GAMATRONIC ELECTRONIC INDUSTRIES LTD

POWER+ 3x208 V

10 TO 100 KVA

MODULAR UPS SYSTEM

User Guide

Release 2.1, October 2008

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CERTIFIED QMS SI ISO 9001: 2000 THE STANDARDS INSTITUTION OF ISRAEL

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The equipment described in this document is not intended for use in connection with any application requiring fail-safe performance, such as the operation of nuclear power facilities, air traffic control or navigation systems, weapons control systems, life support systems, or any other system whose failure could lead to injury, death, environmental damage or mass destruction.

TABLE OF CONTENTS

SAFETY CONSIDERATIONS

The ***POWER+*** UPS system is designed for industrial applications and harsh environments. Nevertheless the ***POWER+*** UPS system is a sophisticated power system and should be handled with appropriate care, following these guidelines.

Do's

- READ THIS MANUAL CAREFULLY before starting installation and operation of the UPS.
- SAVE THESE INSTRUCTIONS. This manual contains important instructions that must be followed during installation and maintenance of the UPS and batteries.
- REVIEW THE SAFETY PRECAUTIONS described below to avoid injury to users or damaging equipment.
- All power connections must be completed by a licensed electrician who is experienced in wiring this type of equipment, and who is knowledgeable about all federal, state, and local electrical codes and regulations. **Improper wiring may cause damage to the equipment or injury to personnel.**
- Pay attention to the warning signs, labels and marks on the unit. A warning sign signals the presence of a possibly serious, life-threatening condition.
- Keep the surroundings clean, uncluttered and free from excess moisture.
- Allow only qualified technicians to service the UPS. There are no user-serviceable components. **Do not try to repair it yourself!**
- Use the UPS only for its intended purpose.

CAUTION - WARNING - RISK OF LETHAL ELECTRIC SHOCK:

The battery drawer contains a series of 12-Volt batteries that provide high voltage and energy in the UPS body even when the UPS is not connected to the ac input. Appropriate precautions should be taken during installation, inspection and servicing.

CAUTION - WARNING - RISK OF LETHAL ELECTRIC SHOCK:

The UPS receives power from more than one source. Disconnection of all of the ac sources and the dc source is required to de-energize this unit before servicing.

ATTENTION - AVERTISSEMENT - RISQUE DE DÉCHARGE ÉLECTRIQUE MORTELLE :

Le tiroir de batterie contient une série de batteries 12-Volt qui fournissent la haute tension et l'énergie dans le corps D'UPS même lorsque L'UPS n'est pas relié à l'entrée à A.C. Des précautions appropriées devraient être prises pendant l'installation, l'inspection et l'entretien.

ATTENTION - AVERTISSEMENT - RISQUE DE DÉCHARGE ÉLECTRIQUE MORTELLE :

L'UPS reçoit la puissance de plus d'une source. Le débranchage de toutes les sources à A.C. et source de D.C est exigé pour désactiver cette unité avant l'entretien.

Don'ts

- Do not open the cover of the UPS or the battery cabinets under any circumstances. All UPS panels and doors should be closed.
- Do not insert any objects through the ventilation holes.
- Do not put objects on the UPS.
- Do not move the UPS while it is operating.
- Do not use the UPS outdoors.
- Do not turn the UPS upside down during transportation.
- Do not connect or disconnect the cable to the battery cabinet before the battery circuit breaker is turned OFF.
- Do not turn ON the battery circuit breaker when the battery cabinet is disconnected from the UPS.
- Do not install next to any gas or electrical heaters. A restricted location is recommended in order to prevent access by unauthorized personnel.

WARNING: RISK OF SEVERE DAMAGE TO THE UPS!!!

THIS SYSTEM USES THE NEUTRAL LINE FOR OPERATION. THEREFORE, IT IS STRICTLY FORBIDDEN TO CONNECT THIS SYSTEM TO THE AC POWER SOURCE WITHOUT A NEUTRAL (NULL) CONDUCTOR!!

FAILURE TO USE A NEUTRAL CONDUCTOR MAY CAUSE PERMANENT DAMAGE TO THE SYSTEM.

AVERTISSEMENT : RISQUE DE DOMMAGES GRAVES À L'UPS ! ! !

CE SYSTÈME EMPLOIE LA LIGNE NEUTRE POUR L'OPÉRATION. PAR CONSÉQUENT, ON INTERDIT STRICTEMENT DE RELIER CE SYSTÈME A LA SOURCE (AC) DE COURANT ALTERNATIF SANS CONDUCTEUR (NUL) NEUTRE ! !

L'ÉCHEC À L'UTILISATION D'Un CONDUCTEUR NEUTRE PEUT ENDOMMAGER EN PERMANENCE LE SYSTÈME.

CAUTION – GROUND CONNECTION ESSENTIAL BEFORE CONNECTING SUPPLY

Connect the UPS to ground before connecting it to the ac supply.

ATTENTION - la PRISE DE TERRE AU SOL ESSENTIELLE AVANT DE RELIER L'APPROVISIONNEMENT

mettre L'UPS à la terre avant de le relier à l'approvisionnement à A.C.

CAUTION - WARNING - RISK OF ELECTRIC SHOCK! DO NOT REMOVE COVER!

Do not remove the UPS cover. There are no user serviceable parts inside. Refer servicing to qualified service personnel.

ATTENTION - AVERTISSEMENT - RISQUE DE DÉCHARGE ÉLECTRIQUE ! N'ENLEVEZ PAS LA COUVERTURE !

N'enlevez pas la couverture D'UPS. Il n'y a aucune pièce utile d'utilisateur à l'intérieur. Référez-vous l'entretien au personnel de service qualifié.

RECYCLING INFORMATION

Consult your local recycling or hazardous waste center for information on proper disposal of a used battery or UPS.

WARNING

Do not dispose of batteries in a fire. Batteries may explode. Consult with your local recycling / hazardous waste center for disposal requirements.

CAUTION

Do not discard the UPS or its batteries in the trash. This product contains sealed lead-acid batteries . For proper disposal, contact your local recycling / hazardous waste center.

CAUTION

Do not discard waste electrical or electronic equipment (WEEE) in the trash. For proper disposal, contact your local recycling / hazardous waste center.

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1. INTRODUCTION

Thank you for purchasing a ***POWER+*** UPS system. ***POWER+*** is the most sophisticated UPS on the market today.

In general, an Uninterruptible Power Supply (UPS) provides backup power for use when the utility ac electric power mains fail or drop to an unacceptable voltage level. ***POWER+*** is a whole lot more.

POWER+ is designed to protect your data and equipment and minimize downtime and other adverse effects normally incurred by power irregularities and failures.

POWER+ continually eliminates surges, spikes and sags that are inherent in commercial utility power. Over time, these irregularities shorten the life of equipment and components. The efficiency of ***POWER+*** thus helps to extend the life of your equipment, even through normal use when the input power system is constant and continuous.

POWER+ requires very little attention or intervention during normal operation; however, you should read and understand the procedures described in this manual to ensure trouble-free operation.

POWER+ is a parallel redundant UPS and is flexible in structure, allowing it to be easily extended by adding modules as required. The UPS modules are designed for hot swapping, making many different configurations possible.

POWER+ has many unique features:

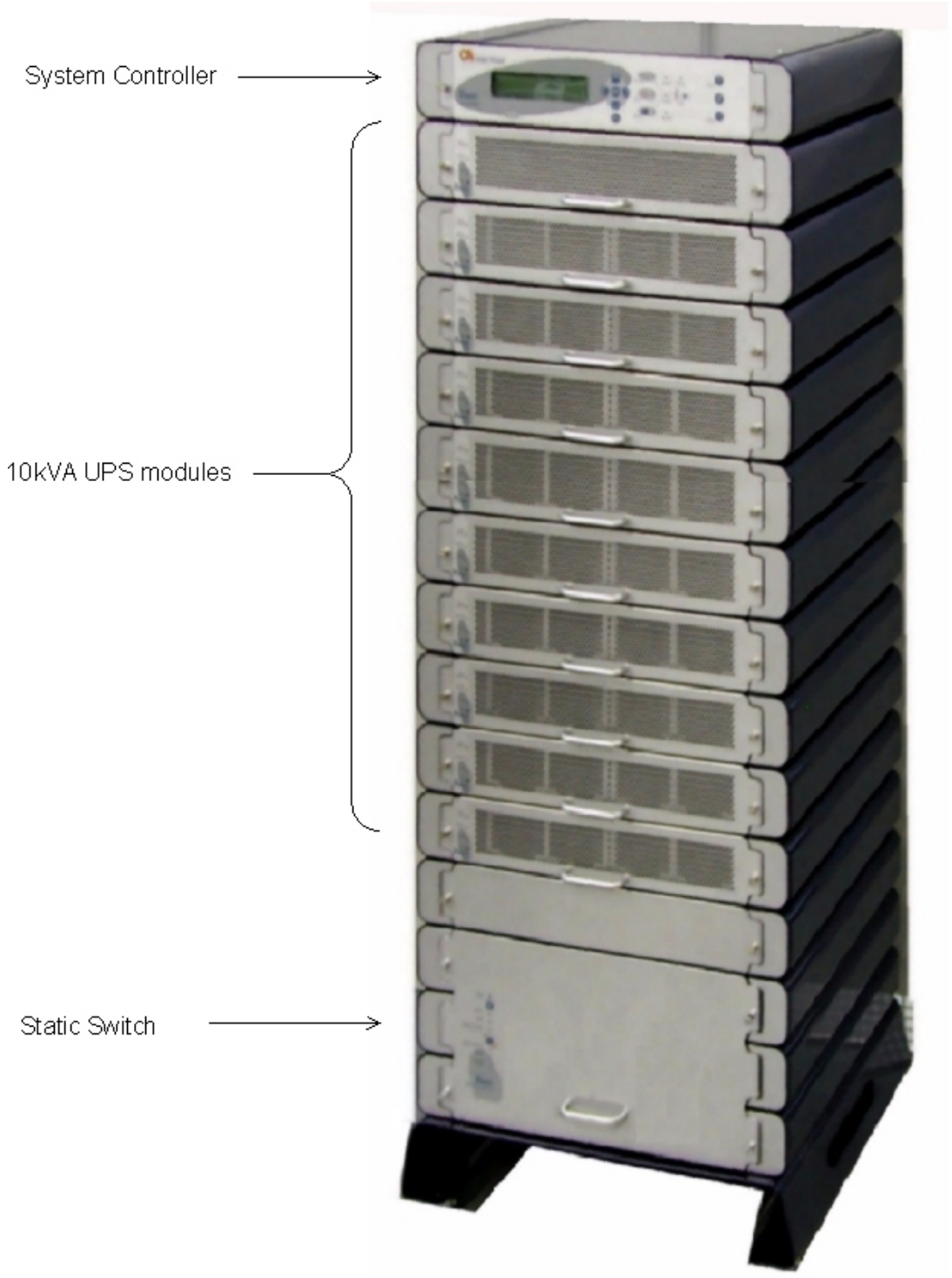
- ***POWER+*** is reliable thanks to its N+ 1 parallel redundancy.
- ***POWER+*** is both flexible and modular; it may include from one to ten modules.
- ***POWER+*** is a true on-line battery design according to IEC62040-3.
- ***POWER+*** is a "green" power solution thanks to THD of 5 % at the input, and provides “clean” power to your loads.
- ***POWER+*** employs active current sharing at the input / output.
- ***POWER+*** has ac-to-ac efficiency of up to 94 %, dc-to-ac of 97 %.
- ***POWER+*** is light and small, a 10 kVA / 8 kW module weighs only 20 lbs (9 kg).

40 kVA Configuration

100 kVA – Small enough to fit in a 4-passenger elevator

The ***POWER***$^{+}$ is comprised of the following sub-assemblies.

- System Controller
- 1-10 UPS modules × 10 kVA
- Static Switch Module



POWER^{+} *System - Full Complement*

System Controller

The ***POWER+*** system controller has three purposes:

- to allow the user to manage and control the UPS as well as monitor the parameters of all sections of the ***POWER+*** via the control panel
- to collect and summarize data from all sections of the UPS
- communication with external computers for data transfer and operation

The ***POWER+*** can work without the system controller but with reduced functionality.

UPS Module (10 kVA / 8 kW)[1]

The UPS module is the core of the ***POWER+***, which consists of from one to ten identical modules in parallel depending on capacity requirements.

Each module includes a 3-phase charger with PFC[2] and a 3-phase PWM inverter connected to batteries by a classic dc link. Each module is plug-in and weighs a mere 20 lbs (9 kg).

Static Switch (ST/SW) Module

The centralized hybrid Static Switch enables an automatic transfer of the load from the output of the inverters to an alternate source whenever the inverter can no longer supply power to the load. The static switch can transfer high currents at high speed.

Battery

The ***POWER+*** battery bank is used as a backup in the event that the utility ac input fails.

For systems from 10 kVA through 20 kVA, the batteries may be housed internally (on battery trays); however, for systems from 30 kVA through 100 kVA, or for sites where a longer backup duration is required, the batteries are housed in an external cabinet next to the ***POWER+*** cabinet.

For ***POWER+*** units equipped with internal batteries (battery trays), do not use excessive force when sliding the battery tray into place. The battery tray must be slid into place gently to avoid damaging the electrical connection on its rear panel.

Batteries are charged by the rectifier which supplies both the inverter and the battery charger.

[1] The kVA and kW per module given here is for 3-3 configuration.

[2] PFC is a feature included that reduces the amount of generated reactive power. Reactive power operates at right angles to true power and energizes the magnetic field. Reactive power has no real value for an electronic device, but electric companies charge for both true and reactive power resulting in unnecessary charges.
In power factor correction, the power factor (represented as "k") is the ratio of true power (kWatts) divided by apparent power (kVA). The power factor value is between 0.0 and 1.00. If the power factor is above 0.8, the device is using power efficiently. A standard power supply has a power factor of 0.70-0.75, and a power supply with PFC has a power factor of 0.95-0.99.

Please refer to the battery manufacturer's installation manual for battery installation and maintenance instructions.

When replacing batteries, replace with the same number and type!

BATTERY MANUFACTURER	PART NUMBER
DiaMec Battery Co. Ltd.	DMC12-7, rated V-2 min.
NOTE: EQUIVALENT TYPE BATTERIES MAY BE USED. PLEASE CONSULT GAMATRONIC.	

CAUTION - RISK OF ELECTRIC SHOCK!

Servicing of batteries should be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from batteries.

CAUTION - WARNING - RISK OF ELECTRIC SHOCK!

Do not touch uninsulated battery terminals.

CAUTION

Do not dispose of battery or batteries in a fire. The battery may explode. For proper disposal, contact your local recycling / hazardous waste center.

CAUTION

Do not open or mutilate the battery or batteries. Released electrolyte is harmful to the skin and eyes, and is toxic.

CAUTION

Batteries are heavy. Move them with care. Dropping a battery can result in injury and may damage the battery.

CAUTION: A BATTERY CAN PRESENT A RISK OF ELECTRICAL SHOCK AND HIGH SHORT-CIRCUIT CURRENT. THE FOLLOWING PRECAUTIONS SHOULD BE OBSERVED WHEN WORKING ON BATTERIES.

1. Remove watches, rings, and other exposed metal objects from the body.
2. Use tools with insulated handles.
3. Wear rubber gloves and boots.
4. Do not lay tools or metal parts on top of the batteries.
5. Disconnect the charging source before connecting or disconnecting battery terminals.

Veuillez se référer au manuel de l'installation du fabricant de batterie pour des instructions d'installation et d'entretien de batterie. En remplaçant des batteries, remplacez avec le mêmes nombre et type !

FABRICANT DE BATTERIE	**NUMÉRO DE LA PIÈCE**
DiaMec Battery Co. Ltd.	**DMC12-7, V-2 évalué minute.**
NOTE : LE TYPE ÉQUIVALENT BATTERIES PEUT ÊTRE EMPLOYÉ. VEUILLEZ CONSULTER GAMATRONIC.	

ATTENTION - RISQUE DE DÉCHARGE ÉLECTRIQUE ! L'entretien des batteries devrait être assuré ou dirigé par le personnel bien informé des batteries et des précautions exigées. Personnel non autorisé de subsistance loin des batteries.

ATTENTION - AVERTISSEMENT - RISQUE DE DÉCHARGE ÉLECTRIQUE !

Ne touchez pas les bornes non isolées de batterie.

ATTENTION

Ne vous débarrassez pas de la batterie ou des batteries dans un feu. La batterie peut éclater. Pour la disposition appropriée, entrez en contact avec votre centre de recyclage de gens du pays/perte dangereuse.

ATTENTION

N'ouvrez pas ou ne mutilez pas la batterie ou les batteries.
L'électrolyte libéré est nocif à la peau et aux yeux, et est toxique.

ATTENTION

Les batteries sont lourdes. Déplacez-les avec soin. La chute d'une batterie peut avoir comme conséquence les dommages et peut endommager la batterie.

ATTENTION : UNE BATTERIE PEUT PRÉSENTER UN RISQUE DE CHOC ÉLECTRIQUE ET DE COURANT ÉLEVÉ DE SHORT-CIRCUIT. ON DEVRAIT OBSERVER LES PRÉCAUTIONS SUIVANTES EN TRAVAILLANT AVEC LES BATTERIES.

1. Enlevez les montres, les anneaux, et d'autres objets exposés en métal du corps.
2. Utilisez les outils avec les poignées isolées.
3. Portez les gants et les initialisations en caoutchouc.
4. N'étendez pas les outils ou les pièces en métal sur les batteries.
5. Débranchez la source de remplissage avant de relier ou débrancher des bornes de batterie.

2. OPERATING MODES

The ***POWER+*** UPS functions to supply ac electrical power to your load.

While using the ***POWER+***, three modes of operation are possible:

- Normal operation
- Battery operation
- Bypass operation

Normal Operation

The UPS is almost always in normal operation mode. The load receives its power from the inverters that supply stabilized voltage, protected from spikes and irregularities in the ac input. The ac input system feeds the charger which supplies dc power to the inverter, while concurrently charging the batteries.

Battery Operation

During battery operation, the load continues to receive power from the inverters, but the dc input to the inverter is taken from the batteries, instead of from the rectifier.

The batteries are galvanically connected by dc link to the inverter and the charger. The dc inherently remains constant when the ac input supply drops out, without any switching devices.

The duration of the battery operation is determined by the load demand and the battery capacity.

Bypass Operation

During bypass operation, the load receives power directly from the ac input via the static switch.

Whenever the inverters cannot provide power to the load, either due to an overload or a short-circuit in the load, transfer to the ac input is automatic. As soon as the problem is corrected, the load is transferred back to the inverter.

How It Works

All three operation modes are encountered during normal UPS use in order to constantly provide a regulated supply to the load.

During normal use, the UPS provides total power protection to the load.

Using bypass, the load is transferred to power directly from the ac input, bypassing the inverter. Using this route, there is no protection, but it can be used in the short term. When power is restored, the UPS returns to normal operation.

In addition to these three operation modes that are negotiated automatically by the UPS, there are 2 other modes that can only be invoked with manual intervention, either by the user or the technician:

- Maintenance bypass
- Emergency Power Off (EPO)

Maintenance Bypass

The maintenance bypass switch allows for connecting the load directly to the utility ac supply, not via the UPS, to enable UPS service and maintenance without disrupting supply to the load. This switch is only to be used by the service engineer.

Emergency Power Off

An external Emergency Power Off (EPO) switch may be installed by the customer. The EPO switch cuts power to the load in emergency situations. Once switched off by the EPO, the POWER+ must be restarted manually.

The EPO switch must be an N.C.-type, rated 120 Vac. Connect the EPO switch to the two EPO terminals on the UPS.

In the event that the POWER+ UPS is used in a computer room, installation of the EPO switch is mandatory. It is also **required** in this case that activating the EPO switch should disconnect the dc power supply from the batteries. The battery CB terminals on the POWER+ must be connected to the trip coil terminals on the battery cabinet.

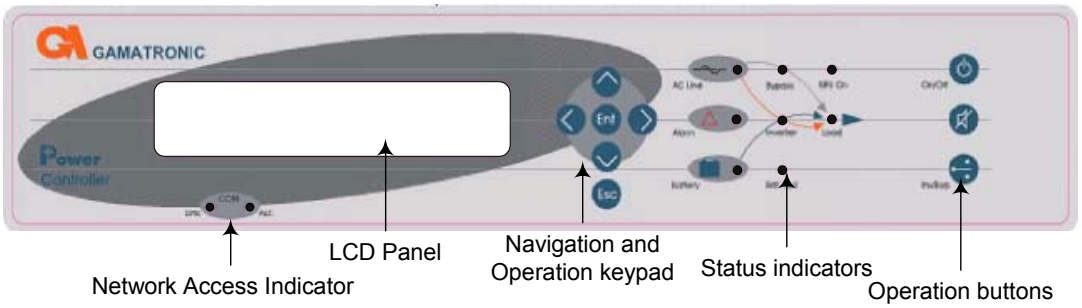
3. USER INTERFACE

This section describes the buttons and indicators used to operate the ***POWER+***.

Control Panel

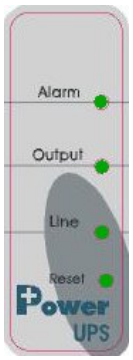
The ***POWER+*** Control Panel, located on the front of the controller, provides the user with an interface to the ***POWER+*** system. It includes an LCD display, a keypad, buttons and indicators for monitoring and controlling the UPS configuration and functions. The control panel is aimed both at the end-user as well as the service engineer. All of the ***POWER+*** parameters can be viewed on the control panel.

Use of the ***POWER+*** Control Panel is described in detail in Chapter 7 beginning on page 43



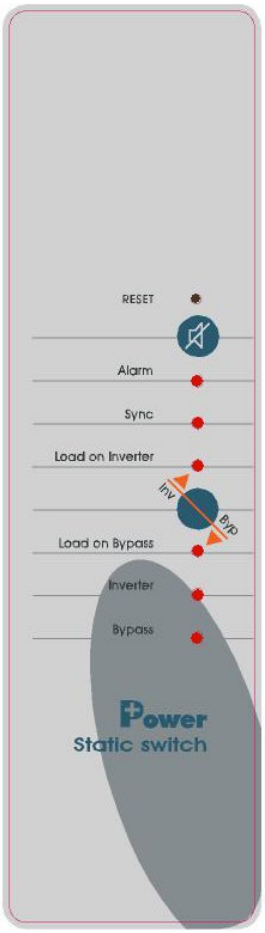
UPS Module Panel

The UPS module panel, located on the front of each UPS module, provides the user with the status of that module



Static Switch Panel

The static switch panel, located on the front of static switch module, provides the user with the status of the static switch module. All the functions and indications are available on the ***POWER+*** Control Panel.



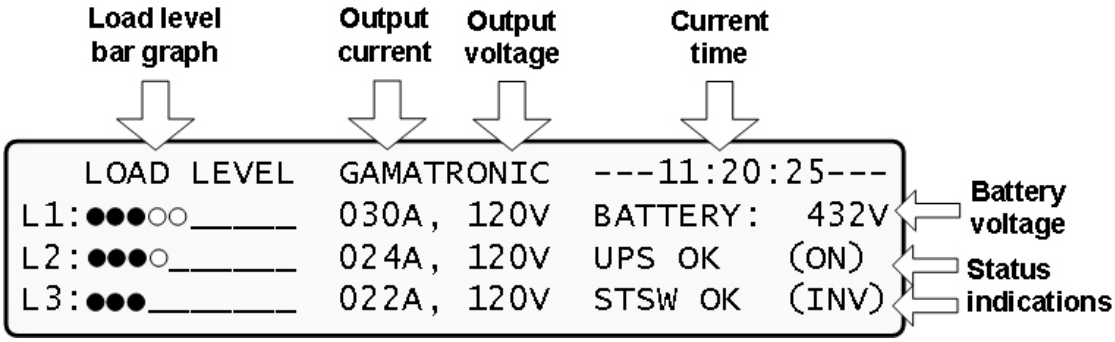
POWER+ Control screen

The ***POWER***+ control screen is illustrated below. It is part of the control panel described on page 10.

How to read and understand the ***POWER***+ control screen is described in detail in Chapter control screen is described in Chapter 7 beginning on page 43

The control screen provides menus and displays all aspects of the ***POWER***+ systems input, output and static switch as well as operational details.

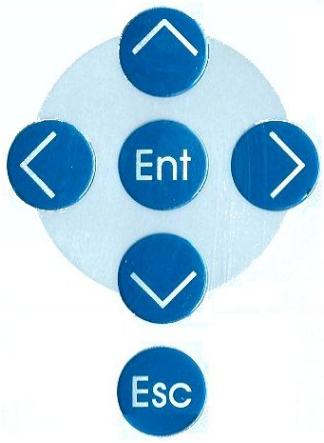
The figure below shows the ***POWER***+ 3-phase display.



This is how the control screen appears while the UPS is running normally.

Navigation and Operation Keypad

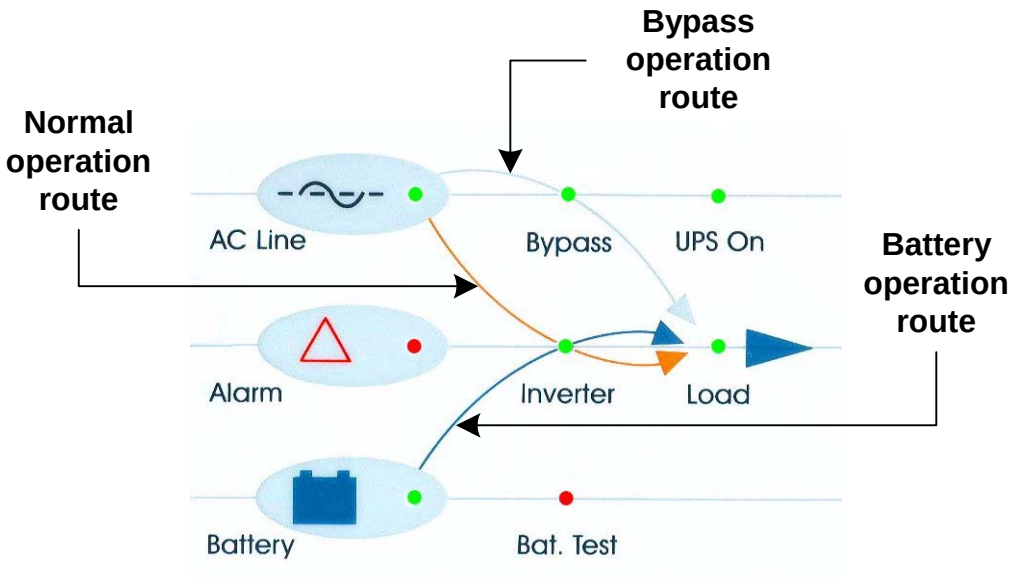
The navigation and operation keypad works in conjunction with the control screen. It allows you to navigate through the available menus using the direction arrow buttons and the Enter and Escape buttons to select or quit, respectively.



Status Indicators

The status indicators show precisely what is running and how the UPS is providing power to the load.

The diagram below shows the power source and destination routes in use for each of the 3 automated operation modes.



Ac Line	Green – Shows that the ac input is present and within range
Alarm	Red – Flashes to indicate general alarm condition
Battery	Green – Shows that the battery is in discharge mode
Bypass	Green – Shows that the load is supplied from the ac input
Inverter	Green - Shows that the inverter is supplying power to the load
Bat. Test	Red – Shows that a battery test is in progress
UPS On	Green – Indicates that the UPS is running
Load	Green – Indicates that ac voltage is available at the output

Operation Buttons

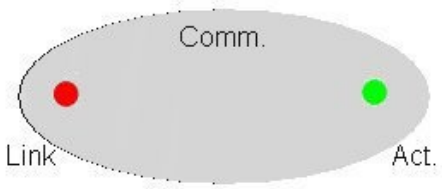
The operation buttons illustrated below are “soft” switches.

- On/Off resets the entire UPS
- Alarm silence shuts the alarm sounder
- Inv/Byp allows the maintenance engineer to manually change the operation mode

	UPS ON/OFF switch
	Alarm silence
	Inverter/Bypass manual switch over

Network Access Indicator

The network access indicator shows whether the network connection is available and whether it is active.



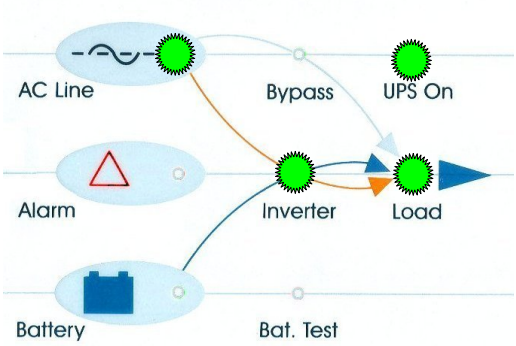
Link	Red – Indicates the presence of a network connection link
Act	Green – Indicates that the network is active

POWER+ Operation Modes

Normal Operation

```
   LOAD LEVEL   GAMATRONIC   ---11:20:25---
L1:●●●○○_____   030A, 120V   BATTERY:  432V
L2:●●●○______   024A, 120V   UPS OK    (ON)
L3:●●●_______   022A, 120V   STSW OK   (INV)
```

During normal operation, the UPS draws power from the ac line, feeds dc to the inverter which provides ac to the load.



Battery Operation

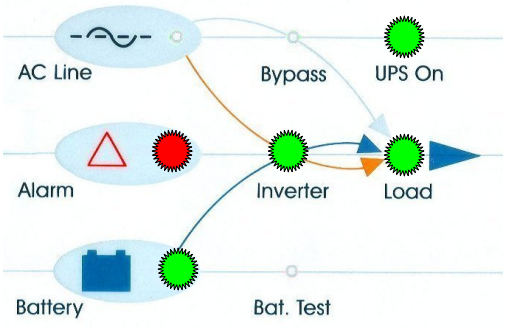
AC failed for the past 5 minutes

```
   LOAD LEVEL   no ac 005m   ---11:20:25---
L1:●●●○○_____   030A, 120V   BATTERY:  432V
L2:●●○○______   022A, 120V   UPS OK    (ON)
L3:●●●○○○____   034A, 120V   STSW OK   (INV)
```

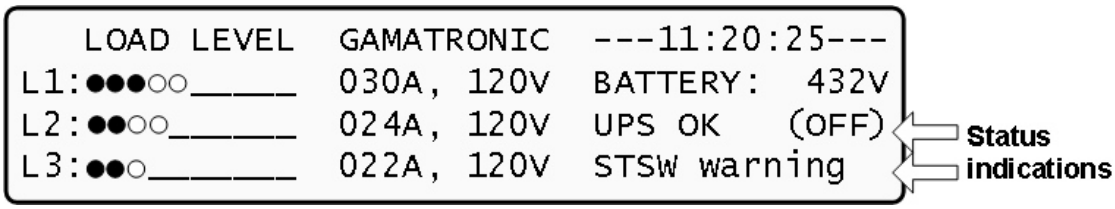
Status indications

During Battery Operation, the battery supplies dc to the inverter which then provides ac to the load.

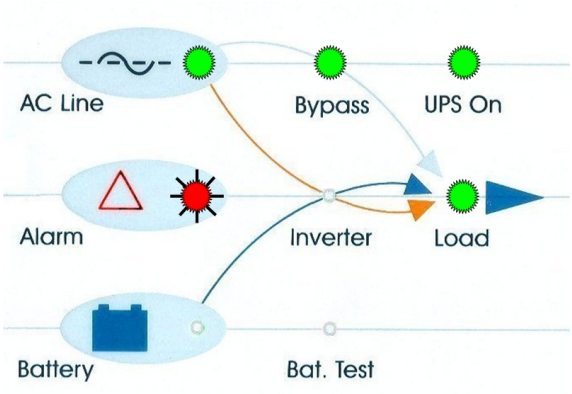
The red alarm flashes to indicate the abnormal status.



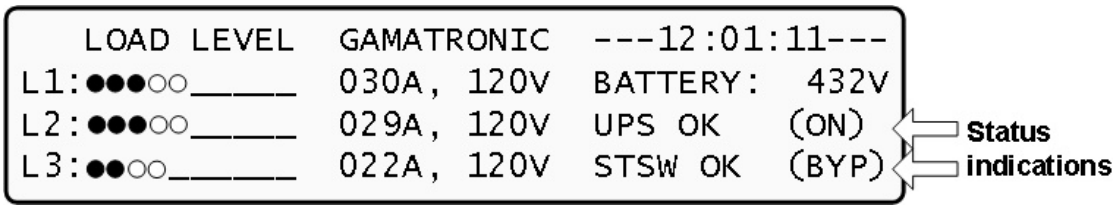
Bypass Operation (Automatic)



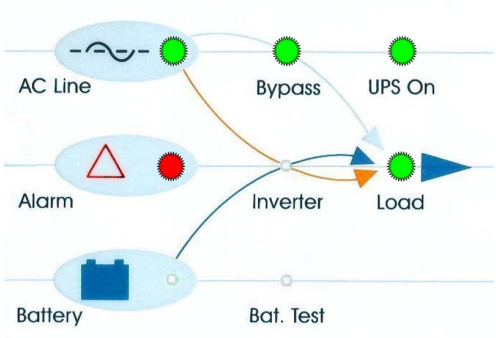
During Bypass operation, the AC feeds the load via the bypass static switch. The red alarm flashes to indicate the abnormal status.



Bypass Operation (Manual)



If the Power+ is manually switched to bypass operation by pressing the Inv/Byp button, the load is transferred to the mains AC input line. Transfer back to normal operation must be performed manually. The red alarm indicator will be lit but will not flash.



Emergency Power Off - EPO (Manual)

The EPO button is for use by the user, in emergency situations only. The EPO button cuts the supply to the load with immediate effect and cannot be reset. Once switched OFF by the EPO, the ***POWER+*** must be restarted manually.

4. INSTALLATION PREPARATIONS

This is where you begin when preparing for **initial installation** of the ***POWER+***.

Ac Input/Output Main Terminals

The main terminals are critical for ***POWER+*** installation. The terminals are used to connect the ac input and bypass inputs and the ac output. When connecting cables to the terminals, use a torque wrench to tighten the terminals to 270 lbs./in.

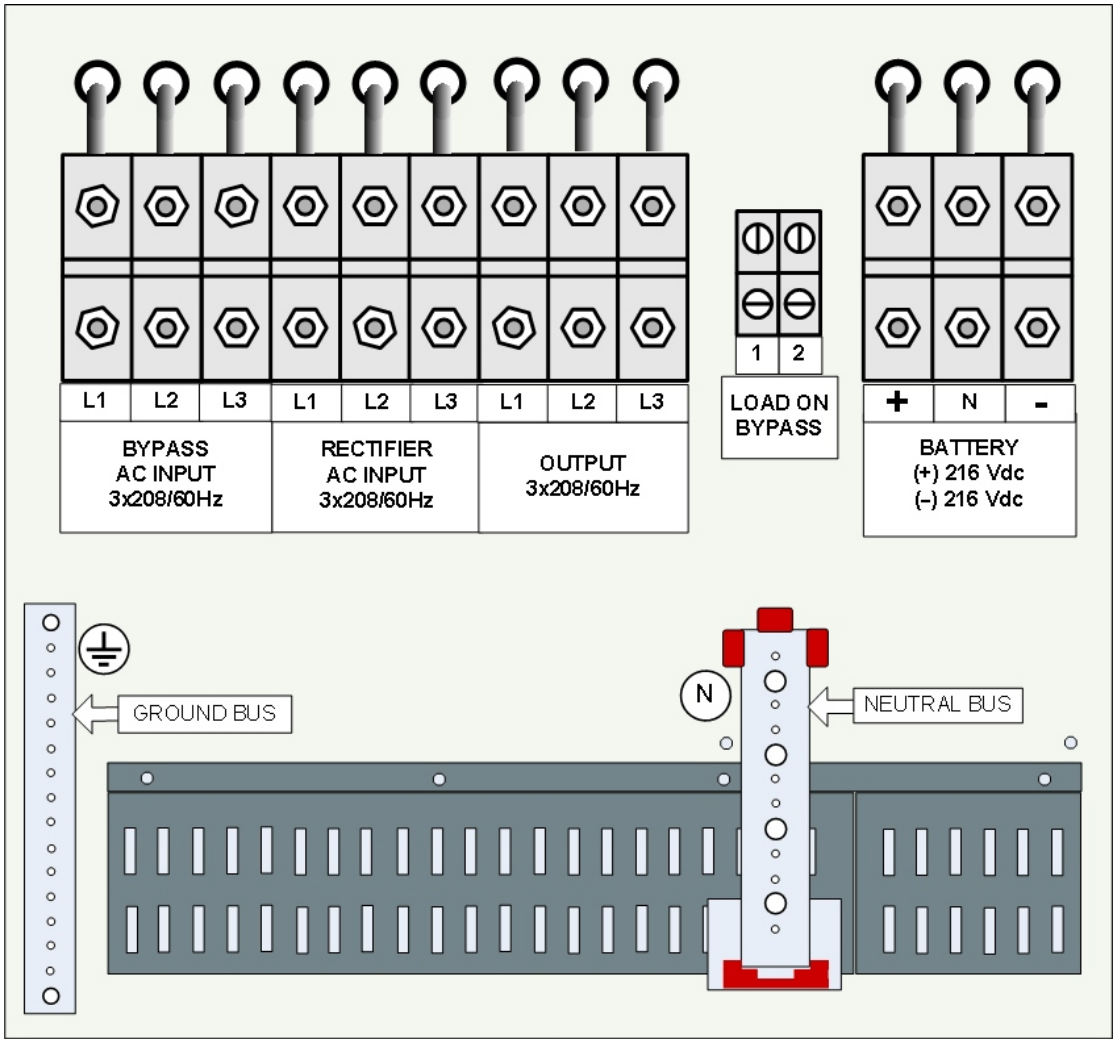
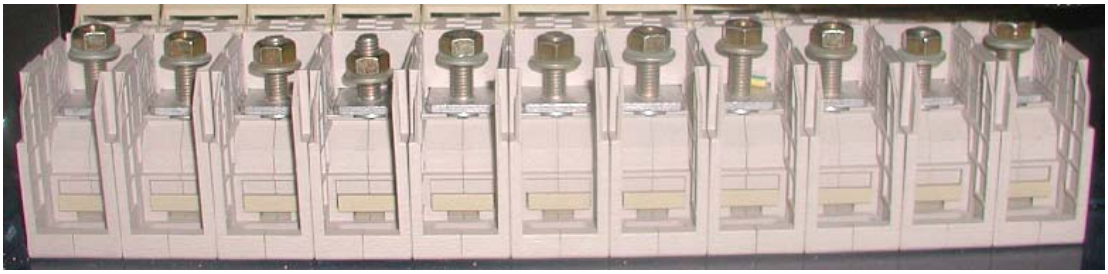


Figure 4-1: Terminals on 60 kVA – 100 kVA models

USE COPPER CONDUCTORS ONLY.

UTILISEZ LES CONDUCTEURS DE CUIVRE SEULEMENT.



L1	L2	L3	N	L1	L2	L3	N	L1	L2	L3
AC INPUT BYPASS 3 X 208, 60 Hz				**AC INPUT UPS 3 X 208, 60 Hz**				**OUTPUT 3 X 208, 60 Hz**		

Figure 4-2: Terminals on the 10 kVA - 50 kVA models

USE COPPER CONDUCTORS ONLY.

UTILISEZ LES CONDUCTEURS DE CUIVRE SEULEMENT.

4.1 Preparation

1. Prepare the proper infrastructure for the ***POWER+*** with adequate cables and connections.
2. Prepare the ***POWER+*** for installation. Ensure all components and modules are complete and securely fastened to their shelves.
3. Verify that utility ac power is disconnected, that the battery is disconnected, and that all switches are OFF.
4. If you have installed a maintenance bypass switch for your system, ensure that the maintenance bypass switch is set to NORMAL (OFF).
5. Connect the ac lines to the ***POWER+*** AC INPUT terminals.
   Do not connect the ac lines to the **bypass input** at this time.
   Do not connect any lines to the UPS **output** terminals or to the UPS **battery** terminals at this time.
6. Turn on the ac input circuit breakers.
7. Wait for the UPS to power up. The power-up process takes about a minute and 15 seconds. Several different screens are displayed on the UPS LCD panel during the power-up process. When you see the default, "Load Level" screen (see Figure 4-3 below), the power-up process has completed.

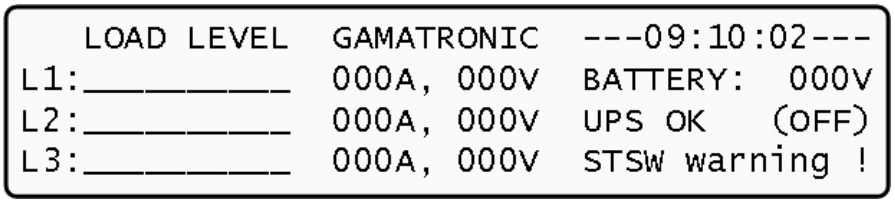


Figure 4-3: System default display, after preparatory power-up

4.2 The Power+ always requires a neutral line

During both installation and operation of the Power +, a neutral line must always be connected to the UPS. This neutral line shall be connected during the entire period that the UPS is working, and shall not be disconnected at any time!

Caution: If at any time the neutral line becomes disconnected, there will be no input or output reference voltage, because the input neutral line and the output neutral line are physically linked together. That may result in system defining its own reference voltage, which will be set by the load distribution between the three phases. ***This can result in serious damage to the UPS.***

4.2.1 A 4-pole switch might disconnect the neutral line

WARNING! If you have a mains-to-generator **four-pole** switching system you are in danger of having the **neutral line disconnected** when the four-pole switch is operated. This can result in the problems described above.

To avoid these problems, we strongly recommend that, if you use a four-pole mains-to-generator switching system, you install an isolation transformer that will constantly provide the UPS with a neutral line.

Figure 4-4 on page 21 illustrates the wrong way to connect the UPS with a grounded-neutral generator.

Figure 4-5 on page 22 illustrates an acceptable connection solution if you already have a grounded-neutral generator.

Figure 4-6 on page 23 shows the preferred generator (neutralized, not grounded) and the preferred connection (three-pole).

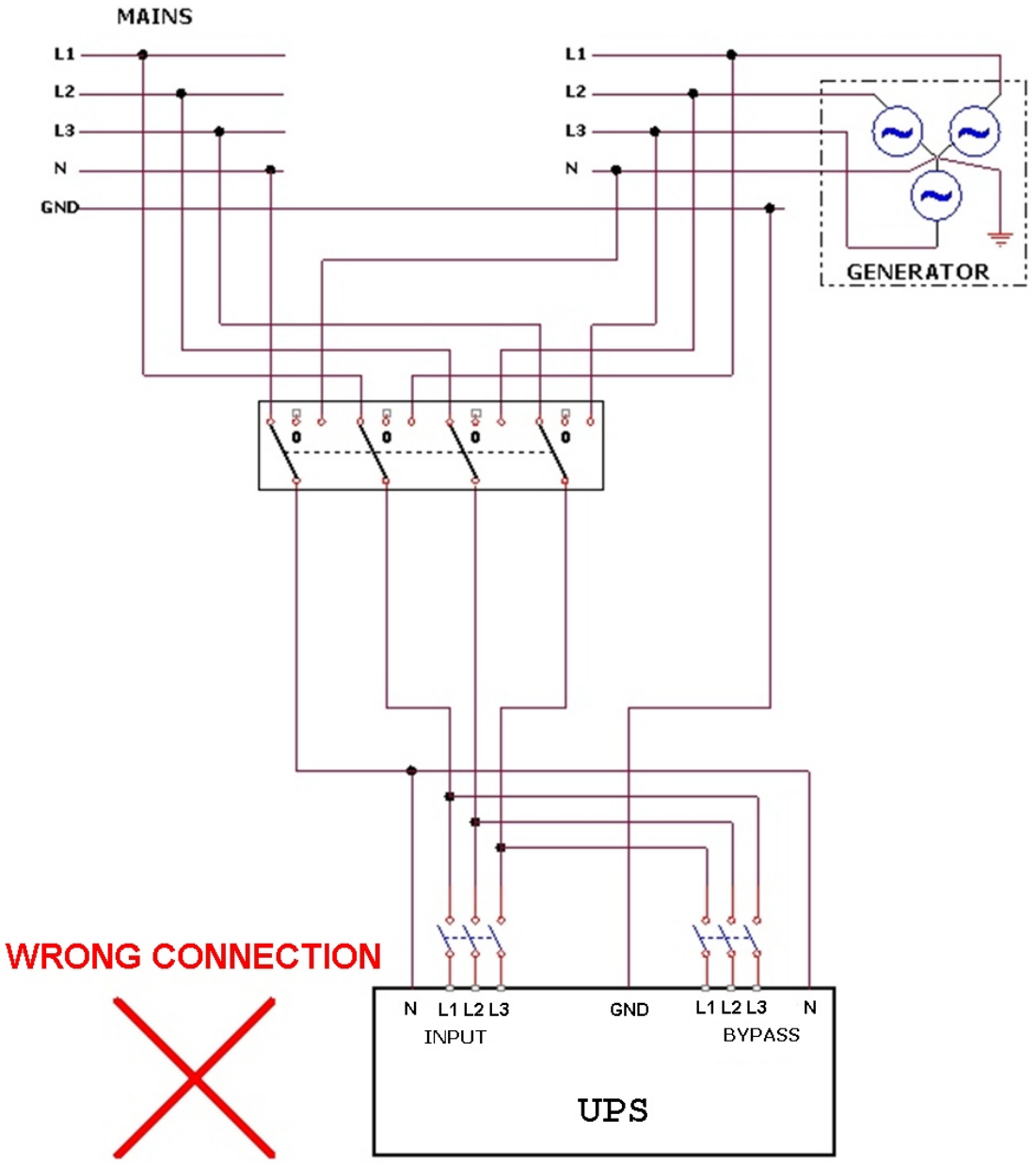


Figure 4-4: Wrong way to connect UPS with four-pole switch

WARNING!

A 4-pole switch may disconnect the neutral line if improperly connected!

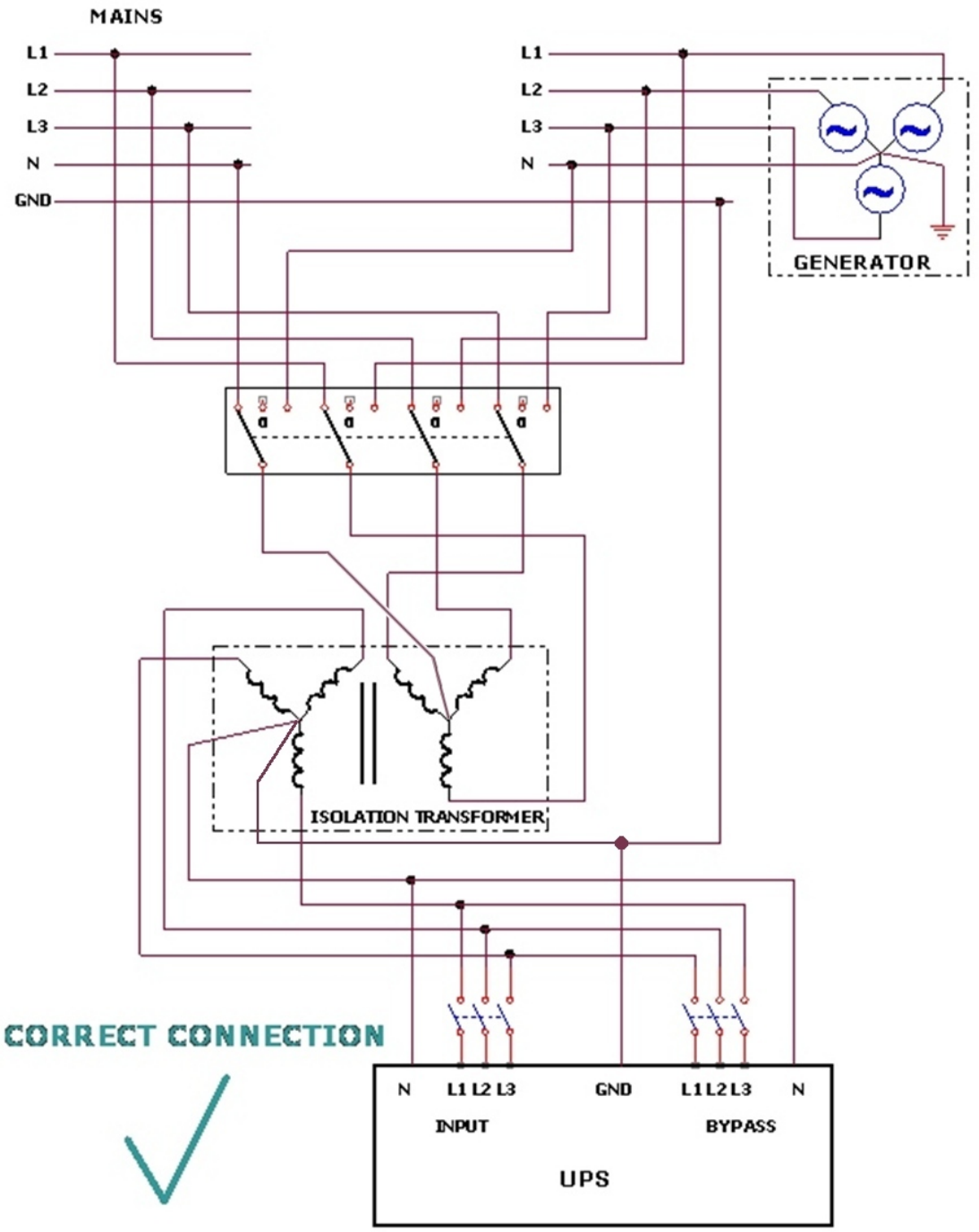


Figure 4-5: Acceptable connection for grounded generator and 4-pole switch

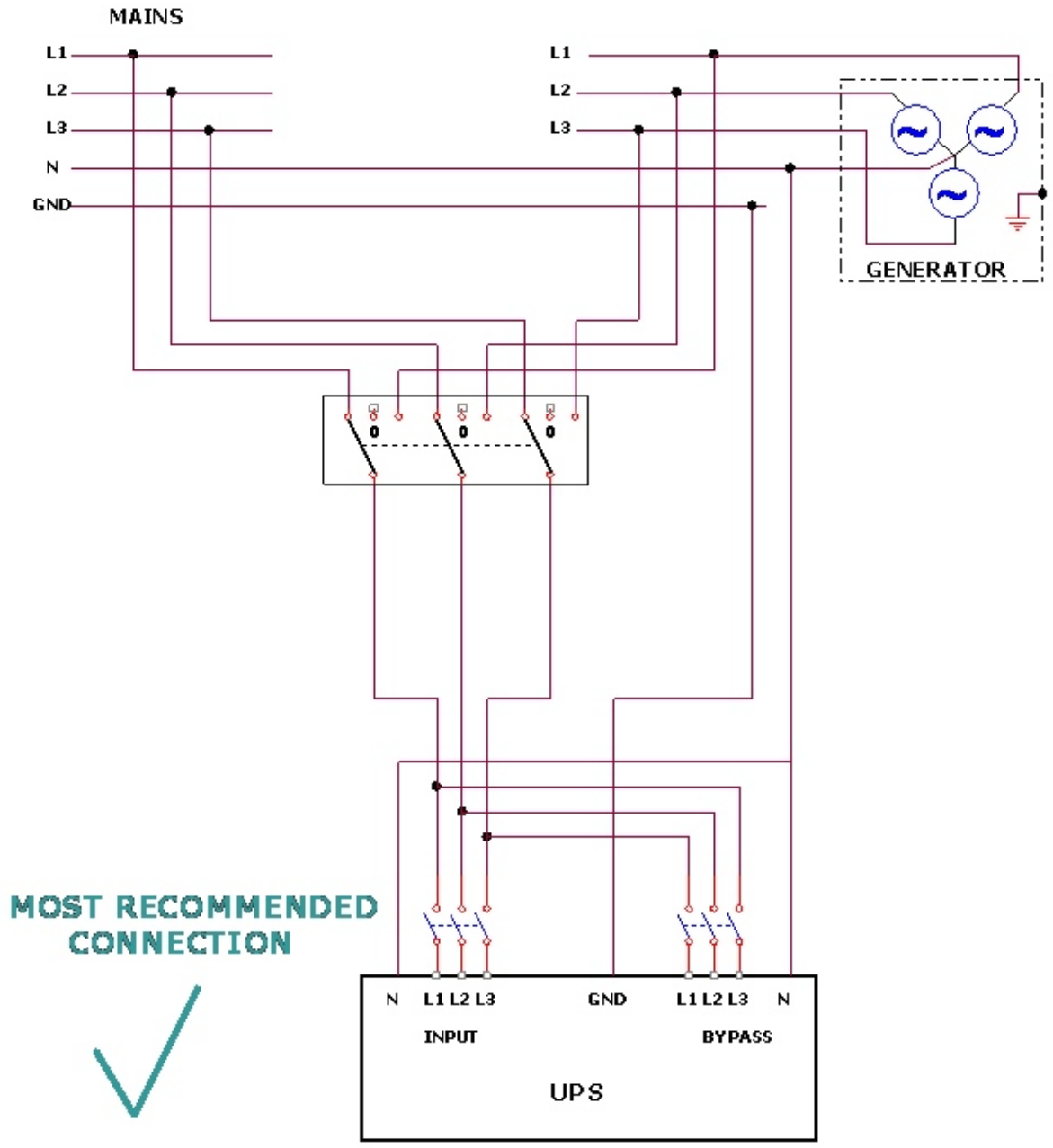


Figure 3

Figure 4-6: Preferred generator (neutralized) and connection (3-pole)

Continue with chapter 5, “System Installation”.

5. SYSTEM INSTALLATION

5.1 Cabling

WARNING! RISK OF ELECTRICAL SHOCK OR INJURY! INSTALLATION MAY BE PERFORMED BY QUALIFIED TECHNICIAN ONLY!

USE REQUIRED WIRING SIZE ACCORDING TO THE NATIONAL ELECTRIC CODE, NSI/NFPA 70.

FOR 10 TO 50 KVA SYSTEMS: 0 AWG MAXIMUM 600 V, 380 A, 75 °C COPPER WIRE.

FOR 60 TO 100 KVA SYSTEMS: 500 KCMILS MAXIMUM, 600 V, 380 A, 75 °C COPPER WIRE.

AVERTISSEMENT ! RISQUE DE CHOC ÉLECTRIQUE OU DE DOMMAGES ! L'INSTALLATION PEUT ÊTRE EFFECTUÉE PAR LE TECHNICIEN QUALIFIÉ SEULEMENT !

EMPLOYEZ REQUIS EN CÂBLANT LA TAILLE SELON LE CODE ÉLECTRIQUE NATIONAL, NSI/NFPA 70.

POUR DES SYSTÈMES DE 10 À 50 KVA : 0 MAXIMUM 600 V, 380 A, D'A.W.G. FIL 75 °C DE CUIVRE.

POUR 60 À 100 SYSTÈMES DE KVA : 500 KCMILS MAXIMUM, 600 V, 380 A, FIL 75 °C DE CUIVRE

Figure 5-1 (3-3 configuration), Figure 5-2 (3-2 configuration), and Figure 5-3 (2-2 configuration) below illustrate the cabling of the POWER+ system to the mains electricity cabinet.

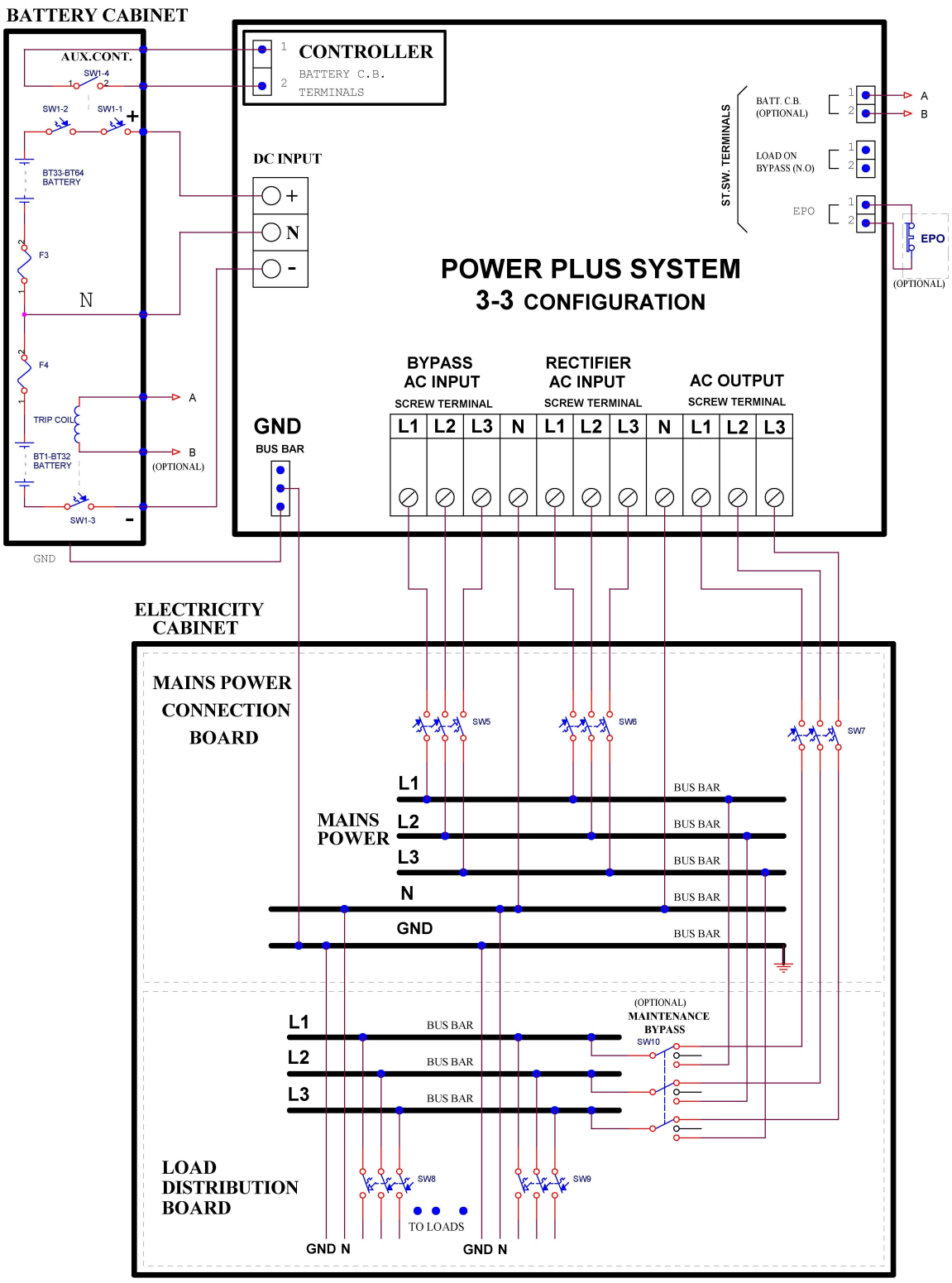


*Figure 5-1: Connection diagram for **3-3** configuration*

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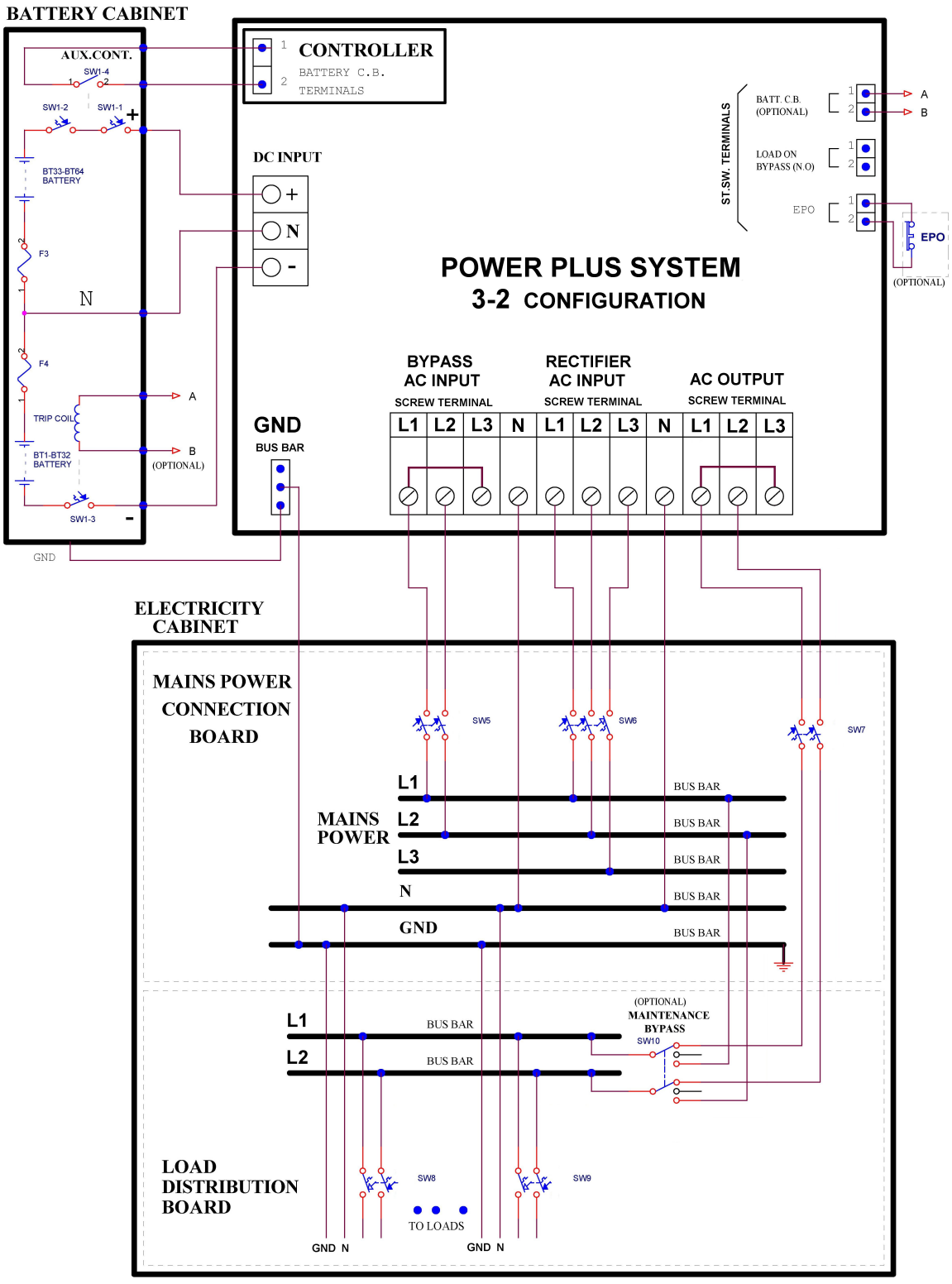

*Figure 5-2: Connection diagram for **3-2** configuration*

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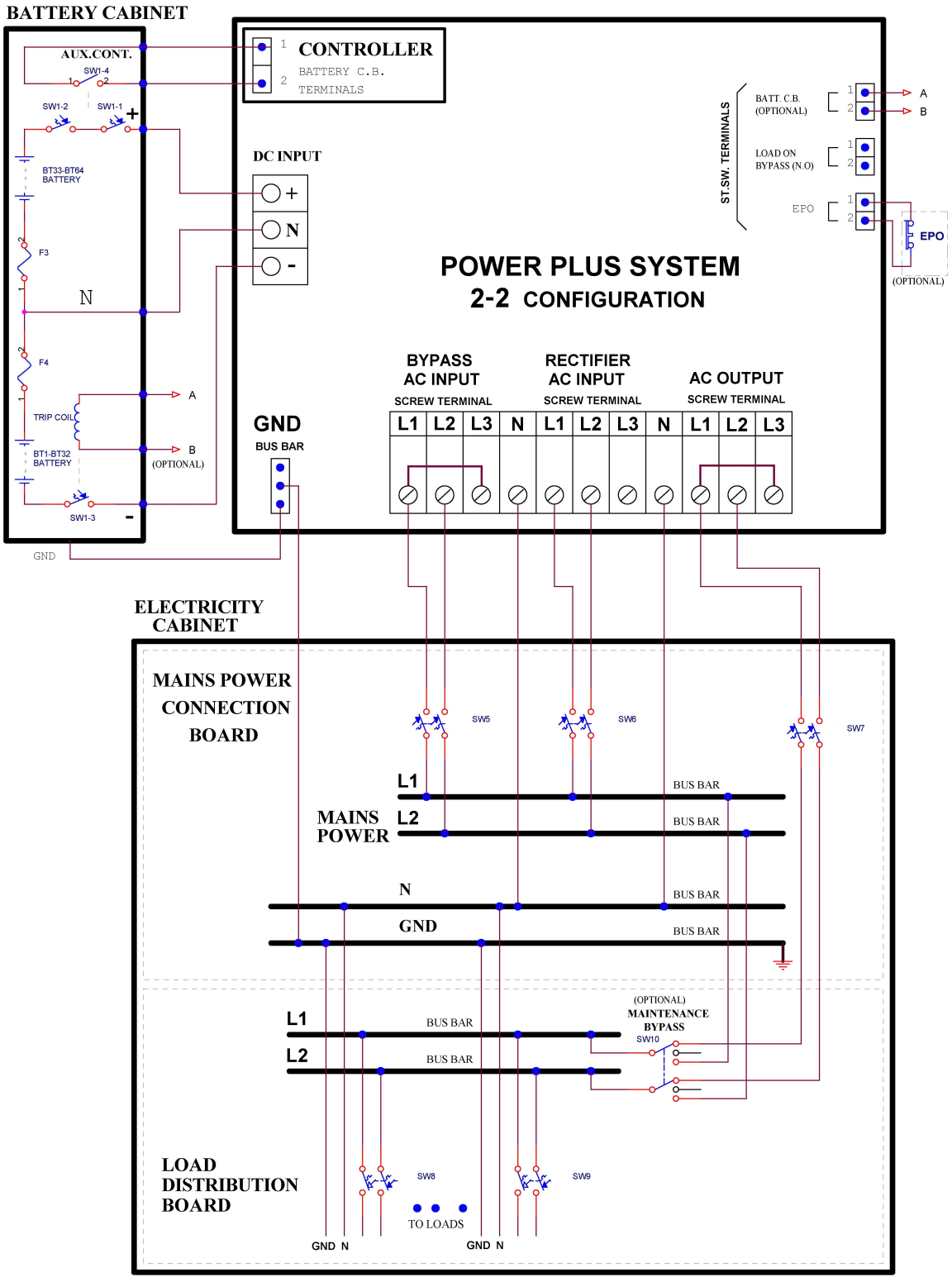

*Figure 5-3: Connection diagram for **2-2** configuration*

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5.2 Over-Voltage Protection

CAUTION!
To reduce the risk of fire, connect the UPS only to a circuit provided with maximum branch circuit over-current protection as indicated in Table 1**, in accordance with the National Electric Code, NSI/NFPA 70.**

ATTENTION !
Pour réduire le risque du feu, reliez L'UPS seulement à un circuit équipé de protection maximum de surintensité de circuit de branche comme indiqué au tableau 1, selon le code électrique national, au NSI/NFPA 70.

Ensure that the lines into and out of the UPS have protective circuit breakers installed in accordance with the ratings listed in *Table 1* for your Power+ model.

Table 1: Required over-current protection

POWER+ Model	Line	Maximum over-current protection
10 kVA	Ac input	35 A
	Ac input bypass	
	Load	
	Battery dc input	30 A
20 kVA	Ac input	70 A
	Ac input bypass	
	Load	
	Battery dc input	60 A
30 kVA	Ac input	110 A
	Ac input bypass	
	Load	
	Battery dc input	90 A
40 kVA	Ac input	150 A
	Ac input bypass	
	Load	
	Battery dc input	125 A
50 kVA	Ac input	175 A
	Ac input bypass	
	Load	

POWER+ Model	Line	Maximum over-current protection
	Battery dc input	150 A
60 kVA	Ac input	225 A
	Ac input bypass	
	Load	
	Battery dc input	200 A
70 kVA	Ac input	250 A
	Ac input bypass	
	Load	
	Battery dc input	225 A
80 kVA	Ac input	280 A
	Ac input bypass	
	Load	
	Battery dc input	250 A
90 kVA	Ac input	350 A
	Ac input bypass	
	Load	
	Battery dc input	300 A
100 kVA	Ac input	350 A
	Ac input bypass	
	Load	
	Battery dc input	300 A

5.3 Fuses

WARNING!
To reduce the risk of fire, replacement fuses must be of the same type and rating as the original.

AVERTISSEMENT !
Pour réduire le risque du feu, les fusibles de rechange doivent être du mêmes type et estimation que l'original.

AC INPUT FUSES

Verify that the appropriate ac fuses are present.

In the ac distribution module, the input for each UPS module is protected by a 32A fuse for each phase, so that each module, including the controller, has 3 fuses (one each for the L1, L2, and L3 phases). Ten modules plus the controller would require 33 fuses, as illustrated in *Figure 5-5*. Fuse receptacles are numbered from right to left, i.e. the 3 fuses on the far right protect UPS module 1.

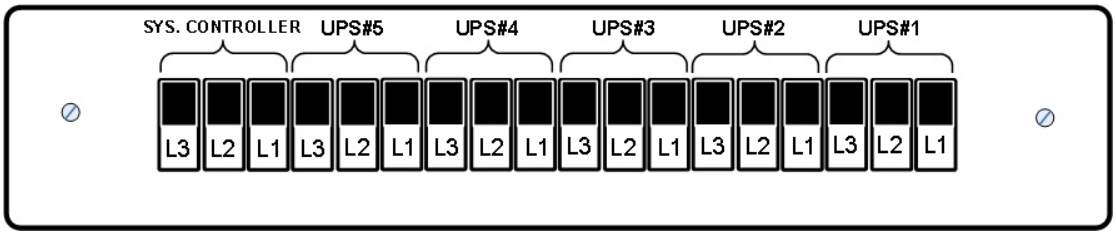


Figure 5-4: Ac input fuse assignments (50 kVA model)

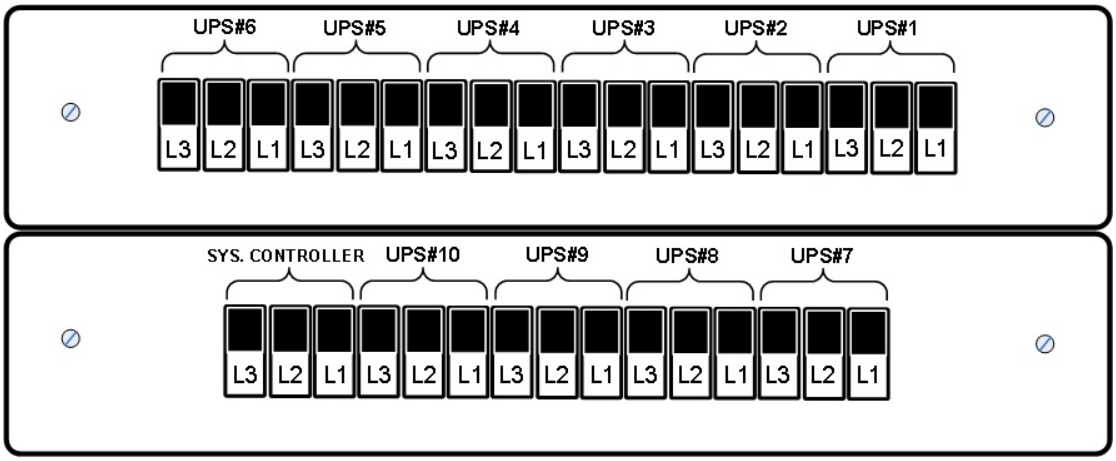


Figure 5-5: Ac input fuses (100 kVA model)

DC DISTRIBUTION FUSES

Verify that the appropriate dc fuses are present.

All dc fuses are located on the opposite side (the front side) of the dc distribution panel. There are two fuses for each power module and for the controller – one for the positive line and one for the negative line. Figure 5-6 show the assignments for the 100 kVA model; Figure 5-7 for the 50 kVA module.

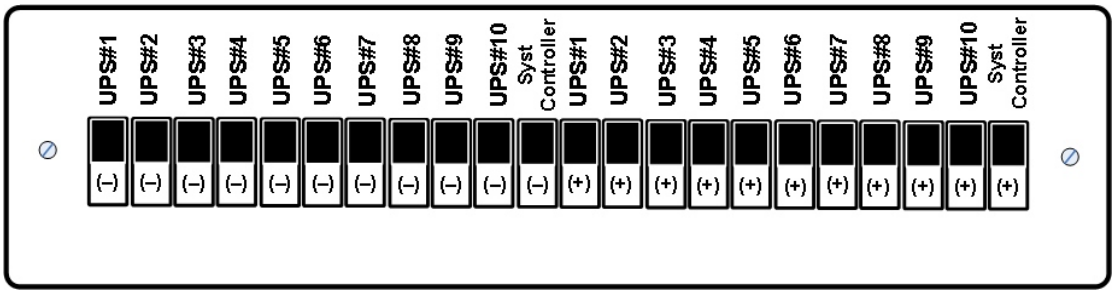


Figure 5-6: Dc distribution fuse assignment (100 kVA model)

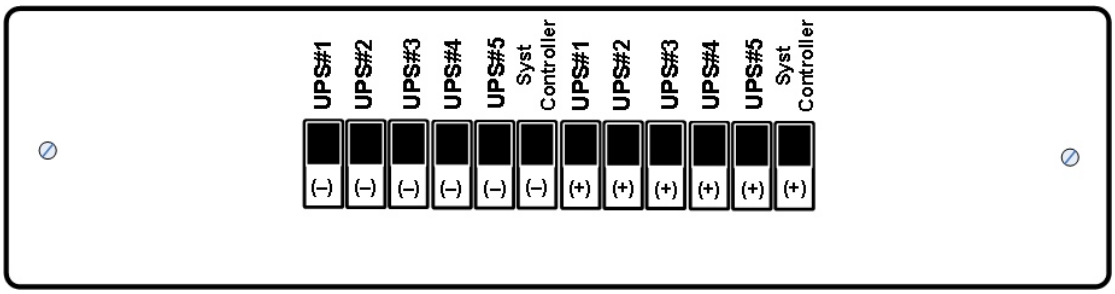


Figure 5-7: Dc distribution fuse assignment (50 kVA model)

5.4 Inspections to be performed prior to installation

	TYPE OF CHECK		REQUIREMENT	VALUE / VERIFICATION
1.	Ambient temperature in the immediate location of the equipment		Recommended: between +59 ° F and +77 ° F (+15 °C and +25 °C)	
			Required: between +14 °F and +104 °F (–10 °C and +40 °C)	
2.	Humidity and condensation		Verify that there is no water condensation or dampness within the installation site	
3.	Ventilation		Verify that sufficient airflow or forced ventilation is provided for battery cabinets location	
4.	Foundation and route to installation site		Verification of adequate structure, space and clearance for dimensions and weights of the UPS units and their battery cabinets	
5.	When planning the location of the UPS units, room for access to battery cabinets and electrical boards is critical.		Verify 16 in. (40 cm) clearance at rear for cable connections and 39 in. (100 cm) at front for user access and service	
6.	Circuit breakers on the electrical board supplying the system		Must be in accordance with Gamatronic system specifications, connection schematic, and local and national codes.	
7.	Diameter of input and output power cable connections, PE (Gnd) and neutral lines.		Must comply with local and national codes, and be appropriate for the circuit breakers protecting them. Refer to connections schematic.	
8.	Lightning / Voltage surge protection on electrical board supplying the system.		Voltage surge suppressors type B are recommended to be installed between each phase and the neutral line: Ratings: 150 Vac for 110-120 Vac mains.	
9.	Ac input voltage	3-3 and 3-2 configuration	Phase-to-Phase: 3x208* Vac, +15 %, -25 %	L1-L2 L2-L3 L3-L1
			Phase-to-Neutral: 120* Vac, +10 %, -15 %	L1 L2 L3
		2-2 configuration	Phase-to-Phase: 3x208* Vac Wye, +15 %, -25 %	L1-L2
			Phase-to-Neutral: 120* Vac, +10 %, -15 %	L1 L2
10.	Voltage between neutral and ground		0 – 2 Vac	
11.	System installation and start-up		Must be performed only by authorized personnel in accordance with connection schematic, Gamatronic system specifications and this User Guide	

** Or other, according to nominal voltage rating of local power mains.*

5.5 Installation Procedure

	OPERATION
1.	Remove rear covers and connect ac input and output power cables to terminals according to markings as shown in this User Guide and according to connection schematic. Verify correct phase sequence between board and UPS
2.	Consult the appropriate connection diagram, depending on the phase configuration of the UPS: • For 3-3 configuration, see Figure 5-1 on page 25. • For 3-2 configuration, see Figure 5-2 on page 27. • For 2-2 configuration, see Figure 5-3 on page 29. Connect ground lines to busses according to markings as shown in the connection diagram. Verify secure connections.
3.	Connect the dc power cables of the battery cabinets to the UPS terminals according to markings as shown in the connection diagram (see step 2 above). Connect neutral and ground lines to busses as per the connection diagram. Verify correct polarity of the connections (+ / N / -) Between the Battery Cabinets C.B.s / Terminals and the UPS terminals. Auxiliary contacts of Battery C.B.s are connected to UPS Controller inputs “Bat CB” and “Com” as marked.
4.	If an external battery cabinet is being used, before turning on the battery cabinet circuit breaker perform the following two checks: 4.1) Measure the voltage between the (+) and (–) terminals on the battery cabinet. The voltage must be within the range of 384–432 Vdc. If the voltage is not within this range, determine what the problem is and resolve it before continuing with system start-up. 4.2) On the battery cabinet, measure the voltage between the (+) terminal and the Neutral terminal, and between the (–) terminal and the Neutral terminal. Both measurements should be within the range of 196–216 Vdc. If a reading outside of that range is obtained, determine what the problem is and resolve it before continuing with system startup.
5.	An external dual-pole / N.C. EPO switch may be connected according to connection schematic. EPO wiring and switch rating must be rated for at least 5A / 120 Vac.
6.	Before connecting power to each system verify again that all connections are secure and are according to instructions and schematics.
7.	Follow the instructions in section 5.6 "First-time Startup" which begins on page 37.

5.6 First-time Startup

This section describes the procedure for starting up the Power+ for the first time, after having completed the installation process described in the previous chapter.

8. Ensure that the maintenance bypass switch is set to NORMAL (OFF), and that no load devices are connected to the UPS.
9. Turn the AC input and AC bypass switch ON and wait (for about 2 minutes) for the ***POWER+*** to initialize.

   When applying power to the **POWER+**, the system automatically runs the startup process without a need to press the On/Off button.
10. The start-up sequence begins and the control panel displays the following sequence. (The details may vary, depending on your application.)
11. Turn the AC input and AC bypass switch ON and wait (for about 2 minutes) for the ***POWER+*** to initialize.
12. The start-up sequence will begin and the control panel will show the following sequence. (The details of the display may vary from what is shown in the illustrations below, depending on your system's particulars.)

Figure 5-8: Start-up screen 1

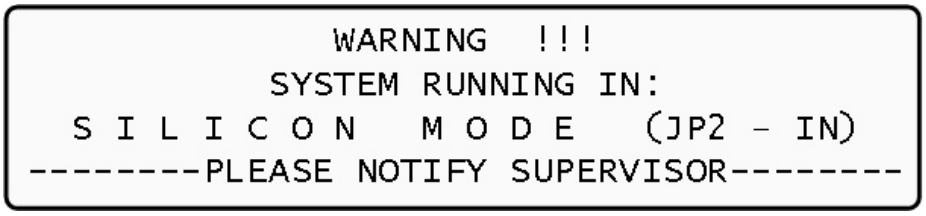


Figure 5-9: Start-up screen 2

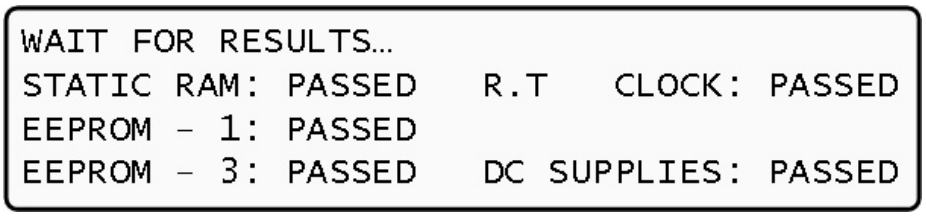


Figure 5-10: Start-up screen 3

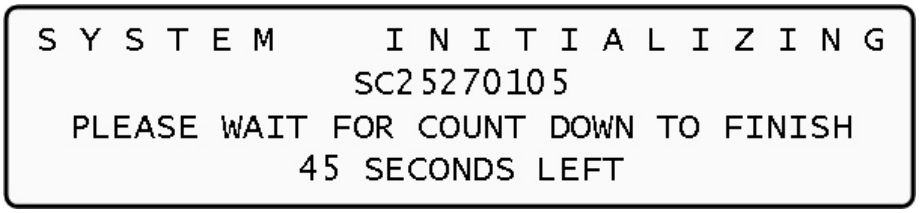


Figure 5-11: Start-up screen 4

During this step, the LEDs are also checked sequentially.

13. Finally the normal default screen is displayed. Verify that the correct number of phases are displayed:
    - for 3-3 configuration, under the LOAD LEVEL heading, you should see a line for L1, L2, and L3 as in Figure 5-12.
    - For 3-2 or 2-2 configuration you should lines for L1 and L2 only, as in Figure 5-14.

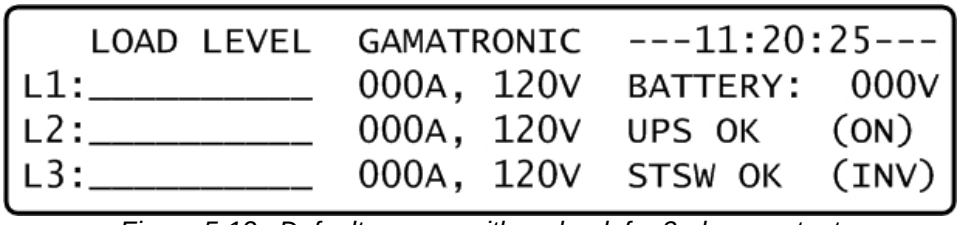


Figure 5-12: Default screen, with no load, for 3-phase output

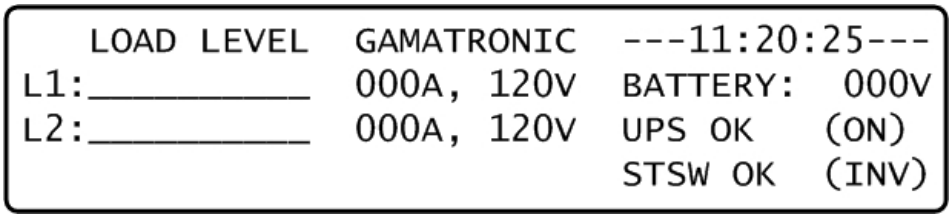


Figure 5-13: Default screen, with no load, for 2-phase output

14. Switch all battery switches "ON" on all battery cabinets.
15. You can now turn on the load devices.
16. After turning on the load devices, verify that you have a normal reading on the display screen.
    - For 3-3 configuration, the display shows readings for L1, L2, and L3 as in Figure 5-14 below, but of course your readings will be different.
    - For 3-2 and 2-2 configuration, the display shows readings for L1 and L2 only, as in Figure 5-15.

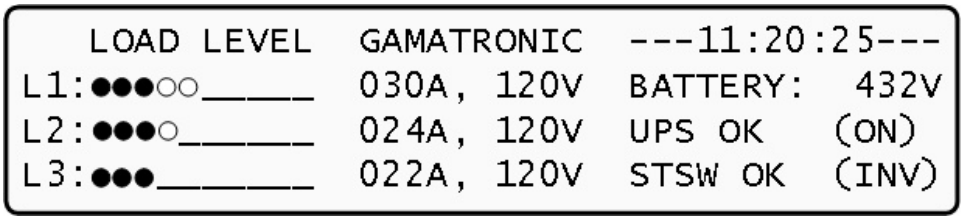


Figure 5-14: Normal display, system under load (3-phase output)

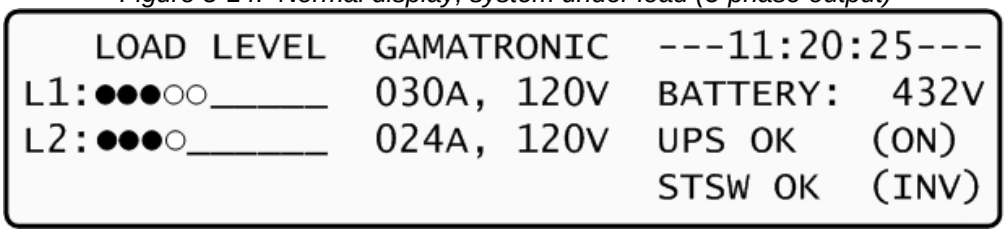


Figure 5-15: Normal display, system under load (2-phase output)

5.7 Checks to be performed following initial startup

	TYPE OF CHECK	REQUIREMENT	RESULT

	TYPE OF CHECK	REQUIREMENT		RESULT
1.	Ac input voltage during operation under load. Take measurements on the input terminals of the system	Phase-to-phase: Not less than 2 % below no-load values measured in item 5 below.	3-3 and 3-2 configuration	L1-L2 L2-L3 L3-L1
			2-2 configuration	L1-L2
		Phase to Neutral: Not less than 2 % below no-load values measured in item 5 below.	3-3 and 3-2 configuration	L1 L2 L3
			2-2 configuration	L1 L2
2.	With no load on the system, measure current circulation between the units.	Irst should be <30 A		
3.	With no load on the system, measure the dc voltage of the system.	Total dc voltage between + and – terminals should be between 384 V and 432 V.		(+) — (–)
4.	Voltage between neutral and ground during operation under load On the input terminals of the system	0–2 Vac		
5.	System output voltage	120 V +/- 2 % or other according to system specifications		
6.	Total system load / output current	Verify that the system is not overloaded in relation to system specifications		
7.	Correct and orderly operation	Verify that the UPS is operating normally in accordance with this User Guide and that no alarms or fault indications are evident		

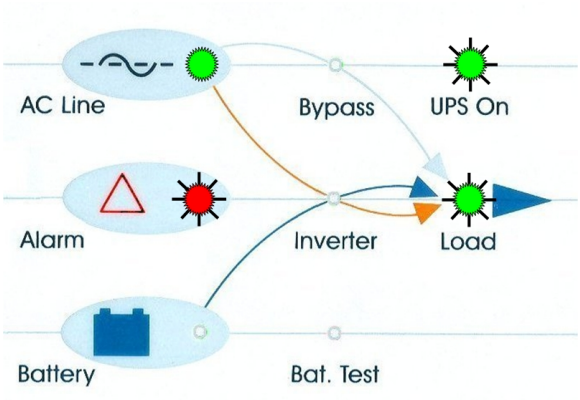
NOTE: It is the responsibility of the customer to notify Gamatronic Electronic Industries Ltd. and receive approval for any deviations from these requirements.

6. *POWER+* ROUTINE START-UP

This section describes the start-up procedures for the operator after a *POWER+* shutdown.

```
   LOAD LEVEL   GAMATRONIC   ---22:21:18---
L1:__________   000A, 120V   BATTERY:  432V
L2:__________   000A, 120V   UPS OK    (OFF)
L3:__________   000A, 120V   STSW OK   (BYP)
```

After shutdown, the *UPS on*, *Alarm* and *Load* indicators will flash.



1. Press twice on the On/Off button on the upper right of the system controller panel.
2. Wait about 2 minutes for the ***POWER+*** to start up.

The following screen is displayed:

```
   LOAD LEVEL   GAMATRONIC   ---22:21:18---
L1:__________   000A, 120V   BATTERY:  432V
L2:__________   000A, 120V   UPS OK    (ON)
L3:__________   000A, 120V   STSW OK   (INV)
```

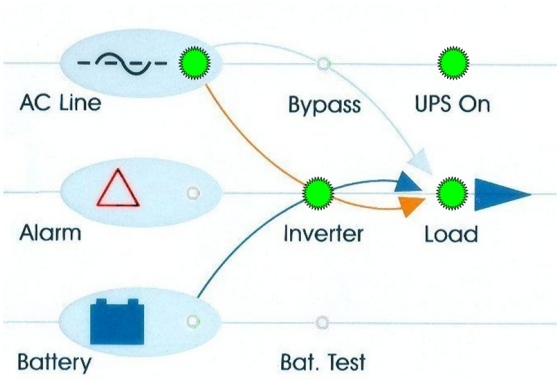
Status indications

Observe that UPS OK indication is now ON and the STSW OK now indicates INV.

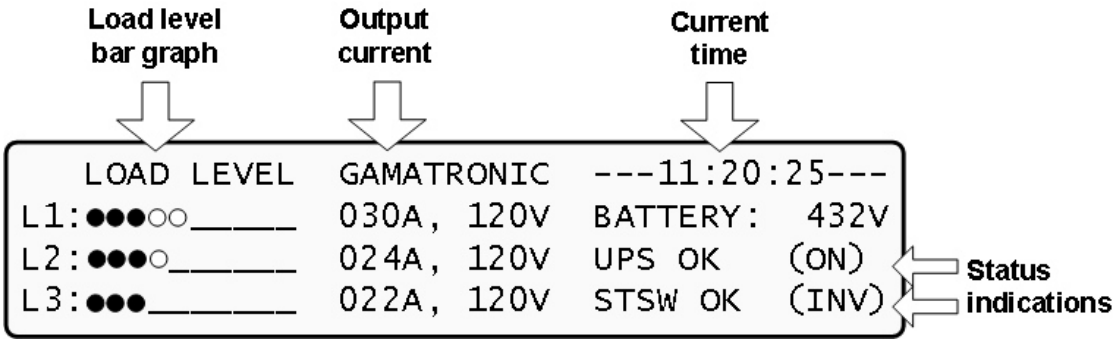
If the display continues to indicate BYP, check on the Static Switch panel, that the inverter is running.

If the inverter indicator on the Static Switch panel is OFF:

- Press the Inv/Byp button on the static switch panel to switch the inverter ON and wait for the indicator to light.
- Press the Inv/Byp button on the lower right of the control panel.



3. Connect the load and observe the results on the display.

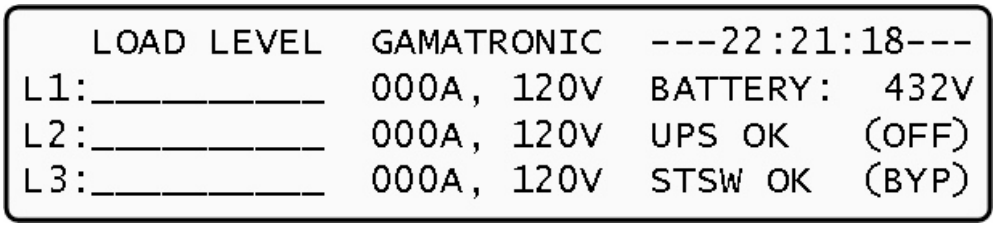


4. Observe that the “dot” bar graph now indicates the load presence and relative power consumption. Filled dots indicate kW; empty dots indicate kVA.

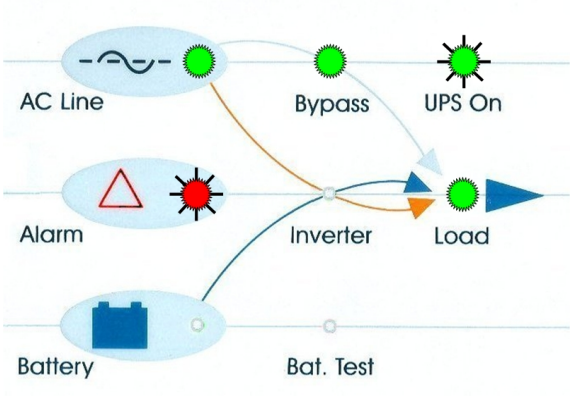
POWER+ start-up is now complete.

POWER+ Shutdown (Switching to Bypass)

1. Switch the load OFF.
2. Press twice on the On/Off button.
3. Wait 2 minutes for the ***POWER***+ to shut down. The control screen will indicate UPS OK (OFF).



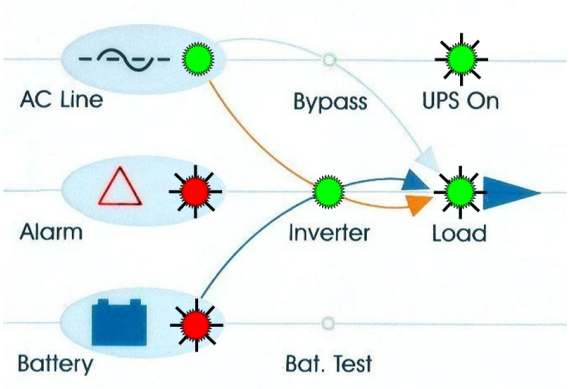
Note: *This does NOT switch the entire* ***POWER***+ *OFF. Power is still delivered to the load but in bypass.*



POWER+ Total Shutdown (No Ac Output)

1. Switch the load OFF.
2. Press and hold the On/Off button for 10 seconds.
3. The control screen will indicate UPS OK (OFF).

```
   LOAD LEVEL   GAMATRONIC   ---23:14:40---
L1:__________   000A, 120V   BATTERY:  432V
L2:__________   000A, 120V   UPS OK    (OFF)
L3:__________   000A, 120V   STSW Warning !
```



7. POWER+ CONTROL PANEL

The ***POWER+*** system is equipped with an LCM display (LCD) and touch pad control panel that enables the user to effectively manage the UPS system. Once ***POWER+*** is installed, the control panel serves as the user's primary interface with the system. Messages, warnings, and error conditions are relayed to the user through the display, LEDs and audible alarms.

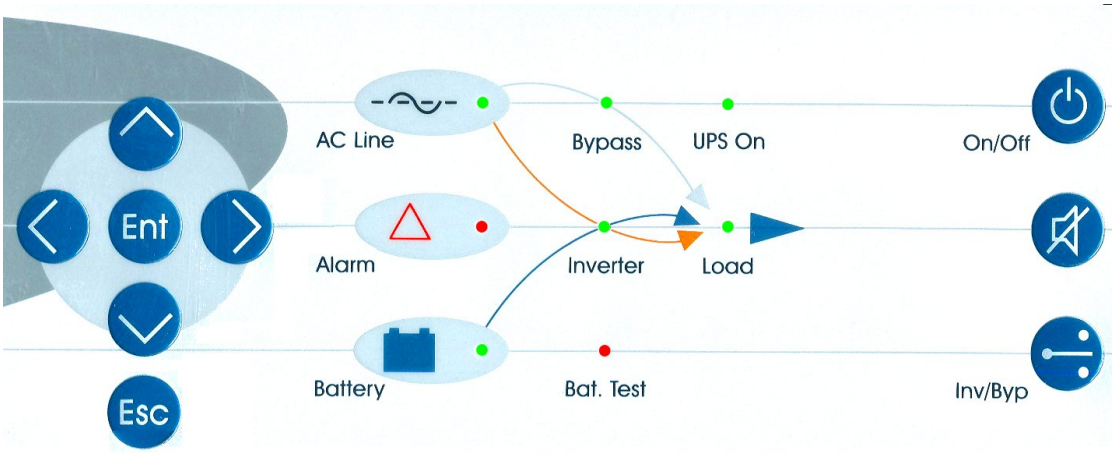


Figure 7-1: Control Panel

The remainder of the current chapter contains a quick-reference summary of the functions available through the ***POWER+*** control menus.

Chapter 8 beginning on page 50 illustrates in detail the functions available through the *POWER+* control menus.

Quick-Reference Summary of Power+ Menu Functions

To access the POWER+ main menu, press the "ENT" key.

Default window

Main menu

```
1> SYSTEM       4> HISTORY    7> SETUP
2> UPS MODULE   5> BATTERY    8> STATIC SW
3> SELFTEST     6> ALARM      9> COMM.
NAVIGATE: <UP, DOWN> 1 SELECT: <ENTER>
```

MAIN MENU Option 1: SYSTEM

- View battery voltage, input/output ac power and power factor values
- View input/output measurements voltage/current
- View operating time
- View controller jumper settings
- View controller voltages
- View battery temperature
- View dry contacts state
- View PD technical bit dialog for each UPS module

MAIN MENU Option 2: UPS MODULE

- View in/out voltage/current, dc voltage, PLL info and operation bits for each UPS module (technical information)

MAIN MENU Option 3: SELFTEST

- Perform a controller self-test, without affecting system operation

MAIN MENU Option 4: HISTORY

- View the history log

MAIN MENU Option 5: BATTERY

- View battery capacity, equalizing settings, battery test progress, battery condition and current limit

MAIN MENU Option 6: ALARM

- View a short version of alarms list and their state

MAIN MENU Option 7: SETUP

- (See the "SETUP" submenu)

MAIN MENU Option 8: STATIC SW

- View the ST/SW inverter/bypass voltage and the output current

MAIN MENU Option 9: COMM.

- Select the communication type for the interface

The "SETUP" submenu, option "7" from the main menu:

SETUP submenu Option 1: ALARM SET

1> AC VOLT

1) Set Ac High & Low Alarm Levels
- *Set the ac low voltage and ac high voltage alarm levels*

2) Set Ac Alarms Hysteresis
- *Set the ac alarm response tolerance.*

2> FLOAT VOLT

1) BATEND
- *Set the end of backup dc voltage*

2) BATLOW
- *Set the battery low alarm voltage*

4) BAT-HI
- *Set high dc voltage alarm*

7> TEMPERATURE

1) Over Temperature
- *Set the over-temperature alarm value*

2) Under Temperature
- *Set the under-temperature alarm value*

9> INTEGRAT.
Set the number of communication repeats until processing an alarm

SETUP submenu Option 2: MODULE CONF.

1> NUM OF PHASE
Set the single/triple phase indication on the controller

2> MODULE/S FREQUENCY
Set the actual frequency for all modules – 50 Hz / 60 Hz or dip switch hardware setting

3> MODULE/S VOLTAGE
Set the actual module output voltage: 110 V, 115 V, 120 V etc…

4> UPDATE VOLT/FREQ
Send the selected voltage and frequency values to UPS modules

5> OUTPUT ADJUST
Set the exact output voltage on each phase for each module

6> FREQUENCY LIMITS
Set the acceptable bypass frequency tolerance: 0.5 Hz to 4 Hz

7> DC CALIBRATION
Calibrate all modules to the measured battery voltage.

SETUP submenu Option 3: BATTERY

1> TEST-VOLTAGE
Set the battery test dc voltage (lowest)
2> TEST ALARM
Set the low battery dc voltage for alarm
3> CURRENT-LIMIT

1) Current Limit Value Setup

1> Set C. Limit Of Battery #1 (Value)
- *Set the current limit for battery cabinet number one*

2> Set C. Limit Of Battery #2 (Value)
- *Set the current limit for battery cabinet number two*

3> Set C. Limit Of Battery #3 (Value)
- *Set the current limit for battery cabinet number three*

2) Enable/Disable Current Limit (State)
- *Enable or disable the battery current limit function*

4> TEMP COMPENSAT..

1) Temperature Compensation Value Setup
- *Set the temperature compensation value: 2.0 to 4.0 mV/C^{O} per battery cell*

2) Enable/Disable Temp. Compensation (State)
- *Enable or disable the battery charging temperature compensation feature*

3) Set ABSOLUTE Max & Min Voltages

1> Set ABSOLUTE MINimum Output Voltage
- *Set the minimal dc voltage under compensation*

2> Set ABSOLUTE MAXimum Output Voltage
- *Set the maximal dc voltage under compensation*

5) BATTERY TEST…

1> Activate Battery Test…
- *Perform a manual battery test*

2> Set Auto Battery Test Period
- *Set a period between automatic battery tests in weeks*

3> Set Auto Battery Test Top Time
- *Set the longest time for the automatic battery test*

6) CAPACITY (Value)

1> Set Capacity Of Battery #1 (Value)
- *Set the capacity (AH) rating of the first battery bank*

2> Set Capacity Of Battery #2 (Value)
- *Set the capacity (AH) rating of the second battery bank*

3> Set Capacity Of Battery #3 (Value)
- *Set the capacity (AH) rating of the second battery bank*

7) 'AUTO' TEST
- *Perform a manual activation of the automatic battery test*

8) ENABLE/DIS OPTIONS

1> ENABLE/DISABLE SHUTDOWN by long ac fail (On/Off)
- *Enable or disable automatic shutdown after 3 hours of power failure*

2> ENABLE/DISABLE Current Sensors (On/Off)
- *Enable or disable the usage of battery current sensors*

3> ENABLE/DISABLE BATT Temperature sensor (On/Off)
- *Enable or disable the usage of battery temperature compensation sensor*

SETUP submenu Option 4: CHARGE

2> Floating Parameters Setup.
Set the actual dc voltage of the system (ups charging voltage)

SETUP submenu Option 5: TIME

- Set the date and the time of the RTC (real time clock) of the controller

SETUP submenu Option 6: SITE

- Set the 6 digit site number for identification through the management software

SETUP submenu Option 7: PASSWORD #1

- Set the 8 character password for entering the SETUP submenu

SETUP submenu Option 8: SERVICE

2> UPSs
Turn selected UPS modules on or off

4> DRYOUT TEST
Test the output dry contacts of the controller

5> CONFIGURE

1) # OF UPSs (redundancy)
- *Set the number of modules used for redundancy only, which will not be counted in the global power of the system*

2) # OF UPSs (total)
- *Set the number of UPS modules in the system*

3) # Of BATT
- *Set the number of battery cabinets for the system – 1, 2 or 3*

4) Static Switch Setup
- *Special function, not for customer use!*

5) DRY, Alarms

1> Dry1 Association
- *Set the alarms that will trigger dry contact number 1*

2> Dry2 Association
- *Set the alarms that will trigger dry contact number 2*

3> Dry3 Association
- *Set the alarms that will trigger dry contact number 3*

4> Dry4 Association
- *Set the alarms that will trigger dry contact number 4*

5> Dry5 Association
- *Set the alarms that will trigger dry contact number 5*

6> Dry6 Association
- *Set the alarms that will trigger dry contact number 6*

7> Enable / Disable Alarms
- *Enable or disable specific alarms from the list of 32*

6) CALIBRATION

2> Dc-I Offset removal
- *Set the battery dc current to zero if not calibrated properly, must be done before the dc-I calibration with disconnected batteries*

3> Dc-I Calibration

1> Calibrate Battery #1 Current
- *Set the measurement current for the first battery cabinet (mA)*

2> Calibrate Battery #2 Current
- *Set the measurement current for the second battery cabinet (mA)*

3> Calibrate Battery #3 Current
- *Set the measurement current for the third battery cabinet (mA)*

7) PARALLEL/STANDALONE
- *Set the system operation – stand alone or parallel for more then one UPS system*

9> SC2012

1) Restart Controller
- *Restart the system controller – will not affect the output voltage*

2) Factory Settings
- *Resets system settings to the default values and restarts the controller – hard reset, for use on manufacturing stage usually*

3) Network…

1> Set IP ADDRESS
- *Set the IP address for the system communications*

2> Set GATEWAY
- *Set the default gateway for the system communications*

3> Set MASK
- *Set the subnet mask for the system communications*

4> Store
- *Store the communication information after changing it*

5> SNMP Factor
- *Set the SNMP no communication factor*

4) Reset MBX
- *Reset the communication card*

SETUP submenu Option 9: SILICON

2> RESET LOG
Reset (clear) the controller's history log

3> DEFAULTS

1) Restore Factory Defaults…
- *Restore the controller values to the factory preset and restart the controller – soft reset, reapplies the factory settings*

2) Restore User Defaults…
- *Restore the controllers user saved preset*

3) Save User Defaults…
- *Save the current controller settings (user preset)*

5> RESET TOTAL TIME
Reset the total system up-time

6> LAST MAINT, SET
Reset the last maintenance date to the current date

The Information menu, accessed with the "ESC" key (press and hold).

1> UPSs Stat
- Displays the status of each UPS module in the system – good or bad.

2> UPSs On/Off
- Displays whether the state is on or off for each UPS module

3> SoftWare Rev
- Displays the firmware revision for system controller and the communication card

4> Network…
- Displays the communication card IP settings and the network faults information

5> Dry In/Out Stat
- Displays the dry contact closed/open information for all of the input output dry contacts

6> Alarms Status
- Displays the list of all alarms and the active ones, including each alarm's long name

7> Language
- System controller's LCD panel language selection – English or Spanish

8> General
- *Displays global system information:*
- *Software revision*
- *Battery current limit on or off*
- *Battery temperature compensation on or off*
- *Last maintenance date*
- *Site 6 digit number*
- *Total battery capacity*
- *Dc voltage setting*

8. POWER+ MENU FUNCTIONS IN DETAIL

This chapter describes the functions available through the ***POWER+*** Main Menu and its submenus.

Main Menu

Press the Enter button to display the main menu.

Note: *To return to the main menu at any time, press the Escape button and then the Enter button.*

Default window

Main menu

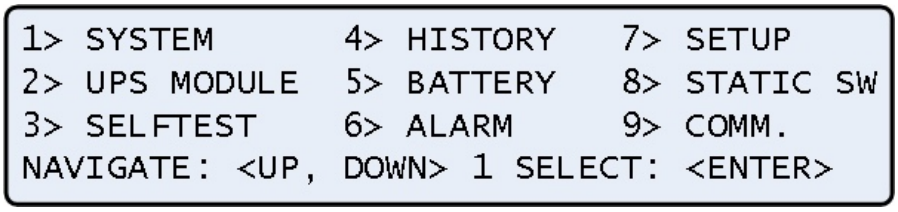


Figure 8-1: Main menu

Table 2: Main Menu Options

1>	**SYSTEM**	General information such as voltages, currents etc.
2>	**UPS MODULE**	Information for a specific UPS module
3>	**SELFTEST**	Self checking of the Controller's components (supply, RTC, memory)
4>	**HISTORY**	History log events (last 255 events, dated and timed)
5>	**BATTERY**	Charging / discharging voltages and currents, battery test etc.
6>	**ALARM**	Detailed alarm status
7>	**SETUP**	Configuring the system (number of modules, alarm, time etc.)
8>	**STATIC SW**	Static Switch data
9>	**COMM**	Determining the type of communications(TCP/IP or WING)

System

From the main menu select option 1 (System) to show the dc voltages (positive, negative and summary):

Main menu → Option 1

```
BATT CURR: ------→TOTAL +053.0A
BATT POS.: 216V   BATT  +053.2A (0531)
BATT NEG.: 216V
BATT VOLT: 432V
```

Figure 8-2: System dc voltages

Note: *The example shown in Figure 8-2 illustrates only 1 battery installed.*

Press the ► key to view the results of power factor 0[3].

System menu → Option 1

OUTPUT	PH1	PH2	PH3	TOTAL
KVA	000.4	000.2	000.2	000.8
KW	000.0	000.0	000.0	000.0
P.F.	0.00	0.00	0.00	0.00

Figure 8-3: Power factor 0

Press the ► key again to view the results of power factor 0.5

System menu → Option 1

OUTPUT	PH1	PH2	PH3	TOTAL
KVA	003.2	002.8	002.8	008.8
KW	001.6	001.6	001.6	004.8
P.F.	0.50	0.59	0.58	0.55

Figure 8-4: Power factor 0.5

Press the ► key again to view the results of power factor 1.0

System menu → Option 1

OUTPUT	PH1	PH2	PH3	TOTAL
KVA	001.5	001.5	001.5	004.5
KW	001.5	001.5	001.5	004.5
P.F.	1.00	1.00	1.00	1.00

Figure 8-5: Power factor 1

Click Esc and then the Enter button again to return to the main menu (Figure 8-1).

[3] 1 kVA is 1000 VA. Apparent power is measured in VA which is a reactive (i.e. a mix of both capacitive and inductive) load's RMS voltage multiplied the RMS current. True power is VA multiplied by the power factor, and the power factor is the cosine of the phase angle between voltage and current. A reactive load that draws an apparent power of 1000 VA and has a 0.5 power factor is consuming 500 watts of power. If a device were purely inductive, it would have a power factor 0. See also footnote 2, on page 4.

Select System (1).

Press the ▼ key to view the next windows, shown in Figure 8-7: through Figure 8-14.

System menu
Option 1

```
phase:   --r--        --s--        --t--
in:   121v/088.0a 122v/088.0a 122v/084.0a
out: 120v/086.0a 120v/084.0a 121v/084.0a
----- total ups in/out measurements ----
```

Figure 8-6: Overall phase voltages/currents

System menu
Option 1

```
total     time: 00004 hourS
current sess.: 00004 hourS
boots  so far: 00001 timeS
```

Figure 8-7: Elapsed time

System menu
Option 1

```
jmP:      jmp1, Jmp2, jmp3, jmP6 and jmp9
●=IN      1. not hard silicoN
○●●●●     2. silIcon modE   6. no rmt pan.
12369     3. jp3:       oN  9. jp9:      on
```

Figure 8-8: Jumper settings WITHOUT remote panel

System menu
Option 1

```
jmP:      jmp1, Jmp2, jmp3, jmP6 and jmp9
●=IN      1. not hard silicoN
○●●○●     2. silIcon modE   6. remote pan.
12369     3. jp3:       oN  9. jp9:      on
```

Figure 8-9: Jumper settings WITH remote panel

Note: *In Figure 8-8 and Figure 8-9, "Silicon Mode" indicates that the configuration jumper is installed, thus allowing for modifications. "Hard Silicon" indicates that the factory defaults hard reset jumper is installed. This is required only at the factory or whenever software reset fails.*

System menu
Option 1

```
5vdC  : 5.19V          controller internaL
12vdC: 09.41V                    voltages
5vP   : gooD
5v2   : gooD          -12vdc: good
```

Figure 8-10: Controller – internal voltages

System menu
Option 1

```
battery charge level:     010ah     050%
while, total capacity:    020aH
remaining backup:         0010    minuteS
battery temperature:      04`C
```

Figure 8-11: Battery temperature

Note: *The data displayed in Figure 8-11 depend on the options installed and configured. See Figure 8-54 on page 62 and Figure 8-71 on page 65.*

System menu
Option 1

```
batt fuse:   bad        emergency:   openN
2:           open       6:           open
3:           opEn       7:           open
4:           off        8:           open
```

Figure 8-12: Fuse status

System menu
Option 1

```
pd dialog: ups    #01
t>c0 42 00 00 d8 00 00 00 00 00 00 00 00
   00 00 00 00 00 00 aa
```

Figure 8-13: Communication with inverter – transmit

System menu
Option 1

```
r<e0e0 0900 0003 0003 0003 e874 1074
   1074 2f37 5362 0000 0200 0100 0310
   f077 0000 0000 0000 0000 0000 0000
   0000 0000 0000 0000 52                    52
```

Figure 8-14: Communication with inverter – receive

UPS Module

1. From the main menu, select option 2 (UPS MODULE) and press the Enter button to display the instructions window shown in Figure 8-15.
2. Press the ▼ key to view information about the UPS modules of the system.
3. Scroll ► and ◄ keys to view additional information for the specific module chosen.

Figure 8-16 and Figure 8-17 on page 54 show parameters of the first module of 4 modules (UPS: #01/04).

Main menu
Option 2

```
    next screens show data on all upss
use up, down arrow keys to select a upS
       use left, right arrow keyS
     to view different ups parameterS
```

Figure 8-15: Instructions

Main menu
Option 2

```
phase:   --r--        --s--        --t--
in:   123v/024.0a 122v/023.5a 122v/020.0a
out:  121v/022.0a 121v/020.0a 121v/020.0a
ups:  01/04
```

Figure 8-16: Module phase voltages/currents for module 1 of 4

System menu
Option 2

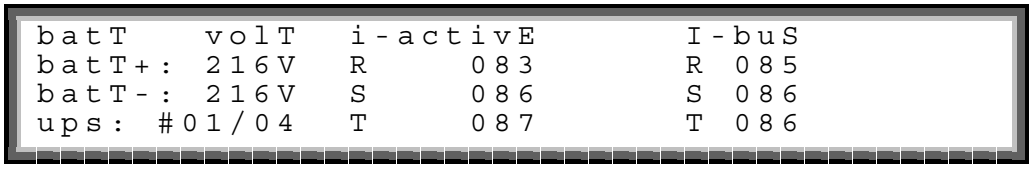


Figure 8-17: Battery voltages for module 1 of 4

Click Esc and then the Enter button again to return to the main menu (Figure 8-1).

Self-Test

Main menu
Option 3

From the main menu select option 3 (SELF TEST) to run a self-test of the ***POWER+***. The self-test displays the window shown in Figure 8-18. You can run a self-test at any time without interfering in the normal operation of the ***POWER+***. A self-test is also initiated by the ***POWER+*** itself each day at midnight.

The failure of a self-test sets on the self-test alarm. The self-test alarm can only be cleared by a subsequent successful self test, or it can be cleared manually by a maintenance technician. Powering the ***POWER+*** down and up, for example, does not clear the self-test alarm. This is because the failure of a self-test is considered a serious event that should not be "forgotten". A self-test failure is also recorded in the alarm log.

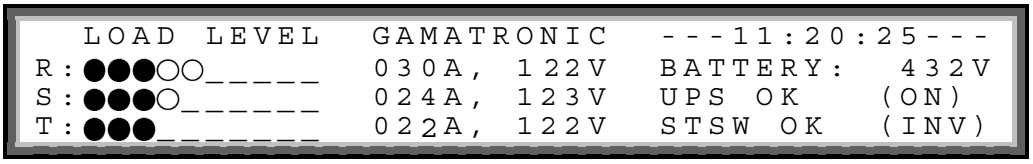


Figure 8-18: Result screen from self-test

History (Logs)

From the main menu select option 4 (HISTORY) to display the window shown in Figure 8-19. The last 255 events reserved in the LOG are displayed, as shown in Figure 8-20.

Navigate the LOG by scrolling using the ▲ and ▼ keys.

Main menu
Option 4

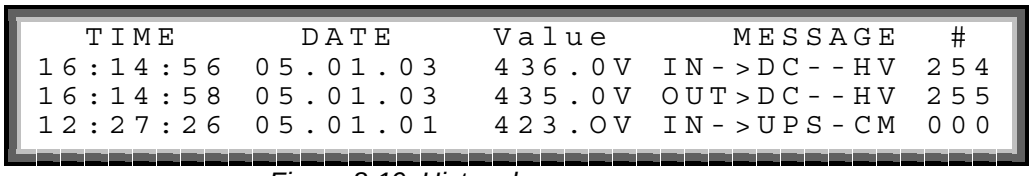


Figure 8-19: History logs

Navigate the LOG by scrolling using the ◄ and ► keys.

Main menu
Option 4

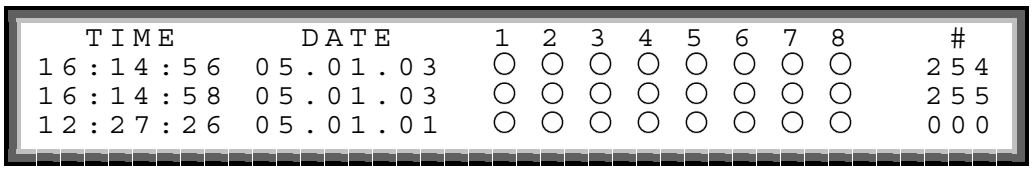


Figure 8-20: History log scroll

Table 3 itemizes the log messages that appear on the controller panel.

Table 3: Log Messages

#	Message	Explanation
01	UPSMAJ	More than 1 UPS Module is sending an alarm or fault warning
02	UPSMIN	Single UPS Module is sending an alarm or fault warning
03	------	N.A.
04	------	N.A.
05	LOADBP	Load is now running on bypass[4]
06	VIBRA_	Alarm(s) vibrating. Alarm is frequently raised and lowered. Ignore to avoid loading the log filling up.
07	OVTEMP	Excess temperature
08	OUTFLT	No ac output to load
09	BAT-HI	Excessive battery voltage
10	------	N.A.
11	BATEND	End of battery backup. Battery is discharged to shutdown limit
12	BATLOW	Low battery voltage
13	STSWRN	Static Switch Warning or alarm
14	E.P.O.	Emergency Power Off is active
15	EQ-HST	Battery is currently charging in equalizing mode, dc voltage is temporarily increased

[4] Given as a decimal, this is the sum of 8 components each with its own weight:

- Detection of inverter voltage blackout for >3mS – 0 if not detected, 1 of detected
- Detection of inverter peak voltage <185 V (brownout) - 0 if not detected, 2 if detected
- Detection of inverter peak voltage high <185 V (brownout) - 0 if not detected, 4 if detected
- Detection of frequency beyond limits (45-65 Hz) - 0 if not detected, 8 if detected
- Detection of inverter average voltage low - 0 if not detected, 16 if detected
- Detection of inverter average voltage high - 0 if not detected, 32 if detected
- 64 if instruction for load transfer is received from the controller
- 128 if instruction for load transfer is received from the Static Switch

Example:
If LOADBP data is 67, (64 + 2 + 1) this means that 3 components are active:

- Instruction to transfer the load was issued by the controller (64)
- Low peak voltage detected (2)
- Voltage blackout encountered (1)

#	Message	Explanation
16	BATFLT	Batteries failed last test
17	USER-1	User 1 input open
18	USER-2	User 2 input open
19	USER-3	User 3 input open
20	AC-BRN	Input ac supply Brown Out
21	ACIN_H	Ac input excessive
22	ACFAIL	Ac input failure
23	STSWCM	Static Switch does not respond
24	SLFFLT	Last controller self-test failed
25	BAT-CB	Battery Circuit Breaker Open
26	CURSHR	Current Sharing fault, load current is not equally divided between modules
27	UPSOUT	Fault (no current) in 1 or more output stage
28	UPSHDN	UPS shutdown by EPO, Battery Discharge, ON/OFF pressed
29	OVLOAD	Load current is high
30	UPS-CM	One or more UPS's not responding
31	STRTUP	Startup time-stamp
32	------	N.A.

Each message is formatted as follows:

Time – HH:MM:SS

Date – YY:MM:DD

Data – dc voltage between + and – terminals for all events except LOADBP and STSW status for LOADBP events. (See below.)

Even start (IN) and end (OUT)

Description – (See *Table 3* on page 55)

Event number – 0 through 255, 255 being the most recent

Example:

```
11:23:56 05.01.28 436 IN -> E.P.O. 254
```

This message means that at 11:23:56 on January 28th 2005, Emergency Power Off alarm was registered as event 254; dc voltage at the time was 436 V being a sum of (V+ -N) and (V- -N).

Battery

From the main menu select option 5 (Battery) to display the window shown in Figure 8-21.

Main menu
Option 5

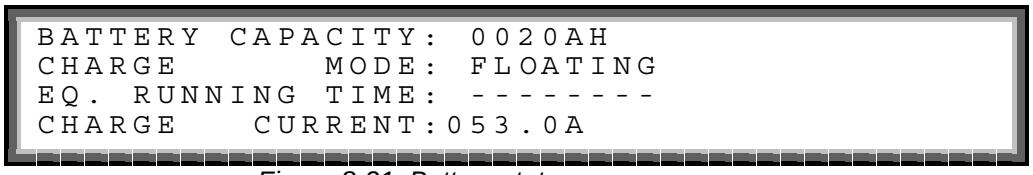


Figure 8-21: Battery status

Press the ▼ key to view the next window.

Main menu
Option 5

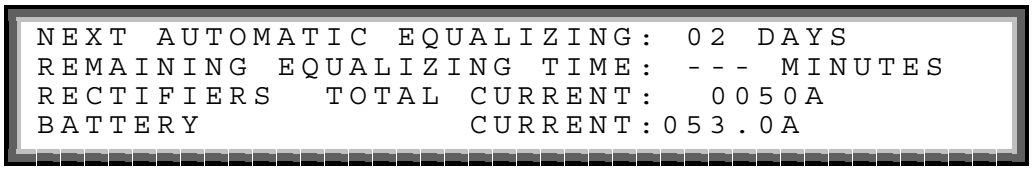


Figure 8-22: Battery equalizing

Press the ▼ key to view the next window.

Main menu
Option 5

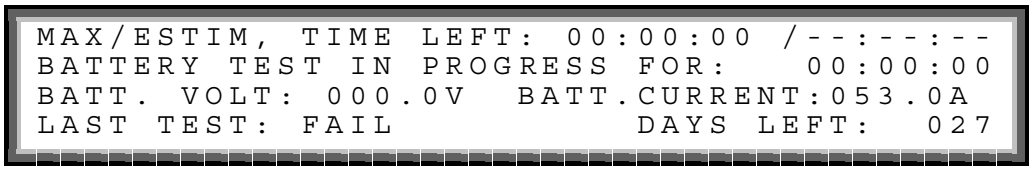


Figure 8-23: Time left

Press the ▼ key to view the next window.

Main menu
Option 5

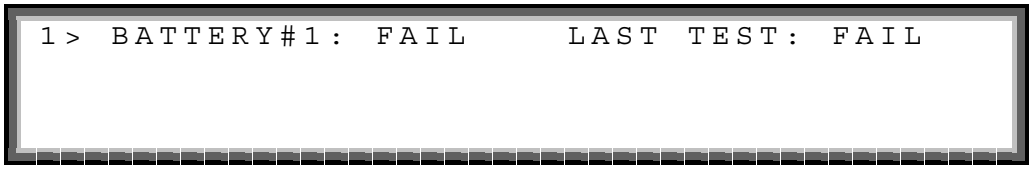


Figure 8-24: Last test

Press the ▼ key to view the next window.

Main menu
Option 5

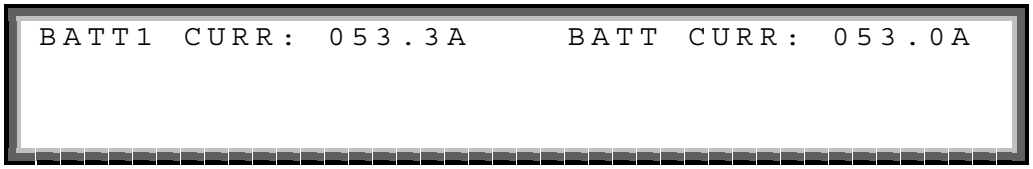


Figure 8-25: Battery current

Press the ▼ key to view the next window.

Main menu → Option 5

Figure 8-26: Battery capacity

Note: *Figure 8-24, Figure 8-25, Figure 8-26 show the individual batteries on the left and the overall total on the right. In the examples shown above, only one battery is installed.*

Press the ▼ key to view the next window.

Main menu → Option 5

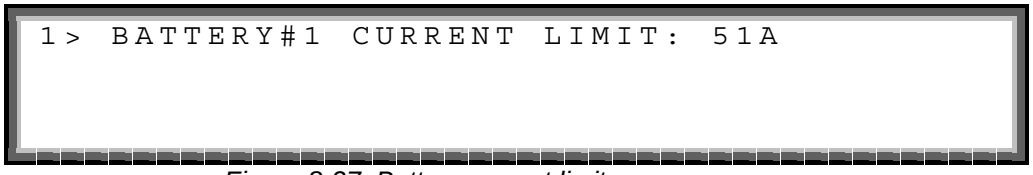


Figure 8-27: Battery current limit

Alarm

From the main menu select option 6 (Alarm) to display the window shown in Figure 8-28.

Main menu → Option 6

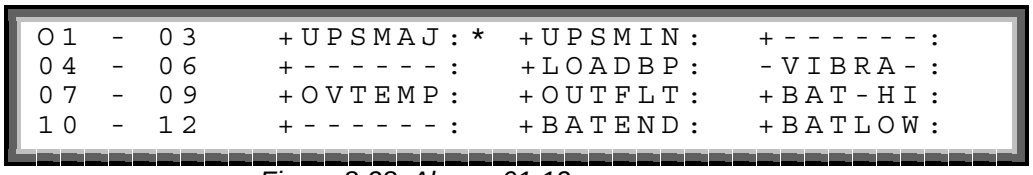


Figure 8-28: Alarms 01-12

Press the ▼ key to view the next window.

Main menu → Option 6

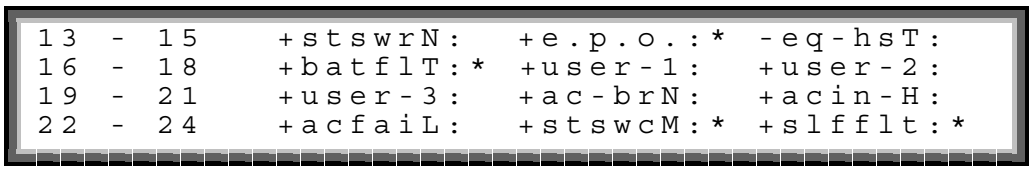


Figure 8-29: Alarms 13-24

Press the ▼ key to view the next window.

Main menu → Option 6

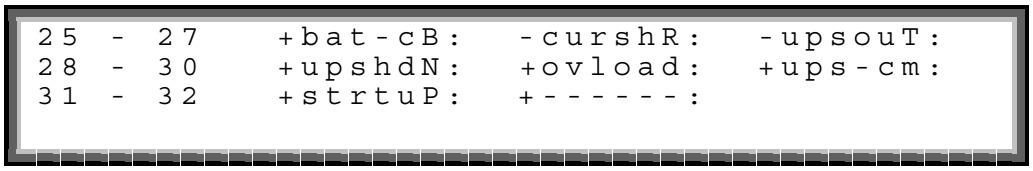


Figure 8-30: Alarms 25-32

Setup Menu

From the main menu select option 7 (Setup) to display the window shown in Figure 8-31.

Main menu
Option 7

```
            SC - 2012 SYSTEM SETUP
TYPE IN LEVEL-1 PASSWORD, THEN - ENTER
YOUR PRIVILEGE WILL EXPIRE AFTER 15 MIN.
PASSWORD:********
```

Figure 8-31: Level 1 password access

Using the keypad, type the password and press the Ent button. The setup main menu will show up on the panel as shown in Figure 8-32.

Press the ▼ key to view the next window.

Main menu
Option 7

```
1> ALARM SET      5> TIME       9> SILICON
2> MODULE CONF.   6> SITE
3> BATTERY        7> PASSWORD #1
4> CHARGE         8> SERVICE             1
```

Figure 8-32: Setup menu

Setup menu
Option 1

```
1> AC VOLT        5> ---------- 9> INTEGRAT.
2> FLOAT VOLT     6> ----------
3> ----------     7> TEMPERATURE
4> ----------     8> ----------
```

Figure 8-33: Setting ac voltage alarm thresholds

Alarm set menu
Option 1

```
1> SET AC HIGH & LOW ALARM LEVELS
2> SET AC ALARMS HYSTERESIS

PLEASE SELECT.                     1
```

Figure 8-34: Setting ac voltage levels

Alarm AC voltages
Option 1

```
AC VOLT SETUP:  NOMINAL          120 VAC
        ----  AC ALARM SETUP ----
     AC-LOW                  AC-HIGH
       93V                     143V
```

Figure 8-35: Ac voltage alarm setup

Alarm AC voltages
Option 2

```
SET AC VOLT ALARMS HYSTERESIS VALUE
              (1 - 20) VOLT

                    05
```

Figure 8-36: Ac voltage hysteresis

Alarm set menu → Option 2

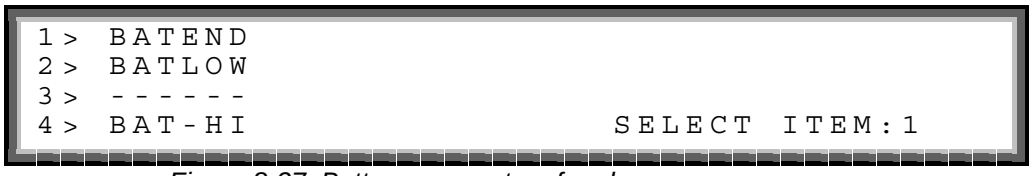


Figure 8-37: Battery parameters for alarm

Alarm set menu → Option 2

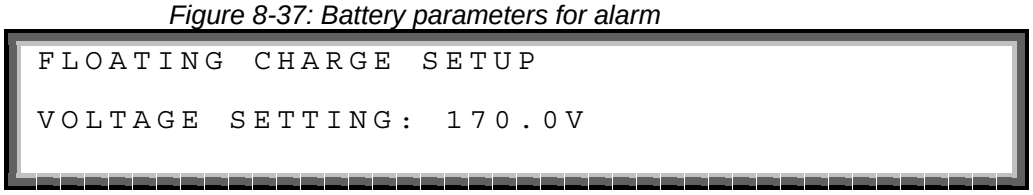


Figure 8-38: Battery floating charge setup for alarm

Alarm set menu → Option 7

Figure 8-39: Alarm battery temperature menu

Alarm temp. → Option 1

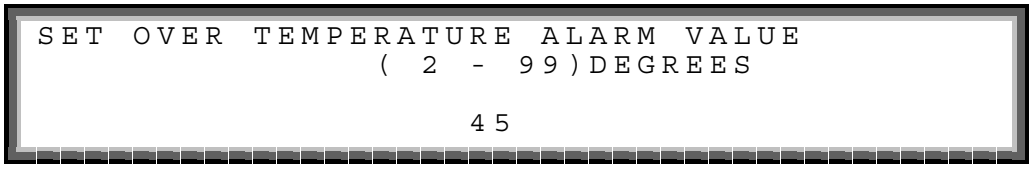


Figure 8-40: Alarm battery maximum temperature setting

Alarm temp. → Option 2

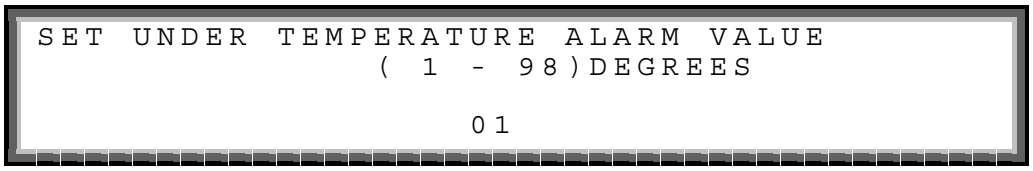


Figure 8-41: Alarm battery minimum temperature setting

Alarm set menu → Option 9

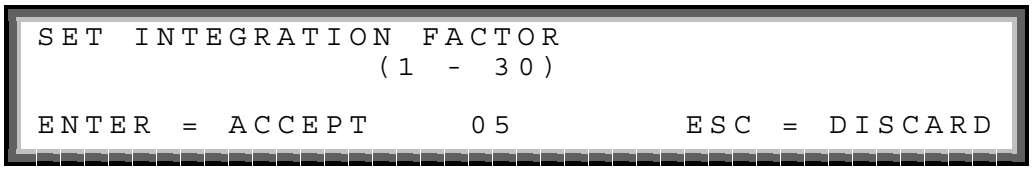


Figure 8-42 :Alarm integration factor setting

The *Alarm Integration Factor* determines the number of times that the controller polls and retries to determine the UPS status before deciding on an error status. Setting the alarm integration factor too low will cause spurious alarms to be generated; conversely, setting the alarm integration factor too high may result in an alarm only being raised when it is already too late to take corrective action.

Setup menu
Option 2

```
Module configuration  4.Update Volt/Freq
1.Num of phase        5.Output Adjust
2.Module/s frequency  6.Frequency Limits
3.Module/s voltage    7.DC Calibration
```

Figure 8-43: Line configuration menu

Module config menu
Option 1

```
 --- MANUAL/AUTO NUM OF PHASE SETUP ---1
SELECT-1: FORCE 3 PHASE       (SELECTED)
SELECT-2: AUTO
SELECT-3: FORCE 1 PHASE
```

Figure 8-44: Setting number of phases

Module config menu
Option 2

```
---       SET MODULE/S FREQUENCY      ---
SELECT - 1 HARD (DIP DEPEND.)
SELECT - 2 SET 60Hz            (SELECTED)
SELECT - 3 SET 50Hz
```

Figure 8-45: Setting the sine wave frequency

Module config menu
Option 3

```
Module/s voltage    4: 235V
1: 220V  (selected) 5: 240V
2: 223V             6: 250V
3: 230V             7: 260V
```

Figure 8-46: Setting the module voltage

Module config menu
Option 4

```
----  NOMINAL  VOLTAGE & FREQUENCY  ----
----- ARE NOW SENT TO ALL MODULES ------
 PLEASE VERIFY ALL MODULES WERE UPDATED!
===  EXIT THIS MODE BY PRESSING ESC. ===
```

Figure 8-47: Setting confirmation

Module config menu
Option 5

```
 -----  Select A Phase To Adjust  -----
SELECT - 1: Phase # 1
SELECT - 2: Phase # 2
SELECT - 3: Phase # 3
```

Figure 8-48: Output fine-tuning adjustment – select phase

Module config menu
Option 5

```
----  Select A Module To Adjust   ----

                  01
------ Use Up/Down, Enter Or Esc ------
```

Figure 8-49: Output fine-tuning – select module

Module config menu
Option 5

```
------  Set A Value To Adjust   ------
                              Phase:   1
                     00       Module: 01
------ Use Up/Down, Enter or Esc ------
```

Figure 8-50: Output fine-tuning – select value

Module config menu
Option 6

```
---      Set frequency limits      ---
1: No Change          4: +/- 3Hz
2: +/- 1Hz  (slctd)   5: +/- 4Hz
3: +/- 2Hz            6: +/- 0.5Hz
```

Figure 8-51: Output fine-tuning – set frequency limits

Module Config Menu
Option 7

```
--- MODULES DC VOLTAGE CALIBRATION ---
SELECT - 1: Calibrate Positive Voltage
SELECT - 2: Calibrate Negative Voltage
Then press ENTER to continue
```

Figure 8-52: Voltage calibration submenu

Module Config Menu
Option 7

```
MODULE DC CALIB

MEASURED VALUE:  999.9V
```

Figure 8-53: Enter measured value

Setup menu
Option 1

```
1> TEST-VOLTAGE     5> BATTERY TEST…
2> TEST ALARM       6> CAPACITY 0020 AH)
3> CURRENT-LIMIT    7> 'AUTO' TEST
4> TEMP COMPENSAT.  8> enable/dis options
```

Figure 8-54: Battery settings menu

Battery menu
Option 1

```
BATTERY (TEST) VOLTAGE SETUP

VOLTAGE SETTING: 352.0V
```

Figure 8-55: Battery test voltage setup

Battery menu → Option 2

```
BATTERY (TEST) VOLT ALARM          180.0 V
```

Figure 8-56: Battery test voltage alarm setup

Battery menu → Option 3

```
1> CURRENT LIMIT VALUE SETUP
2> ENABLE CURRENT LIMIT            (  ON )
                                      1
PRESS '2' TO TOGGLE ENABLE / DISABLE
```

Figure 8-57: Current limit setup menu

Curr. limit menu → Option 1

```
1> SET C. LIMIT OF BATTERY #1    (50A)


                                      1
```

Figure 8-58: Battery current limit setup

Curr. limit menu → Option 2

```
CHARGE CURRENT LIMIT SETUP

CURRENT    LIMIT:   50A
```

Figure 8-59: Charge current limit setup

Battery menu → Option 4

```
1> TEMPErATURE COMPENSATION VALUE SETUP
2> ENABLE TEMP. COMPENSATION      (  OFF)
3> SET ABSOLUTE MAX & MIN VOLTAGES    1
PRESS '2' TO TOGGLE ENABLE / DISABLE
```

Figure 8-60: Temperature compensation menu (disabled)

Temp comp. → Option 1

```
1> TEMPErATURE COMPENSATION VALUE SETUP
2> DISABLE TEMP. COMPENSATION    (2.0MV)
3> SET ABSOLUTE MAX & MIN VOLTAGES    1
PRESS '2' TO TOGGLE ENABLE / DISABLE
```

Figure 8-61: Temperature compensation menu (enabled)

Battery menu → Option 5

```
1> SET aBSOLUTE MINIMUM OUTPUT VOLTAGE
2> SET aBSOLUTE MAXIMUM OUTPUT VOLTAGE
---= ACTIVE IN FLOATING MODE ONLY =---
PLEASE SELeCT.                        1
```

Figure 8-62: Battery Test – Setting floating mode voltages

Floating mode
Option 1

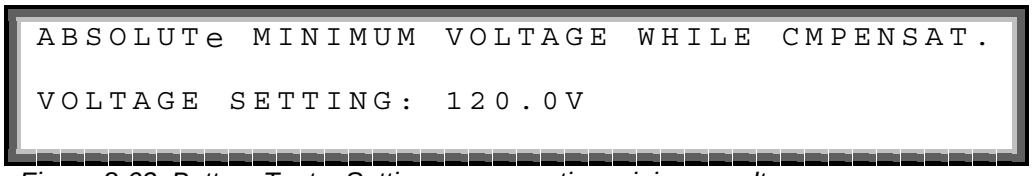


Figure 8-63: Battery Test – Setting compensation minimum voltage

Floating mode
Option 2

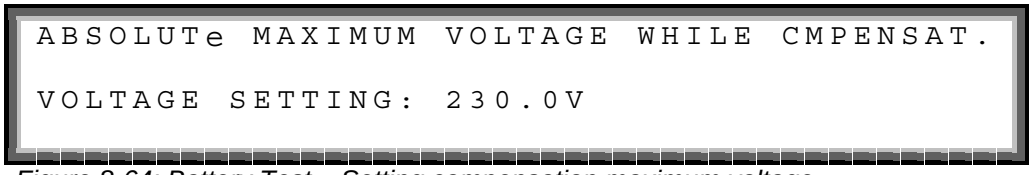


Figure 8-64: Battery Test – Setting compensation maximum voltage

Battery test menu
Option 1

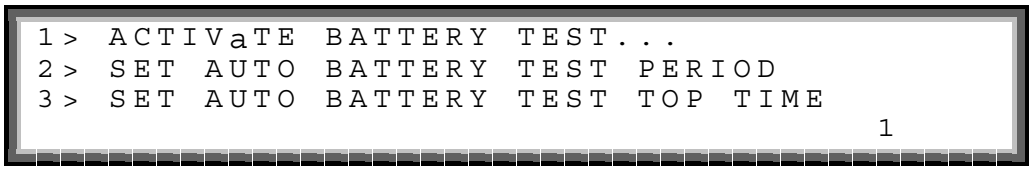


Figure 8-65: Battery test – settings

Batt. test options
Option 1

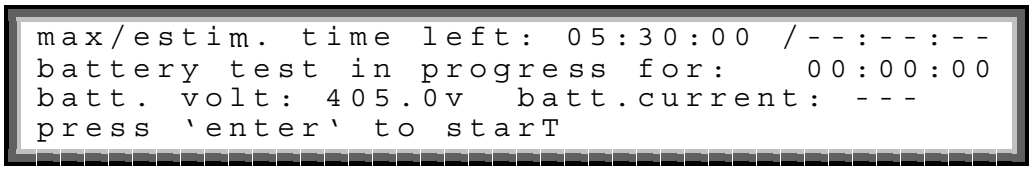


Figure 8-66: Battery testing

Batt. test options
Option 2

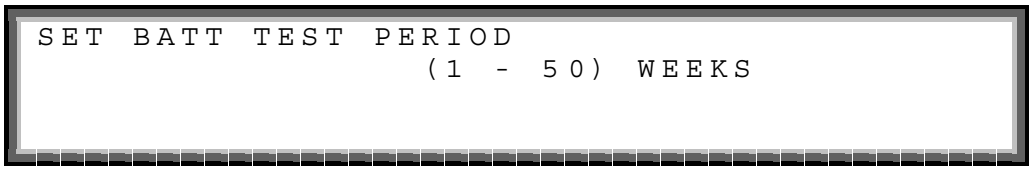


Figure 8-67: Battery test – setting test period

Batt. test options
Option 3

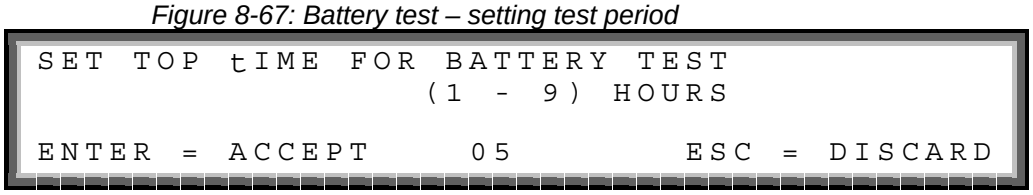


Figure 8-68: Battery test – setting maximum time

Setup menu
Option 4

Figure 8-69: Setup – setting equalizing/floating parameters

Equalizing menu → Option 2

```
FLOATING CHARGE SETUP

VOLTAGE SETTING: 216.0V
```

Figure 8-70: Setup – setting floating voltage

Battery submenu → Option 5

```
1> disable shutdown by Long ac fail(on )
2> enable  current sensOrs          (off)
3> enable  batt temperaTure sensoR (off)
select & press To togglE enable/disable
```

Figure 8-71: Battery menu, enable/disable options

Option 1 allows the user to enforce shutdown after a given length of input ac failure, even when the batteries are still fully charged.

Setup menu → Option 5

```
SET REAL TIME

YEAR    MONTH    DAY    HOUR    MIN    SEC
2006    08       27     12      02     28
```

Figure 8-72:Setup - setting real Time

Setup menu → Option 6

```
SITE  NUMBER: 000002
```

Figure 8-73:Setup - configuring the site number

Setup menu → Option 7

```
CHANGE PASSWORD

                 --------
          PRESS ESC TO ABORT
```

Figure 8-74:Setup - changing the password

Setup menu → Option 8

```
1> ---------- 4> DRYOUT TEST 7> --------
2> UPSS       5> CONFIGURE   7> --------
3> ---------- 6> ---------- 9> SC2012..
SELECT, THEN ENTER                    1
```

Figure 8-75: Setup - service menu

Service menu → Option 2

```
1234
++++
SET UPSS   (UP= ON<+>, DOWN= OFF<->)
ENTER= EXECUTE                ESC= GO BACK
```

Figure 8-76: Service – selecting the UPS

Service menu
Option 4

```
RELAY STATUS:
PRESS 'UP' AND REPEAT FOR RELAY TEST(04)
123456                          CONTACTS 1-6
●●○○●○                          ●=ON,    ○=OFF
```

Figure 8-77: Service – setting alarm contacts

Service menu
Option 5

```
1> # OF UPSS (REDUNDANCY)  5> DRY, ALARMS
2> # OF UPSS (TOTAL)       6> CALIBRATION
3> # OF BATT
4> STATIC SWITCH SETUP        SELECT1
```

Figure 8-78: Service – configuration menu

Service menu
Option 5

```
    SET NUMBER OF UPSS (REDUNDANCY)


                    02     (04  TOTAL)
```

Figure 8-79: Service – setting redundancy

Service menu
Option 9

```
1> RESTART CONTROLLER 3> NETWORK...
2> FACTORY SETTINGS   4> RESET MBX
YOUR SELECTION: 1     5> ---------------
ENTER IF YOU ARE SURE (ELSE PRESS ESC.!)
```

Figure 8-80: Service – SC2012 controller reset menu

Option 1 resets the controller.

Option resets to the configuration to factory default settings.

SC2012 NW menu
Option 3

```
1> SET IP ADDRESS          192.168.000.252
2> SET GATEWAY             192.168.000.254
3> SET MASK                255.255.255.000
4> STORE  5> SNMP FACTOR       SELECT: 1
```

Figure 8-81: Service – SC2012 network setup menu

NW setup menu
Option 1

```
SET IP ADDRESS

          192.168.000.252
```

Figure 8-82: Service – setting IP address

NW setup menu
Option 5

```
SET SNMP NO COMM FACTOR VALUE
            (10 - 99)

                5
```

Figure 8-83: Service – configuring SNMP

Static Switch (ST.SW.)

From the main menu select option 8 (Static Switch) to display the window shown in Figure 8-84.

Main menu → Option 8

```
SSW          VOLTAGE                        FREQ
INVERTER:    R-120V,  S-120V,  T-120V       60 HZ
BYPASS:      R-120V,  S-120V,  T-120V       60 HZ
IOUT:           050       050       050
```

Figure 8-84: Static Switch voltage and frequency

View the current messaging status by using the ◄ and ► keys.

Main menu → Option 8

```
M<-----B3----->L    M<---------B4--------->L
1  2  3  4  5  6  7  8    9  10  11  12  13  14  15  16
0  0  0  0  0  0  0  0    0   0   0   0   0   0   0   0
SSW STATUS
```

Figure 8-85: Static Switch status

Alarm Dry Contacts

Configure menu → Option 5

```
1> dry1 association   4> dry4 association
2> dry2 association   5> dry5 association
3> dry3 association   6> dry6 association
7> enable / disable alarms
```

Figure 8-86: Dry Contacts/alarms association

Configure menu → Option 5

```
associate dRy contact #01   wIth   alarm/s
0    0     1     1     2     2     3 3   0- deL
1...5....0....5....0....5....0....5....0.2   1- adD
-----●-------------------●---------   alm#01
```

Figure 8-87: Dry Contacts/alarms association – example

Calibration

Configure menu → Option 6

```
1> -----                        5> -----
2> dc-i offset removal          6> -----
3> dc-i calibratioN             7> -----
4> -----                           selecT
```

Figure 8-88: Calibration

Communications

1. From the main menu (Figure 8-1: Main menu on page 50), select item 9, COMM.
2. Select the appropriate mode using the ► and ◄ keys.

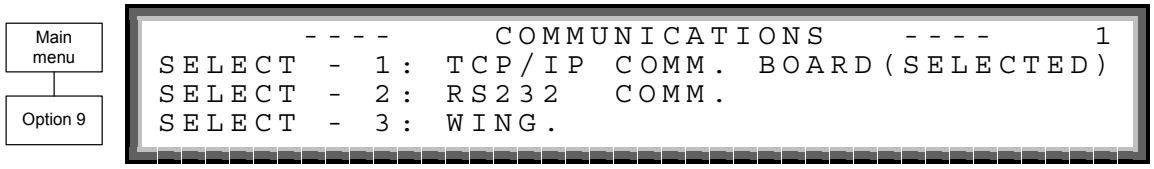


Figure 8-89: Communications

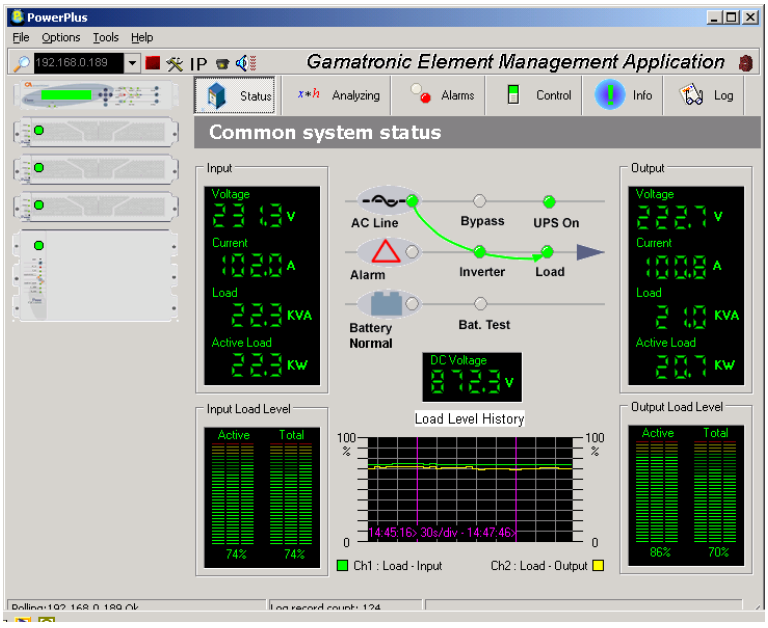
9. SNMP AGENT

The SNMP agent is an internal card which lets you monitor and control the ***POWER+*** system from a PC. The SNMP agent supports standard UPS RFC1628 MIB.

The SNMP agent enables monitoring, management, control, and orderly shutdown of the UPS via the Internet protocol SNMP. The SNMP agent is a dedicated adapter that provides connectivity between the UPS and a management platform, such as Gamatronic's ***POWER+*** **PSM-AC**. During normal operation, the SNMP agent transmits information about current operating conditions, such as input and output voltage, current, and frequency. In the even of a power outage, the SNMP agent can automatically shut down protected computer systems before battery run-down. The SNMP agent can provide real-time notification of UPS events in several modalities; for example, via email or SMS.

POWER+ **PSM-AC** software, available from Gamatronic, enables you to monitor and control the *POWER+* UPS system.

POWER+ **PSM-AC** is part of GeMSi (Gamatronic Element Management Software, Innovated, Gamatronic's sophisticated suite of software for managing multiple power supply and UPS systems. The systems can be controlled both locally and from a remote location.



POWER+ ***PSM-AC*** *lets you monitor and control your* ***POWER+*** *UPS*

10. WIRELESS CONTROL (OPTIONAL)

The ***POWER+*** system includes an option for wireless control and management, using the Gamatronic WING (Catalog reference 199WING).

The **WING** (Wireless New Generation) is a wireless communications board that enables you to manage and control your UPS and other power systems from a remote location via cellular network (GSM/GPRS/CDMA).

It allows real-time detection of power system faults and immediately notifies selected recipients (control center, technician, etc.) detailing the faults.

WING can operate through a variety of parallel connections, protocols and applications at the same time. It is compatible with all Gamatronic products, as well as with the products of many other manufacturers.

The **WING** comprises:

- *WING* board
- A SIM board
- Application management software dedicated to wireless communications.

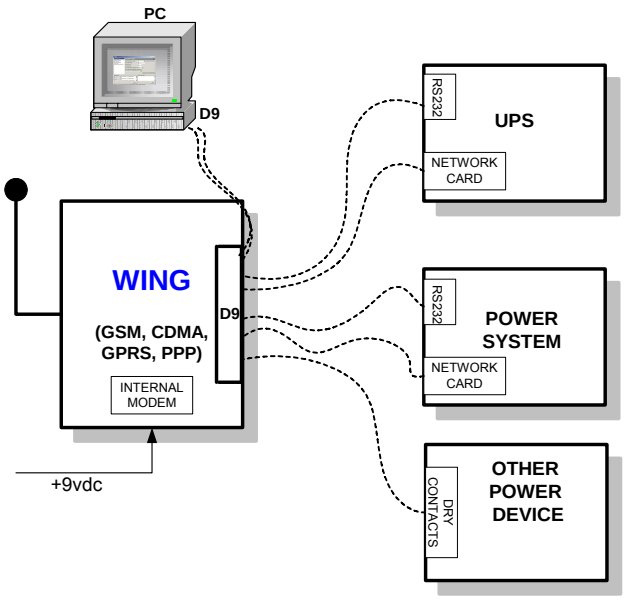


Figure 10-1: WING General Block Diagram

The **WING** board contains an internal GSM/GPRS Modem plus antenna and a microprocessor that enables it to manage the power systems, monitor and control their values and status, and get real-time alarm notifications – all via any standard mobile cellular phone.

The user may communicate with the **WING** by either using a mobile cellular phone or the dedicated GeMSi application provided by Gamatronic.

A service technician can perform the following activities using his mobile phone:

- Specify the code or command appropriate to the specific needs
- Send a message via SMS to the system ID

The system replies, informing the sender whether the command was performed. The board can filter the received messages by authorizations (complete management/monitoring only/none).

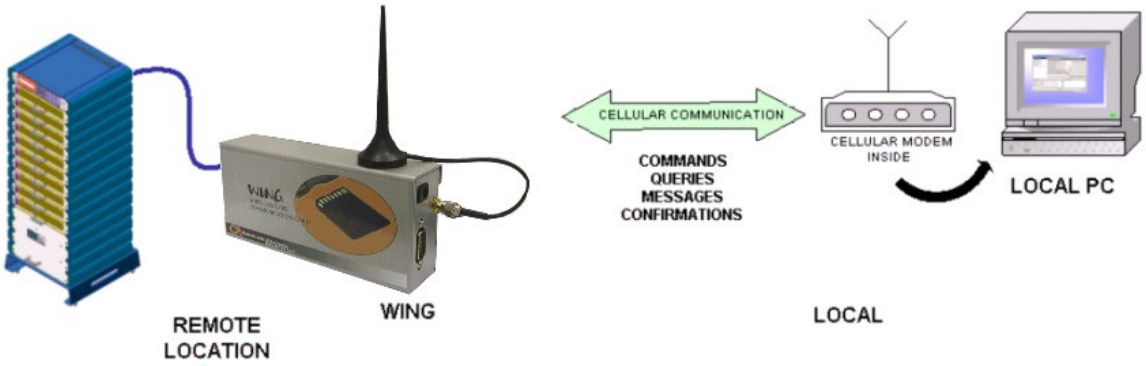
The **WING** scans the remote power system every three seconds and alerts all the predefined recipients. (up to 10 recipients) whenever a malfunction occurs.

The **WING** enables you to protect your system by 2 levels of passwords (administrator, technician) and broadcast a message in the case of an alarm.

WING Configurations

The **WING** may be used in three types of configurations:

- PC & WING at the local end, and WING and power system at the remote location.
- PC & cellular modem at the local end, and WING and power system at the remote location.
- Cellular at the local end, and WING and power system at the remote location.



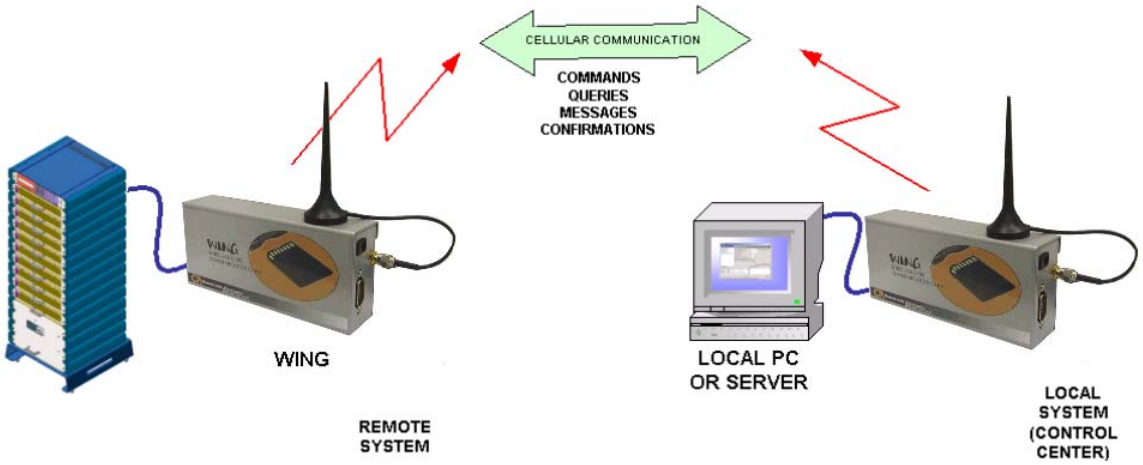


Figure 10-2: WING Optional Configurations

11. POWER+ SPECIFICATIONS

Table 4: Specifications

POWER+ TECHNICAL DATA	
Topology	True On-line Battery, Double Conversion, VFI
Construction	Modular parallel hot-plugged modules
Operation	Continuous
Input	
Voltage (V)	3 × 208+ N (3x120 V)
Voltage range (%)	+ 15 and – 25
Current (A)	28 A per module – no inrush current at startup
Frequency (Hz)	47-63
Power walk-in (sec)	> 60
Power Factor	0.99
THDI (%)	5
Output	
Rated Power	10 kVA / 8 kW to 100 kVA / 80 kW
Frequency tracking range (Hz)	±2
Slew rate	1 Hz / sec
Voltage (V)	3 × 208+ N (3x120 V)
Static Regulation %	±1
Regulation for unbalanced load %	±1 for 100% unbalanced load
Dynamic response to 100% load step %	±2
Overload	110 % for 10 minutes, 125 % for 60 sec. 1000 % for 1 cycle
Waveform	Sinusoidal
THD (%)	Less than 2 for linear load
Load CF	4:1
Ac-Ac efficiency (nominal) %	Up to 94 at full load
Dc-Ac efficiency (nominal) %	Up to 97 at full load
Batteries	
Dc-Link Voltage (V)	±160 to ±216
Quantity	32 × 12 V
Type	Sealed, lead acid, rechargeable
General	
Maximum power dissipation (Po=8KW)	N*510W (N*998 BTU)
Ambient temperature operation: °F (°C) storage: °F (°C)	 +14 to +104 (-10 to +40) -4 to +140 (-20 to +60)
Relative humidity (%)	95 max non-condensing
Altitude (m)	1500 without derating
Enclosure	IP20
Cooling system	Multi-Fan with speed control (forced)
Standards	
EMC emissions	IEC 62040-2; FCC part 15/B
Safety	UL1778; IEC 62040-1-1
Design	IEC 62040-3
Low magnetic field radiation	EMF as per ICNIRP

(continued…)

Dimensions (U.S. measurements)										
UPS type	10 kVA	20 kVA	30 kVA	40 kVA	50 kVA	60 kVA	70 kVA	80 kVA	90 kVA	100 kVA
Height (in)	27.2	31.1	34.6	38.2	42.1	49.6	53.2	56.7	60.6	64.6
Width (in)	23.6									
Depth (in)	27.2					39.0				
Weight (lbs)	223	258	291	326	359	428	463	496	531	564
Dimensions (metric measurements)										
UPS type	10 kVA	20 kVA	30 kVA	40 kVA	50 kVA	60 kVA	70 kVA	80 kVA	90 kVA	100 kVA
Height (cm)	69	79	88	97	107	126	135	144	154	164
Width (cm)	60									
Depth (cm)	69					99				
Weight (kg)	101	117	132	148	163	194	210	225	241	256
Acoustic Noise										
Noise (dBA) with half load	48	52	53	54	55	55.8	56.4	57	57.5	58
Noise (dBA) with full load	51	54	55	57	58	58.8	59.4	60	60.5	61

All specifications are subject to change without notice.

SYSTEM CONTROLLER – TECHNICAL DATA	
Micro Controller core	16 bit
Display	4 × 40 characters LCD with backlight
Other indicators	8 LEDs, buzzer
Analog input channels	4 input dry contacts (N.C.)
Real Time Clock (RTC)	Yes, with backup
Power meter	kVA, kW, PF
Volt-free outputs (dry contacts)	6 outputs, rated 50 V / 1 A
Communication	TCP/IP, GPRS/SMS wireless communications (optional)
Communications with system modules	Serial, isolated
Events log	255 events
System operation without controller	Unchanged
On-screen parameters	Load bar-graph 3-phase voltages 3-phase currents Battery voltage Status of each UPS module Static-switch parameters and status Battery sensor temperature
Alarms	Ac failure Dc failure UPS module(s) failure Load on bypass Battery test failure Over/under temperature Overload (Contacts rated max. 48 V 1 A)

SYSTEM CONTROLLER – TECHNICAL DATA	
RTC operation without power	2 weeks
Power requirements	3 × 208 Vac / ±216 Vdc 15 W

For a full company profile, please visit out website at www.gamatronic.com.

Gamatronic Building, Jerusalem, Israel

Gamatronic's product range:

- UPS Systems
- Power systems for Telecom
- Dc-to-Ac Inverters
- Dc-to-Dc Converters
- Frequency Changers
- Battery Chargers
- Power Management Solutions

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