



SUNTRACK SELF POWERED PV TRACKER CONTROL UNIT



**Installation and
Maintenance Manual**

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SUNTRACK

PS17026

SUMMARY

SUNTRACK Installation and maintenance.

APPLICATION

Suntrack Self Powered PV Tracker ZigBee Controller 3Ah Battery or 6Ah Battery.

SUMMARY REVIEW

REV	DATE	AUTOR	COMMENTARY
A	2017 - 11	A.M.T.	Adaptation



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GLOSSARY, TECHNICAL TERMS AND ABBREVIATIONS

TERM	DESCRIPTION
Sw	Software
Hw	Hardware
GMT	Greenwich Mean Time
BT	BackTracking
TCU	Tracker Control Unit

Table 1.- Glossary



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1.- SAFETY INSTRUCTIONS



It is very important to read this safety section thoroughly as the SUNTRACK UNIT works with high current. During installation which is dangerous for personnel as well as for equipment.

It is recommended that the manual should be read before using the Suntrack unit. P4Q Electronics is not responsible for damage caused by undue use, negligence, modifications or the use of different materials to those authorized by the manufacturer.



Warning: It is of the utmost importance that the installation instructions included in this document should be strictly followed. Warranties or claims will be deemed void if the above instructions not fully complied with.



If a mechanical or electrical component is found to be defective do not use the product and contact your supplier right away.



If the installation instructions are not followed serious problems may arise, such as: damage to the unit, physical harm or even death from electric shock.



Should the unit not be installed immediately, it is advisable to keep it in its original packaging, and it should be kept in a dry and ventilated area.



The Suntrack unit should only be installed by a qualified electrician and authorized by the supplier.



The work tools used to accomplish the installation of Suntrack should have prior approval for the job taking into account the voltage present in the system.



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 Conductors used should be adequate for the appropriate section, resistant coatings and composed of material capable of enduring long periods of exposure to the sun.

 Wiring should be protected from rodents, as they can deteriorate the electric insulation.

 During installation, the conductor ends should be protected to avoid accidental contact with high voltage.

 Once the installation start up has been carried out, the installed units as well as the cables should not be moved. Carry out the assembly so that this cannot happen accidentally.



Follow the instructions carefully as described in this document.
Otherwise **"The warranties will be void and claims invalidated"**.



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2.- CONDITIONS FOR PACKAGING AND STORAGE

2.1.- Reception Conditions

Once the product has been received and before opening the same, packaging of the product should be checked and verified that it remains in perfect condition.

In case of damage, contact the transport company or supplier, and notify them about the damage caused to the packaging.



Important! Damage should be notified in written form within a maximum of three days [See Annex III. Transport Incident Template]

Once unpacked, check that everything is included as indicated in the section 2.2 Contents of Packaging.

2.2.- Contents of Packaging

The Suntrack goes with all necessary cables, power and motor, and everything needed for assembly on the panel (4 x Self Threading Screw 4.2x25mm DIN 7981 INOX A2, 4 x Washer D4,3 DIN6798A Inox A2, 4 x Washer with large outside diameter D4,3 DIN9021 Inox A2, 4 x TR U-nut for DIN 7970 threaded bolts). Optionally, it also goes with a photovoltaic panel.

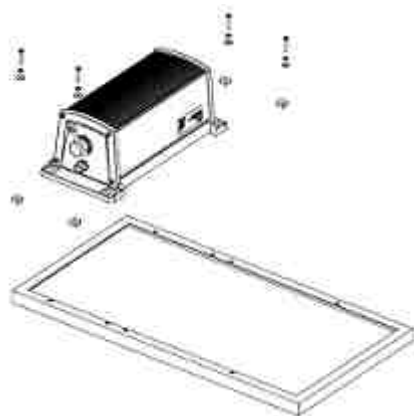


Figure 1.- Suntrack Packaging



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2.3.- Storage Conditions

If the unit is not installed right away, it is advisable to keep it in its original packaging and situated in a ventilated environment and it should be preserved at dry and low temperature.

Aiming no to affect battery performance, if the Suntrack is preserved for a long time, the battery should be recharged every 3 months.



Be careful not to pull on the cables when handling Suntrack devices.



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3.- DESCRIPTION OF UNIT

The Suntrack is a control unit capable of thoroughly tracking the trajectory of the sun. Its use is recommended for all the usual types of photovoltaic modules.

3.1.- General Description

3.1.1.- Technical Characteristics

-  Extruded aluminium and ASA plastic material.
-  CE Mark Approval.
-  Battery pack of LifePO4 cells with optimum charge algorithm.
-  Battery protection through a 10 Amperes 5x20mm (3Ah) or 15 Amperes 6x32mm (6Ah) designed to UL specification.
-  Solar Position in-built algorithm within an 8 bits microcontroller.
-  Tracking precision of 0.1°.
-  Designed to IP65/NEMA3S specifications
-  Emergency Stop button located in the casing exterior and accessible by the end user, in accordance to the current norms.
-  External QR code traceability label prepare to be outside.
-  Warranty seals.
-  Working temperature range: -10 a 60°C.
-  Configurable by software. A PC application is provided to interact with the unit (See fourth point of the manual).



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PARAMETERS		UNIT
PV Panel Output Voltage	36	VDC
PV Panel Maximum Power	30 (3Ah) / 60 (6Ah)	W
PV Panel Weight	2.8 (3Ah) / 5.1 (6Ah)	KG
Suntrack Output Maximum Voltage	24	VDC
Suntrack Output Overcurrent Protection	6.4 (3Ah) / 12.5 ⁽¹⁾ (6Ah)	A
Suntrack Temperature Range	-10 to +60	°C
Suntrack Weight	2.8 (3Ah) / 3.3 (6Ah)	KG
Battery Input Voltage	26 – 40	VDC
Battery Nominal Capacity	3 or 6	Ah
Battery Overcurrent Protection Fuse	10 (3Ah) / 15 (6Ah)	A
Battery Operating Temperature	-10 to +60 (Discharge) 0 to +60 (Charge)	°C

(1) Not designed for continuous drain of batteries at max motor current requirements. Maximum pulse duration is 30° sec (@ambient temperature of 50°C and max. motor current) followed by a 10 sec stop-time.

Table 2.- Technical Characteristics



3.1.2.- Mechanical Characteristics

There are four 9.5 x 11.5 holes at the upper side of the TCU in order to fix the unit.

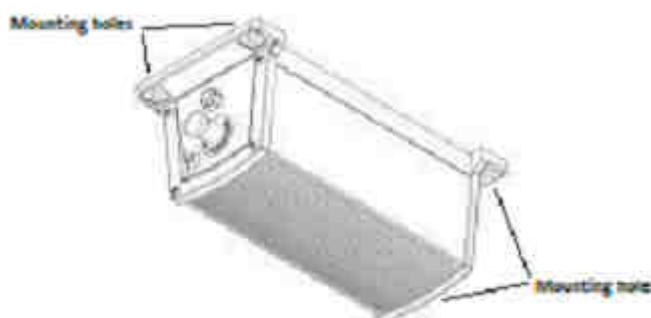


Figure 2.- TCU Support



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The Suntrack TCU dimension is 344 x 167 x 135 mm.

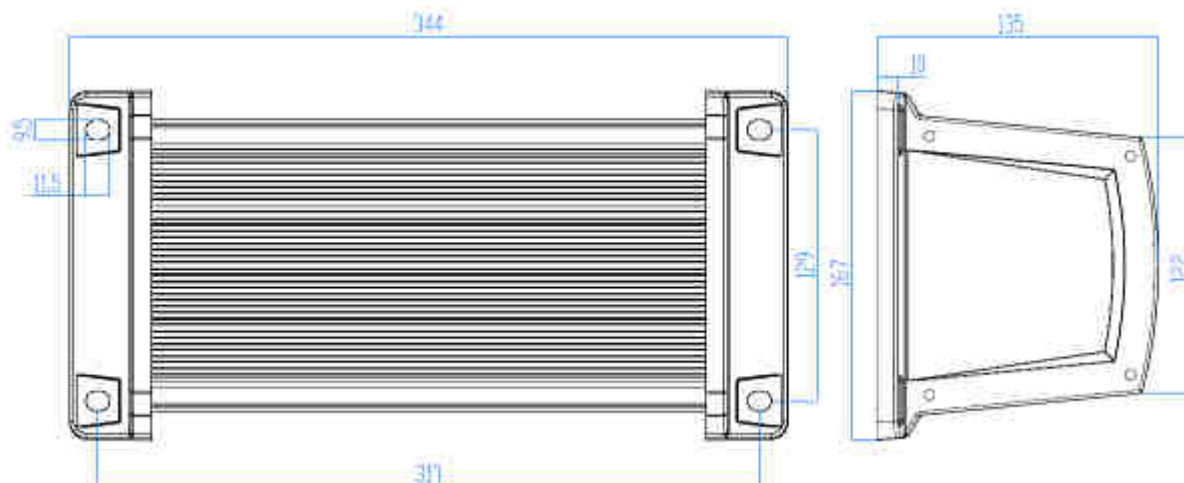


Figure 3.- TCU Dimensions

The 30W polycrystalline silicon solar cell photovoltaic panel has IP67 degree protection and 650 x 350 x 25 mm dimensions.

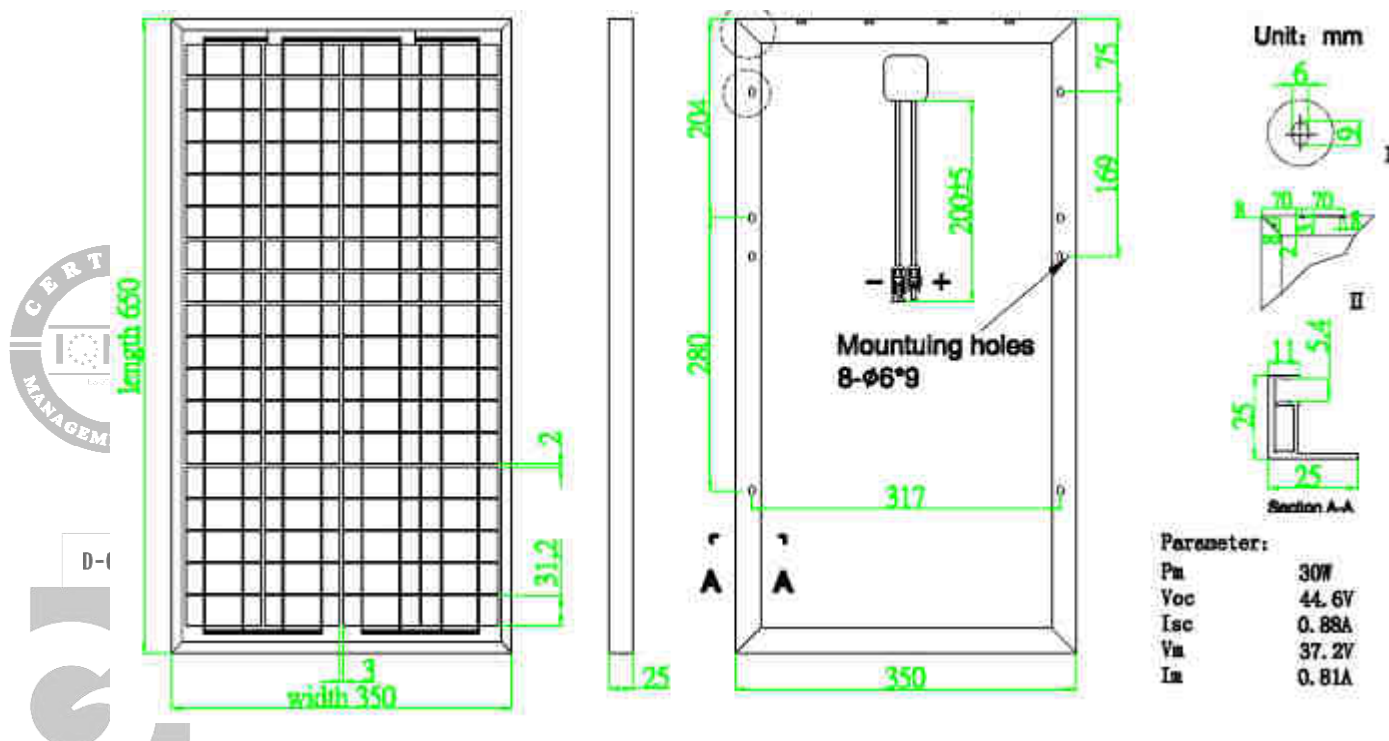


Figure 4.- 30W Polycrystalline Photovoltaic Panel Dimensions

(In case you have acquired the controller with solar panel)

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Suntrack can also optionally use a 30W monocrystalline silicon solar cell photovoltaic panel has IP67 degree protection and 645 x 345 x 25 mm dimensions.

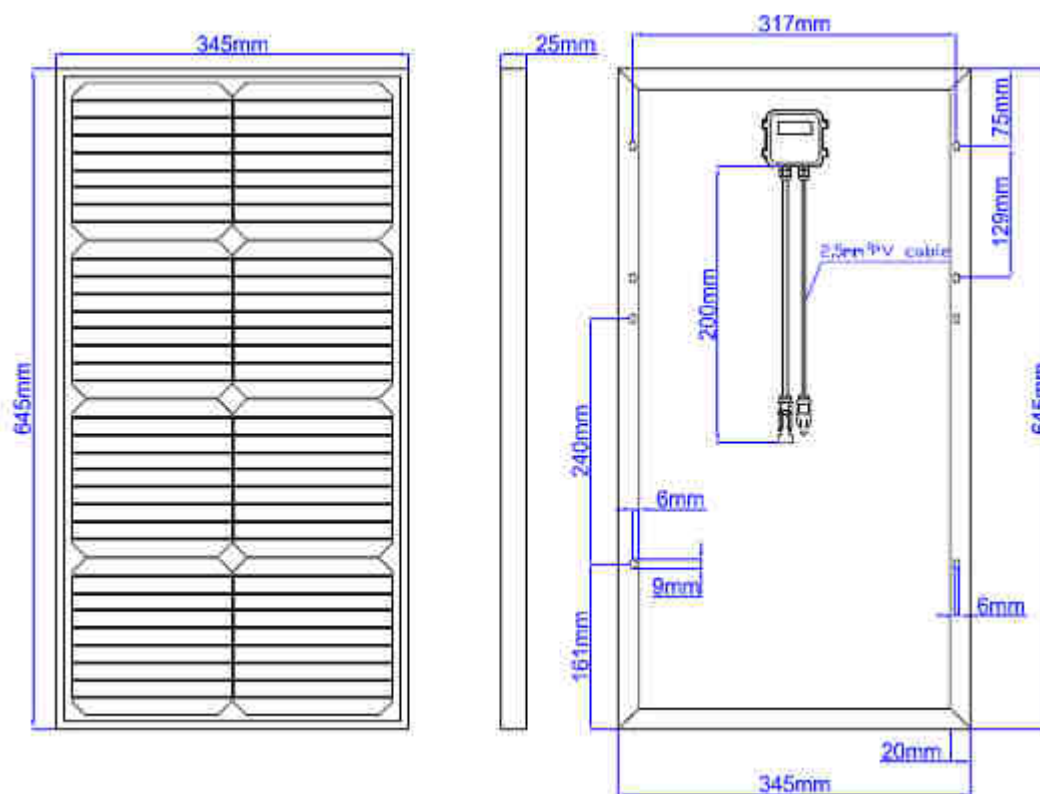


Figure 5.- 30W Monocrystalline Photovoltaic Panel Dimensions
(In case you have acquired the controller with solar panel)



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The 60W polycrystalline silicon solar cell photovoltaic panel has IP67 degree protection and 1250 x 350 x 25 mm dimensions.

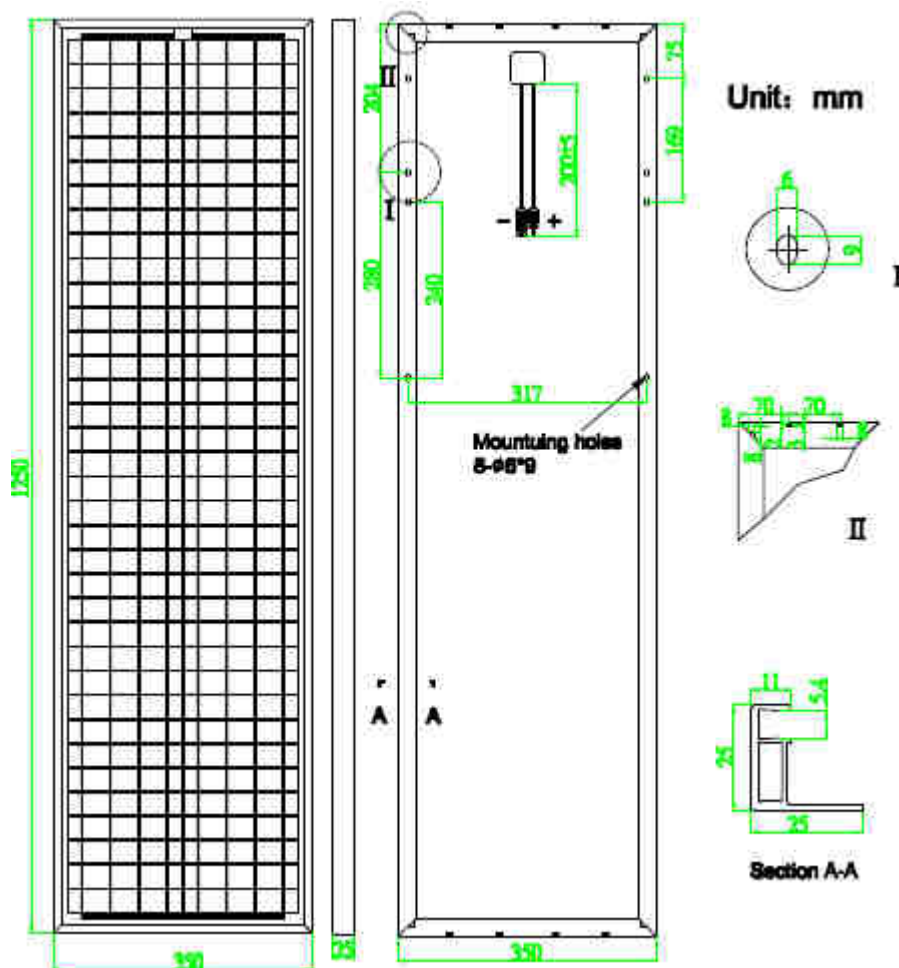


Figure 6.- 60W Polycrystalline Photovoltaic Panel Dimensions
(In case you have acquired the controller with solar panel)

3.1.3.- Ground

The Suntrack not necessarily must be connected to the ground connection to allow that the over-voltage protections work properly and guarantee the people's safety.

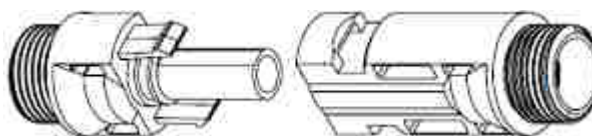


Figure 7.- Suntrack Power MC4 Connectors

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3.2.- TYPICAL NETWORK CONFIGURATION

3.2.1.- ZigBee Network

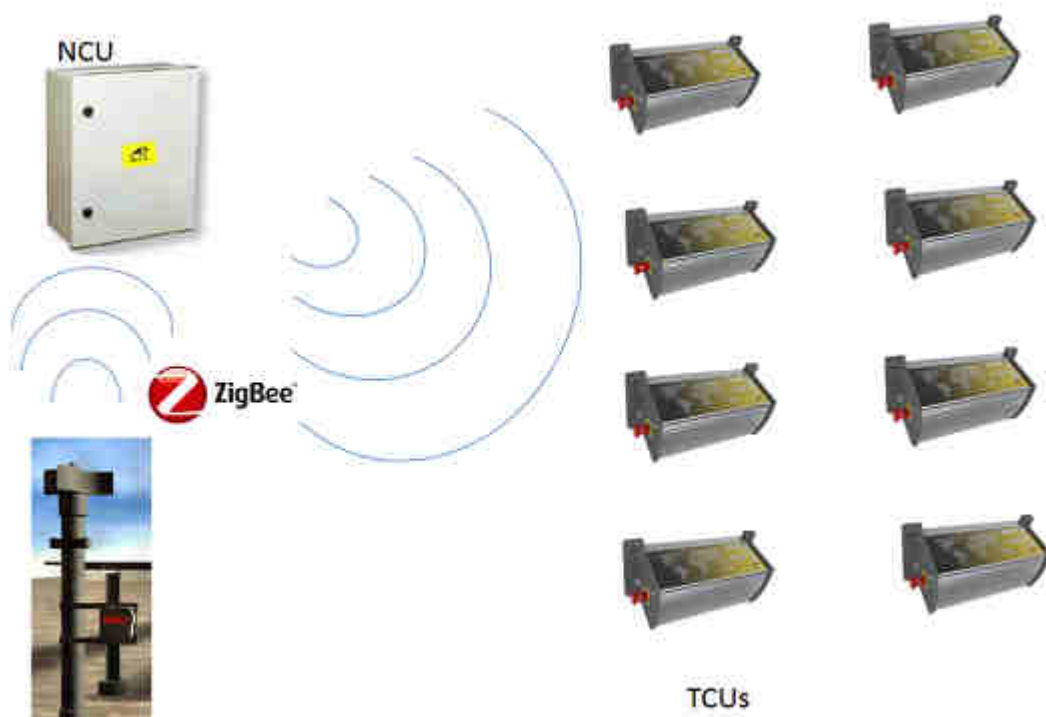


Figure 8.- Zigbee Network



Every ZigBee network must contain a network coordinator and all TCU's can serve as network routers.

Good line of sight is necessary between coordinator and nearby devices.



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4.- INSTALLATION OF EQUIPMENT

Installation of the Suntrack should be only be executed by trained and qualified personnel. Special tools which are the standard tools of specialized technicians are necessary.



The installation and the commissioning is not responsibility of P4Q Electronics, but always can help taking decisions or helping resolving problems. At this point there are basic steps to consider in the installation. If there are any doubts, do not hesitate to contact with Suntrack department. Take into account that can be some error in this document, so it is important to be in contact with the Suntrack deparment.

As Special tools we can recommend some amphenol tools that can help in the disconnection of the panels:

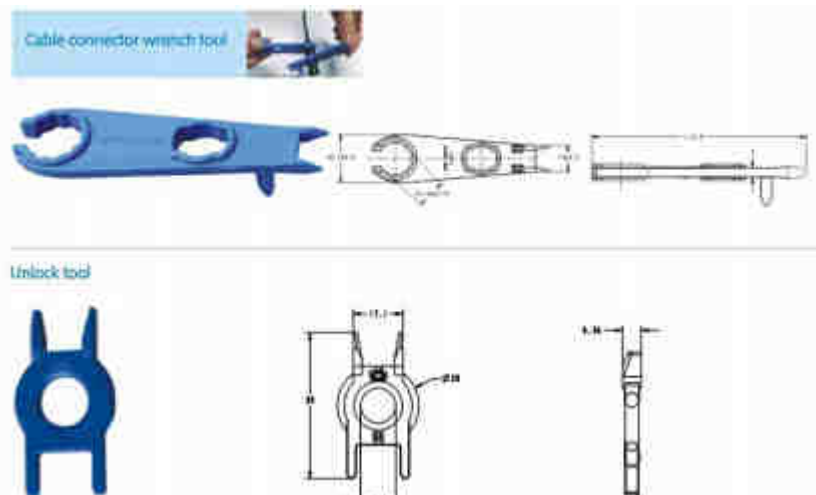


Figure 9.- Tools

Before initiating TCU installation, planning is crucial so as to provide an organised work method. To perform the installation the following steps should be followed:



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4.1.- Ground

The grounding system should be regulated by the corresponding norms of each country.

Grounding of the installation should be at a unique point. Place all the ground conductors at one point, so as to reduce the risk of damage due to power surges derived from lightning.

4.2.- Electrical TCU Location

The priority selection criteria for situating the TCU depend on the condition of its surroundings and the facility for connecting the aerial connectors.

The TCU is prepared for working outdoors and can bear adverse atmospheric conditions such as snow and hailstone.

Below there are certain points to be considered when positioning the control TCU.

4.2.1.- Mechanical Aspects

Mount on a stable and resistant surface, one should take into account the mechanical aspects of the equipment as well as its weight, 2,8 Kg. or 3,3 Kg.

The panel weigh is 2,8Kg. or 5,1Kg.



4.2.2.- Thermal Aspects



The surface where the assembly is performed should not be made of inflammable material. If it is necessary to assemble on these types of materials (e.g. Wood), it is necessary to add a heat resistant and non-inflammable coating.



Do not install the unit in the interior of an enclosure.



Although the TCU can be installed outdoors, it should not be installed on a location which is exposed to the Sun.



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The recommended altitude for the installation of the unit should be less than 3.000 meters.

4.2.3.- Safety

The TCU has IP65 protection, that is, it is protected from dust, water jet and high temperature, nevertheless one should be aware of the following safety aspects.



Do not store next to inflammable liquids and materials of the unit, the temperature of the unit can facilitate the possibility of fire.



Wiring should be protected against rodents that can deteriorate the electric insulation, endangering personnel as well as the risk of fire. Cover the connectors not in use to ensure water tightness and avoid entrance of unwanted animals.



To avoid direct and indirect contacts it is important to verify that the TCU is closed securely.



For the installation and maintenance of the unit it is important to use adequate work tools that comply with the protection of direct and indirect contacts.



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4.3.- Fixing the TCU

The TCU should be fixed vertically on a flat surface so that it is capable of bearing the weight of the unit.

Fix the TCU to the structure; using the holes at the top of the TCU (distance between screws is 317mm and 129mm). The hole has 9,5 x 11,5 mm.

All screws must be tightened with a tightening torque of 1.7 Nm.

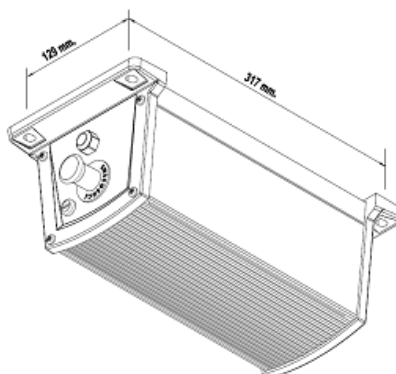


Figure 10.- Fitting the TCU



Pay special attention on fixing the unit, as its weight is approximately 3 Kg. Under **no** circumstances **use** the electrical TCU assembly holes to Ground the unit. If you use P4Q panel take into account the weight of it.



Figure 11.- Fitting the PV Panel

To fix the TCU to the panel P4Q supplies the necessary nuts and bolts including a



Figure 12.- Clip nut

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4.4.- Cable assembly

Preparation for the cable assembly where the conductors pass will facilitate the installation process. The conductors should have a route that provides mechanical protection and appropriately fitted so as to have a long and useful life.



Figure 13.- Fixing the TCU

The Suntrack must be positioned so that the X axis, shown in the attached image, points in the same direction as the elevation turn axis of the tracker.

The Suntrack cables must be prevented from interfering with the movement of the tracker or from hanging, in order to avoid possible snags or yanks on them. It is recommended to point it toward the North. Even so it is necessary to follow the recommendations given in the previous point.



The Suntrack cables must be attached to the structure in order to prevent it from splitting or suffering possible pulls with the movement of the structure.

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4.5.- Electric Connection

Position the unit in the position that it is assigned for fitting the same.

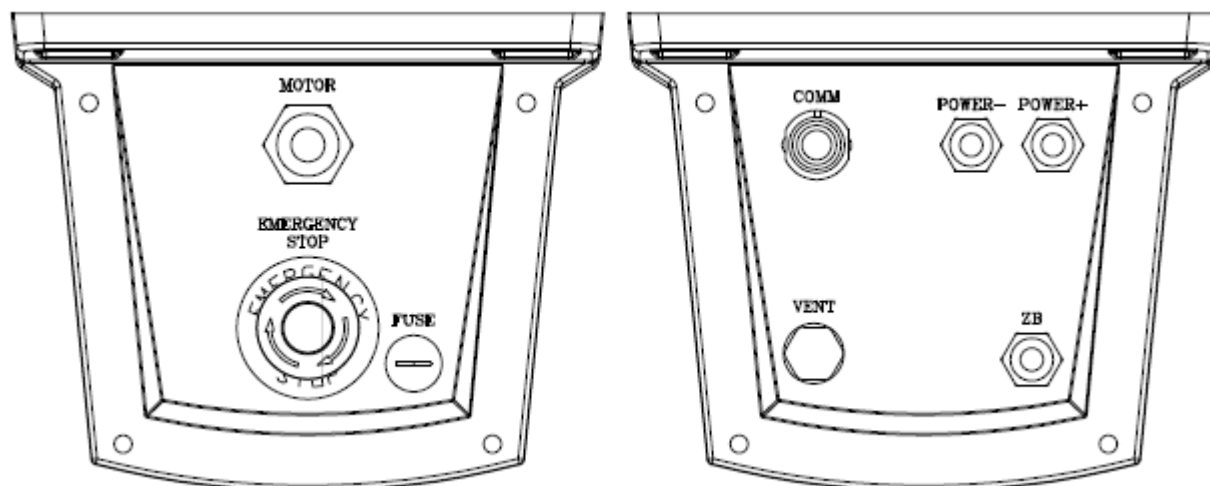


Figure 14.- Typical 3Ah cable glands and connectors

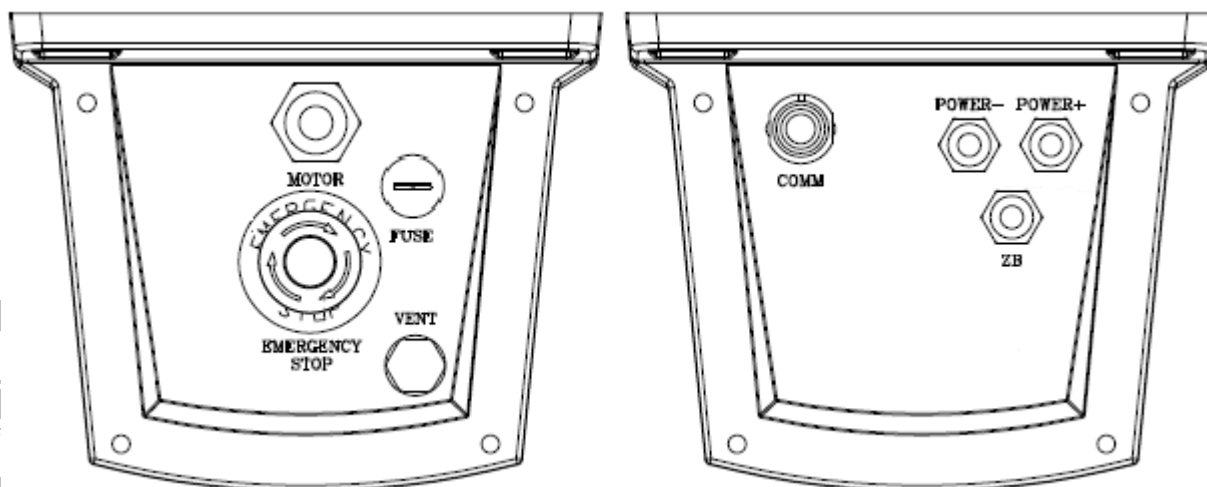


Figure 15.- Typical 6Ah cable glands and connectors

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DO NOT connect the fuse of the Suntrack until the installation has been completed. Fuse cap tightening torque: 0.4-0.6Nm.

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Connect the motor connector and swivel the upper part of the connector to the full (until it clicks). Check that the connector is secured to the Motor.

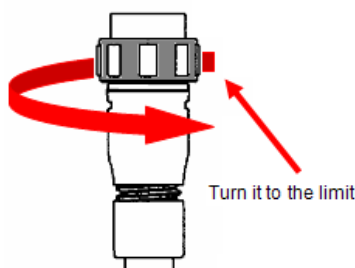


Figure 16.- Motor Connector Connection

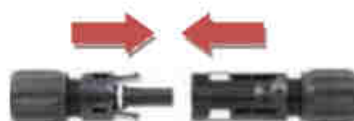


Figure 17.- Panel Connector Connection



DC POWER + : Connector MC4 female compatible and 450mm. cable.



DC POWER - : Connector MC4 male compatible and 450mm. cable.



MOTOR: Aerial connector reference Binder 99-5606-75-03 and 1600mm. cable.

- Pin1 → Motor -
- Pin2 → Motor +
- Pin3 → (NC)



ZIGBEE COMMUNICATIONS: Antenna with 300mm. cable to be placed always loose down.



Do not fasten the antenna to any structure.

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COMMUNICATIONS: Panel reference WEIPU SP1312/S4C. Communication Kit aerial connector reference WEIPU SP1310/P4 Type I.

- Pin 1 → Comm. 3V3
- Pin 2 → Comm. RS485 Power
- Pin 3 → Comm. RS485 Negative
- Pin 4 → Comm. RS485 Positive

For the Power and Communication connectors first it is important to install the wiring and later connect the Suntrack unit. Connect the local communication connector and then the power supply to the Suntrack.

Communicate with the unit with a PC through the converter USB-RS485.

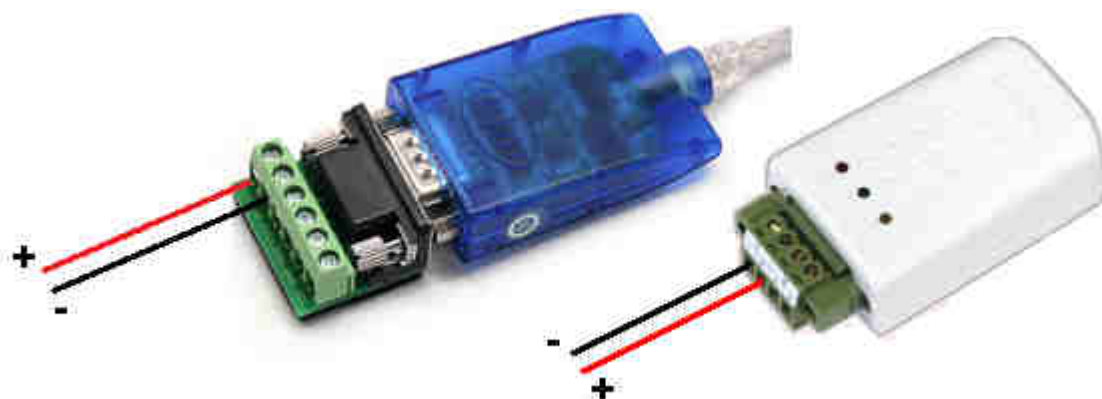


Figure 18.- USB-RS485 Converters

Proceed to power the equipment by activating the fuse.



The wrong supply polarity will result in a system fail.

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4.6.- Uninstalling the Electrical TCU

-  Situate the tracker in horizontal position.
-  Press the stop emergency button.
-  Shut down the tracker.
-  Disconnect the fuse.
-  Disconnect the rest of the connectors.
-  Extract the fixing screws and take away the equipment.

4.7.- Verification and Problems

Guidelines are provided in case of an alarm in the system.

4.7.1.- Axis Blockage

If there is an alarm, the following sequence of action should be followed to verify how it originated:



-  One should go to the installation and verify that nothing inhibits the axis movement
-  Check that in the Time/Position tab the inclinometer pulses increase or decrease. If this is not so it could be that the inclinometer is broken.
-  Another reason could be that either the motor cables have been cut.
-  When you move the tracker to the East, the tracker is not moving to the East.

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When the tracker moves to the East the tracker is not decreasing pulses.

4.7.2.- Pointing Problems



Check that the the localization is correct.



Check that the offsets are correct.



Check that GMT is entered correctly

4.7.3.- Shadow Generation

Check that the tracker parameters are correct.



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5.- MAINTENANCE

Equipment maintenance should only be carried out by trained and qualified personnel. Special tools are needed which the technician has as standard.

Preventive equipment maintenance has to be carried out after one year from its installation, and subsequently every three years. The following points for the correct maintenance should be observed:

 Check that all the mechanical connections of the unit are adequately adjusted, if not so, they should be tightened with the appropriate tools.

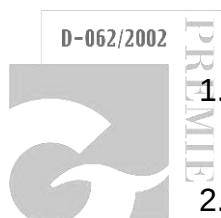
 Check the good working order of the box and that it has no sign of corrosion or deterioration.

 One should simulate abnormal behaviour, such as wind, axis blockage, etc, so that all the alarms are generated correctly and that the system responds as expected.



5.1.- Battery replacement

In case that is authorized by P4Q the replacement of the battery, is essential to follow the next steps:



- 1.- Shut down the tracker.
- 2.- Disconnect photovoltaic panel connections.
- 3.- Pull out fuse.

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4.- Remove the four screws from fuse holder cover.

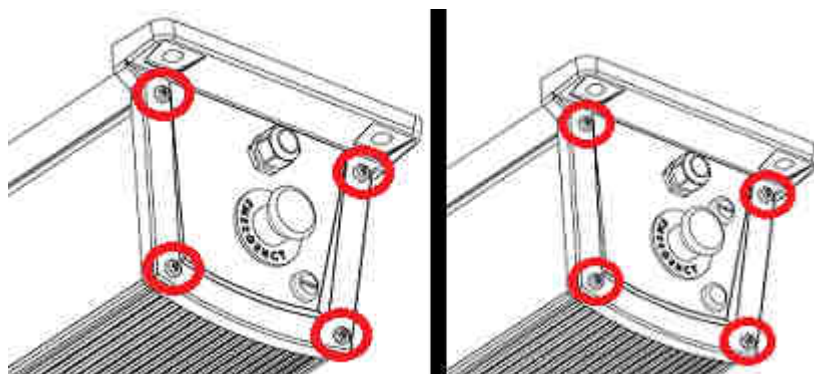


Figure 19.- Fuse holder cover

5.- Take away the battery retainer from the TCU case.

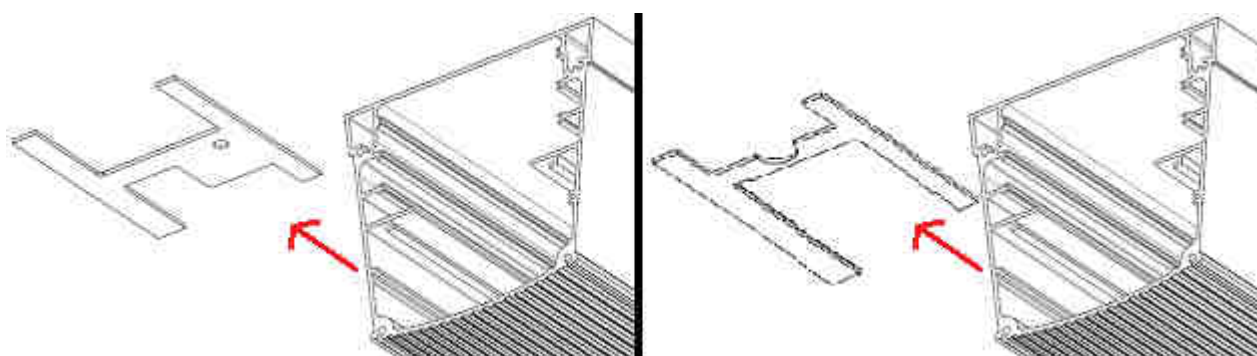


Figure 20.- Battery retainer

6.- Disconnect battery connectors.

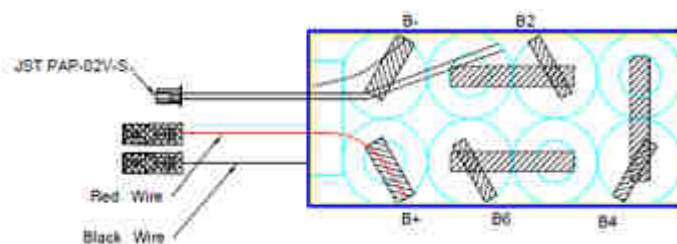


Figure 21.- Battery connectors

7.- Remove the battery from the TCU case.

8.- Stick the battery retainer clip to the new battery.



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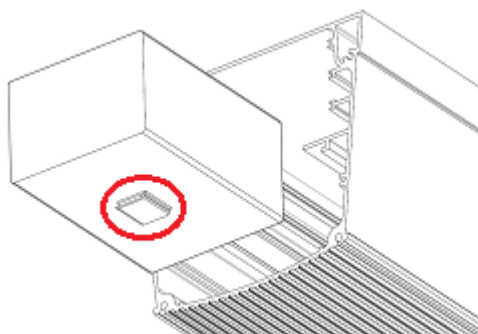


Figure 22.- Battery retainer clip

9.- Insert the battery in the TCU case.

10.- Connect battery connections.

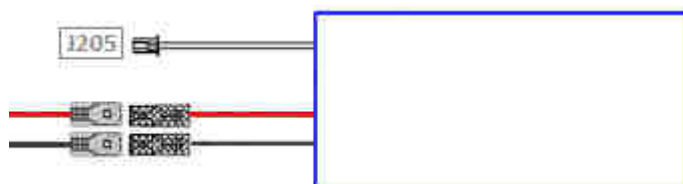


Figure 23.- Battery connections



The wrong battery polarity will result in a system fail.



11.- Connect the local communication connector and then communicate with the unit with a PC through the converter USB-RS485.



In case of not communication through the above converter, check that battery connection is correct.

12.- Insert the battery retainer in the TCU case.

13.- Fit the four screws.

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14.- Introduce fuse into the fuse holder (Fuse cap tightening torque: 0.4-0.6Nm.).

15.- Turn on the tracker.

16.- Finally, connect photovoltaic panel connections.



Important! In case it has been necessary to exchange battery connection, it must take 5 minutes from the battery connection and the photovoltaic panel connection.



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6.- TERMS AND CONDITIONS OF WARRANTY

6.1.- Duration of Warranty

The period of warranty is that which is specified on the supply contract and begins on the delivery of the unit. Should one decide to increase the warranty period it will be specified in the supply contract on request.

6.2.- Conditions of the Warranty

During the warranty period, the equipment will be repaired at no cost in material or labor costs at the factory. Assembly costs at location are not included.

In case of equipment failure the warranty claim should be sent by mail to P4Q then one should wait to obtain authorisation for delivery of the same. Please indicate the name of the company, the use that the unit is given, delivery address for the repaired unit and the person to contact as well as the telephone number. Authorization is performed after sending the completed error protocol filled in indicating the failure. (Annex III). P4Q Electronics cannot accept equipment received without prior notification in writing or without being informed of the failure.

6.3.- Air Shipping Goods With or Containing Lithium Batteries

Due to increasing safety concerns raised by the aviation industry, the IATA regulations governing the shipping of Lithium Batteries have been tightened and airlines consequently have to enforce these regulations more rigorously.

Please note that the safe transportation of such contents by air and the full compliance to IATA regulations is the legal responsibility of the Shipper. In view of this fact, IATA has produced a guide to help Shippers understand and comply with the regulations.

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Important! Lithium Batteries that are known or suspected to be defective or damaged present a high safety risk to personnel and property, and are not permitted on aircraft under any circumstances.

The end customer will be responsible of the recycling of the damaged battery.

6.4.- Exclusion of Liability

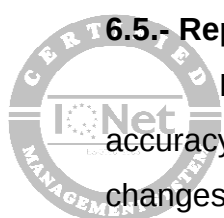
P4Q is not in any way responsible in the following cases:

- Damage cause by undue use of equipment.
- Constant use of charges above those defined in the equipment specifications in the mounting and installation manual.
- Use in inadequate environmental conditions (see location section).
- Equipment damaged, dismounted o manipulated by unauthorised technical service.
- Lightning, accidents, water, fire and other circumstances beyond the control of the manufacturer.

6.5.- Representations

P4Q Electronics makes no representations or warranties with respect to the accuracy or completeness of the contents of this document and reserves the right to make changes to specifications and product descriptions at any time without notice.

P4Q Electronics does not make any commitment to update the information contained herein. Unless specifically provided otherwise.



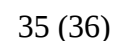
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7.- TRADEMARKS

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ANEXO I.- REPAIR INCIDENT SHEET

	REPAIR INCIDENT SHEET		COMPANY:
			WORK:
			EQUIPMENT SERIES Nº:
PLEASE SEND A COPY BY E-MAIL PRIOR TO DELIVERY OF EQUIPMENT			
RESPONSIBLE FOR TRANSPORT		CLIENT	P4Q
NAME OF CONTACT			
TELEPHONE CONTACT			
E-MAIL CONTACT			
DESCRIPTION OF EQUIPMENT			
DESCRIPTION OF DAMAGE			
CAUSE OF DAMAGE			
COMMENTS			
Name and Surname:			
Date of incident:			
Signature:			

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ANEXO II.- INCIDENT IN TRANSPORT SHEET

	TRANSPORT INCIDENTE		COMPANY:
			WORK:
			EQUIPMENT SERIES Nº:
PLEASE SEND AN E-MAIL COPY PRIOR TO EQUIPMENT DELIVERY			
RESPONSIBLE FOR TRANSPORT		CLIENT	P4Q
NAME OF CONTACT			
TELEPHONE CONTACT			
E-MAIL CONTACT			
DESCRIPTION OF INCIDENTE			
DESCRIPTION OF DAMAGE			
CAUSE OF DAMAGE			
COMMENTS			
Name and Surname:			
Date of incidence:			
Signature:			