Bio UV
Ultraviolet Solutions

INSTALLATION, OPERATING AND MAINTENANCE MANUAL

BIOSUN 340

USE UNDER GRAVITY CONDITIONS OR WITH A LOW PRESSURE SYSTEM

GENERAL TECHNICAL DATA FOR THE BIOSUN RANGE

	BIOSUN 85	BIOSUN 340
FUNCTIONAL CHARACTERISTICS		
Flow rate	500 liters/hour	500 liters/hour
Number of hours of production per day	4 hours	4 hours
Volume produced per day	2 m^3	2 m^3
Standalone operating time	3 days	3 days
Draw-off	Manual plunger, automatically closing valve	
Volume meter	electronic, with resetting	
UV reactor ON/OFF switch	Yes, with integrated LED	Yes, with integrated LED
WATER SUPPLY		
Tank volume	20 liters	20 liters
tank materials	304L stainless steel	304L stainless steel
Supply type	Pressure system, 1.5 bar	manual or supply < 1 bar
Max. pressure	3 bars	3 bars
Pump	-	24V DC, with a built-in pressure switch
FILTERING		
Filtering media	Zeolite	Zeolite
filter volume	7 liters	7 liters
filtering threshold	<10µ	<10µ
backwashing	Manuel, with a set of 3-way valves	
cartridge size (optional)	10"	10"
UV REACTOR		
UV lamp power	14W	14W
UV power delivered	4.6W	4.6W
UV operating light	Yes	Yes
Dose delivered	40 mJ/cm²	40 mJ/cm²
Ballast	24VDC electronic	24VDC electronic
Supply voltage	24VDC	24VDC
Lamp service life	13,000 hours	13,000 hours
HOUSING		
Materials	Fiberglass + polyester complex: special for outdoor use	
Dimensions	1400 mm high x 600 mm wide x 396 mm deep	
PHOTOVOLTAIC POWER SUPPLY		
Number of solar panels	1	4
Panel size (unit)	1200 x 600 mm	1200 x 600 mm
Panel power and voltage	85W/12V	85W/12V
Panel attachment	Built into the frame	remote support (roof, floor, etc.)
Number of batteries	1	2
Battery type	70Ah(C100), 60Ah(C20), 12V	70Ah(C100), 60Ah(C20), 12V

INTERNAL VIEW OF THE BIOSUN TERMINAL

20-liter tank

Tank drain valve

Regulator

UV lamp ballast

Converter

Pump (at the rear)

UV reactor

Filter tank

Protection plate

Batteries (x2)

INSTALLATION INSTRUCTIONS

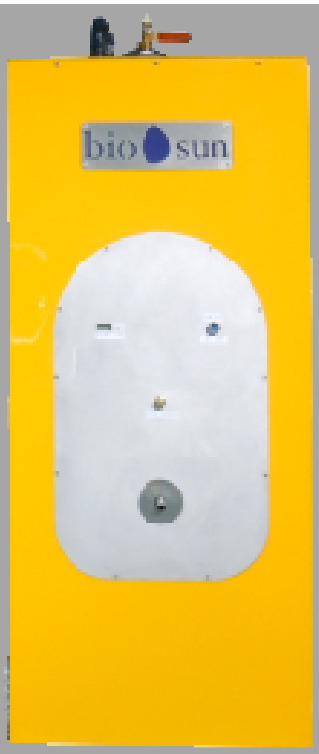
OF THE BIOSUN 340 TERMINAL

IMPORTANT: BIOSUN 340 is designed to be connected to a low pressure system (< 1.5 bar)

If the operating pressure exceeds 1.5 bar, the BIOSUN 85 model must be used

PARTS SUPPLIED

The parts list of the structure supporting the solar panels is specified on page 22.

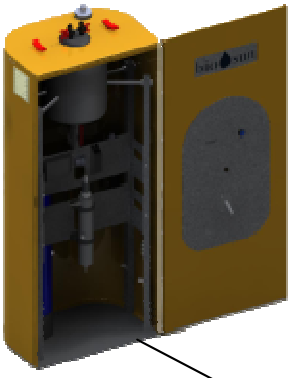


BIOSUN terminal

INSTALLING THE PHOTOVOLTAIC PANELS: see the specific chapter at the end of the technical manual.

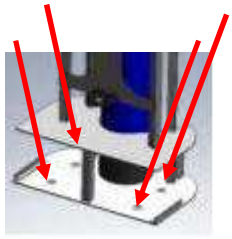
INSTRUCTIONS FOR INSTALLING THE BIOSUN 340 TERMINAL

A



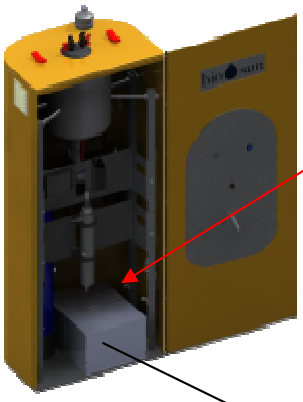
Carefully remove the BIOSUN module front panel, taking care not to damage the hydraulic connections and wiring.

B



Attach the BIOSUN terminal to the floor: for example, use the 16 mm threaded rod sealed in the floor.

C

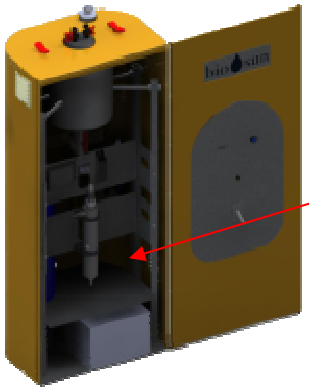


Fit the battery.

D

Connect the batteries in series with the polarities the right way round.

E



Fit the battery protection plate.

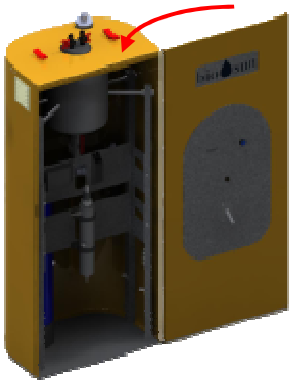
F

Feed through the photovoltaic panel cable
(after fitting the panels)

G

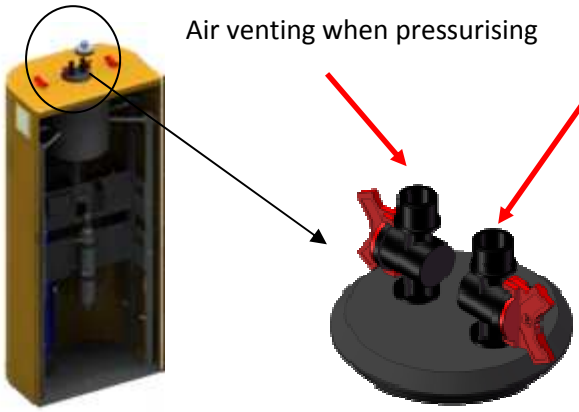
Connect the connector to the BIOSUN terminal supply connector
(male/female connectors)

H



Refit the BIOSUN terminal front panel

TO BE TESTED WHEN SWITCHING ON



Vent the air

CHECKLIST

Point the solar panel SOUTHWARDS

INSTRUCTIONS FOR COMMISSIONING THE BIOSUN 340 TERMINAL

1. Charge the batteries from the solar panels for 3 sunny days: do not use the terminal.

2. Rinse the filter by running the water for 10 minutes, and then backwash the filter

INSTRUCTIONS FOR USE

OF THE BIOSUN 340 TERMINAL

IMPORTANT

USE A CLEAN DRUM: must be suitable for storing drinking water

must be regularly cleaned

STORE THE DRUM IN A PLACE AS SHELTERED FROM LIGHT AND EXTREME TEMPERATURES AS POSSIBLE

CONSUME THE STORED WATER DURING THE DAY.

PRODUCTION

- The terminal should not operate for more 10 hours a day, i.e. when set to the "ON" position with the blue LED light lit (see below).
- The terminal produces 2000 liters or 540 gallons a day: This production ensures the correct operation of the batteries and the terminal's standalone operating time of 3 days.
- The BIOSUN 340 terminal should be set to the ON position for the entire planned production time: do not switch the BIOSUN 340 terminal on or of according to the flow.
- If the BIOSUN 340 terminal's flow drops very significantly, the filter should be backwashed (see "filter backwashing chapter").

START THE TERMINAL

Set the volume to zero:

- Press the pushbutton to make the water flow and thus turn on the volume meter Press RESET for 5 seconds

Press "ON»: the blue LED must be lit

WAIT for 5 minutes before using the BIOSUN terminal,

Then run and discard 20 liters of water,

The BIOSUN terminal is then ready for production.

The daily production should be monitored,
using the volume meter,
so as not to exceed a production of
2 m3 of water per day.

It is important to use the BIOSUN terminal on a regular basis. If the terminal has not been used for several days, a disinfection rinse is required (see maintenance chapter: preventive disinfection).

INSTRUCTIONS FOR MAINTENANCE OF THE BIOSUN 340 TERMINAL

BACKWASHING THE FILTER

It is recommended that a filter backwashing operation be performed once a week as a preventive measure.

When the flow rate of BIOSUN terminal decreases, this means that the filter is clogged: A filter backwashing operation should be carried out. During operation, the two valves should be set to the "filtered" position.

Valve in the "cleaning" position

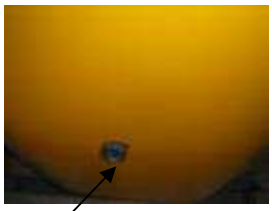
Valve in the filtering position

Set the 2 valves to the FILTERING position → Press the pushbutton to make the water flow for 3 minutes → Set the 2 valves to the "cleaning" position

TANK DRAINING

When suspended solids have settled at the bottom of the tank, they must be removed using the draining valve

Draining valve



32mm dia drain located on the rear of the BIOSUN housing
A 32mm dia. evacuation tube can be connected

The solar panels should be regularly cleaned.

FUNCTIONAL CHECK OF THE PHOTOVOLTAIC POWER SUPPLY

The solar charging regulator consists on the following components:

1. Information LED
2. 4 LEDs indicating the charging status (red, yellow, green 1 and green 2)
3. Junction box for connecting the solar panel
4. Junction box for connecting the battery
5. Junction box for connecting the electrical components

LED displays

LED	State	Meaning
Information LED	Green comes on	Normal operating mode
	Red flashing	Error status (see "Errors and resolution")
Red LED	Flashes quickly	Battery discharged, charging state <40%. Charging is disconnected if the decrease in the charging state is more significant.
	Flashing	Charging disconnection, charging state <30%
Yellow LED	Comes on	Battery charge low, charging state <50%
	Flashing	Re-engagement threshold not reached after charging disconnection, state of charge between 40% and 50%
1st green LED	Comes on	Battery normal, charging state >50%
2nd green LED	Comes on	Battery fully charged, charging state >80%
	Flashes quickly	Battery fully charged, charging regulation enabled (charging current decreases)

UV REACTOR MAINTENANCE

1		**The sterilizer must be** **SWITCHED OFF, ISOLATED AND DRAINED.**
2	**Remove** the nut cover	
3		**Grasp** the 4-pin connector and pull the lamp gently upwards.
4		When the lamp has been withdrawn by a few centimeters, **remove** the connector, grasp the socket and **unplug** the quartz sleeve lamp, making sure to pull it out squarely. **Perform this operation GENTLY.**
5		**Do not drop the quartz sleeve lamp as this could damage the quartz.**
6		**Unscrew the** stainless steel nut and **remove the** plastic washer
7		**Insert the thumb or finger inside the sleeve, and gently slide it to disengage the O-ring from its housing.**
8	**Grasp** the quartz sleeve to withdraw it completely from the unit **MAKING SURE** to pull it out squarely.	
9	**Clean the quartz sleeve with acid or white vinegar or replace it if required.**	
10		**GENTLY insert the sleeve into the unit making sure it is squarely positioned.**

11	Using your finger inside the sleeve, **position** the quartz in its socket at the bottom of the unit. The quartz should protrude slightly (by the thickness of the O-ring), **it should not have fallen fully to the bottom**. If the quartz is correctly positioned in the socket, it should feel resilient when pressed (pneumatic effect).
12	**Lubricate** the new O-ring using food-quality grease**.** (Fit a O-ring each time the lamp is replaced) **Position it** around the sleeve and push it fully home into its housing with a fingernail (do not use a tool).
13	**Fit** the plastic ring inside the stainless steel thread. **Retighten** the nut normally by hand.
14	Re-pressurise the installation **before** refitting lamps and **make sure that there is no leakage** in the quartz sleeve.
15	 **Take the new lamp** making sure not to touch anywhere other than the socket with the fingers. *(if not, clean with a soft cloth and methylated spirits)*
16	**Insert the lamp** into the quartz sleeve making sure it is squarely positioned.
17	After inserting it ¾ of the way in, **plug in** the lamp's 4 pins. **Do not use undue force.**
18	**Insert** the lamp fully into the quartz sleeve.
19	**Attach** the 4-pin connector to the stainless steel nut.
20	**Refit** the nut cover.

Preventive disinfection:

Once a year, the terminal must be vaccinated: place some bleach in the full tank and let the water run until it smells of chlorine. Leave to act for 2 hours. Drain the tank and rinse twice.

RENEWING THE FILTER CARTRIDGES (OPTIONAL)

A

Unscrew the transparent filter bowl.
It is a good idea to place an empty bucket under the filter before removing it.
Recover the water.

B

Renew the cartridge.

1.Cartridge activated carbon

2. 10µ cartridge

C

Place the cartridge in the transparent filter bowl and screw the bowl back onto the filter head.

ERRORS & REMEDIAL ACTION: regulator

Error	Cause	Remedial action
No display	Battery voltage too low	Precharge the battery
	Blowing of the external fuse in the battery connecting cable	Replace the external fuse
	The battery is not connected	1.Disconnect all the connections 2.Re-connect the (new) battery with the polarities the right way round 3.Reconnect the solar panel and electrical components
	Battery connection polarities reversed	
	Faulty battery	
Information LED flashing red	Charging interrupted due to the charging current being too high	Charging continues automatically when the charging current has reached an authorized level again
Electrical components cannot operate or are inhibited for a short period + Information LED flashing red	The output of the electrical components is disconnected due to high current consumption	➧Decrease the current consumption and disconnect or unplug the electrical components if necessary. ➧Check the electrical components.
	The output of the electrical components is disconnected due to a short-circuit at this level.	1. Disconnect the electrical components. 2. Eliminate the short-circuit cause. 3. Reconnect the electrical components.
	The output of the electrical components is disconnected due to overheating of the solar charging regulator.	The output of electrical components reconnects automatically when the solar charging regulator has cooled down. ➧Improve the air flow for cooling. ➧Prevent any influence from other heat sources. ➧Check the operating terms and the installation site.

Consumer operation not possible + Information LED flashing red + The battery red LED light flashes	The output of the electrical components is disconnected due to the battery voltage being too low.	The output of electrical components reconnects automatically as soon as the battery voltage reaches the threshold value. ➧Precharge the battery. ➧Fit any electrical components connected directly to the battery with a system providing protection against deep discharges. ➧Check the battery and replace it if necessary.
Electrical components cannot operate + info LED flashes red + 2nd LED flashes green	The output of the electrical components is disconnected due to the battery voltage being too high.	The output of electrical components reconnects automatically when the battery voltage reaches an authorized level.
	Faulty grounding.	➧ Check the grounding.
	No voltage limitation for external charging sources.	➧ Check the external charging sources. ➧ Disconnect any external charging sources, if applicable.
Electrical components cannot operate + Green information LED	Faulty consumer or faulty installation.	➧ Connect the consumer correctly.
		➧ Replace the consumer.
The battery is not charged	The solar panel is not connected	➧Connect the solar panel
	Solar panel connection polarity reversed	➧Re-connect the solar panel with the polarities the right way round
	Solar panel input short-circuited	➧Eliminate the short-circuit cause
	Solar panel voltage incorrect	➧Use the solar panel with the required voltage
	Faulty solar panel	➧Replace the solar panel
The battery display jumps quickly	High pulse current	➧Adjust the absorbed current to the battery's capacity
	Faulty battery	➧Replace the battery

Problem: The terminal's flow rate decreases

Solution: The filter should be backwashed (see page 14)

With the cartridge filter option: if filter backwashing does not solve the problem, the filter cartridges must then be renewed.

Problem: The front panel blue light does not come on

Solution: Check the battery charging light

Red LED:
Charge low

Green LED:
charge OK

Make sure that the voltage across the DC/DC converter terminals is 24V +/- 1V.
If the voltage is too low, refer to the following question.
If the battery is charged, replace the UV lamp
If replacing the UV lamp does not solve the problem, then replace the ballast.

Problem: The converter output voltage is low: it must be 24 V +/- 1V

Solution:

Check the wiring; all connectors must be properly tightened.
Check the battery charging level: If it is low (red LED), then let the battery charge without using the BIOSUN terminal until the battery charging indicator is green.

Red LED:
Charge low

Green LED:
charge OK

If the two previous operations have no effect, the converter must then be replaced.

FREQUENTLY ASKED QUESTIONS

Questions	Answers
Operating characteristics	
What are the technical reasons for limiting use to 4 hours a day?	Because after 4 hours, the batteries are too discharged, and the BIO-SUN terminal operation can no longer be ensured for the following days (as it is calculated on the basis of statistics depending on sunshine). The service life of the batteries would also be significantly penalized.
Motor-drive pump feeding? Under what conditions, terminal tank pressurized?	The desired information are shown in the BIO-SUN 85 column, for the pressurized supply model: . Supply type - 1.5 bar pressurized system . Maximum pressure: 3 bars.
Is a timer used to program the terminal for a battery life of 3 days with a daily use of 4 hours?	No.
What is the difference between BIO-SUN 85 and BIO-SUN 340?	The BIO-SUN 85 terminal does not have a built-in pump and is fitted with one solar panel (for pressure feed) and one battery. The BIO-SUN 340 terminal has a built-in pump and is fitted with four solar panels and two batteries.
And what about the number of production hours: 4hours/day mentioned in the catalogue. Can the unit be used for 8 hours in one day assuming that it will then only have a battery operating time of two days instead of three days?	No, the terminal must be used under the defined conditions.
How much sunlight time is needed to fully charge the battery?	3 days, which is why, on commissioning, the BIO-SUN should not be used for 3 days.
After 2m3 of water treated in a day, does the UV	It's manual, the volume meter acts as a control.

lamp go off to mean that the water is no longer drinkable? Or does the battery stop working after 4 hours of operation?	There is no automation: it's intentional.
Should the battery be used until discharged to ensure it has a longer service life?	Absolutely not.
Can BIO-SUN units be used directly on the normal power grid (220V)?	The battery supply is 12 V. As the principle of the BIO-SUN is standalone operation, it cannot be connected to the normal power grid (220V).
UV reactor	
What is the service life of the UV lamp?	The UV lamp should be replaced once a year.
Water supply	
Where is the outlet for evacuating the dirty water?	At the rear of the terminal.
Maximum permitted turbidity	about 5 NTU.
in the event of high turbidity: what is the recommended treatment upstream?	Filtering possibly with coagulation/flocculation, but this really depends on the water qualities, and there is no absolute rule.
Filtering	
How long does the zeolite filter guarantee last?	There's no guarantee on the media itself On the filter body itself = terminal guarantee, in other words for one year.
In what case is the activated carbon filter recommended?	this serves to reduce organic matter, pesticides and heavy metals.
Is there a signalling/indication/alarm system? For example, to confirm that the water coming out is well purified or to indicate when the cartridges/filters need replacing.	There is no signalling/indication/alarm system on our cartridge filters (for example, carbon filter): the filter cartridges should be replaced every 3 months or so Zeolite washable filter: guaranteed for 1 year, service life 5 years.
How long does it take to filter 20 gallons of water?	The water treatment is instantaneous, and the maximum flow rate is 500 liters/hour.
How do you replace the cartridges and filters?	By unscrewing them.
And what if the water entering the unit (tap or river water) has a certain taste (bleach/other)?	In this case, choose the cartridge filter option as this is what the activated carbon is intended for.
Water quality	
What if the water entering the unit is acidic, which is often the case in the mining sector in RDC?	BIO-SUN's primary objective is to make water bacteriologically safe. However, BIO-SUN does not address acidity issues.

GUARANTEE TERMS

The guarantee terms for equipment in the BIO-UV range are as follows:

2 years for all the other components with the exception of the UV lamp (consumable).

The electrical components are not guaranteed against overvoltage or lightning strikes

NOTE: The housing, the photovoltaic panels, the quartz sleeve and the lamp are not guaranteed against breakage.

- **Faulty parts must be sent back to BIO-UV with details of the type and the equipment serial number. BIO-UV will replace them after carrying out a technical survey.**
- **The cost of shipping will be shared between the retailer and BIO-UV.**
- **The guarantee takes effect on the day the equipment is installed: BIO-UV must be informed of this date by sending the guarantee validation by post or by fax.**

NOTE: If the guarantee validation is not sent back with 3 follows of acquiring the equipment, BIO-UV will take the month and year the equipment was manufactured as the guarantee effective date.

- **If the installation rules and instructions for use are not complied with, BIO-UV cannot be held liable and the guarantee cannot be invoked.**

The BIO-UV team, at your service

Company BIO-UV SA
ZAC La Petite Camargue
34400 LUNEL
Tel: 04 99 133 911
www.bio-uv.com **Email** : info@bio-uv.com

INSTALLING THE SOLAR PANELS

1. Preparation

1.1 Description of THE symbols used

Safety tips: This symbol indicates a warning, which, if ignored, could result in risks to people or equipment.
Read these passages carefully.
Example:
Risk of injuries
> Risk of serious injury to the hands
> Wear protective gloves!

Information This symbol indicates information on the most appropriate procedure.

Use a screwdriver to tighten the screws.

1.2 General safety recommendations

When assembling the aluminium structure and the module, be sure to follow these safety tips:

Risks of cuts
> Cuts to the hands due to incorrectly deburred parts.
> Wear safety gloves!

Risks of burns
> Risk of burns from parts exposed to high heat.
> Check the temperature of parts and wear gloves!
Risks of explosions
> Risk of explosion due to improper use of batteries
> Do not smoke or bring a naked flame near the batteries!
Risks of chemical burns
> The acid in the batteries can cause chemical burns.
> Wear an apron and ant-acid gloves!

1.3 Tools required

The tools required to assemble the module support structure are indicated below

1.4 Parts list

The module support structure parts are included

Table for adjusting the solar panel tilt angle:

LATITUDE	TILT ANGLE
Latitude < 20°	15°
20° < latitude < 35°	Latitude + 10°
Latitude > 35°	Latitude + 15°

The minimum tilt angle value of 15° provides for "self-cleaning" of the photovoltaic panel and limits the risk of residual moisture.

2. Assembly

2.1 Foundations for the aluminium support structure

Pre-tighten the screws during the assembly period and firmly tighten only after assembling the whole structure with its modules.

Risks of cuts
> Cuts to the hands due to structural parts not deburred.
> Wear safety gloves!

When the concrete foundation is completely dry, drill the attaching holes in the floor.

> Using figure 01, measure and make marks on the concrete

> Drill the concrete with a hammer drill using a 12 mm diameter drill bit.

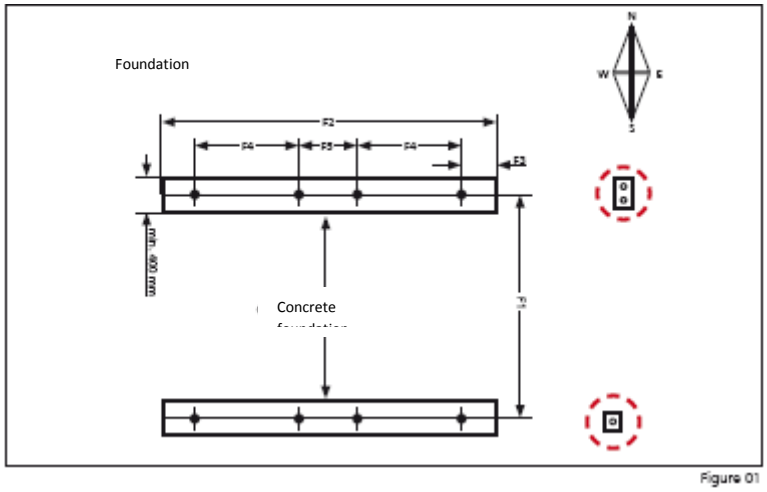


Figure 01

2.2 Assembling the aluminium support structure

2.2.1 Assembling the base

For this step, you will need four anchoring studs, two narrow U formed sections (3 holes) and two wide U formed sections (5 holes).

Before attaching, make sure you have properly positioned the wide U formed sections for the part pointing towards the foundations pole and the narrow U formed sections for the part pointing towards the equator (see Figure 01, red circles).

> Fit the four anchoring bolts in the four holes drilled in step 2.1, and make sure to attach them the right way round!
> Fit the U formed sections to the threaded rods (see figure 02) of the anchoring studs and then bolt the whole assembly together.
=> The bolts are now attached in the holes.

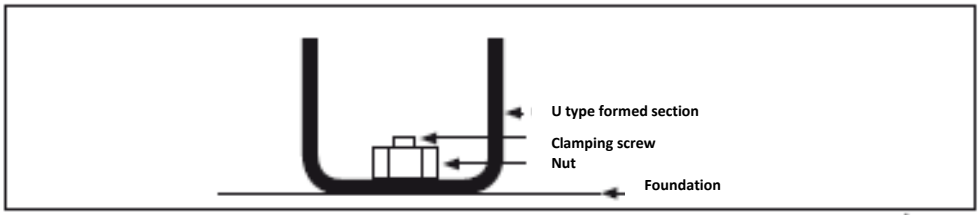


Figure 02

2.2.2 Installing the two P2 type formed sections

In the next steps, install the P2 and P5 type formed sections. Figure 03 provides an overview of the structure showing the use of the formed sections (red circles).

First assemble the three formed sections together on the floor. Then attach them to the foundations, otherwise the screws cannot be tighten!

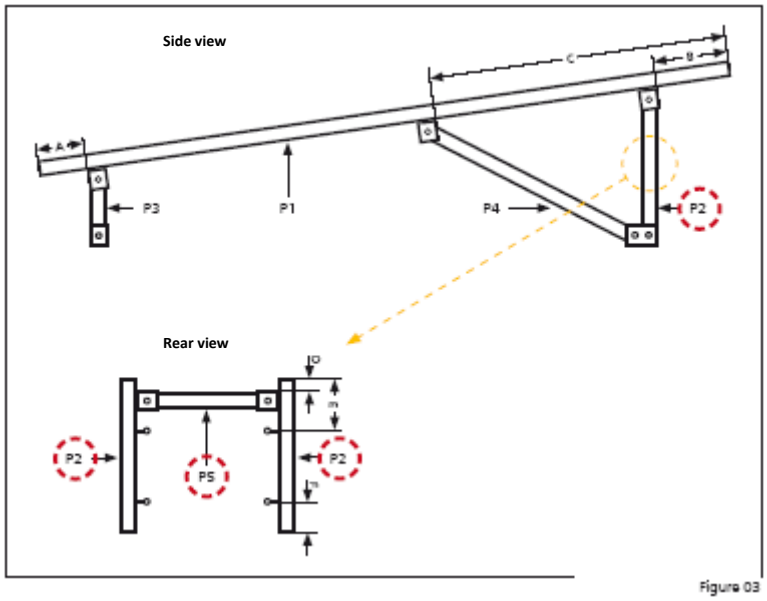


Figure 03

2.2.3 Fitting the eye nuts to the P2 type formed sections

For this step, you will need four eye nuts (see figure 04, red circles), four L 8 mm dia plain washers, eight HU M8 nuts and two P2 type formed sections.

Option: If you have the version with the GCB support (support for junction box), you also need to fit the support in this step! (see next paragraph)

The following figure shows you what the structure should look like after this step.

> If you do not fit the GCB support - assemble the eye nuts (see figure 04).

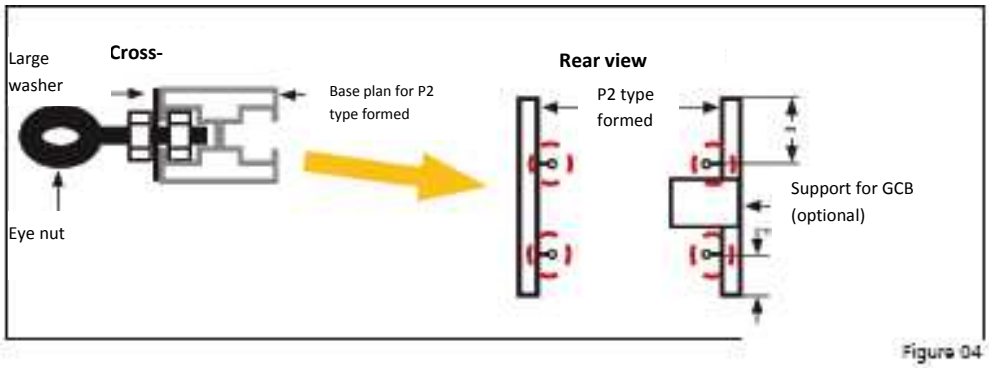


Figure 04

2.2.4 Fitting the eye nuts and the GCB support

The eye nuts are fitted in the same way as in the previous step! But make sure to fit the support between the eye nuts on the outside (rear view)

How to install the GCB support:

> Prepare two narrow U formed sections as shown in figure 05 (below).

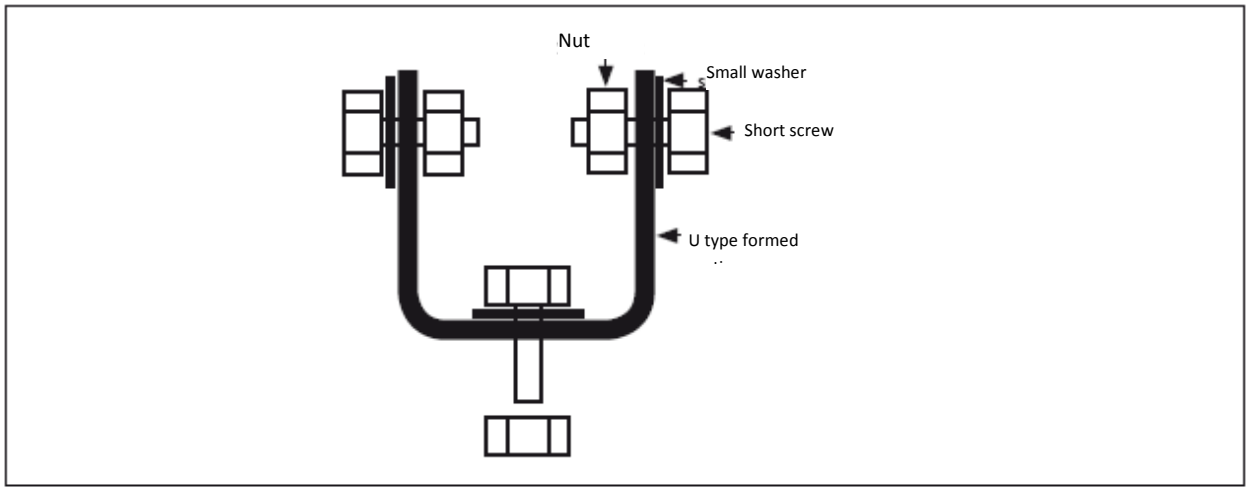


Figure 05

> Fit the GCB support to the two U formed sections as shown in the following diagram (figure 06)

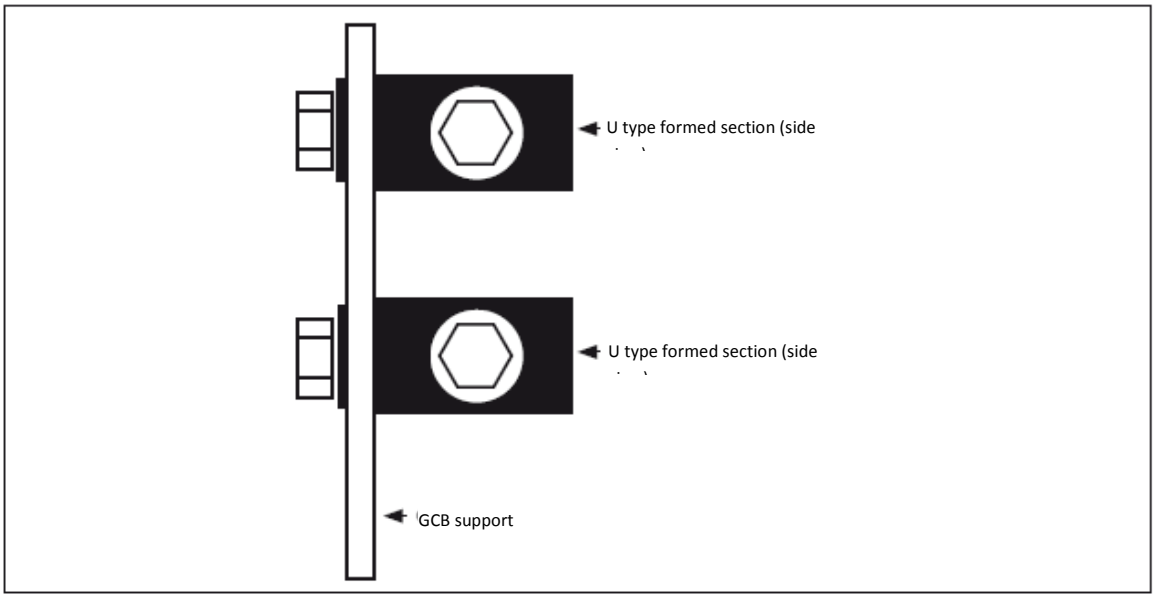


Figure 06

> After fitting the first eye nut, fit the GCB support with the two U formed sections to the two P2 type formed sections (rear view) (see figure 07)

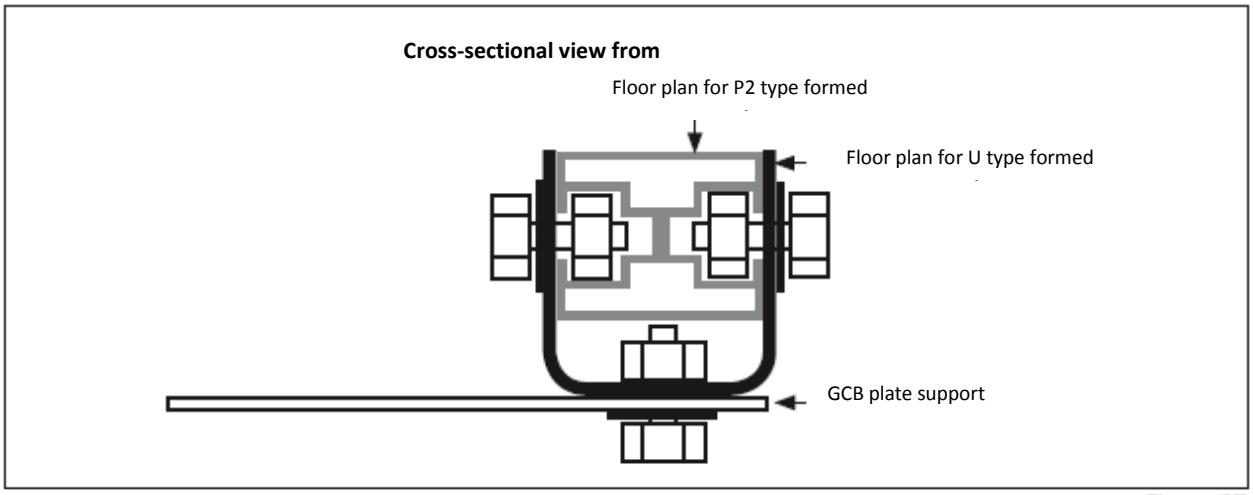


Figure 07

2.2.5 Fitting the P5 type formed section

For this step you need the P5 type formed section, two narrow U formed sections, six short screws, six M plain washers d= 8 and six HU M8 nuts.
Figure 03 shows you where the formed sections are located in the overall construction (red circles)

> Prepare two narrow U formed sections as shown in the following figure (figure 08)
Do not tighten nuts at this point, as you will have to handle the formed sections in the next step!

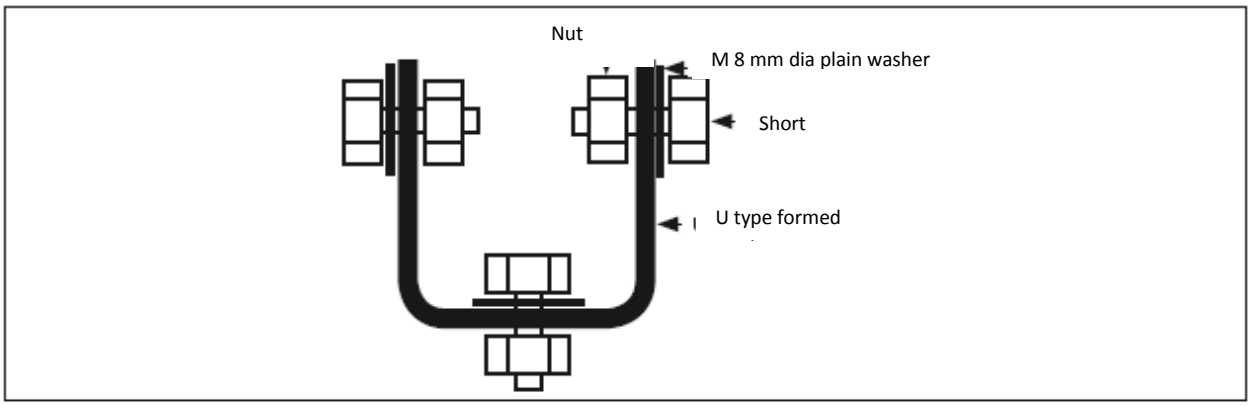


Figure 08

> Fit the two U formed sections prepared with the two P2 type formed sections, as shown in figure 09.

Figure 09

> Attach the P5 type formed section to one of the U formed sections (see figure 10 below) - the attachment is similar to the attachment you performed previously.

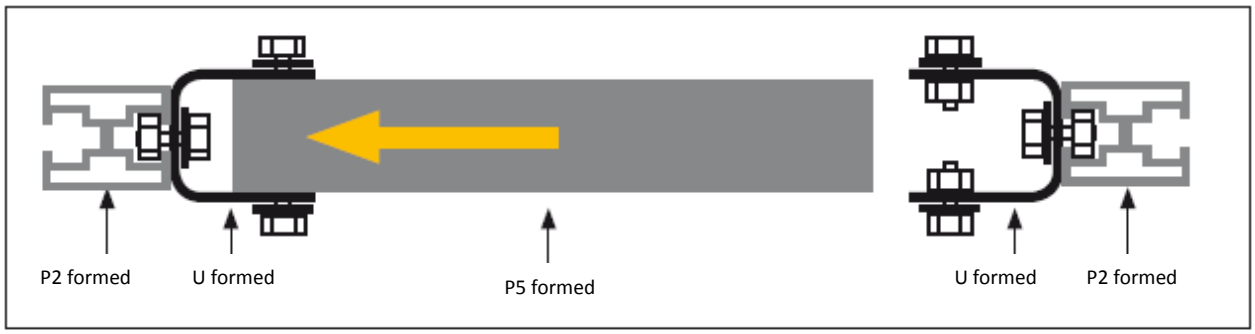


Figure 10

> Tighten the nuts of the U formed section, in which you attached the P5 type formed section
> Attach the P5 type formed section to the second U formed section, which is itself already attached to the second P2 type formed section

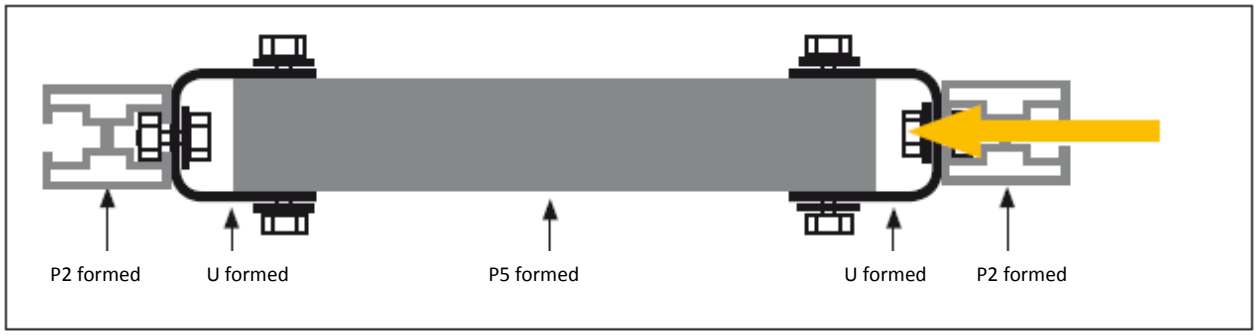


Figure 11

>Tighten the nuts of the U formed section, in which you attached the P5 type formed section
=> You structure should look as shown in the diagram below!

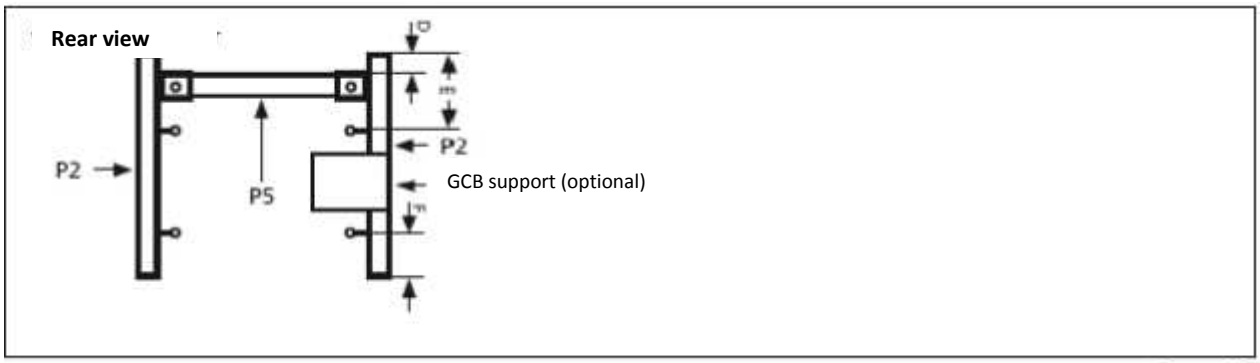


Figure 12

2.2.6 Fitting the P2/P5 constructions to the foundations

Fit the screws, the nuts and the plain washers in the holes in the opposite direction to the equator of the wide U formed sections!!! See figure below (figure 13)

> Fit the two short screws (20mm) in the "Pole" holes of one of the wide U formed sections that you have already fitted to the foundations. You will need a nut and an M 8 mm dia plain washer for each screw. Figure 14 shows how to assemble the bolts.

Do not tighten the screws at this point, as you will need to handle the formed sections in the next step!

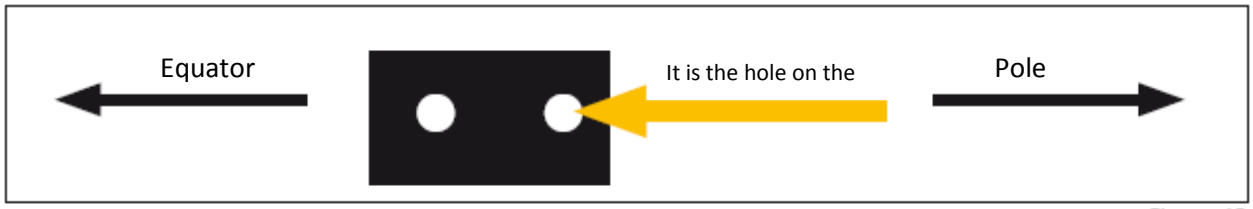


Figure 13

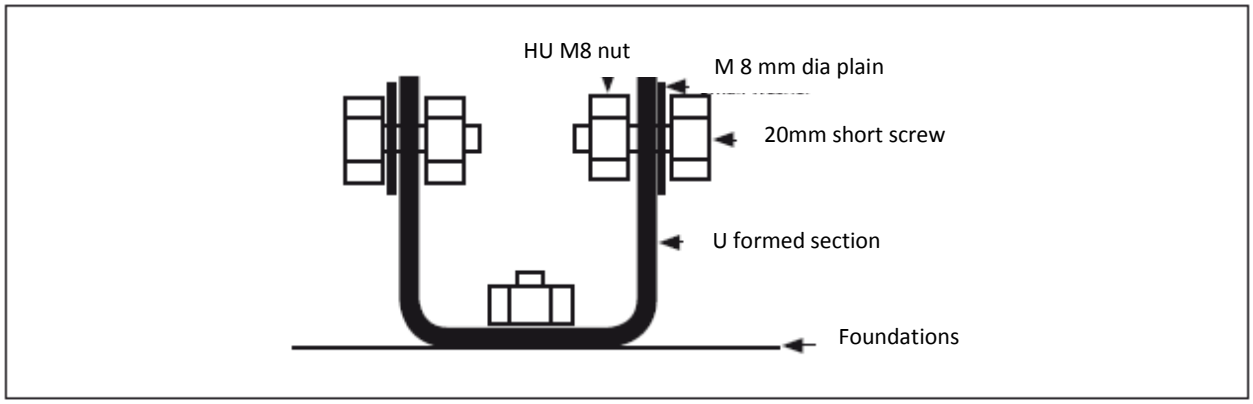


Figure 14

> Repeat this procedure for the other U formed section!

> Attach the screws to the two sides of the P2 type formed section, as indicated in figure 15

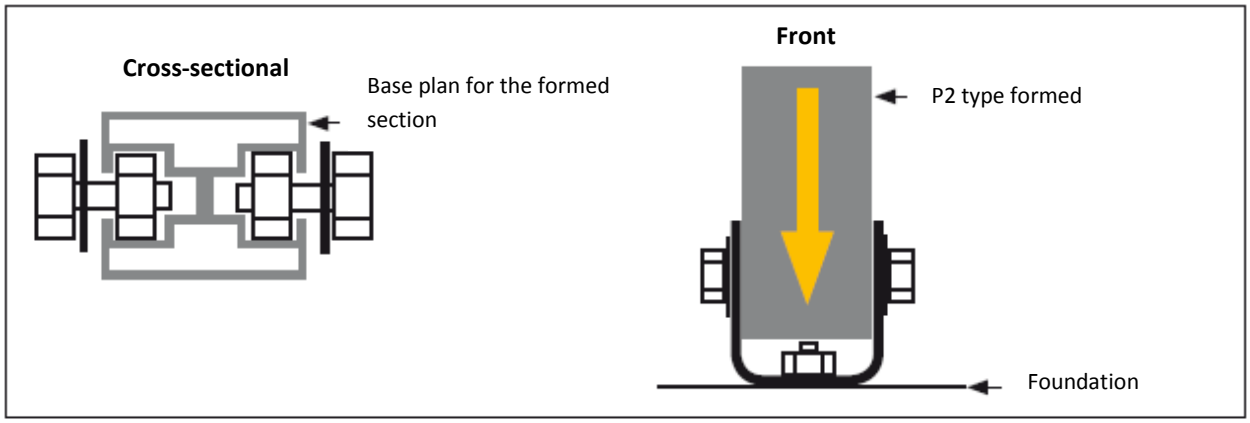


Figure 15

> Make sure that the construction makes a right angle (90) relative to the foundation

> Tighten the screws on both sides
=> Both P2 formed sections are now firmly secured to the base (floor).

2.2.6 Fitting the P3 type formed sections

Do not tighten the screws at this point, as you will need to handle the formed sections in the next step!

> Fit two short screws (20mm) to the U formed sections you previously fitted to the foundations. You will need a nut and a small washer for each screw.
Figure 16 shows how to assemble the screws.

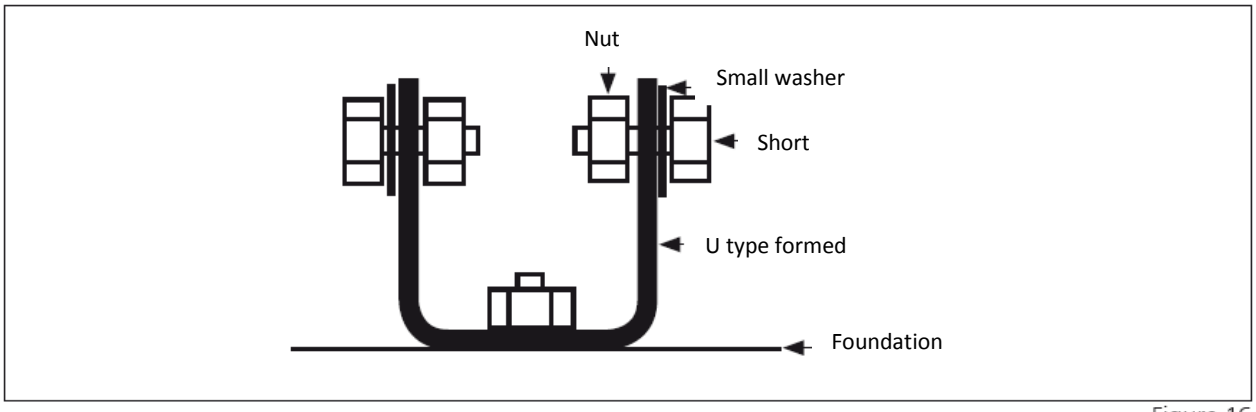


Figure 16

> Repeat this procedure for the other narrow U formed section!
> Attach the screws to the P3 type formed section as indicated in figure 17 on both sides

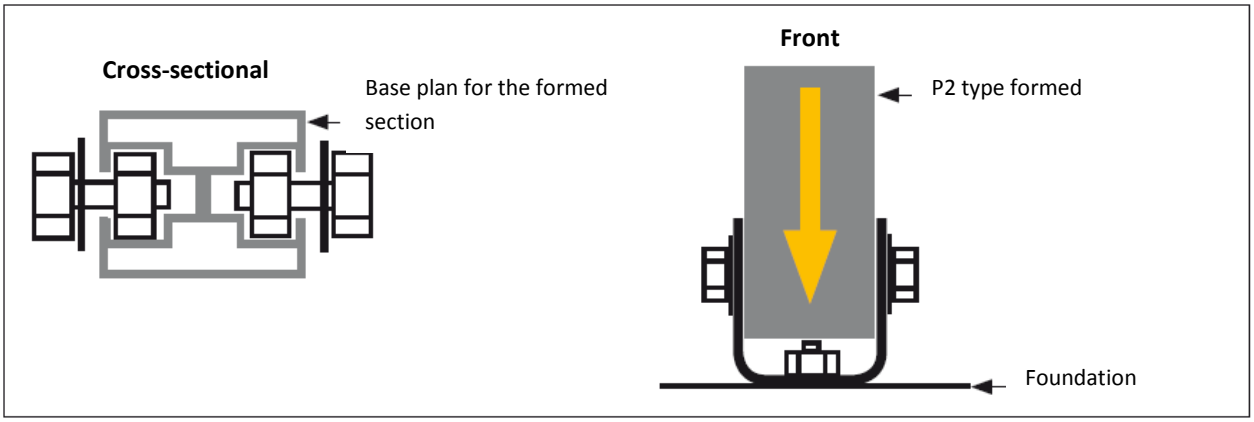


Figure 17

> Make sure that the construction makes a right angle (90) relative to the foundation
> Attach the screws on both sides
=> Both P3 formed sections are now screwed to the floor

2.2.7 Preparing the P1 type formed sections

For this step, you will need P1 type formed sections, six narrow U formed sections, 18 short screws and 18 small washers. Figure 18 shows you where the formed sections should be installed in the overall structure (red circles).

Side view
> Prepare six narrow U formed sections as shown in figure 19.

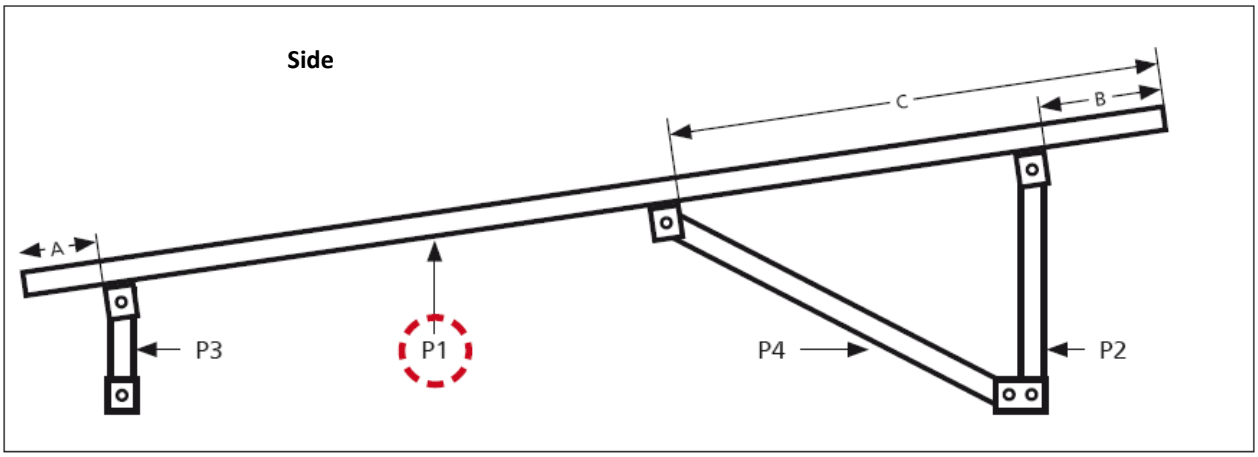


Figure 18

Do not tighten the screws at this point, as you will need to handle the formed sections in the next step!

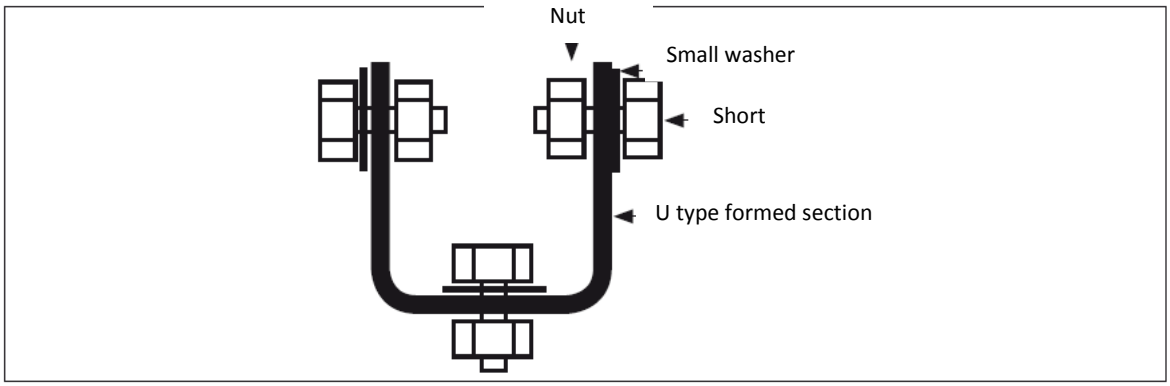


Figure 19

Install three of the prepared U formed sections to the first P1 type formed section (see figure 20) - Make sure to comply with the distances A, B and C (see figure 21).

P1 type formed section; U formed section

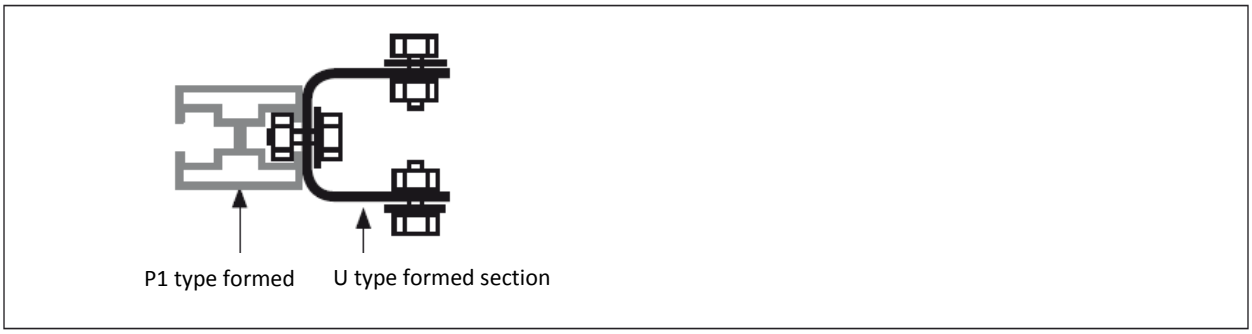


Figure 20

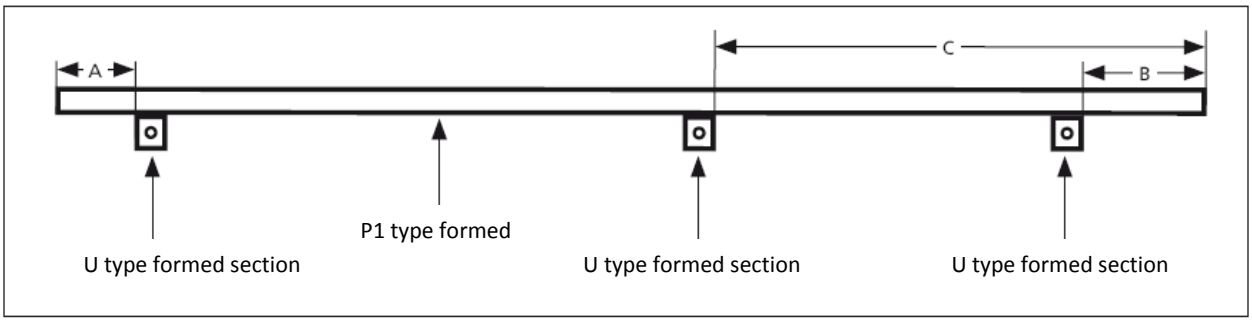


Figure 21

> Repeat this procedure with the other P1 type formed section
> Tighten the screws fitted to the P1 type formed sections

=> Both P1 type formed sections are now ready to be assembled to the P3 and P2/P5 type formed section

2.2.8 Fitting the P4 type formed sections

For this step, you need P4 type formed sections, 4 small washers and 4 nuts.

Figure 22 shows where the formed sections are fitted in the overall structure (red circle).

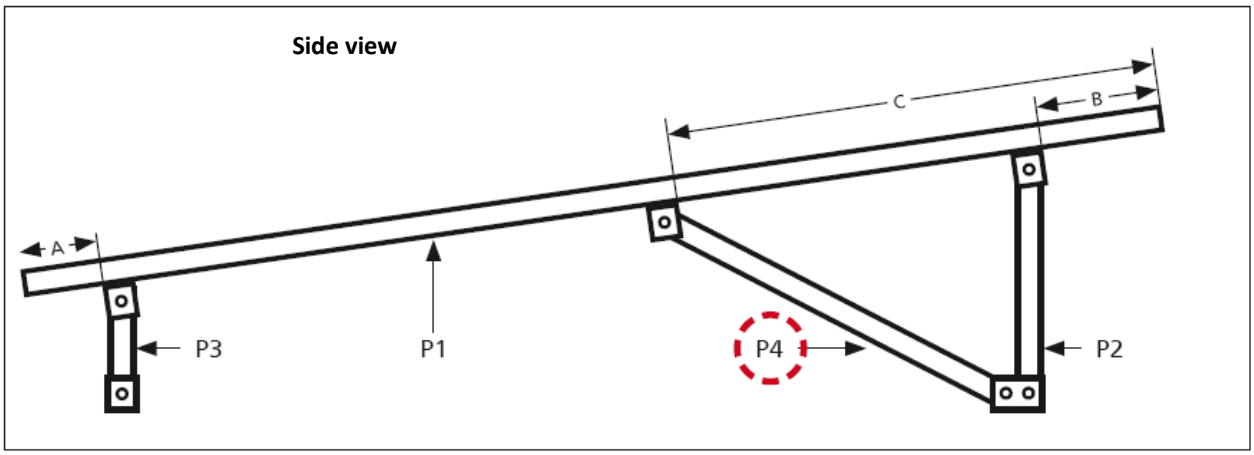


Figure 22

> Fit the short screws (20mm) in the remaining hole in one of the wide U formed sections that you have already attached to the foundations. You will need a nut and a small washer for each screw. Figure 23 shows how to assemble the screws.

Do not tighten the screws at this point, as you will need to handle the formed sections in the next step!

Nut; Small washer; short screw; U formed section; Foundation

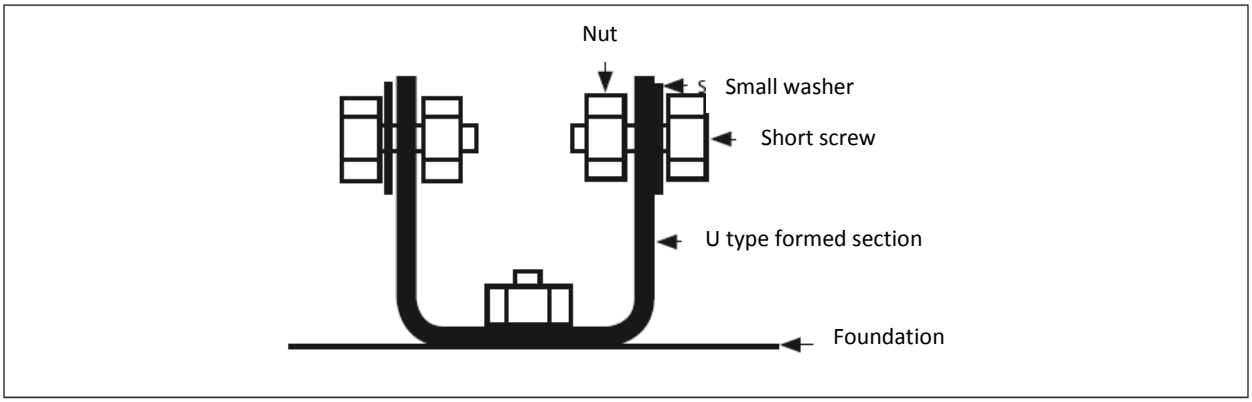


Figure 23

> Install the P4 type formed section in the U formed section as shown in figure 15 (the angle is not important for the time being and will be adjusted automatically in the next steps.)

> Repeat this procedure for the other P4 type formed sections

=> The aluminium support structure is ready to be fitted to the P1 type formed section

2.2.9 Fitting the P1 type formed sections

For this step, you will need the previously prepared P1 type formed sections.
> Fit the P1 type formed sections to the P4, P2 and P3 formed sections as shown in figure 24 below.

Slight differences can be balanced by adjusting the U formed sections. But make sure that the parts are fitted the right way round!

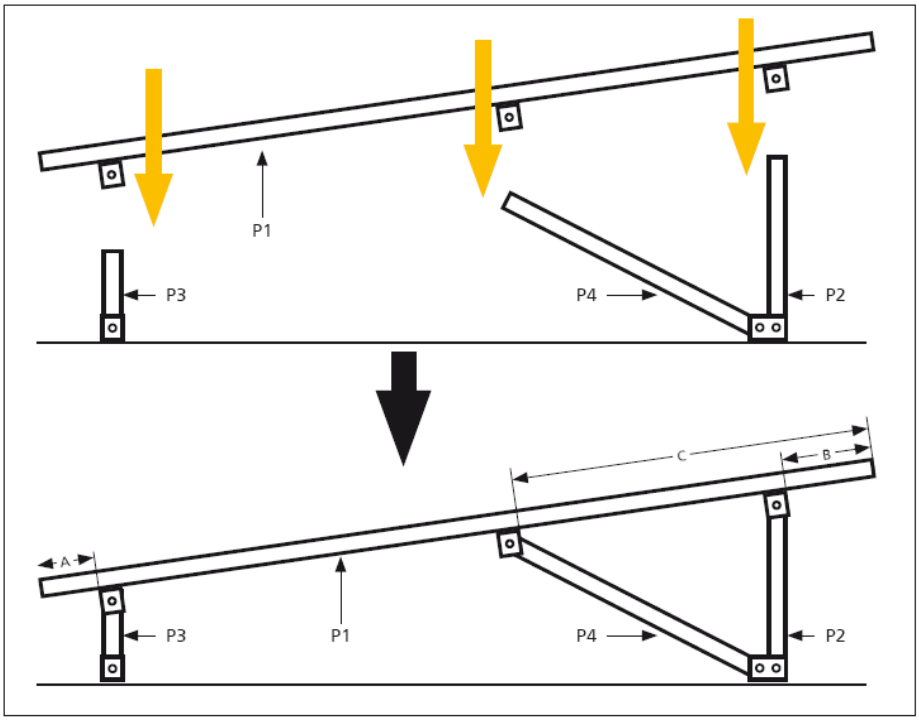


Figure 24

2.2.10 Fitting the safety cables

For this step, you need four shackles, four core lugs, eight cable clamps, two turnbuckles and steel cable.
Check the length between the eye nuts (diagonally), (see figure 25 - red lines)

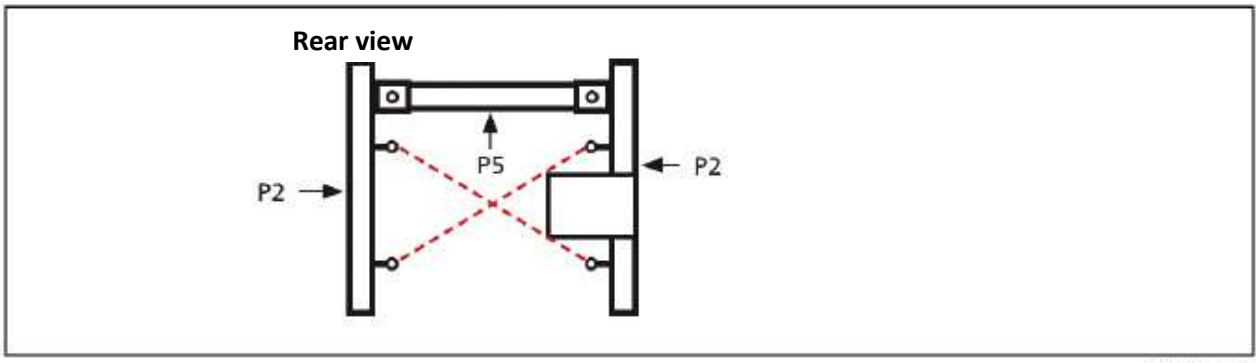


Figure 25

Assemble the wiring as shown in Figure 26, and make sure that they are the right length.

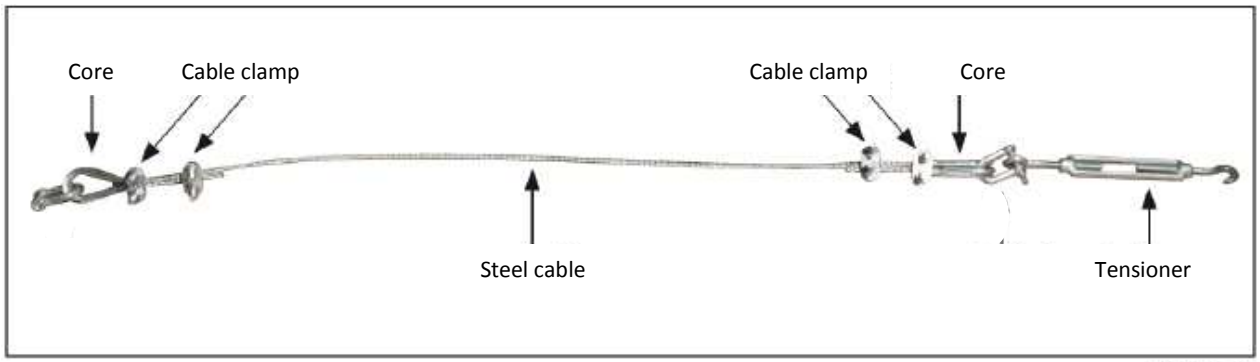


Figure 26

> Attach both cables as shown in figure 25 (red dashed lines) and tighten the cables using the turnbuckles

2.2.11 Fitting the photovoltaic modules

For this step, you will need fasteners for T and L type modules. Make sure that you have screws and nuts - long screws for attaching T modules and short screws for attaching L modules.
Prepare two L fasteners as shown in figure 27.

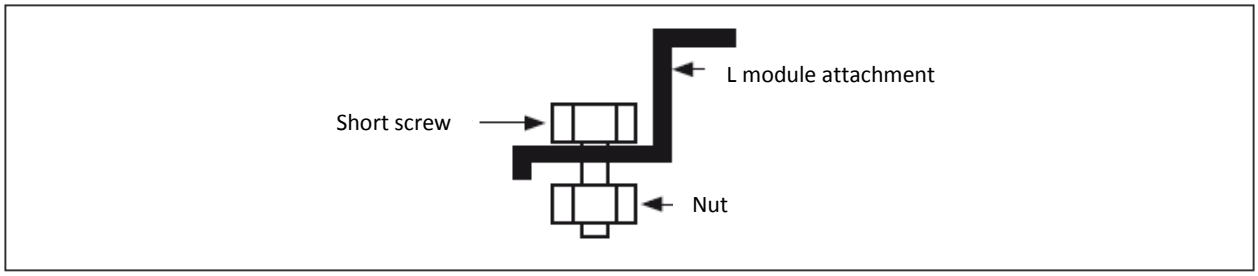


Figure 27

Screw the L fasteners into each of the two P1 type formed sections as shown in figure 28.

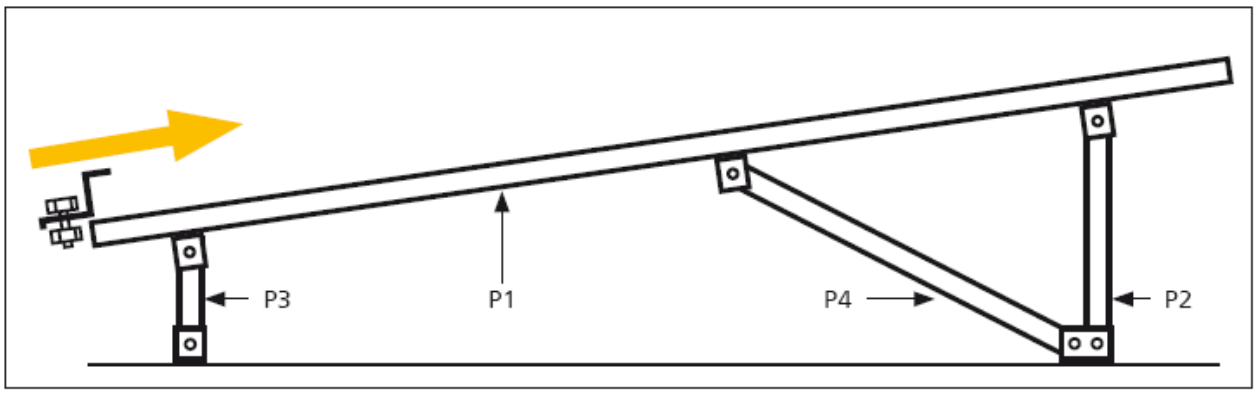


Figure 28

Fit the photovoltaic module to the two P1 type formed sections and tighten the L attaching screws (see figure 29)

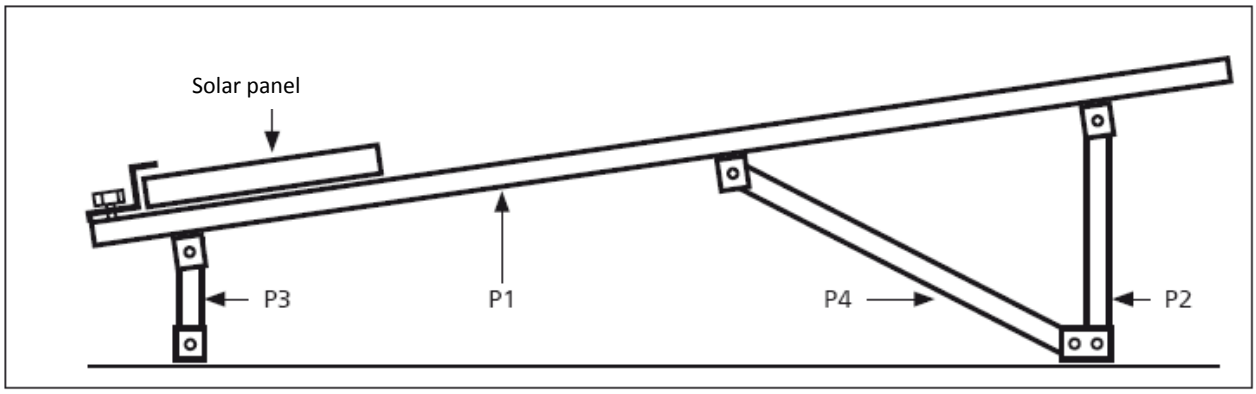


Figure 29

Prepare two T fasteners (see figure 30)

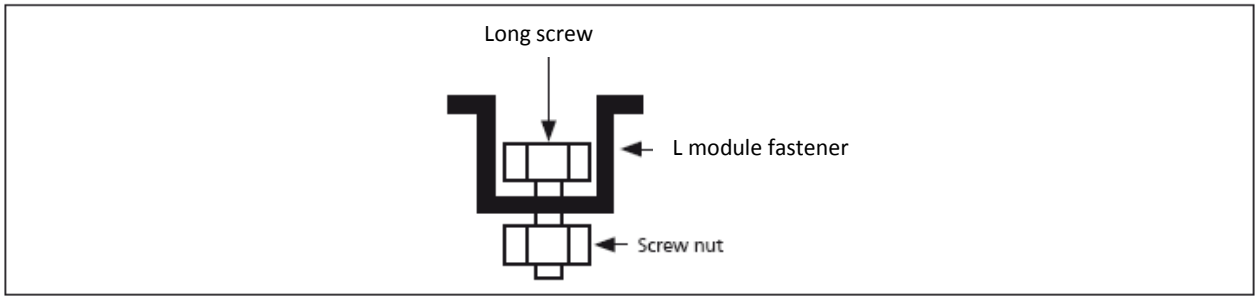


Figure 30

Fit a T fastener to each of the two P1 formed sections (see figure 31)

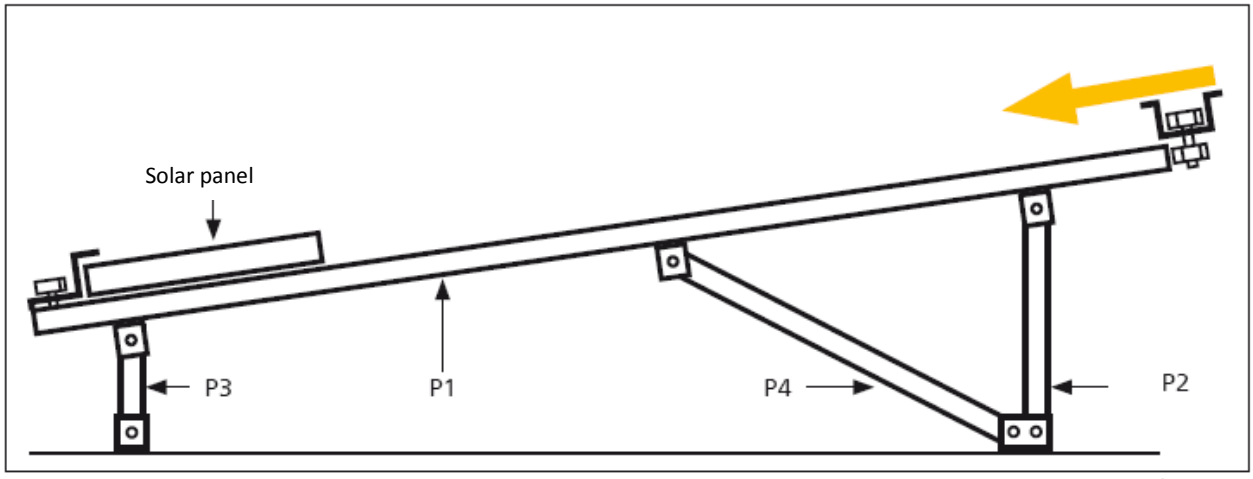


Figure 31

Fit the second photovoltaic module to the two P1 type formed sections and tighten the T fasteners as shown in figure 32.

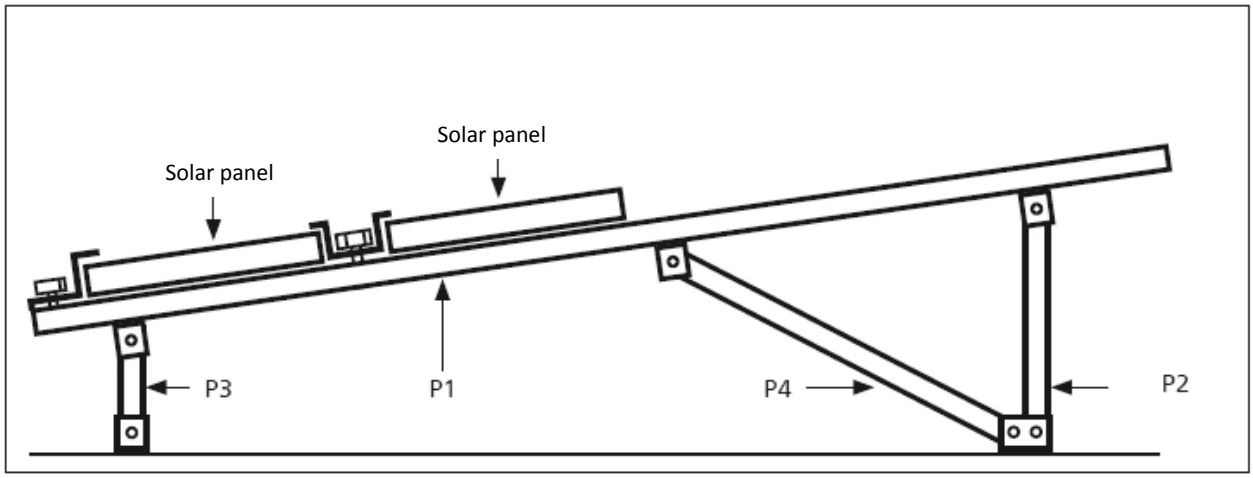


Figure 32

Continue this procedure until all the modules have been fitted (see figure 33)

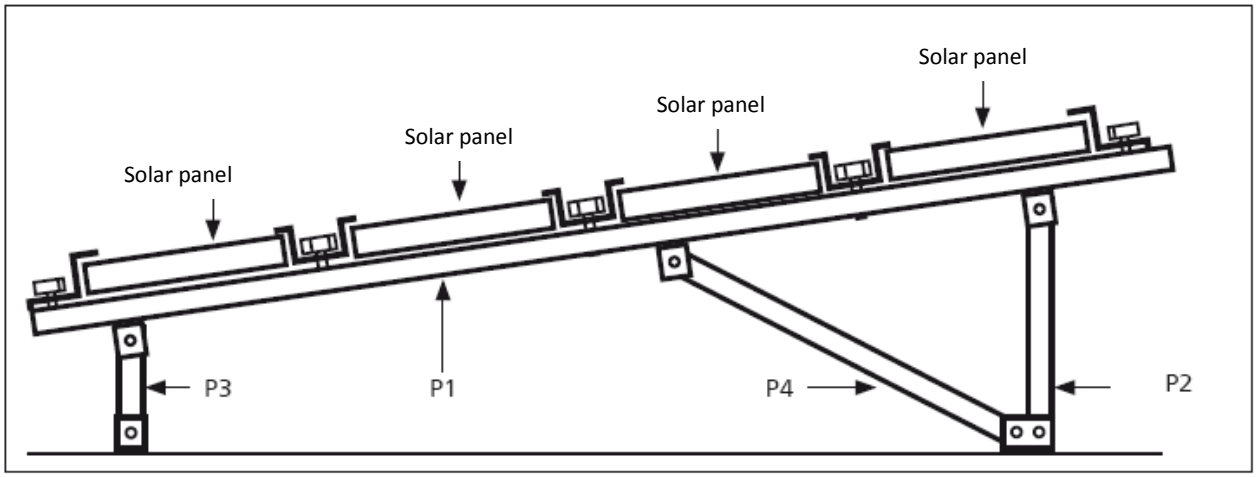


Figure 33

High risk of injury

> Injury and damage may be caused by structural parts during high winds

> Firmly tighten all the screws to stiffen the whole structure!