



INSTALLATION AND USER MANUAL

TITAN ENERGY & TITAN POWER

INSTALLATION AND USER MANUAL OF THE STORAGE SYSTEM

TITAN ENERGY AND TITAN POWER 30 - 50 - 100 KW

(REV **01.03**)



Dear customer, thank you for choosing UNE products.

Please do not hesitate to contact us at the e-mail address **info@unesrl.com** for any information that may help us improve this Manual.

Before operating on the TITAN Energy & TITAN Power, please carefully read this manual and the safety instructions.

These instructions are intended for all installers, maintenance technicians and operators responsible for the installation, maintenance and use of the system, in order to make it as efficient as possible.

These instructions form an integral part of TITAN Energy & TITAN Power and must always be available to the technical personnel working on TITAN Energy & TITAN Power.

All data indicated in this Manual exclusively describe TITAN Energy & TITAN Power as supplied by UNE srl. Any modifications made without prior written authorisation from UNE srl invalidate the contents of this Manual and, in particular, any declared data as legally binding.

The original language of this document is Italian; in case of discrepancies or doubts, please request the original document from UNE srl.

Below are the symbols pertaining to each chapter (Installer, maintenance technician, user):



"INSTALLER"

The following chapter must be read and understood by the installer of the TITAN ENERGY & TITAN POWER system.



"MAINTENANCE TECHNICIANS"

The following chapter must be read and understood by the maintainer of the TITAN ENERGY & TITAN POWER system.



"USER"

The following chapter must be read and understood by the user of the TITAN ENERGY & TITAN POWER system.

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1. - GENERAL AND SAFETY INFORMATION

All operators must comply with the applicable safety regulations, bearing in mind that their own actions may cause danger to others (the EMPLOYER must carry out a risk assessment).

1.1. Manual recipients

This User Manual is intended for all personnel responsible for the installation, commissioning (use) and maintenance of TITAN Energy & TITAN Power and for guaranteeing the safety provisions and measures related to TITAN Energy & TITAN Power.

The original language of this document is Italian, in case of inconsistencies or doubts, download the original Italian document from UNE srl.

The Manual must be consulted for any information concerning the installation, operation (use) and maintenance of the TITAN Energy & TITAN Power.

The BESS user must be familiar with basic electrotechnical and physics knowledge, the cabling technique and the symbols used in the wiring diagrams, the safety rules, and the use of low voltage equipment.

This manual must be read very carefully before using the TITAN Energy & TITAN Power, to follow all the instructions therein.



Figure 1 - TITAN Energy (left) and TITAN Power (right)

1.2. Scope of validity

These instructions for installation, maintenance, and use of TITAN Energy & TITAN Power apply to all firmware versions.

The type of electrical supply systems allowed are **TN-S** (no switching on neutral conductor) and **TN-C**. **IT** system **is not allowed**.

TT systems are permitted only after assessing and defining the required parameter settings and/or safety levels, as the neutral-to-MEN connection must be maintained at the inverter in all operating modes. If the inverter is only set in grid mode (stand-alone mode is not possible), TT is permitted.

For further information and questions, please contact UNE srl.

1.3. Terms of delivery and warranty

The warranty conditions are described in a specific document supplied with the equipment and are to be considered an integral part of the delivery. In particular, the warranty conditions are valid only if:

- The installer and the maintenance technician comply with all the instructions in this Manual;
- NO operations are carried out on TITAN Energy & TITAN Power that are not authorized or that are in conflict with this document;
- "Open casing" operations on TITAN Energy & TITAN Power are carried out only by authorised personnel;
- NO modifications are made to TITAN Energy & TITAN Power.

UNE srl is NOT liable for defects or malfunctions deriving from:

- Improper use of the product;
- Alteration/damage due to transport or particular environmental conditions;
- Lack of maintenance or improper maintenance;
- Tampering or makeshift repairs;
- Installation or maintenance carried out by unauthorized persons.

In addition, UNE disclaims any liability in the event that the proper installation standards in force in the country of installation are not followed.

1.4. Symbols used

Below is the list of symbols used in this manual:



"ATTENTION".

Failure to comply with the information marked with this symbol may result in fatal danger and cause damage to the device.



"WARNING"

Failure to comply with the information marked with this symbol may hinder the correct execution of the work phases and prevent the optimal operation of the device.



"READ CAREFULLY"

The recommendations marked with this symbol may facilitate the use of TITAN Energy & TITAN Power and improve its performance, depending on its place of installation.



"EXAMPLE"

Here you will find practical examples.



"NOTE"

Points out particular procedures or operating modes.



"DANGEROUS VOLTAGE"

The highlighted information pertains to parts of the converter which may be functional, or which may still be at high voltage.



"HOT SURFACE"

Some surfaces may become hot; wear appropriate personal protective equipment (PPE) when working with this product.



"CRUSHING HAZARD"

Indicates crushing hazards for hands or limbs caused by cutting or pressing parts. Danger of death!



"NO ACCESS"

Indicates that unauthorized people cannot access the system area (technical room).



REPAIRS, MAINTENANCE OR LUBRICATION CANNOT BE CARRIED OUT WITH THE SYSTEM IN OPERATION (ACTIVE).



"PROHIBITION TO USE WATER TO FIGHT OUT THE FIRE"

It is forbidden to use water or any other fluid to put out a fire.



"MANDATORY READING OF THE INSTRUCTIONS"

Anyone intending to use the system must read this manual and familiarize themselves with all controls and equipment in advance.



"SYSTEM OPERATING RANGE"

This symbol indicates the operating range.



"WAITING TIME"

Wait a certain amount of time before taking the indicated action.

IP20

"DEGREE OF PROTECTION"

Indicates the degree of protection provided by mechanical enclosures and electrical panels against the intrusion of solid particles and the access of liquids.



"ALTERNATE CURRENT POWER SUPPLY"

Indicates that a circuit must be AC.



"CLASS II DEVICE"

Class II devices do not require earthing of one of the two poles.



"EARTHING"

Identify a ground terminal.



"EAR DEFENDERS MUST BE WORN"

Anyone who uses the system must wear ear defenders.



"SAFETY GLOVES MUST BE WORN"

Anyone who intends to use the system must wear cut resistant safety gloves.



"AN OVERALL MUST BE WORN"

Anyone who uses the system must wear a work overall.



"SAFETY SHOES MUST BE WORN"

Anyone who uses the system must wear safety shoes.



"SAFETY GLASSES MUST BE WORN"

Anyone who uses the system must wear safety glasses.



"A GAS MASK MUST BE WORN"

Anyone who uses the system must wear a suitable gas mask to be protected from vapours or dust which could be released during system operation.



"DIRECT CURRENT SUPPLY"

This symbol indicates "DIRECT CURRENT SUPPLY": indicates a DC circuit.



"ON"

This symbol indicates "ON": indicates that a control device in this position is in on.



"OFF"

This symbol indicates "OFF": indicates that a control device in this position is in off.



"PHASE SYMBOL"

This symbol indicates "PHASE SYMBOL": this symbol is equivalent to the word "phase".



"SINGLE PHASE LINE"

This symbol indicates "SINGLE PHASE LINE".



"THREE PHASE LINE"

This symbol indicates "THREE PHASE LINE".



"NON-ORDINARY TRASH"

The article must not be thrown into general waste but collected separately in the appropriate containers



"ELECTRONIC WASTE"

The article must not be thrown into general waste but collected separately in the appropriate containers. Electronic waste contains substances that are toxic to the environment and non-biodegradable.

1.5. Documentation

This Manual defines the safety standards, general instructions and operating procedures that must be followed for safe transport, installation and use of TITAN Energy & TITAN Power.



ATTENTION: This Manual must be considered an integral part of the TITAN Energy & TITAN Power. This Manual must be read by anybody who uses and operates on the TITAN Energy & TITAN Power.



ATTENTION: This manual refers only to the use of the TITAN Energy & TITAN Power.

For any indications about the maintenance of its main components, the operator must refer to the datasheet and manual of the main components and to the electrical diagram of the cabinet.

Any operation not in conformity with what is indicated in the aforementioned documents may cause severe danger and the forfeiture of the warranty conditions.



ATTENTION: Once TITAN Energy & TITAN Power is installed, the AC input cables and DC input terminals inside the cabinets can always be live even if all breakers inside the TITAN Energy & TITAN Power system are open.

The only way to remove the voltage from the AC and DC input cables inside the cabinet terminals is to disconnect the TITAN Energy & TITAN Power system from the external AC and DC grid, with a dedicated switch installed outside the TITAN Energy & TITAN Power.



ATTENTION: Please refer to the **FZSONICK ST523** battery manual for battery instructions.



ATTENTION: UNE is not responsible for any consequence resulting from the use of non-original parts.



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ATTENTION: Any **hardware and/or software** modification must be performed by UNE technicians or authorized by the **UNE technical office**.

1.6. General installation warnings

- **BEFORE** installation, inspect the unit to ensure that there is no damage due to transport or handling, which could compromise the integrity of the insulation or safety distances; failure to observe this precaution could result in safety risks;
- **BE CAREFUL** when choosing the installation site and follow the specified cooling requirements. Take care to provide adequate ventilation when installed indoors;
- **UNAUTHORIZED** removal of necessary protective features, improper use, incorrect installation, or operation may result in serious safety hazards and electric shock and/or equipment damage;
- **READ** all chapters of this manual before installing or commissioning TITAN Energy & TITAN Power;
- **GROUND** the metallic cabinets;
- **DO NOT TOUCH** the electrical parts of the converter while the power is present and wait at least 5 minutes after the power is switched off before touching any electrical components;
- **DO NOT CARRY OUT** any operations on the product when the power is on;
- **DO NOT INSTALL** in environments at risk of explosion and fire;
- **DO NOT PERFORM** insulation tests between the power terminals or between the control terminals;
- **TIGHTEN** the screws of the terminal blocks properly;
- **COMPLY** with environmental installation conditions;
- **DO NOT TOUCH** the circuit boards unless absolutely necessary as they contain static-sensitive components. If so, use precautions to prevent damage caused by electrostatic discharge;
- **DO NOT TOUCH** internal parts immediately after or during operation of the inverter, it could be dangerous due to risks of electric shock and of burnings burns due to the high temperatures;
- **DO NOT OPERATE** the inverter above the maximum ambient temperature of 45°C;
- **CAUTION**, the unit should be installed in such a way as not to be in contact with unauthorized personnel;
- **CAUTION**, the grounding of the system is responsibility of the installer.

General safety instructions for the operator:

- Make sure to have read and also understood the following instructions and that such instructions are always applied when using and carrying out maintenance on the system;
- Using the system with **missing or damaged safety devices** is prohibited;
- Before starting the system, make sure that there are **no people near the cabinet** and in a hazardous position;
- Before installation, **check you have a flat/even floor for battery insertion**, and which can support a weight;
- Before starting the system, **check whether the cabinet is compliant with the rules, laws, and provisions for AC connections** in the country where it is installed; power on the system only if it is compliant;
- Before starting the system, check **whether the cabinet has all the certifications required for the application type in the country where it is installed**; Power on the system only if it is compliant;
- Before starting the system, evaluate with **the site safety expert the best choice in terms of location**, safety, precautions, and everything necessary on site to eliminate all the risks, which is the risk of explosion (non-explosive atmosphere, etc.), flooding, etc;
- Before installing TITAN Energy & TITAN Power, check **the INDOOR location for a dry environment**, where no condensation is generated, and without dust;
- Using the system in hazardous or malfunctioning conditions is prohibited; **notify any problem** to the maintenance manager;
- At the start of each shift, make sure the system is working correctly and check that **the guards and safety devices are in place and working efficiently**;
- Hand over the switchboard access key only to authorized personnel;



ATTENTION: NEVER leave the system unattended with the access key inserted in the electrical control panel.

- Ensure that **repairs are carried out by qualified and authorized technicians**. This system and its electrical equipment are designed in compliance with current safety regulations. Repairs must only be carried out with the system switched OFF, by qualified staff, and using genuine spare parts, to avoid injuries to the user;
- **Adequate lighting.** To facilitate monitoring and control operations, the system must be installed in an illuminated area;
- **Never insert foreign objects** in electric motor covers, moving parts of the ventilation system, or into electrical components;
- **Do not power the system by tampering with safety devices**;
- Notify the **system manager** and site safety expert of any dangerous condition;
- **Keep this operating manual carefully**, so that it is available to authorized personnel even in the event of intervention;
- **Failure to follow safety rules** during operation and maintenance of the system **may result in accidents**.



ATTENTION: High leakage current, earth connection essential before connecting supply. The leakage current exceeds 3.5mA and is less than 1000mA (measured leakage current 7.1mA).



Be aware that even when the converter is not powered from the grid, the battery is a power source. Therefore, for maintenance operations, OPEN the circuit breaker between the battery and the converter.



Wait 5 minutes after removing power from the PCS, for the capacitors to discharge before working on the cabinet.

A label must be attached to warn the electrical service personnel, who must be qualified, of any feedback situations not caused by the converter. A backfeed situation can occur when a particular load fault is present while the converter operates in energy storage mode.

A warning label must be affixed by the installer; which must be a qualified person, to all primary power isolators installed remote from the converter area and on external access points, if any, between such isolators and the converter.

The warning label shall bear the words shown in the figure below:

BEFORE WORKING ON THIS CIRCUIT

- Isolate Uninterruptible Power Supply (UPS);
- Check for dangerous voltages on all terminals including the protective earth.



Risk of backfeed voltage



ATTENTION: TITAN Power is equipped with auxiliary batteries.

- Do not open or tamper with batteries.** Released electrolyte is harmful to skin and eyes. It can be toxic;
- A battery may present a risk of electric shock** and burns due to a high short-circuit current.

Failed batteries can reach temperatures above the burn thresholds for touchable surfaces.



ATTENTION: Salt batteries can present a risk of electrical shock and high short-circuit current.

Risk assessment for worker's health and safety carried out in the workplace or on any of the equipment used, as well as assessing the residual risks affecting the system, as described in this manual, allows the

client to assess the need to provide the workers with more suitable and appropriate **Personal Protective Equipment (PPE)**.



READ CAREFULLY: Correctly use the system, the equipment, the PPEs.

The following precautions should be observed when working on batteries:



REMOVE RINGS OR OTHER METALLIC OBJECTS



REMOVE WATCHES



WEAR INSULATING RUBBER GLOVES
Class III (EN 374-3) PVC coated gloves



USE TOOLS WITH INSULATED HANDLES



WEAR INSULATED RUBBER BOOTS



WEAR PROTECTIVE GLASSES



FULL MASKS EN137 STANDARD
compliant, type 2, with E yellow filters for acid gases and vapours.



EAR DEFENDERS
or ear plugs must be worn;

Also:

- **Determine** if battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Touching any part of a grounded battery can cause electrical shock. This risk can be reduced if grounding is removed during installation and maintenance.
- **Disconnect** the charging source before connecting or disconnecting the battery terminals.



WARNING: The TITAN Energy & TITAN Power operator must be an educated and trained person and can only use the TITAN Energy & TITAN Power system after reading this **manual**, the **technical data sheet**, and the **manual of the main components inside the cabinet**, the **wiring diagram**, the **ST523 Battery Manual**.



ATTENTION: Directly connecting the positive and negative poles of the same battery could damage the battery and cause dangerous electric arcs.

1.6.1. Precautions

It is advisable to provide a **fire extinguisher near the system**, suitable for Electrical cabinets and enclosures, and low voltage electrical equipment.



ATTENTION: Water or foam must never be used to fight the start of a fire or a fully developed fire.

To avoid fire developing, the system **must be kept clean** from oils, solvents, flammable liquids and powders, rags, explosive atmosphere, zones with fire and explosion risks, etc.

1.6.2. Noise



ATTENTION: The ear defenders must be worn when carrying out checks, adjustments, and maintenance operations near the cabinet.



If the daily exposure of operators to **noise exceeds 80 dBA**, the employer is responsible for implementing all safety measures aimed at protecting the health of the operators, as specified by **Directive 86/188 / EEC**, implemented in **ITALY from Presidential Decree no. 277 of 08/15/1991**.

More specifically, the operator, if necessary, must use ear defenders to protect himself from noise.

Also check the noise limits in the country in which the cabinet is installed, to be compliant.

1.7. Recommended ambient conditions and installation

To ensure the system's correct and safe operation, it must be located in an area specifically assigned and authorized by the required licenses.

The main usage restrictions that the installation site must comply with are listed below:

a) Indoor installation;

b) Maximum **gradients/slope of the foundation on both sides:**

- 10mm wide side;
- 2mm short side.

c) **Foundation construction suitability for the type of ground selected (for weights, etc.);**

d) **Low flooding and fire/explosion risk area; no rain for the cabinet;**

e) **TITAN Energy & TITAN Power minimum operating temperature of 0°C and maximum temperature of +45°C.**

The internal thermostats are set to a maximum of 45°C as set-point (or lower values), this means that the internal temperature of the cabinet can reach maximum 45°C: at 45°C the fans will remain active until the internal temperature decreases to 40°C. The ambient temperature should be equal to or lower than the thermostat set point, so the ambient temperature must be maximum 45°C.

f) **Area around the installation free from grass or other green, free from flammable materials or similar materials.**

1.7.1. Safety devices

Mechanical safety devices:

- TITAN Energy & TITAN Power door with lock.

TITAN Power: Is equipped with a door-switch connected to the PC.

Optional extras to be provided by the client:

- Smoke detection sensor to be installed by the client (in the technical room where the cabinet is placed) and connected to the main Client Firefighting System.

1.7.2. Residual risks

Residual risks that cannot be eliminated at the design stage and that remain in the system must be assessed by the Employer/Customer and by all authorised personnel working on the cabinet. For each residual risk, specific instructions and rules are provided and must be followed to avoid endangering operators and maintenance staff.

In any case, the operator must never **attempt to remove a movable guard in a production stage** where it is prohibited to do so, or a fixed guard required for maintenance operations.



READ CAREFULLY: The client is responsible for instructing the operator on the necessity of this manual, and for ensuring that the tasks, safety rules, provided risk have been fully understood.

After using a fire extinguisher indoors, air it and recharge it even after partially using it.



READ CAREFULLY: Operating instructions are clearly stated on the distinctive sign (label) affixed to the fire extinguisher.



READ CAREFULLY: The fire extinguisher is a pressurized cylinder and must therefore be handled with care, avoiding accidental falls during transport or installation that dent the cylinder and/or break the parts provided to supply and control the powder flow.



WARNING: Avoid inhaling or ingesting the fire extinguishing agents and wear a dust mask.



WARNING: The products can cause irritation to the respiratory tract or to the eyeball. In the event of contact with fire extinguishing agents, wash the affected parts with plenty of water and mild soap. In this case, contact a general practitioner and show the safety datasheet supplied with the fire extinguishing agent.



READ CAREFULLY: The fire extinguisher must be recharged and checked by qualified staff even if partly used.

Provide maintenance on the powder fire extinguisher as provided for by law.

Being pressurized pieces of equipment, the cylinders must be tested every six years (in Italy), **in compliance with standard UNI 9994**. Anyway, for other countries, the customer must monitor the frequency of the periodic fire extinguisher checks and maintenance.

The fire extinguisher must be disposed of according with current waste disposal regulations. Disassembling and dismantling fire extinguishers should be carried out by qualified staff.

For any other information, please read the operating and maintenance manual supplied with every fire extinguisher.

1.8. Allowed fire extinguishing methods

An inadequate response by emergency staff or by users to a faulty battery in the place where the accident occurred or in the event of an injury could potentially have a negative impact; these situations need to be adequately and efficiently handled.

1.8.1. Battery chemical compounds and fire extinguishing agents

Refer to the Product Safety Datasheet of the **FZSONICK Sodium Metal Chloride battery ST523**.

2. - GENERAL PRODUCT OVERVIEW

2.1. General description

TITAN ENERGY:

TITAN Energy is a battery storage cabinet (max 90kWh each) for indoor applications.

TITAN Energy must be connected, up to 5 modules, to its inverter (TITAN Power) to be interfaced with the grid and to power the user's load.

Each battery is connected to its line via a Harting connector which guarantees maximum modularity and safety.



Figure 2 - Titan Energy

TITAN POWER:

TITAN Power is a line of converters (30 – 50 – 100 kW) designed for energy storage applications.

It is designed to ensure:

- High performance;
- Reliability;
- Durability.

To achieve the higher efficiency, a single AC/DC power converter bridge has been implemented.

The most significant choices, in terms of reliability and durability, are the elimination of electrolytic capacitors on both the power and control side in favour of film capacitors, and the use of extended temperature industrial components for the electronic boards.

The choice of materials and production solutions was carefully considered: **e.g. tinned cables for auxiliary circuits, electronic boards with conformal coating.**

The cooling fans are controlled by a temperature sensor in order to minimize self-consumption and maximize life expectancy; their operation is constantly monitored to prevent damage due to failures.



Figure 3 - TITAN Power

2.2. Dimensions

TITAN ENERGY



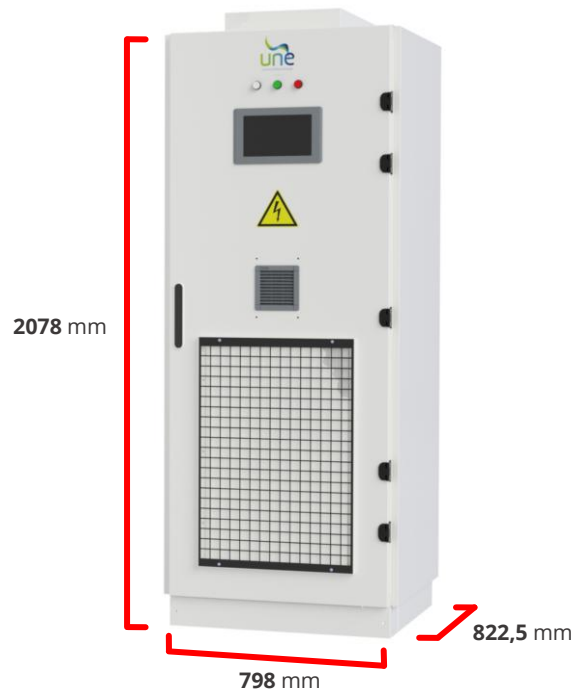
The dimensions of TITAN Energy are as follows:

- Height: **2300 mm**
- Width: **810 mm**
- Depth: **1320 mm**

The weight of the system is:

- Without batteries **380 kg**
- Each battery: **256 kg** (up to 4)

TITAN POWER



The dimensions of TITAN Power are as follows:

- Height: **2078 mm**
- Width: **768 mm**
- Depth: **822,5 mm**

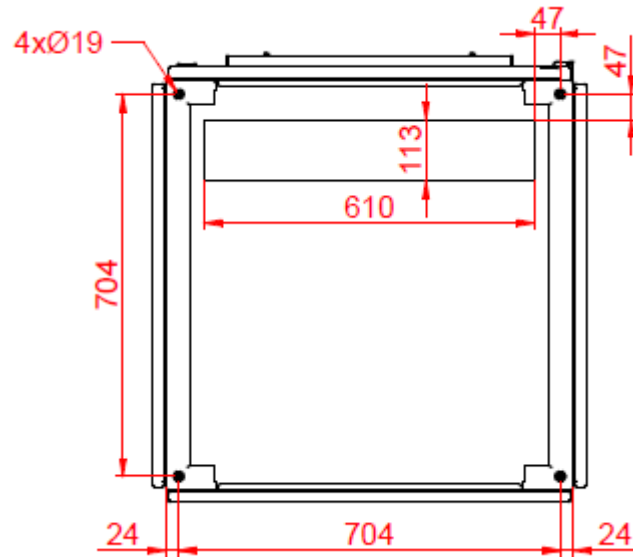
The weight of the system is:

- TITAN Power 30 kW **390 kg**
- TITAN Power 50 kW **610 kg**
- TITAN Power 100 kW **800 kg**

MINIMUM DISTANCES TO WALL	TITAN ENERGY	TITAN POWER
Front clearance	500 mm	800 mm
Rear clearance	3500 mm	400 mm
Side clearance (right and left side)	100 mm	100 mm

2.3. TITAN POWER floor fixing dimensioning

Below are the fixing dimensions of the TITAN POWER base.



2.4. Block diagram

The figure below shows the block diagram of TITAN Energy & TITAN Power where the input and output systems are present:

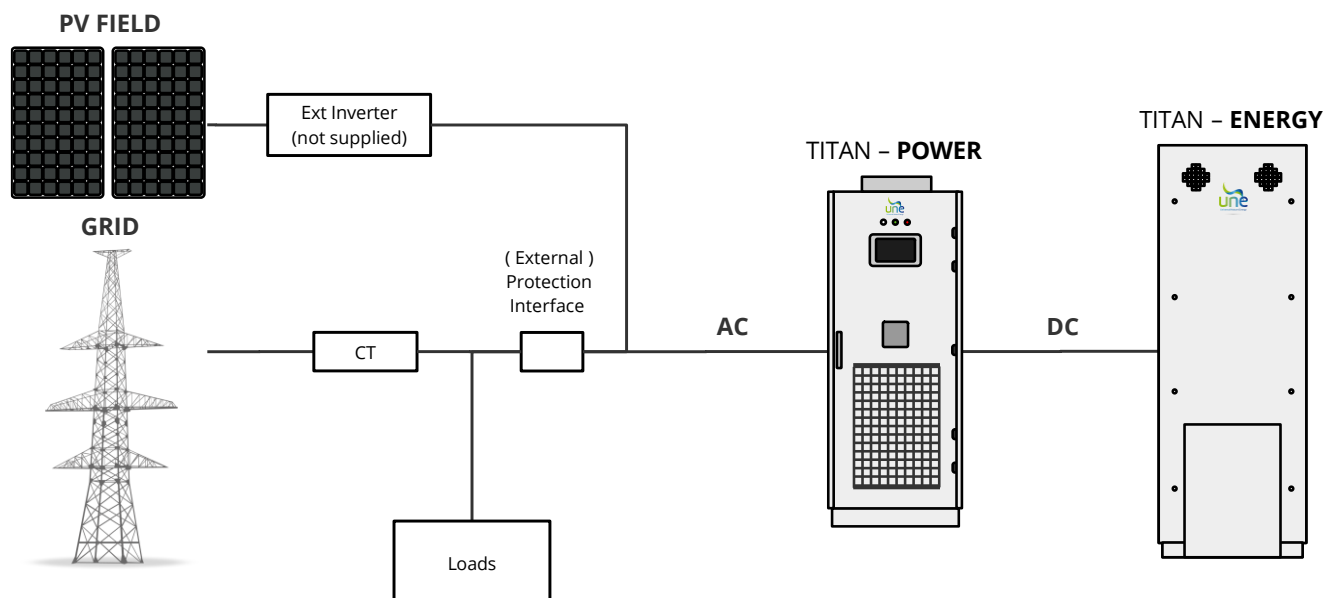


Figure 4 - Block diagram of TITAN Energy & TITAN Power

2.5. Plates

2.5.1. TITAN Energy & TITAN Power plate

Shown below is an example of the identification plate inside the framework of the TITAN Energy.

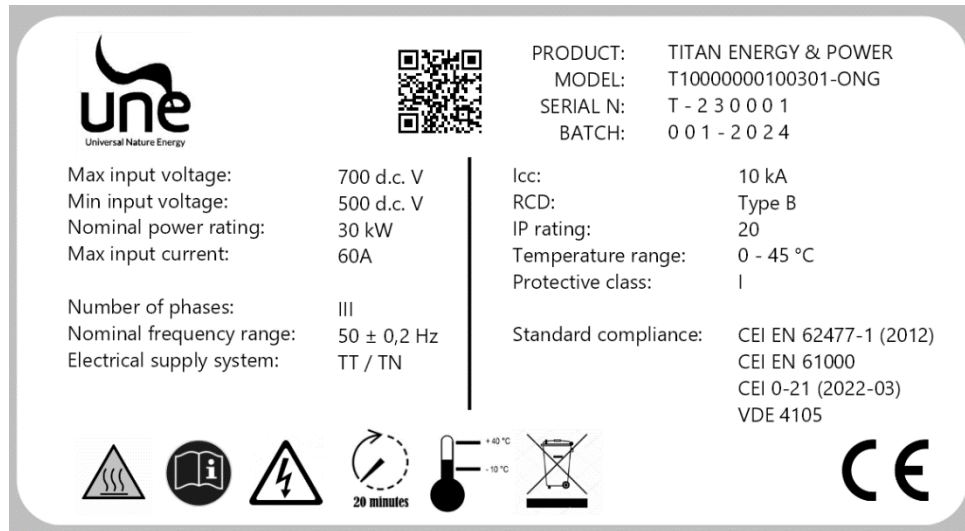


Figure 5 - TITAN Energy & Storage plate

Technical data contained in this manual **do not replace the data on the labels applied to the electrical cabinet.**

The identification plate is located in 2 places, outside the **TITAN Energy** and the **TITAN Power**.

2.5.2. TITAN Energy and TITAN Power generic plates

The following plate are used on the cabinets:



DANGER

Shock and arc flash explosion hazards.
Follow ALL requirements in NFPA 70 E for safe work practices and for Personal Protective Equipment.



DANGER

Turn off all the power supplies before disconnecting battery cables.



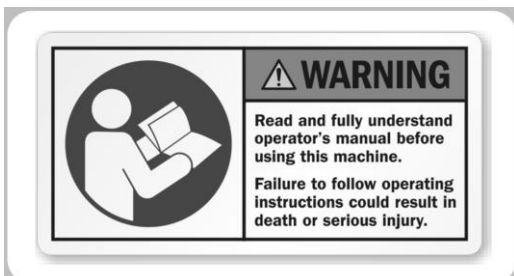
DANGER

Electrical Shock Hazard.
Do Not Touch.



DANGER

HIGH VOLTAGE
Turn off power before servicing/maintenance.



WARNING

Read and fully understand the operator's manual before using this machine/cabinet.
Failure to follow operating instructions could result in death or serious injury.

2.6. Mechanical specifications

TITAN POWER – MECHANICAL SPECIFICATIONS

		TITAN POWER 30 KW	TITAN POWER 50 KW	TITAN POWER 75 KW	TITAN POWER 100 KW
Dimensions	mm	820 (W) 820 (D) 2060 (H)			
Weight	kg	390	610	705	800
Inverters per box	N°	1	1	1	1
Acoustic emissions	dB	≤ 68	≤ 68	≤ 68	≤ 68
Air ventilation		Forced	Forced	Forced	Forced



TITAN ENERGY – MECHANICAL SPECIFICATIONS

		TITAN ENERGY 22,5 – 90 KWH
Dimensions	mm	810 (W) 1320 (D) 2300 (H)
Weight	kg	380 (Without batteries)
Battery weight	kg	256 - (Each battery)
Batteries per box	N°	4
Acoustic emissions	dB	42
Air ventilation		Forced



ATTENTION: The positioning base or support surface must be able to support the weight of the TITAN Energy & TITAN Power.

Install the TITAN Energy & TITAN Power on a solid and flat base. An unsolid base could create risks of falling and/or damage to the cabinets and other equipment with possible danger and risks for people.

2.7. Identification of the components

2.7.1. TITAN Energy components

A maximum of 4 batteries can be installed in each TITAN Energy, with their Harting connectors for DC power, 24Vdc and 24Vac, canbus communication, etc. Batteries are connected to the gateway (CAN 1) which collects all the information coming from the batteries through a canbus.

The gateway also communicates with the inverter via LAN 1.



Figure 6 - Disposition of the batteries inside TITAN Energy

DISPOSITION:

First TITAN Energy	ADDR. 14	FOURTH ST523 (Upper);
	ADDR. 13	THIRD ST523;
	ADDR. 12	SECOND ST523;
	ADDR. 11	FIRST ST523 (Bottom).
Second TITAN Energy	ADDR. 24	FOURTH ST523 (Upper);
	ADDR. 23	THIRD ST523;
	ADDR. 22	SECOND ST523;
	ADDR. 21	FIRST ST523 (Bottom).
Third TITAN Energy	ADDR. 34	FOURTH ST523 (Upper);
	ADDR. 33	THIRD ST523;
	ADDR. 32	SECOND ST523;
	ADDR. 31	FIRST ST523 (Bottom).
Fourth TITAN Energy	ADDR. 44	FOURTH ST523 (Upper);
	ADDR. 43	THIRD ST523;
	ADDR. 42	SECOND ST523;
	ADDR. 41	FIRST ST523 (Bottom).
Fifth TITAN Energy	ADDR. 54	FOURTH ST523 (Upper);
	ADDR. 53	THIRD ST523;
	ADDR. 52	SECOND ST523;
	ADDR. 51	FIRST ST523 (Bottom).

Use the figures below to identify the main components of TITAN Energy:

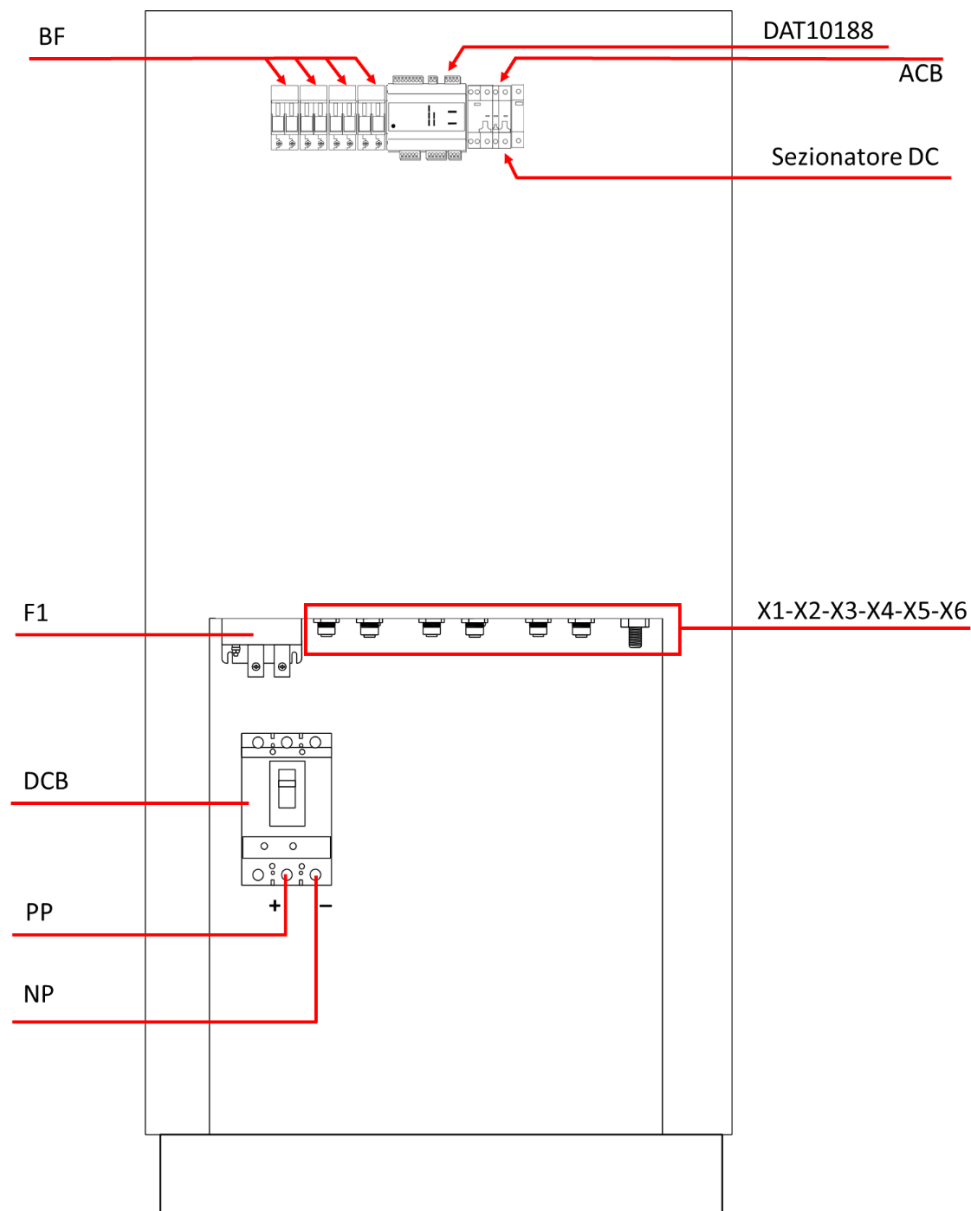


Figure 7 - TITAN Energy panel

LEGEND	DESCRIPTION
+ BF	Battery fuses
+ F1	EMI filter
+ DCB	DC Breaker
+ NP	Negative Pole
+ PP	Positive Pole

LEGEND	DESCRIPTION
+ ACB	AC 24V Breaker
+ DAT10188	I/O distribution module
+ DCB	DC 24V Breaker
+ X1 --- X6	Panel connectors

The ventilation system of the TITAN Energy system shown below:



Figure 8 - Ventilation system of TITAN Energy



WARNING: Cooling of the TITAN Energy is carried out with no. 2 forced air fans.

Outside air is drawn in through the grilles located in the lower part of the cabinet. The cabinet must be installed in such a way as to ensure free air circulation. Hot air is expelled through the upper grilles by means of 2 fans, as shown in the picture.

Be careful not to install the cabinet in dusty places, and not to obstruct the ventilation grilles.

Ventilation is automatically switched on and off by thermostats (inside the TITAN Energy) and allows cooling of the control cabinet from the bottom up and also of the BMS area (of the batteries).

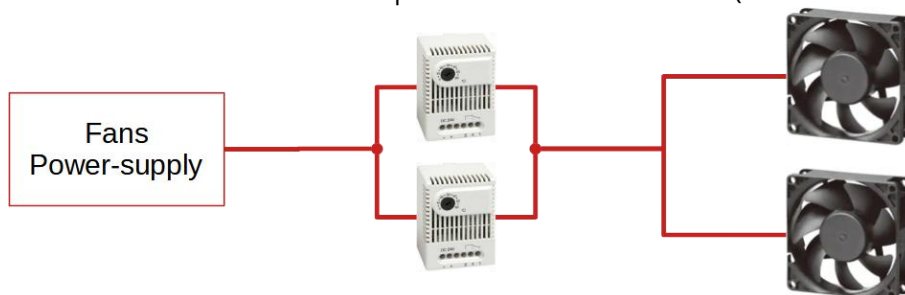


Figure 9 - Cabinet fans and thermostats

The cabinet is equipped with a redundant double thermostat and two fans, to continue working even if the first fan or thermostat fails.

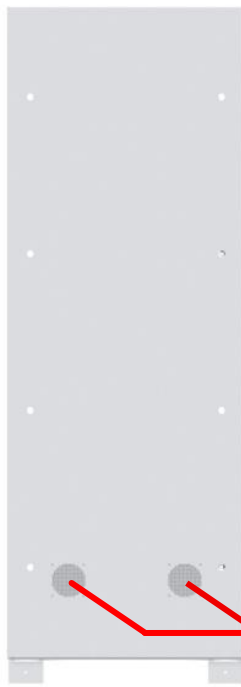


Figure 10 – FRONT layout of the TITAN Power

Air outlet



Figure 11 – REAR layout of the TITAN Power

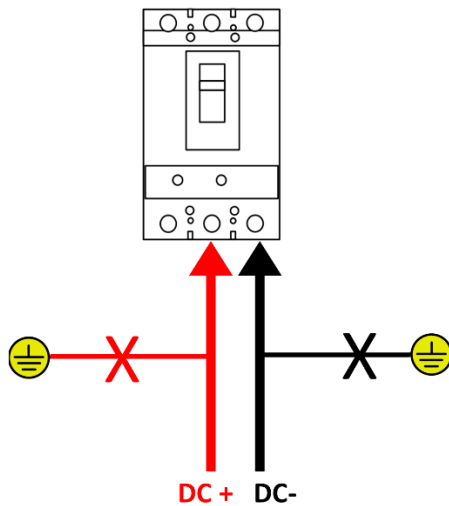
LEGEND	DESCRIPTION
+ Fans outlet	Hot air outlet from inside the cabinet
+ Cable entry	Input of signal and power cables in TITAN Energy
+ Air inlet	Cold air inlet to the inside of the cabinet



WARNING: Earthing the positive or the negative pole of the DC section in the picture is forbidden.

It is therefore not possible to earth the positive or the negative pole of the battery system. The TITAN Energy & TITAN Power has been designed assuming an IT configuration, the section is carried out in DC.

TITAN ENERGY - DC CONNECTION



TITAN POWER - DC CONNECTION

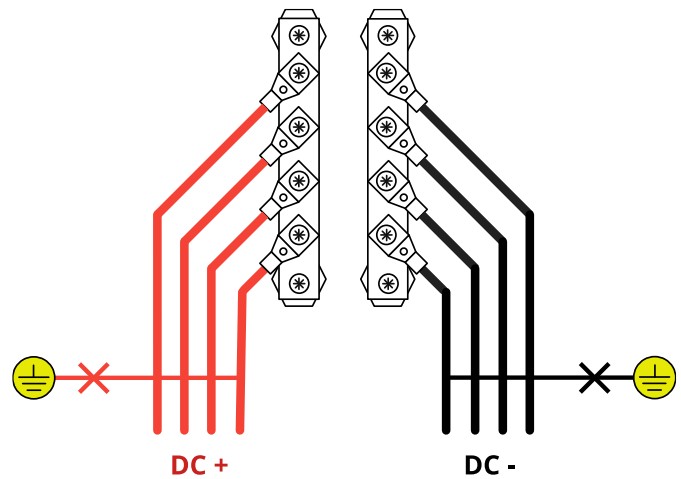


Figure 12 - Forbidden connections



ATTENTION: All exposed conductive parts of the system, including the metallic battery enclosures and the cabinet structure, **must be connected to the customer's earthing system.**



ATTENTION: Prepare fire extinguishers suitable for electrical and electronic equipment nearby. **DO NOT USE WATER TO EXTINGUISH A FIRE.**

2.7.2. TITAN Power components

The TITAN Power is an INDOOR device. The following image shows the front door and indicates the air inlet and outlet.



Figure 13 - TITAN Power cooling system

Inside the cabinet there are those components:

- Electromechanical components;
- electronic boards;
- AC terminal blocks;
- DC bars;
- I/O signal, terminal blocks.

The following images shows the **FRONT AND REAR** interior layout of the TITAN Power:

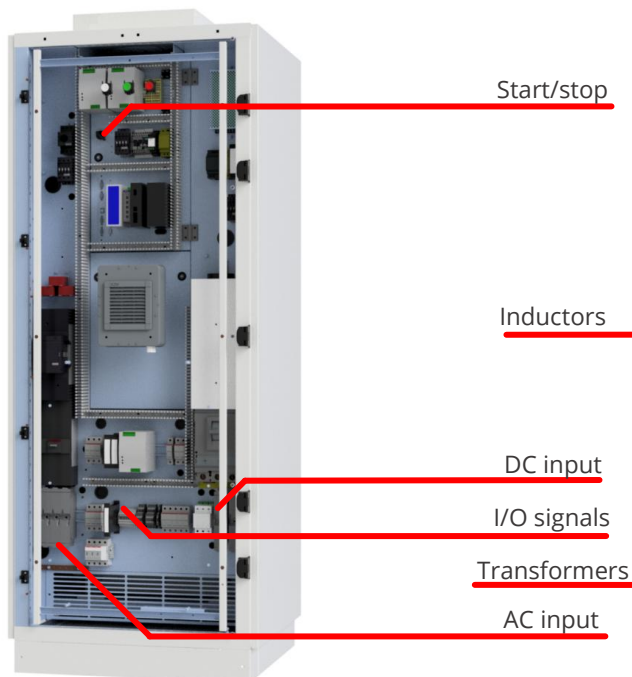


Figure 14 – FRONT interior layout of the TITAN Power

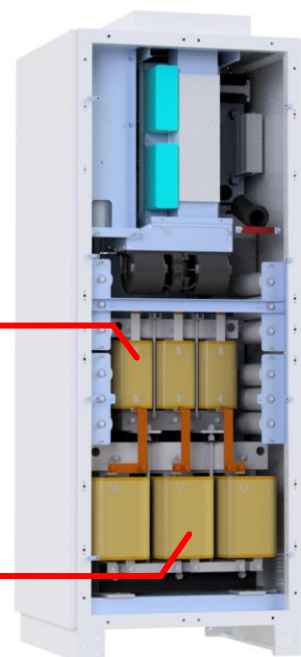


Figure 15 – REAR interior layout of the TITAN Power

Referring to the TITAN Energy & TITAN Power schematic, there is a list of electromechanical devices, to be checked and operated on for the first start up.

DEVICE LABEL	DESCRIPTION	REMARKS
F0404	Surge arrester fuses	32A mA 10x38
Q0410	Input/output grid switch disconnecter	-
F0411	AC power supply auxiliary circuitry protection fuses	2A am 10x38
Q0502	AC pre-charge circuit breaker	-
F0707	Battery DC input measurement protection fuses	10AgPV 10x38
F0711	DC pre-charge circuit protection fuses	10A gPV 10x38
Q0714	DC input circuit breaker	-



ATTENTION: The converter cover can be removed to access the **IGBT driver board and IGBT power modules** (the flat cable must be disconnected before opening the converter cover).

2.8. Technical specifications

For further technical specifications consult the product datasheet.

3. - PRELIMINARY OPERATIONS FOR INSTALLATION

Storage temperature range:



Temperature for storage and transport: -25°C +70°C.

Environmental humidity during storage:



From **5% to 95%**, from **1g/m³ to 29 g/m³**, without condensation or ice formation (class 1K3 according to EN 50178).

Environmental humidity during transport:



Max 95%, up to 60 g/m³, a little condensation can be developed when the machine is not working (class 2K3 according to EN 50178).

OVC category:

OVC

OVC category: **Overvoltage category III.**



ATTENTION: Inside the cabinet, there are the closing panels for the cable entries and the fixing screws. On the **outside there are proper keys to open the door of the cabinet, and removable internal panels.**

Once the cabinet has arrived on the installation site, **unpack it**, and check the above-mentioned components.

Inspect the unit for any damage due to transportation or handling (since these could cause loss of insulation or reduce safety clearances).



WARNING: Everything concerning the transportation, handling, and storage of the equipment, should only be performed by **skilled and competent personnel**, with adequate tools and equipment, subjected to regular maintenance.

3.1. Shipped items

- TITAN Power cabinet;
- TITAN Energy Cabinet(s) – Without batteries;
- Individual salt batteries.



3.2. Handling packed equipment

The equipment is easily transportable with a forklift of adequate capacity.



ATTENTION: Never transport TITAN Energy cabinet if it contains batteries, always move it from empty.

Dimensions and weights are shown in the dedicated paragraph.

Correct transport, storage, installation and assembly as well as careful operation and maintenance are essential for proper and safe operation of the unit.

Protect the device from shock and vibration during transport. Also make sure that it is protected from water (rain), humidity, and extreme temperatures outside the range indicated in this manual.

3.3. Unpacking

Check immediately upon delivery:

- That the packaging has **no visible damage**;
- That the data on the delivery note matches your order.

Perform all operations after having carefully removed the packaging and make sure that:

- No part of the internal devices and the external structure has been damaged during transport (rust, dents, etc.);
- The device corresponds to the one ordered.

In the event of **damage or an incomplete or incorrect delivery**, report it directly to the competent sales office.

3.4. Handling and Storage of the TITAN Energy & TITAN Power

Storage must only take place in a dry room and within the specified temperature limits, see the dedicated paragraph. Protect the devices against **dust, shock, vibration, water** (rain) and **humidity** during storage.



WARNING: Temperature changes can cause **condensation of moisture in the appliance**, which is not acceptable, causing the devices to malfunction. It is therefore necessary in any case that the product to which the voltage is applied does not have moisture condensation.

After the activities described in the previous paragraph, the cabinet can be positioned with a suitable forklift truck, inserting the forks under the base of the cabinet (height 100 mm).



Figure 16 – Fork inlet of the TITAN Energy & TITAN Power

4. - INSTALLATION



ATTENTION: Before starting the system for the first time, please follow the instructions in this chapter carefully.



ATTENTION: It is recommended that one operator checks the positioning of the batteries while the other operator on the forklift inserting the batteries.

ENVIRONMENTAL SPECIFICATIONS

Ingress protection	IP	20
Maximum working temperature	°C	+ 45
Minimum working temperature	°C	0
Relative humidity	%	< 80
Pollution Degree	PD	II
Altitude	m	2000 a.s.l
Installation site	Indoor, conditioned.	

All the operators must comply with safety standards, considering and evaluating all the risks for themselves or to the others (the EMPLOYER must carry out a risk assessment).



ATTENTION: Carefully read these instructions before using the product.



ATTENTION: Installation must be carried out with both TITAN Energy & TITAN Power switched off.



ATTENTION: All switches must remain in the open position for the entire duration of the installation operations, and until all the conditions for switching on the system have been set up. Furthermore, the external lines relating to the BESS cabinet must be in the OFF condition.

Indoor, conditioned: install TITAN Energy & TITAN Power in a dry environment, where condensation does not occur.



ATTENTION: Before installation, ensure that the floor is level for batteries insertion and that it can support the weight of the batteries.

4.1. PV arrays requirements

Earth Fault Detection and Alarm

The TITAN Power does not have a PV port and it cannot work with PV arrays.

The requirements relating to earth fault detection and notification, in:

- **AS 4777.2:2015** Clause 5.3;
- **IEC 62477-1**;
- **AS 5033:2014** Clause 3.4.3.

Are not applicable, so the **TITAN Energy & TITAN Power does not have an earth fault detection and alarm.**

4.2. TITAN Energy installation

4.2.1. Cabinet positioning procedure



ATTENTION: The base positioning must be able to support the weight of the TITAN Energy & TITAN Power and also consider the weight of other TITAN Energy & TITAN Power and PCS and other equipment if present on the same base/support surface.

Placing the TITAN Energy & TITAN Power on a non-solid, non-level surface can lead to the risk of tipping over and/or damage to the cabinets, PCS/inverter, other equipment, endangering persons.



ATTENTION: Battery handling and BESS Cabinet handling must be carried out slowly, on a flat/even surface (without hollows, holes, etc.) by expert and skilled operators, with an adequate forklift and regularly maintained, to avoid any risks of instability of heavy components.



ATTENTION: The TITAN Energy & TITAN Power must always be moved without battery modules.

4.2.2. Battery installation procedure

The first step is to open the battery case. The lid of the case is closed by metal straps. The unpacking operations to be performed are as follows:

- a) **Remove the fastening straps, the crate cover and the panels that make up the crate side wall;**

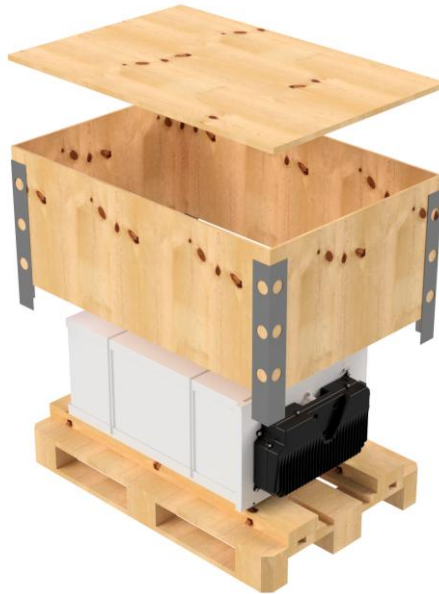


Figure 17 - Removing battery box

- b) **Remove the battery to pallet fastening straps;**

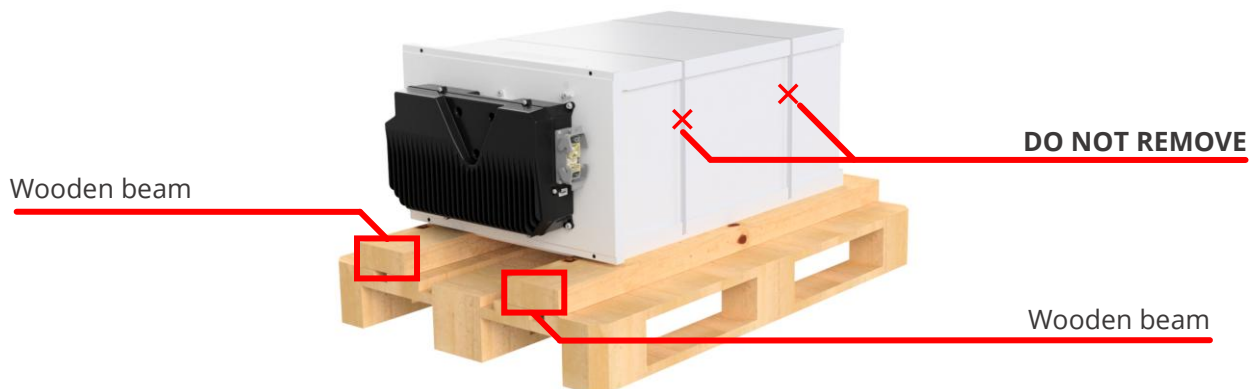


Figure 18 - Battery on the pallet without his fastening straps

After completing the above operations, the battery can be removed from the crate.



WARNING: The plastic straps must be removed using cut resistant **gloves and safety glasses**.



WARNING: The metal straps fixing the battery to its tray **MUST NOT BE REMOVED**.

c) Lift the battery;

To lift the battery, it is necessary to bring the forklift buckets just close enough to allow them to pass through the timbers that keep the battery raised from the base of the pallet.



Figure 19 - Inserting the forklift between wooden beams to lift the battery from the pallet.



WARNING: The battery must be moved gently to avoid any damage.

d) Insert the battery inside the TITAN Energy;

Using a forklift that can lift a weight greater than 500 kg, adjust the forks to fit the battery as shown in the image.



Figure 20 - Inserting the battery inside the TITAN Energy

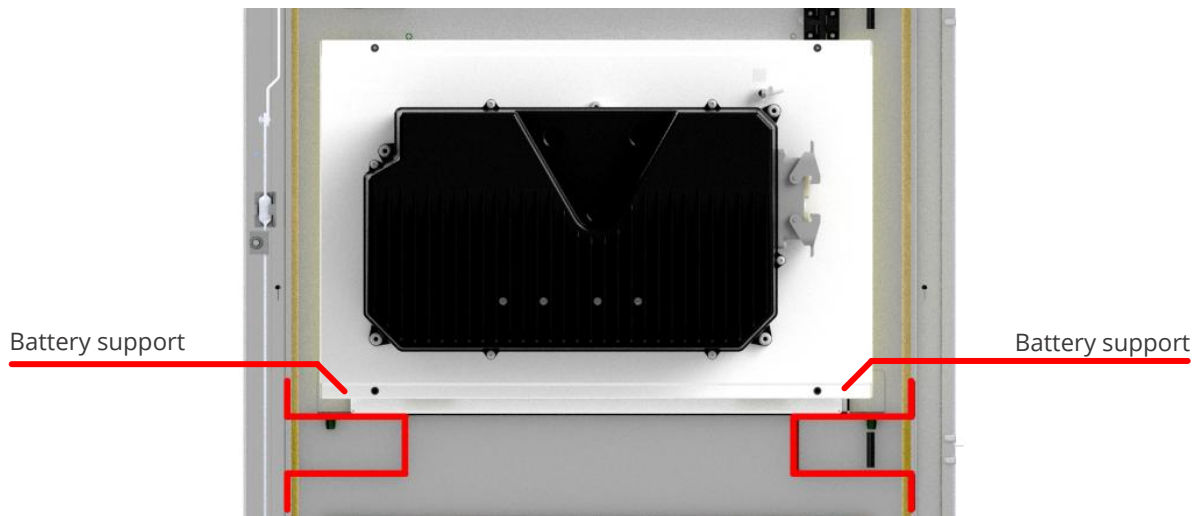


Figure 21 - Battery supports inside TITAN Energy



ATTENTION: The extensions/forks must be narrower than the battery holders inside the BESS cabinet (approx. 600 mm). In any case, the extensions/forks cannot be too close together, otherwise a loss of load stability may occur.

In the event of unbalanced (battery) loads or the impression that safety is at risk, stop immediately, place the battery on the floor and check all structures for signs of damage or malfunction.



WARNING: Before repeating battery lifting, recheck forklift forks, lifting device installation, floor flatness, and all other requirements/conditions to avoid unbalanced loads.



WARNING: Lift the battery keeping a safe distance between the load and the operators. All movements must be done very slowly, quick movements or oscillations of the batteries must be avoided where possible.

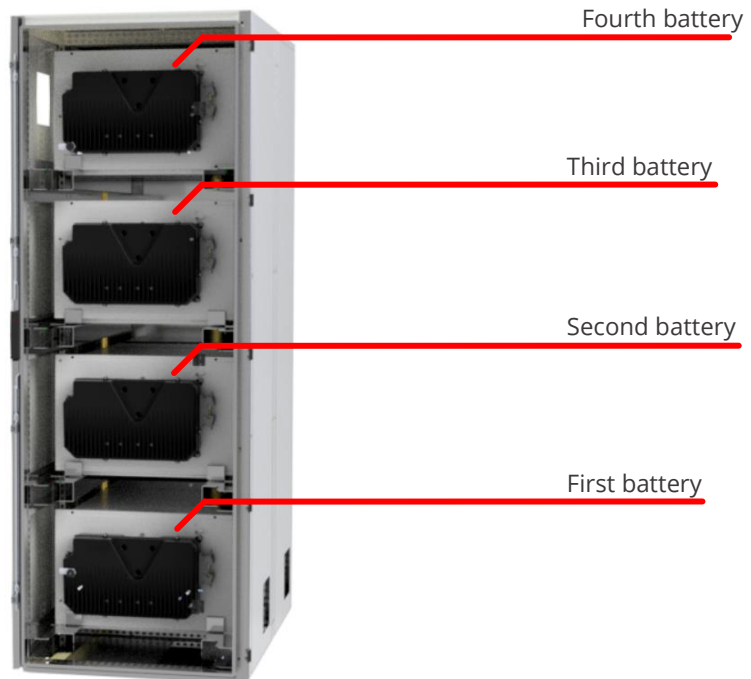


Figure 22 – Full battery insertion in TITAN Energy

Keep the following considerations in mind:

- a) It is recommended that one operator checks the positioning of the batteries, while the other operator on the forklift is inserting the batteries;
- b) Insert the batteries from the bottom upwards;
- c) Place the battery in the center of the battery supports;
- d) Push the battery all the way down until it touches the rear corners, anyway until a “L” bracket (in the image below, it is coloured **RED**) positioned on the rear part of the cabinet blocks the battery movement:



Figure 23 – In red the detail of the back “L” bracket

- e) After placing each battery, pay attention when extracting the forklift forks;
- f) After removing the forklift forks, fix the battery to the cabinet support with his brackets (in the image below, they are coloured **RED**).

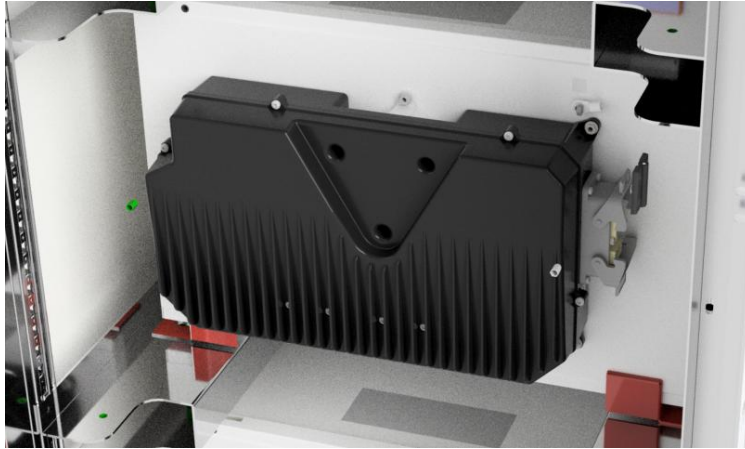


Figure 24 - Front stop bracket

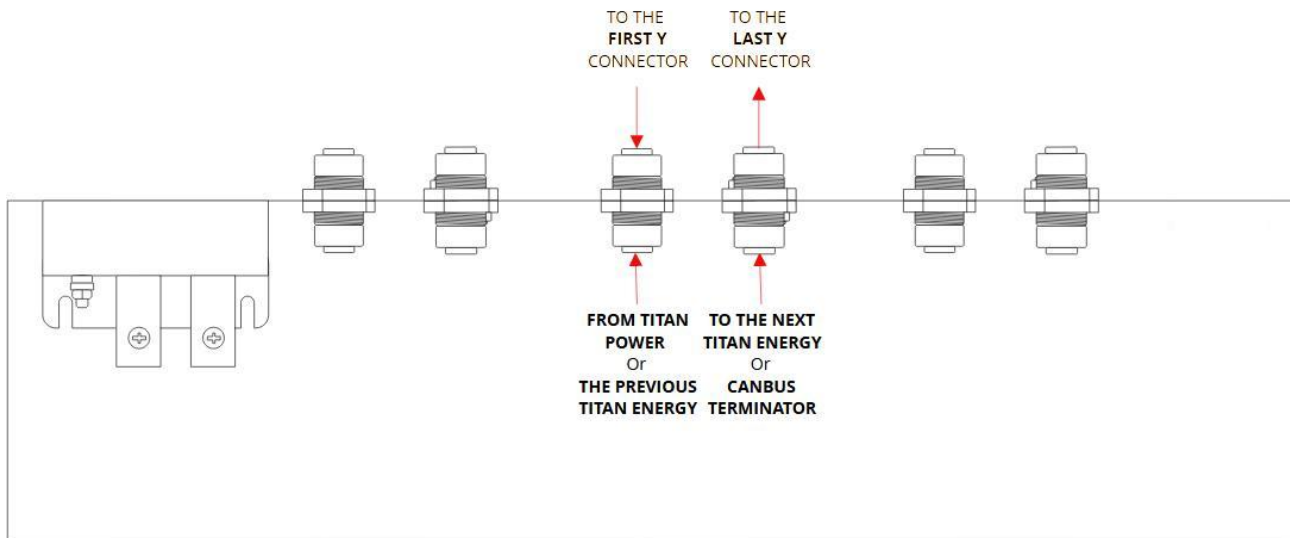
- g) Connect the connectors to the batteries making sure they are properly engaged (**BLUE**), and with the latches inserted (**RED**), as shown below:



Figure 25 - Inserting the battery connector.

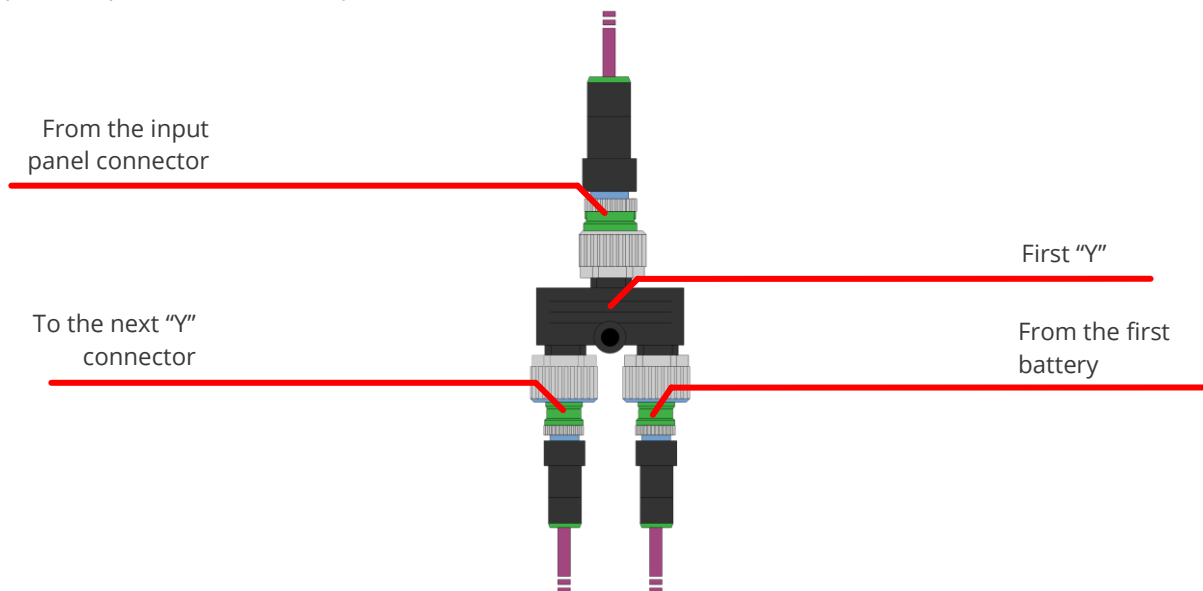
4.2.3. Batteries communication connection

After installing batteries in their housing, connect the M12 connector coming from the Harting connector to the respective Y connector on the front right side of the cabinet.

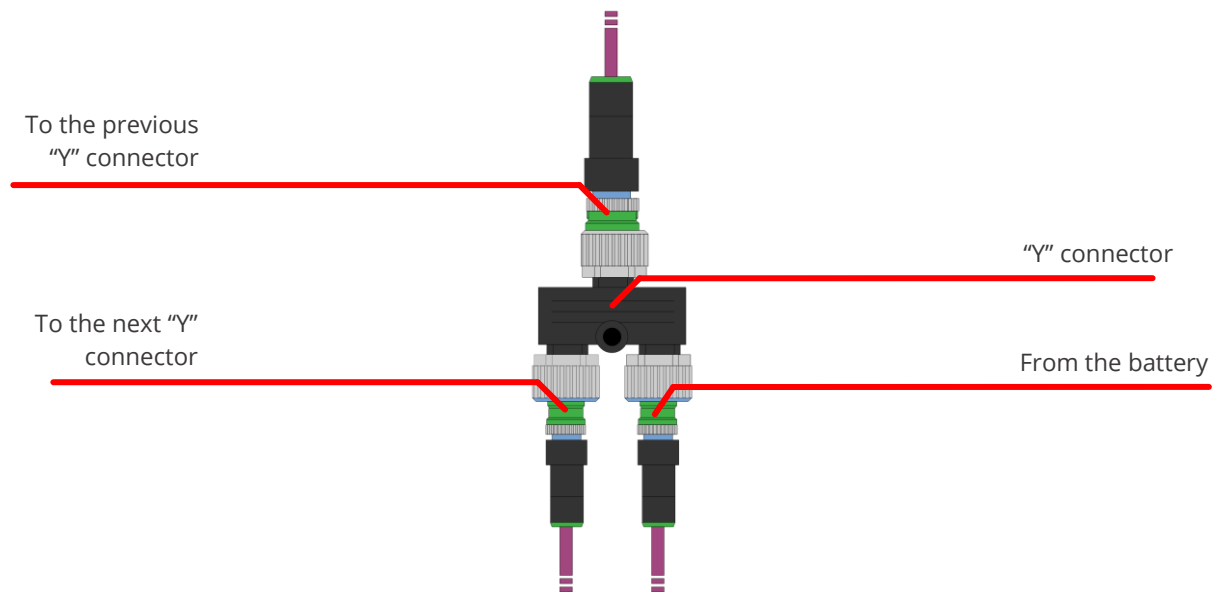


The cable of the right connector of the image must be led to the first Y-connector (top), while the left connector must be led to the last Y-connector (bottom).

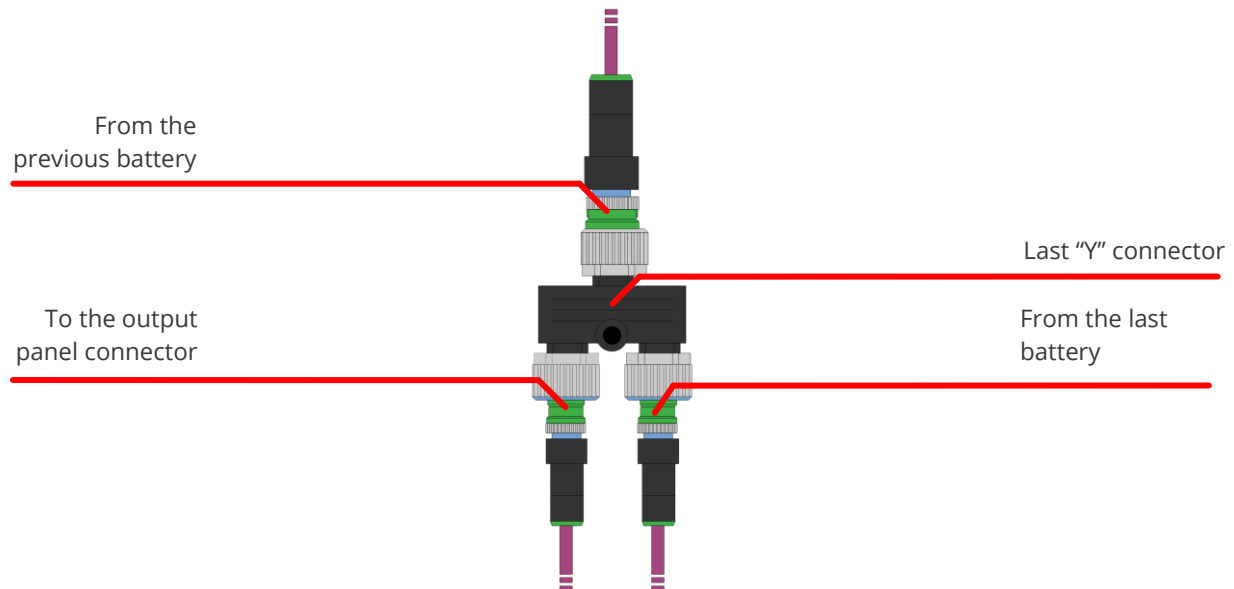
From the first Y-connector, it goes to the second Y-connector to which the second battery is connected, up to the penultimate battery.



From the previous Y-connector, it goes to the second Y-connector to which the next battery is connected, up to the penultimate battery.



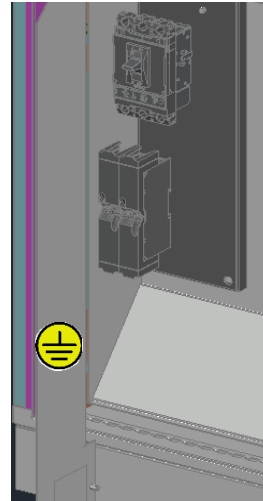
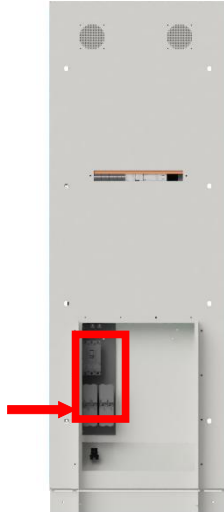
Check that the terminator is plugged into the panel connector where the last Y cable arrives.



WARNING: it is recommended to always check the integrity of the cables and their correct connection to the respective Y-connectors, M12 cables and terminator, in order to avoid interruption of communication with the batteries.

4.2.4. Grounding

TITAN Energy modules are grounded using the threaded pin located on the side of main switch in the left area of connection compartment. Do not connect the earth conductors of the system modules in a loop ring.



ATTENTION: Before powering the cabinet, make sure that the ground is properly connected; use a minimum size of 3 AWG (or 25 mm²) copper. **It is the user's responsibility to ensure that the grounding system complies with current standards.**



High leakage current, earth connection essential before connecting supply!

A 10mm hexagonal socket with the proper torque tool is required to tighten the 10mm hexagonal bolt (M6 hole): the tightening torque is 5 to 6Nm (44 to 53 lb.in).

Do not ground any AC phase wires. The input and output circuits are isolated from the casing, which is connected to the system earth.

4.3. TITAN Power installation

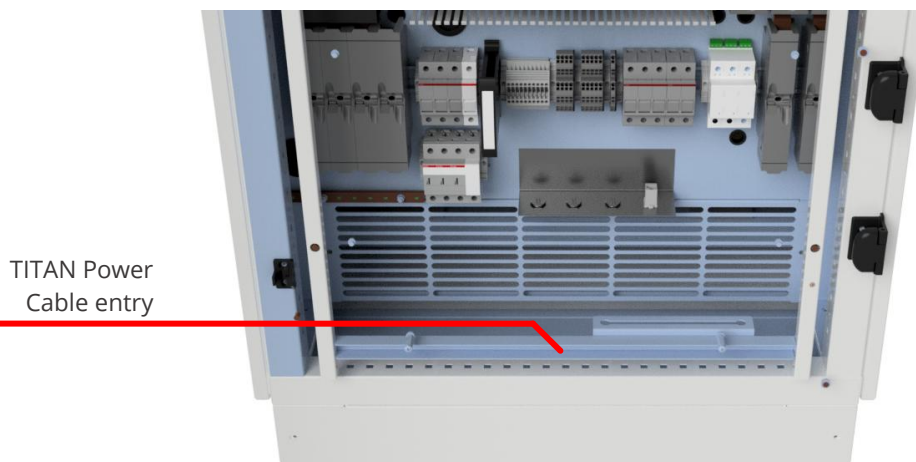


WARNING: these instructions must be carefully read before proceeding with the installation, start up and use of the converter. Qualified personnel must perform the installation only.

4.3.1. Cabinet positioning procedure

To install TITAN Power you need:

- Position the cabinet with a forklift truck using the space available at the base (opening the base);
- Mount the cable glands on the cover panels of the cable entry plate according to the cable types (figure below):



If the closing panel is not placed to properly close the cable entry, **the converter is suitable for mounting on concrete or other non-combustible surfaces only.**

The enclosure must be positioned with the top **no less than 500 mm from the ceiling**; moreover, since the enclosure dissipates heat into the surrounding environment, this must be considered when dimensioning the cooling system for that room.



ATTENTION: After positioning the panel, it is necessary to check the tightness of all power, signal and auxiliary connections to avoid malfunctions and/or damage resulting from terminals that have become loose due to vibration during transport.



ATTENTION: Before starting the connections, make sure that the mains switch, located to protect the connection line between the power point and the cabinet, is open.



WARNING: Also check that the grid input corresponds to the input configuration of the inverter and that the nominal voltage is compatible with the voltage rating stated on the nameplate of the cabinet.

After performing all the above steps, the converter can be connected to the grid and DC power source. Run the cables through the conduit and conduit panel. Finally, close the base with their panels.

4.3.2. Type of electrical supply system and stand-alone output circuit bonding

The type of electrical supply systems allowed for multiple mode configuration are **TN-S** (no switching on neutral conductor) and **TN-C**. **IT system is not allowed.**

TT is permitted with changing values and/or safety levels that must be quantified, because in any case the neutral-MEN connection must be maintained to the inverter during all operating modes. If the inverter is only set in grid mode (stand-alone mode is not possible), TT is permitted.

TITAN Power has no built-in RCMU (Residual Current Monitoring Unit).

The inverter is equipped with built-in isolation power transformer, so it is compatible with type A external RCD (Residual Current Device).

External RCDs rating depends on the number of installed TITAN Power:

- In case of one unit use 1A rating;
- In case of two units use 2A rating.

These RCDs rating refer to the inverter branch.

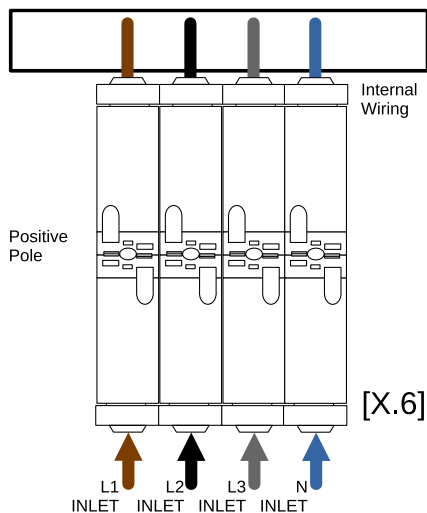


ATTENTION: RCDs outside the loads must be dimensioned according to local standards and load types.

4.3.3. AC connection

The AC terminal block for the three-phase grid is only located inside TITAN Power, in the bottom left corner, as illustrated.

The connection must be made from left to right by connecting L1, L2, L3 and N, respectively.



400V (415V) 3 phases + neutral to the PCS (the neutral is only present in the case of OFF-Grid operation), is connected to the cabinet via terminal blocks [X.6], where the label "AC GRID INPUT/OUTPUT" is located.

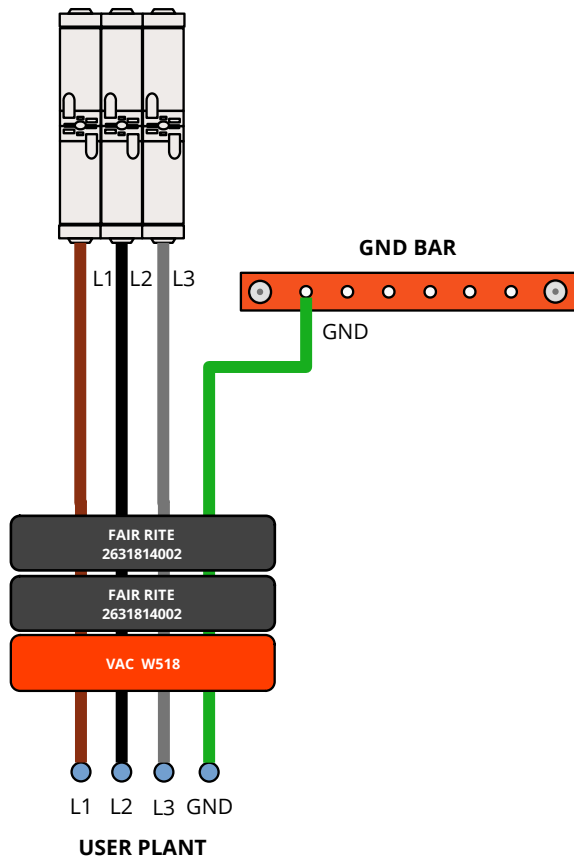


READ CAREFULLY: The neutral must only be connected if the system is in OFF-GRID operation.

NUMBER TERMINAL	CATEGORY	DESCRIPTION
[X.6]- Screw 01	Grid	Phase (L1)
[X.6]- Screw 02	Grid	Phase (L2)
[X.6]- Screw 03	Grid	Phase (L3)
[X.6]- Screw 04	Grid	Neutral (N)

RATED VOLTAGE	TITAN POWER
400V or 415V with transformer tap.	Use 90°C wire 2/0 AWG (67.4 mm ²) copper.

INTERNAL WIRING



For regulatory compliance it is necessary to install 2 **“FAIR RITE 2631814002”** ferrites and 1 **“VAC W518”** type in series inside the TITAN Energy box on the incoming AC cables with single passage inside the rings.

After connecting the wire to the M8 cable lug, this should be tightened to the [X.6] terminal. A 13mm hexagonal socket with the appropriate torque tool is required to tighten the M8 nut/bolt to 6 to 12 Nm (52 to 104 lb.in).

Wiring requirements:



“EYELET LUG”



“RATCHET”



“HEXAGONAL SOCKET”

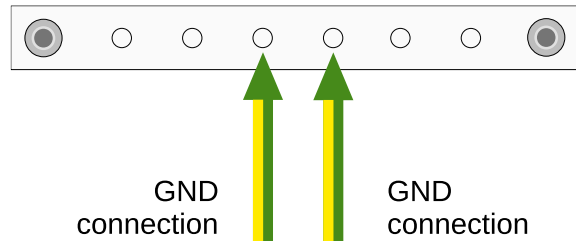


ATTENTION: After the connections are ready it is mandatory to mount all the phase barriers (protections) of the terminal blocks [X.6].

The incoming three-phase AC line is protected by an internal differential circuit breaker Q0410 C.BREAKER FOUR-POLE WITH FRONT TERMINALS AND THERMOMAGNETIC RELEASE, with minimum required prospective short-circuit current 1000A.

4.3.4. Grounding

TITAN Power is equipped with a ground terminal; it constitutes the collector for all connections to system's ground.



ATTENTION: Before powering the cabinet, make sure that the ground is properly connected; use a minimum size of 1 AWG (or 42.4 mm²) copper. **It is the user's responsibility to ensure that the grounding system complies with current standards.**



WARNING: High leakage current, grounding is essential before connecting the power supply! To tighten the 10 mm hexagonal bolt (M6 hole) a 10 mm hexagonal socket is required with the appropriate tightening tool: tightening torque is between 5 and 6 Nm (44 and 53 lb.in).

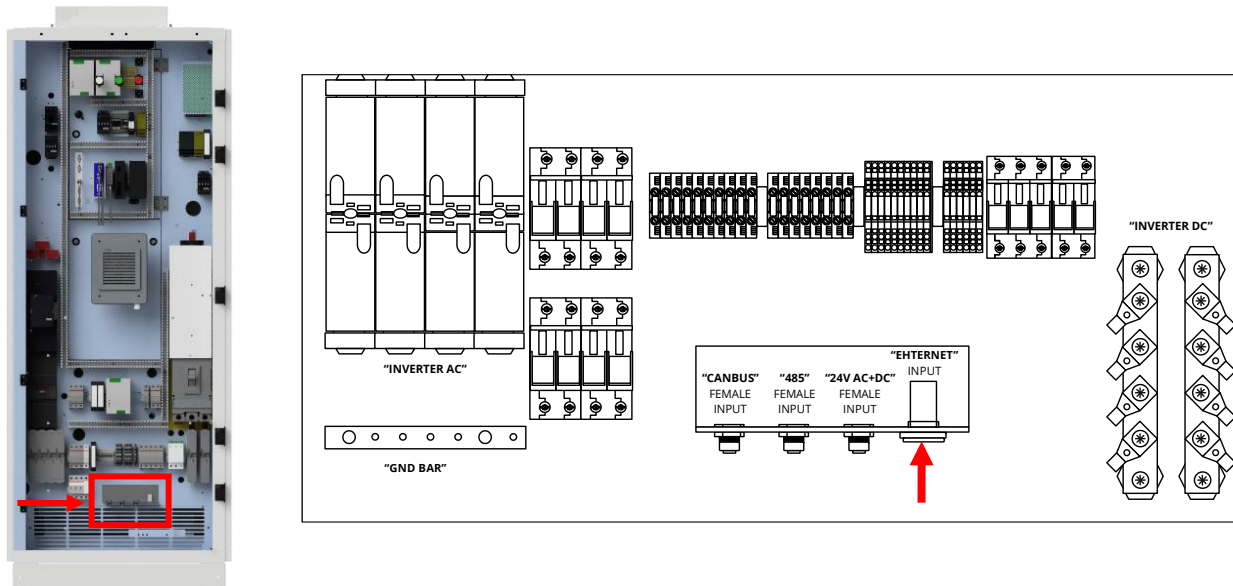
Do not connect any AC phase wire to ground. Input and output circuits are isolated from the enclosure, which is connected to the system ground.

4.3.5. Internet connection

An Internet connection is required for remote monitoring and supervision of the system.

The system connection must be made via Ethernet cable and provided by the customer.

TITAN Power, internet connection using Ethernet:



**TITAN POWER
CONNECTOR**



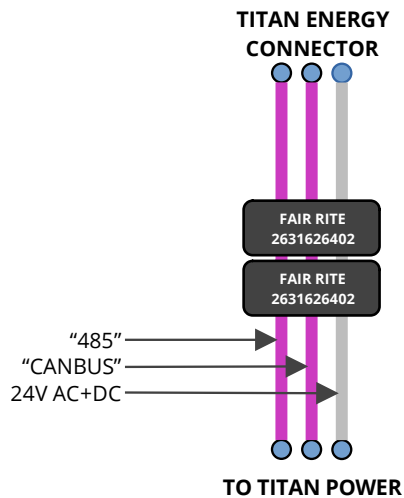
"INTERNET" CABLE

USER'S ROUTER

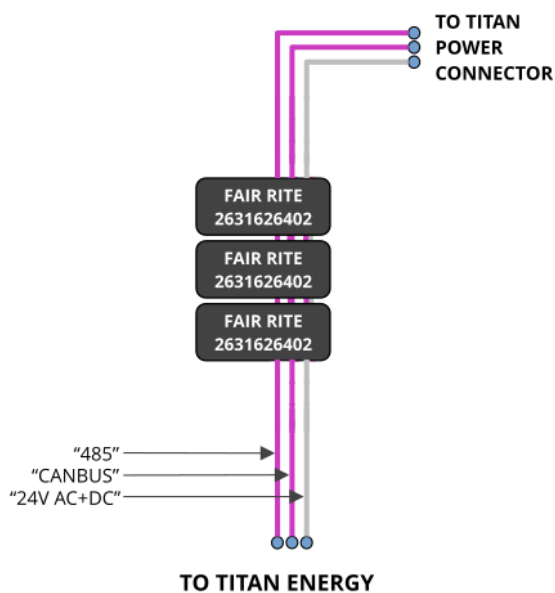
For regulatory compliance, before connecting the Ethernet cable to the TITAN Power System, it is necessary to run it twice through the ferrite "**FAIR RITE 0475176451**".

4.4. TITAN Energy & TITAN Power connections

4.4.1. Application of ferrites



For regulatory compliance, it is necessary to install in series on the outside of TITAN Energy on the "485", "CANBUS" and "24V AC+DC" cables 2 ferrites of type: "**FAIR RITE 2631626402**" so that the wires cross the loop once.



For regulatory compliance it is necessary to install in series on the outside of TITAN Power on the '485', 'CANBUS' and '24V AC+DC' cables 3 ferrites of type: "**FAIR RITE 2631626402**" so that the wires **cross the rings once**.

TO TITAN POWER
CONNECTOR



TO TITAN ENERGY

For regulatory compliance, ferrites must be applied strictly according to these guidelines:

The 485 cable on the TITAN Power side must pass through the ferrite ring once " **FAIR RITE 2631626202** "

4.4.2. DC interconnections

Connect the positive and the negative power poles according to the indications below: that is, **the positive of the DC-BUS coming from the inverter/PCS to the positive of the batteries**, and **the negative of the DC-BUS coming from the inverter/PCS to the negative of the batteries**.

The DC connection between the inverter/PCS and the batteries is located in the lower part of the electrical switchgear.

The DC bars [X.3] are the terminals for connection to the battery. The following table shows the standard position of the bars, to be checked on the diagram.

NUMBER TERMINAL	CATEGORY	DESCRIPTION
01	Battery	Positive pole
02	Battery	Negative pole



WARNING: Take care not to reverse the positive pole with the negative pole, so as not to damage batteries and other devices.



ATTENTION: never supply a DC voltage higher than 700 VDC.

The battery module must be connected to the DC bars [X.3].

The connection cables must be of type FG16R16 0,6/1KV with 25 mmq (3 AWG) copper section and must not exceed a maximum length of 10mt. In case of installation with another type of cable, check the range and make the appropriate dimensioning.

After attaching the wire to the M8 lug terminal, this should be tightened to the [X.3] terminal. A 13mm hexagonal socket with the appropriate torque tool is required to tighten the M8 nut/bolt with a torque between 6 to 12 Nm (52 to 104 lb.in).

Requirements for wiring:

- 2 x M8 lug terminals (size accordingly to the chosen wire);
- Hydraulic crimping clamp for cable lugs.

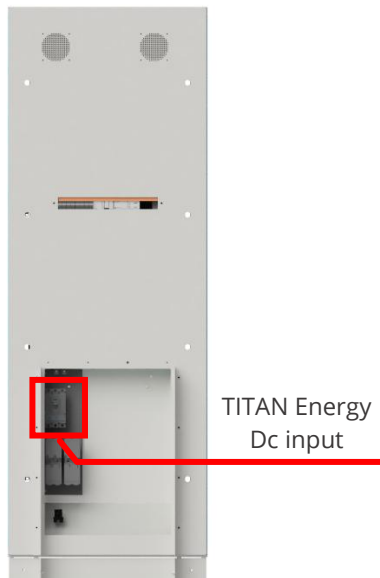


Figure 26 – FRONT interior layout of the TITAN Power

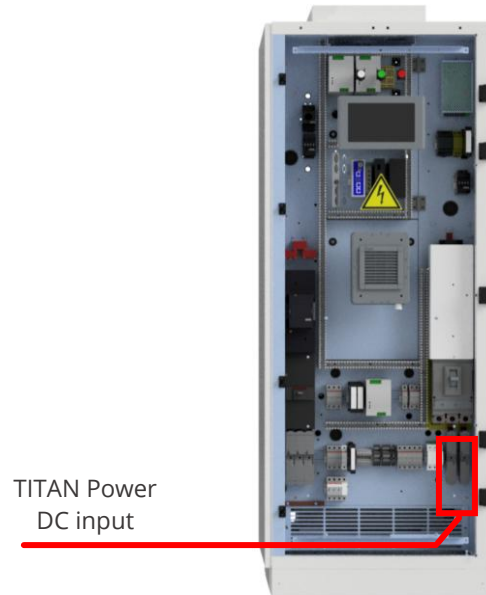


Figure 27 – REAR interior layout of the TITAN Power

TITAN **Energy**, DC connections:

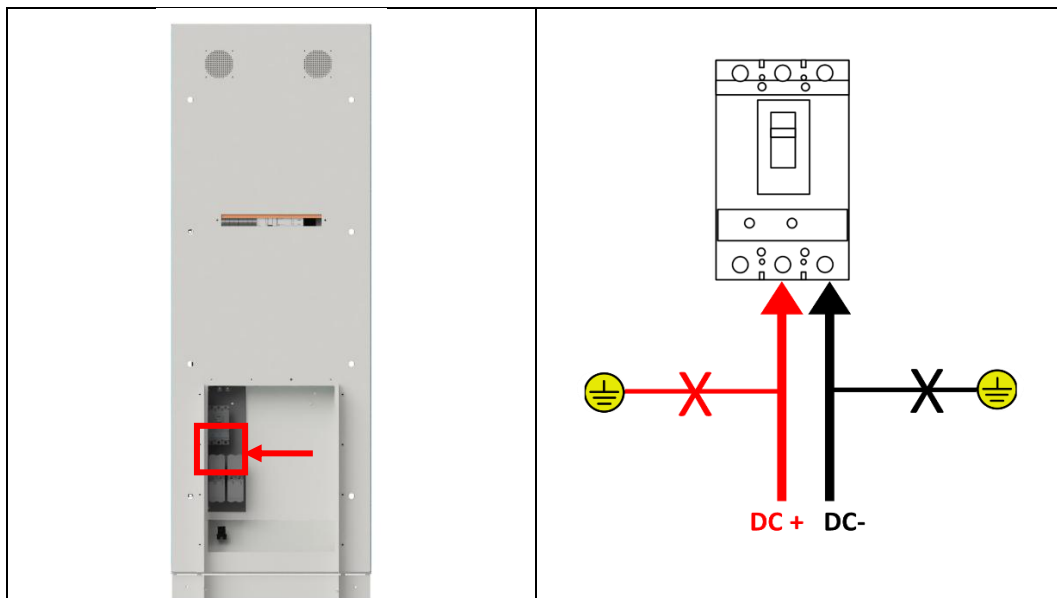
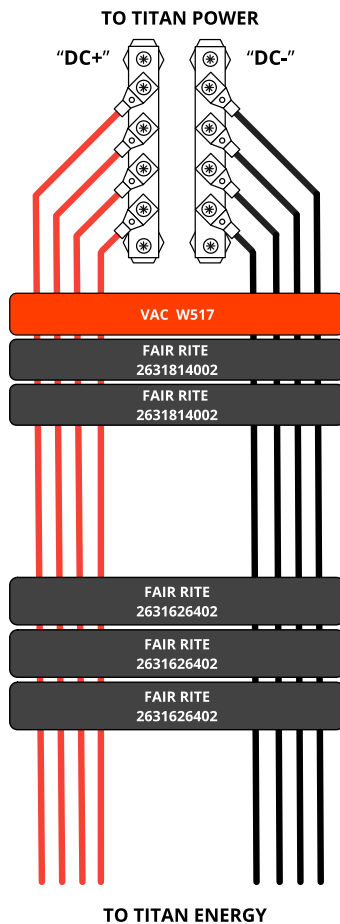


Figure 28 – TITAN Energy diagram of DC wiring connection

Connect according to these indications:

- | | |
|----------------------------|----------------------------------|
| • + Positive DC-BUS | ➔ + Positive BATTERY Pole |
| • - Negative DC-BUS | ➔ - Negative BATTERY Pole |

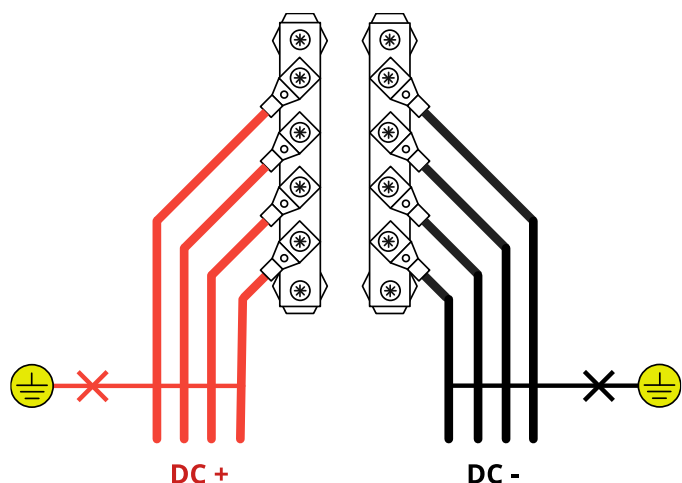
Application of ferrites on TITAN **Power** DC harnesses:



For regulatory compliance, ferrites must be applied strictly according to these guidelines:

DC+ and DC-minus cables must make a single pass through the 3 "FAIR RITE 2631626402" ferrites and, again in single pass through 2 "FAIR RITE 2631814002" and "VAC W517" ferrites.

TITAN Power, DC connections:



Connect according to these indications:

- + DC-BUS Positive
- - DC-BUS Negative
- ➔ + INVERTER Pole Positive
- ➔ - INVERTER Pole Negative

The connection between **TITAN Energy** and the **TITAN Power** must be made in this way: Connections must be made **IN PARALLEL**, never in series; the positive of the first TITAN Energy and the negative of the last TITAN Energy must be brought to the TITAN Power so that the batteries can be discharged evenly without favouring the systems closest to the TITAN Power.

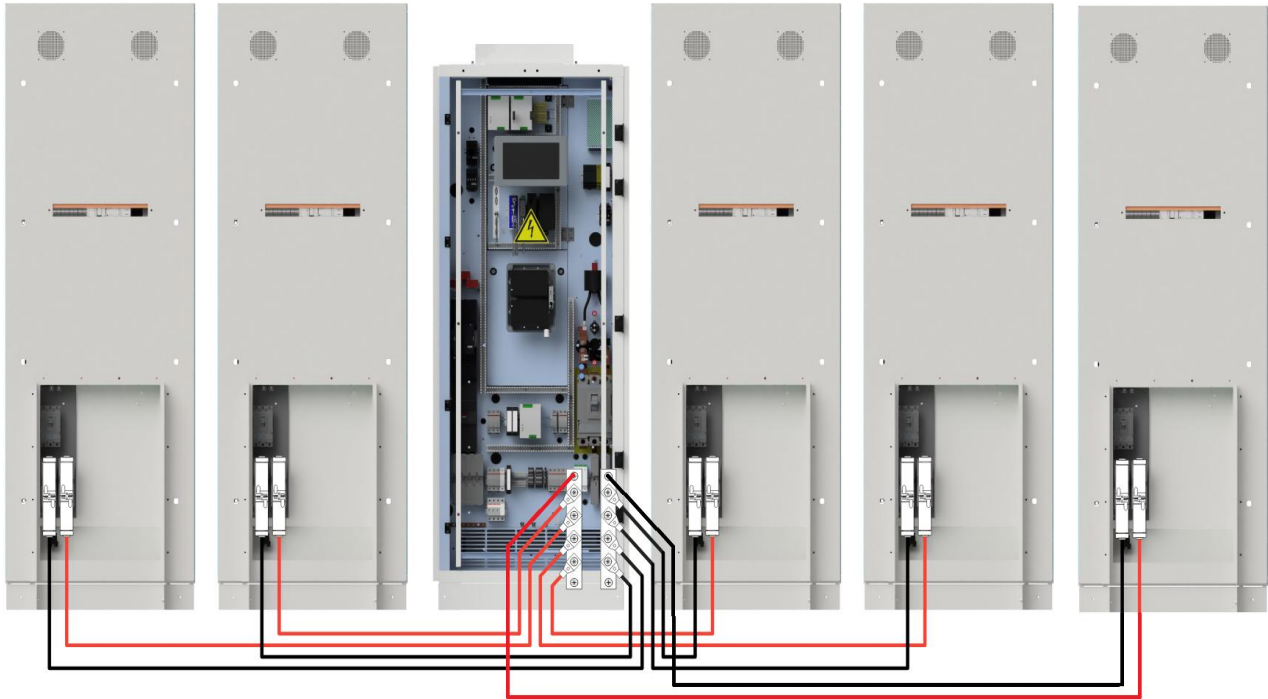
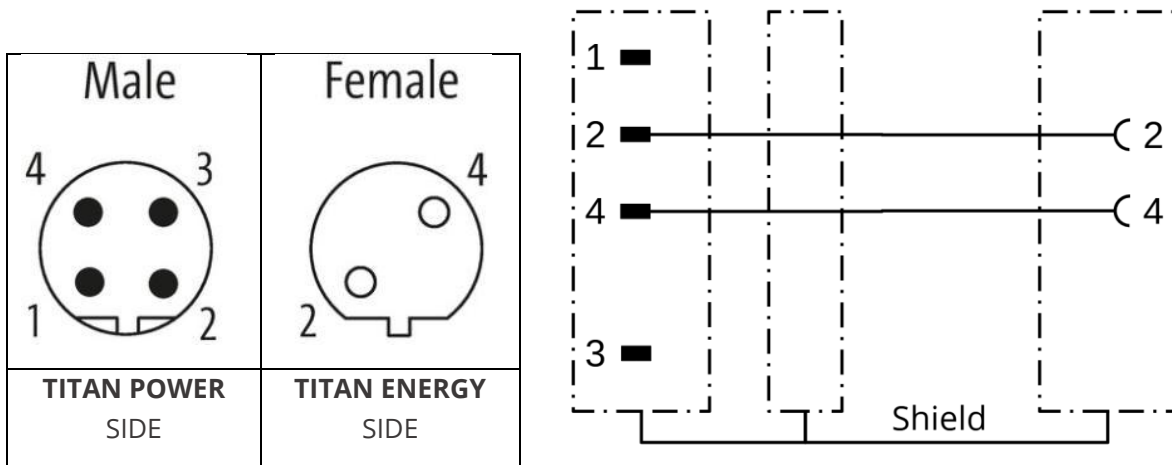


Figure 29 - TITAN ENERGY & TITAN POWER DC 600V interconnections

4.4.3. "485" Communication Cable

The "485" communication cable is an M12 male-female cable that must be no longer than 200 m with the following characteristics:

- Male straight – female straight;
- M12, 4-pole – M12, 2-pole;
- B-coded;
- Shielded;



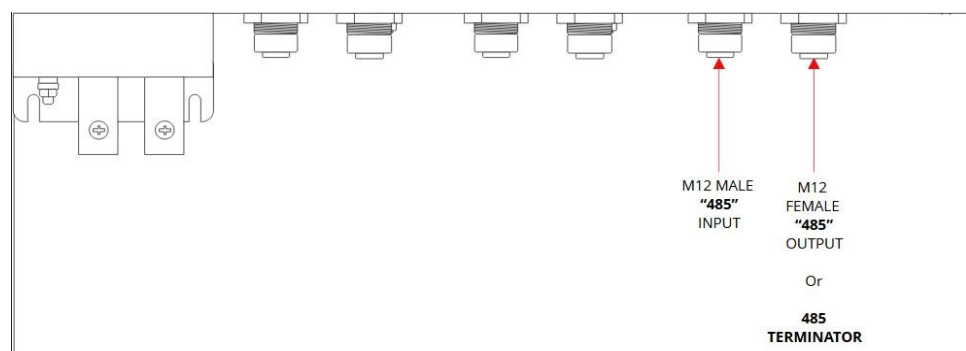
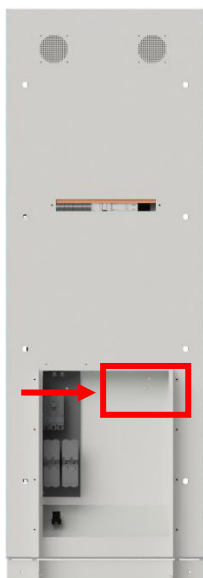
It is necessary to install 1 cable for each TITAN Energy that is to be installed, in order to carry the "485" communication from the TITAN Power to the first TITAN Energy and from this to all subsequent.

The latest TITAN Energy will only have one cable coming from TITAN Power or the previous TITAN Energy, instead of it, a 485 terminator must be installed:



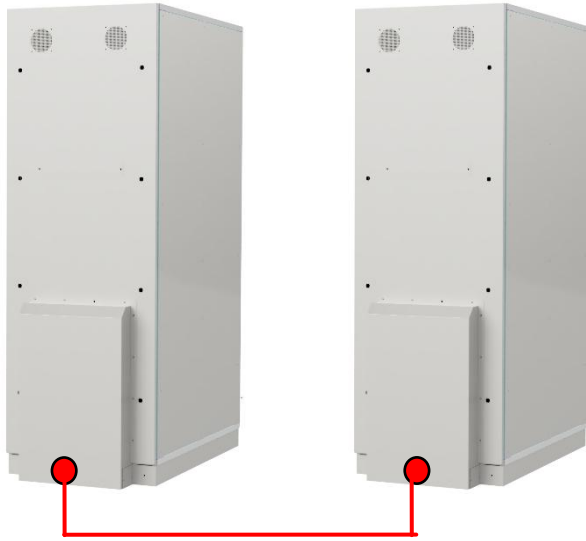
READ CAREFULLY: The cable and the connector are not supplied by UNE;
use **RS PRO: 205-5978** or **equivalent**.

TITAN **Energy** "485" cable and terminator connection:





READ CAREFULLY: "485 TERMINATOR" must be installed only in the last TITAN Energy.



In case there are more than one TITAN Energy, connect, using a **cable**, the last "T connector" of the previous TITAN Energy with the first "T connector" of the next TITAN Energy.

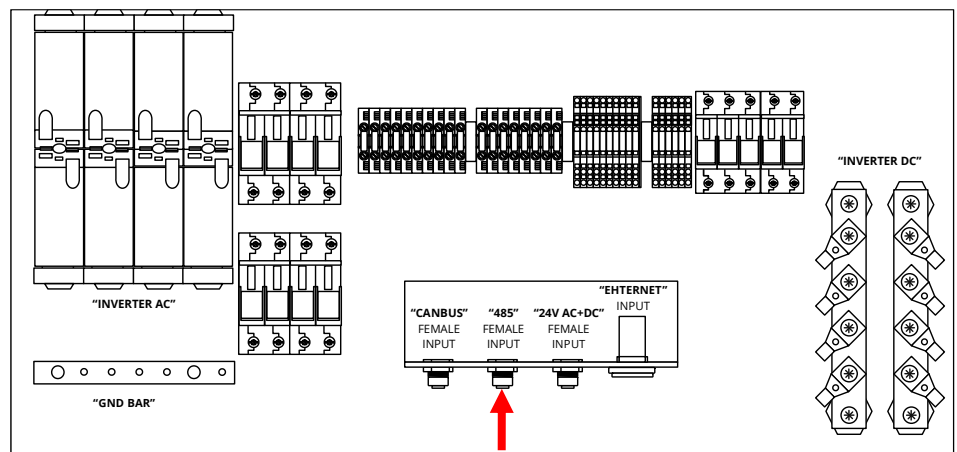


READ CAREFULLY: The last TITAN Energy is always the one with the 'terminator' in the last "T-connector".



READ CAREFULLY: The cable must be shielded to protect the system from electromagnetic interference.

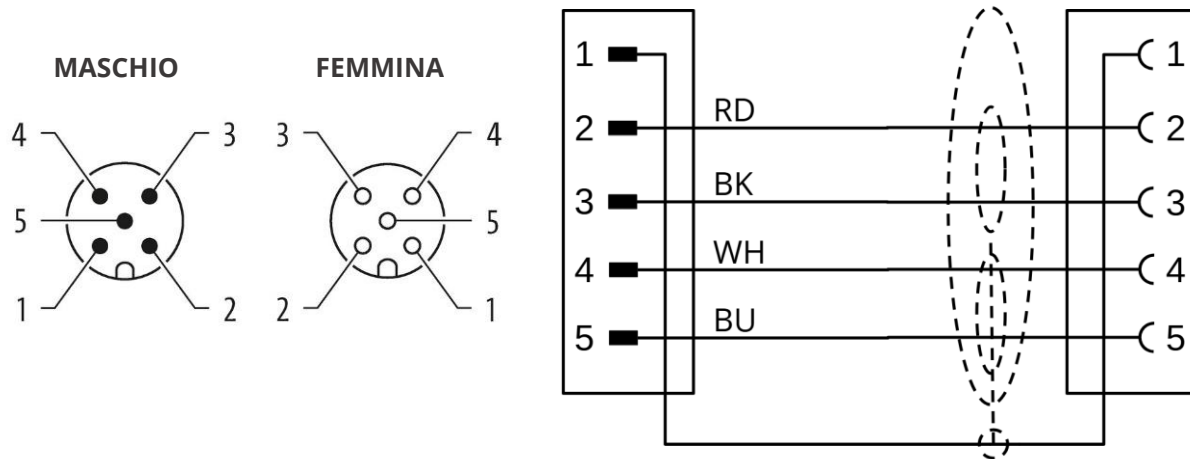
TITAN **Power** "485" cable connection:



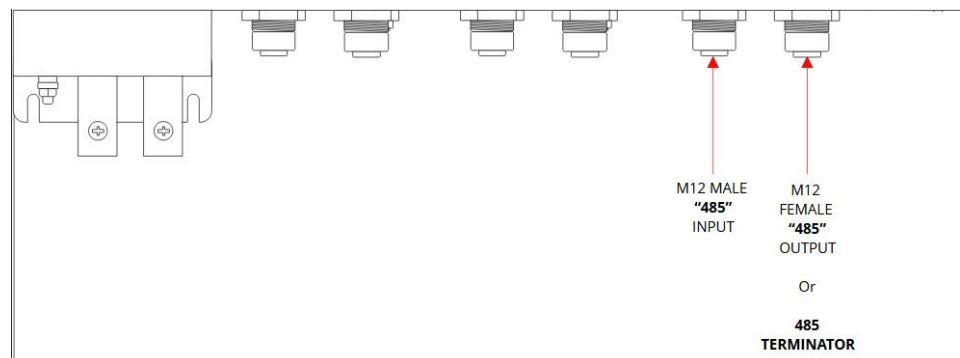
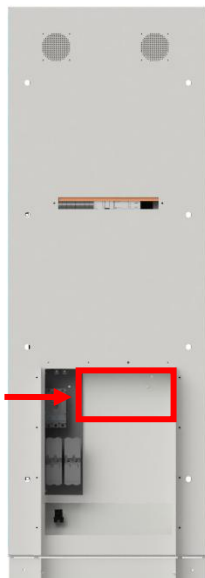
4.4.4. CANBUS Communication Cable

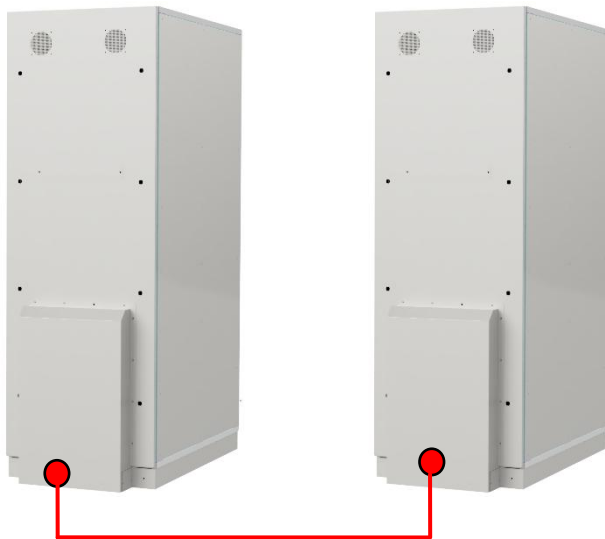
The CANBUS communication cable is an M12 male-female cable that must be no longer than 200 m with the following characteristics:

- DeviceNet, CANopen;
- Male straight – female straight;
- M12 – M12, 5-pole;
- A-coded;
- Shielded.



TITAN Energy **"CANBUS"** cable and terminator connection:





In case there are more than one TITAN Energy, connect, using a **cable**, the last “T connector” of the previous TITAN Energy with the first “T connector” of the next TITAN Energy.

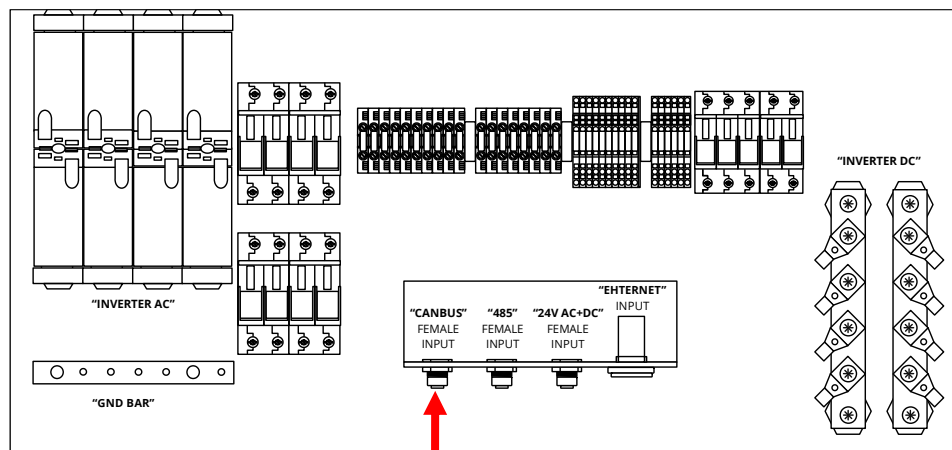


READ CAREFULLY: “CANBUS TERMINATOR” must be installed only in the last TITAN Energy.



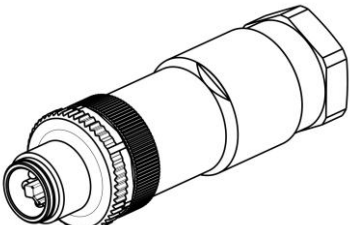
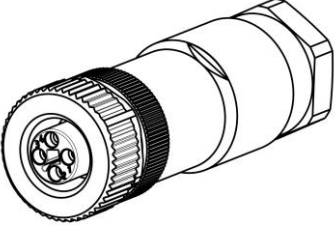
READ CAREFULLY: The cable **must be shielded** to protect the system from electromagnetic interference.

TITAN Power “CANBUS” cable connection:



4.4.5. Auxiliary power supply: 24V AC+DC

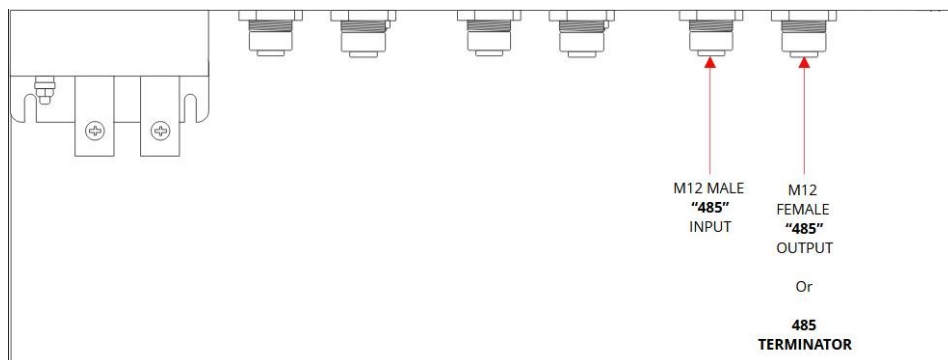
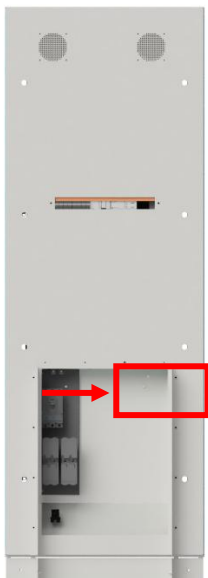
The “**24V AC+DC**” cable is a customised cable to be constructed by the customer to connect the power supply from the TITAN Power to the TITAN Energy and from the latter to any subsequent:

MALE CONNECTOR	CABLE	FEMALE CONNECTOR
TE 2120949-1	LAPP KABEL 281604CY	TE 2120948-1
		

PIN to PIN connection:

PIN TE 2120949-1 CONNECTOR	CABLE	PIN TE 2120948-1 CONNECTOR
PIN: 1	24 VDC connection	PIN: 1
PIN: 2	0 VDC connection	PIN: 2
PIN: 3	24 VAC1 connection	PIN: 3
PIN: 4	24 VAC2 connection	PIN: 4

TITAN **Energy** “**24V AC+DC**” cable connection:





In case there are more than one TITAN Energy, it is necessary to exit the system output connector to power the next one.

As this is a power supply connector, no terminator must be inserted.

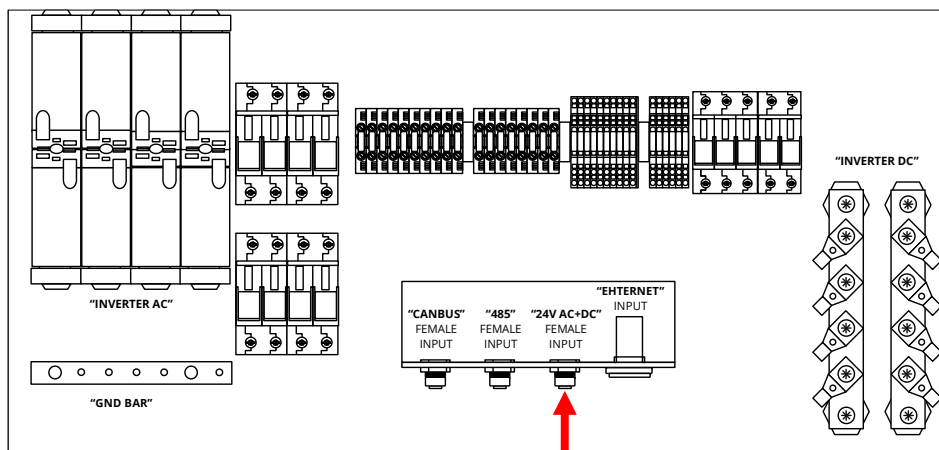


READ CAREFULLY: The cable must be shielded to protect the system from electromagnetic interference.



READ CAREFULLY: As “24V AC+DC” is a power supply connector, no terminator must be inserted.

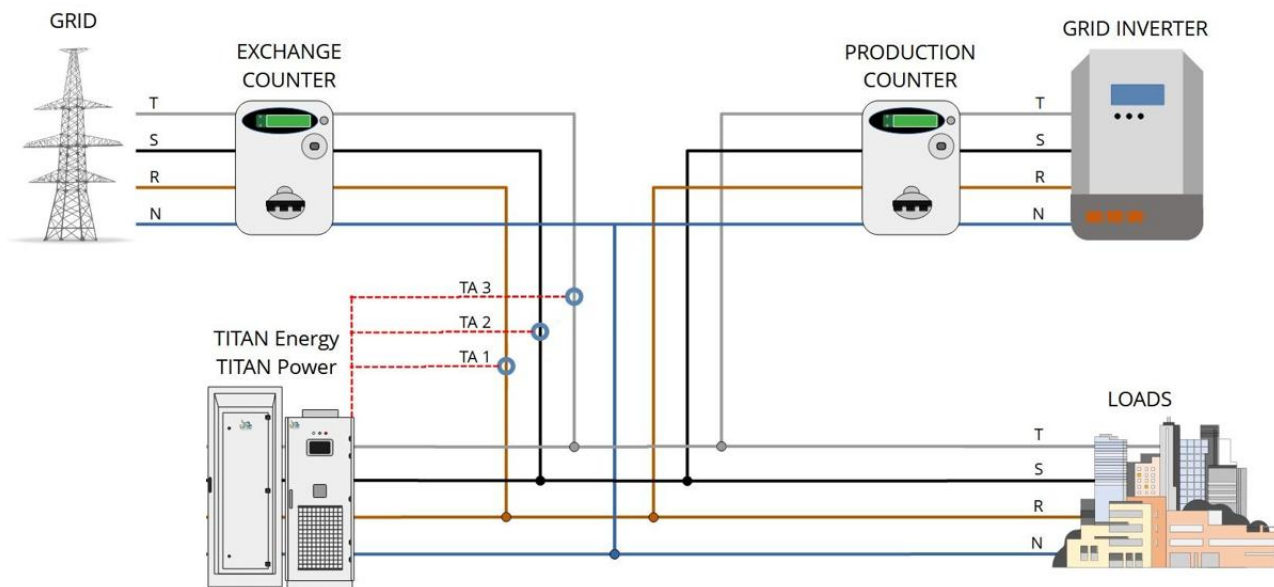
TITAN Power “24V AC+DC” cable connection:



4.4.6. CT positioning and connection

TITAN Power requires the installation of CT. This is because the inverter needs to know how much power is required to stop drawing from the grid.

The "CT" must be connected in series with the exchange meter; no load (including TITAN Power) can be connected before the meter.



ATTENTION: CTs' can only be connected when the input power line is disconnected, and TITAN Energy & TITAN Power are switched off.

The table below shows the minimum CT burden required as a function of conductor cross-section and cable length.

		Section (mm ²)		
Length (m)	X	1	1,5	2,5
	10	2,2 VA	2,0 VA	1,8 VA
	20	2,9 VA	2,4 VA	2,0 VA
	30	3,5 VA	2,9 VA	2,3 VA
	40	4,2 VA	3,4 VA	2,6 VA
	50	4,9 VA	3,8 VA	2,9 VA

Transformer characteristics:

- The accuracy class of the CT to be chosen, according to **IEC 61869** must be **CL.0.5**;
- The secondary of the **CT must be 1 A and a single pass of the cable inside it must be made.**



READ CAREFULLY: The three 'TAs' must be identical.

The connection must be made within TITAN Power:

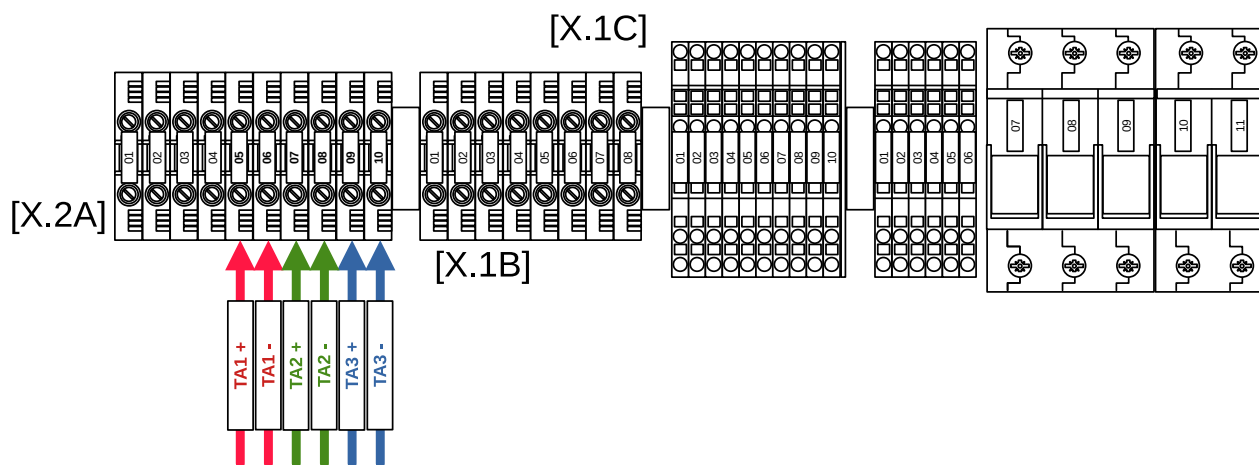


Figure 30 - TITAN Power screw wiring diagram

SCREW NUMBER	CAT	SIGN	INVERTER WIRE	NAME	POLARITY
[X.2A]- Screw - 05	INPUT	IAC1+	16111	TA1- S1	+
[X.2A]- Screw - 06	INPUT	IAC1-	16112	TA1- S2	-
[X.2A]- Screw - 07	INPUT	IAC2+	16113	TA2- S1	+
[X.2A]- Screw - 08	INPUT	IAC2-	16114	TA2- S2	-
[X.2A]- Screw - 09	INPUT	IAC3+	16121	TA3- S1	+
[X.2A]- Screw - 10	INPUT	IAC3-	16122	TA3- S2	-

5. - COMMISSIONING AND DECOMMISSIONING

5.1. Commissioning



ATTENTION: Commissioning should only be carried out by qualified personnel.

Safety instructions have to be strictly observed to avoid serious injuries, loss of life, damage to the converter and the connected equipment.



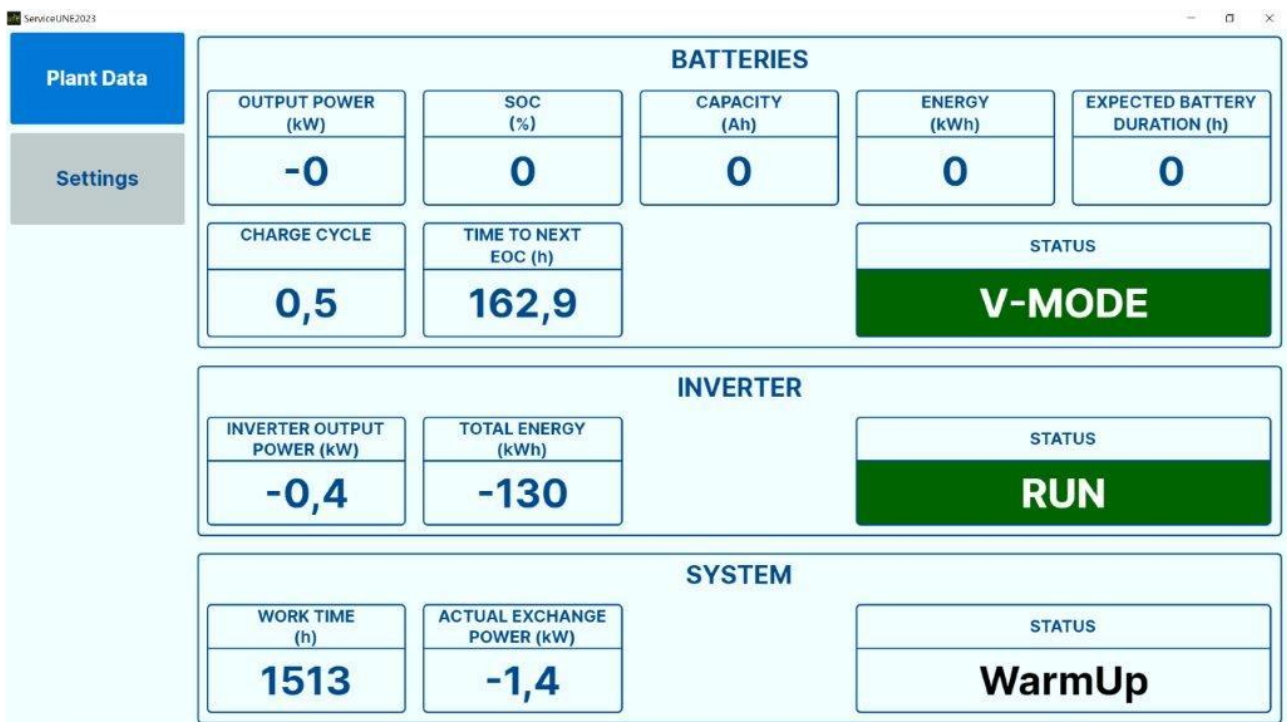
ATTENTION: Unauthorized staff must not operate on the system, display, cables, batteries, gateway, etc.



WARNING: The operator must ensure that all **safety devices are installed and working efficiently.**

5.1.1. User Interface

The USER INTERFACE is a monitoring panel, at the disposal of the technical contact person in charge, which allows monitoring the proper functioning of the system. Access to the interface is done via a remote connection software, so it is essential that the system is connected to the Internet.



The user can only view the interface, interactions with the system are password-protected and can only be modified by qualified personnel.

Below is a description of the variables displayed in the USER INTERFACE:

LABEL	NAME	DESCRIPTION
BATTERIES	OUTPUT POWER (kW)	Value of the power exchanged by the battery: If > 0 : Battery charging; If < 0 : Battery discharging.
	SOC (%)	State Of Charge of the Battery Group.
	CAPACITY (Ah)	Energy in Ah of the battery pack.
	ENERGY (kWh)	Energy in kWh of the battery pack.
	EXPECTED BATTERY DURATION (h)	Battery life expectancy.
	CHARGE CYCLE	Equivalent charges cycle that have been made.
	TIME TO NEXT EOC (h)	Time remaining until next cyclic charge.
	STATUS	V-MODE : Active functionality during cyclic charging; OPERATIVE : Normal operating mode; WAIT : waiting for configuration and/or commands; ALARM : Active alarm.
INVERTER	INVERTER OUTPUT POWER (kW)	Power exchanged by the inverter: If > 0 : AC power fed into the grid; If < 0 : AC power used to charge batteries.
	TOTAL ENERGY (kWh)	Total energy exchanged by the inverter.
	STATUS	RUN (Green light): Normal operating mode; STOP (Yellow light): Inverter is not working; ALARM (Red light): Inverter in alarm.
SYSTEM	WORK TIME (h)	Total system operating hours.
	ACTUAL EXCHANGE POWER (kW)	Power exchanged by the plant with the grid: If > 0 : Import from the grid; If < 0 : Export to the grid.
	STATUS	INIT : Initialization of the system; START COMMUNICATION : communication between the battery and the inverter is set;
		READY : Normal operating mode; LOW BAT : the SOC of the batteries is less than 10%; SOCMIN : the batteries reached their minimum charge level; ALARM : The system is in alarm; WARMUP : the batteries are warming up.

ALARM SIGNALLING

In the event of an alarm, the alarm bit will be indicated in the status boxes instead of the wording.

INVERTER ALARM TABLE

BIT Nr.	NAME	TYPE	DESCRIPTION
0	DC link alarm (overvoltage or precharge failed)	Permanent	DC-side alarm: DC link overvoltage or precharge failure.
1	Overtemperature	Permanent	Inverter temperature alarm. The inverter has already activated all thermal management/cooling functions, such as ventilation. The software performs several reset attempts; if the alarm is not reset, the inverter remains locked.
2	AFE Hardware fault	Permanent	Internal hardware alarm caused by several possible conditions leading to lockout and permanent fault. Examples: blocked internal communication, PC reset, damaged or missing driver, parameters out of range.
3	SPI Fault	Temporary	The alarm is triggered when the grid interface disconnects (grid fault, undervoltage, overvoltage, underfrequency, overfrequency, etc.).
4	Average voltage too high	Permanent	Mains voltage fault above 110%.
5	Wrong phase sequence	Temporary	Missing or reversed phase.
6	Line overvoltage	Temporary	Excessive grid voltage.
7	AFE contactor feedback fault	Permanent	No feedback signal from the contactor.
8	AFE overvoltage	Temporary	Grid overvoltage.
9	AFE undervoltage	Temporary	Grid undervoltage.
A	AFE frequency out of bounds	Temporary	Grid frequency outside the permitted limits.
B	AFE overcurrent and/or unbalanced voltages	Permanent	Overcurrent or unbalanced voltage.
C	DC wrong polarity	Permanent	Battery-side voltage reversal at inverter terminals.
D	DC overcurrent/overvoltage or contactor fault	Permanent	Overcurrent or overvoltage on the DC side.
E	Battery and EMS fault	Permanent	The EMS section enters stop mode.
F	Inverter Alarm	Permanent	Generic hardware failure / generic alarm.

BATTERY ALARM TABLE:

BI T Nr.	NAME	DESCRIPTION
0	vbus_max_th_2_alarm_exceeded	If Vbus_sist > Vbuslim_sist + ΔV1V for T2 sec , the GW trips due to high DC bus voltage, the PCS enable (bit 7 of GW status word) is zeroed.
1	vbus_max_th_3_alarm_exceeded	If Vbus_sist > Vbuslim_sist + ΔV2V for T1 sec ; the GW trips due to high DC bus voltage, the PCS enable (bit 7 of GW status word) is zeroed.
2	vbus_min_th_2_alarm_exceeded	If Vbus_sist < Vbuslim_sist - ΔV1V for T2 sec ; the GW trips due to low DC bus voltage, the PCS enable (bit 7 of GW status word) is zeroed.
3	vbus_min_th_3_alarm_exceeded	If Vbus_sist < Vbuslim_sist - ΔV2V for T1 sec ; the GW trips due to low DC bus voltage, the PCS enable (bit 7 of GW status word) is zeroed.
4	temperature_batt_high_th_2_alarm_exceeded	If Tbatt > Temp2°C for T5 sec in at least one battery; the GW sends a command to the BMS/battery with high temperature to disconnect completely the battery pack and DC heater from DC bus; The GW removes the 24 Vdc enable signal from the BMS/battery with high temperature via PLC, if a PLC is present; the BMS/battery with high temperature is disconnected from the DC bus by GW via PLC, if PLC is present; Due to high battery temperature the GW trips, the PCS enable signal (bit 7 of GW status word) is zeroed.
5	too_much_disconnected_batteries_alarm	If more than M batteries are disconnected from DC bus , i.e. for balancing reasons, the GW trips, the PCS enable signal (bit 7 of GW status word) is zeroed.
6	too_much_bms_uai_active_alarm	Due to more than N batteries disconnected from DC bus , due to BMS alarms, the GW trips, the PCS enable signal (bit 7 of GW status word) is zeroed.
7	pcs_comm_fault_alarm	Toggleing from PCS not active for more than T2 sec ; the GW trips, the PCS enable signal (bit 7 of GW status word) is zeroed.
8	too_much_bms_timeout	No CAN communication is active with at least M BMS for more than T2 sec ; the GW trips, the PCS enable signal (bit 7 of GW status word) is zeroed.

5.1.2. Preliminary checks

- a) **Verify** that the TITAN Energy is correctly and safely installed;
- b) **Verify** that the TITAN Energy's main DC circuit breakers are open;
- c) **Verify** that the upstream DC circuit breakers are switched off;
- d) **Verify** that all earthing connections are correctly and safely made;
- e) **Verify** that all DC input power cables are correctly and securely connected, without open circuits or short circuits;
- f) **Verify** that all connections between TITAN Energy and TITAN Power are correctly and securely connected, without open circuits or short circuits;
- g) **Verify** that the communication cables are correctly and securely connected.
- h) **Verify** that all cable glands used at the bottom of the enclosure are sealed and that the sealing nut is tightened;
- i) **Verify** that the terminal covers are reinstalled and that all protection panels are fitted;
- j) **Verify** that the inside of the cubicles is clean and tidy, free of foreign bodies;
- k) **Verify** that the cabinet doors are closed.
- l) **Verify** that the AC and DC cables connected in the TITAN Power are correctly connected and secure;
- m) **Verify** the connection of the Canbus, Modbus, auxiliary power supply and CTs;
- n) **Verify** that the Ethernet/SIM connection is present and connected.

5.1.3. Start-up



WARNING: Commissioning should only be carried out by qualified personnel.

Safety instructions have to be strictly observed to avoid serious injuries, loss of life, damage to the converter and the connected equipment. Before switch on the AC power supply and DC power supply, use a multimeter to check that the AC voltage and DC voltage are within the specified range.

TITAN Energy startup:

- a) **Make sure** that the **switches of each battery are in position "0" (OFF)**;
- b) **Make sure** there is 24Vac on the fuse disconnecter (F120-D1, Pin 1 & 3);
- c) **Make sure** there is m24Vdc on the circuit breaker (Q121-F5, pin 1) and polarities are not reversed;
- d) **Turn** the auxiliary circuit breaker inside the electrical control panel to position "I" (ON);
- e) **Turn** the 24Vdc power supply circuit breakers inside the electrical control panel to position "I" (ON);

TITAN Power startup:

- a) **Close F0404** surge arrester fuse holder;
- b) **Close F0411** AC power supply auxiliary circuitry protection fuse holder;
- c) **Close Q0502** AC pre-charge circuit breaker;
- d) **Close F0707** Battery DC input measurement protection fuse holder;
- e) **Close F0711** DC pre-charge circuit protection fuse holder;
- f) **Check** that the Emergency push button on DB 200 it is released, if needed rotate anticlockwise the button to release;
- g) **Close Q0714** DC input circuit breaker;
- h) **Close Q0410** switch disconnecter;
- i) **Rotate** to position "I" the **START/STOP enable** selector;

Then the system is ready to be power supplied:

- j) Switch on upstream **DC switches** and upstream/downstream **AC switches**;
- k) Switch on **Q0404** to position II "ON";
- l) The system will operate according to EMS set and external PLC commands.

Further indications:

- f) **Check** that the DC Bus voltage is at 670VDC through the PCS supervisory system (follow the PCS manual);
- g) **Connect to the Gateway through the Web interface** and make sure that the warmup procedure has been started (follow the web interface user manual);
- h) **Wait until the batteries reach the operating temperature** (around 12 hours) and have been fully charged (around 14 hours);
- i) **When the system ends the stage**, it will automatically **enable I-MODE**.

5.1.4. TITAN Energy Controls

TITAN Energy main switch breakers.

Inside the electrical switchgear of the TITAN Energy there are **N° 4 DC fuse breaker, able to interrupt the DC power flow between the batteries and the PCS/inverter.**

Refer to TITAN Energy & TITAN Power electrical diagram.



ATTENTION: Even if all No. 4 DC breakers are in position "0" (OPEN), and if the batteries are hot and operative, they are always LIVE, that is having a nominal voltage of 620Vdc at their DC poles (+ and -) and at the MCB terminals.

In addition, even if you open the DC MCBs, **the DC-BUS coming from the inverter/PCS may still be active, at the input terminal of the cabinet and also on MCB's terminals.**

5.1.5. TITAN Energy & TITAN Power opening with batteries in normal operation

If the cabinet door is opened while the batteries are in operation, TITAN Energy & TITAN Power is equipped with 1 door switches that warn the customer (if the customer has implemented the warning) of the cabinet opening battery area. For details, please refer to the wiring diagram of the cabinet.



WARNING: It is forbidden to carry out operations (maintenance, etc.) on the cabinet when it is running. The customer is responsible for limiting access to the cabinet while it is operative.

5.1.6. Shut down

TITAN Power:

- a) **TITAN Power must be stopped.** START/STOP selector must be turned to STOP wait for the converter to stop;
- b) **Then follow the TITAN Energy's instruction** to ensure safe stop (no voltage on DC input);
- c) **Then the TITAN Power main AC circuit breaker** and battery circuit breaker must be opened;
- d) **In case of maintenance** open all isolators from the sources and to the loads;

Before touching any electrical parts, wait 5 minutes for the capacitors to discharge.

TITAN Energy:

- a) **Stop** the current work cycles;
- b) **Stop** the PCS (follow the PCS manual);
- c) Make sure that the conversion system DC side cut-out is set to position "0" (OFF) and the external main DC-BUS breaker upstream of the cabinet to position "0" (OFF);
- d) **Connect** to the Web Interface of the gateway and select "power-off" in bootloader state to switch off the gateway correctly.
- e) **Deactivate** the enabling connection of the single battery module through Power Conversion System HMI or External Control System.
- f) **Turn** all battery MCB's and the external main DC-BUS breaker upstream of the cabinet to position "0" (OFF);
- g) **Turn** the auxiliary power supply circuit breaker to position "0" (OFF) (only after the period necessary for the gateway to power-off after point 4) and the external AC-AUX upstream breaker.
- h) **Disconnect** the batteries' Harting connectors.

5.1.7. TITAN Power Bypass

- a) **Shut down** the system;
- b) **Open** upstream AC switch (grid side);
- c) **Close** the upstream AC switch (grid side) to supply the loads in bypass mode.

5.1.8. Restart after emergency procedure

To restart the system after pressing the emergency button, the following operations must be carried out:

- a) **Turn** the battery DC MCBs to position "0" (OFF);
- b) **Restore** the external electrical system after emergency procedure to the operative condition;
- c) **Connect** to the gateway through the web interface and put it in the operating mode (follow the Gateway manual);
- d) **Run** the PCS (Follow the PCS supervisory system manual). According to the status of the batteries, the Gateway will automatically put the system in the V-MODE i.e. I-MODE;
- e) **After making sure that the PCS is operating correctly** (right DC-BUS), turn battery DC MCBs to position "1" (ON). According to the status of the batteries, the system will pass automatically to the operating mode (i.e. V-MODE or I-MODE);
- f) **As soon as the system goes automatically into I-MODE**, it becomes operational. Follow the inverter supervisory system and/or the PPC manual to operate the system.

5.2. Decommissioning



ATTENTION: UNE is not responsible for the disposal of the TITAN Energy & TITAN Power and its components such as metalwork, displays, cables, etc.

Therefore, the customer must dispose of them in accordance with the regulations in force in the country of installation.



ATTENTION: In case of dismantling of the TITAN Energy & TITAN Power, for the disposal of the products that compose it, it is necessary to follow the regulations in force in the country of installation and **in any case avoid causing any type of pollution.**



ATTENTION: Dispose of the different types of materials that make up the various components and the various parts of the **TITAN Energy & TITAN Power through local recycling facilities suitable for the purpose.**

6. - MAINTENANCE



Carefully follow the instructions given in this chapter carrying out maintenance on the system.



ATTENTION: To perform any maintenance operations it is mandatory to switch off the system.

The **TITAN Power** must be stopped. START/STOP selector must be turned to STOP wait for the converter stop (no voltage on DC input).

Then the main circuit breaker and battery circuit breaker must be opened.
Open all circuit breakers from sources and loads. Before touching any electrical parts, wait 5 minutes for the filter capacitors to discharge.



WARNING: The system is equipped with **auxiliary batteries**.

CAUTION:

- **Do not dispose** of batteries in a fire as they may explode;
- **Do not open** or tamper with batteries. Released electrolyte is harmful to the skin and eyes. It can be toxic;
- **A battery** may present a risk of electric shock and burns due to a high short-circuit current;
- **Faulty batteries** can reach temperatures that exceed the burn thresholds for touchable surfaces.



Dismantling and disposal operations may only be carried out by a **qualified electrician**.

These instructions are to be considered indicative: in each country there are different regulations with regarding the disposal of electronic or hazardous waste such as batteries. The regulations in force in the country where the equipment is used must be scrupulously observed.

Do not throw any component of the equipment in the ordinary trash.

Batteries must be disposed of in a toxic waste recovery site. Disposal in a traditional waste is not allowed.

Contact the relevant agencies in your country for the correct procedure.

6.1. TITAN Power maintenance

6.1.1. Air filter periodical replacement

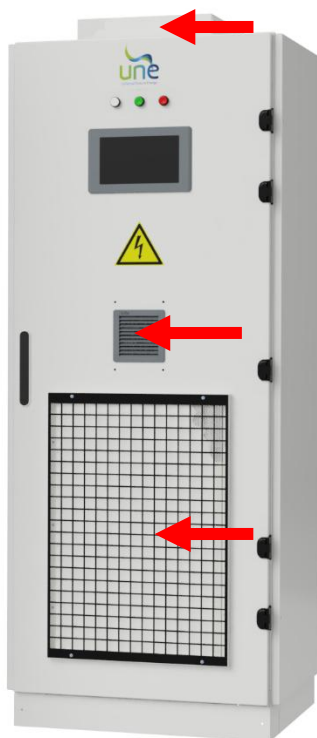
The list of components subject to periodical replacement is:

DEVICE LABEL	DESCRIPTION	TYPE	CHECK INTERVAL/REPLACEMENT
-	Front air inlet filter	Viledon P15/150S Dimensions L 525 x H 775 mm	1 years check and cleaning, replacement depending on environment pollution
-	DSP board RTC battery	CR2032	5 years

The list of components subject to periodical check/replacement is:

DEVICE LABEL	DESCRIPTION	TYPE	CHECK INTERVAL/REPLACEMENT
M0908	Converter Fan	G1G146-BA07-52	Expected life L10 70000h @ 40°C
M0911	Converter internal fan	3414-NH	Expected life L10 70000h @ 40°C
M0916	Cabinet Fan	W3G300-BV24-01	Expected life L10 40000h @ 40°C

The expected life of the fans refers to full speed and rated temperature. Depending on operating condition the fans speed may be lower than rated and/or the operating time is not continuous (the fans are controlled by temperature thresholds).

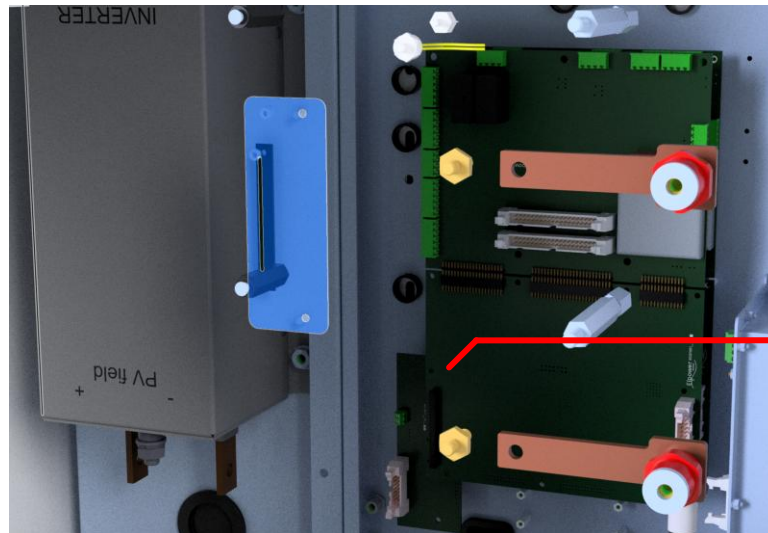


6.1.2. DSP board RTC battery replacement

The **RTC battery of the DSP** board is a CR2032 type. To replace the battery, it is necessary gain access to the DSP board (see Picture below).

Push gently the little battery holder and extract the old battery).

Insert the new battery: pay attention to the correct polarity. After replacing the battery, close the panels/doors.



DSP RTC
Battery holder

Figure 31 - Replacing the RTC battery

6.2. TITAN Energy maintenance

The Client is responsible for assessing risks and dangers and for informing operators on how to handle the devices, check also that the technicians who work in the cabinet are skilled, expert and informed of all technical, safety and risk issues.

The client is also responsible for providing personal protective devices and equipment.

No special maintenance is required on the TITAN Energy, the air inlet louvers, as well as the outlet fans, are not protected by filters.

6.2.1. Replacing batteries



ATTENTION: Before disconnecting the Harting connector from TITAN Energy for a single battery module, **disable the battery disconnect**, at which point the battery MCB can be opened (in OFF) and the Harting connector can be disconnected

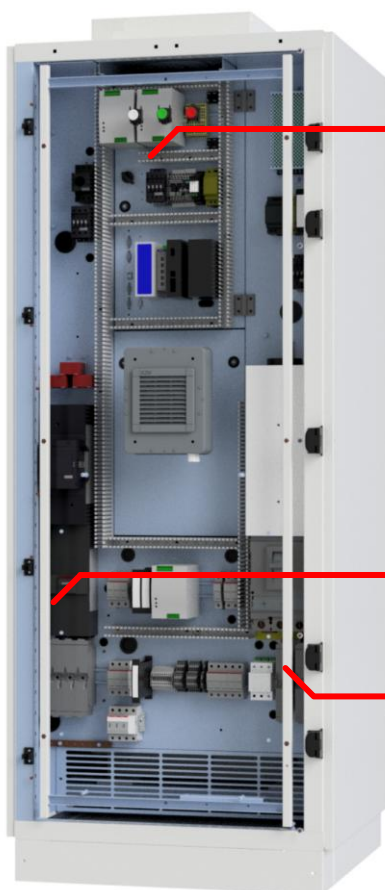


Figure 32 - TITAN Power panel

TITAN Power
START / STOP

TITAN Energy
DC fuses

TITAN Energy
I/O module

TITAN Power
AC main switch

TITAN Power
DC main switch



Figure 33 - Titan Energy panel

After disconnecting the battery module, let it cool for at least 5 days until the internal temperature of the battery does not reach the room temperature.



WARNING: TITAN Energy & TITAN Power includes a door switch that will prevent access through the BESS cabinet doors to the battery area with batteries in operation. TITAN Energy & TITAN Power cannot work with **DOOR OPENING**. Refer to Cabinet electrical diagram for details.



ATTENTION: Battery handling and BESS Cabinet handling are to be carried out slowly to avoid risk of instability of heavy components. **The BESS cabinet must always be moved without battery modules.**

- a) Open the door of TITAN Energy to access the batteries.
- b) Disconnect the connectors to the batteries making sure they are properly disconnected (**BLUE**), and with the latches inserted (**RED**), as shown below:



Figure 34 - Inserting the battery connector

- c) Remove the batteries brackets (in the image below, they are coloured **RED**).

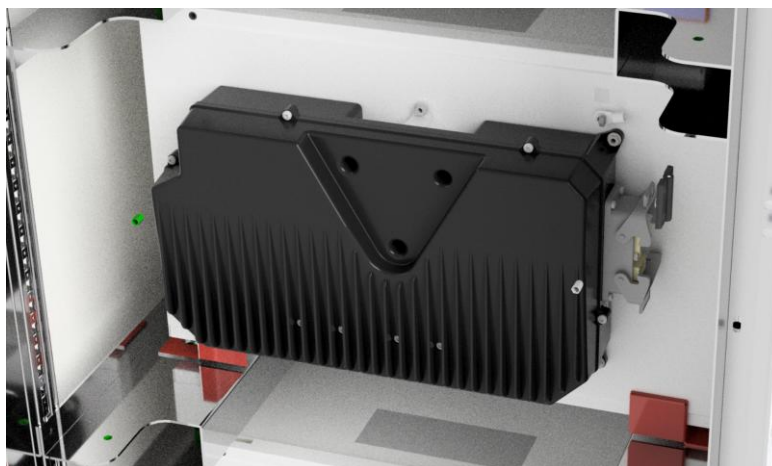


Figure 35 – Battery brackets

- d) Extract the batteries using a forklift that can lift a weight greater than 500 kg.



Figure 36 – battery moved with forklift truck



WARNING: Before repeating battery lifting, recheck forklift forks, lifting device installation, floor flatness, and all other requirements/conditions to avoid unbalanced loads.



WARNING: Lift the battery keeping a safe distance between the load and the operators. All movements must be done very slowly, quick movements or oscillations of the batteries must be avoided where possible.



ATTENTION: The extensions/forks must be narrower than the battery holders inside the BESS cabinet (approx. 600 mm). In any case, the extensions/forks cannot be too close together, otherwise a loss of load stability may occur.

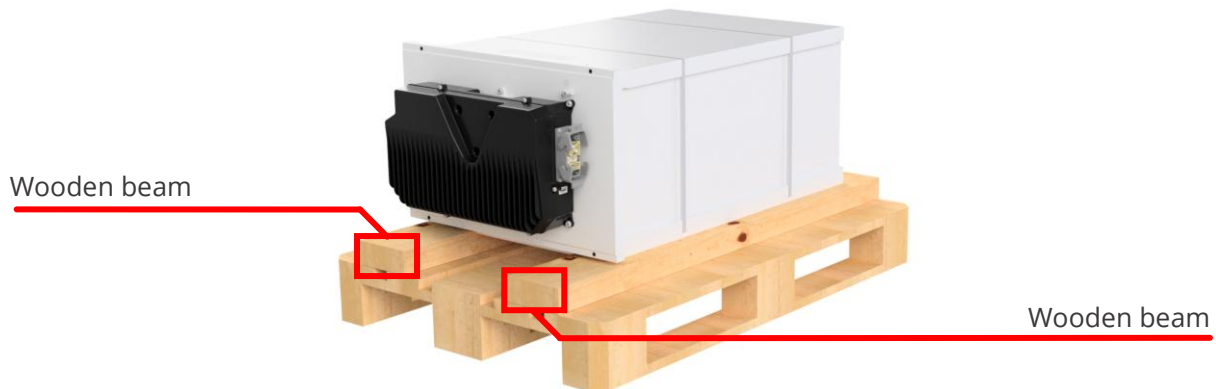
- e) Placement of batteries on specially modified pallets;

Place the battery on a pallet modified with wooden beams so that the buckets can be pulled out.



Figure 37 – Place the battery upon a pallet with wooden beams.

Place the batteries on pallets with 2 wooden beams, as shown below:



- f) **Repeat this procedure for all the TITAN Energy batteries;**
- g) **To reinsert the battery, follow the instructions in chapter 4.2.2.**

6.2.2. Cleaning the system



ATTENTION: The cleaning operation cannot be carried out with cabinet switched ON.

Do not use compressed air to clean the system to avoid dispersing dust or dirt in the air, which could damage the electrical equipment.

Do not use solvents or flammable liquids to clean electrical equipment, motors, and the entire frame.

Use non-flammable, non-corrosive, and nontoxic products instead.

6.2.3. Checking the system

To ensure long-term reliability and safety, the following checks should be carried out approximately every 3 months, or more frequently if required:

- **Visually check** that all electrical equipment, including cables, are tidy and in good condition;
- **Verify** that over the past period the batteries have charged and discharged normally;
- **Visually check** the condition of the cabinets. Check that cabinets are coated with protective paint and that there are no signs of rust, to avoid abrasive damages to the structure;
- **Visually check** the cleanliness and the functionality of the ventilation system.

7. - PRODUCT ASSISTANCE SERVICE

Technical assistance for the TITAN ENERGY & TITAN POWER storage system is provided by contacting UNE at:

assistenza@unesrl.com

The assistance department is aimed at providing support to professionals in the sector and to partner installers to whom the private individual must, in any case, contact in case of need.

To speed up the procedure, the following data must be provided:

- **Serial number** (SN: XXXXXX);
- **Mail and Telephone Reference**
- **Indicative date and time** of the event encountered;
- **Description**, as complete and detailed as possible, of the event/problem.

After the email has been sent, UNE will receive the request and an operator will reply as soon as possible.

8. - STANDARDS AND REGULATIONS

SYSTEM – REGULATORY COMPLIANCE

Marking	+	CE
Certifications	+	CEI EN 62477-1: 2012-07
	+	CEI EN 62477-1: 2012-07
	+	CEI EN 62477-1/A1: 2016
	+	CEI EN 62477-1: 2012
	+	CEI EN 62477-1/A1: 2017
	+	CEI EN 62477-1/A11: 2017
	+	CEI EN 62477-1/A11: 2014
	+	CEI EN 62477-1/A12: 2021-02
	+	CEI EN 61000-6-2: 2005-08
	+	CEI EN 61000-6-2/EC: 2005-09
	+	CEI EN 61000-6-2 2005-11
	+	CEI EN 61000-6-3:2007-01
	+	CEI EN 61000-6-3/A1: 2011-03
	+	CEI 0-16 2022-03
	+	CEI 0-21 2022-03
	+	VDE-AR-N 4105: 2018-11

9. - DISPOSAL

TITAN Energy & TITAN Power, at the end of its life cycle, must be stored and disposed of according to the regulations in force in the country of installation.

To carry out the demolition and subsequent scrapping, follow the procedure below:

- Have TITAN Energy & TITAN Power-qualified personnel disconnect all systems entering and leaving it.
- Consult the entity responsible for the disposal of TITAN Energy & TITAN Power according to the regulations in force in the country where the system is installed.
- Have TITAN Energy & TITAN Power disassembled by authorized personnel in the country in which disposal is taking place, taking care to divide the materials that make them up according to their nature.
- Unload the components in the appropriate places according to current legislation, in the place of disposal (the various components that make up TITAN Energy & TITAN Power will be disposed of in different places, depending on whether they are solid, special, or toxic waste according to the classification in force in the place of disposal).

For battery disposal, refer to the attached battery manual.



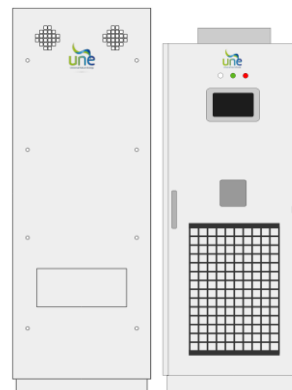
10. - DOCUMENTS

10.1. Technical datasheet

TITAN POWER and TITAN ENERGY is a complete system of energy storage, for industrial use based on the use of salt batteries.

The system allows the battery pack to be connected to the power grid.

- + Tropicalized electronic boards;
- + RADOX 155 cables for high performance;
- + On-board oscilloscope and real time datalogger;
- + No gas emissions;
- + Redundant safety features (chemistry, cell, battery module and BMS);
- + Free of toxic material;
- + Sustainable and fully recyclable.



TITAN POWER – DC SPECIFICATIONS

Minimum input voltage	d.c. V	500
Maximum input voltage	d.c. V	700
Nominal DC voltage	d.c. V	640
ICU / ICN / ICS	d.c. kA	5
Battery side voltage RIPPLE	%	≤ 0,5
Thermal protection		Yes
Electronic overcurrent		Yes
Control		Digital

TITAN POWER – AC SPECIFICATIONS

		TITAN POWER 30 KW	TITAN POWER 50 KW	TITAN POWER 100 KW
Grid		Three-phase	Three-phase	Three-phase
Nominal input voltage	a.c. V	400 ± 15%	400 ± 15%	400 ± 15%
Rated input frequency	Hz	50 ± 5%	50 ± 5%	50 ± 5%
Rated output voltage	a.c. V	400	400	400
Rated output frequency	Hz	50 ± 5	50 ± 5	50 ± 5
Rated output power	kW	30	50	100
Maximum output current	a.c. A	52	86,6	173,2
Short-circuit current (Phase-Neutral)	kA	10	10	10
Overall short-circuit power	kW	45	75	150
Maximum inrush current	A	200 for 3 ms	200 for 3 ms	200 for 3 ms
THDI (At nominal power)	%	≤ 3	≤ 3	≤ 3
Allowed cos φ		± 0,9	± 0,9	± 0,9
Net type		TT / TN	TT / TN	TT / TN

TITAN ENERGY – DC SPECIFICATIONS

Rated voltage	d.c. V	620
Storage capacity	kWh	22,5 (1 battery) – 90 (4 batteries)
Depth of discharge	%	80
Battery type		Sodium chloride – Nickel
Lifecycle	N°	4500 cycles at 80% DOD
Battery warranty	Years	5 (see applications)
Maximum batteries number	N°	20

SYSTEM – ENVIRONMENTAL SPECIFICATIONS

Ingress protection	IP	20
Maximum working temperature	°C	+ 45
Minimum working temperature	°C	0
Relative humidity	%	< 80
Pollution Degree	PD	II
Maximum altitude	m	2000 A.S.L.

SYSTEM – SAFETY / PROTECTIVE DEVICE

Galvanic separation (inverter)		Yes
Protective class	CLASS	I
AC overvoltage category	OVC	III
DC overvoltage category	OVC	II

SYSTEM – INSULATION SPECIFICATIONS

Impulse withstand voltage U_{imp}	d.c. V	4000
Insulation	a.c. V	2000

SYSTEM – REGULATORY COMPLIANCE

Marking	+	CE
Certifications	+	2014/35/UE
	+	2014/30/UE
	+	CEI EN 62477-1 (2012)
	+	CEI EN 61000-6-1 (2007)
	+	CEI EN 61000-6-3 (2007)
	+	CEI 0-16: 2022-03
	+	VDE-AR-N 4105: 2018-11

SYSTEM – MONITORING

Remote monitoring	ETHERNET
Local monitoring	PC EMBEDDED

TITAN POWER – MECHANICAL SPECIFICATIONS

		TITAN POWER 30 KW	TITAN POWER 50 KW	TITAN POWER 100 KW
Dimensions	mm		820 (W) 820 (D) 2060 (H)	
Weight	kg	390	610	800
Inverters per box	Nº	1	1	1
Acoustic emissions	dB	≤ 68	≤ 68	≤ 68
Air ventilation		Forced	Forced	Forced

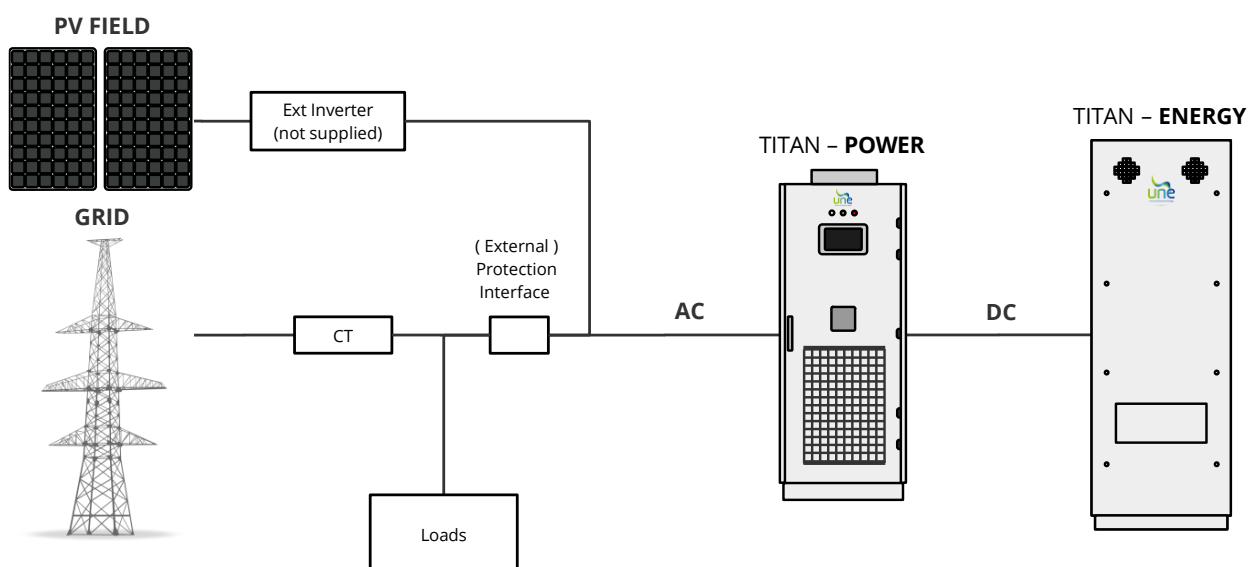


TITAN ENERGY – MECHANICAL SPECIFICATIONS

		TITAN ENERGY 22,5 – 90 KWH
Dimensions	mm	810 (W) 1320 (D) 2300 (H)
Weight	kg	380 (Without batteries)
Battery weight	kg	256 - (Each battery)
Batteries per box	Nº	4
Acoustic emissions	dB	42
Air ventilation		Forced



TYPICAL CONFIGURATION:



10.2. Attached

- TITAN Energy & TITAN Power manual;
- TITAN Energy & TITAN Power datasheet;
- ST523 Battery Manual;
- FZSONICK ST523 Battery Energy Storage Systems: PCS technical requirements;
- FZSONICK ST523 Battery Energy Storage System to PCS Interfacing;
- Web Interface manual of the gateway.



U N I V E R S A L N A T U R E  e N E R G Y

UNE Srl – Via Modena 48/E – 42015 Correggio (RE) – **Tel.** +39 0522 69 35 66 – Fax +39 0522 14 83 326
P.Iva 02513460358 – Pec info@pec.unesrl.com – Mail info@unesrl.com – www.unesrl.com