"TL Equalizer"

VERSION WITH NEW ELECTRONIC CONTROL CARD AP070 SW 1.5

- **READ THE INSTRUCTIONS CAREFULLY** before connecting charger to mains and battery.

"TL Equalizer" battery charger

USER MANUAL

INSTALLATION / USE / OPERATION

To use the charger, you have to abide by safety prescriptions contained in laws and regulations and in provisions made by Local Authorities.
Obligations of the "user" : conforming to the operating instructions, the "*user"* is any natural or juridical person using directly P.B.M. battery chargers or anyone using them for account of the above mentioned person. Under special circumstances, e.g. leasing, renting, the "*user*" is the person who takes following obligations according to the agreements made by owner and user.
The "*user"* will be responsible for the installation site of the charger. He shall check, whether very sensitive appliances are disturbed by the influence of the battery charger. He shall choose such an installation site, that the operation of the charger does not affect the functioning of electromagnetic devices and magnetic data carriers (f.e. pace makers, monitors, magnetic disks and diskettes, magnetic tapes, magnetic cards, watches etc.), since a high direct current produces interference magnetic fields.
The *"user"* shall make sure that the use of P.B.M. battery chargers conforms to the rules in force, that any action is avoided which may endanger life and safety of the user or third parties or which may damage things.
The *"user*" shall make sure that users and operators have read and understood the operating instructions and that they abide by the accident prevention and safety rules and the use and maintenance provisions.

A) INSTALLATION AND SAFETY INSTRUCTIONS

READ THE INSTRUCTIONS CAREFULLY before connecting charger to mains and battery.

- Skilled and authorised personnel only shall be allowed to open the charger.
- Before setting the charger at work, the insulation of mains connection cable and battery connection connectors has to be checked.
- The electrical appliances have to be operated by skilled personnel only.
- Disconnect from mains before connecting or disconnecting battery.
- **BE CAREFUL !!** Batteries produce explosive gases while being charged, therefore there must be neither flames nor sparks near the charger while it is in operation. Keep the charger far away from other appliances which may endanger people and objects.
- The charger contains electrical components which may produce voltaic arcs and sparks, therefore if it is used in a closed environment it has to be installed in a proper site. The standard charger (IP 20) is to be used in closed and ventilated environments only and not exposed to rain nor splashed with water. It has to be positioned onto solid and flat floors, far away from dust, water, heating, and moisture. The charger has not to be positioned onto supports and/or shelves made of wood or other inflammable materials. Do not stock materials near the charger and do not place any objects and fluid containers on the charger top.
- Ensure that an **adequate earth connection** is made to prevent risks of electrocution. The charger has to be connected to a mains supply of standards corresponding to the power of the charger and has to be protected through an adequate electrical device (fuse or automatic cutout) complying with European Standards. The protection needs at least a 10% higher setting than the power input of the device; furthermore the device has to be protected from a too high contact voltage, according to the provisions made by Local Authorities.
- It is recommended to use **bipolar standard connectors** which do not allow a polarity reversal on battery ; check the **proper connection of cables in the contacts of the connectors (connectors with oxidized electrical contacts may produce sparks or fires).**

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- Do not use patch cords to prolong the existing electrical connections.
- It is recommended to use batteries in good conditions. Therefore check them regularly.
- Do not modify the P.B.M. chargers, and in particular their safety systems.
- Problems in the electrical components have to be removed by skilled personnel only. Defective parts have to be replaced with other components with the same features. Replacements have to be authorized by the manufacturer.
- Check regularly all internal electrical connections. Make sure that cables and terminals have not been damaged by overheating due to bad contacts ; remove dust (in particular from contactor and moving parts).
- P.B.M. battery chargers do not need any special maintenance, apart from the usual cleaning which has to be performed regularly depending on the installation site. Before cleaning the charger, disconnect it from mains and battery.

B) CONNECTION TO MAINS

It is essential to connect the charger to a mains supply of standards corresponding to the power of the battery charger installed : **SINGLE-PHASE 230V AC / 50Hz (2 poles + earth/16A)**.
Make sure **to earth the charger properly**.

C) ADJUSTMENT TO MAINS VOLTAGE

During installation, or after changing installation site, it is advisable to **check the actual value of the mains voltage**.
If it is too high or too low compared to the rated values, problems due to **drops or increases** in the charging current might arise. (The charger is usually pre-set for a 230V AC mains voltage).
Check mains voltage and adjust it, if required, by means of the **adjusting terminal board** on the transformer.
The above has to be performed by skilled personnel only.

D) CONNECTION TO BATTERY

We advise the use of **bipolar standard connectors** which do not allow reverse polarity on battery.
Check **cable connection in the connector contacts**.
This operation has to be performed by skilled personnel only.

E) OPERATION

- Once mains and battery have been connected, **all LED's will light up**, which means that card is performing a diagnostic test.
- Once all connections have been performed properly, the upper **green "BATTERY CONNECTED" LED** will light up.
- By pressing the **GREEN button, the charger begins charging the battery** and the green LED **begins blinking**. To stop charging, press the green button again.
- If autostart is enabled (default configuration), the charger begins automatically charging the battery **5 seconds after** connection to it (a delayed start is programmable by DIP switches).
- After the **initial charge stage**, depending on the discharge rate of the battery, and provided that the average cell voltage has reached 2.4 V/cell (adjustable value), the **yellow "FINAL CHARGE"** LED will light up. Then an electronic timer starts counting down the **last 3 hours** of final charge.
- When the final charge time (adjustable) expires, the charger automatically switches off, as is shown by the lighting up of the **green "END OF CHARGING" LED.**

F) EQUALIZING CHARGE

- The equalizing charge **will start automatically** after each normal charging cycle, but **it can also be deactivated by software** (see the functions of the SW1 DIP switches).
- It is performed after the normal charge: after **T. Pause (min**.), **T. ON charging pulses are delivered, which alternate with T. OFF (see table).**
- These pulses are performed during the **Active cycle**, followed by a **Stop cycle**.
- **This equalizing system has no time limits and it is stopped only on battery disconnection. This system is useful also during holidays and week-ends, since it makes it possible to keep battery charged while preventing overcharging, overheating, and/or water consumption.**

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Card model	SW version	T. Pause (min)	T. On (min)	T. Off (min)	Vb On (V/cell)	Vb Off (V/cell)	Active cycle (hours/N)	Stop cycle (hours)	Note
AP070	**1.4-1.5**	60	5	55	-	-	48h (2 days)	120h (5 days)	week-end cycle

G) SAFETY DEVICES

- A quick-break fuse on mains input.
- An output fuse as protection against polarity reversals and/or overloads.
- The electronic control card is **equipped with a safety timer, set at 11 hours,** which stops the charging process if the battery voltage does not reach 2.4 V/cell within the foreseen time.
  Should the timer operate, the **red "FAULT"** LED will light up. In this case, both battery and charger have to be checked by the service personnel.
- If a power failure takes place, the electronic card will switch off. **On power fail restart, the card resets and the charging process starts from the beginning.**

- The transformer is equipped with an overload cutout with a contact which stops the charging process in the event of an overheating. The operation of the cutout is signalled by the **red LED "FAULT"** blinking quickly. Both the battery and the charger should be checked by the service technicians. The alarm is deactivated after the make of the cutout contact.

PROPORTIONAL CHARGE : It is a system devised to prevent damages due to prolonged charging of batteries already partially charged. Should battery voltage reach 2.4 V/cell within the **first hour of charging**, a **final charge, lasting half the time of the initial charge, will take place.**
When the final charge is over, the card signals **"END OF CHARGING"** (green LED).
The proportional charge can be activated or deactivated by means of the SW1.7 (G) DIP switches on the AP070 card.

H) GUARANTEE

- *The charger is guaranteed for 12 months from the date of installation.*
- *The guarantee covers all proven defects in components, assembly, and construction.*
- *Any incorrect installation or use of the machine NULLIFIES the guarantee.*
- *Any unauthorised tampering NULLIFIES the guarantee.*
- *In case of difficulties please contact the LOCAL DEALER or P.B.M. S.r.l.*

I) COMPONENTS LIST of "TL EQUALIZER", see wiring diagram no. **NB01 rev.2**

F1	Mains fuse ……..... A-T (glass 6.3x32)
F2	Output fuse on battery side, NH00 …… A-T
PT	Overload cutout contact on transformer
M	Terminal board for adjustment to mains
TR	Single-phase transformer C1 Wa
RD	Diode rectifier bridge
P1	ON-OFF button, charging process
PCB	Electronic control and display card **AP070**

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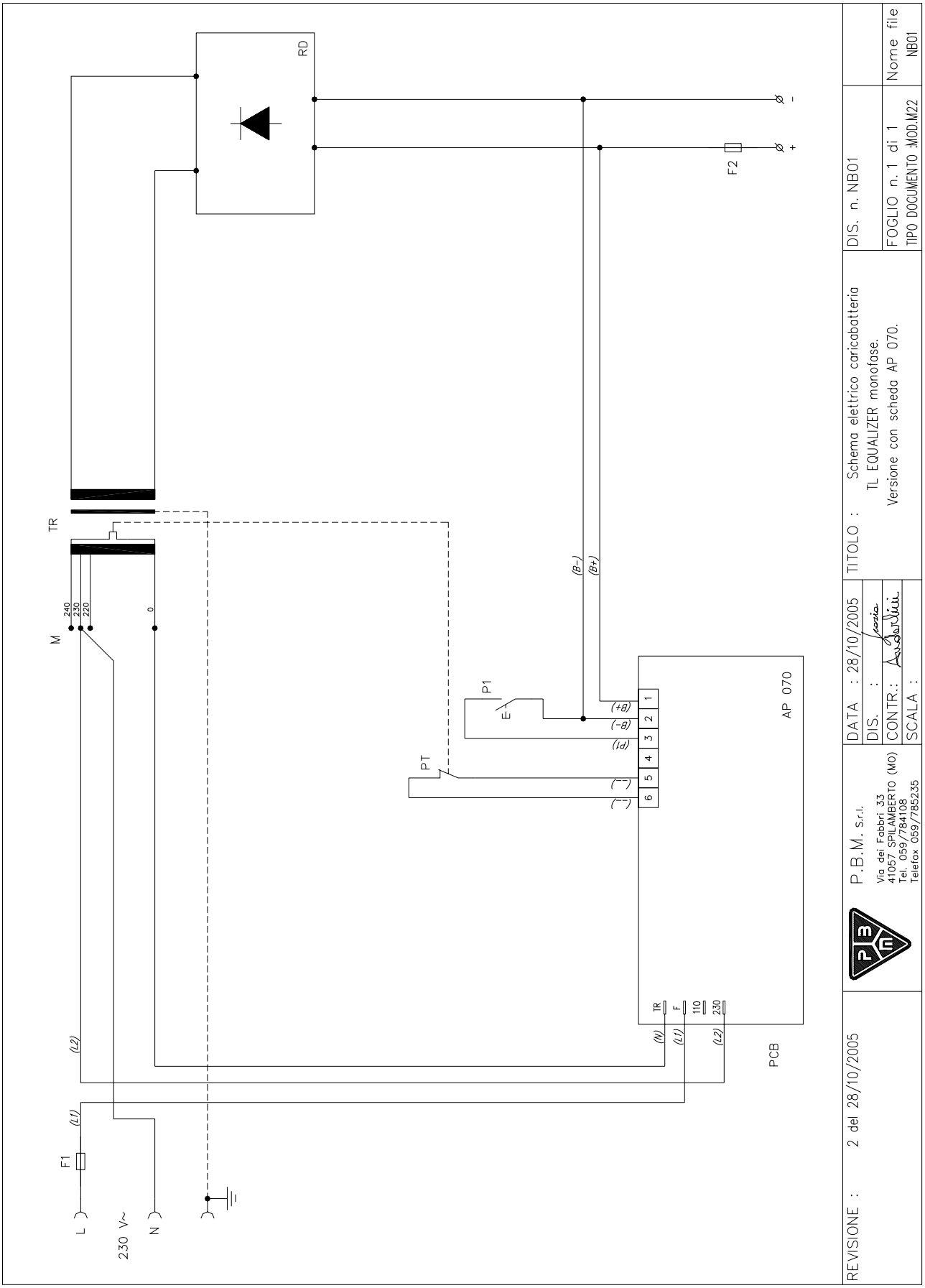
WIRING DIAGRAM



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DECLARATIONS OF CONFORMITY

file: CE Declaration-TL Equalizer-rev0-061211.doc

DECLARATION OF CONFORMITY

We

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declare under our sole responsibility that the following product

Product type: BATTERY CHARGER
Name: TL Equalizer
Models:
12V/15A, 12V/20A, 12V/25A, 12V/30A, 12V/40A, 12V/50A, 12V/60A
24V/15A, 24V/20A, 24V/25A, 24V/30A, 24V/40A, 24V/50A, 24V/60A
36V/15A, 36V/20A, 36V/25A, 36V/30A, 36V/40A, 36V/50A
48V/20A, 48V/30A

Options: ALL

to which this declaration relates complies with the requirements of the following Directives of the European Union:

73/23/EEC (LVD), amended by **Directive 93/68/EEC** and following modifications
and
89/336/EEC (EMC), amended by **Directive 93/68/EEC** and following modifications

Standards to which conformity is declared:

Safety: CEI EN60335-1:(04-2004)

EMC: CEI EN61000-6-2 :(10-2002)
CEI EN61000-6-3 :(10-2002)
CEI EN50366 : (02-2004)
including amendments

Date of issue:
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Place of issue:
VIGNOLA

P.B.M. S.r.l.
Lino Pelloni
President

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QUALITY SYSTEM CERTIFICATION

UNI EN ISO 9001:2000 n° LRC 141297

TÜV CERTIFICATION

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Certificate

No.: Z1A 02 07 15042 115

TÜV PRODUCT SERVICE

P.B.M. s.r.l.

Via dei Fabbri, 33
I – 41057 Spilamberto (MO)

with production facility(ies)
15042

is authorised to label the following product with the
„TÜV Mark P"
as shown overleaf. This certificate also covers the compliance of the tested product with the German Equipment Safety Law requirements of October 23, 1992. The product can also be labelled with the TÜV Product Service GS-Mark A or B. See also notes overleaf.

Product:	**Battery charger** **Series TL**	
Model:	**TL 12/15; TL 12/20; TL 12/25; TL 12/30; TL 24/10;** **TL 24/15; TL 24/20; TL 24/30; TL 24/40.**	
Parameters:	Rated voltage:	230V AV 50-60 Hz
	Rated output voltage:	12 V DC – 24 V DC
	Rated output current:	10 A DC – 40 A DC
	Rated power:	200 – 1400 W
	Type of protection:	I
	Degree of (water) protection:	IP 20

The compliance of the above-mentioned product with the following essential requirements was tested on a voluntary basis:

EN 60335-2-29:1998

Report No.: SIC02090.01, E-(AL 99 05 15042 107)

Released with the above certificate number by the
Certification Body of TÜV PRODUCT SERVICE GMBH.

064325

Department: TECIT / an
Date: 07-15-2002

Translation of the German original

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