

# ENERGIC Plus

## BATTERY CHARGER

### RE



## USER'S MANUAL

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# 1. Introduction

This manual contains instructions and suggestions for the users of *Energic plus RE* battery chargers. Before to install, use or repair the charger, it's necessary to read and understand this manual completely.

It's recommended to keep the manual in good condition for all the lifetime of the charger. It should be kept in a dry and clean place, always available to the users.

Throughout this manual, the following special annotations have been used to indicate important information.



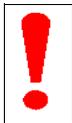
## **WARNING !**

Gives important information regarding possible personal injury



## **CAUTION !**

Gives important information regarding possible equipment damage



## **NOTE**

*Gives additional information and tips concerning important procedures and features of the charger*

## **RESPONSIBILITY DISCLAIMER**

The manufacturer of the *Energic plus RE* battery charger will not be responsible for damages and/or injuries caused by the charger in these situations:

- The charger is not installed properly by a qualified electrician;
- Maintenance operations are not done by a qualified electrician;
- The charger is not used according to the instructions included in this manual;
- The charger is not connected to the correct input supply (see data label on the box);
- The battery is damaged during the charge;
- The charger has been modified without the authorization of the manufacturer;
- Non-original spare parts are used in the charger;
- Wrong spare parts are used in the charger.

## **2. Safety instructions and warnings**

### **GENERAL**

Battery chargers can cause injury or death, or damage to other equipment or property, if the user does not strictly observe all safety rules and take precautionary actions.

Safe practices must be learned through study and training before using this equipment.

Only qualified personnel should install, use, or service this battery charger.

### **SHOCK PREVENTION**

Bare conductors, or terminals in the output circuit, or ungrounded, electrically-live equipments can fatally shock a person. To protect against shock, have competent electrician verify that the equipment is adequately grounded and learn what terminals and parts are electrically HOT.

The body's electrical resistance is decreased when wet, permitting dangerous current to flow through the body. Do not work in damp area without being extremely careful. Stand on dry rubber mat or dry wood and use insulating gloves when dampness or sweat cannot be avoided. Keep clothing dry.

**INSTALLATION AND GROUNDING** – Electrical equipment must be installed and maintained in accordance with all the applicable national and local codes.

A power disconnect switch must be located at the equipment. Check the data label for voltage and phase requirements. If only 3-phase power is available, connect single-phase equipment to **ONLY TWO WIRES** of the 3-phase line.

**DO NOT CONNECT** the equipment grounding conductor to the third live wire of the 3-phase line as this makes the equipment frame electrically HOT, which can cause a fatal shock.

If a grounding conductor is part of the power supply cable, be sure to connect it to a properly grounded switch box or building ground. If not part of the supply cable, use a separate grounding conductor. Don't remove a ground prong from any plug. Use correct mating receptacles. Check ground for electrical continuity before using equipment.

The grounding conductor must be of a size equal to or larger than the size recommended by Code or this manual.

**CHARGING LEADS** – Inspect leads often for damage to the insulation. Replace or repair cracked or worn leads immediately. Use leads having sufficient capacity to carry the operating current without overheating.

Never extend the charging leads without prior approval of the manufacturer. Extending the charging leads without prior approval of the manufacturer may cause wrong operation of the charger and voids the warranty.

**BATTERY TERMINALS** – Do not touch battery terminals while equipment is operating.

**SERVICE AND MAINTENANCE** – Shut OFF all power at the disconnect switch or line breaker **BEFORE** inspecting, adjusting, or servicing the equipment. Lock switch OPEN (or remove line fuses) so that the power cannot be turned ON accidentally.

Disconnect power to equipment if it is to be left unattended or out of service.

Disconnect battery from charger.

Measure voltage on capacitors and, if there is any voltage reading, wait 5 minutes before to proceed.

Keep inside parts clean and dry. Dirt and/or moisture can cause insulation failure. This failure can result in high voltage at the charger output.

***BURN AND BODILY INJURY PREVENTION***

The battery produces very high currents when short circuited, and will burn the skin severely if in contact with any metal conductor that is carrying this current.

Do not permit rings on fingers to come in contact with battery terminals or the cell connectors on top of the battery.

Battery acid is very corrosive. Always wear correct eye and body protection when near batteries.

***FIRE AND EXPLOSION PREVENTION***

When batteries are being recharged, they generate hydrogen gas that is explosive in certain concentrations in air (the flammability or explosive limits are 4.1% to 72% hydrogen in air). The spark-retarding vents help slow the rate of release of hydrogen, but the escaping hydrogen may form an explosive atmosphere around the battery if ventilation is poor.

The ventilation system should be designed to provide an adequate amount of fresh air for the number of batteries being charged. This is essential to prevent an explosion.

Always keep sparks, flames, burning cigarettes, and other sources of ignition away from the battery recharging area. Do not break "live" circuits at the terminals of batteries. Do not lay tools or anything that is metallic on top of any battery.

To prevent arcing and burning of the connector contacts, be sure the charger is OFF before connecting or disconnecting the battery. The digital display must be completely OFF.

***MEDICAL AND FIRST AID TREATMENT***

First aid facilities and a qualified first aid person should be available for each shift for immediate treatment of electrical shock victims.

**EMERGENCY FIRST AID:** Call physician and ambulance immediately and use First Aid techniques recommended by the American Red Cross.

**DANGER: ELECTRICAL SHOCK CAN BE FATAL.**

If person is unconscious and electric shock is suspected, do not touch person if he or she is in contact with charging equipment, battery, charging leads, or other live electrical parts. Disconnect power at wall switch and then use First Aid.

Dry wood, wooden broom, and other insulating material can be used to move cables, if necessary, away from person.

**IF BREATHING IS DIFFICULT,** give oxygen.

**IF NOT BREATHING, BEGIN ARTIFICIAL BREATHING,** such as mouth-to-mouth.

**IF PULSE IS ABSENT, BEGIN ARTIFICIAL CIRCULATION,** such as external heart massage.

In case of acid in the eyes, flush very well with clean water and obtain professional medical attention immediately.

***EQUIPMENT WARNING LABELS***

Inspect all precautionary labels on the equipment.

Order and replace all labels that cannot be easily read.

### 3. Description

*Energic plus RE* battery chargers have been designed to charge Pb batteries.

These units convert the AC input voltage to a DC voltage at the correct level, in order to charge the battery cells.

These battery chargers are fully automatic, and they are controlled by a microprocessor based electronic board.

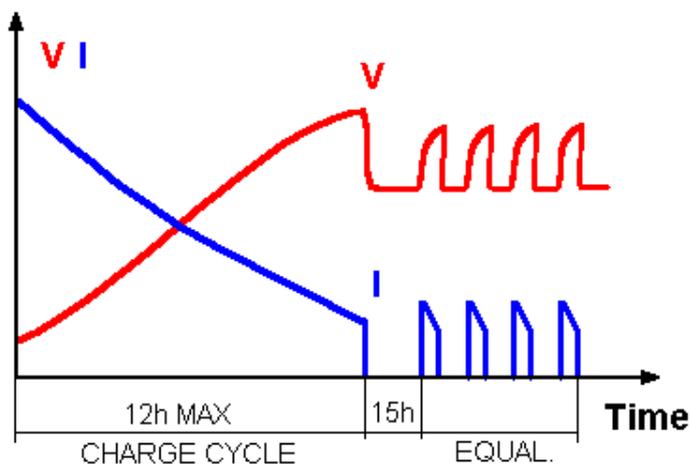
The entire charge sequence is monitored by the microprocessor, that is programmed to manage all the possible operating conditions:

- Automatic start on battery connection, with 5 seconds delay to avoid sparks between the connectors;
- Automatic shutdown on battery disconnection;
- Adaptive algorithm for charge time calculation;
- Wrong battery detection;
- Automatic weekly equalization charge;
- Two emergency timers for battery protection.

#### STANDARD CHARGERS [Wa]

The charge current follows the Wa curve, as defined by the Standard DIN 41774.

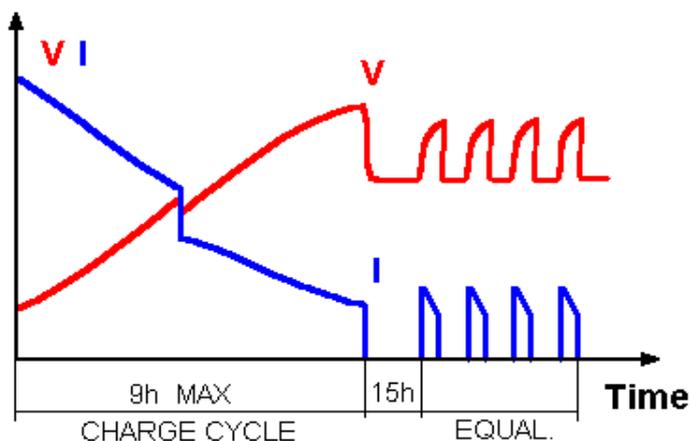
After some hours, depending by the conditions of the battery, when the battery's voltage reaches the "gassing" value (2,4 Volt per cell), the LED "FINAL CHARGE" starts to flash and the charge continues.



#### FAST CHARGERS [WoWa]

The charge current follows the WoWa curve, as described by the Standard DIN 41773.

The reduction of the charge time is achieved by applying a higher current during the first period of charge. When the "gassing" voltage is reached, the current value is reduced to avoid overheats in the battery, and the charge continues in the same way of standard Wa models.



## 4. Installation

The charger is marked with a technical label, containing the following data:

- Model;
- Serial number (S/N);
- Weight (kg);
- Input voltages (V);
- Maximum input current (A);
- Maximum input power (KVA);
- Input frequency (Hz);
- Battery voltage (V);
- Maximum output current (A).



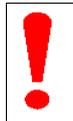
Conditions of use:

- Operating temperature: 5°C to 45°C
- Storage temperature: -20°C to 60°C
- Relative humidity: less than 75%



### CAUTION !

The charger can be installed by qualified personnel only.



### NOTE

This unit operates on 220-230-240 V AC, 50Hz.  
Check that the unit's operating voltage is identical to your local power supply.  
Check that the unit's maximum input power is available from your power supply.



### CAUTION !

To prevent fire or shock hazard, do not expose the unit to rain or moisture.  
Do not use the unit in presence of flammable gas, because it can generate sparks.

**CAUTION !**

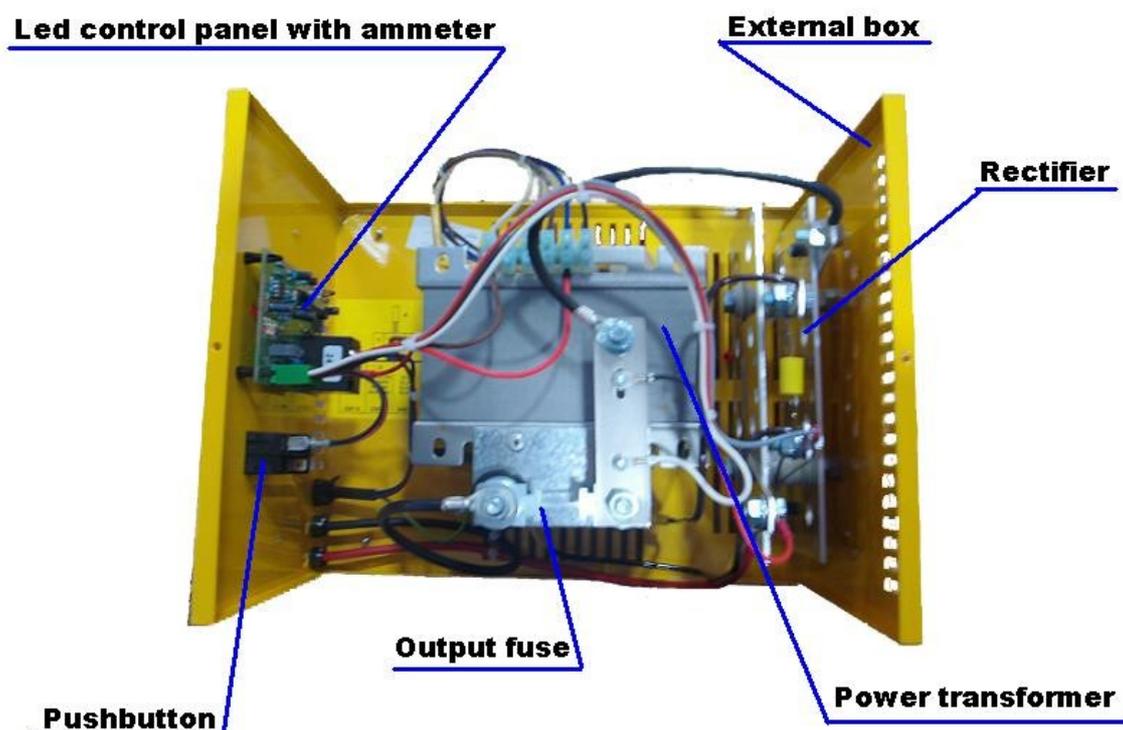
To avoid electrical shock, do not open the cabinet.  
Refer servicing to qualified personnel only.

**CAUTION !**

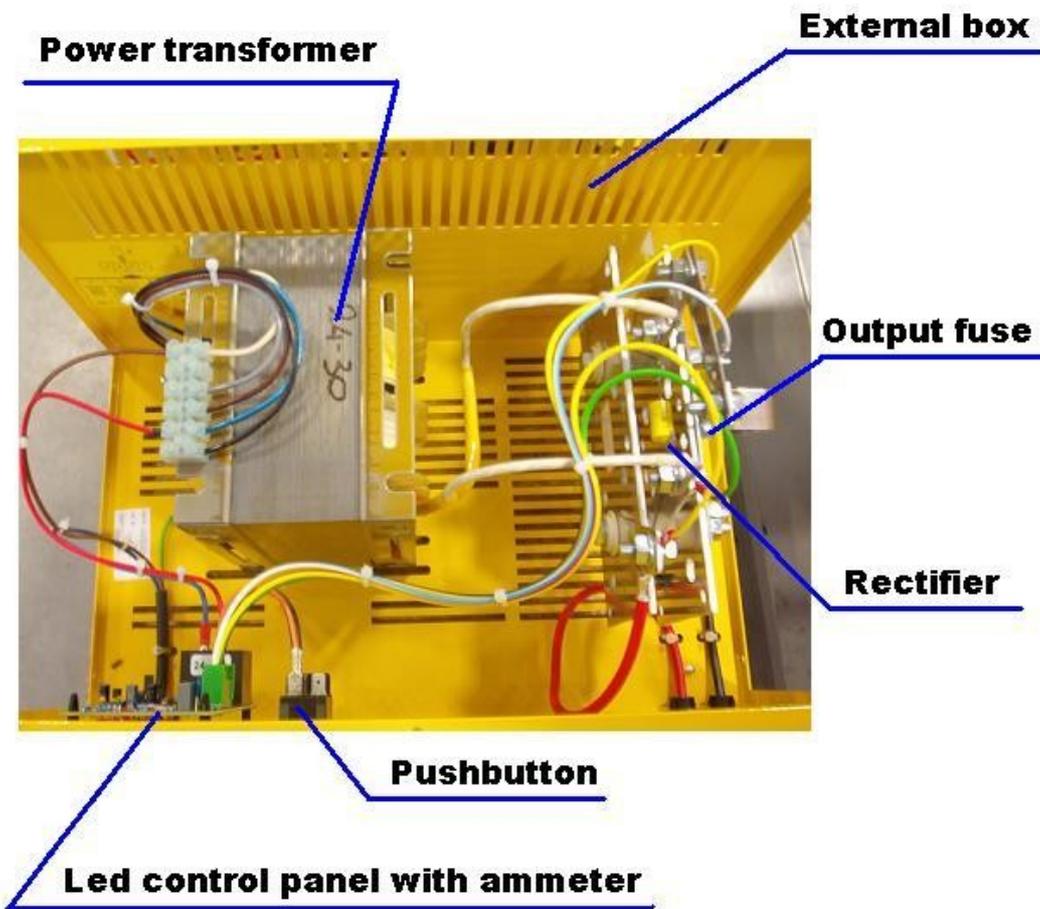
Allow adequate air circulation to prevent internal heat buildup.  
Do not place the unit near materials that may block the ventilation slots.  
Do not install the unit near heat sources such as radiators or air ducts, or in a place subject to direct sunlight, excessive dust, mechanical vibration or shock.

**NOTE**

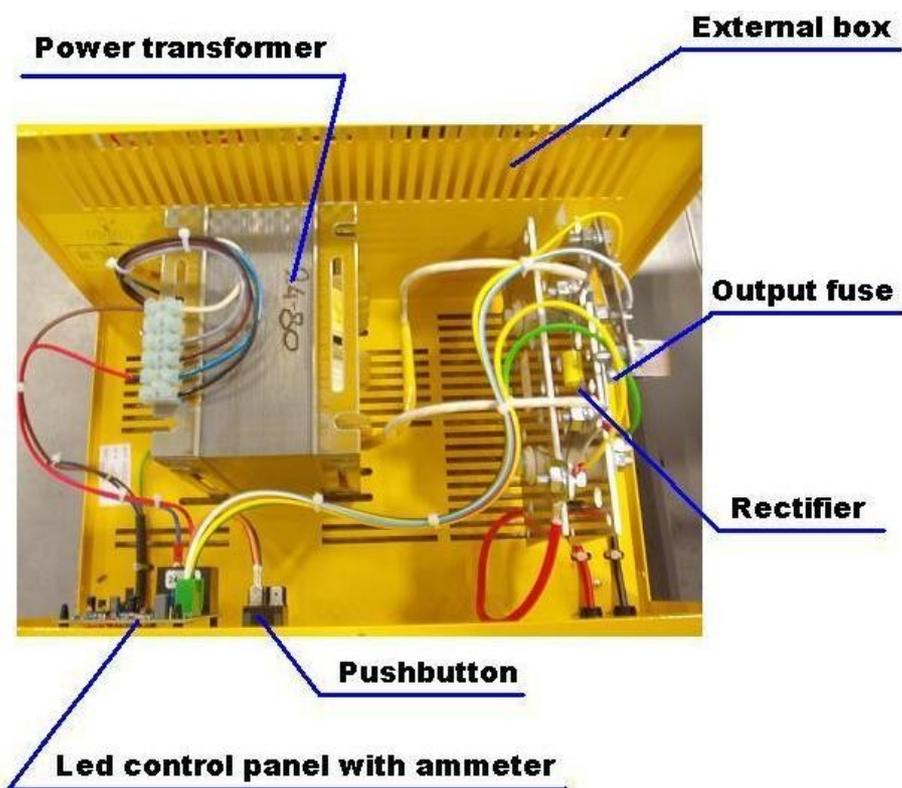
Check the efficiency of earth circuitry (yellow/green cable);  
Connect the charger to the mains using an adequate plug, with pushbutton and fuses;  
Use an adequate plug to connect the charger to the battery.

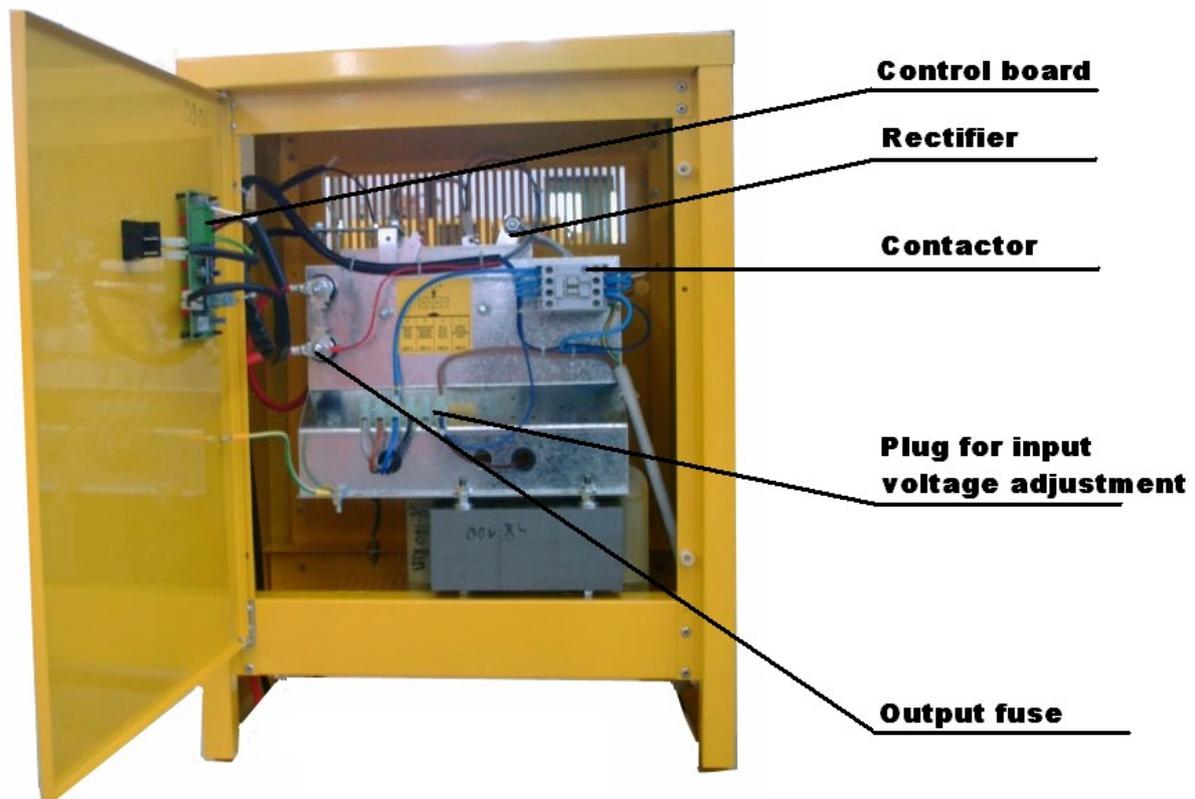
**INTERNAL VIEW OF THE CHARGER – CABINET S**

**INTERNAL VIEW OF THE CHARGER – CABINET A**



**INTERNAL VIEW OF THE CHARGER – CABINET B**



**INTERNAL VIEW OF THE CHARGER – CABINET C****ELECTRICAL INSTALLATION OF THE CHARGER**

- Check the efficiency of earth circuitry (yellow/green wire);
- Connect the charger to the mains using an adequate plugs, with pushbutton and fuses;
- Use an adequate plug to connect the charger to the battery.

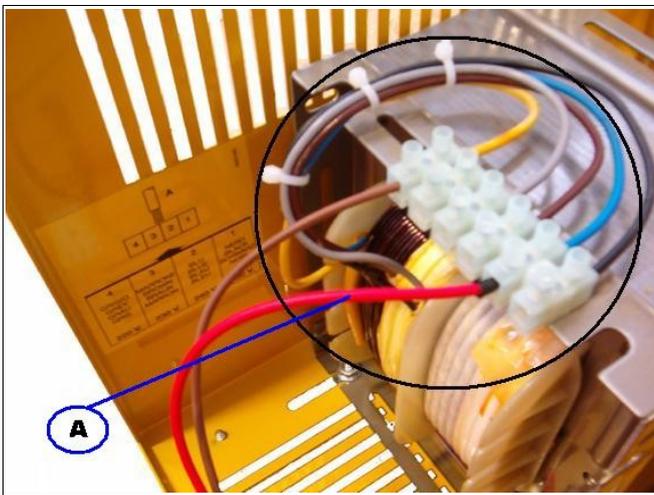
**AC INPUT VOLTAGE ADJUSTMENT – CABINETS S, A, B**



**CAUTION !**

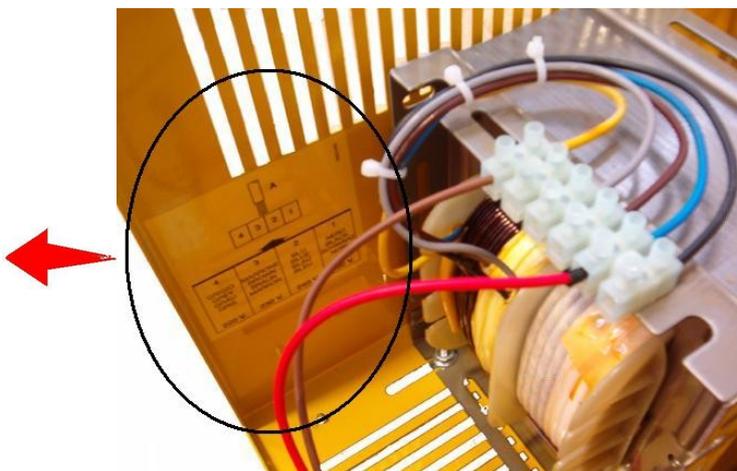
**These settings can be done by qualified personnel only.  
For more information please contact the manufacturer.**

**PROCEDURE:**



- Disconnect the charger from main supply and battery;
- Open the cabinet;
- Locate the terminal block for AC input voltage setting;
- Disconnect the wire A from the original terminal block (position 2);
- Connect the wire A to the desired position. [Check the table to find the correct position];
- Close the cabinet;
- Connect the charger to main supply.

4	3	2	1
GRIGIO GREY GRAU GRIS	MARRONE BROWN BRAUN MARRON	BLU BLUE BLAU BLEU	NERO BLACK SCHWARZ NOIR
220 V.	230 V.	240 V.	250 V.

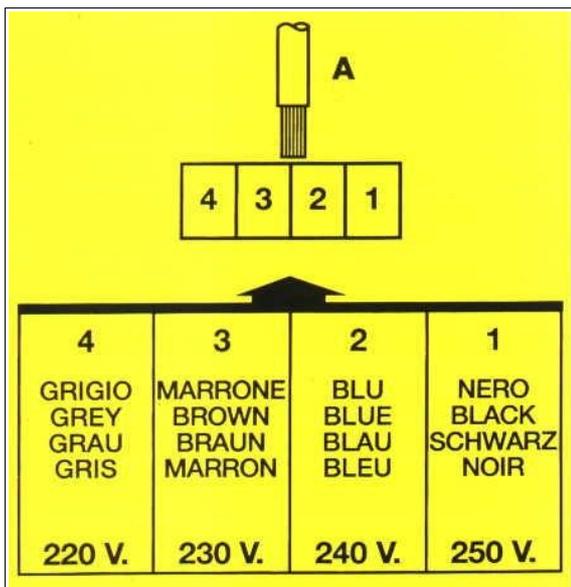
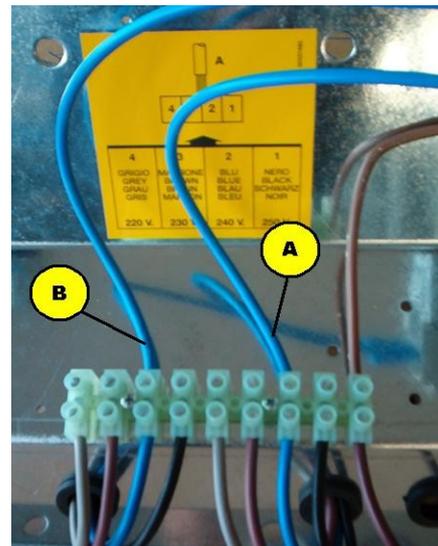
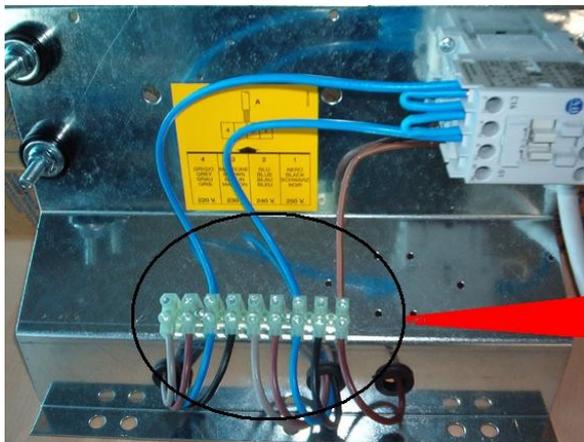


**AC INPUT VOLTAGE ADJUSTMENT – CABINET C**



**CAUTION !**

**These settings can be done by qualified personnel only.  
For more information please contact the manufacturer.**



**PROCEDURE:**

- Disconnect the charger from main supply and battery;
- Open the cabinet;
- Find the terminal blocks for AC input voltage setting;
- Disconnect the wire A from the original terminal block (position 2);
- Connect the wire A to the desired position. [Check the table to find the correct position];
- Close the cabinet;
- Connect the charger to main supply.

## 5. How to use the charger [Cabinets S, A, B]



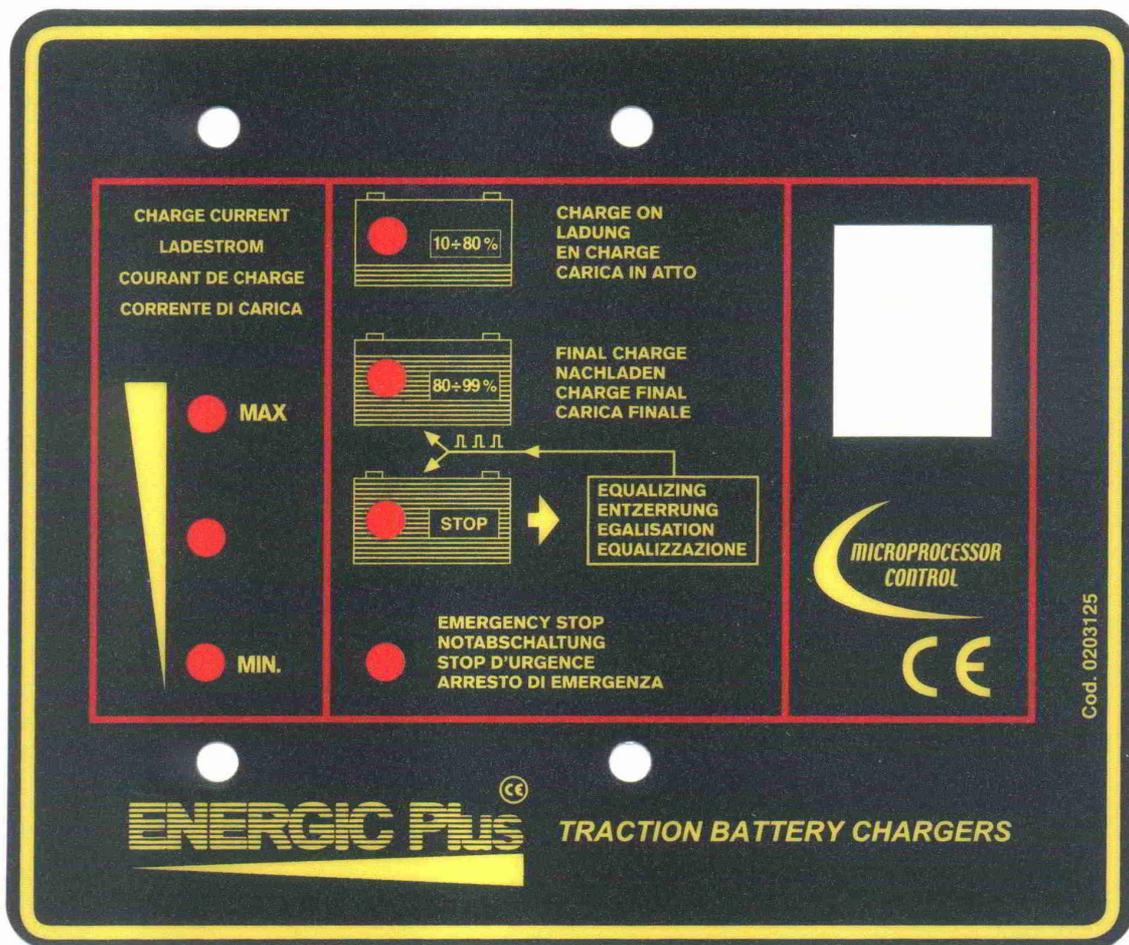
### WARNING !

**ENERGIC Plus** RE chargers are programmed to do a complete cycle of charge, however it's recommended to survey the operations when the battery must remain connected to the charger for more than 12 hours (example: week-ends)

### PRELIMINARY CONTROLS

- Inspect the charger completely for loose screws, electrical connections or other damages;
- Check that all the ventilation slots are not obstructed to assure proper air flow;
- Make sure that the charger is installed as instructed in this manual and in accordance with any applicable national or local norm.

### LED CONTROL PANEL



## **START OF CHARGE**

The charger turns on automatically when the battery is correctly connected, with a delay of 5 seconds, in order to avoid sparks between the connectors.

If the main supply is not present, all the control LEDs (except the "BATTERY CONNECTION" LED) blink alternately.

## **CHARGE CYCLE**

The current of charge follows the Wa curve. During the first charge period, while the battery voltage is below the gassing value, the LED "CHARGE ON" blinks continuously.

After some hours, depending by the conditions of the battery, when the battery's voltage reaches gassing value, the LED "FINAL CHARGE" starts to blink and the charge continues.

The electronic control of the charger measures only the time of effective charge so, even after one or more main supply black-outs, the charge cycle re-starts from the point of interruption. The electronic control is reset only when the battery is disconnected.

After the finishing charge time (~3 hours) the charge is completed, and the LED "STOP-100%" turns on. At this point the equalization cycle starts.

If the charge is not normally completed within 12 hours, the electronic control stops the charger, the LED "EMERGENCY STOP" turns on and the equalization cycle is excluded. If this happens, it's recommended to check the conditions of charger and battery before starting another charge cycle.

## **EQUALIZATION**

When a battery is new, all the cells are virtually in the same condition. After the first cycle of charge-discharge, it's possible to measure small differences of voltage between the cells. These little differences between cells, in the next charge-discharge cycles, are more and more emphasized. This process reduces the performance of the battery and its life.

The EQUALIZATION function, performed by *ENERGIC Plus* RE chargers, has been developed to keep all the cells of the battery at the same level, even after years of continuous work.

Equalization is performed by giving extra charge cycles of 30 minutes every 15,5 hours. During extra charge cycles the LEDs "FINAL CHARGE" and "STOP-100%" blink alternately.

The equalization function starts with a pause of 15,5 hours, it is then performed when the battery remains connected to the charger for more than about 24 hours (example: week-ends).

## **END OF CHARGE**

When the battery is completely charged the charger turns off automatically, and the LED "STOP – 100%" continues to blink.



### **WARNING !**

**Before disconnecting the battery, check it is not being charged. If it is charging turn off the charger using the pushbutton, to avoid sparks between connectors.**

## 6. How to use the charger [Cabinet C]



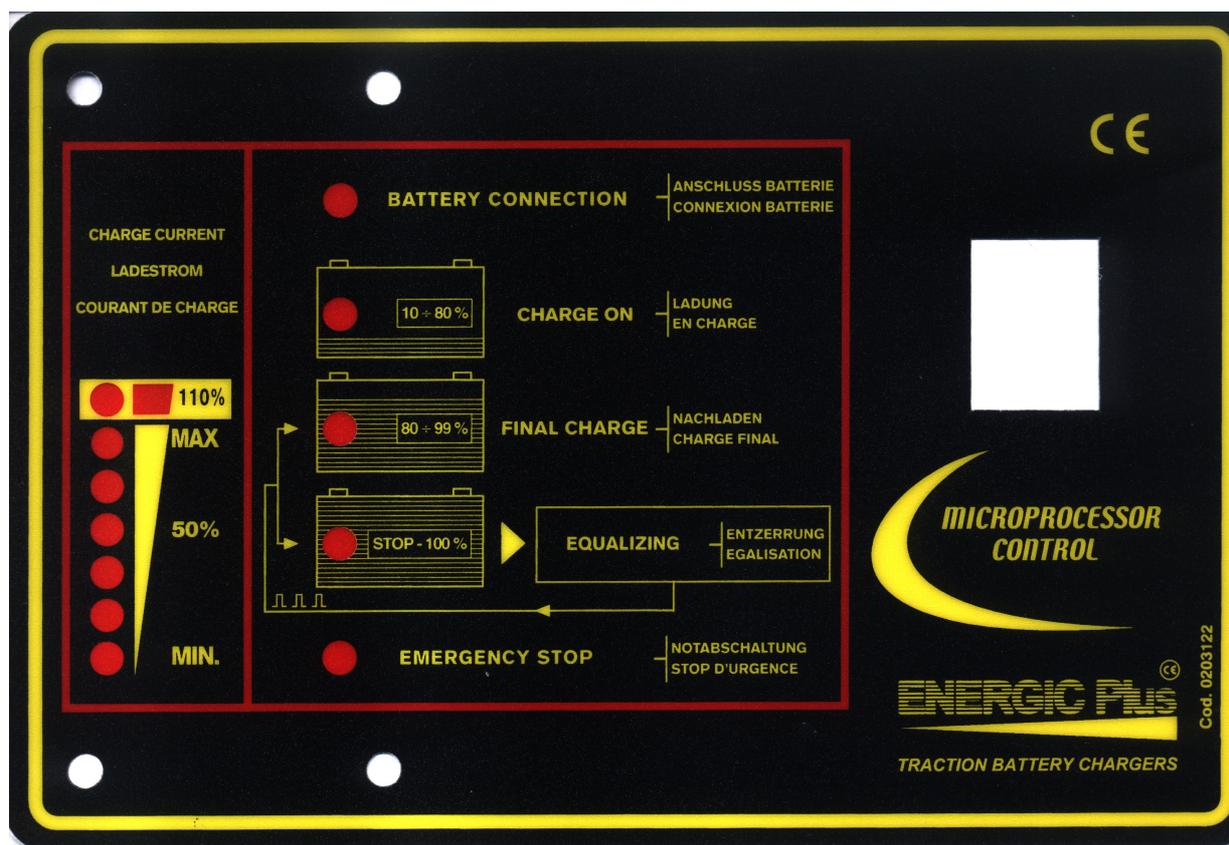
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### PRELIMINARY CONTROLS

- Inspect the charger completely for loose screws, electrical connections or other damages;
- Check that all the ventilation slots are not obstructed to assure proper air flow;
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### LED CONTROL PANEL



- **BATTERY CONNECTION:** lights on when the battery is connected.
- **0-80% (CHARGE ON):** lights on and flashes during the first period of the charge
- **80-99% (FINAL CHARGE):** lights on and blinks, together with the LED "CHARGE ON", during the second part of the charge (battery voltage above gassing value);

- **STOP-100% (EQUALIZING)**: At the end of the charge, this LED blinks. At the end the equalization, it remains on.
- **EMERGENCY STOP**: if the charge continues after the maximum time allowed, the charger turns off automatically and this LED remains on.
- **LED AMMETER**: the ammeter gives an indication of the charge current. The indication of the LED ammeter is in percent of the rated output current (see data label on box).  
Normally, the seventh LED (110%) should never light on, except for the first minutes of charge.

## **START OF CHARGE**

When the battery is correctly connected, the first LED "BATTERY CONNECTION" lights on, then, the charge cycle starts automatically in 5 seconds and the LED "CHARGE ON" starts to blink.

If the main supply is not present, all the control LEDs (except the "BATTERY CONNECTION" LED) blink alternately.

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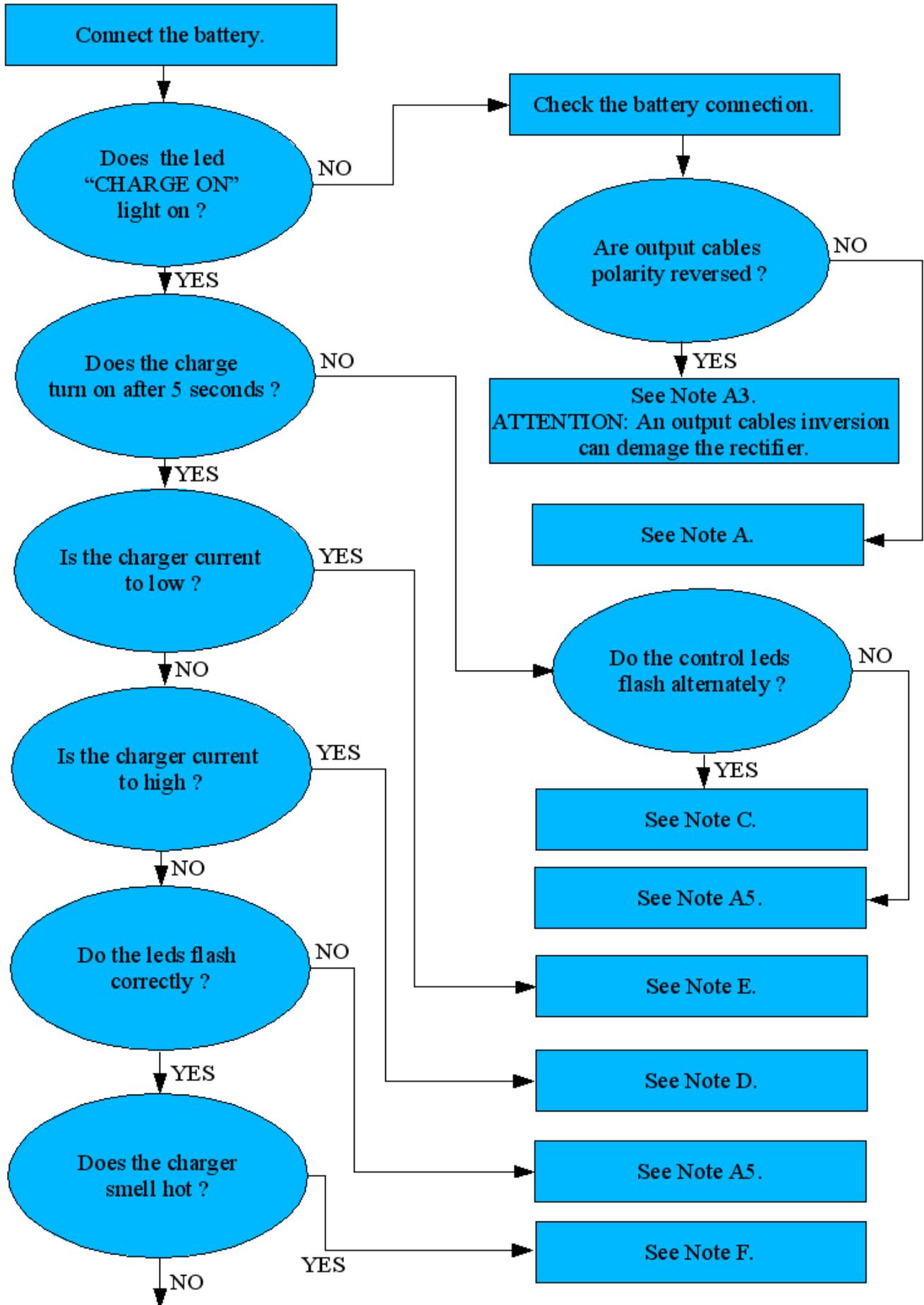
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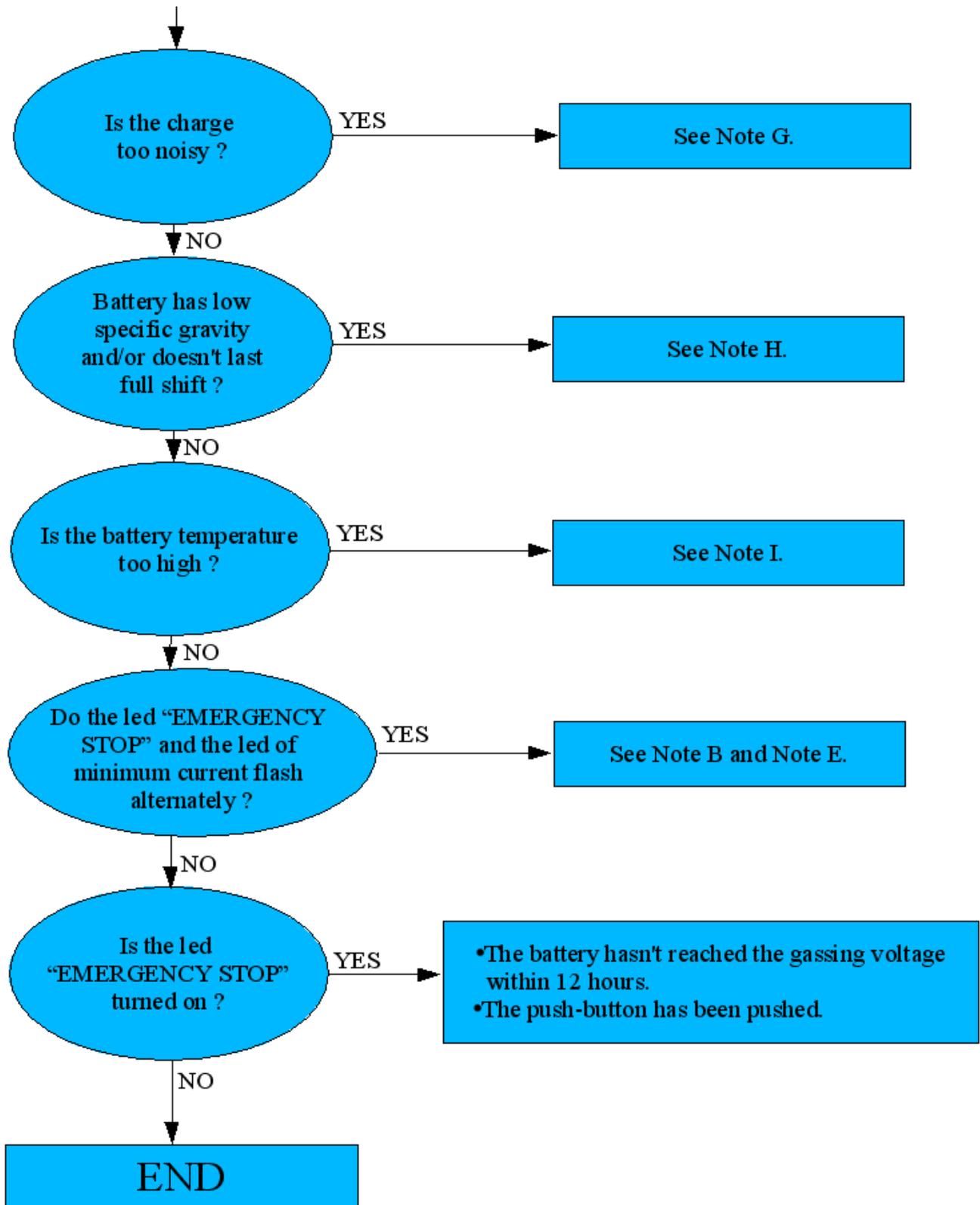
The equalization function starts with a pause of 15,5 hours, it is then performed when the battery remains connected to the charger for more than about 24 hours (example: week-ends).

## **END OF CHARGE**

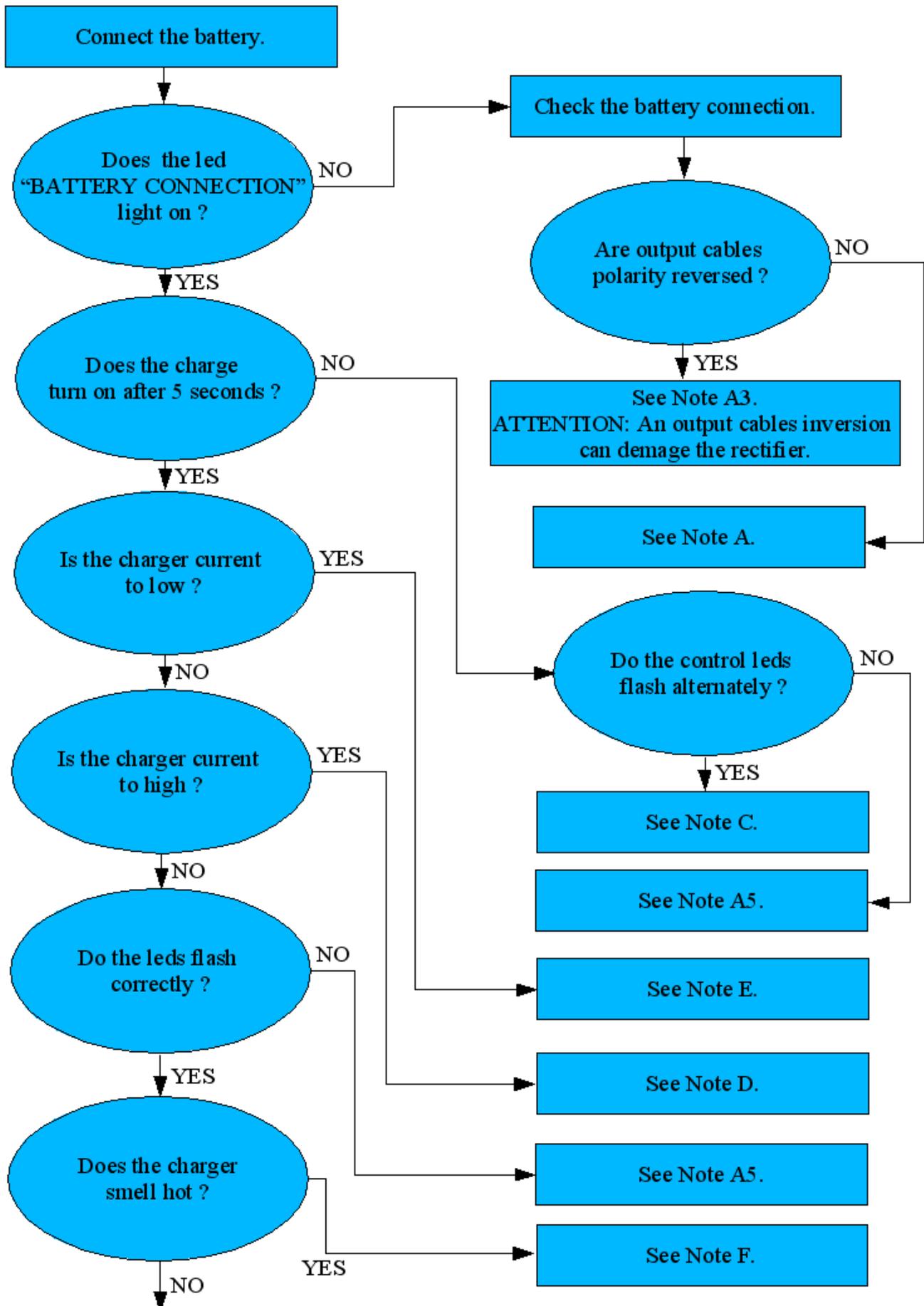
When the battery is completely charged the charger turns off automatically, and the LED "STOP - 100%" continues to blink.

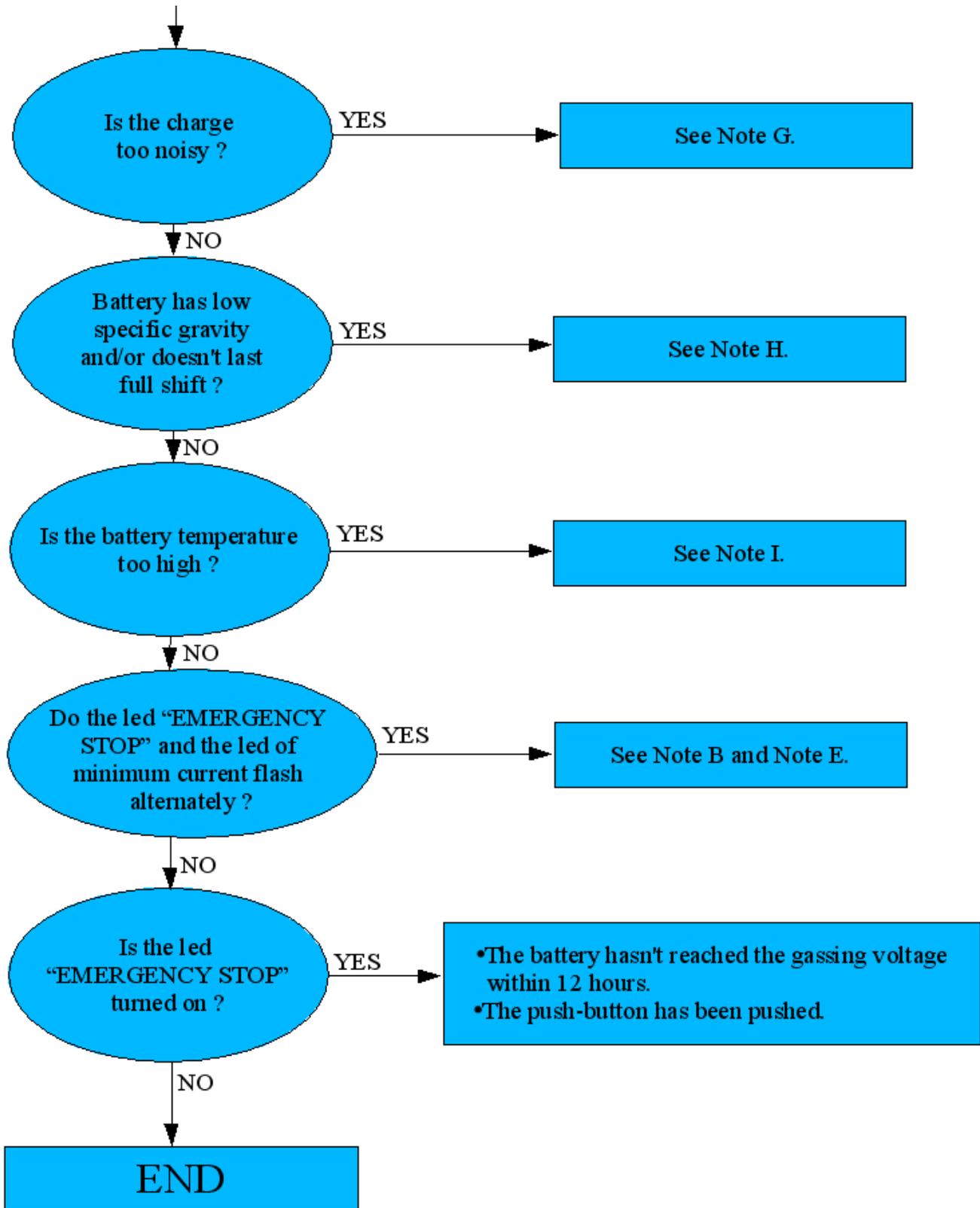
**TROUBLE SHOOTING**





**TROUBLE SHOOTING – CABINET C**





## 8. Trouble Shooting Guide

<i>SYMPTOM</i>		<i>POSSIBLE CAUSES</i>		<i>ACTION</i>	
Charger does not react to battery being connected, and LED panel remains OFF.	A	1	Battery not connected properly.	Check battery connectors/harness.	
		2	Charger has been connected to forklift motor connector.	Disconnect forklift motor and connect battery.	
		3	Output cables reversed.	Check charger, connectors and battery polarities. Output fuse is probably blown.	
		4	Bad control board connection.	Check board connectors (green).	
		5	Bad control board.	Replace control board.	
The led "EMERGENCY STOP" and the led of minimum current flash alternately	B		Output fuse blown.	Replace output fuse and adjust AC input setting.	
All the control led flash alternately.	C	1	AC input is absent.	Check AC input voltage on each phase. Check AC input connections. Check AC disconnect switch and fuses.	
		2	Bad contactor.	Replace contactor.	
Output current is too high	D	1	Wrong AC input settings.	Adjust AC input settings to higher voltage.	
		2	One or more cells are shorted.	Repair battery.	
Output current is too low	E	1	Wrong AC input settings.	Adjust AC input settings to lower voltage.	
		2	One AC phase is absent.	Check AC input voltage on each phase.	
		3	One or more diodes blown.	Replace rectifier.	
		4	Bad contactor.	Replace contactor.	
Charger smells hot	F	1	Bad location.	Install the charger in proper location.	
		2	Ventilation slots obstructed.	Remove objects which may obstruct slots.	
		3	Wrong AC input settings.	Adjust AC input settings to higher voltage.	
		4	Bad or loose power wirings.	Check and tighten all power wirings.	
		5	Transformer burned.	Replace transformer.	
Charger too noisy	G	1	Bad contactor.	Replace contactor and freewheeling diode.	
		2	One or more diodes shorted.	Replace rectifier.	
Battery has low S.G. and/or doesn't last full shift	H	1	Wrong AC input settings.	Adjust AC input settings to lower voltage.	
		2	Battery capacity too low.	Replace battery.	
Battery temperature too high.	I	1	Wrong AC input settings.	Adjust AC input settings to higher voltage.	
		2	Battery power demand too high.	Consider purchasing bigger Ah battery.	
		3	Insufficient cool down time.	Increase cool down time before/after charging.	
		4	Automatic stop doesn't work.	Check and replace board and/or contactor.	

## 8. Spare Parts List

### COMMON PARTS – CABINET S

POSITION	CODE	DESCRIPTION
1-S	0203340	Base RE box S
2-S	0203341	Cover RE box S
3-S	0203123	Printcard external plate RE
4-S	RLCBSRE-06-01	Printcard support (x4)
5-S	0201341	Red pushbutton
6-S	600380GE/000	Cable strain relief (serial < 60000)
7-S	0201822	Cable strain relief (serial > 60000)
8-S	0100999	Hand grip
9-S	100001	Output fuse holder
10-S	1011CA01	Plastic feet RE (x4)

### VARIABLE PARTS – CABINET S

POS.	DESCR.	12-10	12-15	12-20	12-25	12-30	12-40	24-10	24-15	24-20	24-25
11-S	<b>Rectifier</b>	0201902	0201903	0201903	0201911	0201911	0201912	0201902	0201903	0201903	0201911
12-S	<b>Printcard 539SCE</b>	0202751	0202751	0202751	0202751	0202751	0202751	0202752	0202752	0202752	0202752
13-S	<b>Output fuse</b>	0201061	0201061	0201061	0201062	0201062	0201063	0201061	0201061	0201061	0201062

### COMMON PARTS – CABINET A

POSITION	CODE	DESCRIPTION
1-A	0203345	Base RE box A
2-A	0203341	Cover RE box A
3-A	0203123	Printcard external plate RE
4-A	RLCBSRE-06-01	Printcard support (x4)
5-A	0201341	Red pushbutton
6-A	100001	Output fuse holder
7-A	1011CA01	Plastic feet RE (x4)

### VARIABLE PARTS – CABINET A

POS.	DESCR.	12-50	12-60	12-80	24-30	24-40	24-50	24-60
8-A	<b>Rectifier</b>	0201914	0201916	0201888	0201811	0201912	0201914	0201916
		<b>36-30</b>	<b>36-40</b>	<b>48-15</b>	<b>48-30</b>			
		0201911	0201912	0201903	0201911			
9-A	<b>Printcard 539SCE</b>	0202751	0202751	0202751	0202752	0202752	0202752	0202752
		<b>36-30</b>	<b>36-40</b>	<b>48-15</b>	<b>48-30</b>			
		0202753	0202753	0202754	0202754			
10-A	<b>Output fuse</b>	0201064	0201065	0201066	0201062	0201063	0201064	0201065
		<b>36-30</b>	<b>36-40</b>	<b>48-15</b>	<b>48-30</b>			
		0201062	0201063	0201062	0201062			

### COMMON PARTS – CABINET B

POSITION	CODE	DESCRIPTION
1-B	0203370	Base RE box B
2-B	0203374	Cover RE box B
3-B	0203123	Printcard external plate RE
4-B	RLCBSRE-06-01	Printcard support (x4)
5-B	0201341	Red pushbutton
6-B	100001	Output fuse holder
7-B	1020CA01	Plastic feet RE (x4)

**VARIABLE PARTS – CABINET B**

POS	DESCR.	12-100	24-80	24-100	36-50	36-60	36-80	48-40	48-50	48-60	
8-B	Rectifier	0201922	0201888	0201889	0201914	0201915	0201888	0201912	0201914	0201915	
9-B	Printcard 539SCE	0202751	0202752	0202752	0202753	0202753	0202753	0202754	0202754	0202754	
10-B	Output fuse	0201067	0201066	0201067	0201064	0201065	0201066	0201063	0201064	0201065	

**COMMON PARTS – CABINET C**

POSITION	CODE	DESCRIPTION
1-C	0303270	Base RE box C
2-C	0303271	Side panel RE box C
3-C	0303272	Upper panel RE box C
4-C	0203273	Rear panel RE boc C
5-C	0303277	Front panel RE box C
6-C	0201341	Red pushbutton
7-C	0203122	Printcard external plate
8-C	RLCBSRE-06-01	Printcard support (x4)
9-C	0203999	Varistor 275V
10-C	0201740	Cable strain relief (x 3)

**VARIABLE PARTS – CABINET C**

POS.	DESCR.	24-120	24-140	36-100	36-120	48-80	48-100	
11-C	Rectifier	02018895	02018897	0201889	02018895	0201888	0201889	
		48-120	72-60	72-80	72-100	80-40	80-60	80-80
		02018895	0201915	0201888	0201889	0201912	0201915	0201888
POS.	DESCR.	24-120	24-140	36-100	36-120	48-80	48-100	
12-C	Output fuse	0201068	201069	0201067	0201068	0201066	0201067	
		48-120	72-60	72-80	72-100	80-40	80-60	80-80
		0201068	0201065	0201066	0201067	0201063	0201065	0201066
POS.	DESCR.	24-120	24-140	36-100	36-120	48-80	48-100	
13-C	Printcard	0202802	0202802	0202803	0202803	0202804	0202804	
		48-120	72-60	72-80	72-100	80-40	80-60	80-80
		0202804	0202805	0202805	0202805	0202806	0202806	0202806
POS.	DESCR.	24-120	24-140	36-100	36-120	48-80	48-100	
14-C	Contactor	0202961	0202961	0202961	0202961	0202961	0202961	
		48-120	72-60	72-80	72-100	80-40	80-60	80-80
		0202961	0202961	0202961	0202962	0202961	0202961	0202962
POS.	DESCR.	24-120	24-140	36-100	36-120	48-80	48-100	
15-C	Current shunt	0200064 (x2)	0200065 (x2)	0200063 (x2)	0200064 (x2)	0200062 (x2)	0200063 (x2)	
		48-120	72-60	72-80	72-100	80-40	80-60	80-80
		0200064 (x2)	0200064	0200062 (x2)	0200063 (x2)	0200062	0200064	0200062 (x2)

## 9. Cabinet table

S	12/10	12/15	12/20	12/25	12/30	12/40	24/10	24/15	24/20	24/25	48/10	60/10
A	12/50	12/60	12/80	24/30	24/40	24/50	24/60	36/30	36/40	36/50	48/15	48/30
B	12/100	24/80	24/100	36/60	36/80	40/50	40/60	48/40	48/50	48/60	---	---
C	12/120	24/120	24/160	36/100	36/120	40/80	40/100	48/80	48/100	48/120	---	---
	72/60	72/80	72/100	80/40	80/60	80/80	---	---	---	---	---	---