



## HTUB

### Legend

Dangerous Situations  
to pay the utmost attention



Warnings and  
Potential Dangers



Important  
Information



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## 1. WARNINGS – SAFETY

- The charger is designed for charging conventional free acid batteries (PzS) and hermetic batteries (PzV, Gel, AGM).  
WARNING: The charger is set for a specific type of battery. Do not use Chargers set to charge open batteries to power closed batteries. In order to reduce risks of explosion of the battery, please follow these instructions and those reported on the battery:
- Never charge a frozen battery
- 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 and sparks
- Study all battery manufacturer's specific precautions such as removing or not removing cell caps while charging and recommended rates of charge
- 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
- 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
- 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:
  - I. position ac and dc cords to reduce risk of damage by hood, door, or moving engine part.
  - II. stay clear of fan blades, belts, pulleys, and other parts that can cause injury to persons.
  - III. check polarity of battery posts. a positive (pos, p, +) battery post usually has a larger diameter than a negative (neg, n, -) post.
  - IV. 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 (vi).
  - V. 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.
  - VI. 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.
  - VII. connect charger ac supply cord to electric outlet; and
  - VIII. when disconnecting charger, turn switches to off, disconnect ac cord, remove clip from vehicle chassis, and then remove clip from battery terminal
- 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:
  - I. check polarity of battery posts. a positive (pos, p, +) battery post usually has a larger diameter than a negative (neg, n, -) post.
  - II. attach at least a 60 cm 6-gauge (awg) insulated battery cable to a negative (neg, n, -) battery post.
  - III. connect the positive (red) charger clip to the positive (pos, p, +) post of battery.
  - IV. 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.
  - V. do not face battery when making final connection.
  - VI. connect charger ac supply cord to electrical outlet; and
  - VII. 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
- 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
- Before charging the battery read carefully the instruction
- Keep the documents in a clean and dry place for future consultations.
- For indoor use. provide adequate ventilation. do not expose to rain.
- Install preferably in a vertical position, remembering that **the forced air flows from the right and exits to the left**
- The openings must not be blocked. Ensure that there is sufficient free space around the charger to ensure adequate air recirculation. Do not place it near sources of heat
- In case of cable replacement, do it with adequate sections and lengths or do not modify them.
- Perform periodic routine maintenance and repairs.
- In case of failure: identify the reason, act accordingly and use only original spare parts.
- Working in proximity of a lead acid battery is dangerous. batteries generate explosive gases during normal operation. it is therefore of utmost importance that each time, before using the charger, you read and follow the instructions provided.
- Explosive gases! avoid flames and sparks and provide proper ventilation of rooms.
- The battery charger is a device that can cause electric shock. it must be used only by personnel trained on electrical hazards.
- Disconnect the supply before making or breaking the connection to the battery.
- Do not use adapters, reducers or wound cables.
- The Power Socket must have an efficient ground.  
If it is not available, do not use the appliance until a suitable socket is installed by a qualified electrician!

The content of this manual corresponds to our products at the time of printing.

It can not be excluded that there are involuntary errors or omissions.

We therefore reserve the right to make changes if there is no more correspondence between what is written and our products.

Nobody, even those who have purchased the product, can copy or disseminate this information if not authorized.

We will take into consideration all those who, noticing discrepancy and defects, wanted to let us know.

Any errors or suggestions for improvement of this manual are welcome. We will be grateful



The Battery Charger is part of the "Electrical and Electronic Equipment" category and must be disposed of in compliance with the national laws in force. It should not be disposed of as domestic waste, but collected separately to achieve responsible recovery. Failure to follow these instructions can have a dangerous effect on the environment and on health

## 1.1. Safety and Reference Rules

The Battery Charger is made in accordance with the following rules:

CSA 22.2 No. 107.2 (2016) Battery Chargers and UL 1564 (2015 - fourth edition - including revisions through August 8, 2017 ) Industrial Battery Chargers  
The Charger is built in ISO9001 conditions.

## 1.2. Thermal security devices and systems

The chargers are power supplies. Their purpose is to transfer energy from the Mains to a battery and consequently they are devices that tend to heat up. This is considered normal especially during the first hours of charging.

The battery charger has two thermal protection systems that acts absolutely (block) and preventive (derating).

The charger has two thermal protection systems that act in a preventive (derating) and absolute (stop) mode.

The charger has three thermal probes, two on active components (diodes and IGBTs) and one on the power transformer. When a temperature approaches its maximum value, an algorithm (derating) begins, which tends to progressively reduce the output current. This reduces overheating and stabilizes the temperature to lower values avoiding the machine stopping.

However, if the maximum temperatures are reached, the charge stops (typically 85 ° C and 105 ° C), the charger stops to cool down.

Afterwards, the charger will restart automatically.

AC Protection: All Chargers have internal protection fuses (aR) for overcurrents and Varistors for overvoltages.

DC protection: The three-phase HTU are protected against polarity inversion of the battery cables by means of a fuse.

## 1.3. Electrical information



Consult the electrical data on the product identification plate and make sure that they comply with your electrical system and the battery to be charged. Below you see the typical plate of a battery charger.

Absorptions and power refer to maximum values. Values can also be much lower during operation



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**Model :** HTUB display version 48V with I<sub>max</sub> 200A

**Serial Number :** 6-digit number for the unique identification of the Charger followed by the model and by the month and year of production. In this case 120 means January 2020

**AC input :** It shows the Nominal Voltage of the Main (Vac 480V), the maximum Current absorbed (13,3A), the Power (11,1 kVA) and the operating frequency (60Hz)

**DC output :** Nominal voltage of the battery (48V) and the current supplied at the nominal voltage (200A)

Read the instructions before use

	Model:	Serial Number (mmyy)
	<b>HTUB 48/200-L</b>	<b>123459 HTUB 120</b>
AC input	<b>480 V ( 13,3 A )</b> <b>3 ph</b>	<b>60 Hz</b> <b>11,1 kVA</b>
DC output	<b>48 V ( 200 A )</b>	



**WARNING:** The charger changes the Charging values according to the battery charge status.

Sometimes it is the current that remains constant, and then the Voltage may be.

Any measurement of the values of power and current absorbed during charging will be different from the nominal values indicated on the nameplate

If the nameplate data does not agree with your system and your battery, DO NOT power the battery charger!

In case of failure or malfunction switch off the appliance and do not attempt to repair it, but contact our technical office or the nearest service center. Be precise in describing the problem encountered and provide us with the serial number.

Repairs or replacements are not permitted unless authorized in writing by our technical office.

## 2. SERIES AND MODEL RANGES

## 2.1. Basic Information

The HTU series introduces latest-generation battery chargers with high efficiency and power factor values.

Depending on the models, there are efficiencies higher than 90% and consequent energy savings and Power Factors (PF) around 0.95 which significantly reduce the need for reactive energy from the Electrical network.

All this is supported by a new series of boards with advanced microprocessors where new firmware and software have been developed to obtain the maximum performance available on the market today.

The management of ventilation and the distribution of components allows to obtain high cleaning standards.

The following table shows how to read the charger code:

<b>HTU</b>	<b>B</b>	<b>48</b>	<b>200</b>	<b>-L</b>
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Input Voltage code

-L	480 Vac
-V	600 Vac
-ML	480 Vac (multivoltage model)
-MV	600 Vac (multivoltage model)

Output current

80	80 A
100	100 A
120	120 A
140	140 A
160	160 A
180	180 A
200	200 A

Output voltage

24	24 V
36	36 V
48	48 V
72	72 V
80	80 V

Product series

B	CSA certified series
---	----------------------

Family

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The chargers have 7 pre-installed charge profiles.

Through the Display or a PC you can select WUIU, IU1a, IUoU and other Profiles for Pb, Gel and AGM Batteries.

If necessary, the software allows the modification of the individual parameters by entering special modes.

## 2.2. Charger Features

Data common to all versions

Cable and AC main Plug	No Chargers have Mains cable (Permanent Connected)
Cable and Battery Plug	All Chargers are equipped with battery cables, but not a battery plug. The plugs can be supplied on request.
Temperature (@)	operating temperature: 0 ° to 40° C (>40°C derating) and storage: -20 ° to + 60 ° C
Visual signals	HTUB has a 128x64 OLED display (55 x 28mm), 4 LEDs, 4 keys and a Buzzer
Charging Profiles	WUIU – IUIU – WUIa – IUIa – Wuou – IU – IUa etc
Power on	Connecting AC Main

### Technical characteristics Electrical and Mechanical

	HTU B
AC main	480V 60Hz (432V-500V)
Size (NOTE 1)	48V 200A
Max Power	11,1 kVA
Battery Ah	300 Ah to 2.000 Ah
Dimension (NOTE 2)	456 b 570 h 195 p (mm)
Fixing Point	390 x 495 (mm)
Weight (§)	22,2 Kg (25,0 Kg)
Degree of protection	IP21 (vert)

**NOTE 1 :** For the entire list of the chargers available see the table at the end of the manual

**NOTE 2 :** For details , see the drawings at the end of the manual

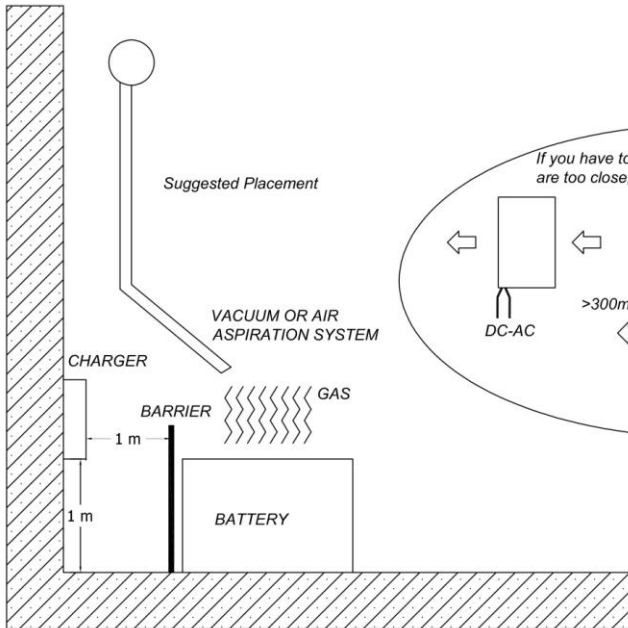
(§) Weight without cables (in brackets including output cables). Weights can change depending on the model and the accessories mounted (sockets, cable cross-sections, auxiliary boards, etc.)

## 3. INSTALLATION AND COMMISSIONING



Read carefully and apply the entire "Warnings and Safety" chapter.

### 3.1. Choice of location and mechanical positioning



Place the cabinet in a suitable place to allow adequate air recirculation away from heat sources.

For positioning, refer to the figure on the side and the drawings at the end of this manual.

Place the wall unit with an underlying non-combustible surface such as stone, cement or metal.

Battery chargers are electrical devices and must be fixed to prevent accidental falls.

Make sure that the switch of the battery charger is clearly visible and easily reachable.

### 3.2. Control of the AC Main

- Make sure that the system has been built according to the regulations in force in the country.
- The electrical connection must be carried out by specialized personnel.  
We recommend that you hire personnel who can issue a "declaration of conformity" for the work performed.  
The declaration must include the efficiency of the connection to the ground installation, the verification of the electrical capacity of the plug and the system to which it is connected.
- Electrical safety is guaranteed only when the power plug is correctly connected to an efficient ground system.
- Check that the system can sustain the power of the battery charger (VA) and that the voltage and the mains frequency agree (Volt and Hz) to the rating plate of the battery charger.
- Make sure that the charger is protected with appropriate delayed fuses. In the case consult our tables.

### 3.3. Control of the Battery and the Charger

- Check that the mains and battery cables are integer and perfectly insulated and do the same with the plugs of both mains and battery.  
**ATTENTION:** Assembly or replacement of the plug-socket of the battery charger must be carried out by specialized personnel.
- Ensure good insulation of the battery and power cables to the ground.
- Make sure the "polarity" of the battery cables agree with the charger.
- Check that the battery is suitable for the charger as both voltage (V) and capacity (Ah)
- The battery must be ready to be charged, cleaned and with a correct electrolyte level (PzS).

### 3.4. Connection of the Battery Charger to the Mains

After verifying that all the elements are suitable for the system, proceed to the physical connection of the Battery Charger to the Mains.  
Drawings illustrating this information are available at the end of this manual.

The HTU Chargers have a plate placed on the left side of the cabinet fixed with 4 self-tapping screws (4.8x13 – no 10).

By unscrewing them, you access a section (field wiring compartment) where you can connect the Mains.

The plate has a 19mm diameter hole for inserting a PG11, M20 cable gland or our BC19 cable gland that you will find mounted in the plate.

All these cable glands are suitable to receive the Mains cable and lead it to the field wiring compartment.

The PG11 cable gland can receive cables with diameters from 5 to 10mm, BC19 cables from 5 to 14mm and the cable gland M20 cables from 5 to 13mm.

Here's how to make the connection:

- 1) Unscrew the 4 self-tapping screws (4.8x13 - no 10) and access the connection box of the Mains.
- 2) Pass the cable through the chosen cable gland (BC19, PG11 or M20)
- 3) Remove and strip cables and wire them. The ground cable must have a ring terminal (4mm) and must be connected first to the grounding pin.
- 4) Connect the mains cables to the L1-L2-L3 terminals, the sequence is not important.
- 5) Place and secure the Mains cable by tightening the cable gland
- 6) Retighten the plate with the 4 screws (4.8x13 – no 10)

## 3.5. Final Checks



We recommend measuring the AC Main using a multimeter, better if the charger is charging.

If you notice reductions in battery performance, or too low charging current, take a measurement from the socket while the Charger is charging.

If the voltage is too low, check or change the socket.

Do not use extensions, wound wires, reducers or other.

Battery chargers are not usually equipped with a plug. If necessary, use a suitable plug for your system.

For the absorptions consult the Serial label.

## 4. BASIC SIGNALLING – LEDs

### 4.1. Informazioni from the DISPLAY

The AE03 board provides synthetic information via LEDs and more complex information via a graphic OLED DISPLAY.

However all the Chargers have a USB port that can be connected to a PC and are provided with an acoustic signal to obtain further information.

Using the LEDs it is possible to:

Understanding the status of the charger. If it is in Charge, in Alarm or the Charge is Completed

Using the DISPLAY you can:

Know the settings of the charger. Which Load Profile is selected, which Current and which Battery capacity

Change the most important parameters. Change a Charge Profile, the maximum current and the Ah of the battery

The Display AE03 card consists of the following elements:

Graphic Display - high brightness OLED type

Four LED lights Green (L1) Yellow (L2) Red (L3) Blue (L4)

An acoustic signal and four keys M (P1) << (P2) >> (P3) Stop (P4)



ATTENTION: The functions of the LEDs and the keys are explained in a following paragraph

NOTE: Refer to the initial image on the cover

### 4.2. LED indications



NOTE 1 : General meaning      Yellow = on Charge      Green = Battery Charged      Red = Error      Blue = transition phase

NOTE 2 : empty = LED off      1 = LED on      L = LED Flashing

NOTE 3 : The NOTetion (L1 L2 L3 L4) shows the LEDs seen by an observer. ex: (1 \_ \_ \_) means only first green LED on

	Green (L1)	Yellow (L2)	Red (L3)	Blue (L4)
No AC Mains				
Battery disconnected				L
Stage 0 o pre-charge (@)		1		L
Bulk Charger (<2,4Vel)		1		
Absorption charge (= 2,4Vel)		1		
Final Charge (>2,4Vel)		L		
Battery Charged (#)	1			
Floating Charge (*)	1	L		
Charge stopped manually (#)	L			
Blocking Error			1	
Error with Restart			L	

(@) For about 5 sec. the Charger perform a ramp of current or Phase 00.

(#) Possible to disconnect the battery safely

(\*) During Floating Stage (Step 4) the Charger may give current. Press Stop before disconnecting the battery safely

#### 4.2.1. BUZZER indications

The Buzzer draws attention to some particular situations

Sound	When ...
Short Bip ( 0,2 sec)	Every time a key is pressed. It means that the card has received the command
Long Bip ( 2 sec)	Signals that the system is "Ready" for a New Charge. Or together with the lighting up of all the LEDs, it means that AC POWER has been supplied to the Charger
Double fast bit ( BipBip 0.2 sec )	When any ERROR occurs
Double continuous bit ( for 30 sec )	Only > Vmax (E12). Indicates a Dangerous situation for the Charger. Disconnect the battery immediately



## 5. INFORMATION AVAILABLE FROM THE DISPLAY

All images are coded

- Code 0 Initial and generic images displayed without the need to press any key
- Code 1, 2, 3 and 4 Images that appear by pressing the reference key, P1 - P2 - P3 and P4
- Code 5 images that appear when an internal event occurs, at the end of the charge and in the event of an error

### 5.1. ... Battery not connected

#### 5.1.1. Switching the charger on



0A  
It only appears when the machine is turned on  
After 5 seconds, the 0B screen appears



0B

Main Image

Battery not connected.

Shows the Standard Charger settings.

In this case the Charger is set up for:

a 80V 700Ah battery

The charge profile is WUIU for Pb (or PzS) batteries

The International Code is WUIU

The Atib elettronica code is 18 and is the first (1) of the 7 available



0C

By pressing any key the menu appears at the bottom of the Display

After 10 sec. it disappears and returns to 0B

Key 1 - Battery - you can set Current, Capacity or Charge Profile (password)

Key 2 - info - you get information on the charger set and the history of the charges

Key 3 - tool - useful information on some internal parameters (service)

Key 4 - OFF - Turn off the charger if it is charging.



NOTE :

If any key is pressed, but no selection is made for 15 seconds, the display automatically returns to the 0C screen.  
After another 10 seconds, return to mask 0B



## 5.1.2. Charger setting (Key 1 - Battery)



1A

Pressing Key 1 from the OC an image appears where you can enter the Password.  
Password is a code of 4 numbers (from 1 to 4)  
Each key represents a value. P1 = 1, P2 = 2, P3 = 3 and P4 = 4

If the code is correct it shows the Mask 1B other items the Buzzer emits a double beep and returns to the mask OC



1B

If the password is correct, the parameters that can be set appear

Key 1 - back  
Key 2 - up  
Key 3 - down  
Key 4 - Confirmation



1C

By pressing the key 4 it is possible to set the initial charging current.  
Change with Up and Down and confirm.  
(step 5A)

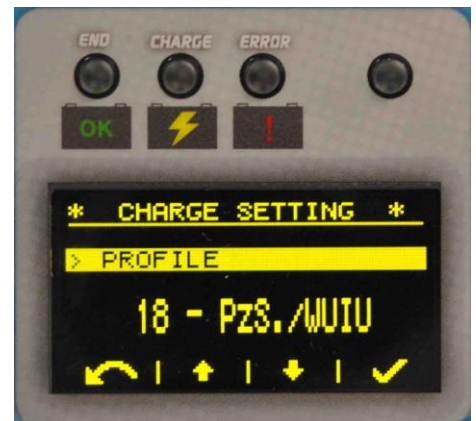
Press Back ( key 1 ) to return to 1B



1D

Battery Capacity Setting.  
Change with Up and Down and confirm  
(step 20Ah)

Pressing the Back button (1) returns to 1B



1E

Charging Profile Setting.  
Change with Up and Down and confirm  
(7 choices)

Pressing the Back button (1) returns to 1B

## 5.1.3. Information (key 2 - info)



2A

Pressing Key 2 from the OC screen shows the possible choices

2B

Confirming with key 4

the display shows information about the charger.

The serial number, the FW revision, and some technical codes

Vel and the number of elements of the battery, the maximum current, the battery Ah, the minimum voltages, Vgas and Vmax, The power set, the current set on stage 3

And the charge retention voltage

Give us the data in case of failure or Assistance

Pressing the Back button (1) returns to 2A



2C

Choosing the "statistics" item in 2A the Display shows Global Statistics on a single screen

2D

Choosing the item "Cycle Report" in 2A the information of the last 50 cycles are visible. Start and Stop of charge. Ah accumulated and kWh The number at the top right indicates the number of charge. The highest value is the last charge.



## 5.1.4. Service (key 3 - Tool)



3A

Pressing Key 3 from the OC mask

the display shows some information related to the operation of the charger

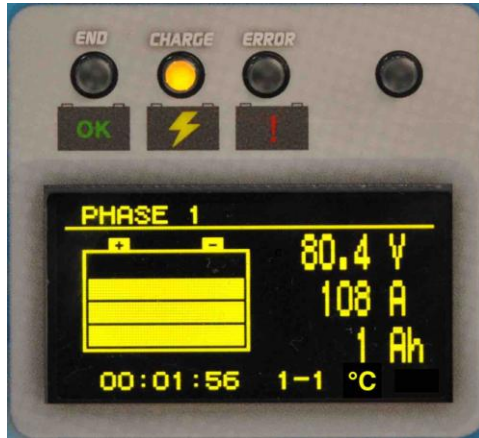
The internal temperatures and their limits, if the charger is on (PWM) and how the fans are set and in which phase is the charge

They are useful information to understand the condition of the Charger.

Communicate this data in case of failure or request for technical assistance

## 5.2. Charging a Battery

### 5.2.1. Connecting the Battery



0L

By connecting a battery the Charger starts charging, showing the symbol of a battery that fills up. The internal battery strips light up consecutively to indicate that the Charger is charging.

The Yellow LED is lit with FIXED light in Step 1 and 2.  
Flashing light in phase 3

00:01:56 indicates hh: mm: ss of charge  
'1-1' shows the charge phase

° C - means that the charger is not cooled down properly.  
Check the Air Filters or the position of the cabinet



0M

By pressing any key the menu appears at the bottom of the Display

After 10 sec. it disappears and returns to 0L

### 5.2.2. Setting (key 1 - Battery)



1L

If I press Button 1 while charging, the Display shows the Charger settings for 5 seconds  
You can not change these settings when the Charger is charging

### 5.2.3. Information (key 2 - info)

The same information explained in the previous paragraph appears  
See images 2A, 2B, 2C and 2D

### 5.2.4. Service (key 3 - tool)

The same information explained in the previous paragraph appears  
See images 3A



## 5.2.5. STOP (key 4 - OFF)



4L

To Stop the Charger press a first time to make the keys appear  
Pressing a second time and "keeping" Pressing the Stop Button the display shows a bar that fills within 3 seconds.  
When the bar is full the Charger will turn off and show the 4M mask

4 M

This is the image that appears when the charger stops after pressing the STOP button



## 5.2.6. End of charge, Error or Charge retention signalling



5A

This is the mask that appears when the Charger ends up charging autonomously

Fase 4-0 means floating charge is taking place  
Error 0 means NO Error

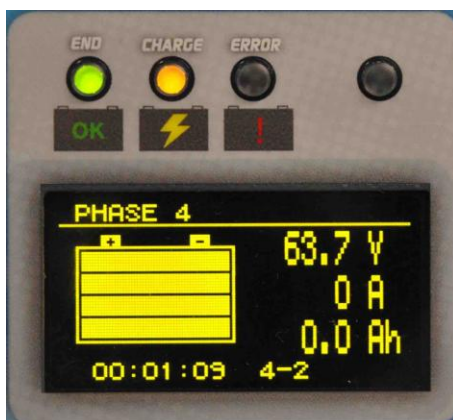
5B

This is the mask that appears when the charger stops due to an error

Show how much time need before the charger starts again.  
Codes 1-1 and E16 indicate that it happened an E16 Error in Stage 1 (see fault table)



If the symbol ° C (see 5B) appears in the upper right-hand corner of the display, this means that the charger during charging has reduced the current (derating) due to lack of adequate cooling. Check the Air Filters or the position of the cabinet



5C - 5D

This TWO IMAGES are visible when the Charge is completed, but the Charger has set up a Charge Retention (Step 4).

The green LED (END) is on, but CHARGE continues to light up to signal a possible current flow.

The battery has the fixed and full stripes to signal that the charge is complete.

WARNING: It is necessary to press STOP key to stop the Charger before disconnecting the battery



CAUTION: If you disconnect the battery, the system will wait approximately 10 seconds and then return to the 0B screen.  
You will hear an extended sound of the buzzer signaling that the system is ready for a new charge

## 6. CHARGER OPERATION

### 6.1. Switching on the Charger

The Charger turns on by supplying the AC Mains.

By inserting only the battery the charger does not turn on and display is off.

### 6.2. Start, Stop of a Charge and disconnection of a Battery

The Charger starts "automatically" a charge:

- If Charger is supplied by AC MAINS and a battery is connected with a voltage within the limit values set by the Charger (min and max).
- If the internal temperatures are within set limit values

The charger stops:

- If the charge is completed (GREEN LED lit with FIXED light)
- If you press the STOP button (P4) twice (the first time OFF appears, press again to confirm the stop and STOP appears)  
(you can not stop the CB in Ramp or Phase 0)



**WARNING:** To stop the charge we suggest to press the STOP button (twice), then remove the Mains, or use the wall switch, and finally the battery. By doing the opposite, unwanted electric arcs are possible.

The Charger waits a few seconds before it switches off completely

The right Routine for "starting" a charge is

Connect the Battery to the Charger.

Close the AC mains Switch

The Board initializes in 9 sec.

All LEDs light up (1 1 1 1), the Buzzer emits a sound and fans starts for 1 sec. (Global Test)

Blue LED (L4) flashes for 5 sec. and the buzzer give a sound (Charger ready)

The control charge (Phase 0) begins.

The YELLOW LED (L1) turn on and the Blue LED go on flashing (ramp 5 sec).

The Bulk Charge (Phase 1) begins.

The Yellow LED (L1) remains on and the blue one turn off

The right routine to "stop" a charge or before "unplugging" the battery is

Press the Stop button (P4).

The menu appears

Press and hold the Stop button (P4) until the shutdown screen is completed.

An image appears showing STOP

The Green LED (L1) flashes

Open the AC mains switch

All the LEDs of the board turn off.

Disconnect the Battery plug socket from the Charger



**WARNING :** The battery disconnection during charging is not allowed as it produces an electric arc.

In any case, if this happens, the charger stops within 3 seconds (E10 "minimum current") red LED (L3) on.

After another 10 sec. signals the Battery has been disconnected (Long beep - 2sec.) the system considers this charge aborted. Blue LED (L4) flashing

**ATTENTION:** When the battery is fully charged, the GREEN LED (L1) with fixed light lights up. However, if the yellow LED (L2) is also on, this means that the floating charge is in progress. Even if the current is presumably low, electric arcs could still occurs.


In this case, press the Stop button (twice - shutdown) before disconnecting the battery



**NOTE:** When you unplug the battery to insert another one it is "necessary" that you hear a long beep (2sec) and the blue LED is flashing.

This is the signal that the charger has recognized the disconnection of the battery

### 6.3. Charger Setting

 **WARNING :** Modifying the programming can be a potentially dangerous action.  
The operation must be carried out by trained and competent personnel, able to understand the implications of any modifications.

To change the settings the Charger must be STOPPED.

The charger has a USB port that can connect to a Windows PC.

This is the "main" method by which you can get a large amount of information and set up the charger.

The HTUB version with Display board allows you to set the essential elements of the Charger (settings are subject to Password).

Charging Current (with steps of 5A)

Battery capacity (with steps of 20Ah)

The choice of 7 charge profiles

## 6.3.1. Changing the Charge Profile, Charging Current and Battery Ah



Refer to paragraph 5 describing with images the Display AE03 board

### Changing the Charging Profile.

Here is the list of pre-set Upload profiles. Many more can be obtained. In the case request the list to our Technical Office

Profile number	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ATIB el. Code	18	118	158	228	328	268	999
International Code	WUIU	WUIa	WUIa	WUoU	WUa	WUoU	IU
Features	3 stadi	3 stadi	3 stadi	2 stadi	2 stadi	2 stadi	2 stadi
Post Charge	Floating	Stop	Stop	Floating	Stop	Floating	Floating
Current	(*) taper	taper	taper	taper	taper	taper	taper
Battery type	PzS	PzS	GEL ; PzV	GEL ; PzV	GEL ; PzV	AGM	PzS

(\*) or Constant Power

### Change of the Nominal Current

Press the key 1, enter the password and choose the current option. A value will appear that you can increase or reduce.

The maximum limit is that indicated on the serial.

### Changing the Battery Capacity

Press the key 1, enter the password and choose the capacity option. A value will appear that you can increase or reduce.

Enter the Capacity value (in C5) of the battery to be charged.

This is a fundamental value for lead batteries (PzS) or anyway for all those batteries that have a 3-stage charge profile.

This value modifies the third phase current (see Charge Cycle section)

### Relationship between Charge Current, Battery Capacity and Charge Time

These 3 factors are strictly connected to each other. Changing one changes the others accordingly.

the Factor (K) which holds these elements together is expressed in A / 100Ah according to the formula  $K = \text{Amp} * 100: \text{Ah}$

Here is the table that links K with the charging time (rounded values for simplification reasons)

<i>to get charges in</i>	<i>hours</i>	<i>14 h</i>	<i>13 h</i>	<i>12 h</i>	<i>11 h</i>	<i>10 h</i>	<i>9 h</i>	<i>8 h</i>	<i>7 h</i>
K Constant ( for WUIU profiles )	A/100Ah	9	10	11	12	13	15	17	19
... assuming a current of = 80A a charger can recharge a battery of (Ah = Amp * 100: K)	Ah	888	800	727	666	615	533	470	421
... supposing a Battery of = 600Ah a charger must deliver at least (Amp = K * Ah: 100)	Amp	54	60	66	72	78	90	102	114

Here's how we read the table ...

ex: An 80A Charger charges in 10h (K = 13) a 615Ah battery

ex: A 600Ah battery charges in 8h (K = 17) if the current set is at least 102A



## 6.4. Explaining the charging cycle and some special Functions

### Pre-Charge ( Stage 0 )

Stage 0 (Initial Phase or Charge of Control).

The charger performs a current ramp for a time that can be set (default 5 sec.). YELLOW LED on and BLU flashing. ( \_ 1 \_ L )

If the nominal battery voltage is not reached after the ramp, the charging continues, but at reduced current.

The phase could also last 3 hours. The LEDs remain unchanged. If the problem remains, the charger stops in E3 alarm (battery problems)

### Sequence of the active phases of the cycle (Stage 1, 2 e 3)

**NOTE 1 :** The ventilation depends on the internal temperatures so the fans can be off, on or operate in PWM mode.

STAGE 1 (Bulk or Main Charge ;  $W=K$  o  $I=K$  )

The charger tends to the set voltage  $V_{gas}$  and to its nominal current.

An internal parameter imposes the maximum usable power. The current could be decreasing (WUIU) or remain constant (IUIU) depending on this value. In the vicinity of the  $V_{gas}$  the current decreases in any case.

When it reaches the minimum current of Phase 1 and the voltage is sufficiently close to the  $V_{gas}$ , Phase 1 is considered closed.

If the Phase 1 time expires it passes without alarms, but if it reaches  $T_{max}$  F1 it goes into alarm E7 time

In this phase the YELLOW LED with fixed light is on. ( \_ 1 \_ )

This is the phase in which the greatest current supply is given and therefore of Ah.

If the battery is charged, phase 1 could last only a few minutes but generally lasts from 4 to 10h.

STAGE 2 (Absorption Charge ;  $U=K$  )

The charger maintains a constant voltage ( $V_{gas}$ ) while the current decreases to a minimum value.

Once the minimum current of Stage 2 has been reached (generally 2-5% of Ah), Stage 2 is considered closed.

If the Stage 2 time expires it passes without Error, but if it reaches Global maximum time goes into Error E8

In this Stage the YELLOW LED (L2) with fixed light remains on ( - 1 - )

Even in this case if the battery was charged, this Stage could last only a few minutes but generally lasts from 1 to 4h.

STAGE 3 (Final Charge ;  $I=K$  )

**NOTE 1 :** This phase is active only in some Profiles. It is generally excluded for Hermetic or AGM batteries, but it is the battery manufacturer that determines whether this phase is appropriate or not.

In lead batteries (PzS) instead it is necessary to give a correct amount of Ah (Charging Factor).

**NOTE 2 :** At this stage the Charger is not allowed to give either maximum power or maximum current



**ATTENTION:** This Stage is also called Final Charge. In principle the battery has already absorbed most of the lost Ah, but the battery needs to recover the necessary capacity to bring the elements to maximum charge.

On the basis of calculations, the Charger decides when to end the charge.

The Charger starts a constant current phase while the Voltage is left free to rise.

The value of this current is normally supplied by the battery manufacturers in percentage value with respect to the Ah of the battery (% Ah).

Usually it varies from 3 to 5% for lead batteries (PzS) and from 1 to 2% in Gel, AGM or Hermetic batteries (PzV).

In this phase the YELLOW LED is on with a flashing light ( \_ L \_ )

The charge can stop for one or more reasons that can be decided in the order phase and pre-calibrated in the factory

Time Stage 3 - the charge is Proportional to the time of F1 and F2 with a minimum and a maximum time

$V_{max}$  - If it reaches the maximum set voltage

Capacitive - CF (Charging Factor) A calculation based on the accumulated Ahs in Phase 1 calculates the missing Ahs to reach the full range.

It is generally expected to accumulate a minimum value ( $CF_{min}$ ) which depends on the set battery capacity.

If the global maximum time is reached, the system sets an E8 time alarm.

### Post or Additional Charge (Stage 4)

STAGE 4 ( Floating Charge ;  $U=K$  )

**NOTE 1 :** At this stage the Charger is not allowed to give either maximum power or maximum current



**ATTENTION :** This Stage is not always active, but depends on the chosen Profile. Notice the last Letter of the International code (e.g. : the IUIU code indicates a floating charge, while IUIa indicates that the Charger stops).

The Charger starts a constant voltage phase while the current is limited to the minimum current value.

By means of an internal parameter two types of additional charges can be selected.

- Continuous constant voltage

- Pulsed constant voltage

The former is more suitable for systems with stationary batteries (PzV), the latter for lead acid batteries (PzS)

Maintenance has an indefinite duration, so it is possible that the current is zero. This is to be considered normal.

Charging stops by pressing the Stop button (twice) or disconnecting the AC Main Switch

## 7. MAINTENANCE

The frequency of checks depends on the use and conditions of use and should not exceed three months.

Operations must be performed by qualified personnel observing the safety regulations. At our offices there are special "Forms" for ordinary and extraordinary maintenance". First of all carry out the operations described in the paragraph "Put the Charger out of Service".

### 7.1. Put the Charger out of Service

When routine maintenance is required or if you do not want to use the charger for a long period of time, the machine must be taken out of service.

Follow this routine:

- 1) Set the Charger switch to the OFF position (only in some models).
- 2) Turn the main power switch and unplug the AC power plug.
- 3) Disconnect the battery plug.

If you decide not to use the battery charger for a long time, do not expose it unnecessarily to atmospheric agents or thermal stress, but place it in a sheltered place. Both the AC and the battery plugs must be secured above the Charger in a place raised from the floor.

### 7.2. Ordinary and Extraordinary Maintenance

Ordinary maintenance should take place every 3 months. Extraordinary Maintenance every time a fault occurs or every year. Here's what we recommend:

- 1) Carefully clean the power cables and battery cables. Make sure that they do not show signs or damage. In this case, replace them immediately.
- 2) Check the condition of the power plug-socket and the battery plug. If they show signs of burning, crushing or damage, replace them immediately.
- 3) Every electrical device is afraid of dust and humidity. Clean your battery charger. If it is excessively dirty or wet, find a better place.

### 7.3. What to do when the Charger signals an ERROR

When the RED LED lights up, the Charger has intercepted an Error. Here is the list of things to do:

- 1) Read the code on the DISPLAY (on connecting a PC) which helps to understand the error.
- 2) Look for the codes that identify the ERROR in the "Error List" list and read the description that often helps to solve the problem

**NOTE : when the charger gives an error, this does not mean that there is an internal error. Often the problem is external.**

#### 7.3.1. Error List and Troubleshooting

	Type	When	Description
--	Charger OFF		Mains is OFF. Check the Power plug connection, the main system switch and the AC Input Fuses
E1	No Batteria	Before Charging	Battery voltage (def. <10V) is missing. Battery not connected, Voltage too low or Internal DC fuse blown. The battery plug is broken or the output cables are damaged.
E2	Battery Undervoltage	After battery plugging	Battery Connected, but below the minimum threshold. (Def. <0.8V <sub>el</sub> ). Low battery voltage or incorrect battery.
E3	Battery Problem	At the end of Stage 0 or during the Charge	Battery under the Nominal voltage during charging. Battery too flat or too big for the charger or current draw during charging
E4	Overtemperature 1 (IGBT)	During Charging (#)	Thermal probe intervention (def. 85 ° C – 105° ) for overheating Fans dirty, hardened, blocked or not working or High ambient temperature or incorrect charger placement
E5	Overtemperature 2 (Diodes)		
E6	Overtemperature 3 (Transfo.)		
E7	Max Time Stage 1	After many hours of charge	Exceeding Maximum time Stage 1 or global time
E8	Global charging Time		Battery too big for the charger or the Mains is too low. Wrong setting of the charger
E9	Max Current	During Charging	Internal Problem. Charger failure
E10	Min Current	During Charging	The current has dropped to too low values. Battery sulfated or with problems or simply fully charged. False contact in the battery plug
E11	Power Fail (1 phase)	During Charging	A phase is missing in a three-phase system. Blown fuse, AC cable disconnected or faulty in the wall switch
E12	Battery Overvoltage	After connecting a Battery	Battery voltage above the maximum threshold. (Def.> 3,0V <sub>el</sub> ). Wrong or sulfated battery
E13	Primary overcurrent	During Charging	Loss of control of the primary current due to imbalances or disturbances of the mains or charger failure
E14	Open thermal probe	During Charging	One of the internal thermal probes is faulty
E16	Battery disconnection	During Charging	The battery was disconnected without pressing the Stop button Wrong action

When the system enters in an Error, it performs some restart cycles to solve the problem.

(#) fans are working

## 7.4. Frequently Asked Questions (FAQ) and Recurring Anomalies

The purpose of the paragraph is to illustrate and clarify some aspects that may arise during the life of the Charger arising from the experience and problems encountered by our customers.

### 7.4.1. What are the most common issues to watch out for in an HF Charger?

The most common problems concern aspects of an environmental nature:

- 1) Excessive dirt and / or humidity. The battery charger must not be exposed to atmospheric agents.
- 2) Heat disposal. Ensure that there are no heat sources nearby and that fresh air is recirculating.
- 3) Wrong positioning. Do not place the Charger too high or too low (see diagrams below) or too close to the battery. Acid fumes that release lead batteries will damage the fans or internal components of the charger.
- 4) Wrong settings. Make sure that the rated current and the Capacity (Ah) set are suitable for the battery
- 5) Fan jam. Periodically check that "all" the fans are not defective, blocked or hardened.

### 7.4.2. What are the thermal security systems in the Charger

The thermal control is one of the most delicate parts of the system, because it is based on mechanical elements in movement that may degrade over time. Here is some information about our security systems

#### Fan Operation

The system provides a thermal protection by means of "Thermal probes" (NTC) which provide reading in °C (degree)

The HTU series provides three probes near the output diodes, IGBTs and the Power Transformer

Forced ventilation is activated according to the temperature detected by the "Probes"

Increases and reduces its speed and therefore the supply of air based on the temperatures reached (PWM system)

#### Thermal shutdown

In any case, when one of the probes reaches the set temperature value, the Charger enters in Overtemperature Error. (E4, 5 or 6)

When this happens it is necessary to verify that "all" the fans are functioning and efficient, that is, they rotate easily, they are not blocked or broken.

A thermal stop does not happen by chance. Search for the cause and analyze the environment.

Also make sure that the charger is not too close to sources of heat and has adequate air circulation.

Is the charger in an environment that is too hot? Is it exposed to sunlight? Does the battery charger suffer especially during the summer? Is it necessary to ventilate the environment? Are the acid fumes from the battery easily reaching the charger? etc.

#### Derating or downgrading

As soon as any of the set maximum temperatures are approached, the system reduces the output current to avoid total blockage of the machine.

This allows to reduce the stress of the components and to reduce the possible breaks for cooling.

It is particularly useful when the room temperature rises or there is little ventilation for short periods of time.

#### Fan Replacement

To check their operation, it is necessary to supply the Charger for a few minutes. When the fans start working, check that they are "all" working. Because of their varying according to the temperature it is difficult to understand the air flow rate, however a visual inspection or a sheet of paper can be made. Do not use mechanical or plastic tools.

If you have doubts replace them. Use only original parts. Not all fans are the same even if they are the same size. In addition to the operating voltage, the air flow must be evaluated. Pay close attention to the direction of the fan that must be "outgoing".

Fasten them with special anti-vibration plastic spacers. Avoid screws that tend to block the fans.

"Preventive" replacement helps to avoid downtime. Difficult to establish a rule, but changing them every two years could be appropriate.

In the event, ask for information from our Service.

#### Why do not the fans run at the beginning of the charge while other times they do not stop?

**NOTE :** The thermal control is always active and does not depend on the charging cycle.

The fans can be on when the charger is not charging or may be off even if the charger does so.

Below 40 ° C the fans are off.

At the beginning of the charge they are usually off and switch on only after a few minutes. This is to be considered normal.

To check them, turn the Charger on for a few minutes. When the fans start working, check them one by one as described above.

Remember that if you turn off the power supply the fans turn off immediately due to lack of energy.

## 7.4.3. How Power and Current is managed in the Charger?

### Why does the charger not give the nominal current when the charge starts?

Because the current depends on the battery voltage that changes continuously during charging.  
When a battery receives power from a Charger it raises its Voltage value. A 48V battery during charging switches from 48V to 57.6V (gas point) up to 64V or more at the end of charging. During this period the Current continues to decrease.  
A further variant is that when a battery is being charged it is not always completely discharged.

### How can I be sure that the charger is charging correctly

One way to understand if the charger is working correctly is to consider the 3 parameters given by the Display:

- The charging phase, the battery voltage and the current supplied.

The comparison of these 3 values let you know if the charger is charging correctly.

See Section "Explanation of the charge cycle". In case you ask these values to our Technical Office.

### Why are the Chargers normally set to Constant Power?

An internal parameter allows the use of the Charger as a Power (ex: WUIU) or Constant Current (ex: IUIU).

The constant current setting allows you to gain some time on the charge, but needs more energy when the battery voltage rises to higher voltage values to reach gasification. The power can reach + 20%.

The more the charge tends to gasify, the more the Charger needs energy and consequently it will heat up more.

On the contrary, the Chargers set to constant Power maintain the same power over time, the Energy required does not change as well as the overheating of the machine. This is, in principle, to be considered safer.

Normally the Chargers come out of the factory at constant power

## 7.4.4. Where can I find the most important information to understand what the Charger can do?

LEDs and their meaning	Show information on the status of the battery charger and the alarm condition	4.2 - LEDs 7.3.1 – Error List
Buzzer	When I hear acoustic signals It warns about some special situations. See also "Unplugged battery while it is charging" explained below	4.2.1 – Buzzer
Display Information	Show all the possible masks and their meaning	5 Display

## 7.4.5. What happens if I unplug the battery while it is charging?

The charger has a charge current detection system.

When someone wrongly unplugged the battery "without" pressing STOP or removing the AC Mains, the system enters a cycle that tends to turn off the charger. Here's what happens:

- |                        |   |
|------------------------|---|
| After about 1-2 sec    | A double beep is heard. Red LED turn on. Charge Stops immediately                     |
| After another 5-10 sec | You hear a long beep. Red LED turn off and Blue LED turn on. A new charge is possible |



**WARNING :** Even if we have introduced a system that stops the charge within a few seconds, we remind you that this operation is to be considered wrong, because it generates unwanted electric arcs.

Always use the STOP (P4) button to Stop the charger

Therefore, if you first hear a short beep and then a long beep, you will know that the battery has been disconnected incorrectly.

## 8. SOFTWARE REV.7

For customers who want to learn more about the Charger having more information or wanting to access a complete programming of the Charger a PC Software is available.

Request additional information if necessary.

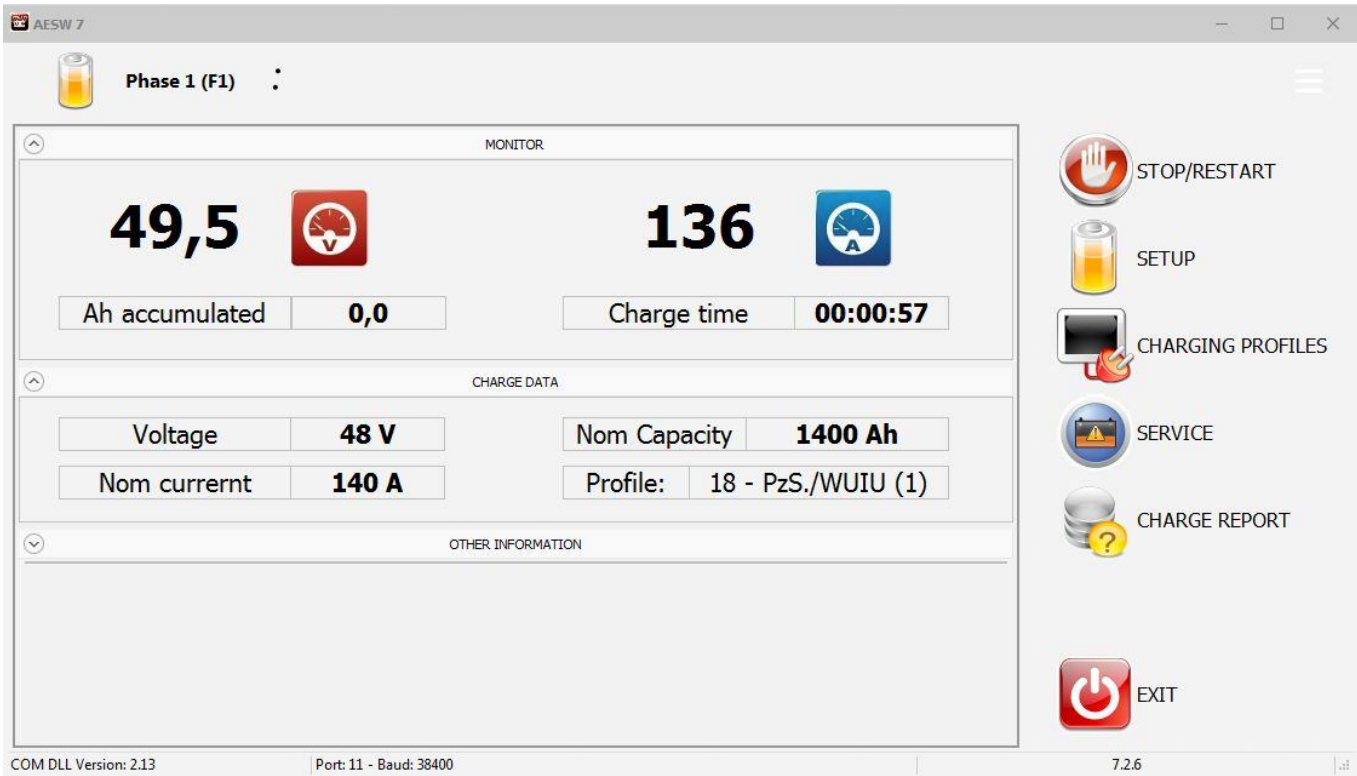
### 8.1. Overview

The Software can perform many functions, this is only a general overview:

"Monitor": Contains real-time data of the battery voltage, charging time current and accumulated Ahs

"Charger": shows the CB plate data or factory maxima, the serial number and the setting data (Type and Model).

"Charging Data" shows the settings of the Charger. This data derives from the settings that a User can modify. See the appropriate section.



There are 6 keys on the right of the mask

Here is their meaning:

STOP / RESTART	Allows shutdown and restart from PC
SETUP	It is possible to set: Charge Profile, Charging Current and Battery Ah
CHARGING PROFILES	It is possible to see the available Profiles and, if necessary, insert "not" provided Profiles (Custom)
SERVICE	Provides information on diagnostics, including a datalogger
CHARGING REPORTS	Allows viewing and printing of a Historical Report of the Office
EXIT	Closes the program

## 9. TABELS AND UTILITY DATA

The Table refers to a three-phase Main 480V-60Hz.

Voltage Range from 432V to 500V

DC		Power	AC		Power
			Main	Cur.	
V	A		(*) kVA	(# Amp	
24	80		2,2	2,7	
	100		2,8	3,4	
	120		3,4	4,0	
	140		3,9	4,7	
	160		4,5	5,4	
	180		5,1	6,1	
	200		5,6	6,7	
36	80		3,3	4,0	
	100		4,2	5,0	
	120		5,0	6,0	
	140		5,8	7,0	
	160		6,7	8,0	
	180		7,5	9,0	
	200		8,3	10,0	
48	80		4,4	5,3	
	100		5,5	6,7	
	120		6,7	8,0	
	140		7,8	9,3	
	160		8,9	10,7	
	180		10,0	12,0	
	200		11,1	13,3	
72	80		6,6	7,9	
	100		8,2	9,9	
	120		9,9	11,9	
80	80		7,3	8,8	
	100		9,1	11,0	
	120		11,0	13,2	

(§) Fuse DC	(@) External AC Cable	(@) External AC Protection
CNL 100	16 AWG	4 Amp
CNL 125	16 AWG	6 Amp
CNL 150	16 AWG	6 Amp
CNL 200	16 AWG	6 Amp
CNL 200	16 AWG	8 Amp
CNL 250	16 AWG	8 Amp
CNL 250	16 AWG	10 Amp
CNL 100	16 AWG	6 Amp
CNL 125	16 AWG	8 Amp
CNL 150	16 AWG	8 Amp
CNL 200	16 AWG	10 Amp
CNL 200	16 AWG	10 Amp
CNL 250	16 AWG	12 Amp
CNL 250	16 AWG	16 Amp
CNL 100	16 AWG	8 Amp
CNL 125	16 AWG	8 Amp
CNL 150	16 AWG	10 Amp
CNL 200	16 AWG	12 Amp
CNL 200	16 AWG	16 Amp
CNL 250	14 AWG	16 Amp
CNL 250	14 AWG	20 Amp
CNL 100	16 AWG	10 Amp
CNL 125	16 AWG	12 Amp
CNL 150	14 AWG	16 Amp
CNL 100	16 AWG	12 Amp
CNL 125	16 AWG	16 Amp
CNL 150	14 AWG	16 Amp

(*)	The Value in kVA refers to the maximum power that can be delivered during the first hours of charging. Power decreases during the charge
(#)	The Value in Amp refers to a voltage of 480V when the Charger is giving the maximum power. Being electronically controlled it varies its absorption in the functioning of the main voltage. At its minimum (432V) it absorbs a + 10% so that a 48/140 instead of 9.3Amp absorbs 10.2Amp. At its maximum (500V) it absorbs -4% so that a 48/140 instead of 9.3Amp absorbs 8.9Amp
(§)	Spare Part - Internal Fuse with 60mm Blade (DIN 43560) typical for forklift applications (CNL Bussman model)
(@)	The values shown are the minimum suggested for standard installations. Use these values to size the Circuit breaker or switch (and in case the fuses) to be used as EXTERNAL protection. WARNING - The Battery Charger is protected with 3 Ultra Rapid Fuses of 25Amp gR - 10 * 38

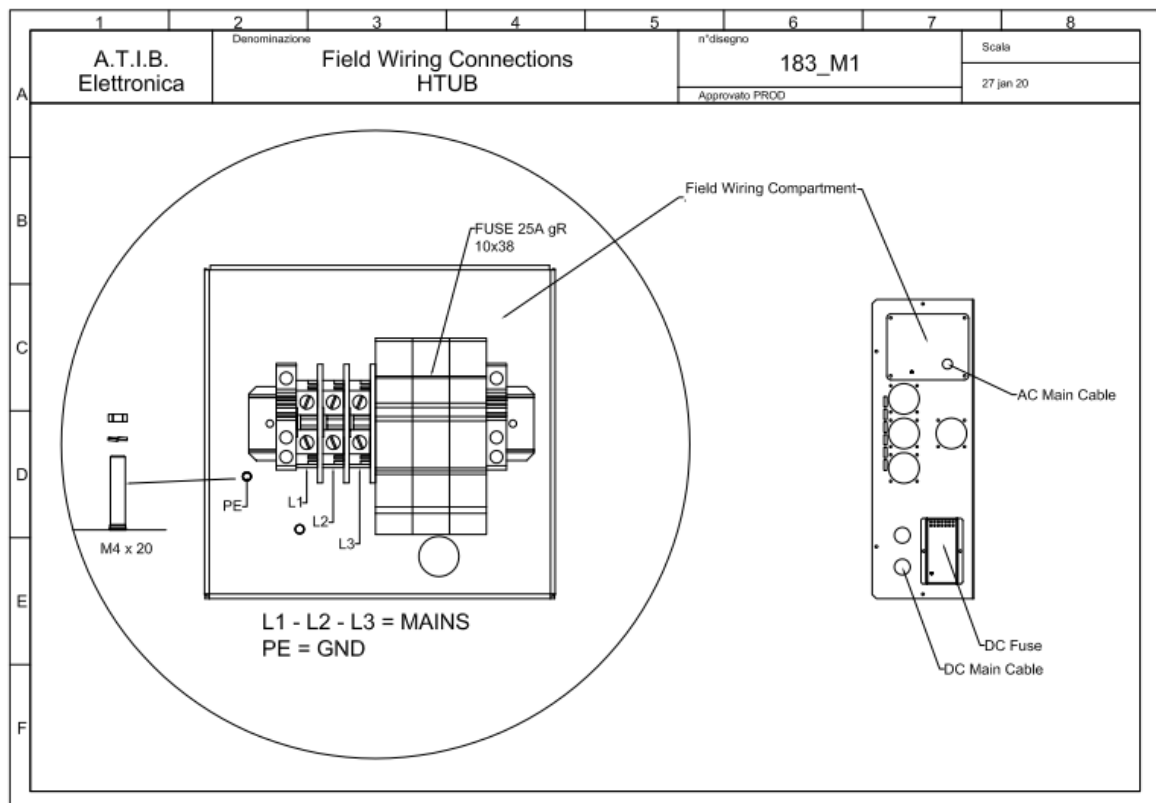
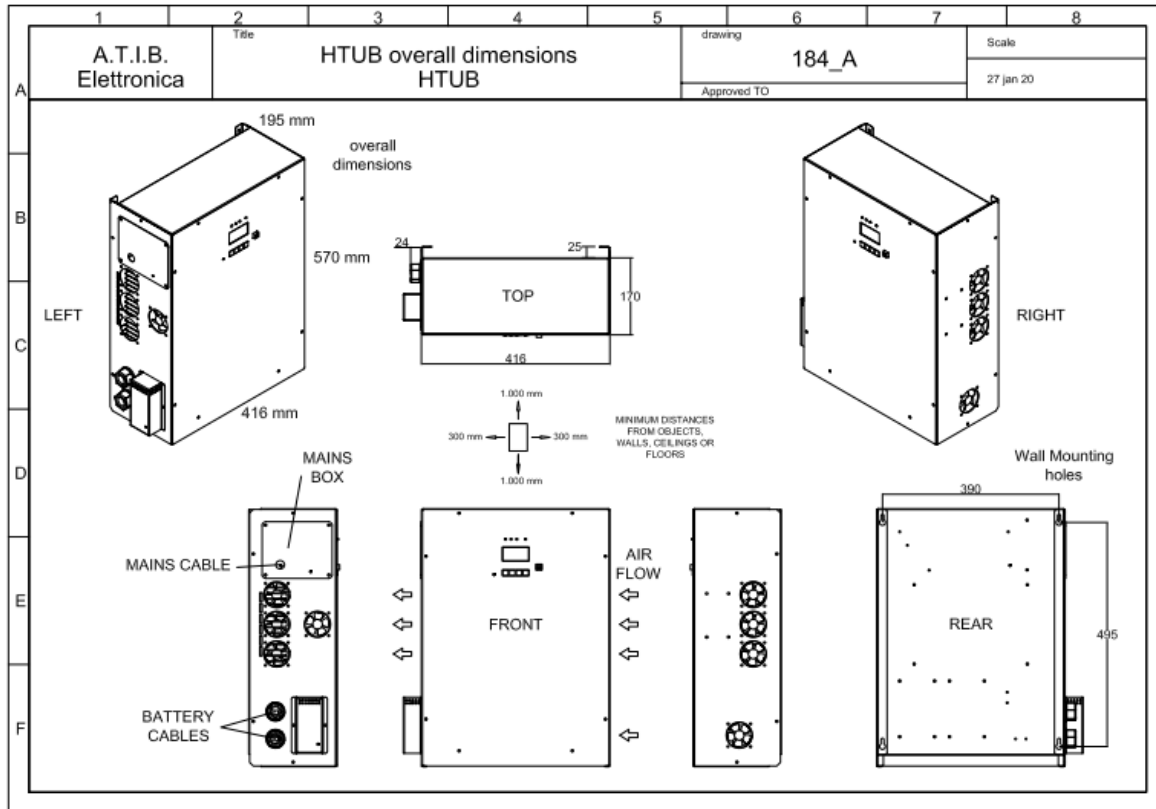


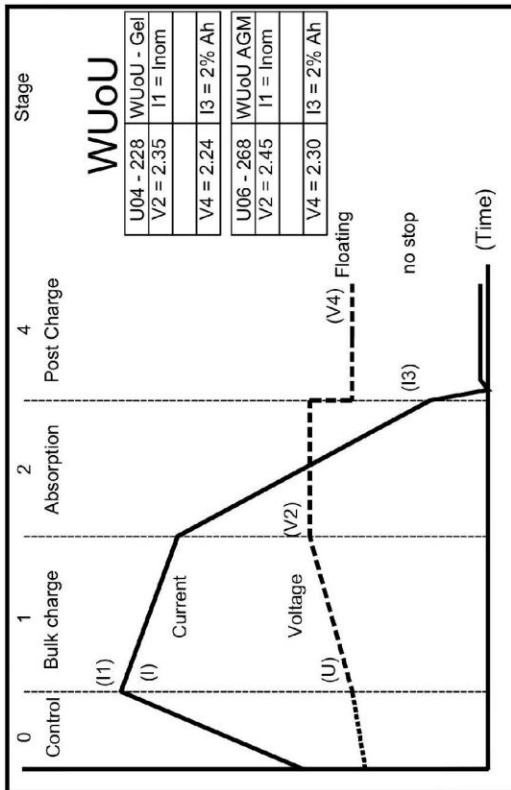
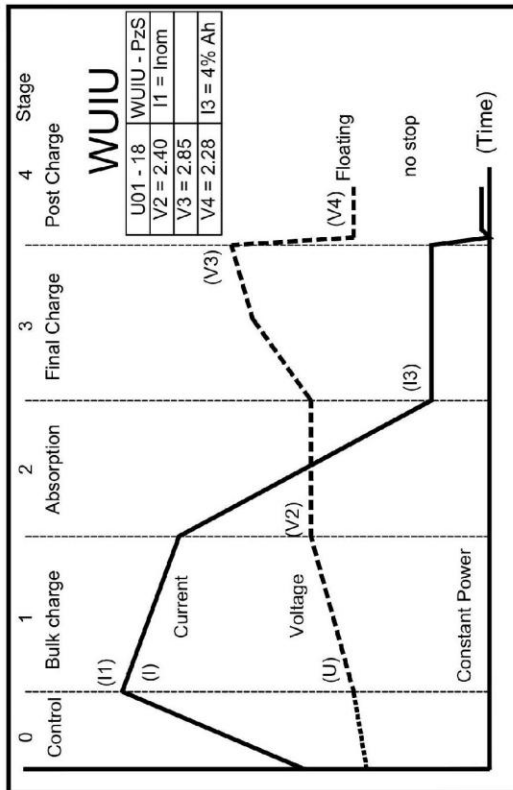
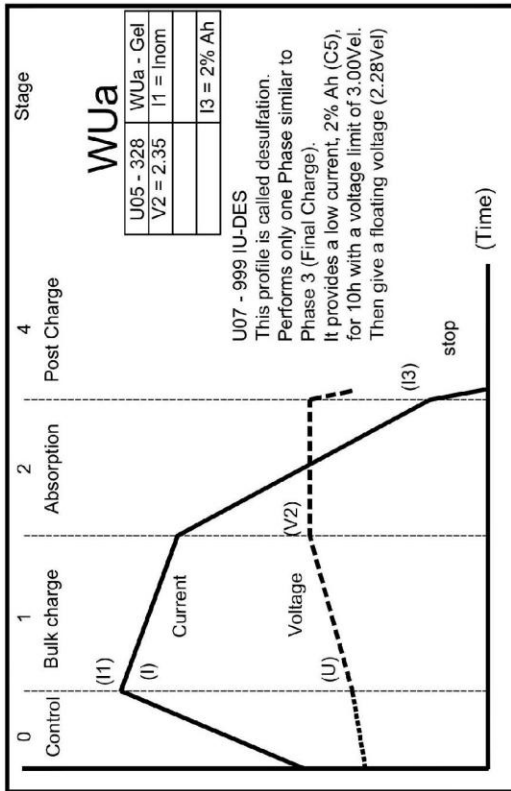
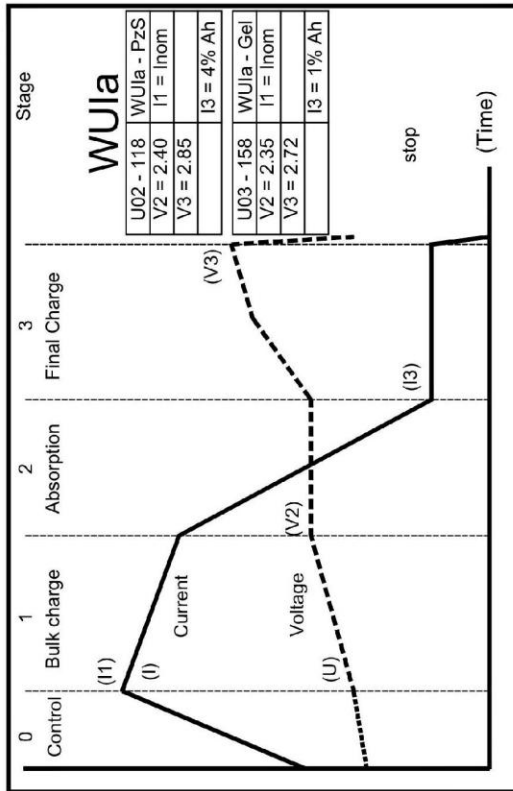
The Table refers to a three-phase Main 600V-60Hz.

Permitted Voltage Range from 575V to 600V

DC Power		AC Power		(\$ ) Fuse DC	(@ ) External AC Cable	(@ ) External AC Protection
V	A	Main (*) kVA	Cur. (#) Amp			
24	80	2,2	2,2	CNL 100	16 AWG	4 Amp
	100	2,8	2,7	CNL 125	16 AWG	4 Amp
	120	3,4	3,2	CNL 150	16 AWG	4 Amp
	140	3,9	3,8	CNL 200	16 AWG	6 Amp
	160	4,5	4,3	CNL 200	16 AWG	6 Amp
	180	5,1	4,9	CNL 250	16 AWG	6 Amp
	200	5,6	5,4	CNL 250	16 AWG	8 Amp
36	80	3,3	3,2	CNL 100	16 AWG	4 Amp
	100	4,2	4,0	CNL 125	16 AWG	6 Amp
	120	5,0	4,8	CNL 150	16 AWG	6 Amp
	140	5,8	5,6	CNL 200	16 AWG	8 Amp
	160	6,7	6,4	CNL 200	16 AWG	8 Amp
	180	7,5	7,2	CNL 250	16 AWG	10 Amp
	200	8,3	8,0	CNL 250	16 AWG	10 Amp
48	80	4,4	4,3	CNL 100	16 AWG	6 Amp
	100	5,5	5,3	CNL 125	16 AWG	8 Amp
	120	6,7	6,4	CNL 150	16 AWG	8 Amp
	140	7,8	7,5	CNL 200	16 AWG	10 Amp
	160	8,9	8,5	CNL 200	16 AWG	12 Amp
	180	10,0	9,6	CNL 250	16 AWG	12 Amp
	200	11,1	10,7	CNL 250	16 AWG	16 Amp
72	80	6,6	6,3	CNL 100	16 AWG	8 Amp
	100	8,2	7,9	CNL 125	16 AWG	10 Amp
	120	9,9	9,5	CNL 150	16 AWG	12 Amp
80	80	7,3	7,0	CNL 100	16 AWG	10 Amp
	100	9,1	8,8	CNL 125	16 AWG	12 Amp
	120	11,0	10,6	CNL 150	16 AWG	16 Amp

(*)	The Value in kVA refers to the maximum power that can be delivered during the first hours of charging. Power decreases during the charge
(#)	The Value in Amp refers to a voltage of 600V when the Charger is giving the maximum power. Being electronically controlled it varies its absorption in the functioning of the main voltage. At its minimum (575V) it absorbs a + 10% so that a 48/140 instead of 7.5Amp absorbs 8.2Amp.
(\$)	Spare Part - Internal Fuse with 60mm Blade (DIN 43560) typical for forklift applications (CNL Bussman model)
(@)	The values shown are the minimum suggested for standard installations. Use these values to size the Circuit breaker or switch (and in case the fuses) to be used as EXTERNAL protection. WARNING - The Battery Charger is protected with 3 Ultra Rapid Fuses of 25Amp gR - 10 * 38





## 10. MULTI-VOLTAGE (SPECIFIC INFORMATION)

HTUM is a three-phase multi-voltage battery charger suitable for 2 to 80V batteries

The ATIB elettronica Multi-Voltage stands out from other Multi-voltage because it has 2 functions:

Desulphation:

- 1) It delivers constant current for a certain period of time, leaving the battery voltage free to go up

Standard Charge:

- 2) Performs Standard Charges (WUIU, IUla, IUoU etc.) for Pb, Gel and AGM Batteries by setting suitable Profiles.

If necessary, the software allows the modification of the individual parameters by entering special modes.

For the limits of the Multi-Voltage, see the appropriate paragraph. The Release described in this manual is Rev 1.3d



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ITALY



Read the instructions before use

	Model:	Serial Number (mmyy)
	<b>HTUB 80/120 -ML</b>	<b>123461 HTUB 120</b>
AC input	<b>480 V ( 13,2 A )</b> <b>3 ph</b>	<b>60 Hz</b> <b>11,0 kVA</b>
DC output	<b>80 V ( 120 A )</b>	

**Model :** HTUM = 80V with I<sub>max</sub> 120A

**DC output :** Nominal voltage of the battery (V<sub>out</sub> 80V) and maximum output current (I<sub>out</sub> 120A)

Being a Multi-Voltage, other battery values are available

**Serial (Sn) :** 6-digit number (123457) for the unique identification of the CB followed by the model (HTUM) and by the month and year of production. (420 means April 2020)

**AC input:** Shows the Nominal Voltage of the Mains (V<sub>ac</sub> 480V), the Current (I<sub>ac</sub> 13.2A) and the Power needed (10.98 KVA) and the operating frequency (60Hz)



**WARNING:** The Charger is a Multi-Voltage and can perform many functions. It can perform constant current desulphation as well as multi-phase charge profiles, where it is sometimes the current to remain constant, and then the voltage could be.

Any measurement of the power and current values during charging will be different from the nominal values indicated on the nameplate.



**WARNING:** Its use is allowed only to those skilled and able to understand the information indicated in this manual.

Parameter modification is an action that can result in battery damage.

Every variation is made under the responsibility of the person who works it. If necessary, request further instructions.

Much information is given in this section only briefly. In the case, examine other sections of the manual.

### Switching on, End of charging and switching off the charger

**Switching on :** The charger is powered by inserting the AC Mains (display on). By inserting only the BATTERY the Charger remains off.

**End of Charging :** The display shows **OK** and the green LED is on.

When an additional charge or maintenance is being performed, the display shows a "full" battery and a PHASE 4 message.

Also shows Voltage, Current and Ah. The current could be close to zero

### SWITCHING OFF and UNPLUGGING the BATTERY:

The Charger stops by pressing the OFF button (P4) twice (call and confirm - see image 4L) or by removing the AC MAIN.

The BATTERY must be unplugged later to avoid possible unwanted electric arcs.

When the AC MAIN is removed, the Charger switches off immediately



**WARNING:** Before connecting another battery, wait for a sound of 2 seconds, the display will show "Battery not connected" and the BLUE LED will be on. After a manual stop, charging can not be resumed. The battery should be disconnected. The charge starts again from the beginning.

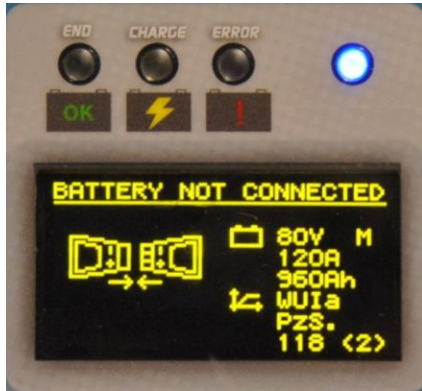
**ATTENTION:** In desulphation, when the battery is disconnected, the CB does not switch off. It's dangerous! Switch off as explained above.

## Information on the Display and LED Indications

The display provides a lot of technical information, such as voltage, current, capacity, number of charges, etc. (see appropriate paragraph)  
When switched on, the Display shows a mask that provides general information on programming the battery charger.  
The Display also indicates whether it is running or and if it is stopped and for what reason. See previous paragraphs

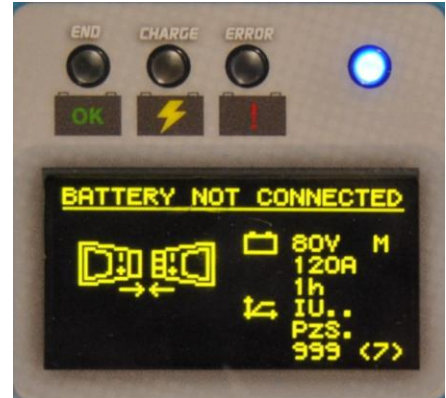
## Turning on the Multi-Voltage (AC only)

When the Multi-Voltage turns on it can be in one of the two situations shown below



08A  
If this mask appears, the Charger is programmed as:  
**Standard Charge**

Profiles from (1) to (6) identify Standard Charges  
(see appropriate paragraph - Change of the Porfilo of charge)



08B  
If this mask appears, the Charger is programmed as:  
**Desulphation**

The Profile (7) generally code 999 indicates the desulphation charge

## Switch between STANDARD and DESOLFATION modes

By pressing any key and then the 1 (Battery) key the setting options appear



09A  
If the charger profile is: Standard  
4 options appear

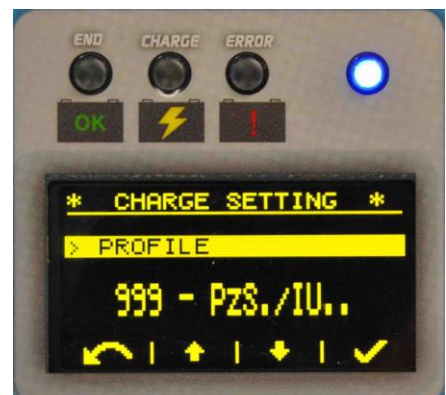


9C  
If the charger profile is: Desulphation  
3 options appear

09B  
Each of the two masks has the possibility to change the charging profile  
Selecting the "Profile" item  
The mask shown at the side appears

In this case, choose the 999 Profile if you want the Charger to function as a Desulphurizer

Press the key (4) to confirm.





## Set a Desulphation Charge



**ADVICE:** A complete cleaning is necessary before subjecting a battery to the de-sulfation treatment. Check that there are no signs of oxidation, that the cables and especially the connections are well made and not oxidized and that the electrolyte level is sufficient. Check that the voltage value of the individual elements in charge or discharge is sufficiently balanced. Based on these factors, determine whether the battery should be subjected to a strong and partial sulfation.

As a general rule, it is assumed that desulphation is obtained by injecting a low current into the battery (from 2-4% of the battery capacity or Ah) for a long time (tipic 24h). Do not give an excessive current, rather give more time!



9C

NOTE: The charger must be in the DESULPHATION charging profile (see 08B)

By pressing any key and then the 1 (Battery) key the setting options appear

Set the Current to 4% of the battery capacity (eg : 500Ah = 20A)  
(Steps of 5A from 5A to 120A)

Set the Charging Time to 24h (or other time - see notes)  
(Steps of 1h from 1h to 48h)

Charge Profile Used to change charge setting from desulphation (7) to Standard (from (1) to (6)) and vice versa



09D

The mask on the side shows what appears by selecting the word "Charging Time"



**WARNING :** pay attention to the nominal current value.

Do not exceed the recommended charging current! (typical 2-4% Ah of C5 battery)

Check **before** loading that the electrolyte level is above the minimum, but it is not too much otherwise it will come out.

Check it periodically even **during** charging.

It must not fall below the minimum. In case switch off and top up.

Our technical department can help you if necessary.

## Set a Standard charge



When you want to charge a low battery, ie without any particular de-sulfation problems, you set one of the available profiles (see paragraph "Setting the Charger"). Choose them according to the battery to be charged.

Profile Number	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Code ATiB el.	18	118	158	228	328	268	999
International Code	WUIU	WUIa	WUIa	WUoU	WUa	WUoU	IU



Current Set according to the table "Setting the Charger" (from 10A / 100Ah to 20A / 100Ah)

Capacity Set the Ah (C5) of the Battery (or the value next to the real one)

Profile Used to change charge setting from Desulphation (7) a Standard (from (1) to (6)) and vice versa

Voltage Set the Nominal voltage of the battery  
(2V steps from 2V to 80V) There are all intermediate values



## Multi-Voltage limits

**HTUB xx/yy -ML** is a Three phase Charger 480V 60Hz

**HTUB xx/yy -MV** is a Three phase Charger 600V 60Hz

Range of Voltage available (xx)

The charger can charge a battery with a nominal value from 2V to 80V

All intermediate values are available in 2V steps

This allows you to cover the range of all possible batteries and to charge batteries even if one or more items are no longer usable

Range of Currents available (yy)

The Charger can supply from 5A up to 120A in steps of 5A

For voltages from 2V to 10V the maximum value is limited to 30A

## Time Management

In desulphation mode (**7**) the charging time is set by Display, there are no internal limits.

The current flows constantly for this time.

In standard mode (from **1 to 6**) charging times are managed internally.

The charge is automatic.

## Battery disconnection

The disconnection of the battery without having turned off the charger with the appropriate STOP button is an incorrect operation and should be avoided.

In the case of Multi-Voltage it is even more important because the Charger needs more time to intercept this error.

The charger needs approximately 30 seconds before understanding that this incorrect action has been made.

This is due to the fact that the voltage range is extremely wide (from 2V to 80V).

We therefore invite you to use the Stop button or remove the AC Main to stop the charge.

# NOTES

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