if alarm is present	8-9	Closed	DL3	On
			7-8	Open		
RL4	Alarm = A13 INV OUT OF TOL	Not energized if alarm is present	11-12	Closed	DL4	On
			10-11	Open		
RL5	NORMAL MODE Alarm = A16 BYPASS → LOAD	Not energized if alarm is present	14-15	Closed	DL5	On
	----- ECO MODE Status = S7 BYPASS → LOAD	Energized if status is present	13-14	Open		
RL6	BATTERY NOT DISCHARGING	Not Energized If battery discharge	17-18	Closed	DL6	On
			16-17	Open		
RL7	NORMAL MODE Status = S4 INVERTER → LOAD	Energized if status is present	20-21	Closed	DL7	On
	----- ECO MODE Alarm = A38 INV → LOAD	Not energized if alarm is present	19-20	Open		
RL8	Status = S6 BYPASS OK	Energized if status is present	23-24	Closed	DL8	On
			22-23	Open		

Relay output characteristics:

120 VAC voltage 1A current
 50 VDC voltage 1A current resistive load

5 STARTUP AND SHUTDOWN



Read the technical documentation

Before installing and using the device, make sure you have read and understood all the instructions contained in the present manual and in the technical supporting documentation.



Further information

In the event that the information provided in this manual is not sufficiently exhaustive, please contact the manufacturer of the device, whose details are available in the “Contacts” section.

5.1 PRELIMINARY CHECKS

Before starting up the unit, make sure that:

- all installation and electric connection works have been performed professionally;
- all power and control cables have been properly and tightly connected to the relevant terminal boards;
- the ground cable is properly connected;
- the battery polarity is correct and the voltage is within the operating values;
- the phase rotation of the line is correct and the voltage is within tolerance with the operating values.
- the emergency power off “EPO” push-button, if installed, is not pressed (if not, press it back to the rest position).

5.2 START-UP PROCEDURE



EPO push-button and phase rotation

Before switching the UPS on, make sure that:

- 1) the emergency power off "EPO" push-button, if installed, is not pressed. If not, press it back to the rest position;
- 2) the input and output phase rotation is correct.



Circuit breaker BCB

Do not close the battery breaker BCB before it's required by the front panel. Serious damages to the UPS internal parts and/or to the battery may occur.

No.	LCD DISPLAY	ACTION	OPERATING CHECKS
1	BLANK	Close RCB	A few seconds after the closing of input circuit breaker RCB the pre-charging phase of the capacitive bank will start. The control logic will be started and the front panel will be activated.
2	BOOT LOADER		"BOOT" phase where the UPS firmware can be updated following the appropriate procedure. All the LED's on the front panel are on.
3	EEPROM READING		Reading of the configuration parameters stored in the EEPROM. All the LED's on the front panel are off.
4	EEPROM PARAM. SENDING		Sending of the configuration parameters stored in the EEPROM. All the LED's on the front panel are off.
5	PLEASE WAIT		
6	UPS START UP PLEASE WAIT		UPS start-up. LED #1 is on - input voltage present.
7	RECTIFIER START UP PLEASE WAIT		The IGBT rectifier bridge starts to modulate; VDC voltage reaches the nominal value. LED #3 is lit green: DC voltage present.
8	INVERTER START UP PLEASE WAIT		The modulation of the inverter bridge is started. The AC output voltage reaches the nominal value. After a few seconds the static inverter switch is closed. LED #5 is lit green: static switch SSI closed.
9	BYPASS START UP CLOSE SBCB	Close SBCB	

10	BYPASS START UP PLEASE WAIT		The control logic checks that all the bypass parameters (voltage, phase rotation, frequency) are correct. LED #2 is lit green: bypass voltage present
11	BATTERY START UP CLOSE BCB	Close BCB	
12	BATTERY START UP PLEASE WAIT		The control logic checks the closing of the circuit breaker to go to the following step. Led #4 lit green.
13	UPS START UP CLOSE OCB	Close OCB	
14	START UP END PLEASE WAIT		The control logic checks that all the output parameters (voltage, current, frequency) are correct. LED #7 is lit green: output voltage present.
End	UPS NAME NOMINAL POWER		The default screen is displayed after a short time with the UPS name and the nominal power.

5.3 BASIC TROUBLESHOOTING

This paragraph provides the basic information if any problems occur during the start-up procedure. In case the problem cannot be solved, contact the service department.

1) *After closing RCB the LCD display is still blank*

- Check the phase rotation of supply voltage.
- Make sure the input voltage and frequency are within tolerance.
- Check the rectifier protection fuses F1-F2-F3; they are inside the unit.

2) *After step #1 the UPS stops the starting sequence and shows one or more alarm messages*

- Check the alarms indicated on the display and remove their causes.
- Close RCB and try to restart the UPS.

3) *After step #2 the unit shows the alarm A15 – Byp fault*

- Make sure you have closed circuit breaker SBCB.
- Check the protection fuses of the static bypass switch; they are inside the unit.
- Check the phase rotation of the bypass voltage.
- Make sure voltage and frequency are within tolerance.

4) *After step #3 the unit shows the alarm A7 – BCB open*

- Make sure you have closed the battery circuit breaker; the circuit breaker or the fuse carrier is external to the UPS system.
- Check the battery fuses.
- Check the interconnection between the auxiliary contact of the battery circuit breaker (in the external cabinet) and the terminals Bac1-Bac2 of the UPS.

5.4 SHUT-DOWN PROCEDURE

No.	ACTION	LCD DISPLAY	OPERATING CHECKS
1	Open OCB	A30 GENERAL ALARM	The supply to the load is interrupted. LED #7 off.
2	Open BCB	A30 GENERAL ALARM	The battery is disconnected from the rectifier. Led #4 red flashing.
3	Open SBCB	A30 GENERAL ALARM	The bypass supply is disconnected. LED #2 off.
4	Open RCB	A30 GENERAL ALARM	Rectifier and inverter shutdown.
5		BLANK	End of shutdown procedure.

5.5 SWITCHING PROCEDURE TO MANUAL BYPASS

The load is transferred to Manual Bypass with no interruption of supply to the loads. In this configuration, the system can be restarted via the return procedure from load on manual bypass, without the need to de-energize the loads.



Manual bypass

To perform the switching procedure correctly, make sure no alarms are present on the system.

During Manual Bypass the load is supplied directly by the input mains, therefore continuous supply cannot be guaranteed to the loads.

No.	ACTION	LCD DISPLAY	OPERATING CHECKS
1	Move the bypass selector SW to BYPASS	A30 GENERAL ALARM	The load is transferred to the bypass line. LED #5 off, LED #6 lit orange.
2	Close MBCB	A30 GENERAL ALARM	The inverter is switched off. The load is supplied by the input mains through the manual bypass switch. The static bypass switch is still closed. Led #8 lit orange.
3	Open BCB	A30 GENERAL ALARM	The battery is disconnected from the DC bus bar. Led #4 red flashing.
4	Open RCB	A30 GENERAL ALARM	The supply input is opened; the rectifier shuts down. LED #1 off.
5	Open OCB	A30 GENERAL ALARM	The load remains fed by the manual bypass switch. LED #8 off.
6	Open SBCB	A30 GENERAL ALARM	The bypass line is disconnected. The display goes out.
7		BLANK	The load is supplied directly by the mains through the manual bypass switch. The UPS is isolated.

5.6 RESTART FROM MANUAL BYPASS

Before restarting the UPS from manual by-pass, make sure the "Bypass_Sw" selector is in *BYPASS* position and the MCB isolator is closed.

No.	LCD DISPLAY	ACTION	OPERATING CHECKS
1	BLANK	Close RCB	
2	BOOT LOADING		"BOOT" phase where the UPS firmware can be updated following the appropriate procedure. All the LED's on the front panel are on.
3	EEPROM READING		Reading of the configuration parameters stored in the EEPROM. All the LED's on the front panel are off.
2	UPS START UP WAIT PLEASE		The rectifier is supplied and the DC voltage reaches the nominal value. All the LED's on the front panel are on. The microprocessor checks that all the start-up conditions are good for restart. Led #1 lit green. Led #8 lit orange.
5	RECTIFIER START UP WAIT PLEASE		The IGBT rectifier bridge starts to modulate; VDC voltage reaches the nominal value. LED #3 is lit green: DC voltage present.
6	START UP FROM MBCB CLOSE SBCB	Close SBCB	
7	BYPASS START UP WAIT PLEASE		The microprocessor checks that all the bypass parameters (voltage, phase rotation, frequency) are within tolerance. Led #2 lit green. The static bypass switch is closed. LED #6 lit orange.
8	START UP FROM MBCB CLOSE BCB	Close BCB	Closing of the battery circuit breaker. Led #4 lit green.
9	START UP FROM MBCB CLOSE OCB	Close OCB	The load is fed by the static bypass switch. Circuit breaker MCB is still closed. Led #7 lit green.
10	START UP FROM MBCB OPEN MBCB	Open MBCB	The load is fed by the static bypass switch and the inverter can be started. LED #8 off.

11	INVERTER START WAIT PLEASE		The modulation of the inverter bridge is started. The AC voltage reaches the nominal value. The microprocessor checks the synchronization with the bypass line.
12	START UP FROM MBCB MOVE BYP - SWITCH	Move the selector “NORMAL-BYPASS” to <i>NORMAL</i>	The load is transferred to the inverter. Led #5 lit green.
13	START UP END WAIT PLEASE		The microprocessor checks that all the output parameters (voltage, current, frequency) are within the tolerance limits.
14	UPS MODEL OUTPUT VOLTAGE		

UPS USER MANUAL

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1 SCOPE

The instructions contained in this section of the manual apply to the UPS systems indicated below.

- PEGASUS II 10kVA 3/1
- PEGASUS II 15kVA 3/1
- PEGASUS II 20kVA 3/1
- PEGASUS II 10kVA 3/3
- PEGASUS II 15kVA 3/3
- PEGASUS II 20kVA 3/3
- PEGASUS II 30kVA 3/3
- PEGASUS II 40kVA 3/3



Storing documentation

This manual and any other supporting technical documentation relating to the product must be stored and made accessible to personnel in the immediate vicinity of the UPS.



Further information

In the event that the information provided in this manual is not sufficiently exhaustive, please contact the manufacturer of the device, whose details are available in the “Contacts” section.

2 SAFETY RULES AND WARNINGS



Injury hazard due to electric shock!

Always respect all the safety instructions and, in particular:

- any work on the unit must be carried out by qualified personnel;
- internal components can only be accessed after disconnecting the device from supply sources;
- always use protective devices designed for each type of activity;
- the instructions contained in the manuals must be strictly followed.



Injury hazard due to device failure

Potentially hazardous situations may arise in case of UPS failure.

- Do not use the device if visibly damaged.
- Maintain the device regularly to identify possible failure.



Possible device damage

Whenever work is carried out on the device, make sure all actions are taken in order to avoid electrostatic discharges which might damage the electronic components of the system.



Read the technical documentation

Before installing and using the device, make sure you have read and understood all the instructions contained in the present manual and in the technical supporting documentation.

3 GENERAL UPS DESCRIPTION

The UPS systems of the FXS line use IGBT technology with a high changeover frequency in order to allow a low distortion of the current re-injected into the supply line, as well as high quality and stability of output voltage. The components used assure high reliability, very high efficiency and maintenance easiness.

3.1 TYPOLOGY

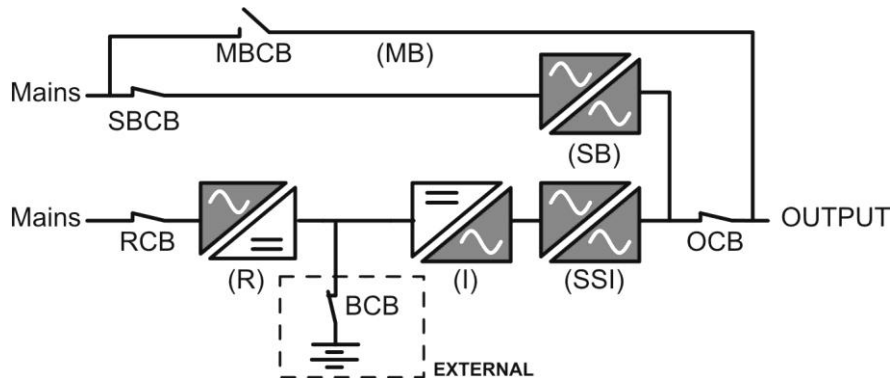
The UPS systems of the FXS line are on-line, double conversion; the inverter included in the UPS always supplies energy to the load, whether mains is available or not (according to the battery autonomy time).

This configuration guarantees the best service to the User, as it supplies clean power uninterruptedly, ensuring voltage and frequency stabilization at nominal value. Thanks to the double conversion, it makes the load completely immune from micro-interruptions and from excessive mains variations, and prevents damage to critical loads (Computer - Instrumentation - Scientific equipment etc.).



Output voltage present

The line connected to the UPS output is energized even during mains failure, therefore in compliance with the prescriptions of IEC EN62040-1-2, the installer will have to identify the line or the plugs supplied by the UPS making the User aware of this fact.



Picture 1 – Block diagram

3.2 SYSTEM DESCRIPTION

3.2.1 Rectifier

It converts the three-phase voltage of the AC mains into continuous DC voltage.

It uses a three-phase fully-controlled IGBT bridge with a low harmonic absorption.

The control electronics uses a 32 bit μ P of latest generation that allows to reduce the distortion of the current absorbed by mains (THDi) to less than 5%. This ensures that the rectifier does not distort the supply mains, with regard to the other loads. It also avoids cable overheating due to the harmonics circulation.

The rectifier is so sized as to supply the inverter at full load and the battery at the maximum charging current.

3.2.2 Inverter

It converts the direct voltage coming from the rectifier or from the DC battery into alternating AC voltage stabilized in amplitude and frequency.

The inverter uses IGBT technology with a high changeover frequency of approximately 15 kHz.

The control electronics uses a 32 Bit μ P of latest generation that, thanks to its processing capability, generates an excellent output sine-wave.

Moreover, the fully digital control of the output sine-wave allows to achieve high performances, among which a very low voltage distortion even in presence of high-distorting loads.

3.2.3 Battery and battery charger

The battery can be installed inside (only 10-20 kVA) or outside (10-40 kVA) the UPS.

The battery charger logic is completely integrated in the rectifier's control electronics.

The battery is charged, according to the DIN 41773 Standard, every time it has been partially or completely discharged. When its full capacity is restored, it is kept floating so as to compensate for any autodischarge.

3.2.4 Static bypass

The Static Bypass allows to transfer the load between Inverter and Emergency Mains, and vice-versa, in a very short time, and uses SCR's as power commutation elements.

3.2.5 Manual bypass

The Manual Bypass is used to cut off the UPS completely, supplying the load directly from the input mains in case of maintenance or serious failure.



Follow the procedures contained in the manual

The sequence of manual bypass switching and return must be carried out with respect to the procedure indicated in the installation and start-up section. The manufacturer cannot accept responsibility for damages arising from incorrect operation.

3.3 OPERATING STATUS

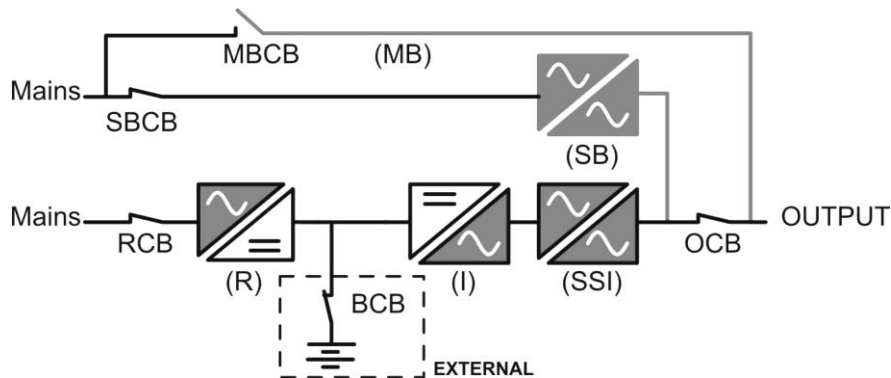
The UPS has four different operating modes, as described below:

- Normal operation
- Bypass operation
- Battery operation
- Manual bypass

3.3.1 Normal operation

During normal operation all the circuit breakers/isolators are closed, except for MBCB (maintenance bypass).

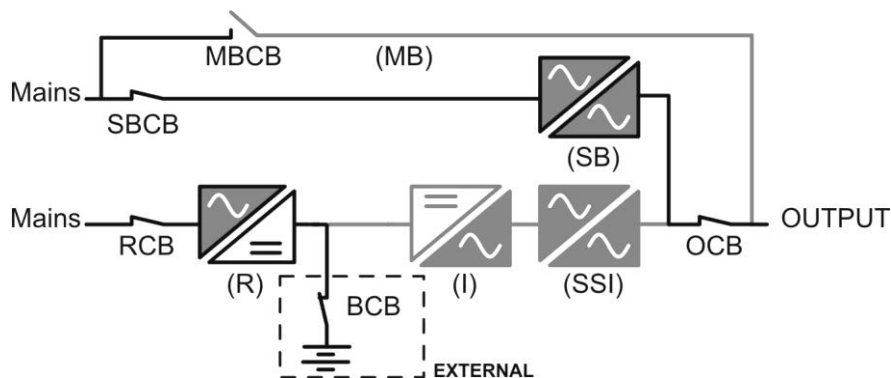
The rectifier is supplied by the AC three-phase input voltage which, on its turn, feeds the inverter and compensates mains voltage as well as load variations, keeping the DC voltage constant. At the same time, it keeps the battery charged (floating or boost charge depending on the battery type). The inverter converts the DC voltage into an AC sine-wave with stabilized voltage and frequency, and also supplies the load via its static switch SSI.



Picture 2 – Normal operation

3.3.2 Bypass operation

The load can be switched to bypass either automatically or manually. The manual changeover is due to the BYPASS SWITCH which forces the load to bypass. In case of failure of the bypass line, the load is switched back to inverter without interruption.



Picture 3 – Load supplied by bypass

3.3.3 Battery operation

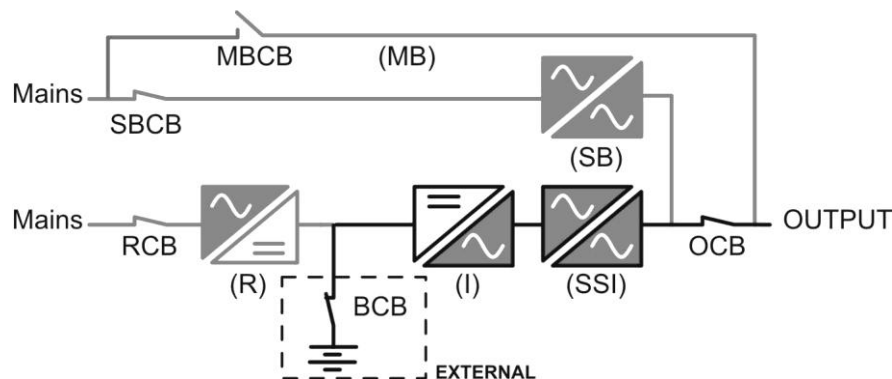
In case of power failure or rectifier fault, the battery feeds the inverter without interruption. The battery voltage drops based on the amplitude of the discharging current. The voltage drop has no effect on the output voltage, which is kept constant by changing the PWM modulation. An alarm is activated when the battery is near the minimum discharge value.

In case the supply is restored before the battery is completely discharged, the system will be switched back to normal operation automatically. In the opposite case, the inverter shuts down and the load is switched to the bypass line (bypass operation). If the bypass line is not available or is out of tolerance, the loads supply is interrupted as soon as the battery reaches the discharge limit threshold (*black-out*).

As soon as the supply is restored, the rectifier will recharge the battery. In the standard configuration, the loads are supplied again via static switch SSB when mains is available again. The inverter is restarted when the battery has partially restored its capacity.

The system restart from the *black-out* condition can be customized based on the requirements of the plant, in three different modes:

- Bypass → loads are supplied as soon as the bypass line is available (factory configuration).
- Inverter → loads are supplied by the inverter (even if the bypass line is available) when the battery voltage has reached a programmed threshold, after the rectifier restart.
- Man. Inverter → the output supply is NOT restored automatically. The system requires a confirmation to restart which can only be done manually by the user via the front panel.



Picture 4 – Battery operation

3.3.4 Manual bypass

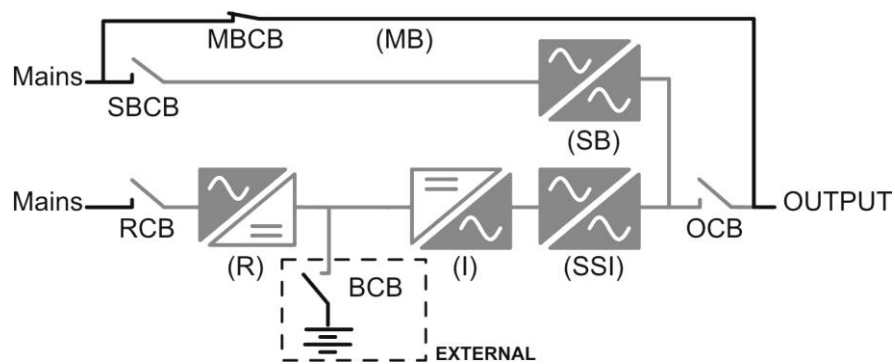
The manual bypass operation is necessary whenever the UPS functionality is tested, or during maintenance or repair work.

During the manual bypass due to repair or maintenance, the UPS is completely shut down and the load is directly supplied by the bypass line.



Follow the procedures contained in the manual

The sequence of manual bypass switching and return must be carried out with respect to the procedure indicated in the installation and start-up section. The manufacturer cannot accept responsibility for damages arising from incorrect operation.



Picture 5 – Manual bypass

3.4 CONTROL AND OPERATION DEVICES

The control and operation devices of the UPS are indicated below:

- AC isolator on rectifier input (RCB)
- AC isolator on bypass line input (SBCB)
- Isolator on UPS output (OCB)
- Manual bypass isolator (MBCB)
- Battery Isolator / Circuit breaker (BCB)
- Emergency power off button (EPO)
- Normal/Bypass selector
- LCD control panel



Check the personnel training

The use of the operation and control devices of the UPS is intended for authorized personnel only. We recommend to check the training of the personnel responsible for the use and maintenance of the system.

3.4.1 Isolators (DC input and AC output)

The isolators provided on the UPS are used to isolate the power components of the device from the AC supply line, from the storage battery and from the loads.



Voltage present on terminals

The isolators do not isolate the UPS completely, where the AC line and battery voltages are still present on the terminals. Before carrying out any maintenance on the unit:

- Isolate the device completely by operating the external circuit breakers;
 - Wait at least 5 minutes in order to allow the capacitors to discharge.
-

3.4.2 Emergency power off command (EPO)

The emergency power off command is used to disconnect the UPS output immediately, interrupting the loads supply. It also shuts down the inverter.



Operate the command only in case of real emergency

The components of the system are subject to a high stress when the emergency power off command is operated under load presence.

- Use the emergency power off button only in case of real emergency.
-



Supply reset

Reset the output supply only when the causes which led to the emergency shutdown have been eliminated and you are sure that there is no hazard to persons and things.

3.4.3 Normal/Bypass selector

The Normal/Bypass selector is installed externally, on the rear of UPS. It is generally used during the manual bypass procedure, when it is necessary to isolate the UPS for maintenance or repair.



Follow the procedures contained in the manual

The Normal/Bypass selector shall only be operated in accordance with the procedures specified in the installation and start-up section. The manufacturer cannot accept responsibility for damages arising from incorrect operation.

3.4.4 LCD control panel

The control panel of the UPS is used in order to:

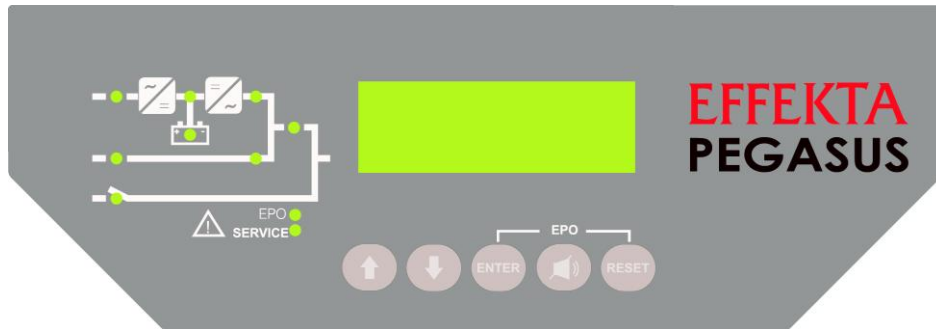
- Check the operating parameters of the device
- Check the alarms present
- Access the event log
- Display the information on the device
- Modify the operating parameters

The menu which allows to change the parameters is password-protected in order to prevent access to unauthorized personnel.

4 FRONT PANEL

The front panel of the UPS, consisting of four rows alphanumeric display plus 5 function keys, allows the complete monitoring of the UPS status.

The mimic flow helps to understand the operating status of the UPS.



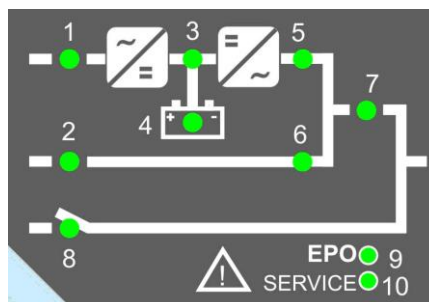
Picture 6 – UPS front panel

4.1 FUNCTION BUTTONS

The front panel of the UPS is provided with 5 buttons whose functions are indicated in the following table:

Button	Assigned functions
	➤ Scrolls up the menus ➤ Increases the values by one unit ➤ Selects a value
	➤ Scrolls down the menus ➤ Decreases the values by one unit ➤ Selects a value
	➤ Selects a menu ➤ Confirms changes
	➤ Silences the buzzer (activated due to an alarm or a failure)
	➤ Returns to the previous menu

4.2 FUNCTION OF MIMIC PANEL LED'S



Picture 7 – UPS mimic panel

LED 1		GREEN	AC line on rectifier input within tolerance
	  	GREEN	Wrong phase rotation
		OFF	AC mains failure on rectifier input
LED 2		GREEN	AC bypass line within tolerance
	  	GREEN	Wrong phase rotation
		OFF	AC bypass line out of tolerance AC bypass line failure
LED 3	  	GREEN	Rectifier off or faulty
		RED	DC voltage out of tolerance
		GREEN	Rectifier on and DC voltage within tolerance
LED 4		GREEN	circuit breaker BCB closed and battery charging
	  	GREEN	Battery discharging or under TEST
	  	ORANGE	Circuit breaker BCB open
		RED	Battery fault (following a battery test)
		OFF	Battery not available
LED 5		GREEN	Inverter voltage within tolerance and static switch closed
	  	GREEN	Inverter overload or short-circuit
		OFF	Inverter off or voltage out of tolerance
LED 6	  	ORANGE	Re-transfer blocked
		ORANGE	Static bypass switch closed
		OFF	Static bypass switch open
LED 7		GREEN	Output circuit breaker OCB closed
		OFF	Output circuit breaker OCB open
LED 8		ORANGE	Manual bypass switch MBCB closed
		OFF	Manual bypass switch MBCB open
LED 9		RED	Emergency power off (EPO) activated
		OFF	Normal operation
LED 10	  	ORANGE	Maintenance request (slow flashing)
	  	ORANGE	Critical alarm (fast flashing)
		OFF	Normal operation

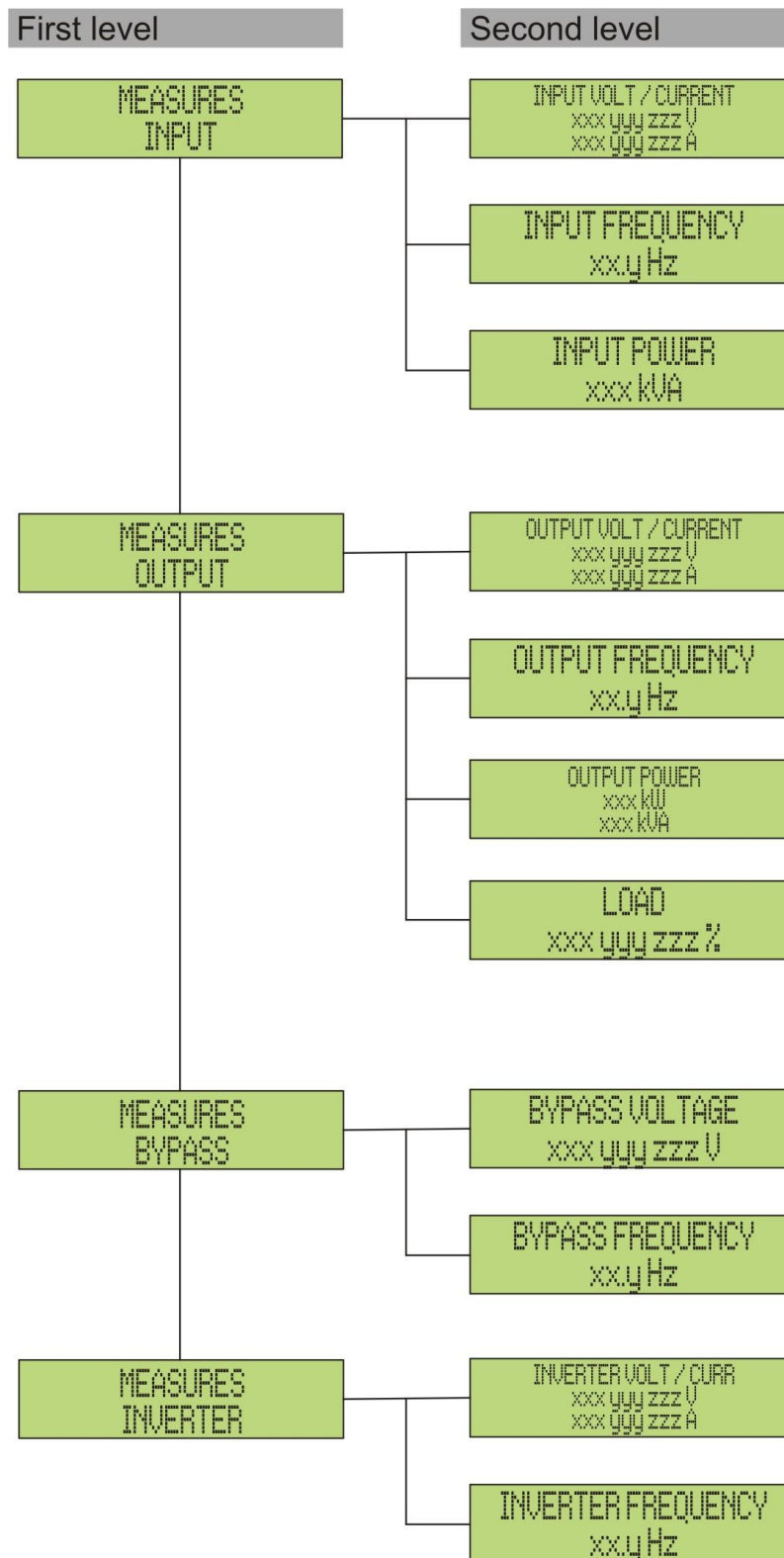
5 HANDLING THE LCD PANEL

5.1 MAIN MENUS

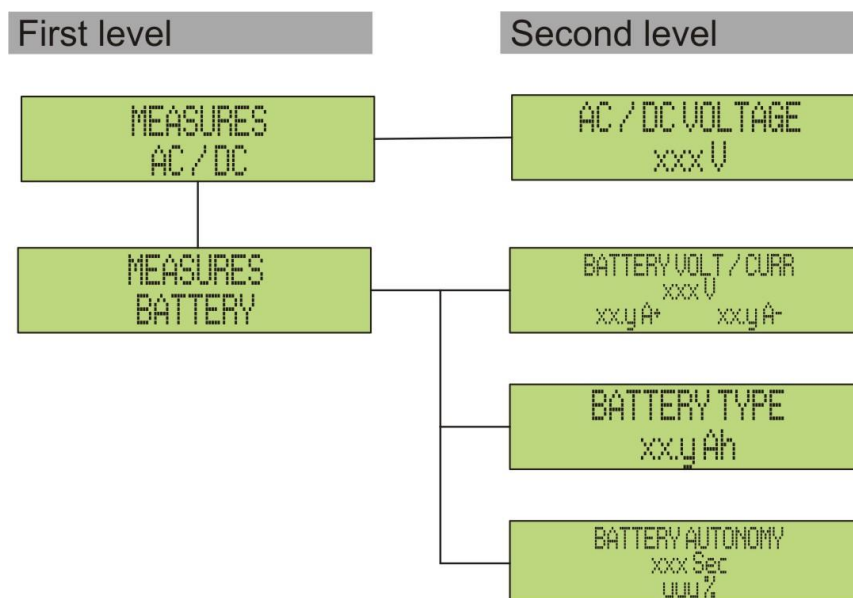
UPS NAME xxx kVA	Main screen (nominal power of the UPS)
UPS NAME MEASURES	UPS measures regarding basic parameters (voltage, current, etc.)
UPS NAME ALARMS	UPS operating status, possible alarms present and alarms history
UPS NAME SPECIAL	Setting of parameters and special functions
UPS NAME INFO	General information regarding the UPS

5.2 MEASURE DISPLAY

The MEASURES menu is structured as follows:



Picture 8 – Structure of MEASURES menu (1 of 2)



Picture 9 – Structure of MEASURES menu (2 of 2)

Sub-menu	Displayed data	Accuracy
INPUT	Rectifier input voltage ^{(1) (2)}	1 V
	Rectifier input current ⁽³⁾	1 A
	Frequency	0.1 Hz
	Input power	1 kVA
OUTPUT	Voltage ^{(1) (2)}	1 V
	Current ⁽³⁾	1 A
	Frequency	0.1 Hz
	Active power	1 kW
	Apparent power	1 kVA
	Load percentage	1 %
BYPASS	Voltage ^{(1) (2)}	1 V
	Frequency	0.1 Hz
INVERTER	Voltage ^{(1) (2)}	1 V
	Frequency	0.1 Hz
AC/DC	Rectifier output voltage	1 V
BATTERY	Voltage and current	1 V / 1 A
	Nominal capacity	1 Ah
	Residual autonomy	1 min / 1 %

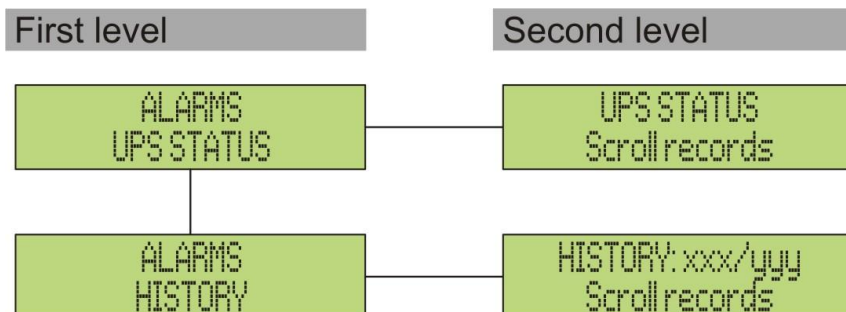
⁽¹⁾ The voltage measures are always referred to the phase-to-neutral value

⁽²⁾ The three voltages are displayed in one screen as “xxx yyy zzz V”

⁽³⁾ The three line currents are displayed in one screen as “xxx yyy zzz A”

5.3 BASIC DIAGNOSTICS

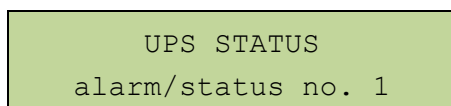
The ALARMS menu allows to display the current operating status of the device and to access the event log, based on the following structure.



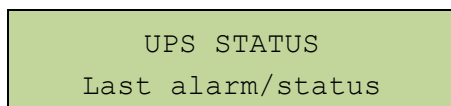
Picture 10 – Structure of ALARMS menu

Sub-menu	Displayed data
UPS STATUS	Alarms present and operating statuses
HISTORY	Event log

The LCD panel displays the ALARMS menu automatically whenever an alarm occurs. The audible indicator, if enabled, is activated to show the occurred failure. The audible alarm is silenced pressing the key (BUZZER).



Display of the first alarm present (if no alarm is present, the operating status is displayed)



Press the key to browse the menu and to go to the next alarm/status (in alphabetical order)

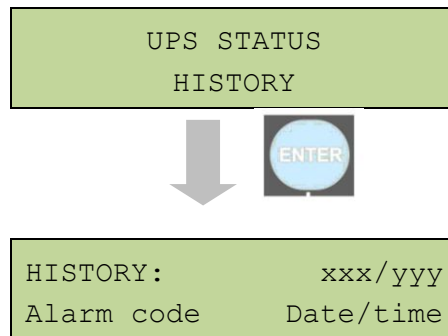


Automatic erasure of alarms

Should an alarm occur and then the conditions that originated it no longer exist, the alarm will be automatically cancelled and the system restarted.

5.3.1 Display of alarms history

All the events are recorded in the alarms history.



The first event shown is the latest one in order of time; a new event makes all the other events automatically shift one position, clearing the oldest event.

The quantity of stored events is displayed on the first line (xxx/yyy), which contains the data currently displayed (position in the list) and the total number of stored data (maximum number equal to **250**) respectively. An asterisk indicates the automatic reset of the alarm.

```

HISTORY:          001/015
A3 *    26-10-10   20:05
  
```

Latest event stored (in order of time)

- E.g.: automatic reset of alarm "A3 – BOOSTER STOPPED"

```

HISTORY:          002/015
A3    26-10-10   19:45
  
```

Immediately prior event

- E.g.: alarm "A3 – BOOSTER STOPPED"

```

HISTORY:          015/015
A18    15-10-10   12:49
  
```

First event stored (in order of time)

5.3.2 Alarms and operating status

ALARMS

A1	MAINS FAULT	A28	CRITICAL FAULT
A2	INPUT WRONG SEQ	A29	MAINTENANCE REQ
A3	BOOSTER STOPPED	A30	COMMON ALARM
A4	BOOSTER FAULT	A31	MBCB BUS CLOSED
A5	DC VOLTAGE FAULT	A32	EPO BUS CLOSED
A6	BATTERY IN TEST	A33	ASYMMETRIC LOAD
A7	BCB OPEN	A34	SERVICE REQUIRED
A8	BATTERY DISCHARGE	A35	DIESEL MODE
A9	BATTERY AUT END	A36	DC FASTSHUTDOWN
A10	BATTERY FAULT	A38	INV --> LOAD
A11	SHORT CIRCUIT	A39	INV ERROR LOOP
A12	STOP TIMEOUT SC	A40	SSI FAULT
A13	INV OUT OF TOL	A41	RECT ERROR LOOP
A14	BYPASS WR SEQ	A43	CURR ERROR LOOP
A15	BYPASS FAULT	A44	DESAT IGBT INV
A16	BYPASS --> LOAD	A45	HIGH TEMP SSW
A17	RETRANSFER BLOCK	A46	PAR LOST REDUND
A18	MBCB CLOSED	A47	SEND PARAM ERROR
A19	OCB OPEN	A48	RCV PARAM ERROR
A20	OVERLOAD	A49	TEST MODE ERROR
A21	THERMAL IMAGE	A50	SSW BLOCKED
A22	BYPASS SWITCH	A51	BATT TEMPERATURE
A23	EPO PRESSED	A52	DC COMP ERROR
A24	HIGH TEMPERATURE	A53	FIRMWARE ERROR
A25	INVERTER OFF	A54	CAN ERROR
A26	COMMUNIC ERROR	A55	PAR CABLE DISC
A27	EEPROM ERROR	A63	START SEQ BLOCK

STATUSES

- S1** BOOSTER OK
- S2** BATTERY OK
- S3** INVERTER OK
- S4** INVERTER --> LOAD
- S5** INV BYPASS SYNC
- S6** BYPASS OK
- S7** BYPASS --> LOAD
- S8** BOOST CHARGE
- S9** INV MASTER SYNC

**Display and recording mode of alarms**

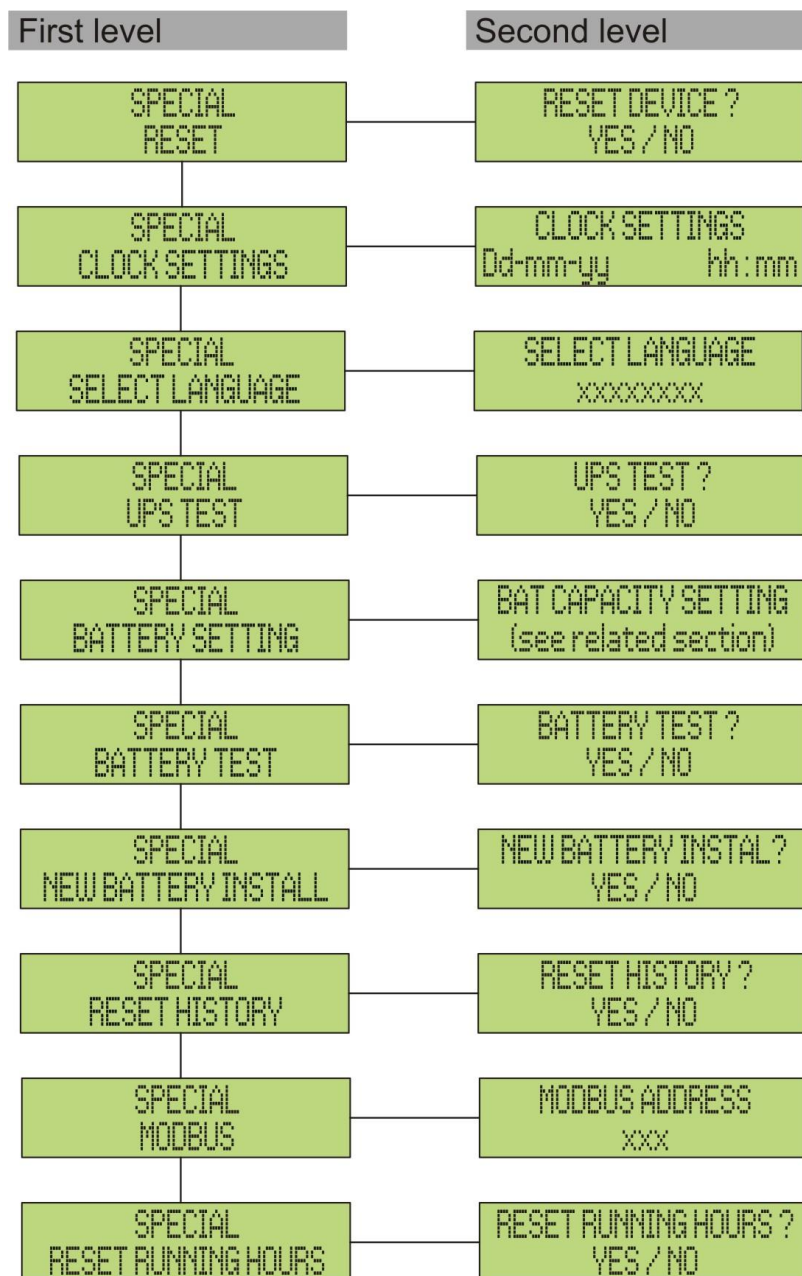
- The statuses are always displayed in ascending order when the ALARMS – STATUSES menu is entered.
 - The alarms are shown when they are present and must be silenced with the buzzer.
 - The alarms remain displayed whilst they are present and they are automatically stored in the event log with date and time.
-

**Description of alarms and statuses**

For a more detailed description of the alarms and statuses, see the “Faults and alarms” section of the present manual.

6 SETTINGS AND ADVANCED OPERATIONS

Some operating parameters of the UPS can be set via the SPECIAL menu, which is structured as follows:



Picture 11 – Structure of SPECIAL menu

Sub-menu	Programmable data
RESET	Reset of failure conditions
CLOCK SETTINGS	System date and time
SELECT LANGUAGE	Display language setting
UPS TEST	Performs a commutation test
BATTERY SETTING	Battery parameter setting
BATTERY TEST	Performs a battery test
NEW BATTERY INSTALL	Sets autonomy to 100%
RESET HISTORY	Event log reset
MODBUS	MODBUS address of device
RESET RUNNING HOURS	Reset the hour counter related to the UPS running time

**Password-protected access**

The SETTINGS menu is protected by a password set by the factory in order to prevent access to unauthorized personnel.

- We recommend minimum disclosure of the access password.
- Changes to the operating parameters and starting operations on the UPS may be potentially dangerous for the device and for persons.

6.1 SETTING DATE AND TIME

Date and time may be set via the CLOCK menu.

CLOCK SETTINGS

DD-MM-YY hh : mm

The single digits can be modified via the arrow keys (▲ / ▼) and confirmed by pressing ↵ (ENTER).



Setting the current date and time correctly

The correct setting of the date and time is essential for the recording of the event log.

6.2 DISPLAY LANGUAGE SETTING

The table below shows the languages which can be set for the display.

Parameter	Standard	Range
LANGUAGE	ITALIAN	ITALIAN GERMAN FRENCH ENGLISH PORTUGUESE SPANISH POLISH TURKISH

The parameters are changed via the arrow buttons (▲ / ▼) to increase the digits, and the ↵ button is used to confirm the entry.

6.3 NEW BATTERY INSTALLATION

The NEW BATTERY INSTALLATION menu is used in case battery circuit breaker BCB is not closed, when requested, in the start-up phase. In this case the system will start considering the battery completely discharged and activating the alarm "A10 – BATTERY FAULT".

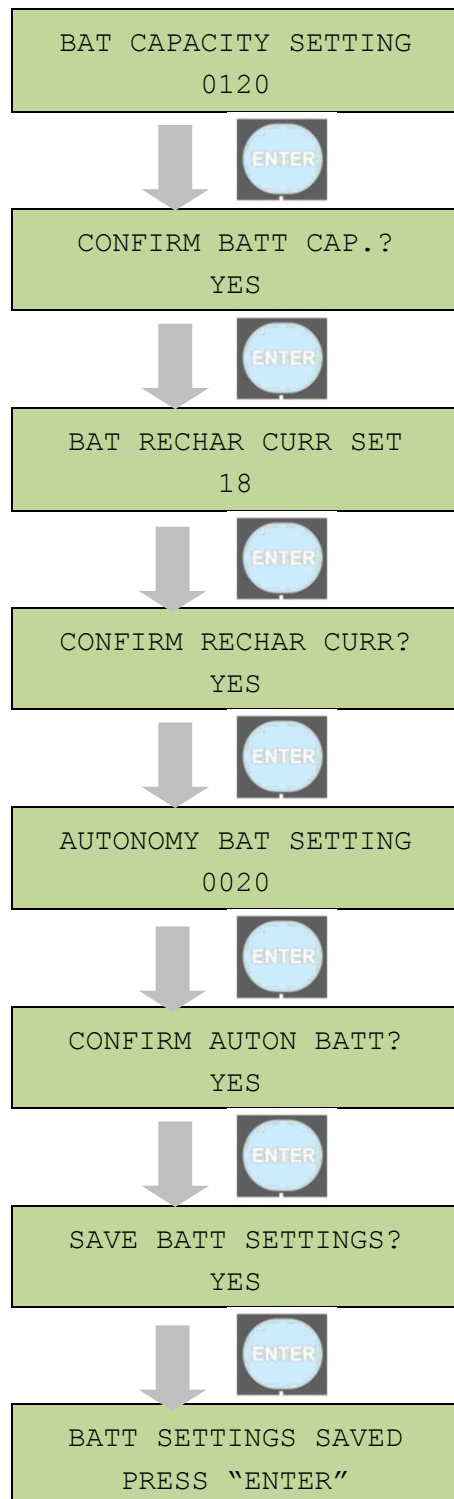
To set the battery autonomy to 100% it is necessary to access the menu and press the ↵ button to confirm.

6.4 BATTERY CONFIGURATION

In case the UPS has been tested without knowing the characteristic data of the storage battery, the BATTERY CONFIGURATION menu allows to set such data. In particular, the following data can be set:

- Battery capacity in Ampere-hours (Ah)
- Recharging current in Amperes (A)
- Nominal autonomy in minutes

Access the menu by pressing the  button (ENTER).



The single digits can be modified via the arrow keys ( / ) and confirmed by pressing  (ENTER).

Confirmation screen of the parameter set

The single digits can be modified via the arrow keys ( / ) and confirmed by pressing  (ENTER).

Confirmation screen of the parameter set

The single digits can be modified via the arrow keys ( / ) and confirmed by pressing  (ENTER).

Confirmation screen of the parameter set

Confirmation screen for the configuration



Setting all the parameters

To save all the parameters it is necessary to reach the end of the guided procedure until the last screen previously shown.

If the procedure is interrupted earlier, none of the parameters previously set will be saved.

6.5 SETTING THE MODBUS PARAMETERS

The parameters regarding the communication via RS485 interface can be set in the MODBUS menu.

➤ Modbus address

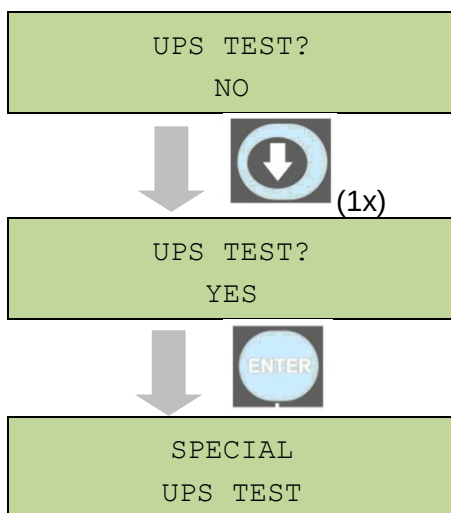
MODBUS ADDRESS
202

The single digits can be modified via the arrow keys (▲ / ▼) and confirmed by pressing ↵ (ENTER).

Parameter	Standard	Range
MODBUS ADDRESS	1	1 247

6.6 UPS TEST

The UPS TEST menu allows to carry out a switching test of the inverter. The inverter is switched off and the load is transferred to the bypass supply. The inverter supply is automatically restored after a few seconds.



The value on the second line is ready to be changed

The parameter is changed. The change is confirmed by pressing ↵ (ENTER)

The system performs a test and returns to the previous screen

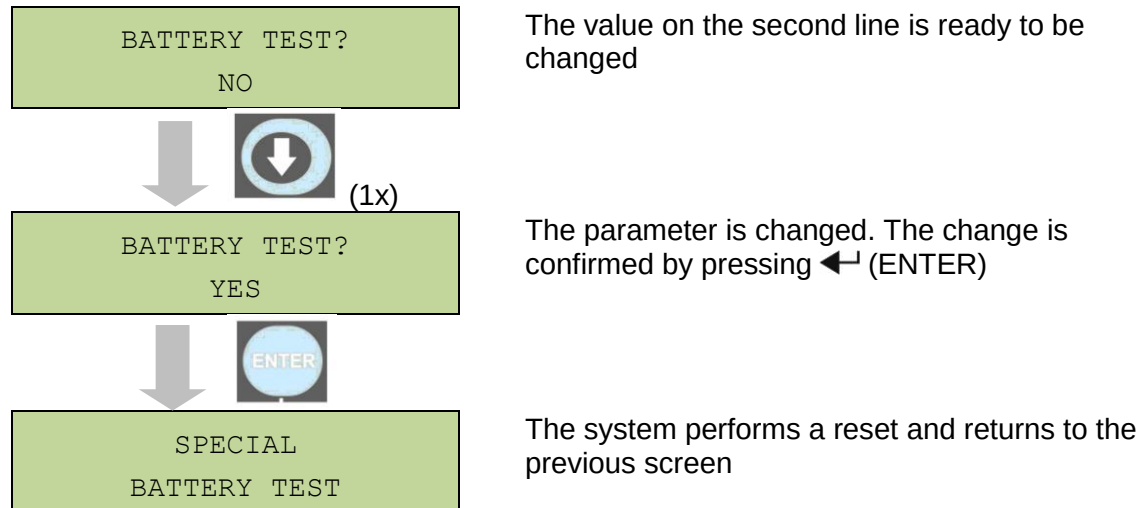


Possible loss of supply

In case of power failure while the test is being performed, the immediate operation of the inverter is not guaranteed.

6.7 BATTERY TEST

The BATTERY TEST menu allows to carry out a short discharge test of the battery. In case the battery is not efficient, the alarm "A10 – Battery fault" is generated at the end of the test.



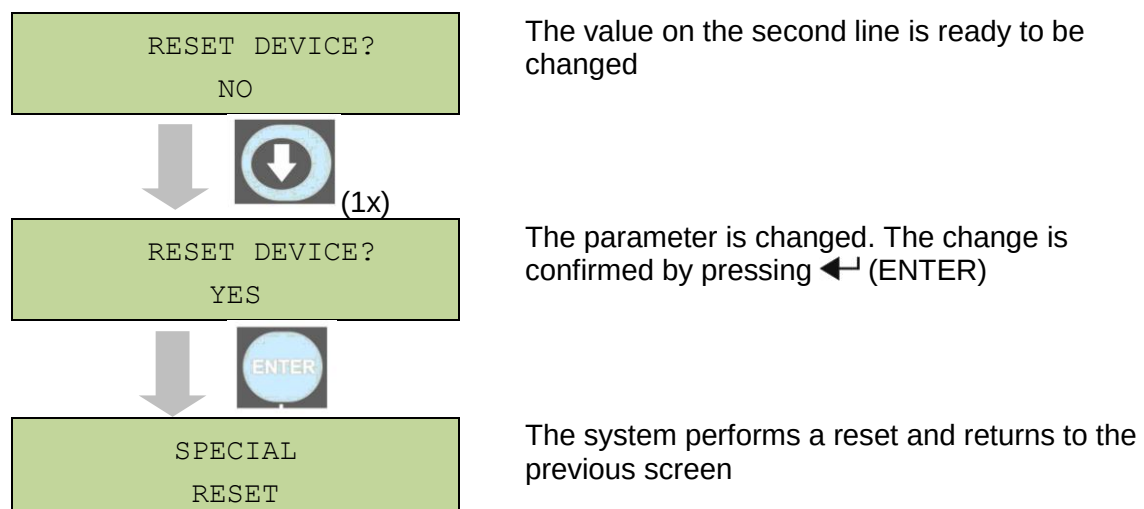
Possible loss of supply

This test can affect the continuity of supply to the loads if the battery is not fully charged.

6.8 SYSTEM RESET

The UPS is equipped with internal protections which block the system or some of its sections. The alarm can be cleared and normal operation can be resumed via the RESET menu. In case the failure persists, the UPS will return to the previous failure condition.

In some cases the RESET is necessary to simply reset a failure signal, then the UPS will resume operation.



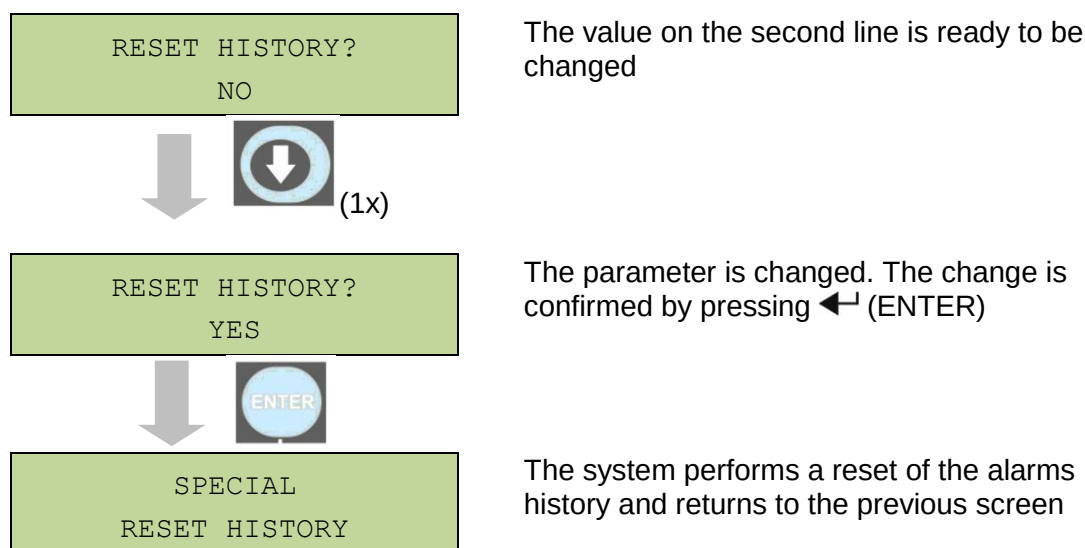
The failure conditions which impose a manual reset are:

- Static switch re-transfer block (alarm A17)
- Inverter shutdown due to the operation of the IGBT desaturation sensor (alarm A44)
- Inverter shutdown due to short-circuit timeout (alarm 12)
- Inverter shutdown due to thermal image protection (alarm 21)
- Inverter shutdown due to the operation of the quick disconnect sensor (alarm A36)
- Inverter shutdown due to voltage control loop error (alarm A39)
- Booster shutdown due to voltage control loop error (alarm A41)
- Booster shutdown due to current control loop error (alarm A43)
- Static switch blocked (alarm A50)
- Booster shutdown due to the operation of the load symmetry sensor (alarm A33)
- Activation of the battery fault alarm (alarm A10)
- Scheduled maintenance request (alarm A29).

For a description of the UPS status in each of the failure conditions listed above, please refer to the “Faults and alarms” section.

6.9 ALARMS HISTORY RESET

Access the RESET HISTORY menu.

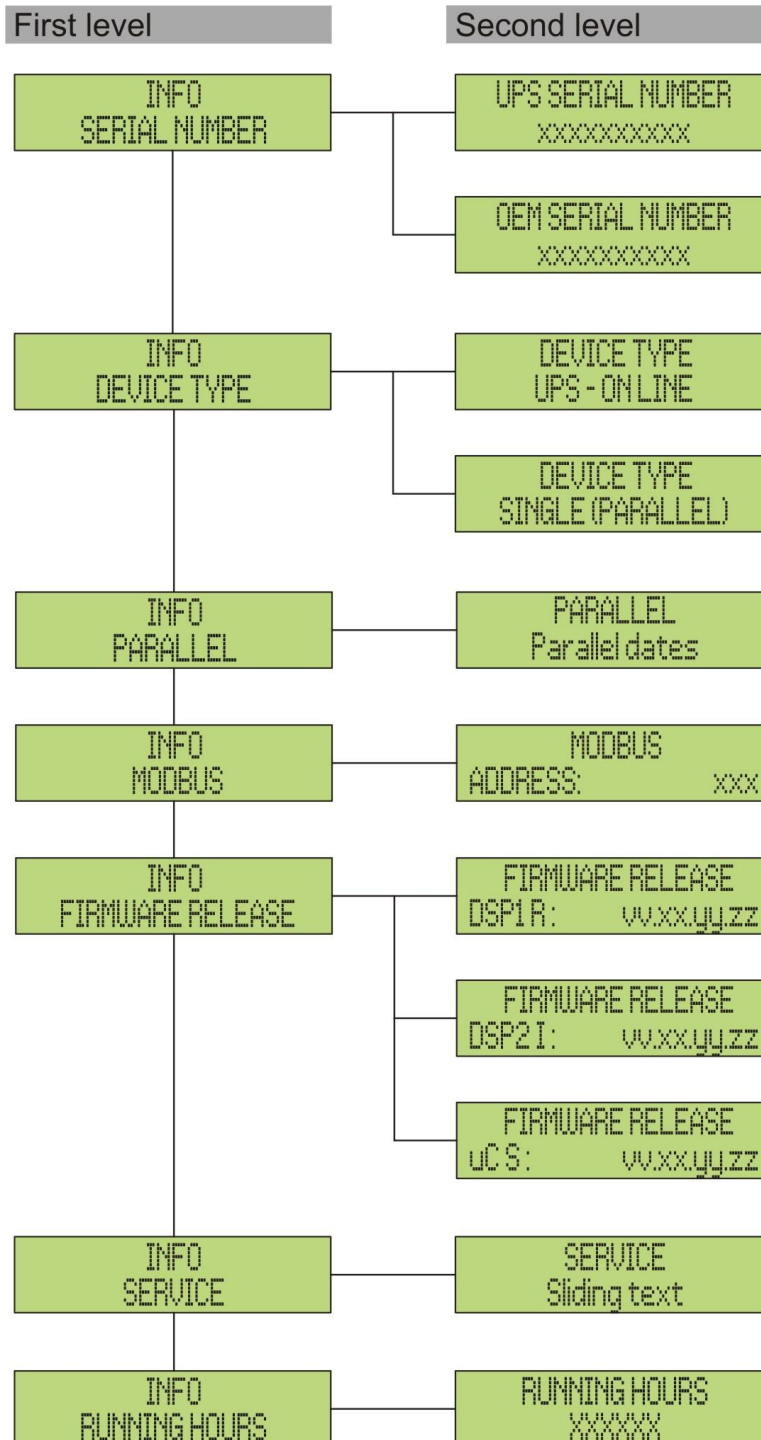


Loss of data

The alarms history contains very important data to monitor the device behaviour over time. We recommend to save the data before deleting it.

7 SYSTEM INFORMATION

The INFO menu provides general information regarding the UPS based on the structure indicated below.



Picture 12 – Structure of INFO menu

All data shown in the various sections are set by the factory via a special interface software and cannot be altered, except by personnel authorized by the manufacturer.

The only adjustable parameters are the MODBUS settings (see SPECIAL menu).

Sub-menu	Displayed data
SERIAL NUMBER	Device serial number given by the manufacturer and by an OEM distributor, if any
DEVICE TYPE	The device type can be: ➤ ON LINE - UPS ➤ FREQUENCY CONVERTER ➤ ECO MODE - UPS ➤ SINGLE UPS ➤ PARALLEL
PARALLEL ⁽¹⁾	Data regarding the parallel configuration
MODBUS	MODBUS address of device
FIRMWARE RELEASE	Firmware versions installed on the system
SERVICE	Scrolling text string with information regarding technical service
RUNNING HOURS	Dates related to hours number of UPS running time

⁽¹⁾ the menu is only active if the UPS belongs to a Parallel or Load Sync system

7.1 PARALLEL OPERATION INFORMATION

The PARALLEL menu is only active if the UPS belongs to a parallel or load-sync system.

7.1.1 UPS position

```

PARALLEL
2 / 6

```

The first number on the second line identifies the *position* of that specific UPS within the parallel system. The second number represents the total number of UPS units.

7.1.2 Master / Slave priority

```

PARALLEL
MASTER

```

The string on the second line may have two values, "MASTER" or "SLAVE". Only one *MASTER UPS* can be present in the system; if not there will be a conflict on the data communication bus.

7.1.3 Communication bus monitoring

```

      PARALLEL
1- [ M   2-   3- S   4- S
   ]     S

```

The second line of this menu gives a general indication regarding the communication between the UPS units composing the system.

- The numbers represent the single UPS units.
- The letters M and S stand for MASTER and SLAVE respectively.
- The brackets [] around a letter indicate that we are working on that specific UPS unit.
- A question mark next to a number indicates that that UPS unit is not communicating on the data bus.

Let us assume to have the following situation:

- system composed of 4 UPS units;
- UPS2 is currently the MASTER UPS;
- we are checking the data communication on UPS3;
- UPS4 is not communicating.

The menu will be as shown below.

```

      PARALLEL
1- S   2-   3- [   4- ?
      M   S ]

```

In case there are more than four paralleled devices, the menu will be as follows.

```

      PARALLEL
1- S   2-   3- [   ....
      M   S ]

```

The dots indicate the presence of a further menu which shows the status of the other UPS units in the system.

7.1.4 Parallel type

```

      PARALLEL
REDUNDANT+x

```

The string on the second line may have two values, "POWER" or "REDUNDANT+x".

- POWER means that the parallel system is so set as to require the presence of all the UPS units to feed the load.
- REDUNDANT+x means that the system is redundant and the redundancy index is indicated by number "X". For example, in a system composed of 3 UPS units, "REDUNDANT+2" means that only one of the UPS units is sufficient to feed the load.

7.1.5 Message statistics

The statistics section regarding the messages exchanged on the communication buses consists of three different menus.

```
CAN STATISTICS SSW
MSG RX: 32564
100.0%
```

Number of messages received and percentage of reception accuracy regarding the status of the static switches. The messages are exchanged between all the UPS units, therefore the number will increase on all of them.

```
CAN STATISTICS INV
SYNC RX: 15849
100.0%
```

Number of messages received and percentage of reception accuracy regarding the synchronism signals. The messages are sent by the MASTER UPS, therefore the number will only increase on the SLAVE UPS units.

```
CAN STATISTICS INV
MSG RX: 9277
99.9%
```

Number of messages received and percentage of reception accuracy regarding the status of the system. The messages are exchanged between all the UPS units, therefore the number will increase on all of them.

7.2 SERVICE INFORMATION

The SERVICE menu provides important information regarding the technical service on the UPS.

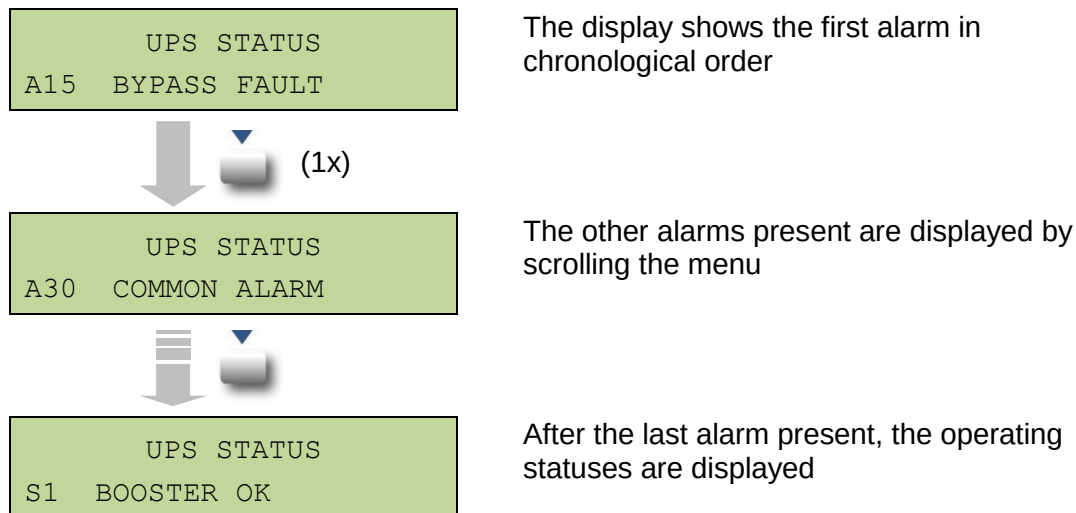
The information is displayed via a text string of max. 60 characters which scrolls on the second display line.

However, please also see the addresses and contact numbers indicated in the present manual.

8 FAULTS AND ALARMS

As indicated in the previous chapters, the system is provided with basic diagnostics which allow immediate visualization of the operating conditions.

The LCD panel displays the alarms screen immediately, and an audible indicator is activated (if enabled). Each screen displays the alphanumeric alarm code and a short description of the alarm.



Injury hazard due to electric shock!

Before carrying out any operation on the UPS, make sure that all the safety precautions are adhered to:

- Any work on the unit must be carried out by qualified personnel;
- Internal components can only be accessed after disconnecting the device from supply sources;
- Always use protective devices designed for each type of activity;
- The instructions contained in the manuals must be strictly followed;
- In case of doubt or impossibility of solving the problem, please contact EFFEKTA® immediately.

8.1 OPERATING STATUS DEFINITION

Status	S1	BOOSTER OK
Description	The rectifier section is working properly.	
Operating condition	The rectifier supplies the inverter and keeps the battery charged.	

Status	S2	BATTERY OK
Description	The battery is connected to the UPS.	
Operating condition	The battery is kept charged by the rectifier and is ready to feed the inverter.	

Status	S3	INVERTER OK
Description	The inverter voltage and frequency are within the allowed range.	
Operating condition	The inverter is ready to feed the load.	

Status	S4	INVERTER --> LOAD
Description	The inverter feeds the load.	
Operating condition	The load is fed via the static inverter switch.	

Status	S5	INV BYPASS SYNC
Description	The inverter is synchronized with the bypass.	
Operating condition	The synchronization between the inverter and the bypass is locked, and the static switch can change over from one source to the other.	

Status	S6	BYPASS OK
Description	The bypass voltage and frequency are within the allowed range.	
Operating condition	The bypass line is ready for changeover in case of inverter failure.	

Status	S7	BYPASS --> LOAD
Description	Load fed by the bypass line.	
Operating condition	The load is fed by the bypass via the static switch, waiting for the inverter to restart.	

Status	S8	BOOST CHARGE
Description	The battery is in <i>BOOST</i> charge.	
Operating condition	The rectifier is charging the battery with a higher voltage. The return to <i>FLOATING</i> charge mode is automatic.	

Status	S9	INV MASTER SYNC
Description	The inverter is synchronized with the MASTER UPS.	
Operating condition	This status is only present on the SLAVE UPS units, and shows that the inverter is synchronized with the signal sent by the MASTER UPS.	

8.2 TROUBLESHOOTING

Alarm	A1	MAINS FAULT
Description	The voltage or frequency of the input line are out of tolerance.	
Possible causes	➤ Mains instability or failure. ➤ Wrong phase rotation.	
Solutions	1. Check the connections to the mains. 2. Check the stability of mains voltage. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A2	INPUT WRONG SEQ
Description	The phase rotation on the rectifier input line is wrong.	
Possible causes	➤ Wrong connection of power cables.	
Solutions	1. Check the phase rotation. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A3	BOOSTER STOPPED
Description	The rectifier has been temporarily disconnected and the inverter is fed by the battery.	
Possible causes	➤ Instability of the AC line voltage or frequency. ➤ Possible fault in the rectifier control circuit.	
Solutions	1. Check the parameters of the AC line voltage. 2. Restart the device. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A4	BOOSTER FAULT
Description	The rectifier has been disconnected due to an internal fault.	
Possible causes	➤ Possible fault in the rectifier control circuit.	
Solutions	1. Check which alarms are present and carry out the indicated procedures. 2. Restart the device. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A5 DC VOLTAGE FAULT
Description	The measured DC voltage is out of tolerance.
Possible causes	➤ The battery has reached the discharge voltage due to a power failure. ➤ Measuring circuit failure.
Solutions	1. Check the actual value of the measured DC voltage. 2. In case of mains failure, wait for the AC voltage to be restored. 3. Check which alarms are present and carry out the indicated procedures. 4. Restart the device. 5. If the alarm persists, contact our Technical Support Service.

Alarm	A6 BATTERY IN TEST
Description	The rectifier voltage is reduced to start a short controlled discharge of the battery.
Possible causes	➤ A battery test has been started automatically (if set), or manually by the user.
Solutions	1. Wait for the test to end, and check possible battery faults.

Alarm	A7 BCB OPEN
Description	The battery isolator is open.
Possible causes	➤ Battery isolator open.
Solutions	1. Check the status of the battery isolator. 2. Check the functionality of the auxiliary contact of the isolator. 3. Check the connection between the auxiliary contact of the isolator and the auxiliary terminals of the UPS (if provided). 4. If the alarm persists, contact our Technical Support Service.

Alarm	A8 BATTERY DISCHARGE
Description	The battery is discharging.
Possible causes	➤ The battery is discharging due to a mains failure. ➤ Rectifier failure.
Solutions	1. Check which alarms are present and carry out the indicated procedures. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A9 BATTERY AUT END
Description	The battery has reached the pre-alarm discharge level.
Possible causes	➤ The battery is discharging due to a mains failure. ➤ Rectifier failure.
Solutions	1. Check which alarms are present and carry out the indicated procedures. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A10 BATTERY FAULT
Description	Fault following a battery test.
Possible causes	➤ Battery fault.
Solutions	1. Check the battery. 2. Reset the system. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A11 SHORT CIRCUIT
Description	The current sensor has detected a short-circuit at the output.
Possible causes	➤ Load problem. ➤ Measuring circuit failure.
Solutions	1. Check the loads connected to the UPS output. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A12 STOP TIMEOUT SC
Description	Inverter shutdown due to an extended short-circuit during a power failure, or due to an overcurrent on the inverter bridge input.
Possible causes	➤ Short-circuit on the loads during a power failure. ➤ Inverter bridge fault. ➤ Temporary current peak.
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A13 INV OUT OF TOL
Description	The inverter voltage or frequency are out of tolerance.
Possible causes	➤ Inverter shutdown due to an alarm. ➤ Inverter failure.
Solutions	1. Check which alarms are present and carry out the indicated procedures. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A14 BYPASS WR SEQ
Description	The phase rotation of the bypass line is wrong.
Possible causes	➤ Wrong connection of power cables.
Solutions	1. Check the phase rotation. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A15 BYPASS FAULT
Description	The voltage or frequency of the bypass line are out of tolerance.
Possible causes	➤ Bypass line instability or failure. ➤ Wrong phase rotation.
Solutions	1. Check the connections to the mains. 2. Check the stability of mains voltage. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A16 BYPASS --> LOAD
Description	The load is fed by the bypass line.
Possible causes	➤ Temporary changeover due to inverter failure.
Solutions	1. Verify the inverter status and check whether other alarms are present. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A17 RETRANSFER BLOCK
Description	The load is blocked on the bypass line.
Possible causes	➤ Very frequent changeovers due to load in-rush currents. ➤ Static switch problems.
Solutions	1. Reset the system. 2. Check the in-rush currents of the loads. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A18 MBCB CLOSED
Description	The manual bypass isolator is closed.
Possible causes	➤ Manual bypass isolator closed.
Solutions	1. Check the status of the manual bypass isolator. 2. Check the functionality of the auxiliary contact of the isolator. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A19 OCB OPEN
Description	The output isolator is open.
Possible causes	➤ Output isolator open.
Solutions	1. Check the status of the output isolator. 2. Check the functionality of the auxiliary contact of the isolator. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A20 OVERLOAD
Description	The current sensor has detected an overload at the output. If the alarm persists, the thermal image protection will be activated (alarm A21).
Possible causes	➤ Output overload. ➤ Measuring circuit failure.
Solutions	1. Check the loads connected to the UPS output. 2. Contact our Technical Support Service.

Alarm	A21 THERMAL IMAGE
Description	The thermal image protection has been activated after an extended inverter overload. The inverter is shut down for 30 minutes and then restarted.
Possible causes	➤ Output overload. ➤ Measuring circuit failure.
Solutions	1. Check the loads connected to the UPS output. 2. Should you need to restore the inverter supply immediately, reset the system. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A22 BYPASS SWITCH
Description	The "Normal/Bypass" selector has been operated.
Possible causes	➤ Maintenance operation.
Solutions	1. Check the selector position. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A23 EPO PRESSED
Description	The system is blocked due to the activation of the emergency power off button.
Possible causes	➤ Activation of the (local or remote) emergency power off button.
Solutions	1. Release the emergency power off button and reset the alarm. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A24 HIGH TEMPERATURE
Description	High temperature of the heat sink on the inverter bridge or tripping of the DC fuses which protect the inverter bridge.
Possible causes	➤ Fault of the heat sink cooling fans. ➤ The room temperature or cooling air temperature is too high. ➤ Tripping of the DC protection fuses.
Solutions	1. Check the fans operation. 2. Clean the ventilation grids and the air filters, if any. 3. Check the air conditioning system (if present). 4. Check the status of the DC fuses on the inverter bridge input. 5. If the alarm persists, contact our Technical Support Service.

Alarm	A25 INVERTER OFF
Description	The inverter is blocked due an operation failure.
Possible causes	➤ Various.
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A26 COMMUNIC ERROR
Description	Internal error.
Possible causes	➤ Microcontroller communication problems.
Solutions	1. If the alarm persists, contact our Technical Support Service.

Alarm	A27 EEPROM ERROR
Description	The controller has detected an error in the parameters stored in EEPROM.
Possible causes	➤ Wrong parameters entered during programming.
Solutions	1. Contact our Technical Support Service.

Alarm	A28 CRITICAL FAULT
Description	An alarm has been activated which causes the shutdown of part of the UPS (rectifier, inverter, static switch).
Possible causes	➤ System failure.
Solutions	1. Check which alarms are present and carry out the indicated procedures. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A29 MAINTENANCE REQ
Description	It is necessary to carry out maintenance work.
Possible causes	➤ The time limit since the last maintenance work has elapsed.
Solutions	1. Contact our Technical Support Service.

Alarm	A30 COMMON ALARM
Description	Common alarm.
Possible causes	➤ At least one alarm is present.
Solutions	1. Check which alarms are present and carry out the indicated procedures.

Alarm	A31 MBCB BUS CLOSED
Description	The manual bypass isolator is closed.
Possible causes	➤ Manual bypass isolator closed.
Solutions	1. Check the status of the manual bypass isolator. 2. Check the functionality of the auxiliary contact of the isolator. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A32 EPO BUS CLOSED
Description	The system is blocked due to the activation of the emergency power off button.
Possible causes	➤ Activation of the (local or remote) emergency power off button.
Solutions	1. Release the emergency power off button and reset the alarm. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A33 ASYMMETRIC LOAD
Description	The positive and negative voltages measured on the DC capacitors towards the middle point are different.
Possible causes	➤ Possible failure on the measuring circuit. ➤ Possible fault of DC capacitors.
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A34 SERVICE REQUIRED
Description	A UPS check is necessary.
Possible causes	➤ Possible UPS fault.
Solutions	1. If the alarm persists, contact our Technical Support Service.

Alarm	A35 DIESEL MODE
Description	The UPS is supplied by the diesel generator.
Possible causes	➤ The auxiliary contact which activates the diesel generator connected to the UPS is closed, and imposes this operating mode.
Solutions	1. Wait for the diesel generator to stop as soon as the mains voltage is restored. 2. Check the connection of the auxiliary contact which signals the diesel generator start, to terminals XD1/XD2. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A36 DC FASTSHUTDOWN
Description	Inverter shutdown due to the operation of the protection sensor as a result of sudden DC voltage variations.
Possible causes	➤ Battery fault.
Solutions	1. Check the battery. 2. Reset the system. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A38 INV --> LOAD
Description	The load is fed by the inverter. This alarm is active for UPS systems in "ECO" mode, where the preferential supply is from the bypass line.
Possible causes	➤ Temporary changeover due to bypass line failure.
Solutions	1. Verify the status of the bypass line and check whether other alarms are present. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A39 INV ERROR LOOP
Description	The control is not able to regulate the inverter voltage precisely.
Possible causes	➤ Regulation system failure.
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A40 SSI FAULT
Description	The system has detected a failure in the static inverter switch.
Possible causes	➤ Possible problems on the loads. ➤ Static switch fault.
Solutions	1. Check the absorption of the loads and the presence of DC components, if any, on AC current. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A41 RECT ERROR LOOP
Description	The control is not able to regulate the rectifier output voltage precisely.
Possible causes	➤ Regulation system failure.
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A43 CURR ERROR LOOP
Description	The control is not able to regulate the rectifier output current precisely.
Possible causes	➤ Regulation system failure.
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A44 DESAT IGBT INV
Description	The inverter is blocked due to the operation of the desaturation sensor of the IGBT drivers.
Possible causes	➤ Inverter bridge fault.
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A45 HIGH TEMP SSW
Description	High temperature of the static switch heat sink.
Possible causes	➤ Fault of the heat sink cooling fans. ➤ The room temperature or cooling air temperature is too high.
Solutions	1. Check the fans operation. 2. Clean the ventilation grids and the air filters, if any. 3. Check the air conditioning system (if present). 4. If the alarm persists, contact our Technical Support Service.

Alarm	A46 PAR LOST REDUND
Description	This alarm is only active on PARALLEL systems. Continuity is not ensured in the event of a fault on one of the UPS units.
Possible causes	➤ The total load is higher than the maximum expected value. ➤ Possible failure on the measuring circuit.
Solutions	1. Check the load fed by the system. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A47 SEND PARAM ERROR
Description	Internal error.
Possible causes	➤ Microcontroller communication problems.
Solutions	1. Contact our Technical Support Service.

Alarm	A48 RCV PARAM ERROR
Description	Internal error.
Possible causes	➤ Microcontroller communication problems.
Solutions	1. Contact our Technical Support Service.

Alarm	A49 TEST MODE ERROR
Description	Internal error.
Possible causes	➤ Microcontroller communication problems.
Solutions	1. Contact our Technical Support Service.

Alarm	A50 SSW BLOCKED
Description	The static switch is blocked. The load is no longer supplied.
Possible causes	➤ Loads failure. ➤ Possible UPS fault.
Solutions	1. Check the loads for possible failures. 2. Reset the system. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A51 BATT TEMPERATURE
Description	The battery temperature is out of tolerance. This alarm is only active when the temperature probe is installed and enabled on the battery.
Possible causes	➤ Anomalous temperature in the battery cabinet. ➤ Possible failure on the measuring circuit.
Solutions	1. Check the temperature on the batteries and remove the cause of the alarm, if any. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A52 DC COMP ERROR
Description	Internal error.
Possible causes	➤ Microcontroller communication problems.
Solutions	1. Contact our Technical Support Service.

Alarm	A53 FIRMWARE ERROR
Description	The controller has detected an incompatibility in the control software.
Possible causes	➤ The software update was not performed properly.
Solutions	1. Contact our Technical Support Service.

Alarm	A54 CAN ERROR
Description	Internal error.
Possible causes	➤ Microcontroller communication problems.
Solutions	1. Contact our Technical Support Service.

Alarm	A55 PAR CABLE DISC
Description	Parallel cable doesn't communicate.
Possible causes	➤ Parallel cable disconnected or damaged.
Solutions	1. Check the connection of cable 2. Contact our Technical Support Service.

Alarm	A63 START SEQ BLOCK
Description	During the UPS start-up a failure prevented the proper execution of the sequence.
Possible causes	➤ Control devices in wrong position or operated improperly. ➤ Possible internal fault.
Solutions	1. Make sure the position of the control devices (isolators, selectors) is as specified in the procedures (see "Installation and start-up" section). 2. If the alarm persists, contact our Technical Support Service.

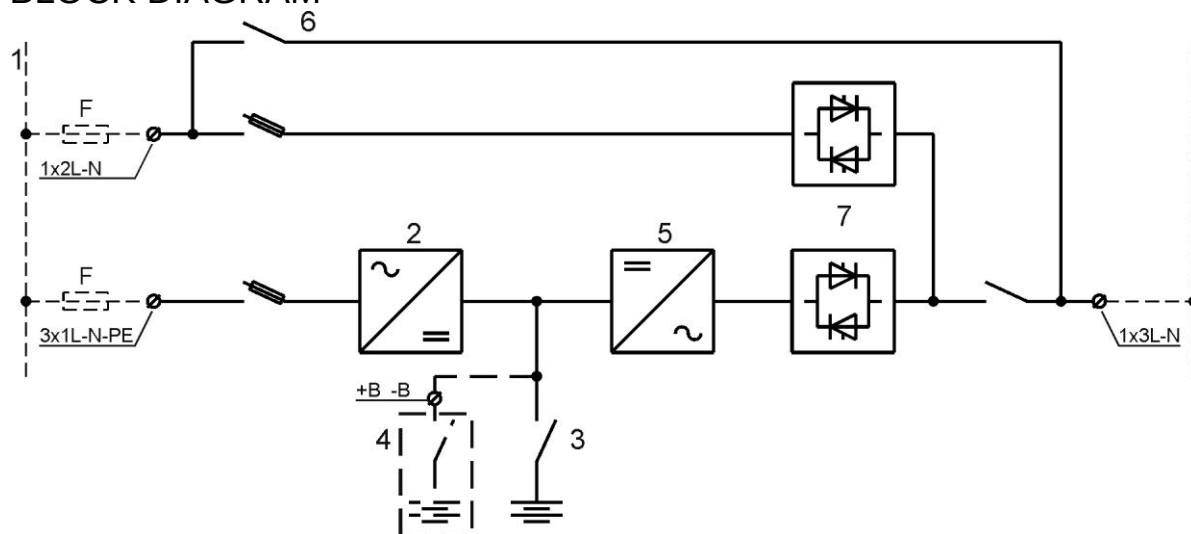
TECHNICAL DATA SHEET “PEGASUS II”

10 – 15 – 20 kVA
3Ph_(In) – 1Ph_(Out)

GENERAL INFORMATION

POWER		kVA	10	15	20
UPS Type			ON LINE – Double Conversion		
Nominal output power (Cosφ 0,8)		kVA	10	15	20
Nominal output power (Cosφ 1,0)		kW	8	12	16
Efficiency (AC ÷ AC) (ON LINE - Double Conversion)	@25% load	%	> 88		
	@50% load		> 90		
	@75% load		> 91		
	@100% load		> 92		
Efficiency (AC ÷ AC) (Eco Mode)		%	> 98		
Heat dissipation at nominal load and voltage		kW	695	1040	1390
		kcal/h	598	894	1195
UPS ambient temperature		°C	0 ÷ 40		
BATTERY ambient temperature		°C	0 ÷ +25		
UPS storage temperature		°C	-10 ÷ +70		
BATTERY storage temperature		°C	-10 ÷ +60		
Relative humidity (non condensing)		%	< 95		
Altitude		m	< 1000 (above sea level)		
Power derating for altitude > 1000 m			According to “IEC62040-3” 1% power derating every 100m above 1000m up to max 2000m		
Ventilation			Forced		
Requested cooling air volume		m ³ /h	500	500	600
Audible noise level (according to IEC EN 62040-3)		dB	< 52 db		
Standard battery type lead acid		n° cells	2 x 180		
			2 X 186		
Protection degree			IP 20		
Electromagnetic compatibility EMI			According to “IEC EN 62040-2” (CE marking)		
Safety			IEC EN 62040-1		
Test and performance			IEC EN 62040-3		
Paint			RAL 7016		
Accessibility			Front and top		
Installation			10 cm from the wall		
Dimensions		mm	L = 450 P = 650 H = 1200		
Weight (with battery)		kg	Min.175	Min. 260	Min. 260
			Max. 285	Max. 275	Max. 275
Weight (without battery)		kg	100	110	110
Static load (with battery)		kg/m ²	Min. 583	Min. 859	Min. 859
			Max. 878	Max- 912	Max. 912
Static load (without battery)		kg/m ²	321	364	381
Input/Output cable connection			Bottom side		
Transport			By wheels		
Transport mechanical stress			According to “IEC EN 62040-3”		
Design standards			“IEC EN 62040”		
			“ISO 9001:2008”		
Free contact interface			On request		
Serial communication interface			Standard: RS232 - USB		
			Optional: RS485 (ModBus protocol)		
Parallel configuration (optional)			Up to 5+1 (Redundant parallel)		
			Up to 6 (Power parallel)		

BLOCK DIAGRAM



1. Input mains (separate for by-pass and rectifier)
2. Rectifier and battery charger
3. Maximum internal battery: 3,3Ah, 7,2Ah and 9Ah – 60 or 62 batteries
4. Optional external battery
5. Inverter
6. Emergency line (by-pass with backfeed contactor)
7. Inverter (SSI) and by-pass (SSB) static switch

UPS INPUT: RECTIFIER AND BATTERY CHARGER

POWER		kVA	10	15	20
Input			Three-phase + Neutral		
Nominal input voltage range		Vac %	400 -20/+15		
Input frequency range		Hz %	50 – 60 ±5		
Input power factor			> 0.99		
Input current THD at nominal voltage and THDV <0,5%	@25% load	%	20 <		
	@50% load		8 <		
	@75% load		6 <		
	@100% load		4 <		
DC output voltage accuracy		%	+/- 1%		
DC output voltage ripple		% rms	2% rms		
Battery recharging characteristic			IU (DIN 41773)		
Maximum recharging current - at nominal load		A	6	10	6
Bridge rectifier type			IGBT PFC		
Input protection			Fuses		
Inrush input current		A	< maximum nominal current		
Earth leakage current		mA	< 22		
Nominal current absorbed from mains (at nominal load and battery charged)		A	12	19	23
Maximum current absorbed from mains (at nom. Load, max. recharging current and min. input voltage)		A	24	36	36
Settable walk-in		sec	Sectable from 5" to 30"		
Settable hold-off		sec	Sectable from 1" to 300"		

BATTERY

POWER		kVA	10	15	20
Maximum internal battery			60 or 62 batteries 3,3AH - 7,2AH - 9AH		
Standard type			Maintenance free		
Cells number (settable)			2x180 or 2x186		
Floating voltage at 25°C (settable)		Vdc	2x406 or 2x418		
Minimum battery discharge voltage		Vdc	Settable		
Inverter input power (at nominal load)		kW	8,5	12,7	17
Inverter input current (at nominal load and minimum Vdc)		A	12	18	24
Battery Protection (external to the UPS)			Fuses		
Battery Test			Included as standard		

UPS OUTPUT: INVERTER

POWER	kVA	10	15	20
Inverter Bridge		Modular IGBT (transformerless)		
Nominal output power (Cosφ 0,8)	kVA	10	15	20
Nominal output power (Cosφ 1,0)	kW	8	12	16
Efficiency (DC ÷ AC)	%	> 95		
Output		Single phase		
Nominal output voltage (selectable)	Vac	220-230-240		
Output voltage stability				
- Static (balanced Load)	%	± 1		
- Static (unbalanced Load)	%	± 2		
- Dynamic (step load 20%÷100%÷20%)	%	± 5		
- Output voltage recovery time (after step load)	ms	< 20		
- IEC EN 62040-3		Class 1		
Output frequency (selectable)	Hz	50 - 60		
Output frequency stability				
- Free running quartz oscillator	Hz	± 0,001		
- Inverter sync. with mains	Hz	± 2 (other on request)		
- Slew rate	Hz/s	±1		
Nominal output current (@ 230 Vac output)				
- Cosφ 0,8	A	43	65	87
- Cosφ 1		35	52	70
Overload capability		125% for 10 min 125%/150% for 30 sec >150% for 10 sec		
Short circuit current	A	70	104	140
Short circuit characteristic		Elect. short circuit protection, current limited at 2 times nominal current. Automatic stop after 5 seconds		
Selectivity		Within ½ cycle (Fuse GL 20% In)		
Output waveform		Sinusoidal		
Output harmonic distortion				
- Linear Load	%	< 2		
- Non Linear Load		< 5		
- IEC EN 62040-3		Fully compliant		
Max crest factor without derating		3 : 1		

UPS OUTPUT: BY PASS

Automatic static by-pass		Electronic thyristor switch
Protection		Fuses
Bypass	Vac	Single phase
Nominal Voltage (selectable)	Vac	220 – 230 – 240
Range	%	±10
Nominal Frequency (selectable)	Hz	50-60
Range	%	± (1÷5) adjustable
Transfer mode		Without break
Transfer inverter → automatic bypass		In case of : - Short circuit - Battery end of discharge - Inverter test - Inverter not operating
Retransfer automatic bypass → inverter		- Automatic - Block on bypass after 6 transfers within 2 minutes, reset by front panel
Overload Capability	%	150 continuously 1000 for 1 Cycle
Manual By-Pass		Standard: - Electronically controlled - No break
Back feed protection		Standard

OPTIONS

1. BATTERY TEMPERATURE VOLTAGE COMPENSATION
2. INSULATION TRANSFORMER ON BY-PASS
3. VOLTAGE ADAPTATION AUTO-TRANSFORMERS
4. RELAY CARD (Eight signals Alarms/Statuses), Free relay contact
5. SERIAL INTERFACE RS-485 (MOD-BUS protocol)
6. SNMP ADAPTER
7. REMOTE MONITORING PANEL
8. PARALLEL CARD INTERFACE KIT
9. EXTERNAL BATTERY CABINET
10. WALL MOUNTED FUSED SWITCH BOX
11. SPECIAL PAINT
12. LOAD-SYNC BUS CARD INTERFACE KIT
13. DIESEL GENERATOR
14. EXTERNAL EPO AUXILIARY CONTACT
15. EXTERNAL MCB AUXILIARY CONTACT

OTHER SOFTWARE SELECTABLE FEATURES

1. OFF-LINE
2. RECTIFIER WALK-IN TIME
3. RECTIFIER DELAY ON STARTUP (HOLD-OFF TIME)
4. FREQUENCY CONVERTER MODE

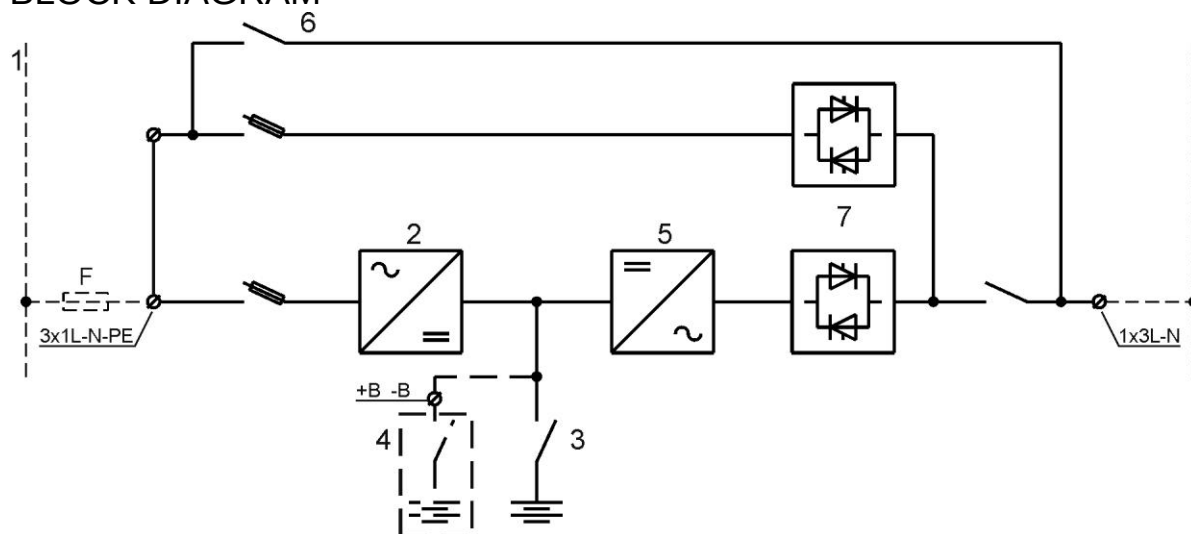
TECHNICAL DATA SHEET “PEGASUS II”

10 – 15 – 20 kVA
3Ph_(In) – 3Ph_(Out)

GENERAL INFORMATION

POWER		kVA	10	15	20
UPS Type			ON LINE – Double Conversion		
Nominal output power (Cosφ 0,8)		kVA	10	15	20
Nominal output power (Cosφ 1,0)		kW	8	12	16
Efficiency (AC ÷ AC) (ON LINE - Double Conversion)	@25% load	%	> 88		
	@50% load		> 90		
	@75% load		> 91		
	@100% load		> 92		
Efficiency (AC ÷ AC) (Eco Mode)		%	> 98		
Heat dissipation at nominal load and voltage		kW	695	1040	1390
		kcal/h	598	894	1195
UPS ambient temperature		°C	0 ÷ 40		
BATTERY ambient temperature		°C	0 ÷ +25		
UPS storage temperature		°C	-10 ÷ +70		
BATTERY storage temperature		°C	-10 ÷ +60		
Relative humidity (non condensing)		%	< 95		
Altitude		m	< 1000 (above sea level)		
Power derating for altitude > 1000 m			According to “IEC62040-3” 1% power derating every 100m above 1000m up to max 2000m		
Ventilation			Forced		
Requested cooling air volume		m ³ /h	500	500	600
Audible noise level (according to IEC EN 62040-3)		dB	< 52 db		
Standard battery type lead acid		n° cells	2 x 180		
			2 X 186		
Protection degree			IP 20		
Electromagnetic compatibility EMI			According to “IEC EN 62040-2” (CE marking)		
Safety			IEC EN 62040-1		
Test and performance			IEC EN 62040-3		
Paint			RAL 7016		
Accessibility			Front and top		
Installation			10 cm from the wall		
Dimensions		mm	L = 450 P = 650 H = 1200		
Weight (with battery)		kg	Min.175	Min. 260	Min. 260
			Max. 285	Max. 275	Max. 275
Weight (without battery)		kg	100	110	110
Static load (with battery)		kg/m ²	Min. 570	Min. 829	Min. 829
			Max. 945	Max. 895	Max. 895
Static load (without battery)		kg/m ²	315	348	348
Input/Output cable connection			Bottom side		
Transport			By wheels		
Transport mechanical stress			According to “IEC EN 62040-3”		
Design standards			“IEC EN 62040”		
			“ISO 9001:2008”		
Free contact interface			On request		
Serial communication interface			Standard: RS232 - USB		
			Optional: RS485 (ModBus protocol)		
Parallel configuration (optional)			Up to 5+1 (Redundant parallel)		
			Up to 6 (Power parallel)		

BLOCK DIAGRAM



1. Input mains (separate for by-pass and rectifier)
2. Rectifier and battery charger
3. Maximum internal battery: 3,3Ah, 7,2Ah and 9Ah – 60 or 62 batteries
4. Optional external battery
5. Inverter
6. Emergency line (by-pass with backfeed contactor)
7. Inverter (SSI) and by-pass (SSB) static switch

UPS INPUT: RECTIFIER AND BATTERY CHARGER

POWER		kVA	10	15	20
Input			Three-phase + Neutral		
Nominal input voltage range		Vac %	400 -20/+15		
Input frequency range		Hz %	50 – 60 ±5		
Input power factor			> 0.99		
Input current THD at nominal voltage and THDV <0,5%	@25% load	%	13 <		
	@50% load		7 <		
	@75% load		5 <		
	@100% load		3 <		
DC output voltage accuracy		%	+/- 1%		
DC output voltage ripple		% rms	2% rms		
Battery recharging characteristic			IU (DIN 41773)		
Maximum recharging current - at nominal load		A	6	10	6
Bridge rectifier type			IGBT PFC		
Input protection			Fuses		
Inrush input current		A	< maximum nominal current		
Earth leakage current		mA	< 22		
Nominal current absorbed from mains (at nominal load and battery charged)		A	12	19	23
Maximum current absorbed from mains (at nom. Load, max. recharging current and min. input voltage)		A	24	36	36
Settable walk-in		sec	Sectable from 5" to 30"		
Settable hold-off		sec	Sectable from 1" to 300"		

BATTERY

POWER		kVA	10	15	20
Maximum internal battery			60 or 62 batteries 3,3AH - 7,2AH - 9AH		
Standard type			Maintenance free		
Cells number (settable)			2x180 or 2x186		
Floating voltage at 25°C (settable)		Vdc	2x406 or 2x418		
Minimum battery discharge voltage		Vdc	Settable		
Inverter input power (at nominal load)		kW	8,5	12,7	17
Inverter input current (at nominal load and minimum Vdc)		A	12	18	24
Battery Protection (external to the UPS)			Fuses		
Battery Test			Included as standard		

UPS OUTPUT: INVERTER

POWER	kVA	10	15	20
Inverter Bridge		Modular IGBT (transformerless)		
Nominal output power (Cosφ 0,8)	kVA	10	15	20
Nominal output power (Cosφ 1,0)	kW	8	12	16
Efficiency (DC ÷ AC)	%	> 95		
Output		Three-phase + Neutral		
Nominal output voltage (selectable)	Vac	380-400-415		
Output voltage stability				
- Static (balanced Load)	%	± 1		
- Static (unbalanced Load)	%	± 2		
- Dynamic (step load 20%÷100%÷20%)	%	± 5		
- Output voltage recovery time (after step load)	ms	< 20		
- IEC EN 62040-3		Class 1		
Output frequency (selectable)	Hz	50 - 60		
Output frequency stability				
- Free running quartz oscillator	Hz	± 0,001		
- Inverter sync. with mains	Hz	± 2 (other on request)		
- Slew rate	Hz/s	±1		
Nominal output current (@ 400Vac output)				
- Cosφ 0,8	A	15	22	29
- Cosφ 1		12	18	23
Overload capability		125% for 10 min 125%/150% for 30 sec >150% for 10 sec		
Short circuit current	A	24	36	46
Short circuit characteristic		Elect. short circuit protection, current limited at 2 times nominal current. Automatic stop after 5 seconds		
Selectivity		Within ½ cycle (Fuse GL 20% In)		
Output waveform		Sinusoidal		
Output harmonic distortion				
- Linear Load	%	< 1		
- Non Linear Load		< 5		
- IEC EN 62040-3		Fully compliant		
Max crest factor without derating		3 : 1		

UPS OUTPUT: BY PASS

Automatic static by-pass		Electronic thyristor switch
Protection		Fuses
Bypass	Vac	Three-phase + Neutral
Nominal Voltage (selectable)	Vac	380 – 400 – 415
Range	%	±10
Nominal Frequency (selectable)	Hz	50-60
Range	%	± (1÷5) adjustable
Transfer mode		Without break
Transfer inverter → automatic bypass		In case of : - Short circuit - Battery end of discharge - Inverter test - Inverter not operating
Retransfer automatic bypass → inverter		- Automatic - Block on bypass after 6 transfers within 2 minutes, reset by front panel
Overload Capability	%	150 continuously 1000 for 1 cycle
Manual By-Pass		Standard: - Electronically controlled - No break
Back feed protection		Standard

OPTIONS

1. BATTERY TEMPERATURE VOLTAGE COMPENSATION
2. INSULATION TRANSFORMER ON BY-PASS
3. VOLTAGE ADAPTATION AUTO-TRANSFORMERS
4. RELAY CARD (Eight signals Alarms/Statuses), Free relay contact
5. SERIAL INTERFACE RS-485 (MOD-BUS protocol)
6. SNMP ADAPTER
7. REMOTE MONITORING PANEL
8. PARALLEL CARD INTERFACE KIT
9. EXTERNAL BATTERY CABINET
10. WALL MOUNTED FUSED SWITCH BOX
11. SPECIAL PAINT
12. LOAD-SYNC BUS CARD INTERFACE KIT
13. DIESEL GENERATOR
14. EXTERNAL EPO AUXILIARY CONTACT
15. EXTERNAL MCB AUXILIARY CONTACT

OTHER SOFTWARE SELECTABLE FEATURES

1. OFF-LINE
2. RECTIFIER WALK-IN TIME
3. RECTIFIER DELAY ON STARTUP (HOLD-OFF TIME)
4. FREQUENCY CONVERTER MODE

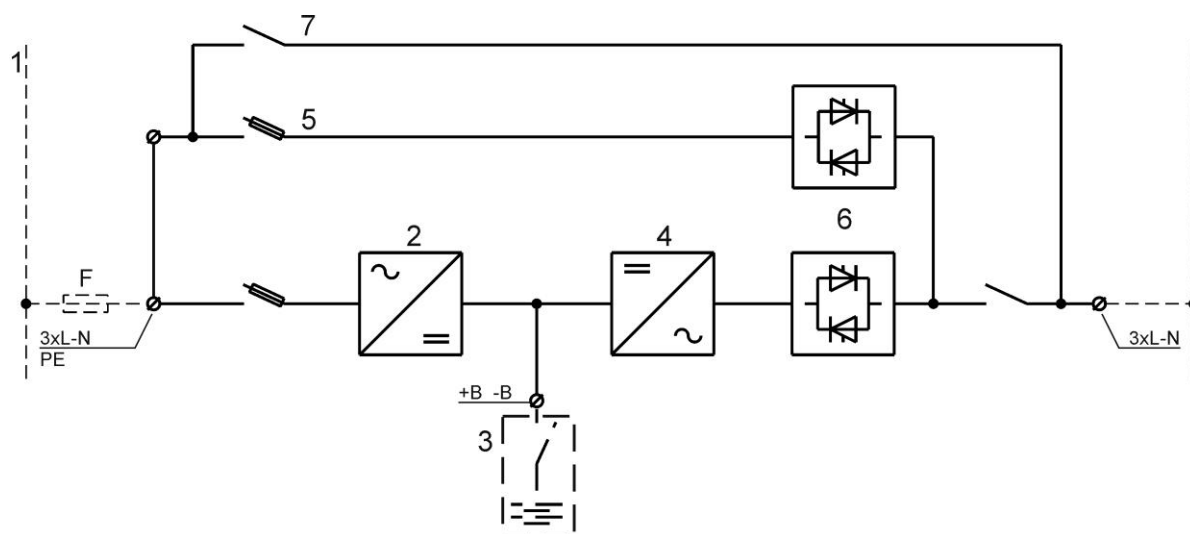
TECHNICAL DATA SHEET “PEGASUS II”

30 – 40 kVA
3Ph_(In) – 3Ph_(Out)

GENERAL INFORMATION

POWER		kVA	30	40
UPS Type			ON LINE – Double Conversion	
Nominal output power (Cosφ 0,8)		kVA	30	40
Nominal output power (Cosφ 1,0)		kW	24	32
Efficiency (AC ÷ AC) (ON LINE - Double Conversion)	@25% load	%	> 88	
	@50% load		> 90	
	@75% load		> 91	
	@100% load		> 92	
Efficiency (AC ÷ AC) (Eco Mode)		%	> 98	
Heat dissipation at nominal load and voltage		kW kcal/h	2080 1788	2780 2390
UPS ambient temperature		°C	0 ÷ 40	
BATTERY ambient temperature		°C	0 ÷ +25	
UPS storage temperature		°C	-10 ÷ +70	
BATTERY storage temperature		°C	-10 ÷ +60	
Relative humidity (non condensing)		%	< 95	
Altitude		m	< 1000 (above sea level)	
Power derating for altitude > 1000 m			According to “IEC62040-3” 1% power derating every 100m above 1000m up to max 2000m	
Ventilation			Forced	
Requested cooling air volume		m³/h	800	900
Audible noise level (according to IEC EN 62040-3)		dB	< 52 db	
Standard battery type lead acid		n° cells	2 x 180 2 x 186	
Protection degree			IP 20	
Electromagnetic compatibility EMI			According to “IEC EN 62040-2” (CE marking)	
Safety			IEC EN 62040-1	
Test and performance			IEC EN 62040-3	
Paint			RAL 7016	
Accessibility			Front and top	
Installation			10 cm from the wall	
Dimensions		mm	L = 450 P = 650 H = 1200	
Weight		kg	140	
Static load		kg/m²	464	
Input/Output cable connection			Bottom front side	
Transport			By wheels	
Transport mechanical stress			According to “IEC EN 62040-3”	
Design standards			“IEC EN 62040” “ISO 9001:2008”	
Free contact interface			On request	
Serial communication interface			Standard: RS232 - USB Optional: RS485 (ModBus protocol)	
Parallel configuration (optional)			Up to 5+1 (Redundant parallel) Up to 6 (Power parallel)	

BLOCK DIAGRAM



1. Common input rectifier and bypass
2. Rectifier and battery charger
3. External battery
4. Inverter
5. Emergency line (optional by-pass with backfeed contactor).
6. Inverter (SSI) and by-pass (SSB) static switch

UPS INPUT: RECTIFIER AND BATTERY CHARGER

POWER		kVA	30	40
Input			Three-phase + Neutral	
Nominal input voltage range		Vac %	400 -20/+15	
Input frequency range		Hz %	50 – 60 ±5	
Input power factor			> 0.99	
Input current THD at nominal voltage and THDV <0,5%	@25% load	%	< 14	
	@50% load		< 7	
	@75% load		< 5	
	@100% load		< 4	
DC output voltage accuracy		%	+/- 1%	
DC output voltage ripple		% rms	1% rms	
Battery recharging characteristic			IU (DIN 41773)	
Maximum recharging current - at nominal load		A	10	8
Bridge rectifier type			IGBT PFC	
Input protection			Fuses	
Inrush input current		A	< maximum nominal current	
Earth leakage current		mA	< 22	
Nominal current absorbed from mains (at nominal load and battery charged)		A	38	50
Maximum current absorbed from mains (at nom. Load, max. recharging current and min. input voltage)		A	58	72
Settable walk-in		sec	Sectable from 5" to 30"	
Settable hold-off		sec	Sectable from 1" to 300"	

BATTERY

POWER		kVA	30	40
External battery				
Standard type			Maintenance free	
Cells number (settable)			2x180 or 2x186	
Floating voltage at 25°C (settable)		Vdc	2x406 or 2x418	
Minimum battery discharge voltage		Vdc	Settable	
Inverter input power (at nominal load)		kW	25,4	34
Inverter input current (at nominal load and minimum Vdc)		A	36	48
Battery Protection (external to the UPS)			Fuses	
Battery Test			Included as standard	

UPS OUTPUT: INVERTER

POWER	kVA	30	40
Inverter Bridge		Modular IGBT (transformerless)	
Nominal output power (Cosφ 0,8)	kVA	30	40
Nominal output power (Cosφ 1,0)	kW	24	32
Efficiency (DC ÷ AC)	%	> 95	
Output		Three-phase + Neutral	
Nominal output voltage (selectable)	Vac	380-400-415	
Output voltage stability			
- Static (balanced Load)	%	± 1	
- Static (unbalanced Load)	%	± 2	
- Dynamic (step load 20%÷100%÷20%)	%	± 5	
- Output voltage recovery time (after step load)	ms	< 20	
- IEC EN 62040-3		Class 1	
Output frequency (selectable)	Hz	50 - 60	
Output frequency stability			
- Free running quartz oscillator	Hz	± 0,001	
- Inverter sync. with mains	Hz	± 2 (other on request)	
- Slew rate	Hz/s	±1	
Nominal output current (@ 400Vac output)			
- Cosφ 0,8	A	44	58
- Cosφ 1		35	47
Overload capability		125% for 10 min 125%/150% for 30 sec >150% for 10 sec	
Short circuit current	A		
Short circuit characteristic		Elect. short circuit protection, current limited at 2 times nominal current. Automatic stop after 5 seconds	
Selectivity		Within ½ cycle (Fuse GL 20% In)	
Output waveform		Sinusoidal	
Output harmonic distortion			
- Linear Load	%	< 1	
- Non Linear Load		< 5	
- IEC EN 62040-3		Fully compliant	
Max crest factor without derating		3 : 1	

UPS OUTPUT: BY PASS

Automatic static by-pass		Electronic thyristor switch
Protection		Fuses
Bypass	Vac	Three-phase + Neutral
Nominal Voltage (selectable)	Vac	380 – 400 – 415
Range	%	±10
Nominal Frequency (selectable)	Hz	50-60
Range	%	± (1÷5) adjustable
Transfer mode		Without break
Transfer inverter → automatic bypass		In case of : - Short circuit - Battery end of discharge - Inverter test - Inverter not operating
Retransfer automatic bypass → inverter		- Automatic - Block on bypass after 6 transfers within 2 minutes, reset by front panel
Overload Capability	%	150 continuously 1000 for 1 cycle
Manual By-Pass		Standard: - Electronically controlled - No break
Back feed protection		Optional

OPTIONS

1. BATTERY TEMPERATURE VOLTAGE COMPENSATION
2. INSULATION TRANSFORMER ON BY-PASS
3. SEPARATED INPUT KIT
4. VOLTAGE ADAPTATION AUTO-TRANSFORMERS
5. BACK FEED PROTECTION
6. RELAY CARD (Eight signals Alarms/Statuses), Free relay contact
7. SERIAL INTERFACE RS-485 (MOD-BUS protocol)
8. SNMP ADAPTER
9. REMOTE MONITORING PANEL
10. PARALLEL CARD INTERFACE KIT
11. EXTERNAL BATTERY CABINET
12. WALL MOUNTED FUSED SWITCH BOX
13. SPECIAL PAINT
14. LOAD-SYNC BUS CARD INTERFACE KIT
15. DIESEL GENERATOR
16. EXTERNAL EPO AUXILIARY CONTACT
17. EXTERNAL MCB AUXILIARY CONTACT

OTHER SOFTWARE SELECTABLE FEATURES

1. OFF-LINE
2. RECTIFIER WALK-IN TIME
3. RECTIFIER DELAY ON STARTUP (HOLD-OFF TIME)
4. FREQUENCY CONVERTER MODE

