

# RPM-2/F1 User's manual

## 1 Table of symbols used in instructions



Information marked with this symbol refers to charger's use and maintenance; they must be carefully read and taken into particular account.



Information marked with this symbol refers to some circumstances potentially dangerous to people or the equipment itself.



Information marked with this symbol refers to some circumstances potentially dangerous to people (lethal hazard from electrical shock).

## 2 Safety Information

Read the present instructions carefully before installing and supplying the charger. Read warnings on type-plate (Information plate) placed on the right side. Store this manual in a safe place.

### 2.1 Preliminary Notice - Recommendations

The chargers of the range **RPM-2/F1**, proven and patented in practice, are suitable for the charging of a crossfire of **lead-acid vented batteries with liquid electrolyte**. Before the battery is used please observe the battery regulations of the manufacturer.



**These equipments must be installed by a qualified personnel.**

Before connecting the battery, check that battery voltage corresponds to the voltage indicated on the charger rating label and the rated output current is suitable to battery capacity according to **Wa profile** as defined in **DIN 41774**. Only electricians are allowed to carry out these checks.



**The connection of an unsuitable battery may result dangerous for battery, charger or the operator himself.**

Contact one of the company's trained technicians if any problem is encountered when putting the charger into operation!

## 3 Installing a charger

### 3.1 Receipt of the charger

When you receive the equipment you must be sure that there aren't damages at all and that it is in compliance with your request making reference to the INFORMATION PLATE placed on the right side of the charger. In case of damages notify the carrier immediately to file a claim. If the supply is not in compliance with the order please contact immediately the supplier. The warranty covers the fabrication defects. The battery charger is packed delivered in a cardboard. NUOVA ELETTRA has no responsibility for damages rise during the transport or unpacking.

### 3.2 Physical environment and operating conditions

The battery charger has to be installed and operating in a dry place.

Use the battery charger in a dry and well-ventilated area away from corrosive fumes (DIN VDE 510, Part 1); furthermore charger must be installed on an horizontal floor or surface. For safety reasons, allow at least 1m free space at the sides of charger.



**Because charger life is heavily influenced by the environmental conditions, not to install the equipment where such conditions aren't respected. Install the charger away from people and/or moving trucks that accidentally could come into contact with the equipment.**

### 3.3 Battery/charger connection

Any charger is provided with 2.5 m charging cables.



**Observe correct polarity: charging cable coded RED should effectively be connected to the positive terminal of the battery (+) and the BLACK cable to the negative terminal (-).**



**Matching charger to an unsuitable battery can seriously damage the battery, causing over temperatures and generating gas hazardous for people!**

We recommend to pay attention while matching charger to the battery.



**Polarity reversal may damage the DC power fuse (blowing up) and causes sparks that can be hazardous for people!**

To avoid this mismatching, the following actions shall be taken:

- Use battery connectors supplied with a coding pin for operating voltage which ensures that only same voltage plugs and sockets will be connected;
- Label the charger and allocate the particular fork-lift or battery. Label the chargers and forklifts (or batteries) with stickers, waterproof pens or colour.

### 3.4 Mains supply connection

Check whether Circuit Breaker fuses are rated to suit the application; nominal current rating is indicated on the type plate.



**Make these controls in order to prevent future damages to battery or battery charger.**



**Always provide proper grounding of the enclosure!**



**If the battery charger without power supply plugs was ordered, the battery charger must be attached to voltage supply by an electrician.**



**The charger plug must only be used with a properly installed and grounded mating receptacle to insure user safety. Make always grounding. It's the responsibility of the user to provide such a receptacle and that its installation meets all appropriate electrical codes.**

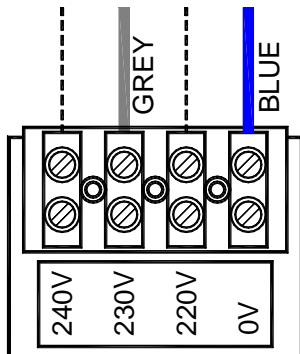
### 3.5 Adjustment to site supply

Chargers with **W** characteristic are extremely influenced by Mains fluctuations. To avoid over and under charging it is important to ensure that the charger involved is correctly matched to the battery and is rated to charge it in the required time.



**Mains fluctuations (Higher) may damage the battery, especially during gassing stage (2.40 V/Cell). Mains fluctuations (Lower) extend charge time, with the risk of Overall charge time fault.**

Power transformer is provided with four taps located on the input terminal block to correspond with the nominal value of the site supply, see Pic. 1 ; 0 tap indicates 230Vac (factory standard).



PIC.1

### 3.6 Maintenance

**RPM-2/F1** are designed for use with batteries which are operated on a duty cycle with a regular level of discharge.

If the equipments are operated within its operating limits, they can be considered maintenance free.



**These equipments must be maintained by trained personnel.**



**Isolate charger from the Mains supply and the battery before removing the covers: risk of electrical shock!**

Periodical inspections :

- Check battery cords ; they should not be damaged or corroded by acid. Ensure that isolation is good;
- Check Mains cable ; particularly, the isolation between single conductors.
- Check battery plug and particularly, its electrical contacts.
- Check cooling slots are not blocked.
- Check all connections and inspect the Contactor, the rectifier , the power fuse,....
- Remove any dust or accumulated electro conductive particles.

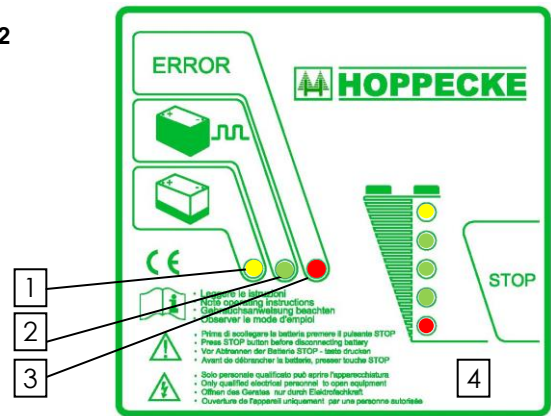
A damaged Mains cable can be replaced by Service or qualified personnel. Use only original spare parts.

### 4 Control panel

During the charge three LED's indicate each state of charge and allows the user to view information about fault conditions (see Pic.2). An additional monitoring **yellow LED** (LED0) is located on the controller mounted behind the top front panel. The LED Bar graph (4) shows battery voltage or

state of charge: **RED LED** indicates a low battery voltage, while **YELLOW LED** is ON with a fully charged battery. **Led3's coded signals** indicate fault conditions.

PIC.2



- YELLOW LED1:** Battery connected/Charge ON
- GREEN LED2:** Charge complete and Equalising/Maintenance in progress
- RED LED3:**  $t > t_{max}$ : Fault condition Led
- LED BAR graph :** Voltage battery (red LED: 20% C<sub>5</sub>...yellow LED 100% C<sub>5</sub>)

Charge pattern	Yellow LED0 (internal)	Yellow LED1	Green LED2	Red LED3
<b>Delayed start</b>	OFF	<b>ON</b>	OFF	OFF
<b>Precharging</b>	<b>BLK</b>	<b>BLK</b>	OFF	OFF
<b>Bulk charge</b>	OFF	<b>BLK</b>	OFF	OFF
<b>Completion of charge</b>	<b>ON</b>	<b>BLK</b>	OFF	OFF
<b>Equalising delay</b>	<b>ON</b>	<b>BLK</b>	<b>ON</b>	OFF
<b>Equalising (battery charged)</b>	OFF	OFF	<b>BLK</b>	OFF
<b>Maintenance charge delay</b>	OFF	OFF	<b>ON</b>	OFF
<b>Maintenance cahрге</b>	<b>ON</b>	OFF	<b>BLK</b>	OFF
<b>Overall charge time fault (<math>t &gt; t_{max}</math>)</b>	OFF	<b>ON</b>	OFF	<b>ON</b>
<b>AC Mains fault Phase failure</b>	*	*	*	
<b>Battery not connected fault</b>	OFF	OFF	OFF	
<b>Over discharged battery fault</b>	<b>ON</b>	<b>ON</b>	OFF	
<b>Thermal protection</b>	*	*	*	
<b>Maintenance charge fault</b>	<b>ON</b>	OFF	*	

**BLK: Blinking /** \*= All LED's which were lightening or flashing, now, are illuminated battery/charger contact.

= Nr of flashes/pause

**N.B.:** during Equalising (green Led is blinking) battery is fully charged and ready for use

#### 4.1 Stop switch

The battery may only be disconnected when charging current has stopped flowing. Therefore, the **STOP** push-button must be pressed before disconnecting the battery from the charger. By pushing this button the unit is automatically switched off. All LED's which were lightening or flashing, now, are lightened. **Charging can be resumed by pressing this switch again (START option) .**

**!** *During the 8 second automatic delay the Stop switch is not activated. Break of charging before the green LED2 lights up may cause lost of capacity or early battery failure (sulphation).*

#### 4.2 End of charging

Recharging time depends on battery state of charge and on charging current related to battery capacity (A/h).



**Press the STOP button on the front side of the charger to interrupt the charging operation at any desired time. Do not disconnect battery from charger while operating! Disconnecting the battery plug while operating causes sparks that may be hazardous due to the high concentration of hydrogen and oxygen which are generated during the charging operation.**

#### 5 Limitations on use

This equipment has been designed for indoor use. It's only designed to recharge lead/acid batteries on industrial premises.

**!** *The equipment is not intended to be used by people (including children) whose physical, sensory or mental abilities are reduced, or people with lack of experience or knowledge, unless they have been granted through the intermediary of a person responsible for their safety, supervision or instruction concerning the use of the equipment. Children should be supervised to ensure they do not play with the equipment*

#### 6 Environmental protection notes



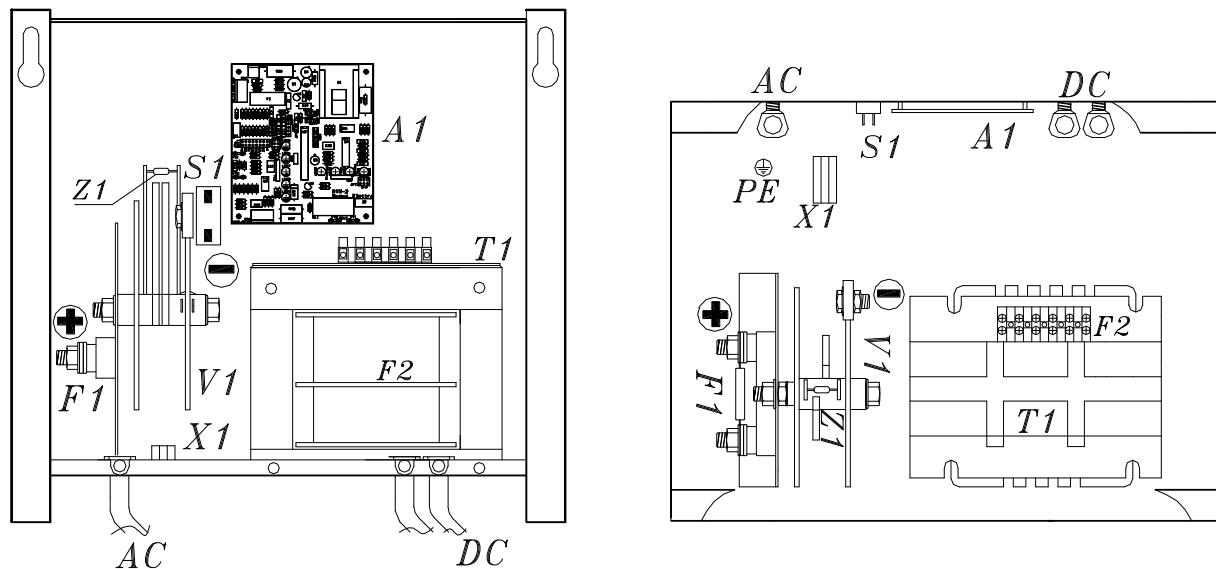
When this product comes to the end of its useful life, you must not dispose of it in the ordinary domestic waste. The correct method of disposal is to take it to your collection point for re cycling electrical and electronic equipment. The symbol shown here, which may be found on the product itself, in the operating instructions or on the packaging, indicates that this is the case.

Individual markings indicate which materials can be recycled and re-used. You can make an important contribution to the protection of our common environment by reusing the product, recycling the basic materials or recycling redundant equipment in other ways.

In case of *RPM-2/F1 models*, you have to remove electronic parts like rectifiers, transformers, electrical cables, etc.: these parts must be disposed of with a corresponding collection point for electrical scrap. Electronic boards must be removed from your equipment and dispose at your local collection point. If you don't know the location of your nearest disposal centre, please enquire at your local council office. Local legislation takes precedence over any instructions in this document and must be scrupulously observed.

## 7 RPM-2/F1 Layout

### 7.1 Internal components



ITEM	COMPONENT
A1	RPMRTM-2 ELECTRONIC BOARD
F1	MAINS FUSE
F2	POWER FUSE
F3	THERMAL PROTECTIONS
K1	RELAY
S1	STOP SWITCH
T1	TRANSFORMER
X1	MAINS PLUG
X5	BATTERY PLUG
V1	RECTIFIER
Z1	VARISTOR

## 7 Cubicle dimensions

CUBICLE DIMENSIONS	HEIGHT (mm)	WIDHT (mm)	DEPHT (mm)
A5	335	300	285

## 8 Spare parts

The equipment's production number (**SERIAL NUMBER**) must be supplied when ordering any replacement parts. This number can be found on the information plate (**type plate**).

## 9 Improvements and modifications

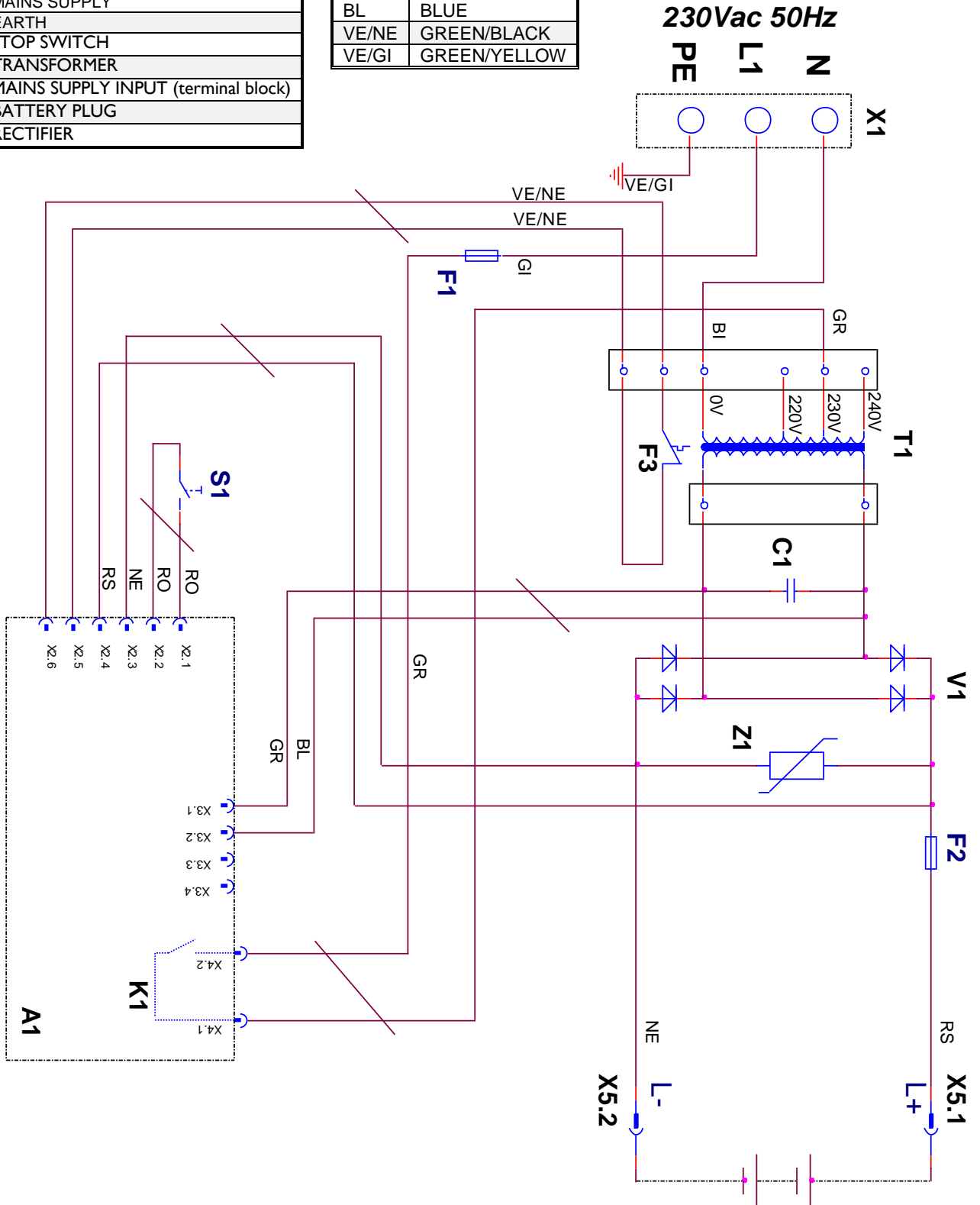
The manufacturer reserves the right to make any improvements and/or modifications to the described in this manual at any time without prior notice and is not obliged under any circumstances whatsoever to update the contents of this manual nor the equipment concerned. This document is not to be considered a contractual offer.

**For more product information please consult the SPECIALIST TECHNICAL MANUAL.**

# 10 Wiring Diagram

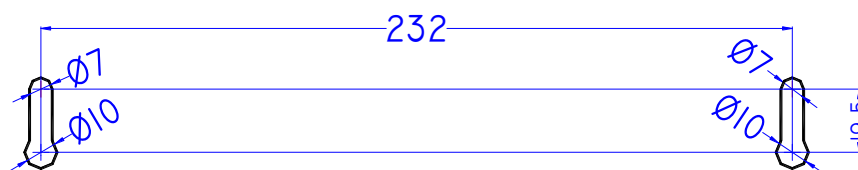
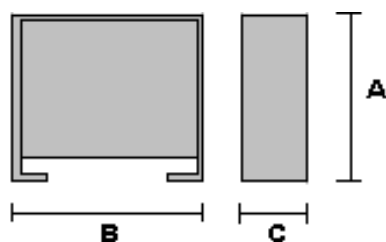
COMPONENTS	
A1	RPMRTM-2 ELECTRONIC BOARD
C1	EMC FILTER
F1	MAINS FUSE
F2	POWER FUSE
F3	THERMAL PROTECTION
K1	RELAY
L1, N	MAINS SUPPLY
PE	EARTH
S1	STOP SWITCH
T1	TRANSFORMER
X1	MAINS SUPPLY INPUT (terminal block)
X5	BATTERY PLUG
V1	RECTIFIER

COLOURS	
BI	WHITE
GR	GREY
MA	BROWN
NE	BLACK
RO	PINK
RS	RED
BL	BLUE
VE/NE	GREEN/BLACK
VE/GI	GREEN/YELLOW



**11 Product table**

Nominal voltage	Battery capacity 10-12 hours (Ah)	Nominal current	Mains voltage (V)	Weight (kg)	Charger model	Dimensions (mm)		
						A	B	C
<b>12V</b>	50-65	<b>10A</b>	230	12	RPM-2/F1 12/10	335	300	285
<b>12V</b>	65-95	<b>15A</b>	230	12	RPM-2/F1 12/15	335	300	285
<b>12V</b>	95-125	<b>20A</b>	230	13	RPM-2/F1 12/20	335	300	285
<b>12V</b>	125-155	<b>25A</b>	230	14	RPM-2/F1 12/25	335	300	285
<b>12V</b>	150-190	<b>30A</b>	230	15	RPM-2/F1 12/30	335	300	285
<b>12V</b>	190-250	<b>40A</b>	230	17	RPM-2/F1 12/40	335	300	285
<b>12V</b>	250-315	<b>50A</b>	230	19	RPM-2/F1 12/50	335	300	285
<b>12V</b>	300-375	<b>60A</b>	230	21	RPM-2/F1 12/60	335	300	285
<b>24V</b>	50-65	<b>10A</b>	230	13	RPM-2/F1 24/10	335	300	285
<b>24V</b>	65-95	<b>15A</b>	230	14	RPM-2/F1 24/15	335	300	285
<b>24V</b>	95-125	<b>20A</b>	230	15	RPM-2/F1 24/20	335	300	285
<b>24V</b>	125-155	<b>25A</b>	230	16	RPM-2/F1 24/25	335	300	285
<b>24V</b>	150-190	<b>30A</b>	230	17	RPM-2/F1 24/30	335	300	285
<b>24V</b>	190-250	<b>40A</b>	230	19	RPM-2/F1 24/40	335	300	285
<b>24V</b>	250-315	<b>50A</b>	230	22	RPM-2/F1 24/50	335	300	285
<b>24V</b>	300-375	<b>60A</b>	230	25	RPM-2/F1 24/60	335	300	285
<b>36V</b>	150-190	<b>30A</b>	230	22	RPM-2/F1 36/30	335	300	285
<b>36V</b>	190-250	<b>40A</b>	230	24	RPM-2/F1 36/40	335	300	285
<b>36V</b>	250-315	<b>50A</b>	230	26	RPM-2/F1 36/50	335	300	285
<b>36V</b>	300-375	<b>60A</b>	230	27	RPM-2/F1 36/60	335	300	285



Dima di foratura per fissaggio a muro (misure in mm)

**12 Troubleshooting**

<u><b>FAULT</b></u>	<u><b>CAUSE</b></u>	<u><b>WHAT TO DO ?</b></u>
<p><b><i>Charger doesn't work after a 8 second delay</i></b></p>	<ul style="list-style-type: none"> <li>- Bad connection to battery or Mains.</li> </ul>	<ul style="list-style-type: none"> <li>- Check for proper battery connection</li> <li>- Check if DC power fuse is blown.</li> <li>- Check the fuse (1A) on the controller; if it isn't blown and LED's are off the controller has to be replaced</li> <li>- Check the voltage across the contactor coil.</li> <li>- Check transformer terminal block for visible damage or loose wires.</li> <li>- Contact Service Dept.</li> </ul>
<p><b><i>Output current is too low.</i></b></p>	<ul style="list-style-type: none"> <li>- Incorrect AC Input setting</li> <li>- Site supply is lower than Input voltage selected on power transformer.</li> </ul>	<ul style="list-style-type: none"> <li>- Measure the AC supply voltage coming into the charger to confirm that it matches the charge input tap settings, see "Installation instructions".</li> <li>- Check if Mains fuses are of the appropriate rating.</li> <li>- Contact Service Dept.</li> </ul>
<p><b><i>Output current is too high.</i></b></p>	<ul style="list-style-type: none"> <li>- Incorrect AC Input setting</li> <li>- Site supply is higher than Input voltage selected on power transformer.</li> </ul>	<ul style="list-style-type: none"> <li>- Measure the AC supply voltage coming into the charger to confirm that it matches the charge input tap settings, see "Installation instructions".</li> <li>- Check if charger is rated to correspond with battery capacity.</li> <li>- Contact Service Dept.</li> </ul>
<p><b><i>Yellow LED 1 flashes very fast, then after 2 minutes displays overall charge time fault.</i></b></p>	<ul style="list-style-type: none"> <li>- Controller is running in "Test mode" (SET jumper SW1 placed to C).</li> </ul>	<ul style="list-style-type: none"> <li>- Remove power and disconnect battery.</li> <li>- Remove charger's front panel to get access to the controller, then, set jumper SW1 to "N".</li> <li>- Contact Service Dept.</li> </ul>

Subject to revisions without prior notice







# trak<sup>®</sup> basic user's manual

## 1 Table of symbols used in instructions



Information marked with this symbol refers to charger's use and maintenance; they must be carefully read and taken into particular account.



Information marked with this symbol refers to some circumstances potentially dangerous to people or the equipment itself.



Information marked with this symbol refers to some circumstances potentially dangerous to people (lethal hazard from electrical shock).

## 2 Safety Information

Read the present instructions carefully before installing and supplying the charger. Store this manual in a safe place.

### 2.1 Preliminary Notice - Recommendations

The chargers of the range **trak<sup>®</sup> basic**, proven and patented in practice, are suitable for the charging of a crossfire of batteries with liquid electrolyte. The system works according to a modified **WpWa**-characteristics; a **Wa**-curve (following DIN 41774) is used until the gassing voltage, then the final charge starts with a pulse charging curve (**BOOST charge**). With **WpWa** profile the 100% charging current flows at 2 V/Cell and when reaching the gassing voltage (2.4 V/Cell) it drops off to approx. 50% Inom. At 2.4 V/Cell the unit automatically switches from the pulse curve Wp: the pulse duration is 3 minutes Wp charge, then 5 minutes W charge etc. until the battery has reached an Ah amount (*capacity recharged*) corresponding of a **1.08 charge factor**. At the end charger switches automatically to *Equalization charge*. *Maintenance charge* will maintain the battery in a fully charged condition when the battery is stood out of service for a long period (see CHARGE PATTERN table, page 2).



**This equipment must be installed by qualified personnel.**

Before connecting the battery, check that battery voltage corresponds to the voltage indicated on the charger rating label and the rated output current is suitable to battery capacity according to **Wa** profile. Only electricians are allowed to carry out these checks.



**The connection of an unsuitable battery may result dangerous for battery and charger and the operator himself.**

## 3 Installing a charger

### 3.1 Receipt of the charger

When you receive the equipment you must be sure that there aren't damages at all and that it is in compliance with your request making reference to the INFORMATION PLATE placed on the right side of the charger. In case of damages notify the carrier immediately to file a claim. If the supply is not in compliance with the order please contact immediately the supplier. The warranty covers the fabrication defects. The battery charger is packed delivered in a cardboard. HOPPECKE has no responsibility for damages rise during the transport or unpacking.

### 3.2 Physical environment and operating conditions

The battery charger has to be installed and operating in a dry place. Use the battery charger in a dry and well-ventilated area away from corrosive fumes (DIN VDE 510, Part 1); furthermore charger must be installed on a horizontal floor or surface. For safety reasons, allow at least 1 m free space at the sides of charger.



Because charger life is heavy influenced by the environmental conditions, not to install the equipment where such conditions aren't respected. Install the charger away from people and/or moving trucks that accidentally could come into contact with the equipment.

### 3.3 Battery/charger connection

Any charger is provided with 3 m of charging cables.



Observe correct polarity: charging cable coded **red** should effectively be connected to the **positive** terminal of the battery (+) and the **black** cable to the **negative** terminal (-).



**Matching charger to an unsuitable battery can seriously damage the battery, causing over temperatures and generating gas hazardous for people!**

We recommend to pay attention while matching charger to the battery.



**Polarity reversal may damage the DC power fuse (blowing up) and causes sparks that can be hazardous for people!**

To avoid this mismatching, the following actions shall be taken:

- Use battery connectors supplied with a coding pin for operating voltage which ensures that only same voltage plugs and sockets will be connected;
- Label the charger and allocate the particular fork-lift or battery. Label the chargers and forklifts (or batteries) with stickers, waterproof pens or colour.

### 3.4 Mains supply connection

Check whether Circuit Breaker fuses are rated to suit the application; nominal current rating is indicated on the type plate.



**Make these controls in order to prevent future damages to battery or battery charger.**



**Always provide proper grounding of the enclosure!**



**If the battery charger without power supply plugs was ordered, the battery charger must be attached to voltage supply by an electrical specialist.**

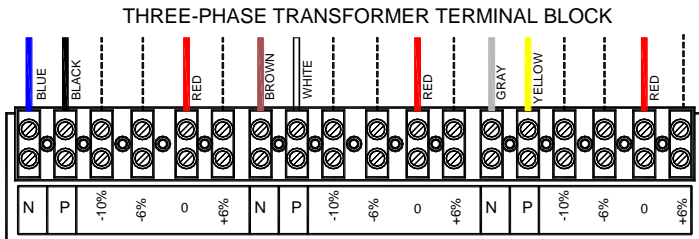
### 3.5 Adjustment to site supply

Chargers with W characteristic are influenced by Mains fluctuations.

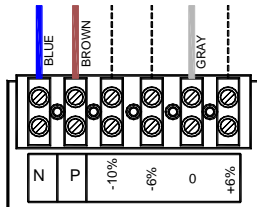


**Mains fluctuations (Lower) extend charge time, with the risk of overall charge time fault. Mains fluctuations (Higher) may damage the battery, especially during gassing stage (2.40 V/Cell).**

Power transformer is provided with four taps (located on terminal block) to correspond with the nominal value (240V<sub>ac</sub> for 1-Ph and 415V<sub>ac</sub> for 3-Ph) of the site supply (see picture 1).



THREE-PHASE TRANSFORMER TERMINAL BLOCK



SINGLE-PHASE TRANSFORMER TERMINAL BLOCK

Pic.1

### 3.6 Maintenance

This battery charger is designed for use with batteries which are operated on a duty cycle with a regular level of discharge. If this equipment operates within its operating limit, it can be considered maintenance free.

**!** *This equipment must be maintained by an instructed person.*



**Isolate the charger from the A.C. supplies and the battery before removing the cover: risk of electrical shock!**

Periodical inspections:

- Check battery cords; they should not be damaged or corroded by acid. Ensure that isolation is good;
- Check Mains cable; particularly, the isolation between single conductors;
- Check battery plug and particularly, its electrical contacts;
- Check cooling slots are not blocked;
- Check all connections and inspect the contactor, the rectifier, the power fuse, Delta/Star connection,...;
- Remove any dust or accumulated electro conductive particles.

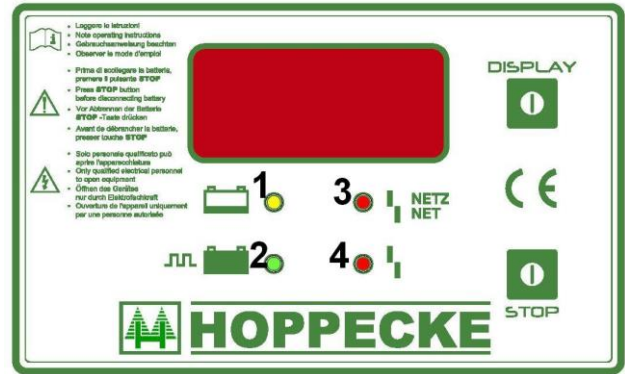
A damaged Mains cable can be replaced by Service or qualified personnel. Use only original spare parts.

## 4 Control panel

The state of charge can be read off at any time from 4 LEDs and a display placed on the front panel's *membrane switch*.

### 4.1 LED's pattern

Four Led's indicate each state of charge or fault condition. An additional monitoring *yellow LED (LED 1)* is located on the controller, mounted behind the top front panel.



1- **yellow LED L3: Battery connected / Charge in progress**

2- **green LED L4: Battery fully charged/ Equalising or Maintenance in progress**

3- **red LED L2: Mains supply fault**

4- **red LED L5: Error**

Charge pattern	Yellow Led (L3)	Green Led (L4)	Red Led (L2)	Red Led (L5)	Yellow Led L1 (internal)
Delayed start	ON	OFF	OFF	OFF	OFF
Precharging	BLK1	OFF	OFF	OFF	ON
Bulk charge	BLK1	OFF	OFF	OFF	OFF
Completion of charge	BLK1/BLK2	OFF	OFF	OFF	OFF
Equalising delay	BLK1	ON	OFF	OFF	OFF
Equalising (battery charged)	OFF	BLK1	OFF	OFF	OFF
Equalising end	OFF	ON	OFF	OFF	ON
Maintenance	OFF	ON / BLK1	OFF	OFF	OFF
AC Mains fault	(*)	(*)	BLK1	OFF	(*)
Low voltage	ON	OFF	OFF	BLK1	ON
Thermal cut-out	(*)	(*)	OFF	BLK1	(*)
Overall charge time fault (t <sub>max</sub> )	ON	OFF	OFF	ON	OFF
Battery disconnected	OFF	OFF	OFF	OFF	OFF
Maintenance fault	OFF	ON	OFF	BLK1	OFF
Stop / Start	(*)	(*)	OFF	OFF	(*)

BLK1:Blinking\_BLK2: accelerated blink; \*= All LED's which were lightening or flashing, now, are illuminated.

**N.B.: during Equalising (green led is blinking) battery is fully charge and ready for use**

## 4.2 Display information

Useful status information and coded signals, indicating the fault or emergency conditions related to the battery or charger, are visually recorded on the central scrolling display (7). Press the **DISPLAY button (5)** you can see **Instantaneous charging current [A]**, **Voltage per Cell [V]**, **Charge time spent [t]**, **Ah returned [Ah]**, **Setted gassing stage [Vg]**, **Charge factor [CF]**.

## 4.3 STOP-START push-button

The battery may only be disconnected when charging current has stopped flowing. Therefore, the **STOP button (6) must be pressed before disconnecting the battery from the charger**. By pushing this button the unit is automatically switched off. **Charging can be resumed when the STOP button will be pressed again (START option).**

! *Press the STOP button on the front side of the charger to interrupt the charging operation at any desired time. Do not disconnect battery from charger while operating! Disconnecting the battery plug while operating causes sparks that may be hazardous due to the high concentration of Hydrogen and Oxygen which are generated during the charging operation!*

! *Break of charging before the green L4 lights up may cause loss of capacity or early battery failure (sulphation).*

## 4.4 End of charging

Charging time is dependent on the state of discharge of the battery and the ability of the charging equipment to deliver the current for the capacity of the battery.

! *The equipment determines, according to the given charge factor, the number of Ah required for fully recharging the battery. The charger is switched off automatically after the battery reached the finishing rate requested*

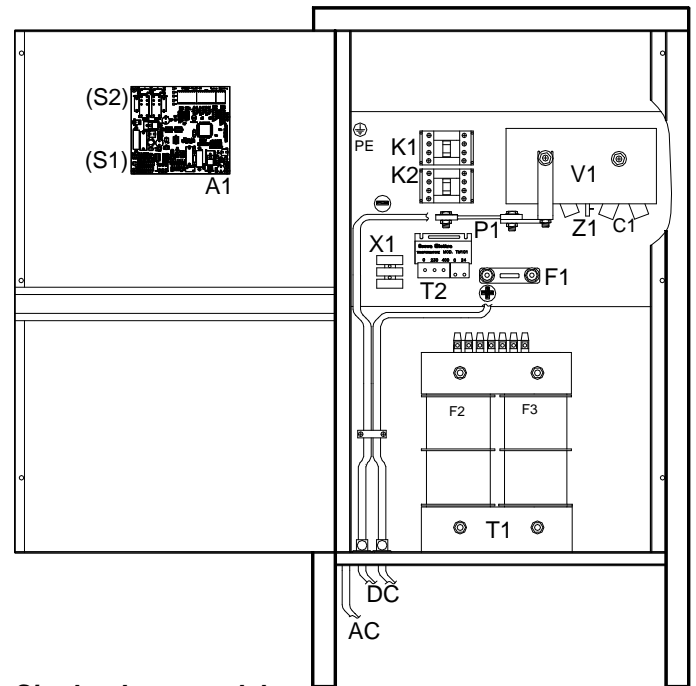
## 5 Limitations on use

This equipment has been designed for indoor use. It's only designed to recharge lead/acid batteries on industrial premises.

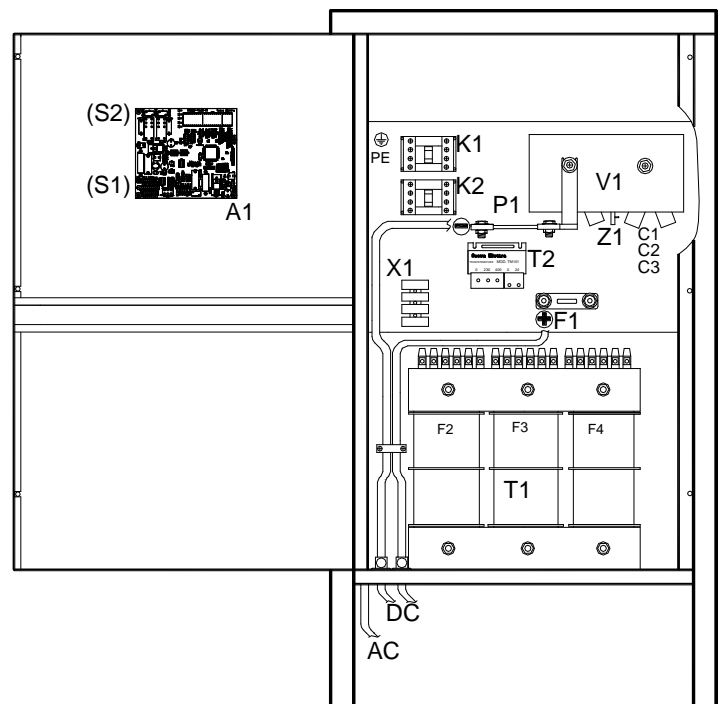
! *The equipment is not intended to be used by people (including children) whose physical, sensory or mental abilities are reduced, or people with lack of experience or knowledge, unless they have been granted through the intermediary of a person responsible for their safety, supervision or instruction concerning the use of the equipment. Children should be supervised to ensure they do not play with the equipment*

## 6 Layout trak® basic

### 6.1 Items designation



Single-phase model



Three-phase model

ITEM DESIGNATIONS
CONTROLLER NR-EPWSA-02 (A1)
EMC FILTER (C1-C2-C3)
POWER DC FUSE (F1)
THERMAL PROTECTION (F2-F3-F4)
CONTACTOR 1st STAGE (K1)
CONTACTOR 2nd STAGE (pulse stage) (K2)
CURRENT SENSOR (P1)
MAINS TERMINAL BLOCK (X1)
POWER TRANSFORMER (T1)
AUX. TRANSFORMER (T2)
RECTIFIER (V1)
STOP PUSH-BUTTON (S1)
DISPLAY PUSH-BUTTON (S2)

## 9 Environmental protection notes



When this product comes to the end of its useful life, you must not dispose of it in the ordinary domestic waste. The correct method of disposal is to take it to your collection point for re cycling electrical and electronic equipment. The symbol shown here, which may be found on the product itself, in the operating instructions or on the packaging,

indicates that this is the case.

Individual markings indicate which materials can be recycled and re-used. You can make an important contribution to the protection of our common environment by reusing the product, recycling the basic materials or recycling redundant equipment in other ways.

In case of **trak<sup>®</sup> basic** models, you have to remove electronic parts like rectifiers, transformers, electrical cables, etc.: these parts must be disposed of with a corresponding collection point for electrical scrap. Electronic boards must be removed from your equipment and dispose at your local collection point. If you don't know the location of your nearest disposal centre, please enquire at your local council office. Local legislation takes precedence over any instructions in this document and must be scrupulously observed.

## 6.2 Cubicle dimensions

CUBICLE DIMENSIONS	HEIGHT (mm)	WIDHT (mm)	DEPHT (mm)
A2 (three-phase) (single-phase 2C)	760	500	400
A1 (three-phase)	900	500	400
B2 (three-phase)	900	600	500

## 7 Spare parts

The equipment's production number (**SERIAL NUMBER**) must be supplied when ordering any replacement parts. This number can be found on the information plate (**type plate**).

## 8 Improvements and modifications

HOPPECKE reserves the right to make any improvements and/or modifications to the described in this manual at any time without prior notice and is not obliged under any circumstances whatsoever to update the contents of this manual nor the equipment concerned. This document is not to be considered a contractual offer.

For more product information please consult the SPECIALIST TECHNICAL MANUAL.

## 10 Pictures

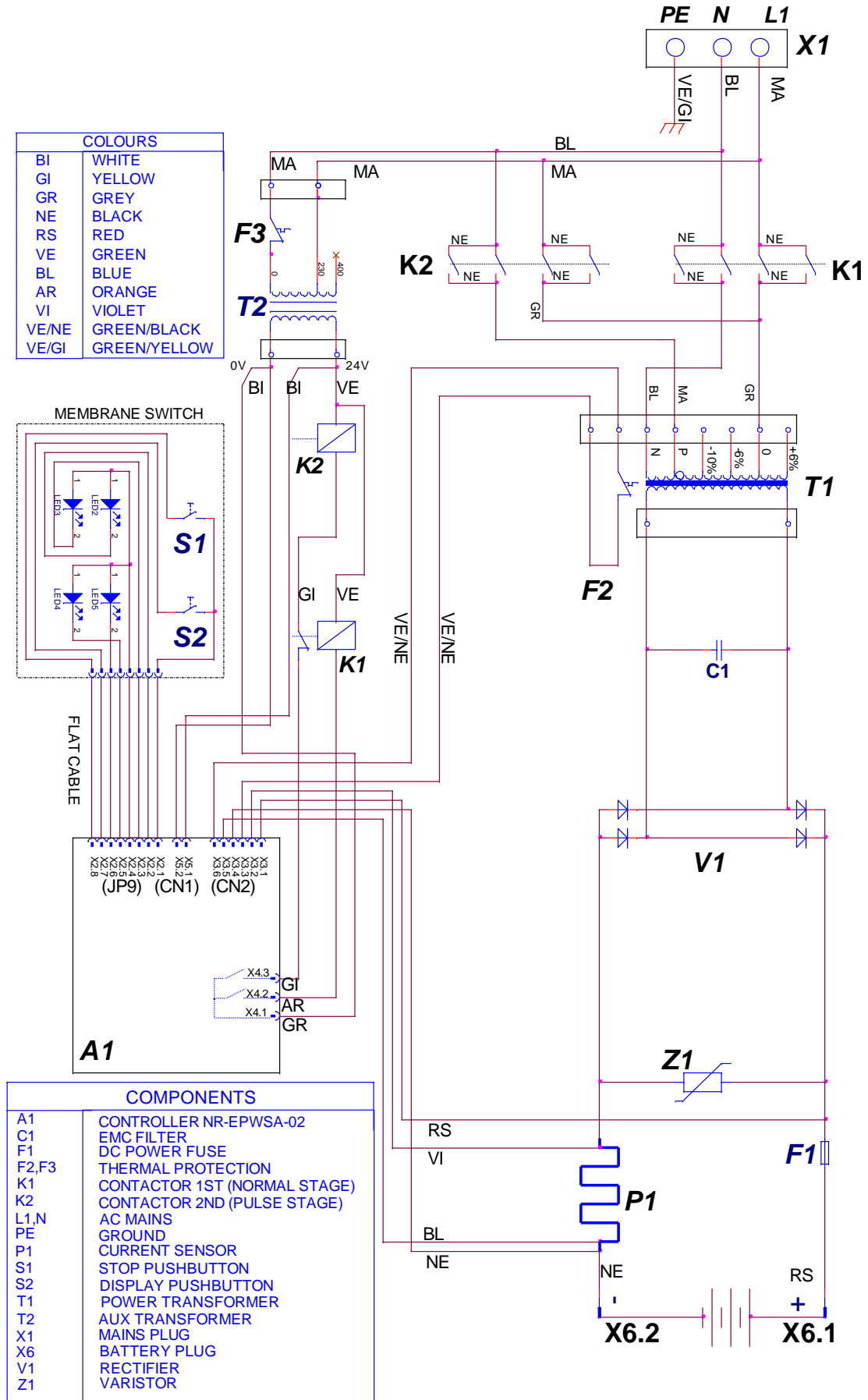


**11 Troubleshooting**

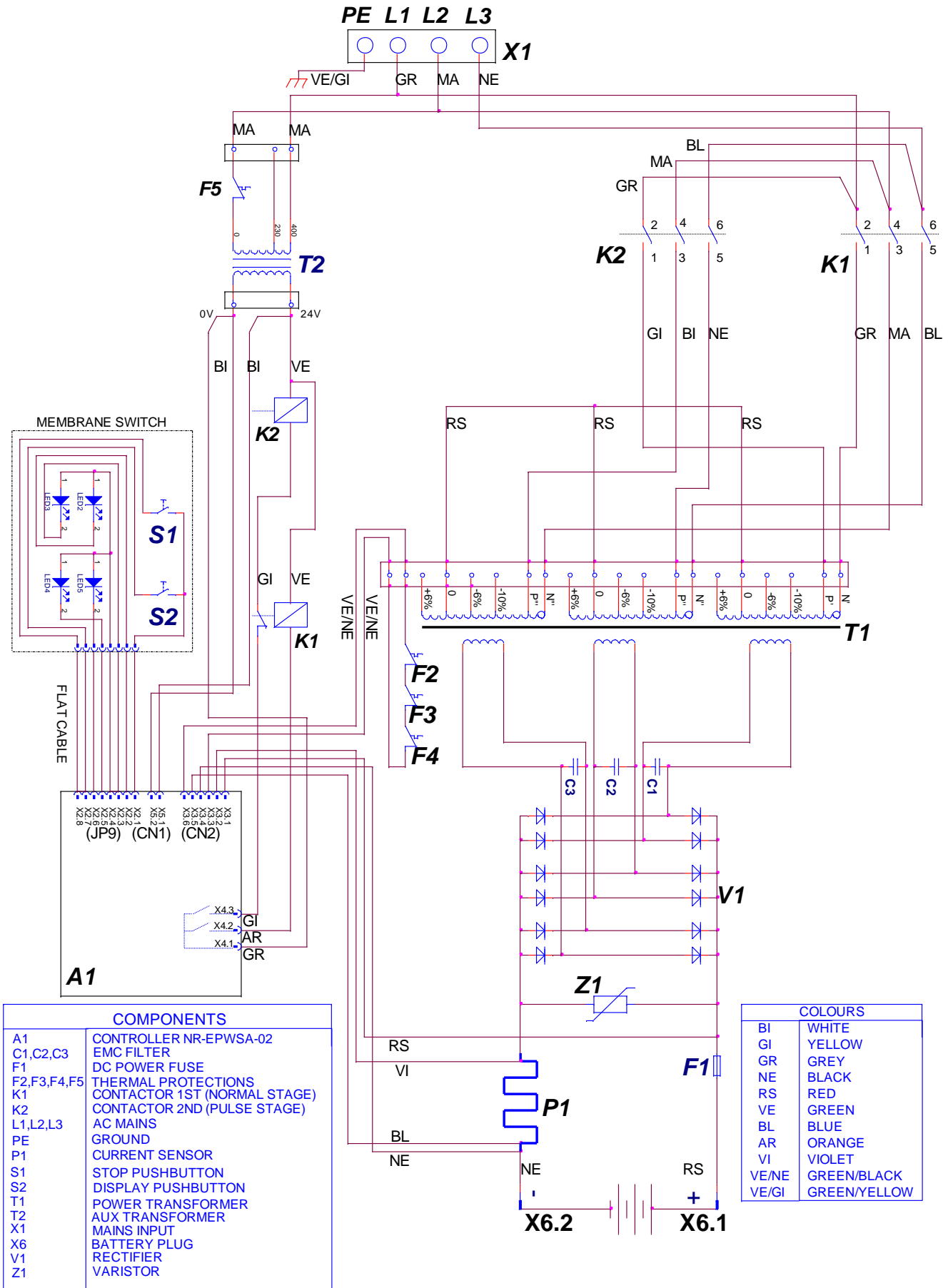
<u>FAILURE</u>	<u>CAUSE</u>	<u>WHAT TO DO ?</u>
<b>Charger doesn't work after an 8 second delay</b>	<ul style="list-style-type: none"> <li>- Battery or Mains connection trouble</li> </ul>	<ul style="list-style-type: none"> <li>- Check correct battery connection</li> <li>- Check DC power fuse</li> <li>- Check the controller fuse (1A); if the fuse isn't blown and LED's are off the controller has to be replaced</li> <li>- Check voltage on contactor coil</li> <li>- Check transformer terminal block</li> <li>- <b>Contact Service Dept.</b></li> </ul>
<b>Output current is TOO LOW</b>	<ul style="list-style-type: none"> <li>- Site supply is lower than Input voltage selected on power transformer.</li> </ul>	<ul style="list-style-type: none"> <li>- Check site supply, then set transformer to correspond with it, see "Installation instructions".</li> <li>- In 3phase models check if all phases are OK.</li> <li>- Check if Mains fuses are of the appropriate rating.</li> <li>- <b>Contact Service Dept.</b></li> </ul>
<b>Output current is TOO HIGH</b>	<ul style="list-style-type: none"> <li>- Site supply is higher than Input voltage selected on power transformer.</li> </ul>	<ul style="list-style-type: none"> <li>- Check site supply, then set transformer to correspond with it, see "installation instructions".</li> <li>- Check if charger is rated to correspond with battery capacity.</li> <li>- <b>Contact Service Dept.</b></li> </ul>
<b>Chargers turns on regularly, but display / membrane switch is OFF</b>	<ul style="list-style-type: none"> <li>- Controller trouble / membrane switch trouble</li> </ul>	<ul style="list-style-type: none"> <li>- Check correct membrane switch connection</li> <li>- Replace the controller NR-EPWSA-01</li> <li>- <b>Contact Service Dept.</b></li> </ul>
<b>LED 3 flashes very fast, then after some minutes displays "An-tM" (OVERALL CHARGE TIME FAULT)</b>	<ul style="list-style-type: none"> <li>- Controller is set to "Test" function (SET jumper SW1 placed to C).</li> </ul>	<ul style="list-style-type: none"> <li>- Isolate charger from Input supply and disconnect battery.</li> <li>- Remove charger's front panel to get access to the controller, then, set jumper SW1 to "N".</li> <li>- <b>Contact Service Dept.</b></li> </ul>



**12 Circuit diagrams**  
**12.1 Single-phase circuit diagram**



12.2 Three-phase circuit diagram





**13 Charge time in relation to models**

Type BF-15 BE	CHARGE TIME/ BATTERY CAPACITY C <sub>5</sub> (Ah)			Type BF-15 BE	CHARGE TIME/ BATTERY CAPACITY C <sub>5</sub> (Ah)		
	6,5÷7,5h	7,5÷8,5h	8,5÷12h		6,5÷7,5h	7,5÷8,5h	8,5÷12h
E230 G24/080	370-440	440-505	505-720	D400 G24/050	230-275	275-315	315-450
E230 G24/090	415-495	495-560	560-810	D400 G24/060	280-330	330-380	380-540
E230 G24/100	460-550	550-630	630-900	D400 G24/070	325-385	385-440	440-630
E230 G24/125	575-690	690-780	780-1125	D400 G24/080	370-440	440-505	505-720
E230 G24/150	690-825	825-940	940-1350	D400 G24/090	415-495	495-560	560-810
E230 G36/060	280-330	330-380	380-540	D400 G24/100	460-550	550-630	630-900
E230 G36/070	325-385	385-440	440-630	D400 G24/125	575-690	690-780	780-1125
E230 G36/080	370-440	440-505	505-720	D400 G24/150	690-825	825-940	940-1350
E230 G36/090	415-495	495-560	560-810	D400 G36/060	280-330	330-380	380-540
E230 G36/100	460-550	550-630	630-900	D400 G36/070	325-385	385-440	440-630
E230 G36/125	575-690	690-780	780-1125	D400 G36/080	370-440	440-505	505-720
E230 G36/150	690-825	825-940	940-1350	D400 G36/090	415-495	495-560	560-810
E230 G36/170	780-935	935-1060	1060-1530	D400 G36/100	460-550	550-630	630-900
E230 G48/050	230-275	275-315	315-450	D400 G36/125	575-690	690-780	780-1125
E230 G48/060	280-330	330-380	380-540	D400 G36/150	690-825	825-940	940-1350
E230 G48/070	325-385	385-440	440-630	D400 G36/170	780-935	935-1060	1060-1530
E230 G48/080	370-440	440-505	505-720	D400 G48/040	185-220	220-250	250-360
E230 G48/090	415-495	495-560	560-810	D400 G48/045	210-245	245-285	285-405
E230 G48/100	460-550	550-630	630-900	D400 G48/050	230-275	275-315	315-450
E230 G48/125	575-690	690-780	780-1125	D400 G48/060	280-330	330-380	380-540
E230 G48/150	690-825	825-940	940-1350	D400 G48/070	325-385	385-440	440-630
E230 G48/160	740-880	880-1010	1010-1440	D400 G48/080	370-440	440-505	505-720
E230 G48/170	780-935	935-1060	1060-1530	D400 G48/090	415-495	495-560	560-810
E230 G48/190	870-1045	1045-1185	1185-1710	D400 G48/100	460-550	550-630	630-900
E230 G72/060	280-330	330-380	380-540	D400 G48/125	575-690	690-780	780-1125
E230 G72/070	325-385	385-440	440-630	D400 G48/150	690-825	825-940	940-1350
E230 G72/080	370-440	440-505	505-720	D400 G48/160	735-840	840-1000	1000-1440
E230 G72/090	415-495	495-560	560-810	D400 G48/170	780-935	935-1060	1060-1530
E230 G72/100	460-550	550-630	630-900	D400 G48/180	830-990	810-900	1135-1620
E230 G72/125	575-690	690-780	780-1125	D400 G48/200	925-1100	1100-1260	1260-1800
E230 G72/150	690-825	825-940	940-1350	D400 G72/070	325-385	385-440	440-630
E230 G72/170	780-935	935-1060	1060-1530	D400 G72/080	370-440	440-505	505-720
E230 G72/190	870-1045	1045-1185	1185-1710	D400 G72/090	415-495	495-560	560-810
E230 G80/025	115-135	135-155	155-225	D400 G72/100	460-550	550-630	630-900
E230 G80/040	185-220	220-250	250-360	D400 G72/125	575-690	690-780	780-1125
E230 G80/045	210-245	245-285	285-405	D400 G72/150	690-825	825-940	940-1350
E230 G80/050	230-275	275-315	315-450	D400 G72/170	780-935	935-1060	1060-1530
E230 G80/060	280-330	330-380	380-540	D400 G72/190	870-1045	1045-1185	1185-1710
E230 G80/070	325-385	385-440	440-630	D400 G80/040	185-220	220-250	250-360
E230 G80/080	370-440	440-505	505-720	D400 G80/045	210-245	245-285	285-405
E230 G80/090	415-495	495-560	560-810	D400 G80/050	230-275	275-315	315-450
E230 G80/100	460-550	550-630	630-900	D400 G80/060	280-330	330-380	380-540
E230 G80/125	575-690	690-780	780-1125	D400 G80/070	325-385	385-440	440-630
E230 G80/150	690-825	825-940	940-1350	D400 G80/080	370-440	440-505	505-720
E230 G80/170	780-935	935-1060	1060-1530	D400 G80/090	415-495	495-560	560-810
D400 G24/030	140-165	165-190	190-270	D400 G80/100	460-550	550-630	630-900
D400 G24/035	160-190	190-220	220-315	D400 G80/125	575-690	690-780	780-1125
D400 G24/040	185-220	220-250	250-360	D400 G80/150	690-825	825-940	940-1350
D400 G24/045	210-245	245-285	285-405	D400 G80/180	830-990	990-1135	1135-1620

**14 Model overview – Single-phase models**

Type BF-15 BE	Charge cable (mm <sup>2</sup> )	Power cable (mm <sup>2</sup> )	Mains Plug	Output (kVA)	Mains connection				Cabinet type	Weight (kg)
					Volts (V)	PEAK Current (A)	MAX. Current (A)	Mains fuse (A)		
E230 G24/080	1.5	25	CEEI6A P+N+E	3.0	240	13.0	11.3	16	A2	47
E230 G24/100	1.5	25	CEEI6A P+N+E	3.7	240	16.2	14.1	16	A2	48
E230 G24/125	2.5	35	CEE 32A P+N+E	4.7	240	20.2	17.6	20	A2	56
E230 G24/150	2.5	50	CEE 32A P+N+E	5.6	240	24.3	21.2	25	A2	58
E230 G36/060	1.5	16	CEEI6A P+N+E	3.4	240	14.6	13.2	16	A2	50
E230 G36/070	1.5	25	CEEI6A P+N+E	3.9	240	17.0	15.5	16	A2	51
E230 G36/080	2.5	25	CEE 32A P+N+E	4.5	240	19.4	17.7	20	A2	53
E230 G36/090	2.5	25	CEE 32A P+N+E	5.0	240	21.8	19.9	20	A2	54
E230 G36/100	2.5	25	CEE 32A P+N+E	5.6	240	24.3	22.1	25	A2	55
E230 G36/125	4	35	CEE 32A P+N+E	7.0	240	30.3	27.6	35	A2	62
E230 G36/150	6	50	CEE 63A P+N+E	8.4	240	36.4	33.1	35	A2	66
E230 G36/170	6	50	CEE 63A P+N+E	9.5	240	41.2	37.5	40	A2	67
E230 G48/050	1.5	16	CEEI6A P+N+E	3.7	240	16.2	14.1	16	A2	57
E230 G48/060	2.5	16	CEE 32A P+N+E	4.5	240	19.4	16.9	20	A2	58
E230 G48/070	2.5	25	CEE 32A P+N+E	5.2	240	22.6	19.7	25	A2	59
E230 G48/080	2.5	25	CEE 32A P+N+E	6.0	240	25.7	22.6	35	A2	60
E230 G48/090	4	25	CEE 32A P+N+E	6.7	240	29.1	25.4	35	A2	61
E230 G48/100	4	25	CEE 32A P+N+E	7.4	240	32.3	28.8	35	A2	62
E230 G48/125	6	35	CEE 63A P+N+E	9.3	240	40.4	35.3	50	A2	38
E230 G48/150	10	50	CEE 63A P+N+E	11.2	240	48.5	42.3	50	A2	73
E230 G48/160	10	50	CEE 63A P+N+E	11.9	240	51.8	45.1	63	A2	74
E230 G48/170	10	50	CEE 63A P+N+E	12.6	240	55.0	50.0	63	A2	75
E230 G48/190	10	70	CEE 63A P+N+E	14.1	240	61.5	55.9	63	A2	80
E230 G72/060	4	16	CEE 32A P+N+E	6.7	240	29.1	25.4	35	A2	71
E230 G72/070	4	25	CEE 32A P+N+E	7.8	240	34.0	30.9	35	A2	72
E230 G72/080	6	25	CEE 63A P+N+E	8.9	240	38.8	35.3	40	A2	73
E230 G72/090	6	25	CEE 63A P+N+E	10.0	240	43.7	38.1	50	A2	75
E230 G72/100	10	25	CEE 63A P+N+E	11.2	240	48.5	44.1	50	A2	76
E230 G72/125	10	35	CEE 63A P+N+E	13.9	240	60.7	55.2	63	A2	78
E230 G72/150	16	50	CEE 125A P+N+E	16.7	240	72.8	66.2	80	A1	88
E230 G72/170	16	50	CEE 125A P+N+E	19.0	240	82.5	75.1	100	A1	90
E230 G72/190	25	70	CEE 125A P+N+E	21.2	240	92.2	83.9	100	A1	92
E230 G80/025	1.5	16	CEEI6A P+N+E	3.1	240	13.5	11.8	16	A2	55
E230 G80/040	2.5	16	CEE 32A P+N+E	4.9	240	21.6	18.8	25	A2	56
E230 G80/045	2.5	16	CEE 32A P+N+E	5.6	240	24.3	22.1	25	A2	58
E230 G80/050	2.5	16	CEE 32A P+N+E	6.2	240	27.0	23.5	35	A2	62
E230 G80/060	4	16	CEE 32A P+N+E	7.4	240	32.3	28.2	35	A2	66
E230 G80/070	6	25	CEE 63A P+N+E	8.7	240	37.7	32.9	40	A2	72
E230 G80/080	6	25	CEE 63A P+N+E	9.9	240	43.1	37.6	50	A2	75
E230 G80/090	10	25	CEE 63A P+N+E	11.2	240	48.5	44.1	50	A2	76
E230 G80/100	10	25	CEE 63A P+N+E	12.4	240	53.9	47.0	63	A2	78
E230 G80/125	16	35	CEE 63A P+N+E	15.5	240	67.4	58.8	80	A1	81
E230 G80/150	16	50	CEE 125A P+N+E	18.6	240	80.9	73.6	100	A1	90
E230 G80/170	25	50	CEE 125A P+N+E	21.1	240	91.7	83.4	100	A1	93

## 15 Model overview – Three-phase models

Type BF-15 BE	Charge cable (mm <sup>2</sup> )	Power cable (mm <sup>2</sup> )	Mains Plug	Output (kVA)	Mains connection				Cabinet type	Weight (kg)
					Volts (V)	PEAK Current (A)	MAX. Current (A)	Mains fuse (A)		
D400 G24/030	1.5	16	CEE 16A 3P+N+E	1.3	3x415	1.8	1.6	10	A2	41
D400 G24/035	1.5	16	CEE 16A 3P+N+E	1.4	3x415	2.1	1.9	10	A2	42
D400 G24/040	1.5	16	CEE 16A 3P+N+E	1.6	3x415	2.4	2.2	10	A2	43
D400 G24/045	1.5	16	CEE 16A 3P+N+E	1.9	3x415	2.7	2.4	10	A2	43
D400 G24/050	1.5	16	CEE 16A 3P+N+E	2.1	3x415	3.0	2.6	10	A2	44
D400 G24/060	1.5	16	CEE 16A 3P+N+E	2.5	3x415	3.6	3.1	10	A2	45
D400 G24/070	1.5	25	CEE 16A 3P+N+E	2.9	3x415	4.2	3.6	10	A2	47
D400 G24/080	1.5	25	CEE 16A 3P+N+E	3.3	3x415	4.8	4.2	10	A2	50
D400 G24/090	1.5	25	CEE 16A 3P+N+E	3.7	3x415	5.4	4.9	10	A2	52
D400 G24/100	1.5	25	CEE 16A 3P+N+E	4.2	3x415	6.0	5.2	10	A2	53
D400 G24/125	1.5	35	CEE 16A 3P+N+E	5.2	3x415	7.5	6.8	10	A2	58
D400 G24/150	1.5	50	CEE 16A 3P+N+E	6.2	3x415	9.0	7.8	10	A2	62
D400 G36/060	1.5	16	CEE 16A 3P+N+E	3.7	3x415	5.4	4.7	10	A2	51
D400 G36/070	1.5	25	CEE 16A 3P+N+E	4.4	3x415	6.3	5.5	10	A2	54
D400 G36/080	1.5	25	CEE 16A 3P+N+E	5.0	3x415	7.2	6.2	10	A2	57
D400 G36/090	1.5	25	CEE 16A 3P+N+E	5.6	3x415	8.1	7.4	10	A2	59
D400 G36/100	1.5	25	CEE 16A 3P+N+E	6.2	3x415	9.0	7.8	10	A2	60
D400 G36/125	1.5	35	CEE 16A 3P+N+E	7.8	3x415	11.3	10.3	16	A2	65
D400 G36/150	1.5	50	CEE 16A 3P+N+E	9.3	3x415	13.5	12.3	16	A2	70
D400 G36/170	1.5	50	CEE 16A 3P+N+E	10.6	3x415	15.3	13.9	16	A2	75
D400 G48/040	1.5	16	CEE 16A 3P+N+E	3.3	3x415	4.8	4.4	10	A2	53
D400 G48/045	1.5	16	CEE 16A 3P+N+E	4.0	3x415	5.8	4.9	10	A2	54
D400 G48/050	1.5	16	CEE 16A 3P+N+E	4.2	3x415	6.0	5.5	10	A2	55
D400 G48/060	1.5	16	CEE 16A 3P+N+E	5.0	3x415	7.2	6.2	10	A2	58
D400 G48/070	1.5	25	CEE 16A 3P+N+E	5.8	3x415	8.4	7.7	10	A2	61
D400 G48/080	1.5	25	CEE 16A 3P+N+E	6.6	3x415	9.6	8.3	10	A2	65
D400 G48/090	1.5	25	CEE 16A 3P+N+E	7.5	3x415	10.8	9.4	16	A2	66
D400 G48/100	1.5	25	CEE 16A 3P+N+E	8.3	3x415	12.0	10.4	16	A2	67
D400 G48/125	1.5	35	CEE 16A 3P+N+E	10.4	3x415	15.1	13.7	16	A2	72
D400 G48/150	2.5	50	CEE 32A 3P+N+E	12.5	3x415	18.1	16.4	20	A2	75
D400 G48/160	2.5	50	CEE 32A 3P+N+E	13.3	3x415	19.2	17.5	20	A2	77
D400 G48/170	2.5	50	CEE 32A 3P+N+E	14.2	3x415	20.5	18.6	25	A2	82
D400 G48/180	2.5	70	CEE 32A 3P+N+E	14.9	3x415	21.6	19.7	25	A2	90
D400 G48/200	4	70	CEE 32A 3P+N+E	16.6	3x415	24.0	20.8	25	A1	99
D400 G72/060	1.5	16	CEE 16A 3P+N+E	7.5	3x415	10.8	9.4	16	A2	71
D400 G72/070	1.5	25	CEE 16A 3P+N+E	8.7	3x415	12.6	11.5	16	A2	75
D400 G72/080	1.5	25	CEE 16A 3P+N+E	10.0	3x415	14.4	12.5	16	A2	86
D400 G72/090	2.5	25	CEE 16A 3P+N+E	11.3	3x415	16.3	14.8	20	A2	88
D400 G72/100	2.5	25	CEE 32A 3P+N+E	12.5	3x415	18.0	15.6	20	A2	90
D400 G72/125	4	35	CEE 32A 3P+N+E	15.6	3x415	22.6	20.5	25	A2	83
D400 G72/150	4	50	CEE 32A 3P+N+E	18.8	3x415	27.1	24.6	35	A1	100
D400 G72/170	4	50	CEE 32A 3P+N+E	21.2	3x415	30.7	27.9	35	B2	135
D400 G72/190	6	70	CEE 32A 3P+N+E	23.8	3x415	34.3	31.2	35	B2	140
D400 G80/040	1.5	16	CEE 16A 3P+N+E	5.6	3x415	8.0	7.3	10	A2	65
D400 G80/045	1.5	16	CEE 16A 3P+N+E	6.3	3x415	9.0	8.2	10	A2	67
D400 G80/050	1.5	16	CEE 16A 3P+N+E	6.9	3x415	10.0	9.1	16	A2	70
D400 G80/060	1.5	16	CEE 16A 3P+N+E	8.3	3x415	12.0	10.4	16	A2	72
D400 G80/070	1.5	25	CEE 16A 3P+N+E	9.7	3x415	14.1	12.8	16	A2	74
D400 G80/080	1.5	25	CEE 16A 3P+N+E	11.1	3x415	16.0	13.9	16	A2	80
D400 G80/090	2.5	25	CEE 32A 3P+N+E	12.5	3x415	18.1	16.4	20	A2	82
D400 G80/100	2.5	25	CEE 32A 3P+N+E	13.8	3x415	20.0	17.3	20	A2	84
D400 G80/125	4	35	CEE 32A 3P+N+E	17.4	3x415	25.1	22.8	35	A1	92
D400 G80/150	4	50	CEE 32A 3P+N+E	20.9	3x415	30.1	27.4	35	B2	107
D400 G80/180	6	70	CEE 63A 3P+N+E	24.9	3x415	36.1	32.8	40	B2	140

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# trak<sup>®</sup> basic PREMIUM/ trak<sup>®</sup> air PREMIUM

## User's manual

### 1 Table of symbols used in instructions



Information marked with this symbol refers to charger's use and maintenance; they must be carefully read and taken into particular account.



Information marked with this symbol refers to some circumstances potentially dangerous to people or the equipment itself.



Information marked with this symbol refers to some circumstances potentially dangerous to people (lethal hazard from electrical shock).

### 2 Safety Information

Read the present instructions carefully before installing and supplying the charger. Store this manual in a safe place.

#### 2.1 Preliminary Notice - Recommendations

The chargers of the range **trak<sup>®</sup> basic PREMIUM/ trak<sup>®</sup> basic air PREMIUM** proven and patented in practice, are suitable for the charging of a crossfire of batteries with liquid electrolyte. The system works according to a modified **WpWa**-characteristics; a **Wa**-curve (following DIN 41774) is used until the gassing voltage, then the final charge starts with a pulse charging curve (**BOOST charge**). With **WpWa** profile the 100% charging current flows at 2 V/Cell and when reaching the gassing voltage (2.4 V/Cell) it drops off to approx. 50% of rated current. At 2.4 V/Cell the unit automatically switches from the pulse curve Wp: the pulse duration is 3 minutes Wp charge, then 5 minutes W charge etc. until the battery has reached an Ah amount (capacity recharged) corresponding of a **1.08 charge factor**. At the end charger switches automatically to **Equalization charge**. **Maintenance charge** will maintain the battery in a fully charged condition when the battery is stood out of service for a long period (see CHARGE PATTERN table, page 2).



**This equipment must be installed by qualified personnel.**

Before connecting the battery, check that battery voltage corresponds to the voltage indicated on the charger rating label and the rated output current is suitable to battery capacity according to **Wa** profile. Only electricians are allowed to carry out these checks.



**The connection of an unsuitable battery may result dangerous for battery and charger and the operator himself.**

### 3 Installing a charger

#### 3.1 Receipt of the charger

When you receive the equipment you must be sure that there aren't damages at all and that it is in compliance with your request making reference to the INFORMATION PLATE placed on the right side of the charger. In case of damages notify the carrier immediately to file a claim. If the supply is not in compliance with the order please contact immediately the supplier. The warranty covers the fabrication defects. The battery charger is packed delivered in a cardboard. HOPPECKE has no responsibility for damages rise during the transport or unpacking.

#### 3.2 Physical environment and operating conditions

The battery charger has to be installed and operating in a dry place. Use the battery charger in a dry and well-ventilated area away from corrosive fumes (DIN VDE 510, Part 1); furthermore charger must be installed on a horizontal floor or surface. For safety reasons, allow at least 1 m free space at the sides of charger.



Because charger life is heavy influenced by the environmental conditions, not to install the equipment where such conditions aren't respected. Install the charger away from people and/or moving trucks that accidentally could come into contact with the equipment.

#### 3.3 Battery/charger connection

Any charger is provided with 3 m of charging cables.



Observe correct polarity: charging cable coded **red** should effectively be connected to the **positive** terminal of the battery (+) and the **black** cable to the **negative** terminal (-).



**Matching charger to an unsuitable battery can seriously damage the battery, causing over temperatures and generating gas hazardous for people!**

We recommend to pay attention while matching charger to the battery.



**Polarity reversal may damage the DC power fuse (blowing up) and causes sparks that can be hazardous for people!**

To avoid this mismatching, the following actions shall be taken:

- Use battery connectors supplied with a coding pin for operating voltage which ensures that only same voltage plugs and sockets will be connected;
- Label the charger and allocate the particular fork-lift or battery. Label the chargers and forklifts (or batteries) with stickers, waterproof pens or colour.

#### 3.4 Mains supply connection

Check whether Circuit Breaker fuses are rated to suit the application; nominal current rating is indicated on the type plate.



**Make these controls in order to prevent future damages to battery or battery charger.**



**Always provide proper grounding of the enclosure!**



**If the battery charger without power supply plugs was ordered, the battery charger must be attached to voltage supply by an electrical specialist.**



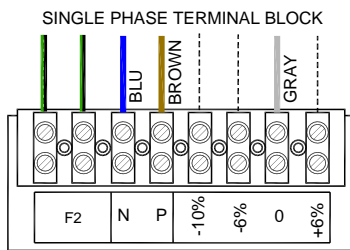
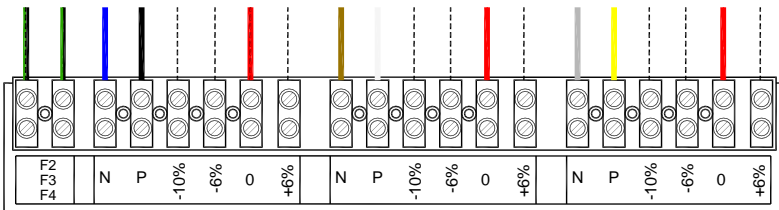
### 3.5 Adjustment to site supply

Chargers with W characteristic are influenced by Mains fluctuations.



**Mains fluctuations (Lower) extend charge time, with the risk of overall charge time fault. Mains fluctuations (Higher) may damage the battery, especially during gassing stage (2.40 V/Cell).**

Power transformer is provided with four taps (located on terminal block) to correspond with the nominal value (230V<sub>ac</sub> for 1-Ph and 400V<sub>ac</sub> for 3-Ph) of the site supply (see picture 1).



Pic.1

### 3.6 Maintenance

This battery charger is designed for use with batteries which are operated on a duty cycle with a regular level of discharge. If this equipment operates within its operating limit, it can be considered maintenance free.

**!** *This equipment must be maintained by an instructed person.*



**Isolate the charger from the A.C. supplies and the battery before removing the cover: risk of electrical shock!**

Periodical inspections:

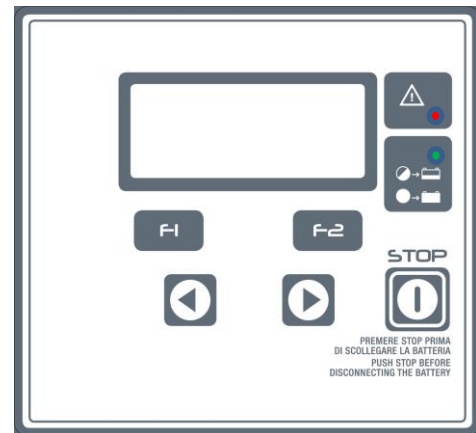
- Check battery cords; they should not be damaged or corroded by acid. Ensure that isolation is good;
- Check Mains cable; particularly, the isolation between single conductors;
- Check battery plug and particularly, its electrical contacts;
- Check cooling slots are not blocked;
- Check all connections and inspect the contactor, the rectifier, the power fuse, Delta/Star connection,...;
- Remove any dust or accumulated electro conductive particles.

A damaged Mains cable can be replaced by Service or qualified personnel. Use only original spare parts.

## 4 OPERATION

### 4.1 CONTROL PANEL

The state of charge can be read off at any time from 2 LEDs and a LCD placed on the front panel's membrane switch. Control panel has a 4 line and 16 columns display with backlight for excellent vision in every conditions.



Backlight also provide information about charge in progress as follows:

- OFF** → no charge in progress
- BLINKING** → charge in progress
- ON** → charge completed

#### 4.1.1 Keys and Leds operation

	Function keys – browse menu
	Arrow keys – browse menu and set parameter
	STOP/RESTART key
	Red led: • OFF – no error • blinking – active error code
	Green led: • OFF – Battery not connected • flashing: 1 Precharge 2 Bulk charge 3 Pulse charge  • ON—charge completed
	USB connector for downloading charge data



### 4.2 Start / Charge cycle

After connecting the mains and charge starts with a delay of 5 ÷ 10 seconds. The charge is chronologically divided into steps below described.

Charge stages	Green led status
1) PRE-Charge (1h)	BLK1
2) BULK Charge	BLK2
3) FINAL Charge	BLK3
4) Equalizing delay	ON
5) Equalizing	BLK1/ON
6) Maintenance delay	ON
7) Maintenance	BLK1/ON

BLK1:1 flash\_ BLK2: 2 flashes; BLK3: 3 flashes  
 N.B.: **during Equalizing (green led is blinking) battery is fully charge and ready for use**

### 4.3 STOP-START push-button

The battery may only be disconnected when charging current has stopped flowing. Therefore, the **STOP button (6) must be pressed before disconnecting the battery from the charger.** By pushing this button the unit is automatically switched off. **Charging can be resumed when the STOP button will be pressed again (START option).**

! *Press the STOP button on the front side of the charger to interrupt the charging operation at any desired time. Do not disconnect battery from charger while operating! Disconnecting the battery plug while operating causes sparks that may be hazardous due to the high concentration of Hydrogen and Oxygen which are generated during the charging operation!*

! *Break of charging before the green LED up may cause loss of capacity or early battery failure (sulphation).*

### 4.4 Signalling lamps

Over the case it is possible in every moment to check charge by means of two warning lamps (YELLOW charge ON , GREEN End of charge). The electronic card NR-EPWA-PREMIUM-01 is equipped with an optional add-on module (EPWA-PREMIUM-RLPP-01 card) for managing these lamps.

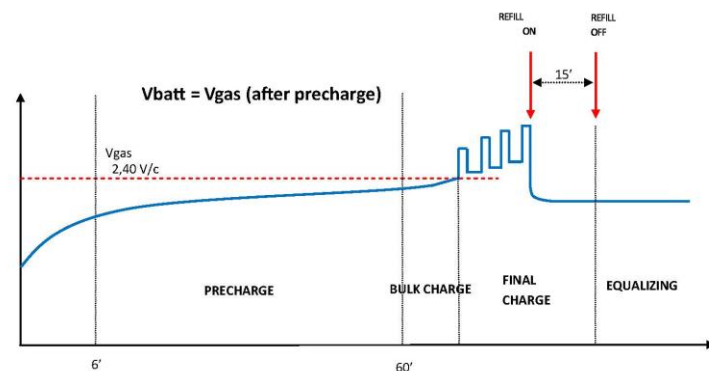
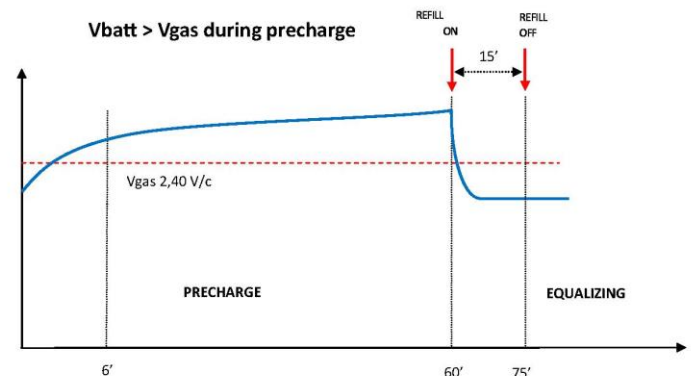
### 4.5 Battery temperature probe (option)

As option the charger may be equipped with external probe for measuring the electrolyte battery's temperature.

### 4.6 Automatic water refill (option)

The charger is designed for the automated water topping inside the accumulator: it is able to control an external solenoid (not supplied) to open the hydraulic circuit. For this purpose, the charger is equipped with two-wire cable for the appropriate connection.

The refill time is specified into the Service Menu (12/19 parameter setting\_ Refill). The setting range is OFF, 0-30 min. (default 15 min.). The filling phase starts at the end of the charge process, as shown in the following graphs.



### 4.7 End of charge

Charging time is dependent on the state of discharge of the battery and the ability of the charging equipment to deliver the current for the capacity of the battery.

! *The equipment determines, according to the given charge factor, the number of Ah required for fully recharging the battery. The charger is switched off automatically after the battery reached the finishing rate requested*

## 5 Limitations on use

This equipment has been designed for indoor use. It's only designed to recharge lead/acid batteries on industrial premises.

! *The equipment is not intended to be used by people (including children) whose physical, sensory or mental abilities are reduced, or people with lack of experience or knowledge, unless they have been granted through the intermediary of a person responsible for their safety, supervision or instruction concerning the use of the equipment. Children should be supervised to ensure they do not play with the equipment*

## 6 Archive function

**The charger has the capability to store 2500 charging cycles; the information provided for each cycle are shown in sequence:**

- ❖ Charge number with starting charge time (date, hour);
  - Battery voltage, in particular:
    - Starting charge voltage;
    - Final charge voltage.(during the charge)
  - Battery temperature (option); in particular:
    - Starting temperature;
    - Max temperature.
  - Duration of charge phases, in particular:
    - Precharge time;
    - Bulk charge time (until Vgas);
    - Final charge time.
  - Capacity returned in battery (ah), in particular:
    - Capacity returned during precharge phase;
    - Capacity returned during bulk charge (until Vgas);
    - Capacity returned during final charge (pulse charge);
  - Equalising charge parameters, in particular:
    - Equalising delay;
    - Equalising duration;
    - Capacity returned during equalizing charge
  - Charging factor;
  - Energy counter (kWh) and starting delay;
  - Other charge parameters, in particular;
    - Vgas;
    - Capacity returned;
    - Complete charge time;
  - Failure conditions

See page 10 how to connect charger to your PC / LAPTOP and to download data.

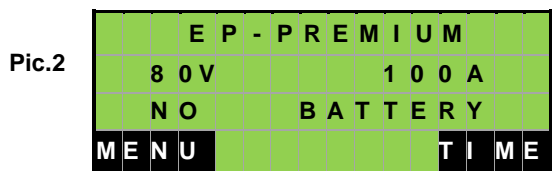
## 7 information shown during the charge

**During charge the charger shows the following information:**

- Current (A);
- Battery voltage [total voltage (V) and voltage per cell (V/el)];
- Capacity returned (Ah);
- Current time (hh : mm : ss);
- Charge time (hh : mm : ss);
- Battery temperature (xxx °C) – optional feature;
- Settings (Nominal voltage/ nominal current/ charge factor FC = 1.xx);
- Failure condition;
- Vgas selected;
- Instantaneous power (kW) ed Energy absorbed by the mains (kWh);
- Active stage of the charge cycle (PRC= precharge/CRN= bulk charge/CRF= final charge/EQU= equalising charge/ MNT= maintenance charge)

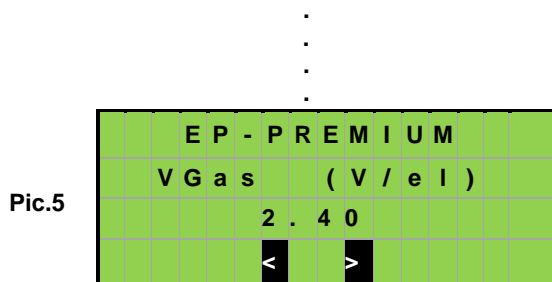
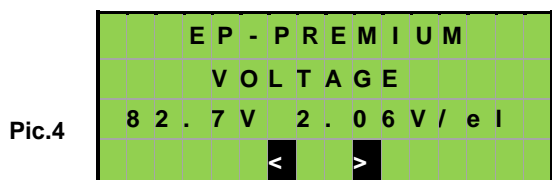
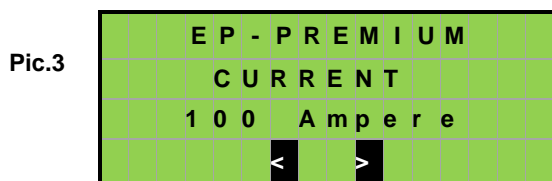
### 7.1 Mains connection

After the *model display* screen appears "BATTERY CONNECT". Note: while battery is not connected you can access the *Settings Menu* (see page 7).



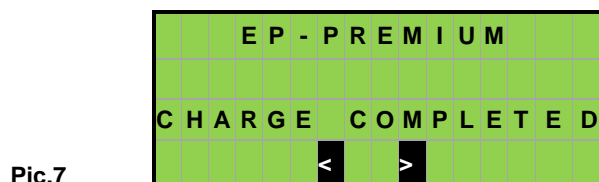
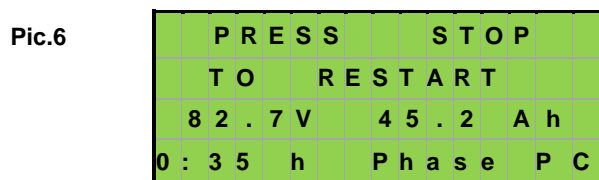
### 7.2 Battery connection / avvio carica

If the connection is correct the display shows BATTERY ON screen and the charge starts automatically with a random delay in the range 5 ÷ 10 sec. If the battery connected is over discharged (voltage under 1.95 V/cell) display shows a warning screen (like on the right) for 10 seconds and the charge starts normally. During charge the display shows the information about charging process (current, voltage, Ah, current time, elapsed time, time remaining, temperature, charge setting and current fault).



### 7.3 End of charge

Charge cycle is made by: 1) precharge, 2) bulk charge, 3) final charge. This cycle ends in automatic mode and the event is marked with the green LED solid and the display backlight. At the end of the final charge Equalizing charge starts automatically; after this Maintenance charge starts monitoring the battery voltage. Press the STOP button on the front side of the charger to interrupt the charging operation at any desired time. By pushing the **STOP** push-button once again, charging progress is restored (Pic.6).



When charge is complete, press button before disconnect the battery. Anomalies occurred during charge result in red led flashing error code while display show corresponding meaning (see right side). At the end of the charge, charge switch automatically to equalization phase and maintenance mode.

**Note:** The full list of display screens is available into the "Service Manual" document.

## 8 Settings menu



Below is provided a summary table of the Settings menu. This Menu is available only with battery not connected.:  
 press the key to access it. Then use the arrow keys and function keys for browsing .


<p>1/6 CHARGER INFO</p>	<p>SERIAL NUMBER (SN) CHARGER TYPE VV/AA MAITENANCE (HRS) SW (release)— LDR (release)</p>
<p>2/6 MANAGE SAVED CHARGES</p>	<p>STORED CHARGE LIST</p> <p>Vstart—Vmax T<sub>batt</sub>start—T<sub>batt</sub>max[phase] Span phase I<sub>max</sub>/U/I<sub>min</sub>/Eq Ah recharged I<sub>max</sub>/U/I<sub>min</sub>/Eq Equalization Param. T<sub>sist</sub>start—T<sub>sist</sub>max[phase] Vmax, I<sub>min</sub>, Charge_Fact kWh, Start_Type Vgas, Ah_tot, Time_Tot (if any) Fault 1—Phase— Time_from_start_phase (if any) Fault 2—Phase— Time_from_start_phase (if any) Fault 3—Phase— Time_from_start_phase (if any) Fault 4—Phase— Time_from_start_phase (if any) Fault 5—Phase— Time_from_start_phase</p>
<p>3/6 SET CURRENT TIME</p>	<p>M T W T F S S TIME --</p>
<p>4/6 VIEW GLOBAL CNTRS</p>	<p>CHRGs: HRS: kWh TOT: kWh AVG:</p>
<p>5/6 VIEW PARTIAL CNTRS</p>	<p>CHRGs: HRS: kWh TOT: kWh AVG:</p>

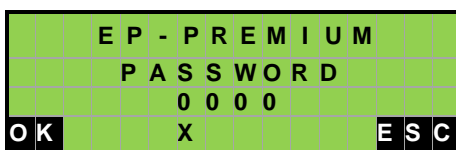
Continued on page 7

Continued from page 6

6/6 SERVICE MENU	→ PASSWORD →	1/20 SELECT LANGUAGE	→ Italiano, English, Francais...
		2/20 SELECT PROFILE	→ WpWa, Wa, ...
		3/20 SELECT SHUNT	→ 150a/100mV
		4/20 SELECT VGAS	→ VGAS (V/el) 2.xx
		5/20 CHARGE FACTOR	→ FC 1.xx
		6/20 CABLE LENGHT	→ CABLE LENGHT STANDARD, 5m...50m
		7/20 CONTRAST ADJUST	→ SET CONTRAST 0%...37%
		8/20 ERASE MEMORY	→ ARE YOU SURE? -> OK, EXIT
		9/20 SELECT BATTERY VOLTAGE	→ 0...96V
		10/20 SELECT EQUALISAT.	→ HRS EQ. Off...72h; DELAY Off...48
		11/20 SET MAINTEN.	→ OFF, 500...5000HRS, RESET
		12/20 SET REFILL	→ OFF, 1...30min
		13/20 SET BATT. ALARM TEMP	→ ALARM TEMP BATT, 40°C...80°C
		14/20 SET WEEK TIMERS	→ OFF, ON, time 15min
		15/20 SET CURRENT	→ SET CURRENT 0...999A
		16/20 SET TRANSF.	→ SET TRANSF. 1PH,...3PH
		17/20 RESET DEFAULTS	→ PRESS F1 AND WAIT FOR RESTART? -> OK, EXIT
		18/20 RESET PARTIAL COUNTERS	→ RESET PARTIAL COUNTERS? -> OK, EXIT
		19/20 SET DESULF	→ HH: , MODE: SINGLE/EVER
		20/20 SET ALIAS	→ Room: A...Z, OFF; Number: 1...9999, OFF

To access the SERVICE MENU (6.6 of SETTINGS MENU) must enter the required password (last 4 digits of the Charger's serial number). To select this value press the STOP button to increase the flashing digit selected; then move on the remaining digits using the arrow keys  .

Then press OK to confirm (  key).



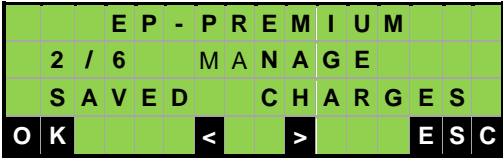
Pic.8

The table below provides the list of the parameters' default values in this MENU with their setting range.

Parameter	Standard value	Range of Setting
<b>1/20 SELECT LANGUAGE</b>	English	Italiano, English, Francais, Deutsch
<b>2/20 SELECT PROFILE</b>	WpWa	WpWa, Wa, WpWa Air, W0Wa, DESULF*
<b>3/20 SELECT SHUNT</b>	150A/100mV	100A/100mV;150A/100mV;200A/100mV; 250A/100mV;300A/100mV, 350A/100mV; 400A/100mV
<b>4/20 SELECT VGAS</b>	2.40 V/el	2.30 ... 2.50 _step 0.01 V/el
<b>5/20 CHARGE FACTOR</b>	1.08 PREMIUM / 1.07 air PREMIUM (pump option)	1.00 ... 1.40 _step 0.01 V/el
<b>6/20 CABLE LENGHT</b>	Standard (2.5 m)	STD, 5 ... 50 meters _step 5 m
<b>7/20 CONTRAST ADJUST</b>	9%	0 ... 37% step 1%
<b>8/20 ERASE MEMORY</b>	-	CONFIRM OK or EXIT
<b>9/20 SELECT BATTERY VOLTAGE</b>	according to V/I model	12V, 24V, 36V, 48V, 72V, 80V, 96V; Other values: step 2V
<b>10/20 SELECT EQUALISAT.</b>	24 hours	OFF... 72 ore _step 1 hour; DELAY OFF..48 hours _step 1 hour;
<b>11/20 SET MAINTEN.</b>	OFF	OFF, RESET 500 ... 5000 Hours _step 100 hours
<b>12/20 SET REFILL</b>	15'	OFF 1 ... 30 minutes _step 1 minute
<b>13/20 SET BATT. ALARM TEMP</b>	60°C	40°C ... 80°C step 1°C, OFF
<b>14/20 SET WEEK TIMERS</b>	ON (range 5÷10s)	ON – OFF 00.00 ... 23.45 _step 15 minutes
<b>15/20 SET CURRENT</b>	according to V/I model	0 ... 999 _step 1 A
<b>16/20 SET TRANSF</b>	according to V/I model	1-ph Wa, 1-ph WpWa, 3-ph Wa, 3-ph WpWa
<b>17/20 RESET DEFAULTS</b>	-	CONFIRM OK or EXIT
<b>18/20 RESET PARTIAL COUNTERS</b>	-	CONFIRM OK or EXIT
<b>19/20 SET DESULF</b>	OFF	ON – OFF 0 ore – 24 ore _step 1hour
<b>20/20 SET ALIAS</b>	OFF	Room: A...Z, OFF; Number: 1...9999, OFF

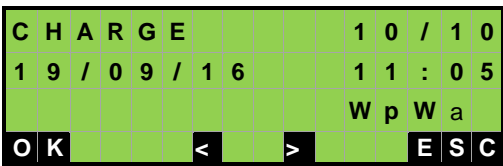
## 9 Viewing the stored charge parameters

The stored charge cycles (max. 2500) can be viewed through the display.



Pic.9

Select the cycle you want to remove by using the arrow keys and then press **F1**. Use the arrow keys to scroll through the data of the charge cycle chosen. Press EXIT **F2** to return to the previous screen.



Pic.10

The charge cycles data can also be downloaded to a PC via a USB connection; for this purpose on the door there's a USB plug to insert the cable from the PC. Every battery charger of this family can be supplied by **B@tview** software for archive and analysis of data. **B@tview** software is available for downloading in the restricted area of the website [www.nuovaelettra.it](http://www.nuovaelettra.it). Requiring credentials to: [tecnico@nuovaelettra.it](mailto:tecnico@nuovaelettra.it). If necessary, request the installation CD. If you have a CD, activate the AUTORUN and follow the instructions; if the AUTORUN is not run, you must run the installers:

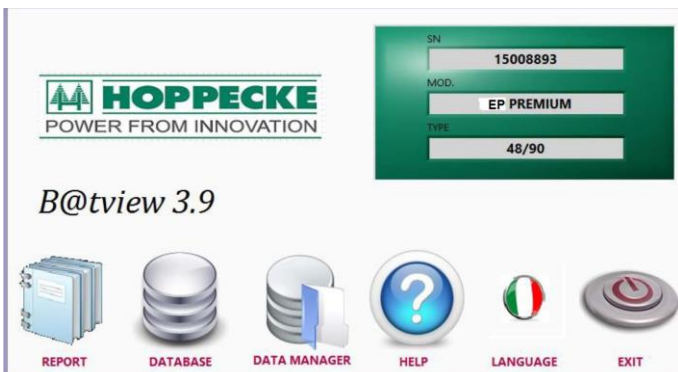
Setup\_1.exe (Driver USB);  
Setup.exe (B@tview)

In case of downloaded version, unzip the downloaded file and run the installer:

Setup\_1.exe (Driver USB);  
Setup.exe (B@tview).

- The main features of **B@tview** software are:
- identification of chargers;
  - Synchronization and fully automated data download;
  - Generating reports in Excel files (highly customizable);
  - Italian/english/ french/deut selection language

Pic.11 – B@tview home screen



Pic.12 – Example of statistics

Date / Ora	Ciclo	Durata Carica	Durata Eq.	Ah Tot	Vstart	Vend	kWh	TStart-TMax	Anom 1
31/05/2014 16:32	20	05 hh : 02 min	10 hh : 00 min	55	51,8	66,2	3,9	START 24, MAX 40	
02/06/2014 10:28	11	06 hh : 41 min	10 hh : 00 min	528	47,8	63,9	31,8	START 26, MAX 37	
03/06/2014 11:37	12	06 hh : 25 min	10 hh : 00 min	517	47,7	64,3	31,2	START 26, MAX 37	
04/06/2014 09:48	13	02 hh : 13 min	02 hh : 00 min	200	47,7	54,3	11,5	START 26, MAX 37	Batteria scollegata - linea
04/06/2014 12:06	14	04 hh : 06 min	04 hh : 05 min	295	50,7	65,7	18,3	START 32, MAX 40	
04/06/2014 20:21	15	06 hh : 25 min	10 hh : 00 min	520	47,6	65,2	31,3	START 31, MAX 38	
05/06/2014 16:18	16	05 hh : 45 min	10 hh : 00 min	461	46,2	65,0	26,0	START 28, MAX 41	
06/06/2014 13:21	17	06 hh : 37 min	10 hh : 00 min	520	47,6	65,4	32,2	START 28, MAX 41	
07/06/2014 10:16	18	06 hh : 39 min	10 hh : 00 min	535	47,6	65,3	32,3	START 30, MAX 43	
09/06/2014 07:20	19	06 hh : 14 min	04 hh : 08 min	483	47,8	64,6	29,2	START 28, MAX 49	
09/06/2014 17:46	20	05 hh : 46 min	10 hh : 00 min	465	46,2	65,6	26,3	START 26, MAX 48	

Pic.13 – Database



## 10 Troubleshooting

Error code <sup>1)</sup>	Screen view	Cause	how to do
1	<b>Low Batt</b>	<ul style="list-style-type: none"> <li>Battery too low</li> <li>Wrong battery</li> </ul>	<ul style="list-style-type: none"> <li>Check the battery</li> <li>Check correct battery connection</li> </ul>
2	<b>Wrong Config.</b>	<ul style="list-style-type: none"> <li>Wrong saved configuration</li> </ul>	<ul style="list-style-type: none"> <li>Contact service dept. <sup>2)</sup></li> </ul>
3	<b>Wrong Battery</b>	<ul style="list-style-type: none"> <li>Battery voltage too high (&gt; 3V/el)</li> </ul>	<ul style="list-style-type: none"> <li>Check the battery</li> </ul>
4	<b>High temperature</b>	<ul style="list-style-type: none"> <li>Environmental temperature too high</li> <li>Air grids obstructed</li> </ul>	<ul style="list-style-type: none"> <li>Install in a more suitable site</li> <li>Clean the air grids</li> <li>Contact service dept.</li> </ul>
5	<b>Pump Off <sup>3)</sup></b>	<ul style="list-style-type: none"> <li>Air pump does not work</li> </ul>	<ul style="list-style-type: none"> <li>Contact service dept.</li> </ul>
6	<b>Unlinked Pipe <sup>3)</sup></b>	<ul style="list-style-type: none"> <li>Air circuit pressure too low</li> </ul>	<ul style="list-style-type: none"> <li>Check presence of leaks in the air circuit</li> </ul>
7	<b>Obstructed Pipe <sup>3)</sup></b>	<ul style="list-style-type: none"> <li>Air circuit pressure too high</li> </ul>	<ul style="list-style-type: none"> <li>Check presence of obstructions in the air circuit</li> </ul>
8	<b>Sensor fault</b>	<ul style="list-style-type: none"> <li>Fault of the internal temperature sensor</li> </ul>	<ul style="list-style-type: none"> <li>Contact service dept.</li> </ul>
9	<b>Shorted Contact</b>	<ul style="list-style-type: none"> <li>Problem on the electronic board (blocked relay)</li> </ul>	<ul style="list-style-type: none"> <li>Contact service dept.</li> </ul>
10	<b>Thermic Contact</b>	<ul style="list-style-type: none"> <li>Transformer's temperature has reached the allowable limit</li> </ul>	<ul style="list-style-type: none"> <li>Clean the air grids</li> <li>Contact service dept.</li> </ul>
11	<b>Charge timeout</b>	<ul style="list-style-type: none"> <li>Charge not over into 16 hours</li> </ul>	<ul style="list-style-type: none"> <li>Check if charger is rated to correspond with battery capacity</li> <li>Check the battery</li> </ul>
12	<b>Dropped Battery</b>	<ul style="list-style-type: none"> <li>Battery disconnected</li> <li>battery disconnected while charge is in progress</li> <li>Sulphated battery</li> </ul>	<ul style="list-style-type: none"> <li>Press STOP button before disconnecting the battery</li> <li>Sulphated battery</li> </ul>
13	<b>Maintenance Err.</b>	<ul style="list-style-type: none"> <li>Battery voltage lower than 2.09 V/el</li> </ul>	<ul style="list-style-type: none"> <li>Contact service dept.</li> </ul>
14	<b>High Temp. Batt.</b>	<ul style="list-style-type: none"> <li>The battery temperature has reached the alert threshold</li> </ul>	<ul style="list-style-type: none"> <li>Check combination charger / battery capacity</li> <li>Check battery working conditions</li> </ul>
15	<b>Sens. TB Fault</b>	<ul style="list-style-type: none"> <li>Temperature probe doesn't work</li> </ul>	<ul style="list-style-type: none"> <li>Contact service dept.</li> </ul>
16	<b>Contact Service</b>	<ul style="list-style-type: none"> <li>Reached time limit for scheduled maintenance</li> </ul>	<ul style="list-style-type: none"> <li>Contact service dept.</li> </ul>
17	<b>Max Ah threshold</b>	<ul style="list-style-type: none"> <li>Reached maximum Ah reintegrated: battery capacity + 20%</li> </ul>	<ul style="list-style-type: none"> <li>Check charger sizing</li> <li>Check the battery condition</li> </ul>
18	<b>Low Temp. Batt.</b>	<ul style="list-style-type: none"> <li>Battery temperature lower than -15°C</li> </ul>	<ul style="list-style-type: none"> <li>Install in a more suitable site</li> </ul>
19	<b>Charge Stopped</b>	<ul style="list-style-type: none"> <li>Charge stopped before completion</li> </ul>	<ul style="list-style-type: none"> <li>Press STOP before disconnecting the battery</li> </ul>

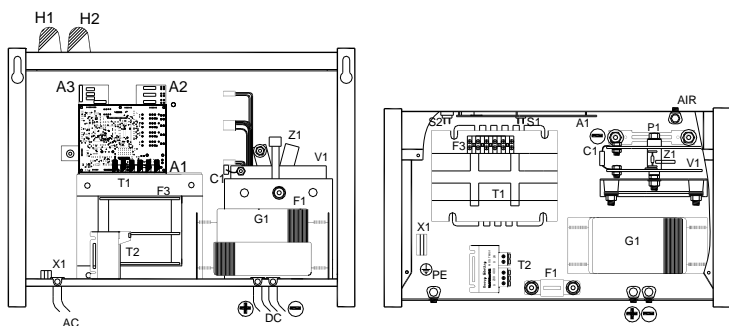
1) The error code is highlighted by the number of consecutive flashes of LED RED

2) Contact Nuova Elettra Service Department \_Suzzara (MN – ITALY) tel.+390376539011

3) Codes # 5,6,7 refer to **AIR PREMIUM chargers**



**11 PREMIUM layout**  
11.1 Items designation



COMPONENTS
CONTROLLER NR-EPWA-PREMIUM-01 (A1)
CONTROLLER EPWA-PREMIUM-RLLP-01 (A2) – option
EMC FILTER (C1-C2-C3)
CONTACTORS/ RELAYS (K1-K2)
FUSE (F1)
THERMAL PROTECTION (F2-F3-F4)
SIGNALLING LAMPS (H1-H2) – option
AIR PUMP (G1)
SHUNT (P1)
EARTH (PE)
POWER TRANSFORMER (T1)
AUXILIARY TRANSFORMER (T2)
RECTIFIER (V1)
FUSE (F1)

**11.2 Case type**

CASE TYPE	HEIGHT (mm)	WIDTH (mm)	DEPTH (mm)
A3	370	475	290
A2	760	500	400
A1	900	500	400
B2	900	600	500
B3	1050	700	600

**12 Spare parts**

The equipment's production number (**SERIAL NUMBER**) must be supplied when ordering any replacement parts. This number can be found on the information plate (**type plate**).

**13 Environmental protection notes**

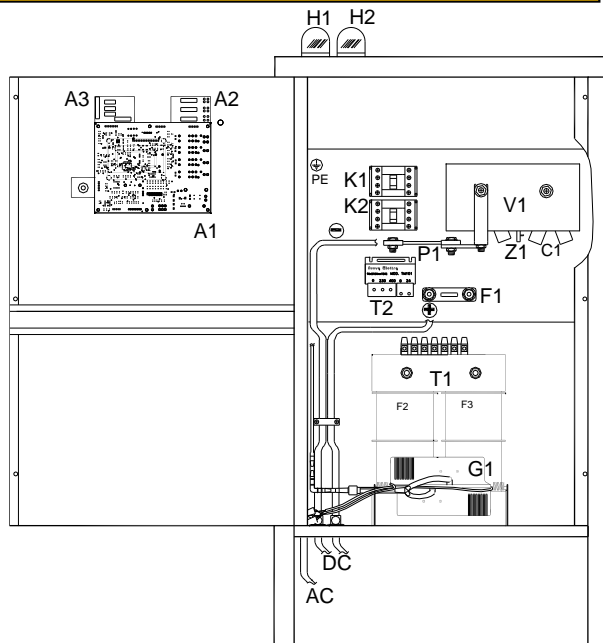
When this product comes to the end of its useful life, you must not dispose of it in the ordinary domestic waste. The correct method of disposal is to take it to your collection point for re cycling electrical and electronic equipment. The symbol shown here, which



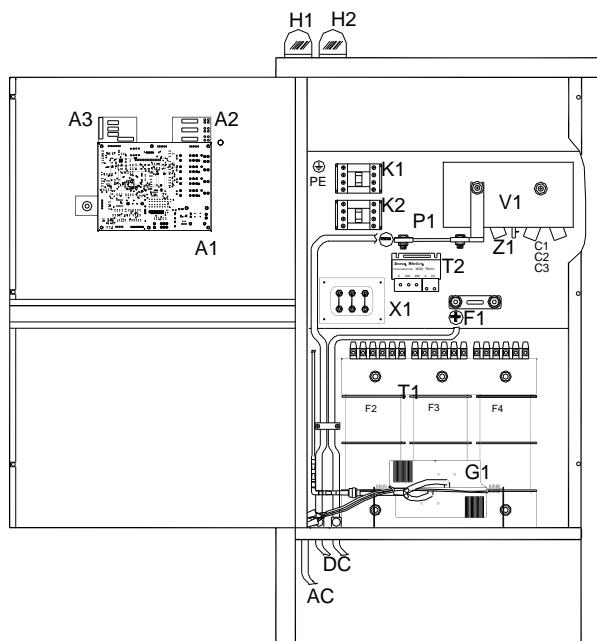
may be found on the product itself, in the operating instructions or on the packaging, indicates that this is the case. Individual markings indicate which materials can be recycled and re-used. You can make an important contribution to the protection of our common environment

by reusing the product, recycling the basic materials or recycling redundant equipment in other ways. In case of **trak® basic** models, you have to remove electronic parts like rectifiers, transformers, electrical cables, etc.: these parts must be disposed of with a corresponding collection point for electrical scrap. Electronic boards must be removed from your equipment and dispose at your local collection point. If you don't know the location of your nearest disposal centre, please enquire at your local council office. Local legislation takes precedence over any instructions in this document and must be scrupulously observed.

**1-ph CHARGER (Mains current ≤16A)**

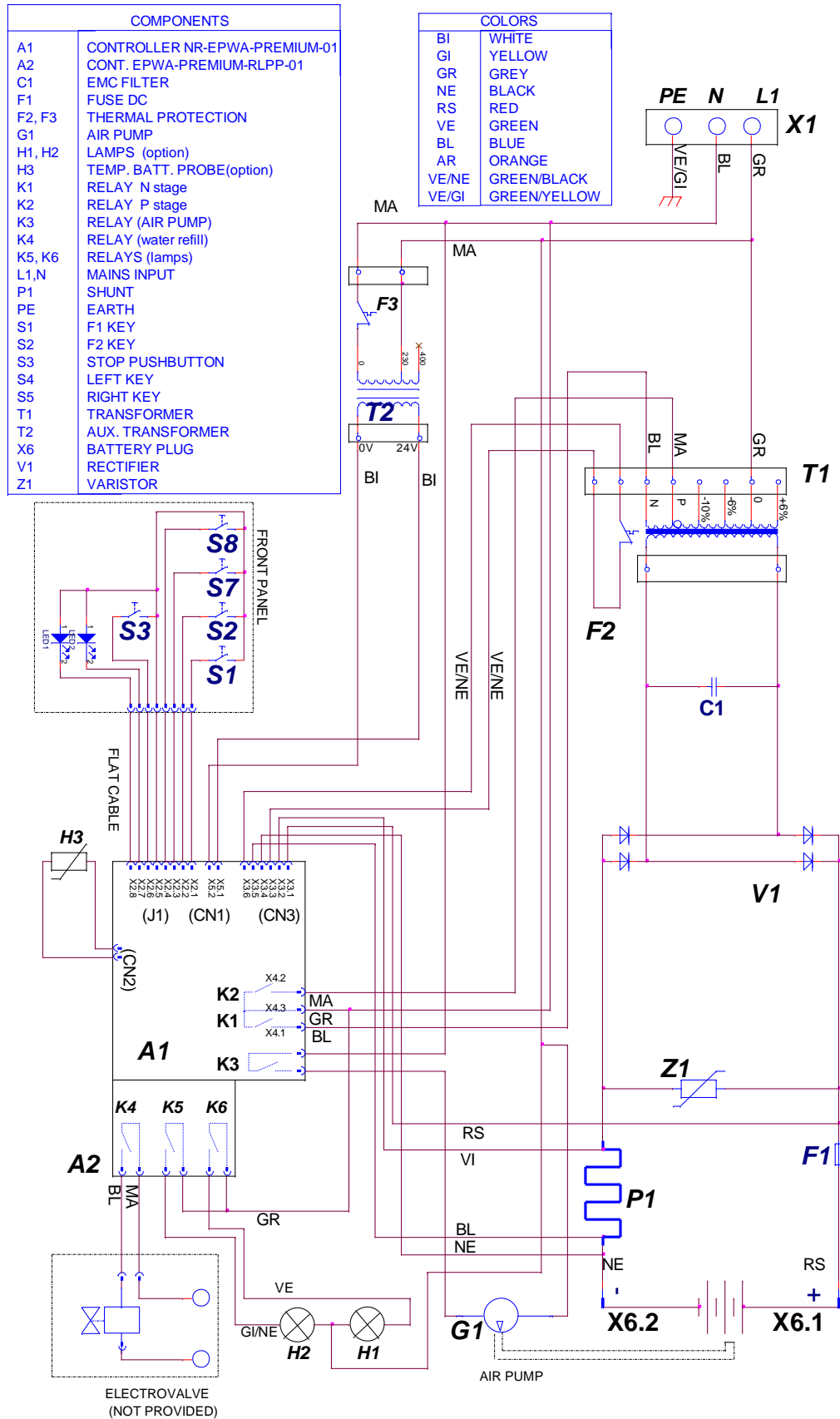


**1-ph CHARGER (Mains current >16A)**

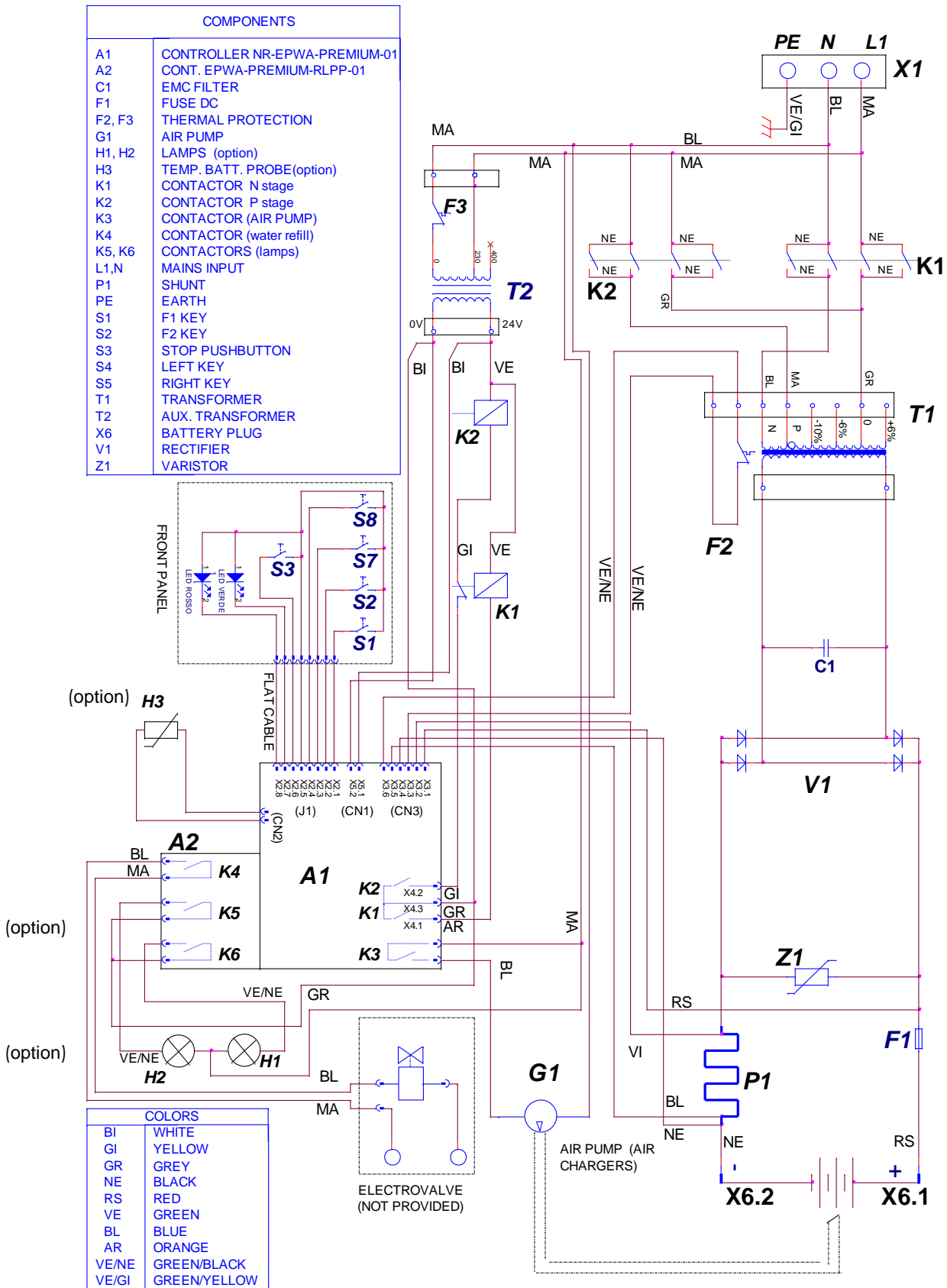


**3-ph CHARGER**

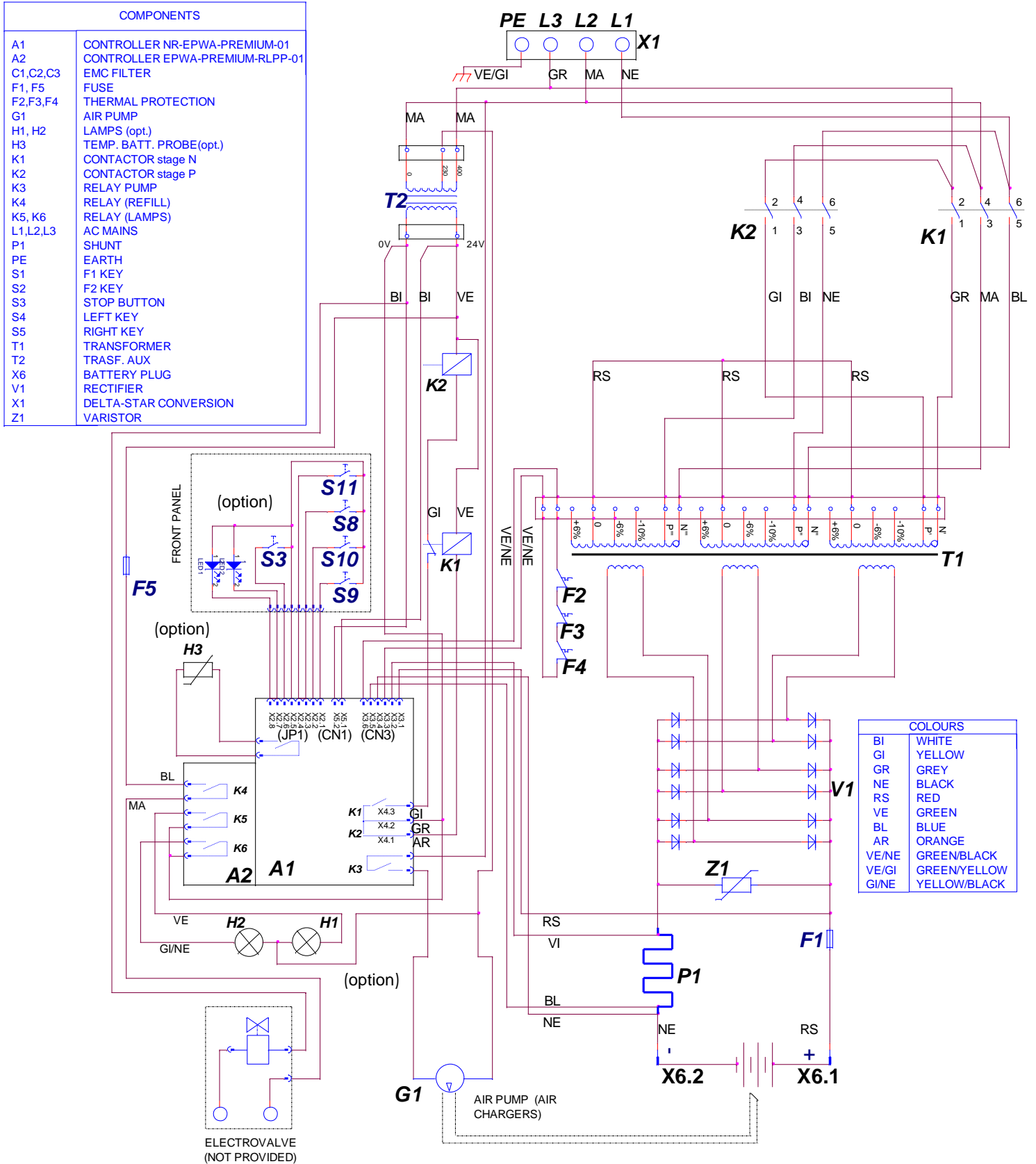
**14 Circuit diagrams**  
**14.1 Single-phase circuit diagram (Mains current ≤16A)**



**14.2 Single-phase circuit diagram (Mains current >16A)**



14.3 Three-phase circuit diagram



## 15 Model overview

### 15.1 Single-phase models

Type*	Rated Voltage (V)	Rated Current (A)	CHARGE TIME/ BATTERY CAPACITY C <sub>5</sub> (Ah)			Volts (V)	Cabinet type	Charge cable (mm <sup>2</sup> )	Power cable (mm <sup>2</sup> )	Mains fuse (A)**	Weight (kg)
			6,5÷7,5h	7,5÷8,5h	8,5÷12h						
M24/40	24	40	185-220	220-250	250-360	230	A3	1.5	10	10	22
M24/50	24	50	230-275	275-315	315-450	230	A3	1.5	16	10	24
M24/60	24	60	275-330	330-380	380-540	230	A3	1.5	16	16	26
M24/70	24	70	320-385	385-440	440-630	230	A3	1.5	25	16	28
M24/80	24	80	370-440	440-500	500-720	230	A3	1.5	25	16	30
M24/100	24	100	460-550	550-630	630-900	230	A2	2.5	25	20	48
M24/125	24	120	555-660	660-750	750-1080	230	A2	2.5	35	20	56
M24/150	24	140	645-770	770-880	880-1260	230	A2	4	50	25	58
M36/40	36	40	185-220	220-250	250-360	230	A8	1.5	10	16	27
M36/50	36	50	230-275	275-315	315-450	230	A8	1.5	10	16	29
M36/60	36	60	275-330	330-380	380-540	230	A8	1.5	16	16	50
M48/60	48	60	275-330	330-380	380-540	230	A2	2.5	16	20	58
M48/80	48	80	370-440	440-500	500-720	230	A2	4	25	32	60
M48/100	48	100	460-550	550-630	630-900	230	A2	6	25	32	62
M48/125	48	120	555-660	660-750	750-1080	230	A2	10	35	40	65
M48/150	48	140	645-770	770-880	880-1260	230	A2	10	50	50	73
M72/60	72	60	275-330	330-380	380-540	230	A2	4	16	32	71
M72/80	72	80	370-440	440-500	500-720	230	A2	6	25	40	73
M80/50	80	50	230-275	275-315	315-450	230	A2	4	10	32	62
M80/60	80	60	275-330	330-380	380-540	230	A2	6	16	32	66
M80/80	80	80	370-440	440-500	500-720	230	A2	10	25	50	75
M80/100	80	100	460-550	550-630	630-900	230	A2	10	25	63	78

## 15.2 Three-phase models

Type *	Rated Voltage (V)	Rated Current (A)	CHARGE TIME/ BATTERY CAPACITY C <sub>5</sub> (Ah)			Volts (V)	Cabinet type	Charge cable (mm <sup>2</sup> )	Power cable (mm <sup>2</sup> )	Mains fuse (A)**	Weight (kg)
			6,5÷7,5h	7,5÷8,5h	8,5÷12h						
T24/60	24	60	280-330	330-380	380-540	3x400	A2	1.5	16	10	48
T24/80	24	80	370-440	440-500	500-720	3x400	A2	1.5	25	10	53
T24/100	24	100	460-550	550-630	630-900	3x400	A2	1,5	25	10	56
T24/120	24	120	555-660	660-750	750-1080	3x400	A2	1.5	35	10	61
T24/140	24	140	645-770	770-880	880-1260	3x400	A2	1.5	35	10	65
T24/160	24	160	740-880	880-1010	1010-1440	3x400	A2	1.5	50	10	67
T24/180	24	180	830-990	990-1130	1130-1620	3x400	A2	1.5	70	16	71
T24/200	24	200	925-1100	1100-1260	1260-1800	3x400	A2	1.5	70	16	78
T24/220	24	220	1015-1210	1210-1385	1385-1980	3x400	A2	1.5	70	16	85
T36/80	36	80	370-440	440-500	500-720	3x400	A2	1.5	25	10	60
T36/100	36	100	460-550	550-630	630-900	3x400	A2	1.5	25	10	63
T36/120	36	120	555-660	660-750	750-1080	3x400	A2	1.5	35	16	67
T36/140	36	140	645-770	770-880	880-1260	3x400	A2	1.5	35	16	70
T36/160	36	160	740-880	880-10010	1010-1440	3x400	A2	1.5	50	16	74
T36/180	36	180	830-990	990-1130	1130-1620	3x400	A2	2.5	70	20	78
T48/80	48	80	370-440	440-500	500-720	3x400	A2	1.5	25	10	68
T48/100	48	100	460-550	550-630	630-900	3x400	A2	1.5	25	16	71
T48/120	48	120	555-660	660-750	750-1080	3x400	A2	1.5	35	16	76
T48/140	48	140	645-770	770-880	880-1260	3x400	A2	2.5	35	20	82
T48/160	48	160	740-880	880-1010	1010-1440	3x400	A2	2.5	50	20	87
T48/180	48	180	830-990	990-1130	1130-1620	3x400	A2	2.5	70	25	93
T48/200	48	200	925-1100	1100-1260	1260-1800	3x400	A1	4	70	25	101
T48/220	48	220	1020-1210	1210-1390	1385-1980	3x400	A1	4	70	35	116
T72/80	72	80	370-440	440-500	500-720	3x400	A2	1.5	25	16	86
T72/100	72	100	460-550	550-630	630-900	3x400	A2	2.5	25	20	90
T72/120	72	120	555-660	660-750	750-1080	3x400	A2	2.5	35	25	93
T72/140	72	140	645-770	770-880	880-1260	3x400	A1	4	35	35	100
T72/160	72	160	740-880	880-1010	1010-1440	3x400	A1	4	50	35	106
T72/180	72	180	830-990	990-1130	1130-1620	3x400	B2	6	70	35	135
T72/200	72	200	925-1100	1100-1260	1260-1800	3x400	B2	6	70	40	138
T80/80	80	80	370-440	440-500	500-720	3x400	A2	1.5	25	16	80
T80/100	80	100	460-550	550-630	630-900	3x400	A2	2.5	25	20	84
T80/120	80	120	555-660	660-750	750-1080	3x400	A1	4	35	25	91
T80/140	80	140	645-770	770-880	880-1260	3x400	A1	4	35	35	97
T80/160	80	160	740-880	880-1010	1010-1440	3x400	B2	4	50	35	107
T80/180	80	180	830-990	990-1130	1130-1620	3x400	B2	6	70	40	143
T80/200	80	200	925-1100	1100-1260	1260-1800	3x400	B2	6	70	40	146
T80/220	80	220	1020-1210	1210-1390	1385-1980	3x400	B3	10	70	50	175
T80/240	80	240	1100-1320	1320-1520	1525-2160	3x400	B3	10	95	50	180

\* Others on request

\*\* Rather use D-type fuses