




Installation and User Manuals



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1. INTRODUCTION

This manual contains important safety instructions, cautions and warnings, to be followed by qualified personnel responsible for the installation, maintenance and operation of battery chargers.

We recommend this manual to be read and understood entirely, to ensure safe and reliable operation of this equipment. Inspect and understand all warning labels located on the charger. Order and replace labels if they cannot be easily read.

In case of doubts, please contact our service department.

Keep printed and electronic copies of this manual readily available for future needs. Please contact our service department if you need a new copy.

PRODUCTS

CLASS 5311 04 – POWER SUPPLIES - Battery Chargers

CLASS 5311 84 – POWER SUPPLIES - Battery Chargers – Certified to US Standards

APPLICABLE REQUIREMENTS

CSA Std C22.2 No. 107.2-01-R2011 - Battery Chargers

UL 1564 4th Ed. 2015 - Industrial Battery Chargers

CEC LBSC SPECIFICATIONS – Industrial Battery Chargers



	AC input	DC output	output Power	output at 80V	Battery Capacity
	Vac 60Hz	A	kW	A	AH
HYB.12.US	3x480	200	11.5	120	700
HYB.12.NA	3x480	200	11.5	120	700
HYB.15.NA	3x480	250	14.4	140	920
HYB.20.NA	3x480	320	18.1	200	1200
HYB.24.NA	3x480	400	23.0	240	1450
HYB.30.NA	3x480	500	28.8	300	1960
HYB.36.NA	3x480	600	34.6	360	2300



2. IMPORTANT SAFETY INSTRUCTION

2.1 IMPORTANT SAFETY INSTRUCTION

(a) THIS MANUAL CONTAINS IMPORTANT SAFETY AND OPERATING INSTRUCTIONS

(b) WORKING IN THE VICINITY OF A LEAD-ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. FOR THIS REASON IT IS OF THE UTMOST IMPORTANCE THAT EACH TIME BEFORE USING YOUR CHARGER, YOU READ AND FOLLOW THE INSTRUCTIONS PROVIDED EXACTLY

(c) TO REDUCE RISK OF BATTERY EXPLOSION, FOLLOW THESE INSTRUCTIONS AND THOSE MARKED ON THE BATTERY

(d) NEVER SMOKE OR ALLOW AN OPEN SPARK OR FLAME IN THE VICINITY OF THE BATTERY OR ENGINE

(e) USE CHARGER FOR CHARGING A LEAD-ACID BATTERY ONLY. IT IS NOT INTENDED TO SUPPLY POWER TO AN EXTRA-LOW-VOLTAGE ELECTRICAL SYSTEM OR TO CHARGE DRY-CELL BATTERIES. CHARGING DRY-CELL BATTERIES MAY CAUSE THEM TO BURST AND CAUSE INJURY TO PERSONS AND DAMAGE TO PROPERTY

(f) NEVER CHARGE A FROZEN BATTERY

(g) IF IT IS NECESSARY TO REMOVE BATTERY FROM VEHICLE TO CHARGE IT, ALWAYS REMOVE GROUNDED TERMINAL FROM BATTERY FIRST. MAKE SURE ALL ACCESSORIES IN THE VEHICLE ARE OFF IN ORDER TO PREVENT AN ARC

(h) STUDY ALL BATTERY MANUFACTURER'S SPECIFIC PRECAUTIONS SUCH AS REMOVING OR NOT REMOVING CELL CAPS WHILE CHARGING AND RECOMMENDED RATES OF CHARGE

(i) FOR A CHARGER HAVING AN OUTPUT VOLTAGE SELECTOR SWITCH, REFER TO THE CAR OWNER'S MANUAL IN ORDER TO DETERMINE THE VOLTAGE OF THE BATTERY AND TO MAKE SURE THE OUTPUT VOLTAGE IS SET AT THE CORRECT VOLTAGE. IF AN OUTPUT VOLTAGE SELECTOR SWITCH IS NOT PROVIDED, DO NOT USE THE BATTERY CHARGER UNLESS THE BATTERY VOLTAGE MATCHES THE OUTPUT VOLTAGE RATING OF THE CHARGER

(j) NEVER PLACE THE CHARGER DIRECTLY ABOVE OR BELOW THE BATTERY BEING CHARGED; GASES OR FLUIDS FROM THE BATTERY WILL CORRODE AND DAMAGE THE CHARGER. LOCATE THE CHARGER AS FAR AWAY FROM THE BATTERY AS DC CABLES PERMIT

(k) DO NOT OPERATE CHARGER IN A CLOSED-IN AREA OR RESTRICT VENTILATION IN ANY WAY

(l) CONNECT AND DISCONNECT DC OUTPUT CLIPS ONLY AFTER SETTING ANY CHARGER SWITCHES TO THE OFF POSITION AND REMOVING AC CORD FROM THE ELECTRIC OUTLET. NEVER ALLOW CLIPS TO TOUCH EACH OTHER

(m) FOLLOW THESE STEPS WHEN BATTERY IS INSTALLED IN VEHICLE. A SPARK NEAR BATTERY MAY CAUSE A BATTERY EXPLOSION. TO REDUCE RISK OF A SPARK NEAR BATTERY:

-(m.1) POSITION AC AND DC CORDS TO REDUCE RISK OF DAMAGE BY HOOD, DOOR, OR MOVING ENGINE PART;

-(m.2) STAY CLEAR OF FAN BLADES, BELTS, PULLEYS, AND OTHER PARTS THAT CAN CAUSE INJURY TO PERSONS;

-(m.3) CHECK POLARITY OF BATTERY POSTS. A POSITIVE (POS, P, +) BATTERY POST USUALLY HAS A LARGER DIAMETER THAN A NEGATIVE (NEG, N, -) POST;

-(m.4) DETERMINE WHICH POST OF BATTERY IS GROUNDED (CONNECTED) TO THE CHASSIS. IF NEGATIVE POST IS GROUNDED TO CHASSIS (AS IN MOST VEHICLES), SEE ITEM (v). IF POSITIVE POST IS GROUNDED TO THE CHASSIS, SEE ITEM (m.6);

-(m.5) FOR A NEGATIVE-GROUNDED VEHICLE, CONNECT THE POSITIVE (RED) CLIP FROM BATTERY CHARGER TO POSITIVE (POS, P, +) UNGROUNDED POST OF BATTERY. CONNECT THE NEGATIVE

(BLACK) CLIP TO VEHICLE CHASSIS OR ENGINE BLOCK AWAY FROM BATTERY. DO NOT CONNECT CLIP TO CARBURETOR, FUEL LINES, OR SHEET-METAL BODY PARTS. CONNECT TO A HEAVY GAUGE METAL PART OF THE FRAME OR ENGINE BLOCK;

-(m.6) FOR A POSITIVE-GROUNDED VEHICLE, CONNECT THE NEGATIVE (BLACK) CLIP FROM BATTERY CHARGER TO NEGATIVE (NEG, N, -) UNGROUNDED POST OF BATTERY. CONNECT THE POSITIVE (RED) CLIP TO VEHICLE CHASSIS OR ENGINE BLOCK AWAY FROM BATTERY. DO NOT CONNECT CLIP TO CARBURETOR, FUEL LINES, OR SHEET-METAL BODY PARTS. CONNECT TO A HEAVY GAUGE METAL PART OF THE FRAME OR ENGINE BLOCK;

-(m.7) CONNECT CHARGER AC SUPPLY CORD TO ELECTRIC OUTLET;

-(m.8) WHEN DISCONNECTING CHARGER, TURN SWITCHES TO OFF, DISCONNECT AC CORD, REMOVE CLIP FROM VEHICLE CHASSIS, AND THEN REMOVE CLIP FROM BATTERY TERMINAL

(n) FOLLOW THESE STEPS WHEN BATTERY IS OUTSIDE VEHICLE. A SPARK NEAR THE BATTERY MAY CAUSE A BATTERY EXPLOSION. TO REDUCE RISK OF A SPARK NEAR BATTERY:

-(n.1) CHECK POLARITY OF BATTERY POSTS. A POSITIVE (POS, P, +) BATTERY POST USUALLY HAS A LARGER DIAMETER THAN A NEGATIVE (NEG, N, -) POST;

-(n.2) ATTACH AT LEAST A 60 CM 6-GAUGE (AWG) INSULATED BATTERY CABLE TO A NEGATIVE (NEG, N, -) BATTERY POST;

-(n.3) CONNECT THE POSITIVE (RED) CHARGER CLIP TO THE POSITIVE (POS, P, +) POST OF BATTERY;

-(n.4) POSITION YOURSELF AND THE FREE END OF CABLE AS FAR AWAY FROM BATTERY AS POSSIBLE, THEN CONNECT THE NEGATIVE (BLACK) CHARGER CLIP TO FREE END OF CABLE;

-(n.5) DO NOT FACE BATTERY WHEN MAKING FINAL CONNECTION;

-(n.6) CONNECT CHARGER AC SUPPLY CORD TO ELECTRICAL OUTLET;

-(n.7) WHEN DISCONNECTING CHARGER, ALWAYS DO SO IN REVERSE SEQUENCE OF CONNECTING PROCEDURE AND BREAK FIRST CONNECTION WHILE STANDING AS FAR AWAY FROM BATTERY AS PRACTICAL

(o) USE OF AN ADAPTER IS NOT ALLOWED IN CANADA. IF A GROUNDING TYPE RECEPTACLE IS NOT AVAILABLE, DO NOT USE THIS APPLIANCE UNTIL THE PROPER OUTLET IS INSTALLED BY A QUALIFIED ELECTRICIAN

(p) CERTIFIED DC OUTPUT CONNECTOR, SUFFICIENTLY RATED IN VOLTS AND AMPERES, SHALL CONNECTED TO FREE ENDS OF OUTPUT CABLE WITH ATTENTION TO MARKED POLARITY

2.2 IMPORTANT NOTES

- Only experienced and qualified personnel, knowledgeable on batteries and safety requirements involved, must perform installation and maintenance.
- Installation and wiring must comply with all the applicable local and the national electrical codes.
- Protection devices as fuses or circuit breakers, must be located on the AC mains where the charger is connected. Check the product nameplate for voltage and phase requirements.
This charger can only charge motive power batteries of flooded lead-acid type. Strictly follow all setup and operating instructions to prevent damage to the battery and hazardous conditions.



DANGER! High Voltage

- Dangerous AC and DC voltages and currents are present in these systems even when external indicators and LEDs are completely off. Before performing any maintenance, make sure that the AC power and battery are disconnected.



DANGER! Explosive Gases

- Lead-Acid batteries generate an explosive mixture of oxygen and hydrogen during the normal charging process. Never smoke or allow sparks or flames in the vicinity of batteries. Ensure a sufficient ventilation to prevent explosive gases buildup.



DANGER! Corrosive Substances

- Lead-Acid batteries contain a sulfuric acid (H_2SO_4) solution, which is capable of causing very severe skin burns and can induce permanent blindness if splashed onto eyes. Always wear correct eye and body protection when near batteries. In case of contact with eyes, flush immediately with clean water for at least 15 minutes, and seek professional medical attention immediately.



DANGER! High Temperature

- The internal parts of the machine are not accessible during normal operation. To access these parts it is necessary to open the front and / or rear doors, closed by screws. Avoid prolonged contact with hot surfaces could cause discomfort or burns. Keep this in mind if you have a physical condition that affects your ability to feel heat on your skin.
- The weight of battery chargers can crush hands and feet if care is not taken when installing and handling them. Use adequate handling equipment and install chargers in a stable location.

- This charger has been designed for indoor use only. It must be installed in a well ventilated, cool, dry and clean place. Do not expose to rain, snow, moisture, dust and corrosive substances.
- To reduce the risk of fire, install chargers on a floor of non-combustible material.
- Never place the charger directly above or below the battery being charged; gases or fluids from the battery may damage the charger. Locate the charger as far away from the battery as DC cables permit.
- The shipping pallets and all packaging materials must be removed for proper and safe operation.
- Do not block the ventilation openings of the charger.
- Do not install or operate charger if it has been dropped during transport or damaged in any way.
- Never charge a frozen battery.
- Inspect AC and DC cables for damage to the insulation. Replace damaged cables immediately, with cables of the same type and length. Do not extend the DC charging cables, as it may cause improper operation of the charger, and damage the battery.
- The manufacturer is not responsible and the warranty is void if the product is damaged due to negligence, abuse, misuse, accident, modification, alteration, tampering and faulty installation.

3. DESCRIPTION AND THEORY OF OPERATION

Battery chargers receive energy from the main AC source (three-phase or single-phase), and provide a controlled and isolated DC (direct current) output, suitable for charging batteries.

The DC output voltage and current follow pre-defined characteristics (usually called "charging curves" or "charging profiles"), depending on the battery type and state of charge.

The battery chargers are designed to charge motive power batteries of flooded Lead Acid type, using conventional profiles according to the standard ("IEI") IULa, IUoU characteristics, according to the standard DIN 41774.

The operation is controlled by microprocessor, and the typical charging cycle consists in 4 sections:

- *INITIAL or BULK CHARGE*
The battery is in a discharged state, as the SOC% (State-of-Charge %) ranges from 20% to 80%. The battery cell voltage is below the "gassing" point (around 2,40 V/cell at the temperature of 30°C), and in this condition the battery can accept a large amount of energy. The charger operates near its maximum power rating, and keeps the battery voltage under control.
- *CONSTANT VOLTAGE*
The battery voltage remains around the "gassing" point, the charging current must be reduced in order to prevent battery overvoltage. The charger adjusts its output current accordingly and it completes the charge when it detects the low output current limit (named "Ia")
- *FINISHING or ABSORPTION CHARGE*
The battery voltage exceeds the "gassing" point, and the SOC % is now higher than 96%. The electrolyte generates gas, and the charging current must be reduced in order to prevent battery overheating. The charger adjusts its output current accordingly and it completes the charge when it detects a full charge state (SOC%=100%).
- *EQUALIZATION*
Once the charge is complete, the charger stops automatically and the battery can cool down. If the battery is left connected to the charger for sufficient time (typically the weekend), the charger will deliver additional, controlled low current pulses. The purpose of this process, called "Equalization", is to bring all the battery cells exactly to the same State-of-Charge.

4. INSTALLATION



CAUTION!

The charger can be installed, configured and serviced by qualified personnel only



CAUTION!

Read and understand Chapter 2 “Important Safety Instructions” before installing, configuring, servicing or using the charger.

PRELIMINARY INSPECTION

- Unbox the charger and remove all packaging materials.
- Inspect the unit for potential damages, loose screws and missing parts.
- Ensure that the ventilation openings are not obstructed.

OPERATING CONDITIONS

Storage Temperature:	-25°C to 55°C
Operating Temperature:	-25°C to 40°C
Humidity:	0% to 70%

The charger has been designed for indoor use only. It must be installed in a well ventilated, cool, dry and clean place. Do not expose to rain, snow, moisture, dust and corrosive substances.

To reduce the risk of fire, install chargers on a floor of non-combustible material.

INSTALLATION OF DC OUTPUT PLUG

Certified DC Output connector, sufficiently rated in volts and amperes, must be installed in the field by a qualified technician.

INSTALLATION OF AC INPUT CABLE and PLUG

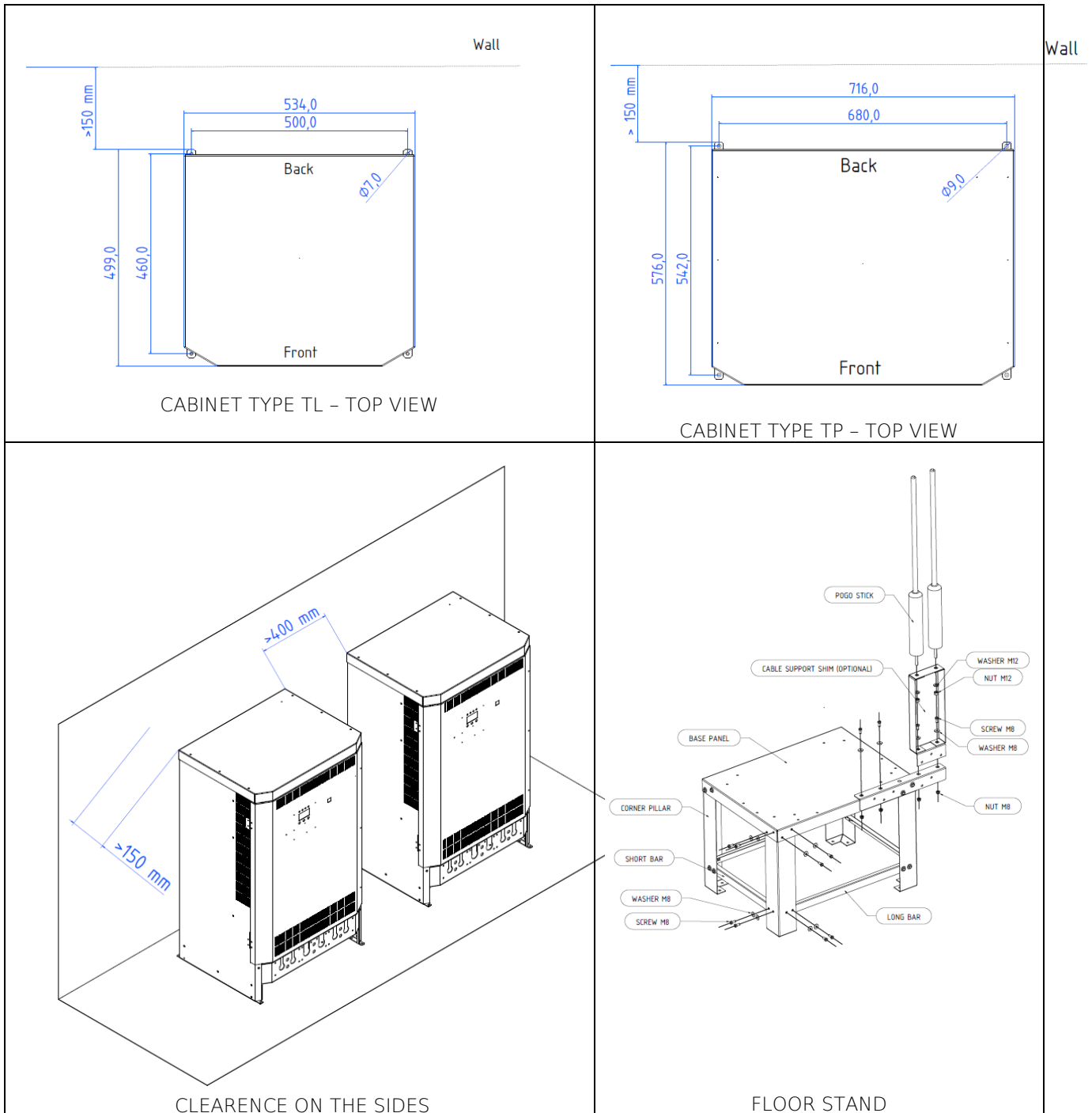
Depending on the applicable local regulations and the electrical ratings of the chargers, units are supplied without AC input cable and/or plug.

In cord-connected models, the AC input cable and plug should be installed by a qualified electrician, in accordance to the local and national electrical code, together with the proper fuses, breakers and disconnect switches.

PHYSICAL INSTALLATION

Choose your installation location to:

- Avoid temperature and humidity extremes.
- Minimize moisture and dust.
- Provide adequate air circulation to prevent the buildup of fumes.
- Install on a cement pad minimum 15 cm above surrounding curbing or walkways for water flood control,
- Maintain a minimum of 40 cm of clearance on the sides of the unit for proper ventilation.
- Maintain 40 cm minimum clearance on Front and Back for servicing as required by local codes.
- Do not install unit where it will be exposed to direct sunlight.



3-PHASE MODEL LIST

model	Pin max (kVA)	Pout max (kW)	Voltage nom.range	max current	cabinet
HPS.12	14 kVA	12 kW	12-180V	200Amp	TL
HPS.15	17.5 kVA	15 kW	12-180V	250Amp	TL
HPS.20	22.5 kVA	18 kW	12-180V	320Amp	TP
HPS.24	28 kVA	24 kW	12-180V	400Amp	TP
HPS.30	34 kVA	30 kW	12-180V	500Amp	TP
HPS.36	42 kVA	36 kW	12-180V	600Amp	TP

TL cabinet mm (inches)

L483 (19.0) x W530 (20.9) x H929 (36.6)

TP cabinet mm (inches)

L560 (22.0) x W712 (28.0) x H1210(47.6)

INPUT VOLTAGE SETTINGS

The battery chargers are equipped with two adjustment blocks for AC input nominal voltage selection and charging curve optimization.

1. NOMINAL VOLTAGE SELECTION 3-phase

This setting is present on chargers designed to operate at different nominal AC input voltages, for specs. 3x400/415 VAC, 3x230/400 VAC, 3x208/240/480 VAC or 3x480/600 VAC (North American specs).

A screw type terminal block is used for this setting in certain chargers, while a bar-type (delta-wye) standard terminal block is used in other chargers.

RECOMMENDED OPERATING SEQUENCE

- Disconnect the charger from the AC input and from the battery.
- Measure the AC input voltage, using an adequate voltmeter.
- Open the cabinet.
- Find the terminal blocks for NOMINAL VOLTAGE SELECTION.
- Make the necessary adjustments at the NOMINAL VOLTAGE SELECTION section.
- Double check that all connections are properly tightened.
- Close the cabinet.
- Connect the charger to the AC input.
- Connect the battery to the charger and verify the correct operation, by measuring the DC output current and DC output voltage.

AC INPUT PROTECTION AND INSTALLATION DEVICES - NorthAmerica

TYPE TIPO	Mains Rate	Phase Current P _{max} @208V _{ac}	Phase Current P _{max} @240V _{ac}	Phase Current P _{max} @480V _{ac}	Phase Current P _{max} @600V _{ac}	HOUSING TYPE	POWER			MAINS PROTECTION					MAINS PLUG @208/240	MAINS PLUG @480	MAINS PLUG @600
							P _{ac} (MAX)	P _n (app)	P _n	BREAKER	FUSE	RATE @208/240	RATE @480	RATE @600			
							kW	kVA	kW	TYPE	TYPE	A	A	A			
HPS.12 US	208/240/480	39.0	34.0	17.0	-	TL	12.0	14.0	12.0	Curve D	Gr	50	25	-	50Amp	20Amp	-
HPS.12 NA	480/600	-	-	17.0	13.5	TL	12.0	14.0	12.0	Curve D	Gr	-	25	20	-	20Amp	20Amp
HPS.15 NA	480/600	-	-	21.0	17.0	TL	15.0	17.5	15.0	Curve D	Gr	-	32	25	-	25Amp	20Amp
HPS.20 NA	480/600	-	-	27.0	21.6	TP	19.2	22.5	19.2	Curve D	Gr	-	40	32	-	30Amp	30Amp
HPS.24 NA	480/600	-	-	33.8	27.0	TP	24.0	28.0	24.0	Curve D	Gr	-	50	40	-	50Amp	30Amp
HPS.30 NA	480/600	-	-	41.7	33.8	TP	28.8	35.0	28.8	Curve D	Gr	-	50	40	-	50Amp	50Amp
HPS.36 NA	480/600	-	-	50.0	40.5	TP	36.8	42.0	36.8	Curve D	Gr	-	63	50	-	50Amp	50Amp

Installation requires an upstream Listed UL / CSA Certified fuses of Type CC, J or RK5		
MODEL	AC INPUT	AC FUSES
HPS.12-US	AC Input 208V 3~60Hz AC 39 A	50A, 200kA
	AC Input 240V 3~60Hz AC 34 A	50A, 200kA
	AC Input 480V 3~60Hz AC 17 A	25A, 200kA
HPS.12-NA	AC Input 480V 3~60Hz AC 17 A	25A, 200kA
	AC Input 600V 3~60Hz AC 13.5 A	20A, 200kA
HPS.15-NA	AC Input 480V 3~60Hz AC 21 A	30A, 200kA
	AC Input 600V 3~60Hz AC 17 A	25 A, 200kA
HPS.20-NA	AC Input 480V 3~60Hz AC 27 A	40A, 200kA
	AC Input 600V 3~60Hz AC 21.6 A	30A, 200kA
HPS.24-NA	AC Input 480V 3~60Hz AC 33.8 A	45A, 200kA
	AC Input 600V 3~60Hz AC 27 A	40A, 200kA
HPS.30-NA	AC Input 480V 3~60Hz AC 42 A	60A, 200kA
	AC Input 600V 3~60Hz AC 34 A	45 A, 200kA
HPS.36-NA	AC Input 480V 3~60Hz AC 50 A	60A, 200kA
	AC Input 600V 3~60Hz AC 40.5 A	50A, 200kA

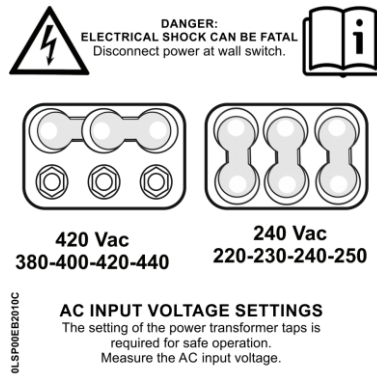
AC INPUT PROTECTION AND INSTALLATION DEVICES – Europe/Asia/Australia

TYPE TIPO	Output Uscita		Mains Rete	Phase Current P _{max} @400Vac	HOUSING	POWER			MAINS PROTECTION			MAINS PLUG
						P _{out} (MAX)	P _{in} (app)	P _{in}	BREAKER	FUSE	RATE	
	V	A			TYPE	kW	kVA	kW	TYPE	TYPE	A	
HPS.12.EU	6/70	200	400/415	20.2	TL	11.5	14.0	12.0	Curve D	gG	25.0	32Amp
	6/130	120										
HPS.15.EU	6/70	250	400/415	24.6	TL	14.4	17.0	15.0	Curve D	gG	32.0	32Amp
	6/130	150										
HPS.20.EU	6/70	320	400/415	32.0	TP	18.1	22.5	19.2	Curve D	gG	40.0	32Amp
	6/130	190										
HPS.24.EU	6/70	400	400/415	40.5	TP	23.0	28.0	24.0	Curve D	gG	50.0	63Amp
	6/130	230										
HPS.30.EU	6/70	500	400/415	46.7	TP	28.8	32.0	28.8	Curve D	gG	65.0	63Amp
	6/130	300										
HPS.36.EU	6/70	600	400/415	60.7	TP	34.6	42.0	36.8	Curve D	gG	65.0	63Amp
	6/130	360										

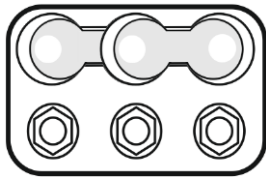
4.1 INSTALLATION 3-phase 3x230/400Vac 50Hz

4.1.1 NOMINAL VOLTAGE SELECTION

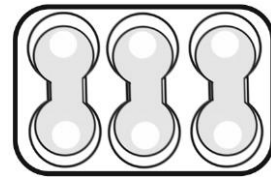
Remove screws from the top and left/right sides in order to open the top cover of the charger.
If the charger model is designed for AC Multi Input. Please set the internal terminal board according to the nominal AC Mains provided from the grid



AC Mains
400 Vac



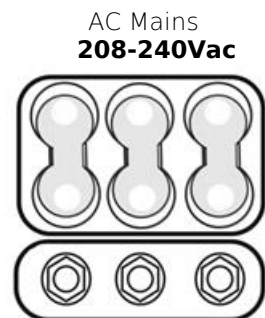
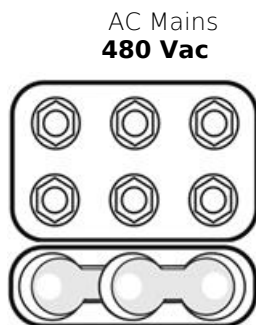
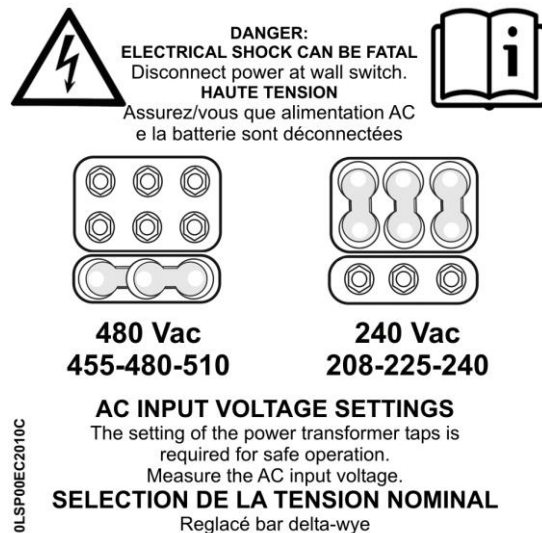
AC Mains
230 Vac



4.2 INSTALLATION 3-phase 3x208/240/480Vac 60Hz

4.2.1 NOMINAL VOLTAGE SELECTION

Remove screws from the top and left/right sides in order to open the top cover of the charger.
If the charger model is designed for AC Multi Input. Please set the internal terminal board according to the nominal AC Mains provided from the grid



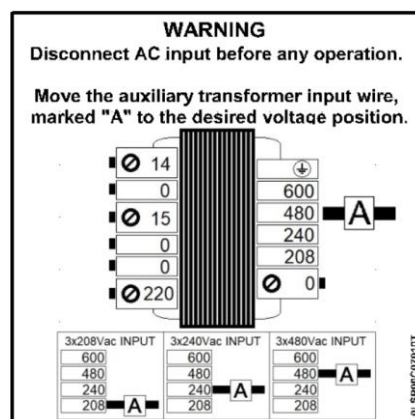
4.2.2 AUXILIARY TRANSFORMER SETTING

Please set the auxiliary transformer primary input, according to the AC input mains incoming

3x208 → A need to be set 208

3x240 → A need to be set 240

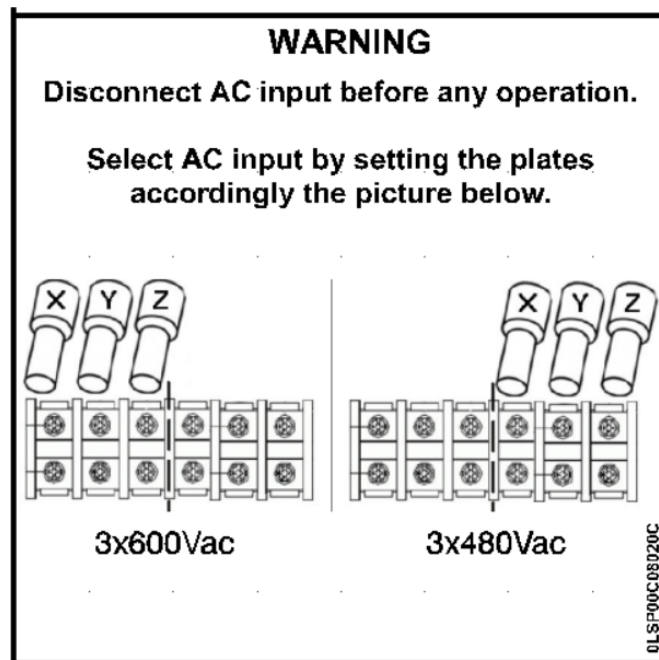
3x480 → A need to be set 480



4.3 INSTALLATION 3-phase 3x480/600Vac 60Hz

4.3.1 NOMINAL VOLTAGE SELECTION

Remove screws from the top and left/right sides in order to open the top cover of the charger.
If the charger model is designed for AC Multi Input. Please set the internal terminal board according to the nominal AC Mains provided from the grid

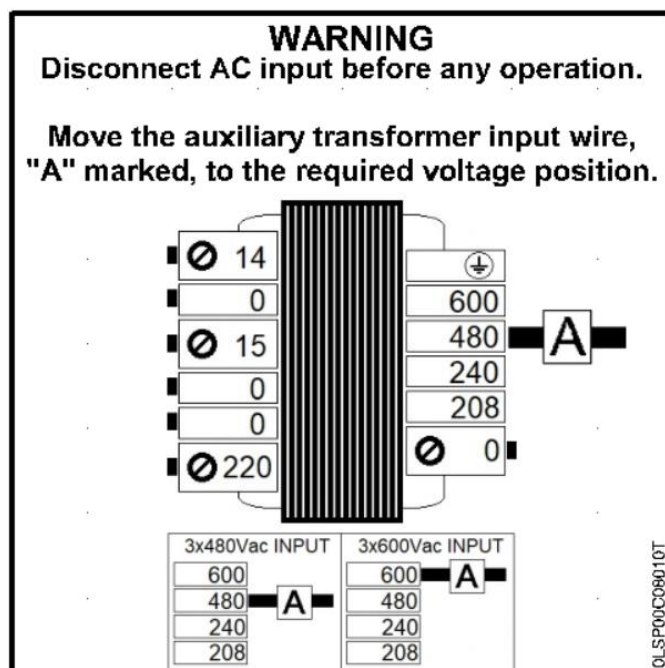


4.3.2 AUXILIARY TRANSFORMER SETTING

Please set the auxiliary transformer primary input, according to the AC input mains incoming

3x480 → A need to be set 480

3x600 → A need to be set 600

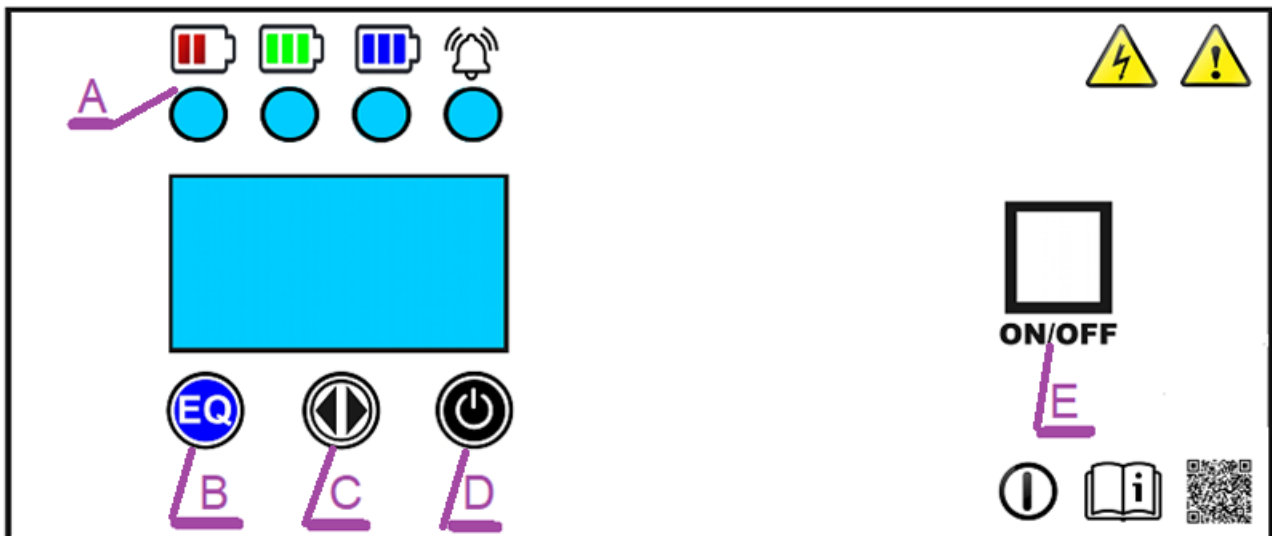


5. PROGRAMMING

HMI HUMAN MACHINE INTERFACE

The charger interface contains:

- A) 4x LEDs
 - a. Red
 - b. Green
 - c. Blue
 - d. Alarm/Warning
- B) 1x Push Button → button (EQ) EQUALIZE
- C) 1x Push Button → button (<=>) SPECIAL FUNCION
- D) 1x Push Button → button (O) STOP/RE-START
- E) ON/OFF Switch
- F) Internal Buzzer
- G) Optional. Serial communication line (RS232)
- H) Optional. USB communication line
- I) Optional. Can bus#1 communication line
- J) Optional. Can bus#2 communication line



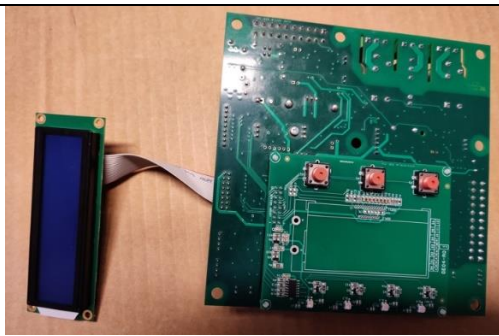
CONTROL BOARD

The charger is controlled by the new “GE00” Control Board.

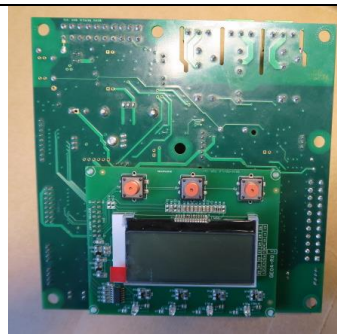
This board is built in different configurations, depending on the presence of certain key components.



Control Board GE00 (Bottom View)



Control Board GE00 (Top View)
Remote display



Control Board GE00 (Top View)
Integrated display

Board Configurations:

- GE00/E/ * model ECO, it is not managing communication with external devices
- GE00/B/ * model BASIC, it is managing communication with external devices like Rs232 and USB
- GE00/P/ * model PRO, it is managing communication with external devices like Rs232,USB, CANBUS#1, special analog signals
- GE00/F/ * model FULL, it is managing communication with external devices like Rs232,USB, CANBUS#1, special analog signals, CANBUS#2.

- (*) Display definition
- 2L Remote display. Like i.e GE00/E/2L
- 4D Integrated display. Like i.e GE00/E/4D

PRELIMINARY INSPECTION

Before connecting a battery and proceeding with the programming sequence, make sure that the Charger has been installed by a qualified electrician, according with the instructions reported in this manual.

Before using the charger, it's necessary to control that the ventilation openings are not obstructed, and that all the safety precautions reported in this manual are respected.

STARTUP SEQUENCE

When a battery is plugged to the charger, the display of the control board shows "BATTERY CONNECTED" and the internal buzzer beeps. The microprocessor performs a leds colour sequence that allows the user to identify that the charger is going to start to charge.

PROGRAMMING MODES

HOW TO ACTIVATE USER PROGRAMMING MODE

Press the button STOP/RE-START and keep it pressed for 5 seconds, the display shows "PASSWORD", press EQ button's 4 times

HOW TO ACTIVATE MFG/SERVICE PROGRAMMING MODE

Press the button STOP/RE-START and keep it pressed for 5 seconds, the display shows "PASSWORD", press SPECIAL FUNCTION button's 4 times

HOW TO MODIFY A VALUE

Scroll between parameters using the STOP/RE-START button and/or EQ button. Press button SPECIAL FUNCTION and keep it pressed for 3 seconds, the cursor will blink.

Now it is possible to modify the value with buttons STOP/RE-START and/or EQ, and keep pressed 3 secs the button SPECIAL FUNCTION in order to save the new value.

HOW TO RETURN TO NORMAL MODE

Press the button STOP/RE-START and keep it pressed for 5 seconds.

PARAMETER A-B-C-D-E: BATTERY SETTINGS

For each nominal battery voltage that can be charged by the charger, it's possible to set the following parameters:

- TYPE,
- CAPACITY,
- DESIDERED START CURRENT. (I1)

This charger is multi-output voltage charger, it is important check the name plate label, in order to understand which nominal batteries voltage are suitable by this battery charger

PARAMETER 1: TIME/DATE

Programmable values: Year/Months/Day Hour/minute

PARAMETER 2: DAYLIGHT SAVING TIME

Programmable values: DISABLED, GMT+1h ROME, GMT+6h CENTRAL AMERICA, GMT+8h BEIJING

Default value: DISABLED

PARAMETER 3: CHARGE STARTING TIME (START / STOP)

Programmable values: Hours during a day

Default value: ON.CH START>STOP 00:00 <> 23:59

PARAMETER 4: OVERCHARGING TIME (START / STOP)

Programmable values: Hours during a day

Default value: OVERC. START>STOP 00:00 <> 23:59

PARAMETER 5 and 6: EQUALIZE STARTING TIME (EQUAL. START ON/OFF)

Programmable values: Days(of the week) and Hours

Default value:
EQUAL. START ON SAT 12 (Saturday 12:00)
EQUAL. START OFF MON 03 (Monday 03:00)

PARAMETER 7: V.GAS-GAS LIMIT

Programmable values: 1.80, ..., 3.50 V/Cell, with step 0.01V/cell

Default value: 2.40 V/Cell

NOTE: This parameter sets a gas limit for the cell voltage. If this limit has reached, the charge is completed 80%.

PARAMETER 8: V.MAX-MAX LIMIT

Programmable values: 1.0, ..., 3.54 V/Cell, with step 0.01V/cell or DISABLED

Default value: 2.80 V/Cell

NOTE: This parameter sets a maximum limit for the cell voltage. If this limit has reached, the charge is finished and a specific error message is given.

PARAMETER 9: EQUALIZE MODE

Programmable values: 2, ..., 12 Hours, with step 1 Hours

Default value: 6 Hours

PARAMETER 10: FULL CHARGE TIME

Programmable values: 0, ..., 360 Minutes, with step 1 Minute,

Default value: 240 Minutes

PARAMETER 11: NOMINAL VOLTAGE [only in ADMINISTRATOR MODE]



NOTE

Usually it's not necessary to change these parameters.
Please contact the manufacturer for more details

Programmable values: 12, 24, 36, 48, 60, 72, 80, 96 Vdc

Default value: Nominal voltage of the charger

NOTE: This parameter may need to be adjusted after replacing the control board

PARAMETER 12: NOMINAL CURRENT [only in ADMINISTRATOR MODE]



NOTE

Usually it's not necessary to change these parameters.
Please contact the manufacturer for more details

Programmable values: 200, ..., 600 Amp

Default value: Nominal current of the charger

NOTE: This parameter may need to be adjusted after replacing the control board

6. OPERATION

CONTROL BOARD OPERATION

At the connection of the battery, if the battery and the AC input are properly connected, the charger cycle starts automatically.

According to the internal settings, the charge DC current follows the programmed curve.

When the charger output is active and a DC output current is present, LEDs blink.

Colour RED (blink)

During the 1-phase when the battery voltage is low and the output DC current is high

Colour GREEN (blink)

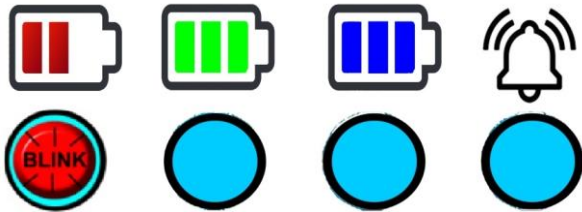
During the Final Phase when the battery voltage is high and the output DC current is low

Colour BLUE (blink)

During the EQ-phase when the battery voltage is very high and the output DC current is very low

During the first phase of charge, the LED RED blinks and the Alarm/Warning LED is off.

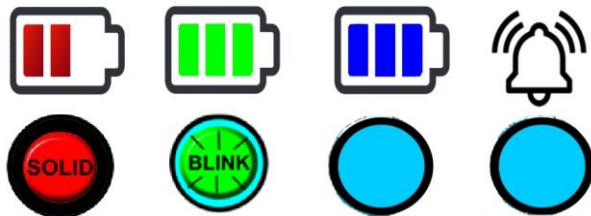
In this condition the battery voltage is still low, and the output current of the charger is high.



First Phase of Charge

During the constant voltage phase of charge, the LED RED is fixed and LED GREEN blinks, the Alarm/Warning LED is off.

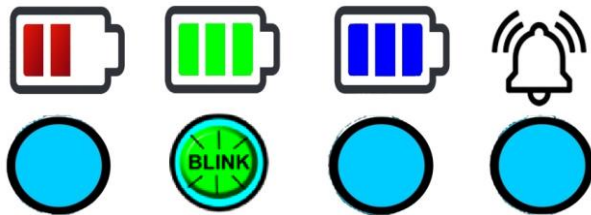
In this condition the battery voltage is around the gassing point, and the output current of the charger is becoming low.



Constant Voltage Phase

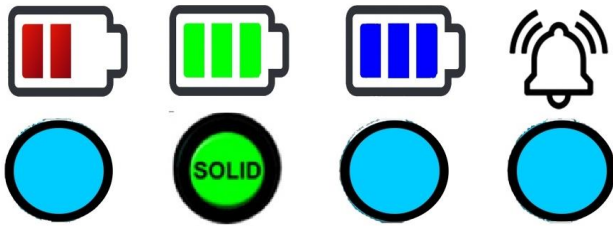
The First Phase will be completed when the battery voltage reaches the Gassing point, after that the charger will begin the Final Phase, where the led GREEN blinks and the Alarm/Warning LED is off.

In this condition the battery voltage is becoming high, and the output current of the charger is low.



Final Phase of Charge

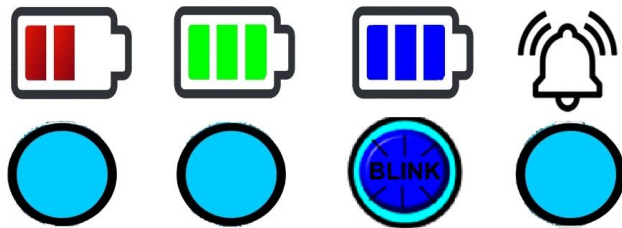
When the Final Charge is completed the control board stops the charge process. The LED GREEN is solid; the charge process is successfully completed.



End of the charge process

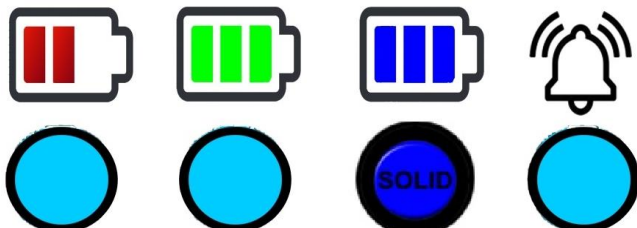
EQUALIZATION CYCLE

After the end of the charge process, if the battery remains connected to the charger for many hours, according to the EQ BEGIN TIME setting, the Control Board executes the Equalization cycle.



Equalization Cycle

The EQUALIZATION has the function of bringing all the cells to the same state of charge, and to compensate for natural imbalances that occur during the service life of the battery. At the End of the Equalization Cycle the BLUE LED stay solid.



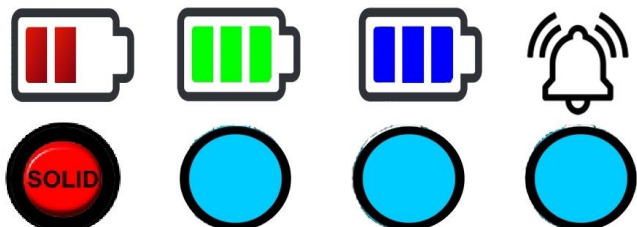
End of the charge process and equalization cycles

DELAY ON START

It is possible to set a delay on start, in order to allow the battery to cool down before to begin the charging process, or to allow to the charger to operate during an off-peak energy time window.

In this case, the charger will wait 1 or more hours before starting the charge process, and the LED configuration will be RED solid during the countdown.

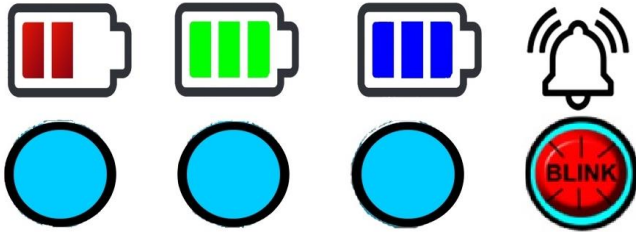
The delay can be bypassed by pressing the STOP/RE-START button.



Delay on start

WARNING SIGNALS

The ALARM/WARNING RED LED will start blinking in these cases: Manual Stop



Warning Events

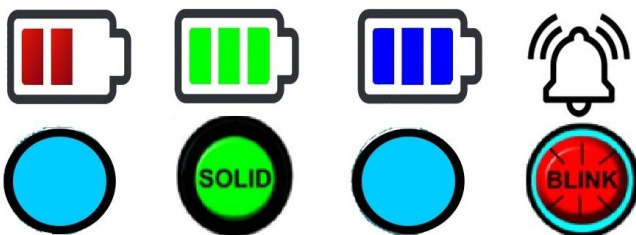
MANUAL STOP



DANGER!

Do not disconnect the battery while it's being charged! RISK OF EXPLOSION!
Always stop the charger by pushing the STOP button, before disconnecting the battery.
The ALARM/WARNING LED needs to be in solid light, before to disconnect the battery.

Before to disconnect the battery, please check that leds RED, GREEN or BLUE are not blinking.
If the charger is providing current, it is recommended to press button "STOP/RE-START" in order to interrupt the charging.
When the ALARM/WARNING LED blinks and the GREEN LED is solid, it means that the user has properly interrupted the charging or the equalization cycle by pressing the button "STOP/RE-START".
If the user will press again the button "STOP/RE-START", the charger will restart the cycle from where it left off.



Stop Push-button pressed during the charge cycle or during an equalization cycle

MANUAL EQUALIZE

During the charging time, it will be possible to request a manual equalize by pressing the EQ button.
The charger is performing a standard cycle, and at the end it will immediately apply the EQ cycle, instead to wait the defined EQ BEGIN TIME setting.

HOT DISCONNECTION

**DANGER!**

Do not disconnect the battery while it's being charged! RISK OF EXPLOSION!

Always stop the charger by pushing the STOP button, before disconnecting the battery.

When the RED, GREEN or BLUE led blinks, the charger is active. Do not disconnect the battery!

When the RED, GREEN or BLUE led shows a SOLID colour, it is possible to disconnect the battery.

7. CONTROL BOARD ALARMS AND TROUBLESHOOTING

If the Alarm/Warning LED is solid means that the charge cycle or an Equalization cycle has been interrupted due to an alarm.



The display shows the cause of the alarm:

- Battery voltage too high
- Gassing Voltage not reached. Exceeded charging Time Out in First Phase
- Battery Temperature too high
- Battery type mismatch, Charging current too low or wrong AC Input setting, Charging current too high

7.1 BATTERY VOLTAGE TOO HIGH

The battery voltage reached during the charging cycle or during the equalization cycle is too high, the charge cycle is terminated.

In order to fix this issue, it will be important check the battery status, evaluate voltage of every cell and check intercell connections.

It is recommended to check also the power connections in the DC Plug and DC Socket and in the charger inner parts, in order to identify if the torque of a power connection is insufficient.

The display shows:

CHARGING STOP
HIGH VOLTAGE

ISSUE	CAUSES	FIX
Alarms appear. During the charging cycle	Battery sulphated	Repair battery.
	Battery nominal voltage is not correct	Check compatibility between battery voltage and charger voltage
	One or more cells are shorted.	Repair battery.

7.2 TIME OUT – GASSING VOLTAGE NOT REACHED

The battery voltage hasn't reached the gassing point within 12 hours of charge.

Please check the battery nominal voltage and the charger nominal matching.

Please check the AC input mains value and check the internal AC input setting of the charger.

it will be important check the battery status, evaluate voltage of every cell and check intercell connections.

The display shows:

CHARGING STOP

80% NOT REACHED

ISSUE	CAUSES	FIX
Alarms appear. During the charging cycle	Wrong AC input settings.	Adjust AC input settings to lower voltage.
	Battery nominal voltage is not correct	Check compatibility between battery voltage and charger voltage
	Output fuse blown.	Replace output fuse and adjust AC input setting.
	One or more cells are shorted.	Repair battery.

7.3 TEMPERATURE TOO HIGH

CASE A) Temperature sensor installed on the battery

If a temperature sensor has been installed on the battery.

During normal operation, if the control board detects an high temperature condition on the battery sensor, the charger will interrupt the charge and apply a cooling pause, at the end of the pause, the charger will restart from the point where it stopped.

CASE B) Temperature sensor installed on the charger

If a temperature sensor has been installed inside or outside the charger.

During normal operation, if the control board detects an high temperature condition on the NTC100 sensor, the charger will interrupt the charge and apply a cooling pause, at the end of the pause, the charger will restart from the point where it stopped.

The display shows:

CHARGING STOP

HIGH TEMPERATURE

ISSUE	CAUSES	FIX
Alarms appear. During the charging cycle	AC input mains is too high or it is too low	Please check AC mains and the charger AC input setting
	Charger ventilation slots obstructed or bad location	Please check charger installation and location, in order to allow ventilation. Remove objects which may obstruct slots.
	Battery high temperature	Please check battery installation and battery location, in order to allow ventilation. Please evaluate to reduce the charger current

7.4 BATTERY TYPE MISMATCH

CASE A) BATTERY NOMINAL VOLTAGE LOW

The battery voltage is too low: the charge cycle doesn't begin.

CASE B) BATTERY NOMINAL VOLTAGE HIGH

The battery voltage is too high: the charge cycle doesn't begin.

CASE C) BATTERY NOMINAL VOLTAGE ERROR

The charge current is too high: the charger shuts down immediately.

The display shows:

CHARGING STOP

NOMINAL VOLTAGE, CURRENT TOO HIGH, HIGH VOLTAGE, LOW VOLTAGE, CHECK OUTPUT FUSE

<i>ISSUE</i>	<i>CAUSES</i>	<i>FIX</i>
Alarms appear. The charger is not starting	Battery not connected properly.	Check battery connectors/harness.
	Output cables reversed.	Check charger, connectors and battery polarities. Output fuse is probably blown.
	Battery nominal voltage is not correct	Check compatibility between battery voltage and charger voltage