e.Bick Ultra 175 Technical Manual

cecasa

Revision Control

REV.	DATE	REASON / RESPONSIBLE
07	24/02/2022	Various changes (Installation improvements)

Limitation of Warranty and Liability

The limitation of warranties and liabilities shall be described in the contractual agreements between CEGASA and the buyer.

The information included in this manual has been written for the purpose of providing the user with more detail and clarity in terms of content. Nonetheless, CEGASA reserves the right to modify the contents of this manual through future revisions at any time and without prior notice.

Confidentiality

All information provided by CEGASA by virtue of this User Manual and any data or features that may be disclosed by such shall be completely confidential and may not be shared with third parties or used for purposes other than that for which it is was intended without prior and express written authorization from CEGASA.

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TCCv2.0 BTH Revision history

REV.	DATE	RECORD OF CHANGES / RESPONSIBLE
01	02/11/2021	Initial document
02	12/11/2021	Revision
03	17/11/2021	CERBO GX cable
04	25/11/2021	SMA cable 3-phase installations
05	15/12/2021	24h Energy / Total Energy
06	18/02/2022	Binary code explanation

Disclaimer and warranty

The information and established recommendations are made in good faith and are considered to be accurate as of the date of preparation.

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Contents

1. Introduction

1.1 Purpose

The following document presents the first steps to ensure that the eBick ULTRA 100C systems are installed and used safely. The company recommends reading the whole user manual beforehand, which can be downloaded from the website or requested in electronic format from the company supplying the equipment.

1.2 Product codes

Products:

✓ ULTRA 175 module w/o base frame or wheels (48Vdc 280Ah)	**(109624)**

Accessories:

✓ Base frame with wheels	**(109512)**
✓ TCCv2.0 CAN BLE	**(109765)**
✓ TCC communications cable (CERBO GX and 3-PHASE)	**(109755)**
✓ RJ45 COM extender cable	**(109642)**

1.3 1.3 Acronyms

FAT	Factory Acceptance Tests
BMS	Battery management system
eBick_ULTRA 175	Battery pack de 48V 280Ah
SOC	State of charge. Cantidad de energía en la batería

2. Technical characteristics

	ULTRA 175_48V 280Ah	ULTRA 175_48V 560Ah	3 MODULE SETUP (To busbar)	4 MODULE SETUP (To busbar)
Mechanical characteristics				
Equipment dimensions (mm)				
Width	765			
Depth	405			
Height	600			
Height w/o base frame	470	-		
Equipment total weight (kg)	105	210		
Finish / Battery seal	IP30			
Electrical characteristics				
Rated voltage (V)	48		48	
Maximum voltage (V)	52,2		52,2	
Minimum voltage (V)	43		43	
Rated capacity (Ah	**280**	**560**	**840**	**1120**
Rated energy (kWh)	13,5	27	40,5	54
Type of communications	CAN Bus			
Protecciones eléctricas				
Overload	ok			
Over-discharge	ok			
Short-circuit	ok			
Over-current	ok			
Over-temperature	ok			
Passive balancing	ok			
Current level (A)				
Maximum continuous charge current	175	320	450	500
Recommended continuous charge current	140	280	400	475
Rated continuous discharge current	140	280	400	475
Maximum continuous discharge current	175; (8kW)	340; (15KW)	500; (22.5kW)	575; (26KW)
Peak discharge (1) current/time	225 (5 minutes); (10kW)	450 (5 minutes); (20KW)	600 (5 minutes); (26KW)	800 (5 minutes); (35KW)
Peak discharge (2) current/time	270 (5s); (12kW)	540 (5s); (24KW)	750 (5s); (32KW)	875 (5s); (40KW)
Peak discharge (3) current/time	400 (<1s)	800 (<1s)	1000 (<1s)	1000 (<1s)
Electrical connections				
Power Connector	REMA SR 350 Connector Grey (Similar connector is supplied for installation with pins for 95mm^2)			
Power Connector	RJ45 Cat 5e (parallel cable)			
Type approval				
	CE Mark			
	UN 38.3			

2.1 Cyclability test conditions

Parameters based on IEC 61960 standard Tested under the following conditions:

Parameter	Conditions as per IEC 61960	Test conditions for eBick ULTRA 175
DoD	100%	**80%**
Temperature	20 +/- 5ºC	**20 +/- 5ºC**
Charge C-Rate / Current	0,2 C	**0.2C / 55A**
Discharge C-Rate / Current	0,5 C	**0.5C / 140A**
Final capacity after test	> 60% of rated capacity	**> 80% of BOL capacity: > 224Ah**
Rest period between charge and discharge	At least 1 hour after each process	**1 hour after each process**
Storage temperature between charge and discharge	20 +/- 5ºC	**20 +/- 5ºC**
Other test conditions	**As per IEC 61960 standard**	

Table 2.

2.2 Battery Management System Technical Specifications

The BMS has the following safeguards:

- Overvoltage
- Undervoltage.
- Overcurrent during CHARGE process
- Overcurrent during DISCHARGE process.
- Temperature protection (DISCHARGE)
- Temperature protection (CHARGE)
- Short-circuit

2.2.1 Safeguards during operation mode

OVP (over-voltage protection):
When a cell reaches 3800 mV, the BMS opens the power connections, terminating the charging process, in order to protect the battery.

UVP (under-voltage protection):
When a cell is discharged to a voltage below 2600 mV, the BMS opens the power connections, terminating discharge.

OCP (over-current protection):

OTP (over-temperature protection):

- Discharge: 70 ° C
- Charge: 55 °C

UTP (under-temperature protection):

- Discharge: -20ºC
- Charge: 0 °C

2.2. Standby mode

The Cegasa BMS automatically switches to standby mode when it detects that there is no current (charge or discharge) or communications.

Consumption in standby mode is less than 800µA. E.g., BMS consumption in standby mode over 3 months is less than 1% of initial capacity.

2.2.3 Cell balancing

Balancing is initiated when cell voltage reaches 3450 mV. Balancing current is 30 ± 5 mA

WARNING:

RISK OF FIRE OR EXPLOSION

Failure to comply with safety messages may cause serious injury, death or damage to property

DANGER!

Check that the voltage is within range before connecting the equipment to the inverter. NEVER connect if the voltage is out of range.

DANGER!

NEVER connect the ULTRA 175 units in SERIES..

DANGER!

All tools shall be approved for working with 60V. All personnel working with low voltage systems shall be duly qualified and certified in accordance with local regulations. The equipment always has a DC voltage at the terminals of both power connectors (top and bottom).

DANGER!

NEVER remove or bypass switching and protection systems.

DANGER!

Do not short-circuit the modules' terminals. The short-circuit current may be several thousand amperes. Prolonged short-circuiting will destroy the battery module and electrolyte may leak out of the cells, causing a fire and/or explosion.

DANGER!

eBick ULTRA 175 installation and maintenance personnel shall wear protective apparel, special gloves and safety glasses. All personal metal objects such as wristwatches, rings, jewellery, etc., shall NOT be worn while working with the Modules.

DANGER!

To avoid short-circuits and electric shock, use safety tools (EN 60900) and protection devices when installing and servicing the equipment.

DANGER!

Do not connect or disconnect the load when the equipment is operating (current circulating). This may cause an electric arc and expose personnel to high DC voltage. The electric arc might also destroy connectors, due to a welding effect.

DANGER!

In case of fire, disconnect the circuit from the battery and use a CO_2 extinguisher to extinguish the fire. The batteries contain flammable materials. Always inform fire-fighters about the lithium batteries.

DANGER!

Do not open the covers on the battery modules. Do not place or drop conductive objects inside the battery module or between the string's terminals.

DANGER!

Do not expose to temperatures above 65ºC. The equipment will not be operational beyond these temperatures, however, even with non-operational equipment exposing the cells to high temperatures may cause fire and/or explosion.

DANGER!

Do not immerse the battery in water or any other liquid.

DANGER!

Never drop or knock the modules.

DANGER!

If chargers/converters are used, use only those authorised by CEGASA. Misuse of the battery module during charging or discharging may cause the equipment to age prematurely leading to fire and/or explosion.

DANGER!

In the event of an emergency, read the MSDS (Material Safety Data Sheet) for the cells before proceeding.

3.1 General information

The eBick ULTRA 175 is an energy storage system using Li-ion LFP cells. Under normal conditions there is always a voltage at the terminals of both power connectors (top and bottom).

The whole system contains a high energy capacity. To minimize the risk of electric shock, short-circuit, explosion and/or fire, follow the relevant procedures and local guidelines, as well as the instructions that are included with the system.

Only qualified personnel should perform the installation, in accordance with the applicable regulations. Systems with visible electrical connections have to be isolated from public access. For safety purposes, cover all direct connections and terminals.

Carefully read, understand and apply all requirements presented in this section.

3.2 Safety Instructions– Potential hazards

- **The area around the eBick ULTRA shall be kept clear and free** of combustible materials, gasoline and/or other flammable fumes, vapours and liquids.
- The area defined by safety margins for the necessary supply and venting of air shall be respected.
- In the event of an emergency, the eBick ULTRA 175 has electrical safety cut-off elements (fuses and MOSFETs). **It is advisable to install an element that protects against over-current and possible short-circuiting during the final installation. It is also advisable that the cut-off element can be manually operated if necessary.**

Remember, that because this deals with batteries, the internal DC bus will always be live.

- **Do not use the module if any of its parts have been immersed in water.** A water damaged cell is potentially dangerous. Any attempts to use the system could cause a fire or an explosion. In such cases, contact CEGASA ENERGY to have the battery pack inspected.
- The following instructions shall always be followed:
  - **Any air inlet or outlet within the room shall be kept clear and free of obstacles.**
  - **The floor shall be capable of bearing the weight of the system.**
  - **There shall be no obvious signs of wear on any eBick ULTRA element.**
  - **As this is a battery, under normal conditions there will always be a voltage on the +/- terminals.**

3.3 Electrical safety

- Never remove safety guards or devices that protect against live parts.
- Do not reach inside the modules, nor touch any internal component.
- Do not use or handle any eBick ULTRA 175 component when accidentally wet, or with wet hands or feet.
- In the event of a failure or incident, as a first step cut off the current. To rescue a person being electrocuted, do not touch them but immediately cut the current.

- If it is not possible or takes too long to cut the current, try to disengage them by means of an insulating element (wooden strip or board, rope, wooden chair ...).
- Make sure that the output and input connection cables are not short-circuited.
- Make sure there is no short circuit between positive and negative terminals at any point.
- Make sure there is always protective insulation on the output and input cables and a reliable connection.
- Never use cables that are visibly damaged or that may be suspected of being damaged.
- Minimise conductivity, avoiding surfaces in contact with water. Hands and clothes have to be dry.
- Do not use, install or store the system under wet or damp conditions.

3.4 Mechanical safety

- Due to the weight of the battery modules (>105 kg), mechanical means have to be employed to install them.
- Do not stack eBick ULTRA 175 modules more than 2 high. If this is absolutely essential for the installation, consult CEGASA about how to mechanically fasten the modules and the power connection.

3.5 User requirements

- In addition to personnel who work with the module, workplace users should also implement safety measure by applying the minimum provisions of RD 614/2001 on the protection of the health and safety of workers exposed to electrical risk in the workplace.
- Hazards related to electrical risk are specifically identified during the work process with this equipment. This does not exclude the possible existence of other risks present during handling and use, such as overexertion, posture, or other measures against health risks. Operators shall receive the necessary training, sufficient to be able to prevent and avoid any risks arising from use of the equipment.
- By design the equipment protects against these risks under normal operating conditions, however, it is with operations that differ from normal ones (installation, maintenance, ...) where special precautions have to be taken.
- Particular care should be taken when handling modules, due to their weight. Respect guidelines according to current regulations regarding ergonomics in the workplace (Royal Decree 487/1997). Use appropriate handling equipment.

3.6 Lockout-tagout of machines and installations (L.O.T.O.)

- To perform operations absent of voltage (L.O.T.O.), the device must be locked and tagged to non-hazardous voltage values. The following section is based on the lockout-tagout at several points according to RD 614/2001:

1. Restrict access to the work area to prevent entry of unauthorised personnel.
2. It shall be disconnected and isolated from the supply network or connection to the converter.
3. Given that the batteries are an energy storage system, it is impossible to make certain points of the system free of voltage. If there is any exposed point where the voltage cannot be eliminated, the terminals will have to be tagged, indicating the voltage value at that point.
4. Prior to conducting any work, the voltage shall be measured at the point where the work is to be done. Some points may be energised directly from the batteries.
    - To carry this out, it is necessary to do the following:
    - Use only 60V insulated tools
    - If terminals are exposed during the sectioning process, use 60V rated insulating gloves.
    - Use a face shield during the work.
    - Should it be necessary to perform an operation on a battery pack, place the modules on insulating matting.
    - Use insulating footwear.
    - To avoid possible short-circuiting, do not carry any conductive device (e.g. pens, tape measures, etc.) during the work.
    - Do not wear any metal, conductive or sharp edged accessories.
    - It is recommended that the installation's positive and negative cables be of the same cross-section and length.

3.7 Switching, measurements and checks

The regulation permits operations and interventions without lockout-tagout, provided that an equivalent level of safety is guaranteed.

These interventions are called switching, trials and checks. They have to be carried out by authorised personnel with protection devices and personal protective equipment appropriate for the voltages in question.

- Special protection against short-circuits should be ensured. Instructions to follow:
- The operations shall only be carried by authorised, duly trained, personnel.

- Safety apparel that covers the whole body (long sleeves) shall be used. Fireproof or flame retardant, with protection against chemicals and arc flash.
- The work shall be done from a solid, stable support
- If a work table is used, it shall be insulated or covered with insulating matting.
- No terminal with an electrical charge should be left uncovered. If, after removing the connections, the terminals are exposed then they have to be protected with the terminal covers supplied.
- All tools shall be insulated and rated up to 60V
- Operators shall not wear or carry any metal elements or devices.
- The work area shall be free of obstacles.
- If necessary, when there are exposed terminals nylon slings shall be used instead of chains.
- The operator shall wear a face shield or safety glasses to protect against short-circuits
- Occasionally, depending on the operation, there should be an OHS assistant present.
- This person should satisfy that stated in Annex IV of RD 614/2001

4. Assembly of the equipment

Caution: *Given that the modules are supplied with electrical charge levels necessary to maintain the chemical properties of the batteries, the entire installation process shall performed with the recommended protection equipment.*

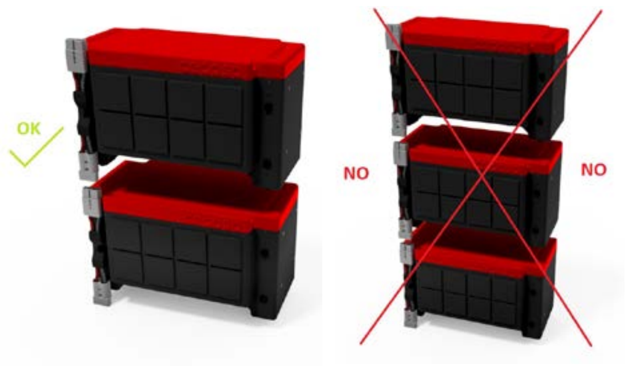
Each eBick ULTRA 175 module is pre-wired, pre-set and factory tested. After receiving and unpacking the system, the installer should find the following pre-assembled:

- An eBick ULTRA 175 module, depending on the set-up
- A protective cover to cover the terminal that is left free without a connection
- An SB350 REMA or ANDERSON connector set and pins ref.102753 for connecting the final installation
- A plate and two screws for fastening the front of the modules together (when they are stacked in two high)

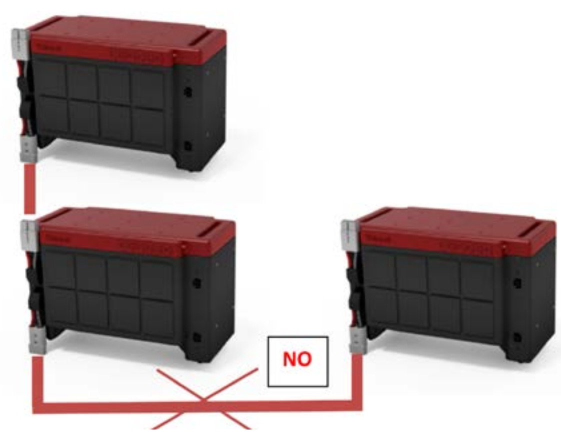
4.1 Potential hazards

IMPORTANT:

The maximum height of these stackable modules is TWO units.



A two unit TOWER (interconnected) CANNOT be connected to ONE SINGLE battery. Imbalances would be generated in the charge and discharge currents. Please consult CEGASA



4.2 Unpacking the product

The ULTRA 175 eBick system is designed with a special box to facilitate ADR transportation. Cegasa reserves the right to charge the customer for the box and its transportation. It is advisable to keep this box for possible returns due to warranty issues. Otherwise, the customer shall have to ask CEGASA for a new box to accommodate ADR transportation.

Because the equipment is very heavy, it is **ESSENTIAL** to remember to take extreme care when moving or lowering it, as there is always a risk of falls and/or entrapment.

In all circumstances the installer is responsible for unpacking the product from the box and the final installation of the module.

Unpack the equipment, removing the strapping, cardboard box and cardboard supports.

Save all the materials for possible future shipments of the battery due to warranty issues.

4.3 Initial check

Before beginning the installation, it is advisable to check the state of the modules:

1. Check the state of the modules. No knocks or apparent damage; The nameplate bearing the serial number fitted to the back of it.
2. With the aid of a multimeter measure DC voltage between the positive and negative terminals on each battery module (points 1 & 2). Check that polarity is correct and that the voltage is within range (≈ 48VDC) The retractable red lug on the cable indicates positive polarity, whereas the black one indicates negative polarity.

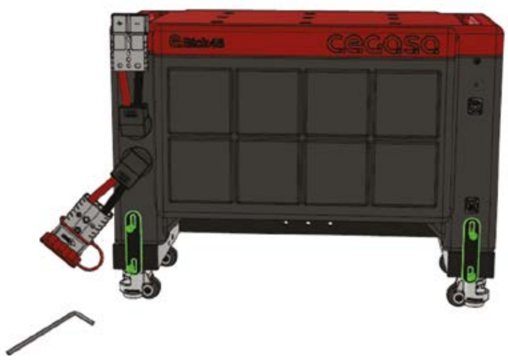
4.4 Final installation w/ BASE FRAME accessory (109512)

By purchasing the BASE FRAME accessory with built-in wheels, it is possible mount ONE or TWO modules on the frame and move it about (in a simpler way) before securing it.

Steps to follow:

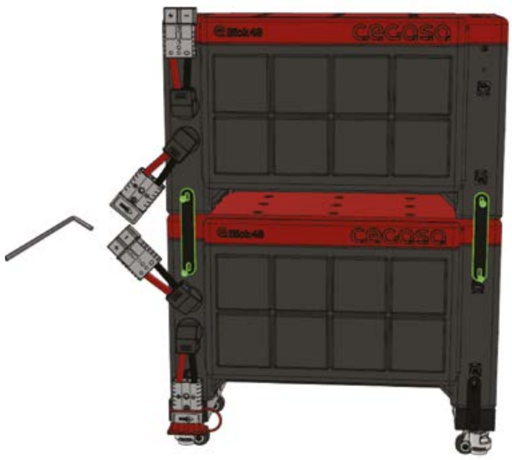
a) Place the module on top of the base frame, inserting the guides on the bottom of the module into the top slots on the frame.

b) At the front, fasten the module to the base frame using the two plates (flat) and screws supplied with the base frame assembly. An ALLEN key is required.



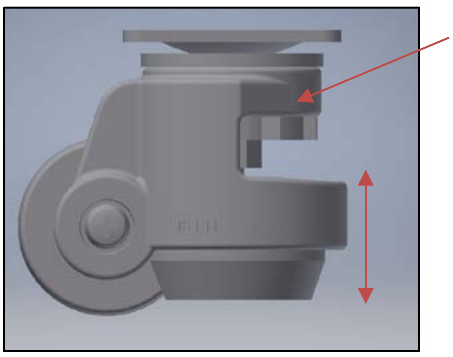
c) At the back, fasten the module to the base frame using the two plates (bent) and screws (2 metric threads - bottom and 2 plastic threads - top) supplied with the base frame assembly. An ALLEN key and screwdriver are required.

d) When mounting TWO modules, the front of the modules have to be fastened together using the fastening plates (long flat) and screws that are supplied with each of the modules. An ALLEN key is required.



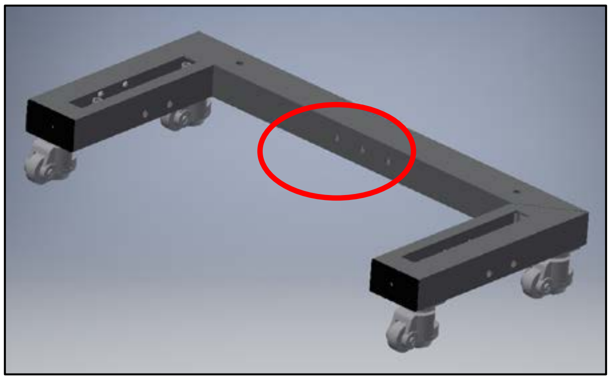
e) Once the eBick ULTRA 175 is in its final position, the 4 feet on the base frame can be lowered (incorporated into the wheels themselves) by using an adjustable spanner to turn the red wheel.

This keeps the equipment “braked” in its final position. It is important to level the legs with respect to the ground.

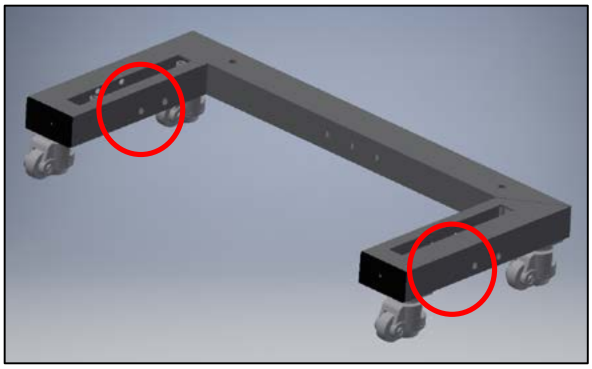


Wheel for lowering the foot

f) If deemed necessary, the base frame can be secured to the wall of floor by using the 3 x Ø10mm holes at the back of it. Please consult CEGASA if the installation has to be secured.



g) In the event that several columns have to be joined together, this is also possible by using a nut-bolt connection through the 2 x Ø10mm holes that are on the sides of the base frame, once the equipment is in position.

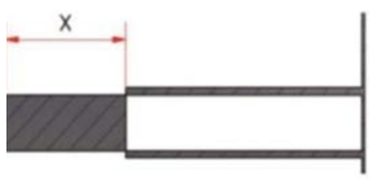


4.5 Parallel power connection

As mentioned throughout this document, the ULTRA 175 units can only be connected to each other in parallel, up to a maximum of 4 **ULTRA 175 units**

The equipment is supplied with Connector + Pins (Ref. SB350 REMA grey and pins) to connect to an inverter or the final application. It is advisable to use cable with a cross-section of 95mm2 - 105mm2.

Follow the pin manufacturer’s recommendations on cable stripping distance. In this case 33mm.



Dibujo 1: cable pelado

TYPE	Contact Ref.	Cable Section	"X" in mm (image 1)
>SR50	109356	10/12 AWG	13,5
>SR50	109358	8 AWG	12,5
>SR50	109354	6 AWG	12
>SR175	10936	4 AWG	26
>SR175	109364	2 AWG	26,5
>SR175	109363	1/0 AWG	26
>SR350	109368	1/0 AWG	30,5
>SR350	109371	2/0 AWG	30,5
>SR350	102752	3/0 AWG	33
>SR350	102753	4/0 AWG	33

Important notes:

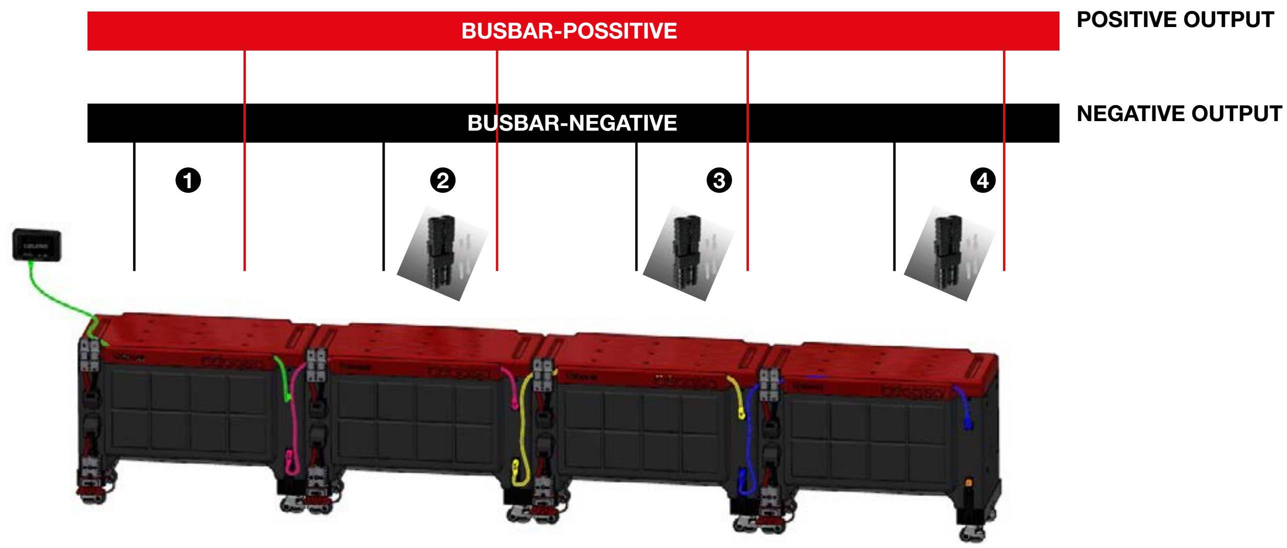
- ✓ **Under no circumstances can ULTRA 175 modules be connected in series.**
- ✓ **The system is self-powered and does not require any connection to an external supply.**
- ✓ **The length of the interconnecting cables affects the final voltage detected by the application. It is recommended that the power output cables be of the same cross-section and length.**
- ✓ **It is advisable to install the battery as close as possible to the element that is going to use it (inverter, DC bus, ...) and avoid sharp curves or bends in the cables.**
- ✓ **For recommended cable lengths, wire sizes and characteristics, please contact CEGASA.**

4.5.1 ULTRA 175 units fitted 1 high

These units can be connected to each other in parallel (up to a maximum of 4 units) **ALWAYS** through an appropriately dimensioned busbar installed by the installer.

It is advisable to use cable with a minimum cross-section of 95mm2 - 105mm2. See point 4.5

It is also advisable to fit a 48Vdc 500A fuse on each positive input to the positive power busbar.



4.5.2 ULTRA 175 units fitted 2 high

These units can be connected to each other in parallel (up to a maximum of 4 units) **ALWAYS** through an appropriately dimensioned busbar installed by the installer.

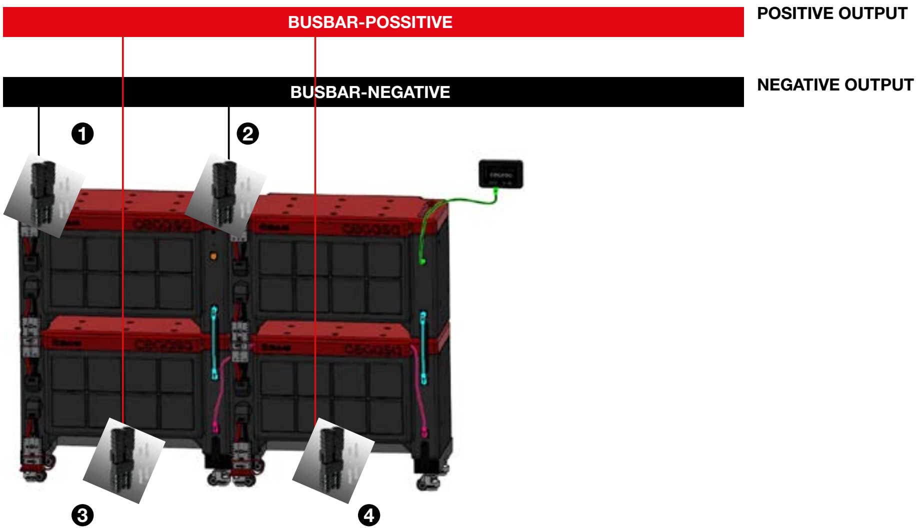
It is advisable to use cable with a minimum cross-section of 95mm2 - 105mm2. See point 4.5

It is also advisable to fit a 48Vdc 500A fuse on each positive input to the positive power busbar.

On installations stacked 2 high, it is advisable to connect to the general power busbar using two power connectors and their pins (included); The tower's general negative has to be connected to the top connector and the tower's general positive has to be connected to the bottom connector.

This ensures better distribution of high currents through both modules.

As shown in the image below.



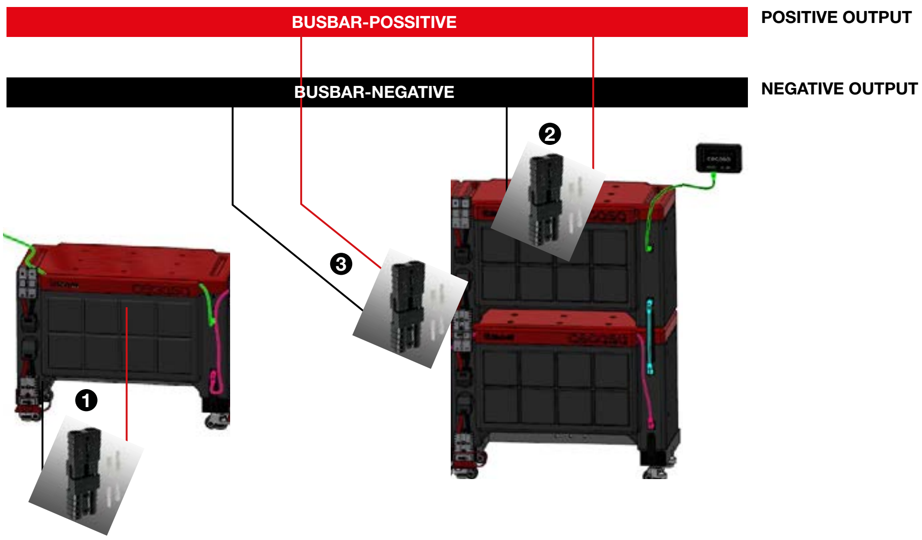
4.5.3 Case of ULTRA 175 units fitted 1 and 2 high

In the case of combining modules of ONE and TWO heights, each module has to be connected to the busbar individually (3 inputs) to prevent imbalances in the modules due to a different distribution of currents during the charging and discharging processes.

It is advisable to use cable with a minimum cross-section of 95mm2 - 105mm2. See point 4.5

It is also advisable to fit a 48Vdc 500A fuse on each positive input to the positive power busbar.

As shown in the image below.



4.5.4 Maximum powers depending on set-up

During discharge:

The maximum power for each of the modules across the entire SOC range is 8kW.

(*) Depending on ambient temperature conditions during the discharge process.

En carga;

(**) If using TCC, the charge parameters (charge voltage and current) are always sent to the inverter via communications.

(***) Even with TCC it is ESSENTIAL to configure the charge values of the solar or wind power controllers in DC (MPPT or similar). Consult CEGASA to establish the ideal charging conditions for the battery.

If the installation has a DIESEL generator set, it is necessary to configure its start and stop values. Consult CEGASA to establish the ideal start/stop conditions for the battery.

4.6 TCCv2.0 CAN system

The ULTRA 175 range can work with a TCC CAN system, offering the possibility to communicate via CAN BUS with commercial inverter/charger equipment from VICTRON ENERGY, SMA, STUDER brands, etc. For other brands of equipment, please consult the CEGASA technical team. The TCCv2.0 CAN system is sold separately and offers the following advantages (with an extremely simple connection system):

a) CAN BUS communication based on protocols defined by major inverter/charger equipment brands.

b) Using CAN communications to send the most relevant battery data, such as:
  - **The battery's actual state of charge (SOC)**
  - **Actual current and voltage during charge or discharge**
  - **Battery temperatures**
  - **Battery alarms;** if the battery suffers a mishap, it sends an alarm to the inverter to display or notify and in turn a setpoint charge/discharge current value of 0A so that the process can finish but without disconnecting the inverter/charger equipment. Reset is fully automatic as soon as the alarm is triggered in the battery, and the process continues with no need of a manual reset.
  - Data for optimal battery charge; depending on the battery's SOC and its temperature, the inverter constantly receives CHARGE VOLTAGE and CHARGE CURRENT variables so that the inverter/charger can modulate the charge process.c) LEDs (4) para visualización del estado de carga (SOC) pulsando un botón.

c) LEDs (4) to display the state of charge (SOC) by pressing a button.

d) LED status to see if the system is OK or an alarm/warning is active.

e) USB port for SW updates

f) Bluetooth connection to display parameters in mobile device APP (iOS and ANDROID).

Example of a of TCCv2.0 CAN connection system with up to 4 batteries:

5. Ambient operating conditions

Parameter	Technical specifications	Comments
Operating Temperature Range during CHARGE (ºC)	0ºC ~ + 50ºC	
Operating Temperature Range during DISCHARGE (ºC)	-20ºC ~ + 50ºC	
Humidity (RH%)	5%≤RH≤85%	

6. Maintenance and storage procedure

The customer is responsible for complying with this procedure:

✓ Each month, check the voltage (within the range of the battery) and the visual state of the casing (no dents, swelling or discolouration) and the positive and negative terminals of the power connector (free of oxidation).

✓ If the battery is to be left off (> 3 months), then it has to be charged up to 40 - 60% SoC.

✓ A full charge is recommended every 7-14 days to update the SoC for measurement errors.

Storage recommendations

✓ Do not expose to direct sunlight or rainfall

Parameter	Technical specifications	Comment
RECOMMENDED STORAGE SOC (%)	40-60%	
STORAGE TEMPERATURE RANGE (ºC	-20ºC ~ + 45ºC	
RECOMMENDED STORAGE TEMPERATURE RANGE (ºC)	15ºC ~ + 25ºC	
HUMIDITY	5% ≤RH≤85%	

Should the module's single-pole fuse need to be changed, then proceed as follows:

1. Reference of single-pole fuse to be changed:
   Code: 576-155.0892.6301

   https://www.littelfuse.com/products/fuses/automotive-passenger-car/high-current-fuses/cf8/155_0892_6171.aspx

2. Use a flat-blade screwdriver to help release the module's left-hand side cover.
3. Check that there is NO continuity between positive and negative on the fuse to verify that it has blown.
4. Use an insulated spanner to remove the fuse, putting the fasteners to one side.
5. Insert the new fuse, refit the fasteners and tighten to a torque of 12Nm

7. Charging WITHOUT TCCv2.0

When working without the CEGASA TCCv2.0 CAN system, it is advisable to configure the battery chargers with the following CHARGE parameters per installed module:

Model	Ultra 175 48280F
Charge voltage (BULK)	52V
Recommend charge current (*)	90 A
Float voltage (FLOAT)	51,8V

8. Discharging WITHOUT TCCv2.0

When working without the CEGASA TCC CAN system or working with it but without any communications with the final equipment, it is advisable to configure the inverters using the following DISCHARGE parameters:

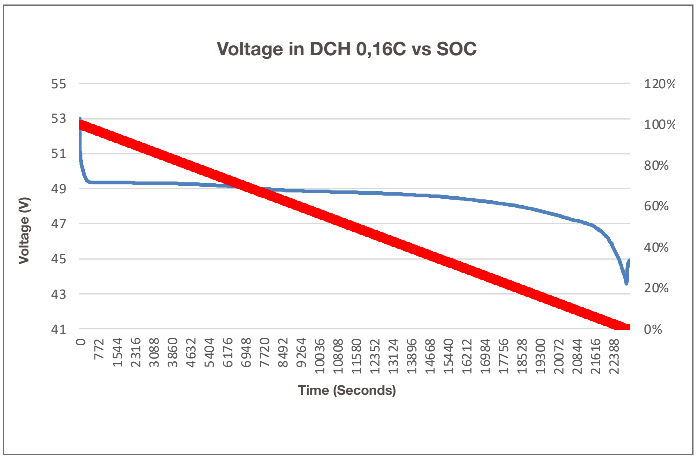
Model	Ultra 175 48280F
Minimum discharge voltage (Vcutoff) (*)	44V
MAXIMUM discharge power (**)	8KW

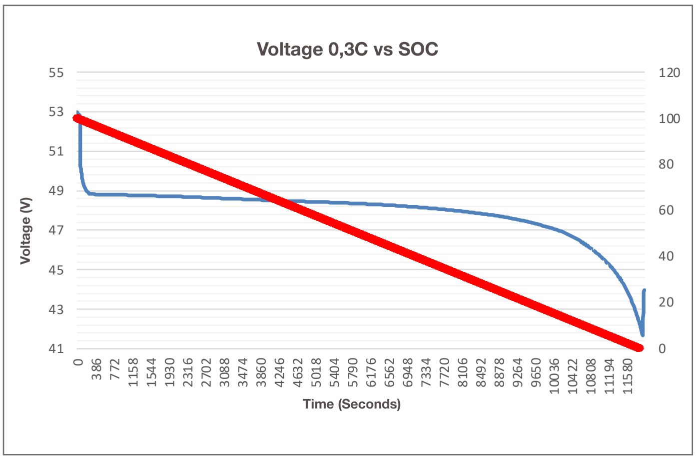
(*) The minimum discharge voltage depends on the level of current and the ambient temperature.

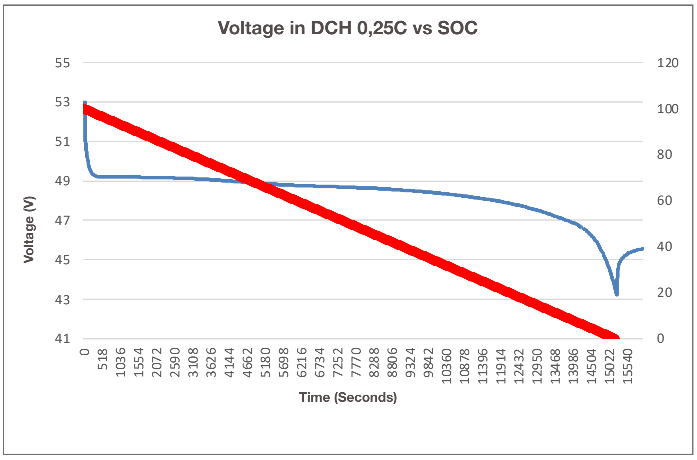
(**) The discharge power may be less than this value but never above it, as this would trigger the system's protection devices.

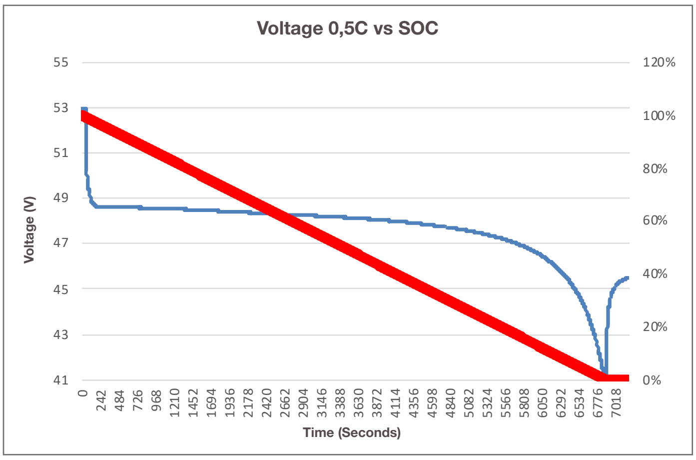
The graphs below provide a summary of the battery's different discharge levels and the evolution of State of Charge (SOC) in order to visualize the flatness of the voltage curve during different discharges and to establish a direct voltage/battery SOC relationship.

Summary table					
Voltage (V) in DCH (25ºC, SOH 100%)	**DCH 0,5C**	**DCH 0,3C**	**DCH 0,25C**	**DCH 0,16C**	**SOC**
	50	50,2	51	51,8	100%
	48,5	48,6	49,1	49,2	80%
	48,2	48,4	48,7	48,8	60%
	48	48,2	48,5	48,6	40%
	47,2	47,4	47,8	48	20%
	45,8	46	47	47,2	10%









9. Over-discharge

In the event of battery over-discharge due to an installation problem, the following actions are recommended in order to restart the batteries and proceed to recharge them:

a) Disconnect the power from all the batteries through its grey connector; (Isolate all batteries)

b) Remove the TCC communication cable (“battery” position)

c) Wait 30 seconds

d) Reconnect power to all the batteries using the grey connector

e) Reconnect the TCC communication cable (“battery” position)

f) The TCC light should light up

g) There is now voltage at the power bus terminals again, starting the inverter/charger

h) Charge the system to recover the batteries

10. Transport regulations

ADR material: Class 9 Hazardous Materials

UN MANUAL OF TESTS & CRITERIA, Subsection 38.3.

The BP complies with the regulations and tests established in the UN MANUAL OF TESTS & CRITERIA.

11. Product warranty

TBD

TCC

TCCv2.0 CAN (109765)

TCCv2.0 BTH SYSTEM

cegasa

1. Introduction

1.1 Purpose of this document

This manual describes the functionality of the TCCv2.0 interface and provides generic instructions for common use cases.

1.2 Acronyms

BMS	Battery Management System
BP	Pack Battery Pack
SOC	State of Charge
SOF	State of Function)

2. TCCv2.0 purpose

The main purpose of the TCCv2.0 is to be able to use a CEGASA battery system (ULTRA175) with commercial inverter/charger equipment or other equipment or applications that may have CAN BUS communications.

For such purposes, the TCCv2.0 communicates, on the one hand, with the system's batteries and, on the other, transmits information from these to the application's end equipment via CAN BUS communications.

In the case of the **ULTRA175** the maximum number of batteries that can be connected in the system is 4.

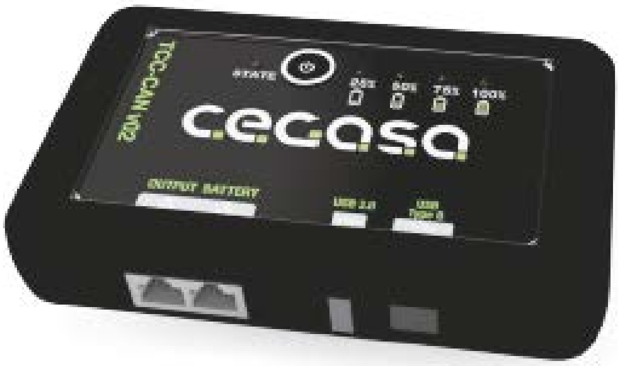
The TCCv2.0 system uses CAN BUS communications to read the present state of the batteries connected on the serial bus. Some of the most important registers read are voltage, current, state of charge (SOC), temperatures, alarms...

Once it has the information about the battery, the TCCv2.0 system transfers this to the end equipment using CAN BUS communications. The CAN registers that are sent to the end equipment refer to the current state of the battery system (voltage, current, temperature, SOC...), it also includes the State of Function (SOF): constantly sending the optimal voltage and current data needed to carry out an optimal charge/discharge process of the battery system based on the SOC and battery temperatures.

3. Component parts

Listed below are the elements that are supplied in with the TCCv2.0 system:

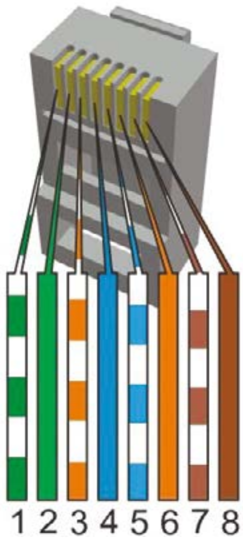
- **TCCV2.0 system:**



- **TCCV2.0 Battery Cable** connected between the battery and the TCCV2.0 system; (RJ45 CAT5e PARALLEL TYPE) 1.5 metre long, connected between the TCCV2.0 system and the HUB (output) or the ULTRA module.

- **120Ω communications terminating resistor on RJ45 connector;** this is connected to the TCCv2.0 housing called *OUTPUT*.

- **USB drive with SW, required to configure** the TCC CAN (compatible inverter brand, battery model, total number of batteries in installation, etc.); Manuals included.
- **TCCV2.0 BUS CAN EXT Output Cable**



- **Victron Inverters:**

  Use a **standard direct/parallel ETHERNET** cable of the required length for the installation

  (**) If using CERBO GX and VENUS GX systems, it is advisable to connect the cable mentioned in the previous point to the port called BMS-CAN.

- **SMA and Studer Inverters:**

  Use a standard **direct/parallel ETHERNET cable** of the required length for the installation

- **Ingeteam Inverters::**

  If using Ingeteam inverters, the installer has to prepare a custom cable, since the connection to these inverters is made using quick connectors.

  The three available CAN wires (CAN-H, CAN-L and GND) should be connected as follows:

  - Pin 2: GND
  - Pin 4: CANH
  - Pin 5: CANL

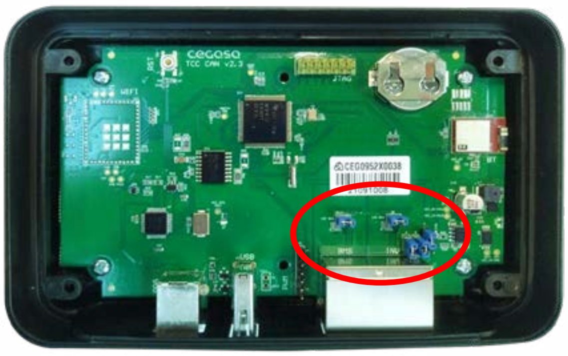
- **Solis & Goodwe Inverters:** *Two options*

  a) The installer can prepare a **direct/parallel ETHERNET cable**, pinning out only **pins 2, 4 and 5** (See initial RJ45 connector image)

b) Use a **standard parallel ETHERNET** cable of the required length for the installation, making the following changes on the TCC:

1. Remove the 4 rear screws from the back cover and remove the cover:

2. Locate and remove the two jumpers from connectors A and B, then close the back cover:



Before:

After removing the jumpers

4. TCCV2.0 Installation Steps with ULTRA175

Follow these steps to install the TCCv2.0 system with CEGASA ULTRA 175 batteries:

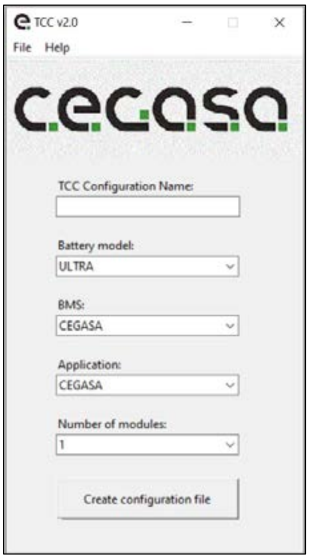
Beforehand, place the modules in their final position and power-connect all the modules to the power busbar.

(DO NOT CONNECT THE COMMUNICATIONS YET)

1. **Connect the battery pack to the inverter (VICTRON, SMA, STUDER…), leaving it powered up and turned on or started.** Still not connecting the communication cable with the batteries.
2. **Meanwhile, configure the "tccConfig.cfg" installation file as follows:**

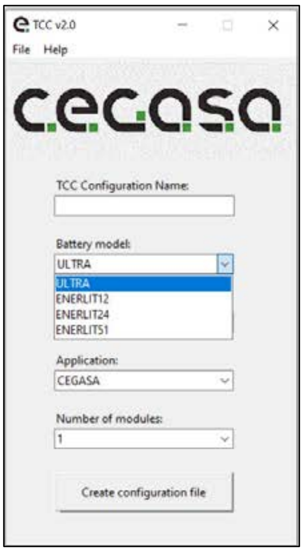
2.1. Open the "TCC_Configurator.exe" program provided by CEGASA. It is an executable file that does not require installation.

2.2. Once opened, the following is displayed:

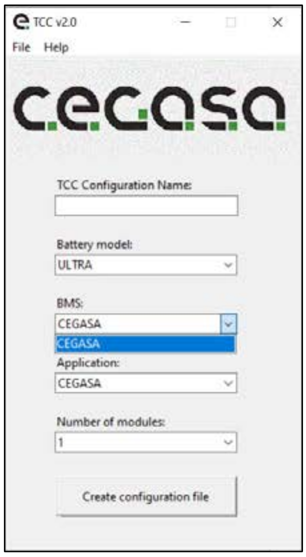


2.3. In the "TCC Configuration Name" field, write the name of the folder that is going to contain the configuration file (E.g., "EXAMPLE"). After which, choose the path where it is going to be stored.

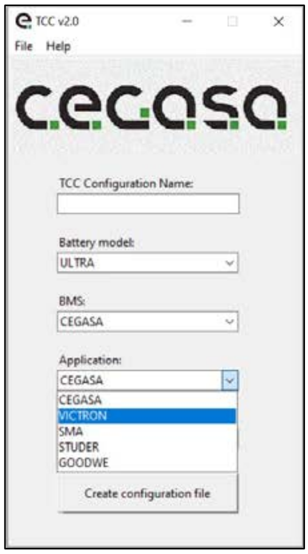
1.4 The "Battery model" field has a drop-down menu. Use this drop-down to select the corresponding battery type. In this case **ULTRA**.



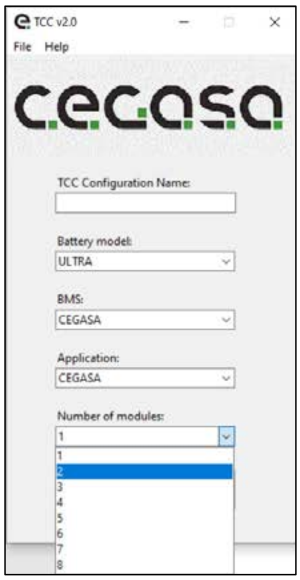
1.5. The "BMS" field has a drop-down menu. Use this drop-down to select the corresponding BMS type. In this case **Cegasa.**



1.6. The "Application" field has a drop-down menu. Use this drop-down to select the corresponding inverter model or application. In this case **Victron.**

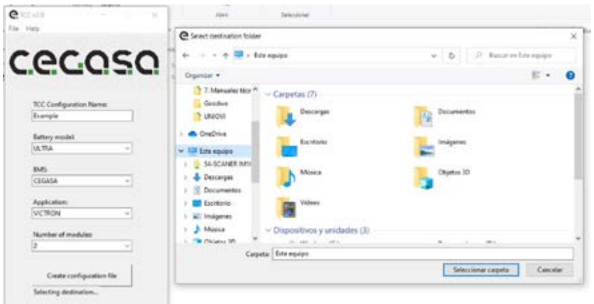


1.7. *T*he "Number of modules" field has a drop-down menu. Use this drop-down to select the corresponding number of modules. In this case **2.**

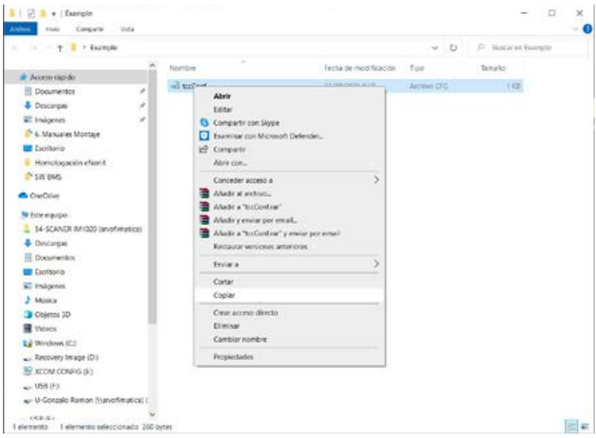


1.8. Once all the fields have been filled in, click on "Create configuration file". Choose the location where the folder is to be generated with the name "EXAMPLE" and with the configuration file inside it.

The said file is to be used later to configure the TCC.

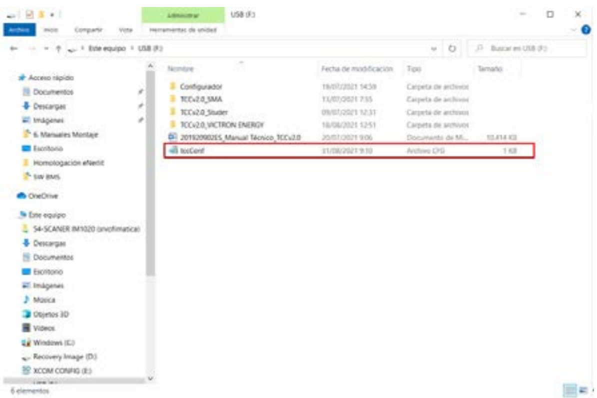


1.9. Now copy the “tccConfig” file, found inside the “EXAMPLE” folder that has just been created, to the root directory of the USB drive.



1.10. Our USB drive, now containing the configuration file, should look as follows:

1.11. Now remove the USB drive and continue with the following steps:



3. **Place the TCCv2.0 into its final position, making sure that the length of the RJ45 cable reaches between the TCCv2.0 and the top position of the RJ45 connector on the top module and fasten it to the wall;** having previously attached a DIN rail to the wall with the help of two M5 screws and their corresponding wall plugs. The back of the TCCv2.0 has some guides that fit onto the DIN rail already attached to the wall.

4. In the case of **TWO module** towers proceed as follows:
   - a) **Plug the USB drive,** containing the configuration file saved in the previous step (1), into the TCCv2.0

   - b) **Connect the RJ45 cable between the top module (top position) and the TCCv2.0 in the position marked “BATTERY”. NEVER CONNECT THE BATTERIES TO ANY OTHER RJ45 PORT CALLED “OUTPUT OR INVERTER” (in some versions) Do not yet remove the RJ45 format resistor connected to the port called “OUTPUT or INVERTER” (in some versions). NEVER CONNECT THE BATTERIES TO ANY OTHER RJ45 PORT**

   - c) **When inserting said cable from the previous point, the LEDs light up progressively while the USB configuration is loaded and then flash when the installation is complete. When all of the LEDs are flashing, the USB drive can be removed. Via the LEDs, the TCC now indicates the next battery to connect.**

d) **Connect the top connector on the second module to the bottom connector on the first module.**

e) **Connect the bottom connector on the second module to the bottom connector on the third.** In the case of several towers of two heights, the communication extension cable (109642) is necessary, see image below. **ALWAYS CONNECT IN RJ45 BOTTOM POSITIONS, as in the image.**

f) **Connect the top connector on the third module to the bottom one on the fourth.**

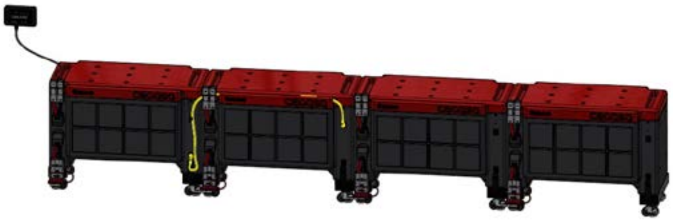
g) **Connect the terminating resistor to the top connector of the fourth module, leaving free the RJ45 port called "OUTPUT or INVERTER" (in some versions).**

a) **Plug the USB drive** containing the configuration file saved in the previous step (1) into the TCCv2.0

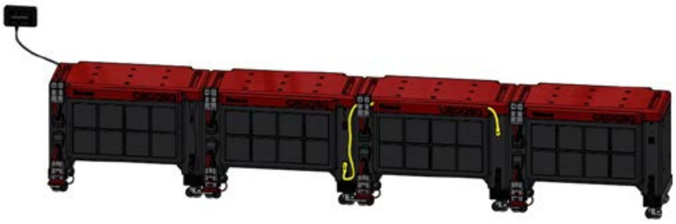
b) **Connect the RJ45 cable between the top connector on the first module and the TCCv2.0,** in the position marked "BATTERY". **Do not yet remove the RJ45 format resistor connected to the port called "OUTPUT or INVERTER" (in some versions). NEVER CONNECT THE BATTERIES TO ANY OTHER RJ45 PORT**

c) **When inserting said cable from the previous point, the LEDs light up** progressively while the USB configuration is loaded and then flash when the installation is complete. **When the LEDs are flashing, the USB drive can be removed.** Via the LEDs, the TCC now indicates the next battery to connect.

d) **Connect the top connector on the second module to the bottom connector on the first module. NEVER BETWEEN TOP or BOTTOM CONNECTORS always alternating.**



e) **Connect the top connector on the third module to the bottom connector on the second module. NEVER BETWEEN TOP or BOTTOM CONNECTORS always alternating.**



f) **Connect the top connector on the fourth module to the bottom connector on the third module. NEVER BETWEEN TOP or BOTTOM CONNECTORS always alternating.**

g) **Connect the terminating resistor to the bottom connector on the fourth module, leaving free the RJ45 port called "OUTPUT or INVERTER" (in some versions).**

5. The last step is **to connect the OUTPUT on the TCC to the communication port on the inverter** using a parallel (not crossover) ETHERNET cable. When the connection is made, the battery data should be visible on the inverter.

IN THE CASE OF VICTRON INVERTERS, CONNECT TO THE FOLLOWING PORT:

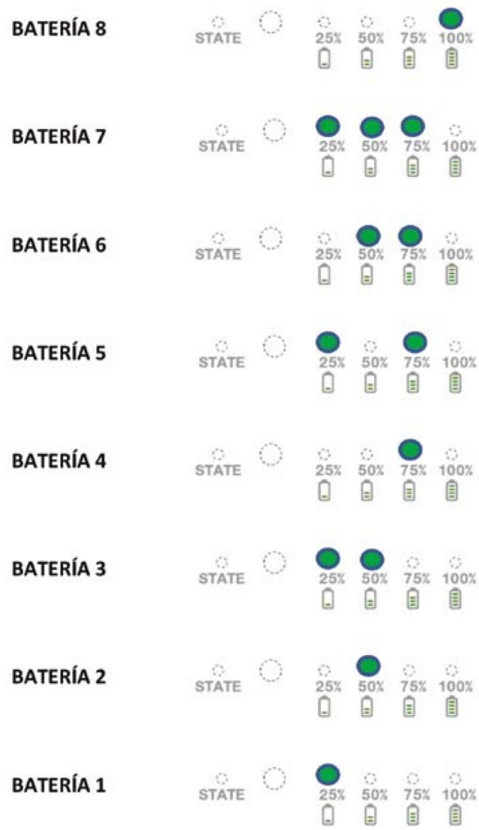
- BMS-CAN in the case of Cerbo GX

or

- VE-CAN in the case of Colour Control and VENUS GX

Note; *If there is no communication with the inverter at this point, then disconnect the cable that goes to the "battery" position on the TCC, wait 5 seconds and reconnect it. This basically resets the communications.*

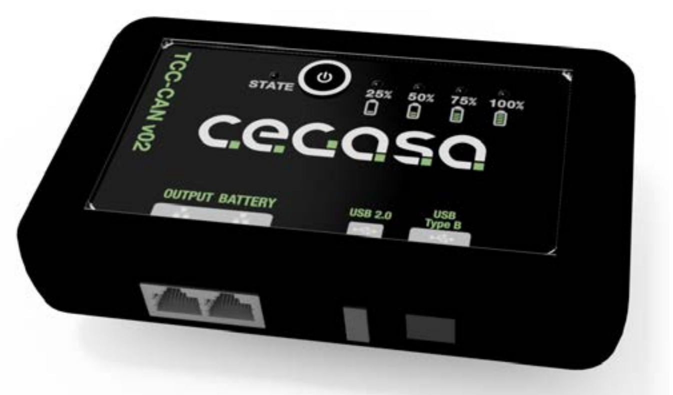
Each time a battery has to be connected to communications, the TCC will ask (USING THE LEDs) to connect the cable for the next battery following the **binary code** (not decimal), leaving the LEDs lit as follows:



5. Operation

5.1 LED Display

The TCCV2.0 system uses 4 LEDs to display the state of charge (SOC) on the right side when the central button is pressed and another LED on the left labelled STATE to show the error status of the connected battery system. The image below shows the position of the LEDs and the button.



The LEDs on the front indicate the following information:

- **4 LEDs** to indicate the battery system's state of charge (SOC). The front panel displays the SOC only after pressing the button. The SOC is displayed for 10 seconds and then switches off.

LED 100%	(SOC between 76-100%)	->	**Steady green**
LED 75%	(SOC between 51-75%)	->	**Steady green**
LED 50%	(SOC between26-50%)	->	**Steady green**
LED 25%	(SOC entre el 21-25%)	->	**Steady green**
	(SOC <20%)	->	**Flashing green**

STATE, bi-coloured LED to indicate state or error code. This state LED remains on as long as the TCCv2.0 has power.

Steady green	->	ALL OK
Flashing red:	->	WARNING
Steady Red:	->	ALARMA

***Note:** If the previous installation steps have been followed, then the STATE LED should be on and when the button is pressed, the battery charge level should be shown by corresponding LEDs. Otherwise, please contact the Cegasa Technical dept.*

5.2 Operating with SOF

The SOF constantly calculates the maximum and minimum voltage and current allowed in the CEGASA battery system during the charge and discharge processes.

By means of this function, the TCCv2.0 system calculates the maximum permissible current and voltage values at all times, based on the battery system's temperature and SOC. This function ensures that the inverter charges and discharges the battery in an optimal way as well as safeguarding the integrity of the system. This function is only used when working with CAN BUS communications (RJ45 cable) connected.

5.2.1 Charge voltage based on battery temperature

Modelo ULTRA_175				
Temperatura				
0 - 5ºC	**6 - 10ºC**	**11 - 40ºC**	**41 - 50ºC**	**51 - 60ºC**
51500mV	52000mV	52200mV	51800mV	51500mV

5.2.2 Charge current based on battery temperature and SOC

Battery model	ULTRA 175	Temperature		
		0 - 10ºC	**11 - 46ºC**	**>46ºC**
SOC	**100-94%**	0,1C	0,1C	0,1C
	93-86%	0,3C	0,5C	0,3C
	85-61%	0,3C	0,5C	0,3C
	60-41%	0,2C	0,5C	0,3C
	40-21%	0,2C	0,5C	0,3C
	20-0%	0,1C	0,3C	0,3C

(*) When connecting several batteries in parallel, the charge currents are limited by a reduction factor; See the manuals for each range to determine the recommended charge currents sent to the inverter.

5.3 Alarms

The detected alarms sent by the TCCv2.0 to the inverters are the following:

✓ Battery over-voltage (Over-charge)

✓ Battery under-voltage (Over-discharge)

✓ Battery over-temperature

✓ Battery under-temperature

✓ TCCv2.0/Inverter communications fault

5.4 Warnings

The Warnings shown by the STATE LED on the TCCv2.0 are as follows:

✓ Communications fault with any battery

✓ Battery over-temperature when the temperature exceeds 53ºC during charge or 60ºC during discharge

✓ Battery over-temperature when the temperature drops below 0ºC during charge or -18ºC during discharge

✓ NTC damaged

✓ BMS fault

✓ Voltage spread	2V
✓ Temperature spread	10ºC
✓ SOC spread	30%

5.5 SOC update

The SOC updates to 99/100% when the following conditions are met:

- Battery voltage 0.5V lower than the charge voltage sent, and current lower than 8% of the capacity of the batteries connected in parallel for 10 seconds

OR

- Vmax for the whole system = 3600mV for 5 seconds

The SOC updates to 20% when the following conditions are met:

- When the discharge current (I <-1A) is enabled **for 15 minutes**

ULTRA 175	(Vbus < 47,5 Vdc)

The SOC updates to 13% when the following conditions are met:

- The minimum cell voltage reaches 3100mV for 4 minutes

The SOC updates to 2% when the following conditions are met:

- The minimum cell voltage reaches 2900mV for 15 seconds
- At this point, we also send a ZERO discharge current value

It is advisable to configure the DIESEL generator or network start-up by SOC levels and also with the following bus voltage levels depending on the range of the CEGASA batteries being used:

a) First level DIESEL or network start-up (for 5 minutes)

ULTRA 175	(46,5Vdc)

b) Intermediate DIESEL or network start-up (for 1 minute or less)

ULTRA	(45,1Vdc)

5.6 FW update

To update the FW (subject to prior communication with CEGASA), follow these steps:

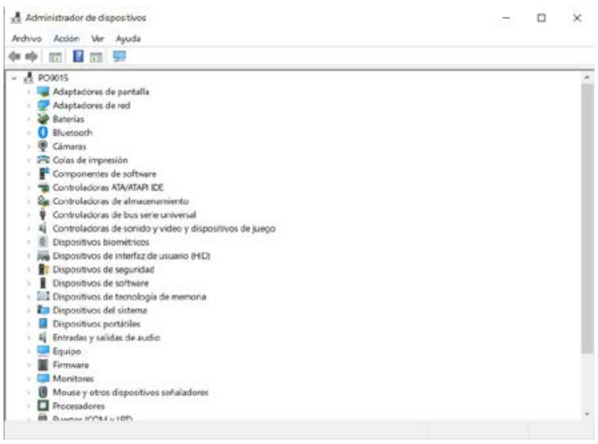
1. Stop the inverter/charger; no current input or output from the batteries
2. Disconnect the communication cable that goes to the battery (BATTERY output)
3. Wait 5 seconds and then reconnect the said cable to the TCCv2.0 while pressing the Display button (The Status LED will flash red and amber) at this point
4. Plug in the USB drive with the TCC.bin file (supplied by CEGASA for the update), this must be the only file on the USB drive.
5. The display LEDs will light up progressively and then finally flash 3 times (in the event of a fault the status LED flashes red)
6. When the LEDs are flashing, the USB drive can be removed.
7. The system is now operational again and the inverter can be switched back on.

5.7 Display using "PuTTY" SW

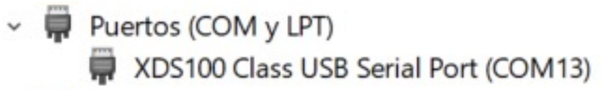
To view the information about the battery being sent through the CAN communications, do the following:

1. Connect the TCC to a PC via the USB Type B port.

2. Open the "device manager" on the PC

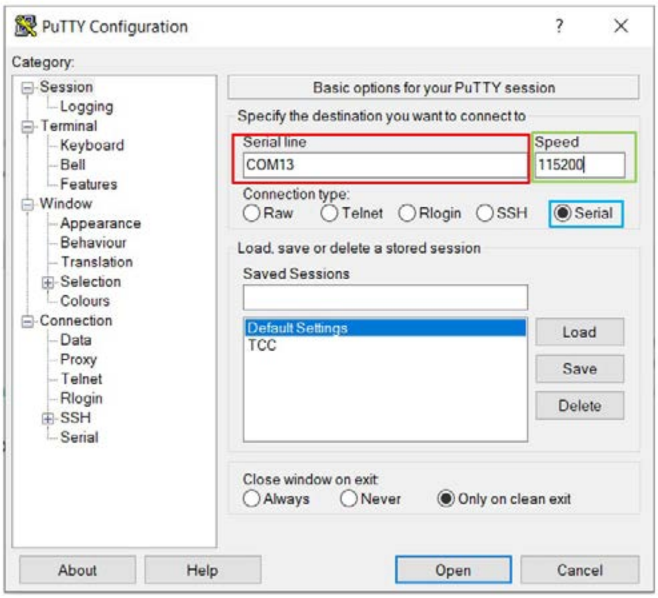


3. Open the “Ports (COM and LPT)” path and note down the COM value (in this case COM13) for subsequent use in the PuTTY program

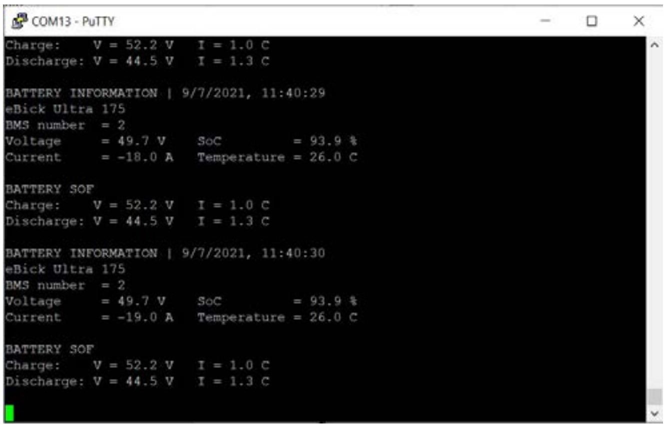


4. Open the “PuTTY” program

- **Blue box (Connection type)**: Select “Serial”
- **Red box (Serial line):** Enter the COM value from the previous step (in this case COM13)
- **Green box (Speed):** Enter the value 115200
- Click on “Open”



5. At this point the following window will open:



The said window shows the following parameters:

- Date and time
- Battery Model: eBick Ultra 175
- Number of batteries connected: 2
- Battery voltage: 49.7V
- Battery current: -19A
- SOC: 93.9%

-Battery temperature: 26°C

- Charge voltage: 52.2V

  Discharge cut-off voltage: 44.5V

- Charge current in battery C-rate (280Ah): 1C

> 280A

- Maximum discharge current in battery C-rate (280Ah): 1.3C --> 364A

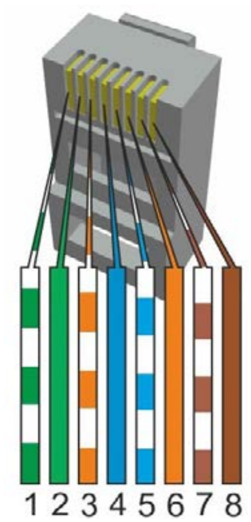
6. Communications

6.1 CAN protocol

CAN 2.0A	**Standard frame format**
	11-bit identifier
	500 kbps

CAN ID	Offset (bytes)	Name	Data type	Scaling	Unit
0x351	0	Charge voltage	un16	0,1	V
	2	Max charge current	sn16	0,1	A
	4	Max discharge current	sn16	0,1	A
	6	Discharge voltage	un16	0,1	V
0x355	0	SOC	un16	1	%
	2	SOH	un16	1	%
0x356	0	Battery voltage	un16	0,01	V
	2	Battery current	sn16	0,1	A
	4	Battery temperature	sn16	0,1	ºC
0x35A	0 (bit 2+3)	Battery high voltage alarm			
	0 (bit 4+5)	Battery low voltage alarm			
	0 (bit 6+7)	Battery high temperature alarm			
	1 (bit 0+1)	Battery low temperature alarm			
	1 (bit 2+3)	Battery high temperature charge alarm			
	1 (bit 4+5)	Battery low temperature charge alarm			
	1 (bit 6+7)	Battery high current alarm			
	2 (bit 0+1)	Battery high charge current alarm			
	2 (bit 6+7)	BMS internal alarm			
	3 (bit 0+1)	Cell imbalance alarm			
	4 (bit 2+3)	Battery high voltage warning			
	4 (bit 4+5)	Battery low voltage warning			
	4 (bit 6+7)	Battery high temperature warning			
	5 (bit 0+1)	Battery low temperature warning			
	5 (bit 2+3)	Battery high temperature charge warning			
	5 (bit 4+5)	Battery low temperature charge warning			
	5 (bit 6+7)	Battery high current warning			
	6 (bit 0+1)	Battery high charge current warning			
	6 (bit 6+7)	BMS internal warning			
	7 (bit 0+1)	Cell imbalance warning			

6.2 Pineado de salida



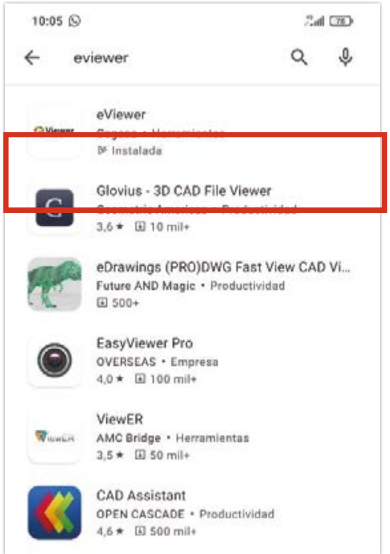
<table>
<tr><th>Inverter</th><th>Pinout</th></tr>
<tr><td>Victron</td><td>CAN_H: 7
CAN_L: 8
GND: 3</td></tr>
<tr><td>SMA</td><td rowspan="5">CAN_H: 4
CAN_L: 5
GND: 2</td></tr>
<tr><td>STUDER</td></tr>
<tr><td>GOODWE</td></tr>
<tr><td>SOLIS</td></tr>
<tr><td>NGETEAM</td></tr>
</table>

6.3 Bluetooth Connection

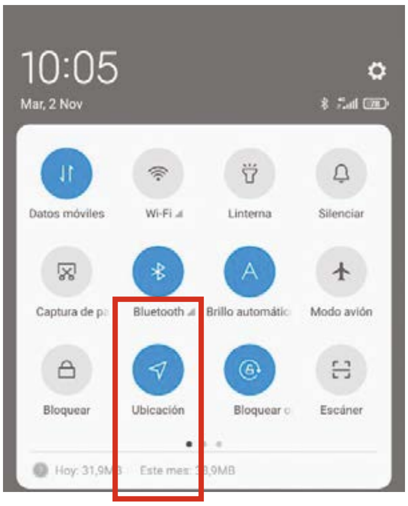
The TCC has a Bluetooth module and an APP for Android and iOS. The said APP can be used to view different parameters of the battery or set of batteries, such as battery charging current and voltage, module status, power delivered

Steps to follow:

1. Download and install the APP on your mobile device. Just write “eViewer” in the search box.



2. Before beginning to use the application, first activate the Bluetooth module and the location of our device



3. After opening the application, the following is displayed. To connect, press the Display button on the TCC. When connecting for the first time it is necessary to enter the following code: **908273**

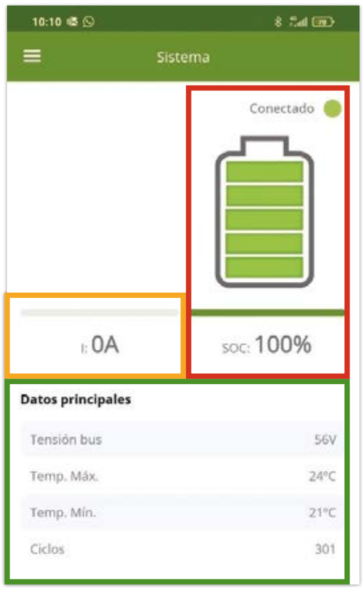
4. The main screen is as follows. This provides general data about the system.

✓ **Red box:** Battery SOC

✓ **Yellow box:** Current flowing through the battery

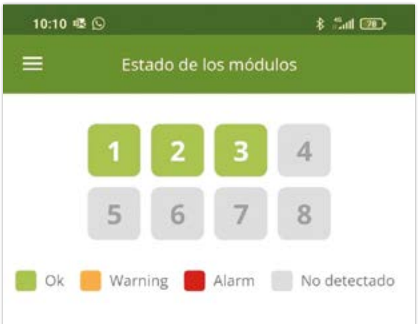
✓ **Green box: Main data for the system:**

- Battery voltage
- Maximum temperature
- Minimum temperature
- Number of cycles



5. On the left side of the screen there is a **drop-down menu** used to select the various screens for the APP. “System” is the main window.

6. **Module status:** This window shows the number of modules in the system (in this case 3) and if any of them have a Warning or Alarm. In which case the cause of the Warning or Alarm is shown.



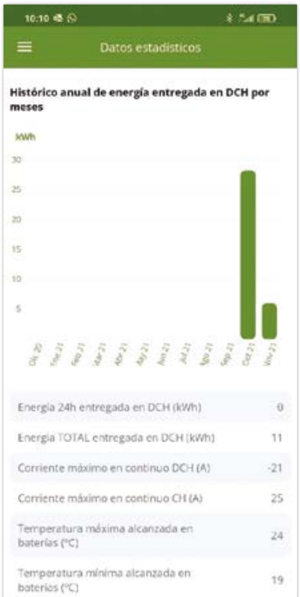
7. **Module parameters:** This window shows different information about each of the batteries that form the system.

	1	2	3	4	5	6	7	8
Tensión	56	56	56	0	0	0	0	0
Corriente	0	0	0	0	0	0	0	0
SOC	100	100	100	0	0	0	0	0
Temperatura	22	21	24	0	0	0	0	0
Vmáx (mV)	3.518	3.518	3.516	0	0	0	0	0
Vmin (mV)	3.458	3.410	3.480	0	0	0	0	0
MOSFET CHG	No	No	No	-	-	-	-	-
MOSFET DSG	No	No	No	-	-	-	-	-

8. **CAN parameters:** This window shows the information that the TCC CAN sends to the inverter or the final application via CAN communications.

9. **Statistical data:** This window shows a monthly log of power delivered by the battery; maximum and minimum temperatures reached; maximum and minimum currents with which the battery has worked.

(*) The 24h energy and total energy values are not updated until the end of the current day or month, respectively.



ANNEX - 01

TCCv2.0 CAN (109765)
COMPATIBILITY WITH OTHER EQUIPMENT

VICTRON ENERGY

cegasa

1. Introduction

1.1 Objective

This document describes the steps to follow in order to connect Cegasa battery TCCv2.0 (109637) CAN communications to a Victron inverter.

1.2 Acronyms

BMS	Battery Management System
BP	Pack Battery Pack
SOC	State of Charge
SOF	State of Function)

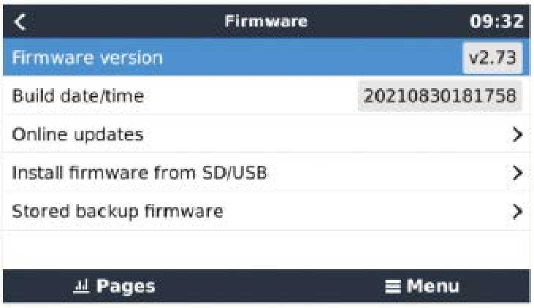
2. VICTRON ENERGY equipment configuration

To fully integrate the TCCv2.0 CAN system with Victron Energy brand equipment, the inverter/charger has to communicate with the TCCv2.0. To achieve this, the Victron equipment has to be set up as explained below.

Before starting, the first step is to connect the TCCv2.0 CAN system as described in the "TCCv2.0 CAN Technical Manual" as well as connecting the batteries (power and communications) to the Victron Energy equipment, as explained in its own installation manual (if in doubt, consult the dealer).

The next step before starting the set-up is to check that the FW version of the Victron Energy equipment is v2.22 or later. The TCCv2.0 CAN is compatible with Victron Energy equipment from this version onward, so, in the case of a previous version, the equipment FW should be updated as an initial measure, if in doubt consult the dealer of the Victron Energy equipment.

The equipment's FW version can be checked on the equipment's display, under ***Settings /Firmware Version*** (visible on the bottom screen).



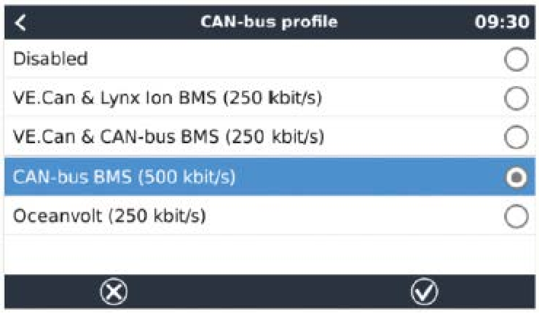
At this point, it is possible to start with the Victron Energy equipment set-up so that it communicates with the TCCv2.0 CAN system via CAN BUS communications through the RJ45 cable already connected between both systems.

(*) When the installation uses a CERBO GX unit, it is necessary to connect the CEGASA communications ETHERNET cable (109755) or, failing that, prepare a cable based on CEGASA's instructions (request documentation).

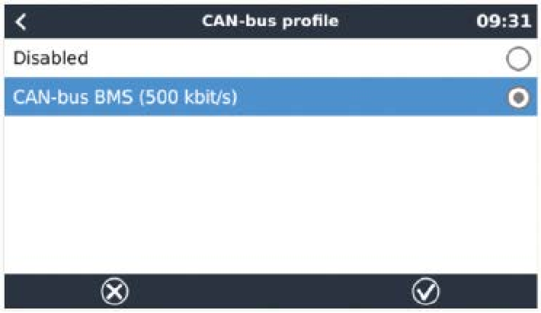
(**) When using VENUS or CERBO GX systems, connect the cable to the port called BMS-CAN on said devices.

2.1 Select communications protocol/speed:

In the main menu, go to ***Device Lists / Settings / Services / VE.Can port / Select CANbus BMS Profile (500 kbit/s)***



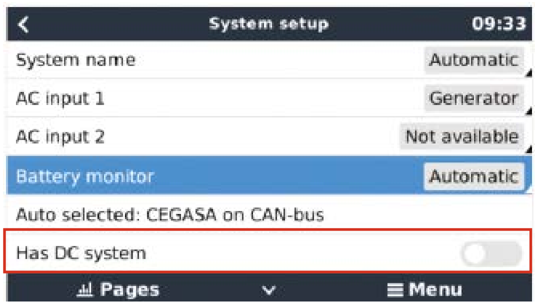
In the main menu, go to ***Device Lists / Settings / Services / BMS-Can port / Select Profile CAN-bus BMS (500 kbit/s)***



2.2 Select automatic mode in the set-up:

On the main menu, go ***to Settings /System Setting.***

Once here, select ***Battery Monitor, Automatic***

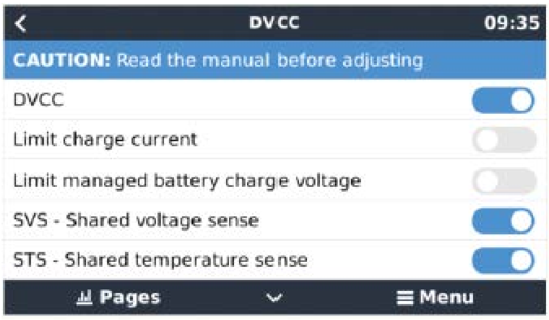


2.3 Check that it recognises the TCCv2.0

To check that the Victron equipment recognises the TCC and to ensure that the communication is correct, the name of the equipment connected to the TCC should appear in the main menu. In the case of the image below: CEGASA. In certain cases, VICTRON does not recognise the CEGASA name, however, if the values for SOC, voltage and current appear then the process is still OK.

2.4 Activate the DVCC option

In order for the inverter to control its current and voltage depending on the logs sent by the TCCv2.0 CAN system, the DVCC (Distributed Voltage and Current Control) option has to be activated on the Victron Energy equipment. To do this, from the main menu go to ***Settings/System Settings*** and activate the DVCC option (in blue)



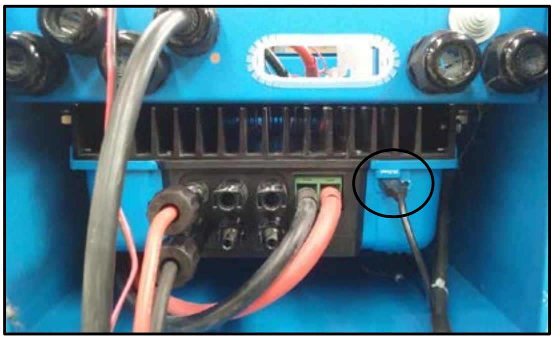
2.5 Configure BlueSolar MPPT Controller (Only in PV installations)

Victron's VE.Direct to USB communications cable is required.

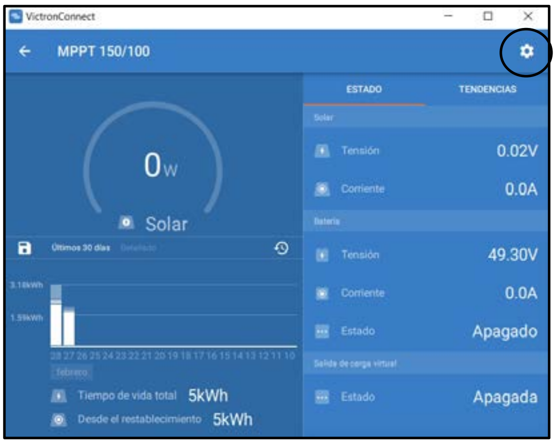
Install the VictronConnect software to communicate with the device. This can be downloaded from the Victron Energy website or from the following link:

- *https://www.victronenergy.com/support-and-downloads/software*

To communicate with the MPPT (with the inverter switched on), connect the USB cable to the computer and the other end of the cable to the MPPT. It connects at the bottom, disconnect the cable that is currently connected and connect the VE.Direct to USB. At the end of the process, reconnect the cable that was initially connected.



When the application is opened it will automatically detect the MPPT. Select it to access its set-up procedure. Once opened go to the settings tab:



Select Battery / Battery Pre-set / User Defined and then modify the following parameters (as shown in the image).

1. Battery voltage	See manual
2. Maximum charge current:	See manual
3. Battery pre-set	User defined
4. Absorption voltage:	See manual
5. Float voltage	See manuall

2.6 VICTRON charger/inverter settings

This can be set up once the battery is installed, and the communication cable is connected.

In order to connect to Victron equipment, the Victron MK3 to USB is required. This device is optional when ordering Victron equipment. Consult the dealer of the equipment.

For further information about MK3, refer to the relevant page in the Victron (VE) manual.

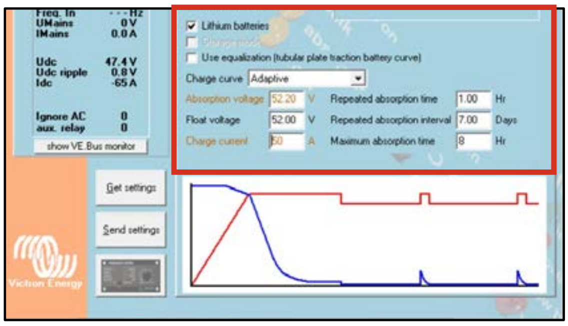
Data to modify:

1. **Lithium batteries and adaptive curve**
2. **Efficiency** of the lithium batteries at 95%
3. **Capacity** value of the batteries (depending on the installed project)
4. **Charger (voltages and times)** configuration

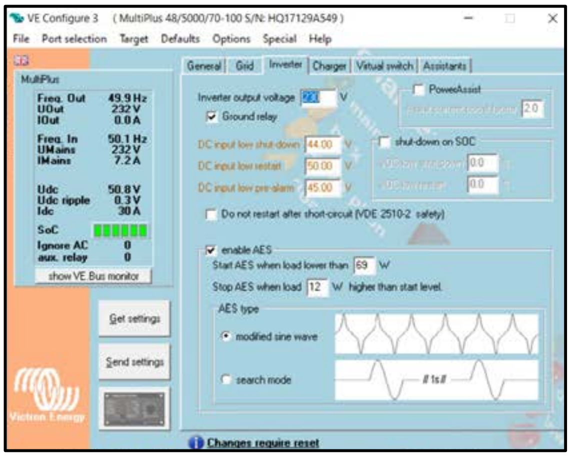
   The values of the free BULK charge limits (at maximum power), **ABSORPTION 52.2Vdc** (switch from CC to CV) and **FLOAT 52Vdc** have to be configured by accessing the "Charger" tab. The parameters recommended by Cegasa are shown inside the red box.

   Recommend charge current: See manual (if in doubt, consult CEGASA).

   (*) The values for both the voltage and the charge current are sent by the TCCv2.0, nonetheless, they are filled in in the same way



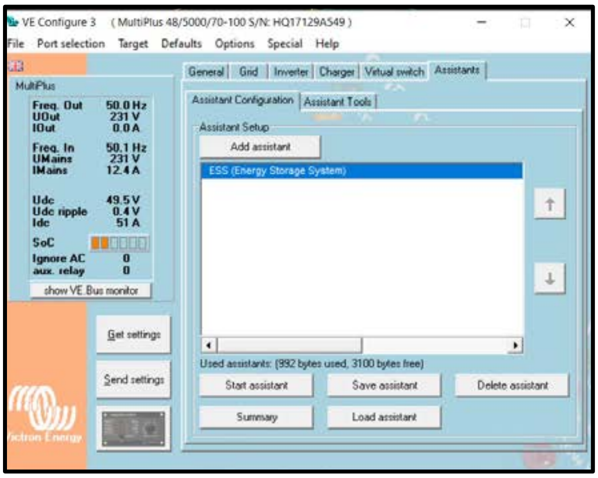
5. **Minimum battery voltage: 44Vdc**
6. **Low restart voltage: 50Vdc**
7. **Pre alarm voltage: 45Vdc**



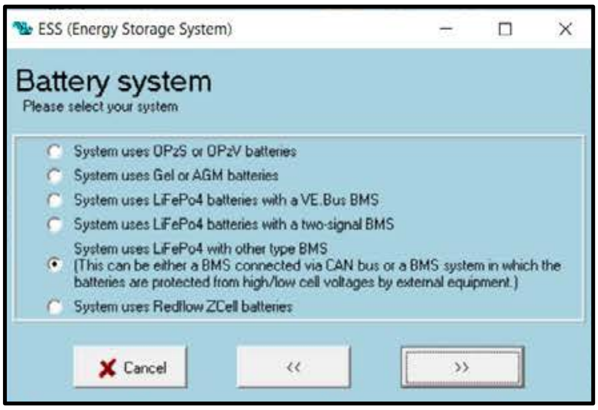
After making all of these changes, press the "Send settings" button. The VE device will ask to restart. Restart to complete the set up. It is best to perform a cold boot

2.7 VICTRON ESS (Energy Storage System) setup assistant

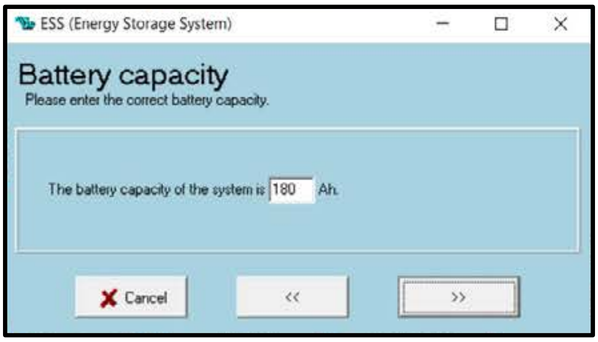
Add the VICTRON **ESS assistant** and start it by using the "Start assistant" button.



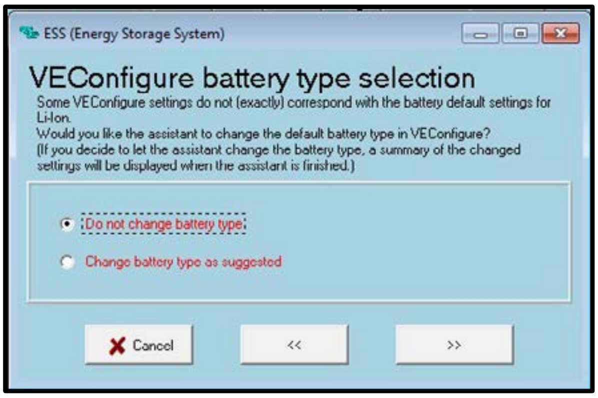
- **Battery system** – Enable the FIFTH option (BMS with CAN BUS)



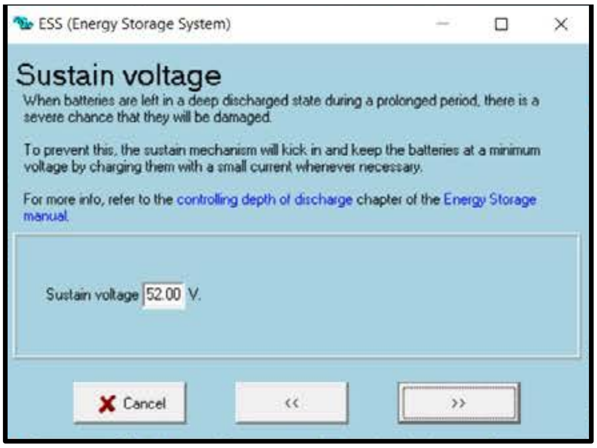
- **Battery capacity –** Enter the number of modules x "X" Ah rated capacity according to the CEGASA battery model



- Because the battery does not match any of the VE categories, choose "Do not change battery type".



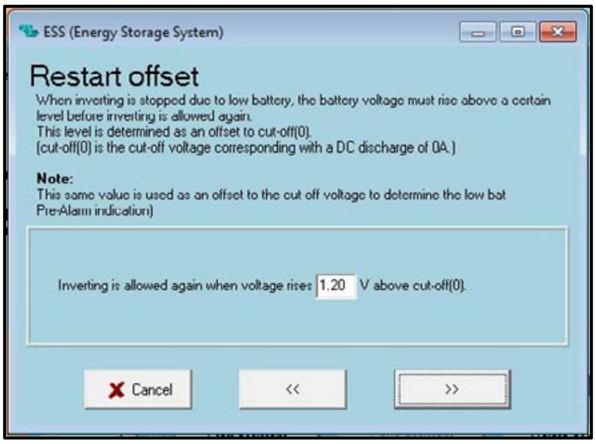
- **Sustain voltage** – Enter a value of 52Vdc



- **The dynamic cut-off values** are those given in the table below:

C_RATE	ULTRA 175 – TCC CAN (V)
0,05	47
0,2	44
0,7	43.5
2	42.5

- The **restart offset** will be 1.2V (also valid for the intermittent pre-alarm signal)

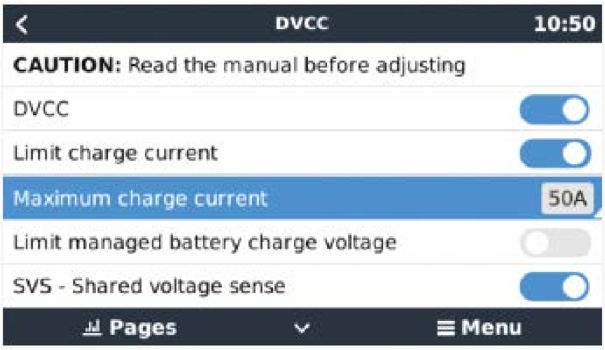


3.1 Charge

The inverter/charger charges the battery using the "charge current" ordered by the TCC CAN system via communications until reaching the "maximum charge voltage", both values are sent constantly by the TCC CAN based on the batteries' SOC and temperature.

The inverter limits the charge current by using the maximum value that is sent to it via the CAN "Charge current limit" register.

- If the ***Limit charge current*** option is enabled (ON THE VICTRON EQUIPMENT, in the inverter/charger settings), then the maximum charge value will be the lowest of the two (i.e. the value entered in the Victron settings or the value from the CAN register).



- If, for some reason (alarm or SOF), the TCCv2.0 CAN system sends a "0" charge current, then the inverter/charger will not

  charge the battery system.

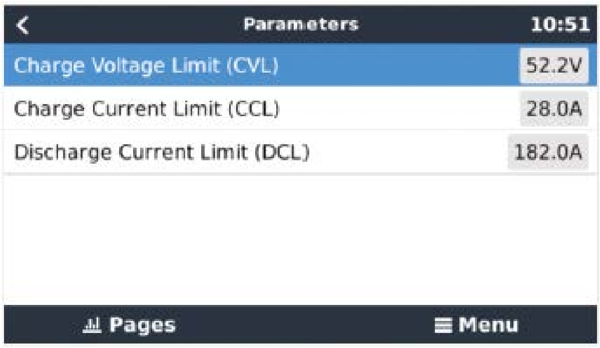
3.2 Discharge

If, for some reason (alarm or SOF), the TCC CAN system sends a "0" discharge current, then the inverter/charger will not discharge the battery system.

In the event that the value is ≠ "0", then the inverter will allow any discharge.

Both the charge and discharge values sent by the TCCv2.0 CAN to the VICTRON system can be viewed by entering the BMS option for the list of VICTRON devices and then entering the "Parameters" option.

This screen shows the charge and discharge values that the TCCv2.0 is sending to the system.



3.3 Alarms

When there is an active alarm on the battery system, the TCCv2.0 CAN system will inform the inverter/charger of the detected alarm. The TCCv2.0 has real-time data about each of the connected batteries. The alarms indicated to the inverter concern possible over-voltage, under-voltage, over-current, over-temperature and under-temperature of any of the batteries connected to the system.

The TCCv2.0 CAN system constantly informs the inverter about the alarm status of the battery system, so that the inverter knows whether the alarms are activated or not at all times.

When the said alarm is reset, the system automatically resets itself, assuming the inverter/charger equipment is configured to do so.

In addition, the activation of any alarm will be shown on the Victron Notifications screen. This screen shows the activated alarm along with a Warning symbol (the image below shows an example of an activated low temperature alarm).

The ***Warning*** symbol will flash while the alarm is active and be semi-transparent and not flashing if the alarm has been reset. Even if the system is active again, the notification remains on the screen so that the warning (not the system) can be reset manually.

ANNEX - 02

TCCv2.0 CAN (109637)

COMPATIBILITY WITH OTHER EQUIPMENT

SMA

cegasa

1. Introduction

1.1 Objective

This document describes the steps to follow in order to connect the Cegasa battery TCCv2.0 CAN to an SMA SUNNY ISLAND brand inverter/charger.

1.2 Acronyms

BMS	Battery Management System
BP	Pack Battery Pack
SOC	State of Charge
SOF	State of Function)

2. Configuration with SMA equipment

To fully integrate the TCCv2.0 with the SMA system, the inverter has to communicate with the TCCv2.0. To achieve this, the SMA inverter/charger has to be set up as explained below.

Before starting, the first step is to connect the TCCv2.0 CAN system as described in the “TCCv2.0 CAN Technical Manual” as well as connecting the batteries (power and communications) to the SMA equipment, as explained in its own installation manual (if in doubt, consult the dealer). Next, switch on the SMA equipment at the front.

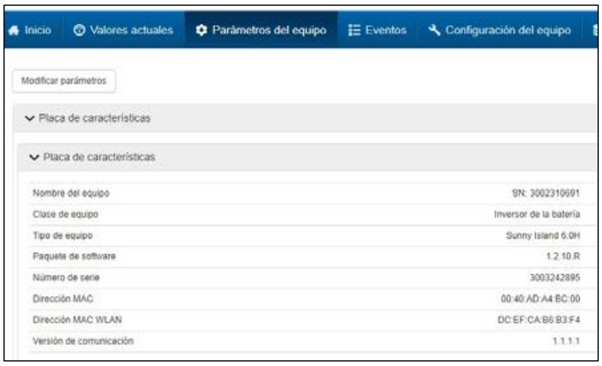
Then, open the file explorer on the connected PC and access the inverter using the IP address. The standard IP address used with SMA equipment for Ethernet connections is **169.254.12.3**

After connecting to the SMA, the system asks for the installer to enter a user group and password, which the SMA dealer will have provided (the image below shows this access).

Once connected to the inverter, the general system screen, shown below, will appear:

The next step before starting the set-up is to check that the Software Package version for the equipment is

1.2.10.R or later. The TCC-CAN system is compatible with SMA from that version onward, so in case of a previous version, the SW has to be updated. The version of the equipment can be checked using the web program which can be accessed via Ethernet, under ***Device parameters / Type Plate / Software Package*** (visible on the bottom screen).

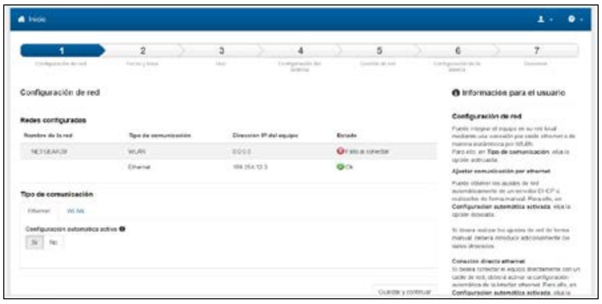


2.1 Installation Assistant

The settings vary depending on the customer’s application. Shown below are the possible configurations via the web access software (as explained in the previous section).

To start the device configuration, click on the user icon and start the installation assistant.

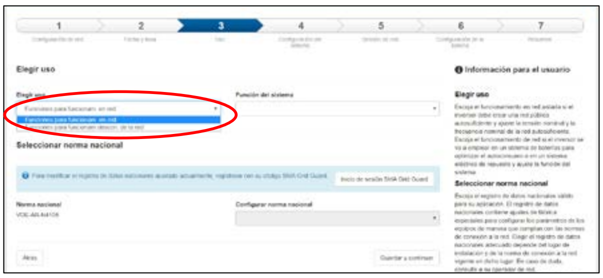
During the first step, the WLAN and Ethernet connections are configured.



Next, set the date and time.

The third step establishes the use of the system. This requires the following application features to be configured (depending on the user’s final application)):

- On-grid / Off-grid
- Nominal voltage / frequency



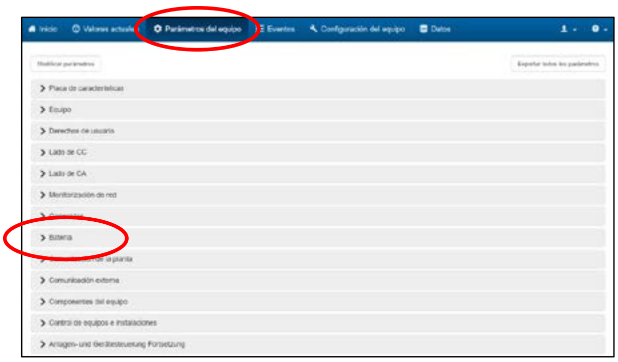
The next step involves selecting the electrical characteristics of the system: single-phase / three-phase. The system’s maximum current is also configured here.

In the next step involves configuring the battery. In this case, select the ***lithium-ion battery***. The TOTAL rated capacity of the battery system connected to the SMA inverter/charger equipment is also entered. ***Number of batteries x Rated capacity of the installed battery.***

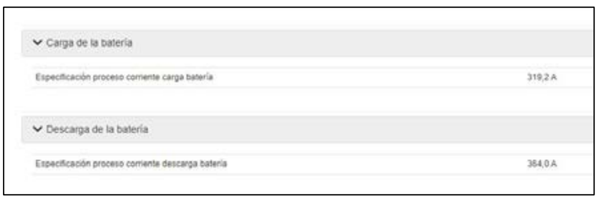
The final step shows a summary of the selected configuration.

This assistant makes it possible to carry out the basic configuration of the SMA equipment. Pressing the “Continue” button on the last screen takes us back to the dashboard screen.

By clicking on the ***Device parameters*** menu option the parameters for the device, battery, communications, logs, etc. will be shown.

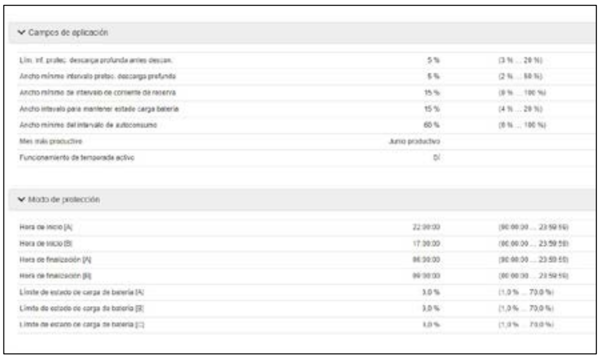


This section of the parameters within the ***Battery*** field gives the charge and discharge values that the TCCv2.0 sends the inverter.



Given here are also the ***Areas of Application and Protection Mode*** sections, which should be configured as recommended by SMA, based on the operation of the system (consult the installer). The values shown are by way of example.

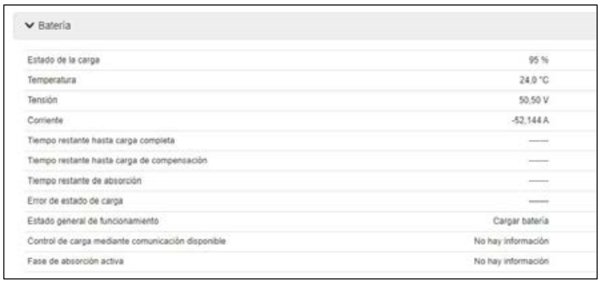
✓ *https://manuals.sma.de/SI-12/es-ES/1414774155.html*
✓ *https://manuals.sma.de/SI-12/es-ES/1414786443.html*



Campos de aplicación		
Lím. inf. protec. descarga profunda antes descon.	5 %	(3 % ... 20 %)
Ancho mínimo intervalo protec. descarga profunda	5 %	(2 % ... 50 %)
Ancho mínimo de intervalo de corriente de reserva	15 %	(0 % ... 100 %)
Ancho intervalo para mantener estado carga batería	15 %	(4 % ... 20 %)
Ancho mínimo del intervalo de autoconsumo	60 %	(0 % ... 100 %)
Mes más productivo	Junio productivo	
Funcionamiento de temporada activo	Sí	

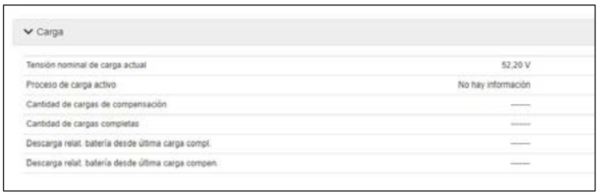
Modo de protección		
Hora de inicio [A]	22:00:00	(00:00:00 ... 23:59:59)
Hora de inicio [B]	17:30:00	(00:00:00 ... 23:59:59)
Hora de finalización [A]	06:30:00	(00:00:00 ... 23:59:59)
Hora de finalización [B]	09:30:00	(00:00:00 ... 23:59:59)
Límite de estado de carga de batería [A]	3,0 %	(1,0 % ... 70,0 %)
Límite de estado de carga de batería [B]	3,0 %	(1,0 % ... 70,0 %)
Límite de estado de carga de batería [C]	3,0 %	(1,0 % ... 70,0 %)

The most important battery values sent by the TCCv2.0 system can be checked in the **Battery** field of the Current Values section within the main menu.



Batería	
Estado de la carga	95 %
Temperatura	24,0 °C
Tensión	50,50 V
Corriente	-52,144 A
Tiempo restante hasta carga completa	——
Tiempo restante hasta carga de compensación	——
Tiempo restante de absorción	——
Error de estado de carga	——
Estado general de funcionamiento	Cargar batería
Control de carga mediante comunicación disponible	No hay información
Fase de absorción activa	No hay información

The charge voltage value is given at the bottom of this same field (depending on battery temperature and SOC).



Carga	
Tensión nominal de carga actual	52,20 V
Proceso de carga activo	No hay información
Cantidad de cargas de compensación	——
Cantidad de cargas completas	——
Descarga relat. batería desde última carga compl.	——
Descarga relat. batería desde última carga compen.	——

3. General operation

3.1 Charge

The inverter/charger charges the battery using the "charge current" and "charge voltage" ordered by the TCCv2.0 CAN system via communications until the said voltage is reached.

If, for some reason (alarm or SOF), the TCC CAN system sends a "0" charge current, then the inverter/charger will not charge the battery system.

3.2 Discharge

If, for some reason (alarm or SOF), the TCCv2.0 CAN system sends a "0" discharge current, then the inverter/charger will not discharge the battery system.

In the event that the value is ≠ "0", then the inverter will allow any discharge.

3.3 Alarms

When there is an active alarm on the battery system, the TCCv2.0 CAN system will inform the inverter/charger of the detected alarm. The TCCv2.0 has real-time data about each of the connected batteries. The alarms indicated to the inverter concern possible over-voltage, under-voltage, over-current, over-temperature and under-temperature of any of the batteries connected to the system.

(For further information about alarms, see the Alarms chapter of the "TCC CAN Technical Manual" document).

The TCC CAN system constantly informs the inverter about the alarm status of the battery system, so that the inverter knows whether the alarms are activated or not at all times. The inverter will not allow the current flow whenever there is an active alarm, given that the TCC CAN system will send the charge/discharge processes a current "0" value.

When the said alarm is reset, the system automatically resets itself, assuming the inverter/charger equipment is configured to do so.

ANNEX - 03

TCCv2.0 CAN (109637)

COMPATIBILITY WITH OTHER EQUIPMENT

STUDER

cegasa

1.1 Objective

This document describes the steps to follow in order to connect Cegasa battery TCCv2.0 CAN communications to a Studer inverter/charger.

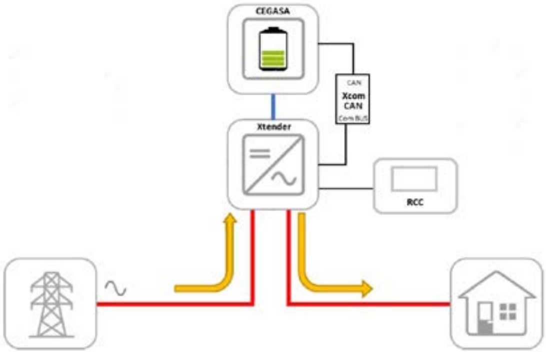
1.2 Acronyms

BMS	Battery Management System
BP	Pack Battery Pack
SOC	State of Charge
SOF	State of Function)

2. Configuration with SMA equipment

In order for the Cegasa battery system to communicate with the Studer inverter, an ***Xcom CAN*** (supplied by Studer) is necessary. With the Studer inverter/charger, the ***Xtender*** device, only has an LED display. If we wish to see the values that the battery system is sending via the TCC (e.g. Battery values and alarms) then an external console, such as a Studer ***RCC*** unit will be needed.

Shown below is an example of a system configuration using the ***Xtender, Xcom CAN*** and ***RCC***.



In this example, the mains supply has been connected to the Xtender inverter as AC In input and an AC output charge. On the DC side, a Cegasa battery system has been connected to the TCC-CAN.

Before starting, the first step is to connect the TCCv2.0 CAN system as described in the "TCCv2.0 CAN Technical Manual" as well as connecting the batteries (power and communications) to the STUDER equipment, as explained in its own installation manual (if in doubt, consult the dealer).

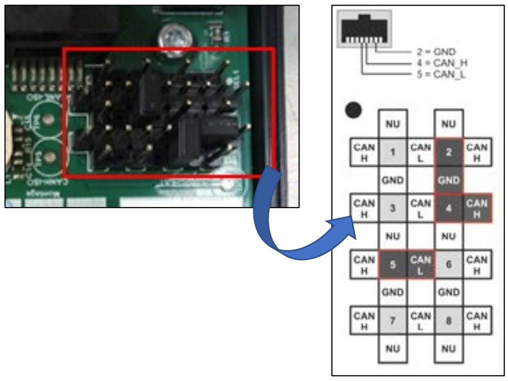
2.1 Xcom-CAN Configuration

Communication between the TCC-CAN system and the inverter is established via the ***Xcom-CAN*** adapter. This Xcom-CAN device has to be configured correctly to allow it to communicate with the TCC-CAN system.

To do this, first open the adapter. The images below show the adapter closed and open.

Once opened, proceed with the following steps:

- Configure the RJ45 pins using the **black jumpers** (marked in red in the image above) as follows (the RJ45 pins are configured to be the same as on SMA equipment):



- Configure the **DIP switch array** (marked in blue in the image above) as shown below in order to select the protocol, battery and bus speed.

Battery Brand and model	DIP switch settings "Activity Control" mode	Comments
• BYD B-Box2.5 – B-Box10.0 – B-Box 13.8 • Pylontech US2000B Plus, Phantom-S & US3000 • BMZ ESS 3.0 – ESS 7.0 • LG Chem RESU 3.3, 6.5, 10 • Autarctech LiRack / LiTerminal • Leclanché Appollion Cube • BueNova BN 13-26-52 series • Super-B SB12V160E-ZC SB12V100-ZC (12V-24V-48V multi batteries system with BCI) • REC Q BMS 16S (please see www.rec-bms.com for more information) • Orion BMS Jr (please see www.orionbms.com for more information)		CAN bus speed not accessible

Once the Xcom-CAN has been configured, close it back up and connect it to the inverter (Xtender) and to the TCCv2.0. Both connections are made using parallel (not crossover) Ethernet cables.

2.2 Xcom-CAN connection to TCC

The connections to make on the **Xcom-CAN** device are shown below. The part labelled STUDER (shown in the image below) is connected to the inverter or Xtender by an Ethernet cable. Note that the position of the T-O switch must be the same as shown in the image.

The part labelled EXTERNAL is connected to the TCCv2.0-CAN by using another Ethernet cable. Note that the position of the T-O switch must be the same as shown in the image.

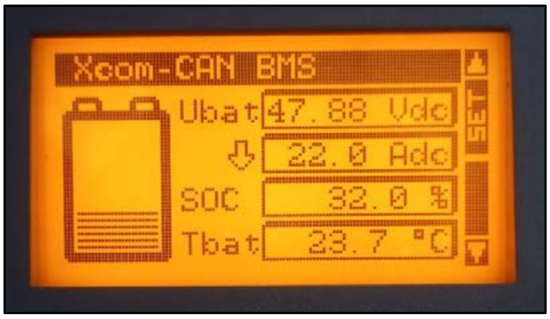
2.3 Communication check

Once the Xcom-CAN is configured and connected, check that the TCCv2.0-CAN is communicating correctly with the inverter. The way to do this using an RCC console is shown below. **Prior to this, it is necessary to have followed the TCCv2.0 installation steps contained in its manual.**

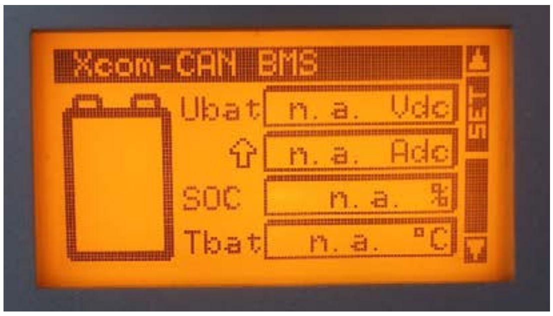
Before checking that it is communicating correctly, check that the battery is connected to the inverter and switch on the equipment. Once switched on, and with the Communications connected, the RCC console will show the most important battery variables, such as state of charge (SOC), voltage and temperature.

The main screen displayed after switching the RCC on will be as follows:

From the main screen, pressing the "down" button selects the screen to be displayed on the console. To view the battery's most important variables, select the ***Xcom-CAN BMS*** screen, as shown in the image below.



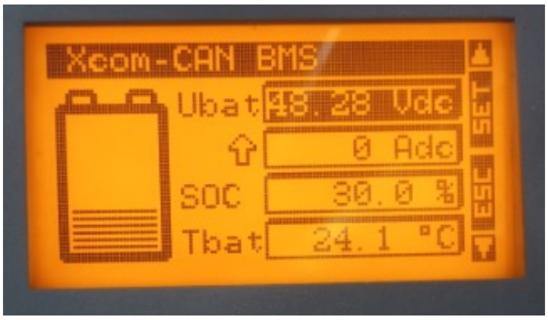
This shows the battery's voltage, current, SOC and temperature. These values are the ones that the TCC-CAN sends the inverter via CAN communications. If the above variables are showing a value (similar to the above image) then this means it is communicating correctly. If there is no communication, then the ***Xcom-CAN BMS*** screen will not appear or appear without any values (see image below).



Once correct communication is established, it is possible to check the values of the other variables sent by the TCC-CAN. To do this, follow these steps on the Xcom-CAN BMS screen:

- Press the ***SET*** button
- Press the "down" button to select one of the variables

on the right. In the image, the first variable has been selected. This is configured to display the voltage.



- If we wish to view another CAN register, press ***SET*** and the list of registers that the TCC-CAN is sending will appear:

Battery voltage, Battery current, Charge voltage limit, Discharge voltage limit, Charge current limit...

If we wish to view any of these registers on the ***Xcom-CAN BMS*** screen, press SET and it will be displayed instead of the variable that was there previously.

3. General operation

3.1 Charge

The inverter/charger charges the battery using the "charge current" ordered by the TCC CAN system via communications until reaching the "maximum charge voltage", both values are sent by the TCC CAN at all times using the SOF function explained in the TCC CAN system manual.

Note: STUDER equipment uses a factor of 0.8 to limit the charge current sent by the battery due to the dynamic regulation of the STUDER equipment.

The inverter limits the charge current by using the maximum value that is sent to it via the CAN "Charge current limit" register.

- If the ***Limit charge current*** option is enabled (ON THE STUDER EQUIPMENT, in the inverter/charger settings), then the maximum charge value will be the lowest of the two (i.e., the value entered in the equipment settings or the value from the CAN register).
- If, for some reason (alarm or SOF), the TCC CAN system sends a "0" charge current, then the inverter/charger will not charge the battery system.

3.2 Discharge

If, for some reason (alarm or SOF), the TCC CAN system sends a "0" discharge current, then the inverter/charger will not discharge the battery system.

In the event that the value is ≠ "0", then the inverter will allow any discharge.

3.3 Alarms

When there is an active alarm on the battery system, the TCC CAN system informs the inverter/charger of the detected alarm. The TCC has up-to-the-minute data about each of the connected batteries. The alarms indicated to the inverter concern possible over-voltage, under-voltage, over-current, over-temperature and under-temperature of any of the batteries connected to the system.

(For further information about alarms, see the Alarms chapter of the "TCC CAN Technical Manual" document).

The TCC CAN system constantly informs the inverter about the alarm status of the battery system, so that the inverter knows whether the alarms are activated or not at all times. The inverter will not allow the current flow whenever there is an active alarm, given that the TCC CAN system will send the charge/discharge processes a current "0" value.

When the said alarm is reset, the system automatically resets itself, assuming the inverter/charger equipment is configured to do so.

ANNEX - 04

TCCv2.0 CAN (109765)

COMPATIBILITY WITH OTHER EQUIPMENT

GOODWE

cegasa

1. Introduction

1.1 Objective

This document describes the steps to follow in order to connect the Cegasa battery TCCv2.0 CAN to a GOODWE brand inverter/charger.

1.2 Acronyms

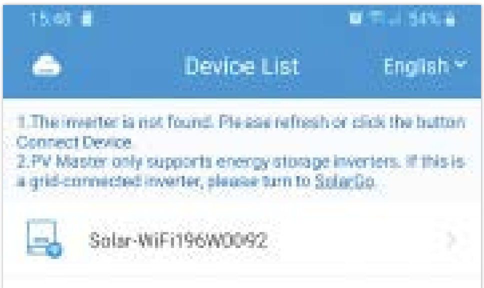
BMS	Battery Management System
BP	Pack Battery Pack
SOC	State of Charge
SOF	State of Function)

2. Configuration with GOODWE equipment

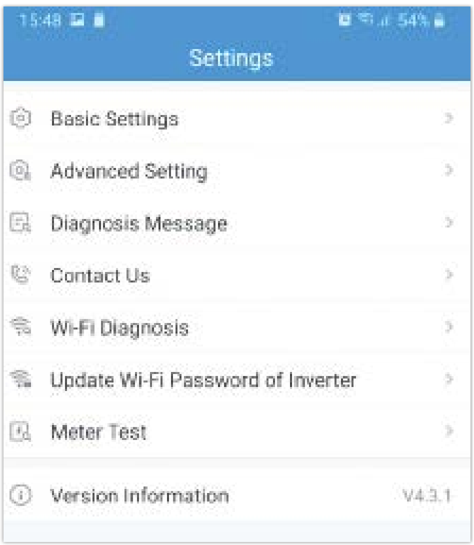
To fully integrate the TCCv2.0 with the GOODWE system, the inverter has to communicate with the TCCv2.0. To achieve this, the GOODWE inverter/charger has to be set up as explained below.

Before starting, the first step is to connect the TCCv2.0 CAN system as described in the “TCCv2.0 CAN Technical Manual” as well as connecting the batteries (power and communications) to the GOODWE equipment, as explained in its own installation manual (if in doubt, consult the dealer). Next, switch on the GOODWE equipment.

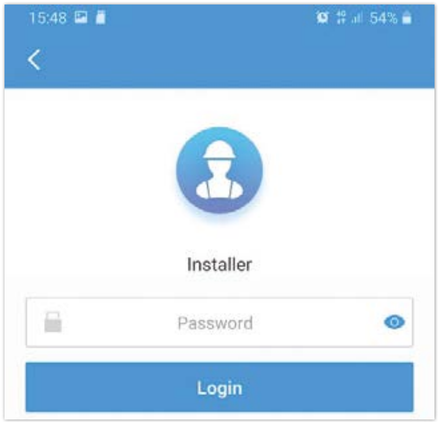
The GOODWE inverter set-up is done through the PV Master application. The application, available for Android and iOS devices, makes it possible to connect to the equipment via Wi-Fi or Bluetooth. In this case, the set-up will be done via Wi-Fi.



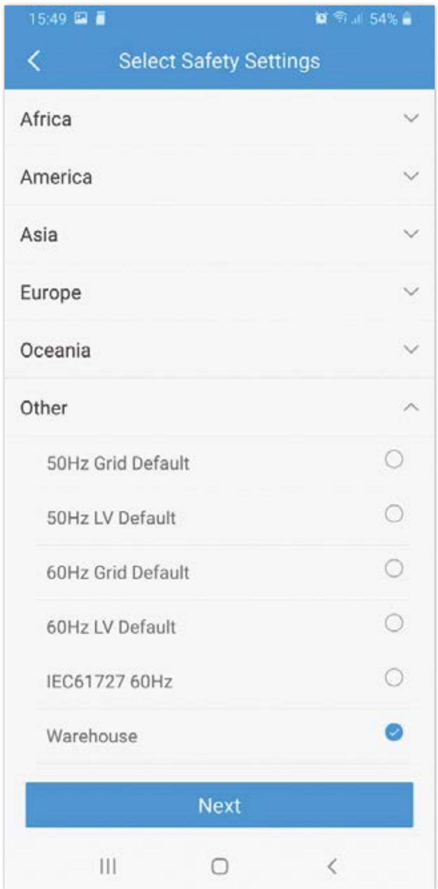
The inverter’s various parameters can be set-up in the “Basic Settings” tab.



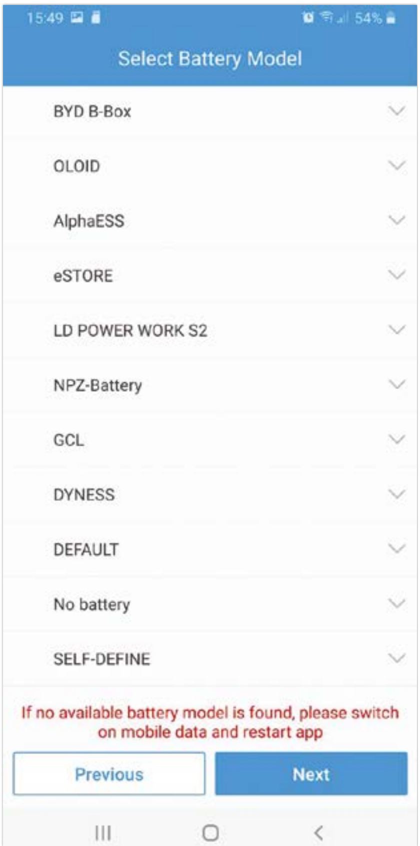
To access these settings, it is necessary to enter the installer password, in this case **Goodwe2010**



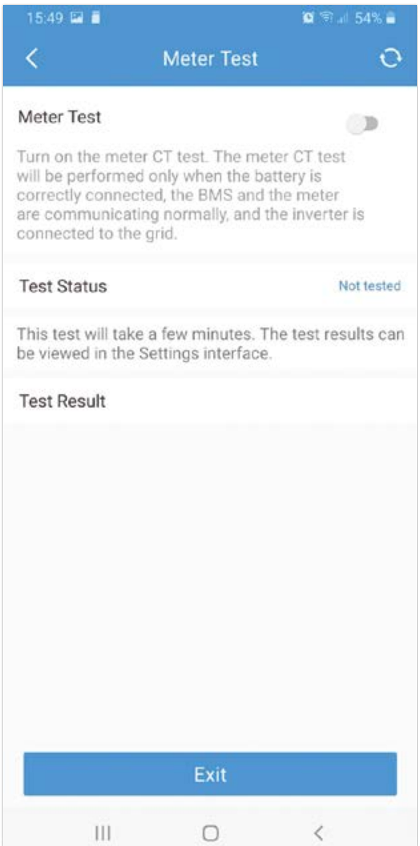
Select the “Safety Setting” based on the country you are in:



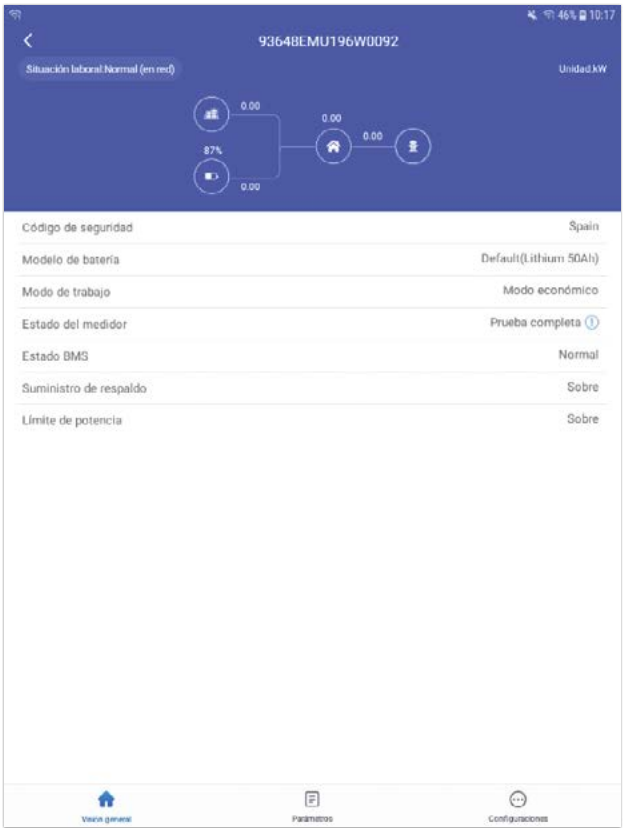
Select the battery model, in this case “Cegasa”, or if this is not present “Default (Lithium 50Ah)”



Once finished, press “Exit”



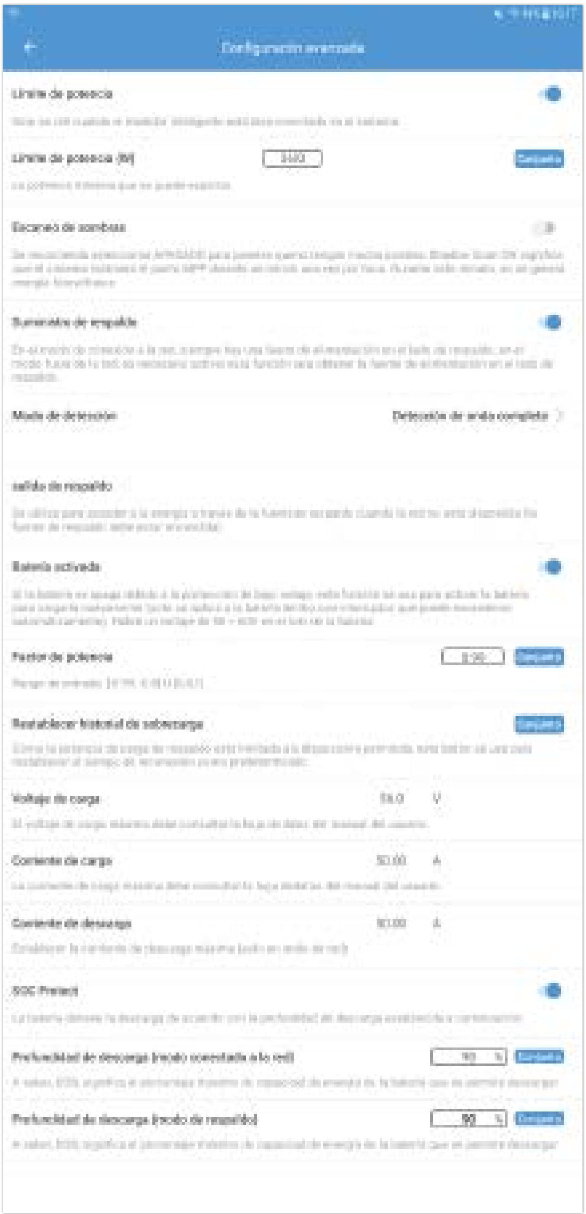
By default, the equipment is configured for Spain, however, numerous countries can be chosen. Once connected to the system, the first screen monitors the inverter’s default setting status:



Default settings:

Safety code:	Spain
Battery model:	Default (Lithium 50Ah)
Work mode:	Economy mode
Meter status:	Normal
BMS status:	Full test
Backup supply:	Over
Power limit:	Over

On the advanced settings screen, the power limit is set to 3600 W and the charge and discharge limits are set at 50 A, which is the inverter’s nominal charge and discharge current.



2.1 Operating modes

The inverter can operate in 4 different modes:

- **General Mode:** To maximise photovoltaic generation and minimise network consumption, primarily loads are covered with the PV generation and if this is not enough, the battery is discharged. If there is a photovoltaic surplus, this is put into the battery.
- **Support Mode:** This prioritises battery charging; first the battery is charged from the PV and any surplus is used to feed loads.
- **Off Grid Mode:** There is no connection to the grid. PV and battery generation take charge of supplying loads with power, in the first instance, the photovoltaic covers the loads and if this is not enough, then battery provides power.
- **Economy Mode:** This mode allows time periods to be set in order to charge and discharge the batteries at a given power (% of nominal power).

In turn, the TCCv2.0 CAN sends the inverter the operating limits of the charge and discharge current:

Batería(Default(Lithium 50Ah))	
Estado de la batería	SOC:87%,Sin cargo ni descarga
Datos de la batería	53.0V/0.0A/0.00kW
Estado BMS	Normal
SOH (de BMS)	99.0%
Corriente de carga (desde BMS)	30A
Corriente de descarga (desde BMS)	120A
Advertencia (de BMS)	Normal
Temperatura (de BMS)	21.0℃

3. General operation

3.1 Charge

The inverter/charger charges the battery using the “charge current” and “charge voltage” ordered by the TCCv2.0 CAN system via communications until the said voltage is reached.

If, for some reason (alarm or SOF), the TCC CAN system sends a “0” charge current, then the inverter/charger will not charge the battery system.

3.2 Discharge

If, for some reason (alarm or SOF), the TCCv2.0 CAN system sends a “0” discharge current, then the inverter/charger will not discharge the battery system.

In the event that the value is ≠ “0”, then the inverter will allow any discharge.

3.3 Alarms

When there is an active alarm on the battery system, the TCCv2.0 CAN system will inform the inverter/charger of the detected alarm. The TCCv2.0 has real-time data about each of the connected batteries. The alarms indicated to the inverter concern possible over-voltage, under-voltage, over-current, over-temperature and under-temperature of any of the batteries connected to the system.

(For further information about alarms, see the Alarms chapter of the “TCC CAN Technical Manual” document).

The TCC CAN system constantly informs the inverter about the alarm status of the battery system, so that the inverter knows whether the alarms are activated or not at all times. The inverter will not allow the current flow whenever there is an active alarm, given that the TCC CAN system will send the charge/discharge processes a current “0” value.

When the said alarm is reset, the system automatically resets itself, assuming the inverter/charger equipment is configured to do so.

ANNEX - 05

TCCv2.0 CAN (109765)

COMPATIBILITY WITH OTHER EQUIPMENT

SOLIS

cegasa

1. Introduction

1.1 Objective

This document describes the steps to follow in order to connect the Cegasa battery TCCv2.0 CAN to a SOLIS brand inverter/ charger.

1.2 Acronyms

BMS	Battery Management System
BP	Pack Battery Pack
SOC	State of Charge
SOF	State of Function)

2. Configuration with SOLIS equipment

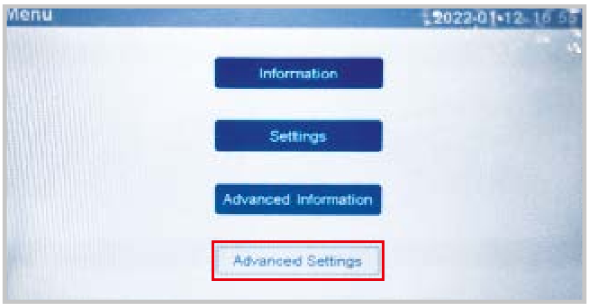
To fully integrate the TCCv2.0 with the SOLIS system, the inverter has to communicate with the TCCv2.0. To achieve this, the SOLIS inverter/charger has to be set up as explained below.

Before starting, the first step is to connect the TCCv2.0 CAN system as described in the "TCCv2.0 CAN Technical Manual" as well as connecting the batteries (power and communications) to the SOLIS equipment, as explained in its own installation manual (if in doubt, consult the dealer). Next, switch on the SOLIS equipment.

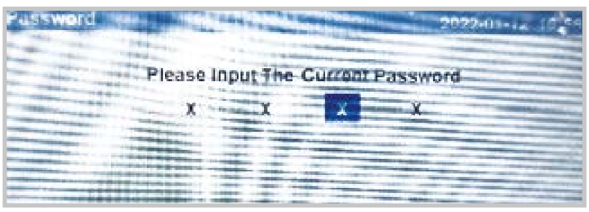
The SOLIS inverter set-up is done through a screen on the inverter.

Steps to follow:

a) First go to the "Advanced Settings" tab.



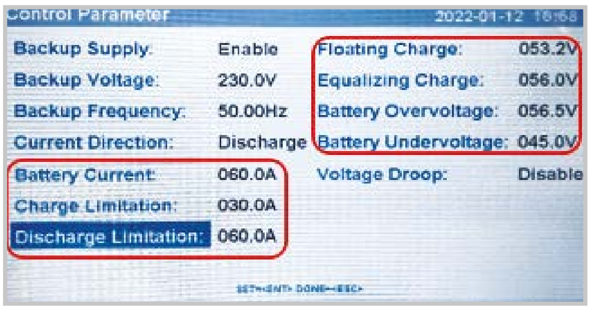
b) The inverter will ask for a password, enter the password **(0010)**



c) Go to the "Storage Energy Set" tab

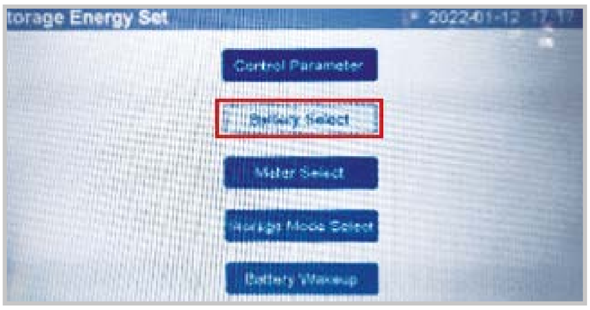
d) Go to the "Control Parameter" tab

e) Assign the following parameters to the inverter:

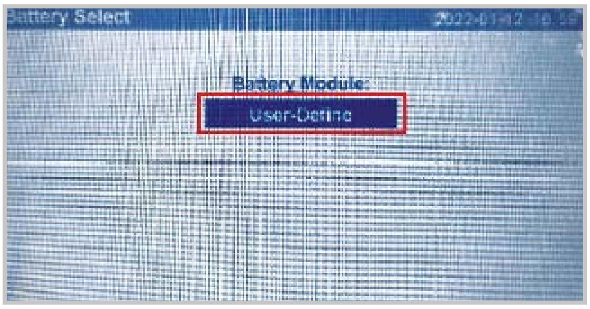


Battery Current:	Battery's maximum discharge current * Nº of batteries
Charge Limitation:	Battery's maximum charge current * Nº of batteries
Discharge Limitation:	Battery's maximum discharge current * Nº of batteries
Floating Charge:	Battery floating voltage
Equalizing Charge:	Battery charge voltage
Battery Overvoltage:	Battery charge voltage + 0.5V
Battery Undervoltage:	Battery discharge cut-off voltage

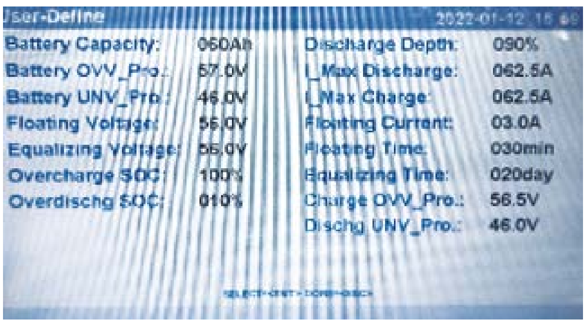
f) Go to the "Battery Select" tab



g) Select "User-Define"



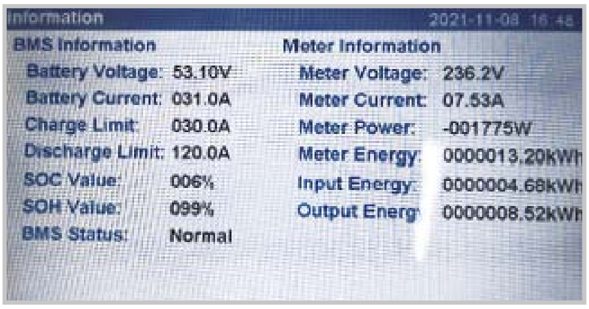
h) Assign the following parameters to the inverter:



Battery Capacity:	Battery's capacity * Nº of batteries
Battery OVV_Pro:	Battery charge voltage + 0.5V
Battery UNV_Pro:	Battery discharge cut-off voltage
Floating Voltage:	Battery floating voltage
Equalizing Voltage:	Battery charge voltage
Overcharge SOC	100%
Overdischg SOC:	10%
Discharge Depth:	Battery Depth of Discharge (20% recommended). Battery's maximum discharge current * Nº of batteries
I_Max Discharge:	Battery's maximum charge current * Nº of batteries
I_Max Charge:	3A
Floating Current:	30 minutes
Floating time:	20 days
Equalizing time:	Battery charge voltage + 0.5V
Dischg UNV_Pro:	Battery discharge cut-off voltage

i) Set the "ForceCharge SOC" value to 10%; forcing the charging process if the battery reaches this SOC value.j)

j) In turn, the TCCv2.0 CAN sends the inverter the operating limits of the charge and discharge current:



2.1 Operating modes

The inverter can operate in 3 different modes, these can be selected from the “Storage Mode Select” tab via the route ***Advanced Settings --> Storage Energy Set --> Storage Mode Select***

- **Reserve battery:**

  To maximise photovoltaic generation and minimise network consumption, primarily loads are covered with the PV generation and if this is not enough, the battery is discharged. Any photovoltaic surplus is put into the battery in recharge mode.

- **Off Grid Mode:**

  There is no connection to the grid. PV and battery generation take charge of supplying loads with power, in the first instance, the photovoltaic covers the loads and if this is not enough, then battery provides the power necessary to feed the loads connected to the system.

- **Time Charging:**

  This mode allows time periods to be set in order to charge and discharge the batteries at a given power.

3. General operation

3.1 Charge

The inverter/charger charges the battery using the “charge current” and “charge voltage” ordered by the TCCv2.0 CAN system via communications until the said voltage is reached.

If, for some reason (alarm or SOF), the TCC CAN system sends a “0” charge current, then the inverter/charger will not charge the battery system.

3.2 Discharge

If, for some reason (alarm or SOF), the TCCv2.0 CAN system sends a “0” discharge current, then the inverter/charger will not discharge the battery system.

In the event that the value is ≠ “0”, then the inverter will allow any discharge.

3.3 Alarms

When there is an active alarm on the battery system, the TCCv2.0 CAN system will inform the inverter/charger of the detected alarm. The TCCv2.0 has real-time data about each of the connected batteries.

The alarms indicated to the inverter concern possible over-voltage, under-voltage, over-current, over-temperature and under-temperature of any of the batteries connected to the system.

(For further information about alarms, see the Alarms chapter of the “TCC CAN Technical Manual” document).

The TCC CAN system constantly informs the inverter about the alarm status of the battery system, so that the inverter knows whether the alarms are activated or not at all times. The inverter will not allow the current flow whenever there is an active alarm, given that the TCC CAN system will send the charge/discharge processes a current “0” value.

When the said alarm is reset, the system automatically resets itself, assuming the inverter/charger equipment is configured to do so.

ANNEX - 06

TCCv2.0 CAN (109765)
COMPATIBILITY WITH OTHER EQUIPMENT

INGETEAM

cegasa

1. Introduction

1.1 Objective

This document describes the steps to follow in order to connect the Cegasa battery TCCv2.0 CAN to an INGETEAM brand inverter/charger.

1.2 Acronyms

BMS	Battery Management System
BP	Pack Battery Pack
SOC	State of Charge
SOF	State of Function)

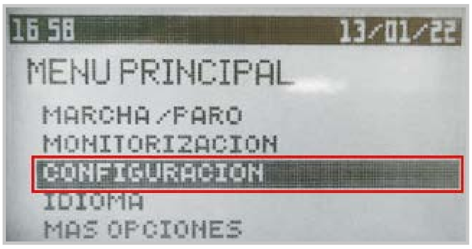
2. Configuration with INGETEAM equipment

To fully integrate the TCCv2.0 with the INGETEAM system, the inverter has to communicate with the TCCv2.0. To achieve this, the INGETEAM inverter/charger has to be set up as explained below.

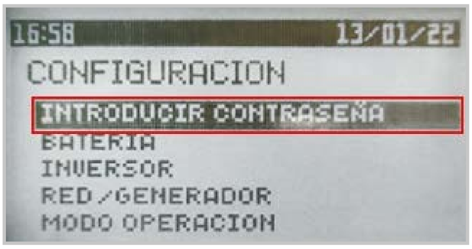
Before starting, the first step is to connect the TCCv2.0 CAN system as described in the "TCCv2.0 CAN Technical Manual" as well as connecting the batteries (power and communications) to the INGETEAM equipment, as explained in its own installation manual (if in doubt, consult the dealer). Next, switch on the INGETEAM equipment.

The INGETEAM inverter set-up is done through a screen on the inverter.

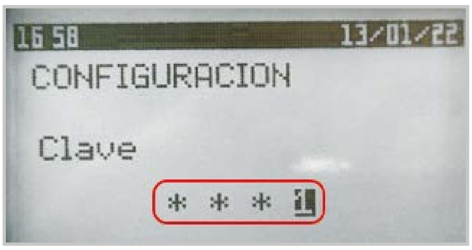
First go to the "MAIN MENU" tab and then to the "SETTINGS" tab.



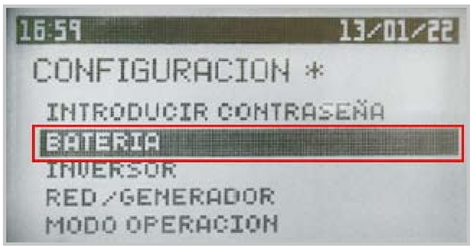
Go to the "ENTER PASSWORD" tab



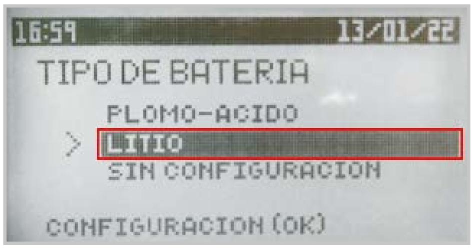
The inverter will ask for a password, enter the password **(0332)**



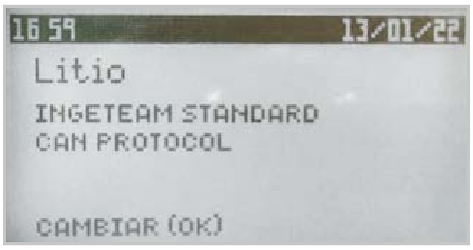
Go to the "BATTERY" tab

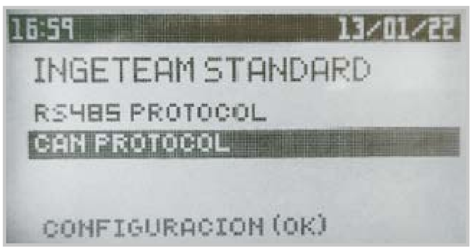


Select "LITHIUM"



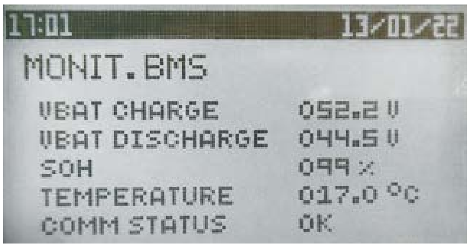
To ensure communications to work correctly, select "INGETEAM STANDARD CAN PROTOCOL"

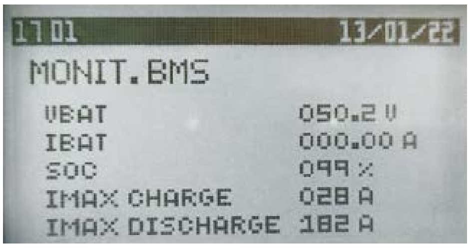




In the "INVERTER" tab it is possible to configure the voltage and frequency in AC.

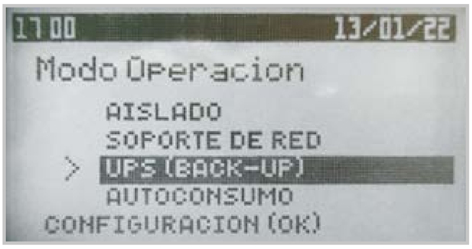
In turn, the TCCv2.0 CAN sends the inverter the operating limits of the charge and discharge current and voltage:





2.1 Operating modes

The inverter can operate in 4 different modes, these can be selected from the ***"OPERATION MODE" tab --> "MODE"***



- **Isolated:**
  There is no connection to the grid. PV and battery generation take charge of supplying loads with power, in the first instance, the photovoltaic covers the loads and if this is not enough, then battery provides power.
- **Grid Support:**
  This prioritises battery charging; first the battery is charged from the PV and any surplus is used to feed connected loads.
- **UPS (Back-Up):**
  Designed for systems where grid outages are prolonged and frequent. As long as the grid is present, the batteries are kept charged, but as soon as mains power is lost the loads are powered from the battery.
- **Self-consumption:**
  To maximise photovoltaic generation and minimise network consumption, primarily loads are covered with the PV generation and if this is not enough, the battery is discharged. If there is a photovoltaic surplus, this is put into the battery.

3. General operation

3.1 Charge

The inverter/charger charges the battery using the "charge current" and "charge voltage" ordered by the TCCv2.0 CAN system via communications until the said voltage is reached.

If, for some reason (alarm or SOF), the TCC CAN system sends a "0" charge current, then the inverter/charger will not charge the battery system.

3.2 Discharge

If, for some reason (alarm or SOF), the TCCv2.0 CAN system sends a "0" discharge current, then the inverter/charger will not discharge the battery system.

In the event that the value is ≠ "0", then the inverter will allow any discharge.

3.3 Alarms

When there is an active alarm on the battery system, the TCCv2.0 CAN system will inform the inverter/charger of the detected alarm.

The TCCv2.0 has real-time data about each of the connected batteries. The alarms indicated to the inverter concern possible over-voltage, under-voltage, over-current, over-temperature and under-temperature of any of the batteries connected to the system.

(For further information about alarms, see the Alarms chapter of the "TCC CAN Technical Manual" document).

The TCC CAN system constantly informs the inverter about the alarm status of the battery system, so that the inverter knows whether the alarms are activated or not at all times. The inverter will not allow the current flow whenever there is an active alarm, given that the TCC CAN system will send the charge/discharge processes a current "0" value.

When the said alarm is reset, the system automatically resets itself, assuming the inverter/charger equipment is configured to do so.

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