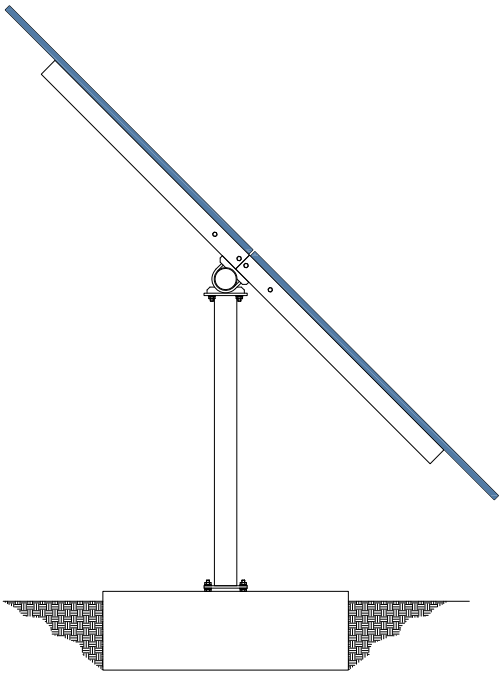
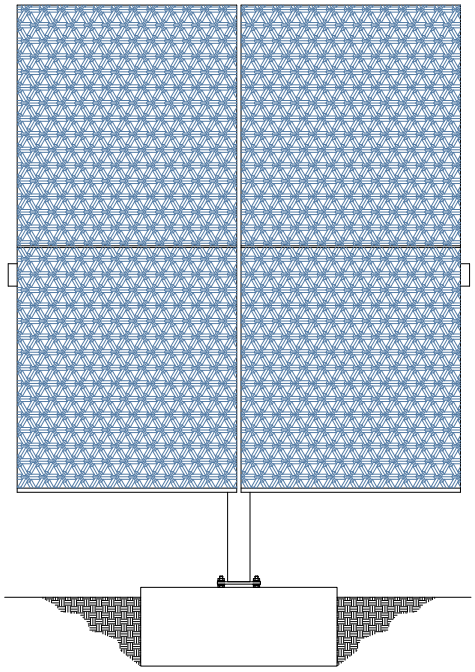
Installation Manual
N type structures
2 or 4 modules





Issue 5 April 2023

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Introduction

Thank you for purchasing the N type structure. These structures are available for a wide range of solar module types with a maximum width of 1150mm and provide mounting for 2 or 4 modules per structure. The tilt angle of the solar panels can be set to your required angle by simply loosening the U bolts, rotating into the correct angle and then re-tightening the U bolts.

Below is a minimum list of tools required for mechanical installation (not including foundation work), others tools would be required for wiring etc.

Description	Use
10mm A/F spanners (2 off)	For use with Modules with M6 fasteners
13mm A/F spanners (2 off)	For use with Modules with M8 fasteners
19mm A/F Spanners (2 off)	For M12 U bolts
24mm A/F spanner	M16 ground anchors & U bolts
Round File	To remove excess galvanising from holes
Super glue	To aid installation of nylon washers
Inclinometer	To set tilt angle
Tape measure	
Wire brush	To Clean up ground anchor bolts
Galvafroid (or similar)	Touch-up of galvanising

Recommended Fastener torque settings

M6 stainless steel (module fixings)	8.5Nm
M8 stainless steel (module fixings)	21Nm
M12 U bolts	90Nm
M16 U bolts	180Nm
M16 ground anchors	210Nm

Foundations

Each structure requires a concrete foundation, this is to be cast preferably at least 2 weeks prior to the installation of the structure assemblies. The concrete foundations shown are for minimum guidance and are suitable for most normal ground conditions with a minimum safe ground bearing pressure of 70kN/m². The minimum density of the concrete should be no less than 2250kg/m³ and have an inherent characteristic strength of 30N/mm². On a steep slope the concrete foundations may need to be deeper to allow for the fall of the ground works and to ensure that each platform is level.

The Foundation kit (if supplied) provides you with 4 x M16 J bolts to be cast into the concrete and a plywood template to ensure correct positioning of the bolts. Once the concrete is set the template can be removed. Note that the nuts, washers & spring washers supplied with this kit are then to be used to bolt down the column.

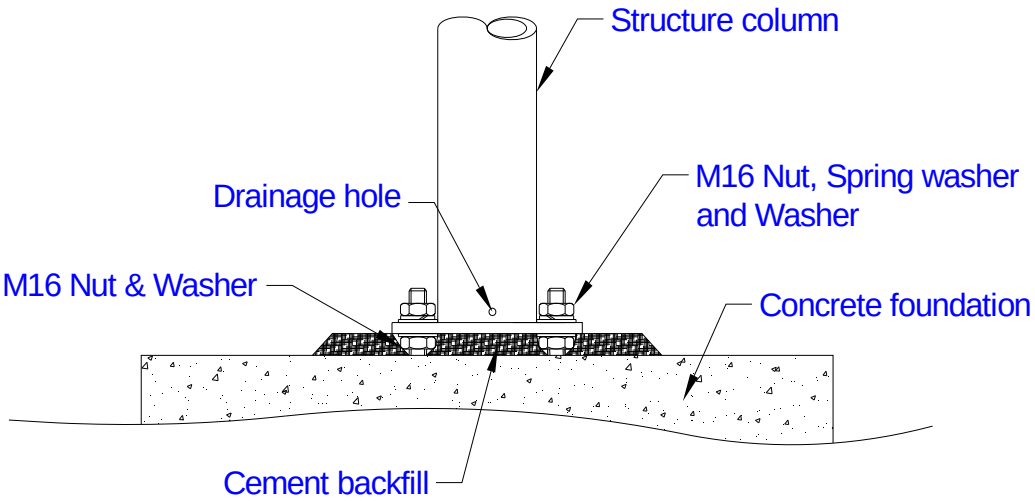


Figure 1 Column fixing details

Fitting Stand to Foundation

Once the concrete has set correctly, place a nut then large washer onto each of the anchor bolts and screw the nut down until it reaches the concrete. The structure leg can be placed over the 4 off M16 ground anchor bolts making sure the round flange is at the bottom and the flat edged on the bottom round flange face North and South, place a large washer, spring washer then Nut onto each in turn. Make sure that the column is vertical by adjusting each nut in turn prior to tightening the nuts. This procedure must be repeated on all the columns if more than one structure is to be installed, making sure the columns are in line with each other and are adjusted to the same height. See tightening torque settings on page 2.

Note – placing the base plate directly onto the concrete base without putting nuts and washers under the plate could cause movement at the base and damage to the structure.

Fitting the horizontal tubes

Now fit the horizontal pole onto the top of the stand using the M16 U bolts and Saddles as shown below. Make sure that the horizontal tube is fitted centrally. The pole is placed on top of the U bolt saddles and the U bolts fitted around the tube and through the slots in the column top flange. Place a washer, spring washer and nut onto both ends of the two U bolts and just finger tighten at this stage. Repeat this process for each structure if more than one structure is supplied, making sure that the poles are all in line prior to tightening the U bolts. Note there will be a gap between each pole, the gap distance is dependant upon structure supplied and the accuracy of the foundations. The slots allow for additional rotation to help line up the tubes. See tightening torque settings on page 2.

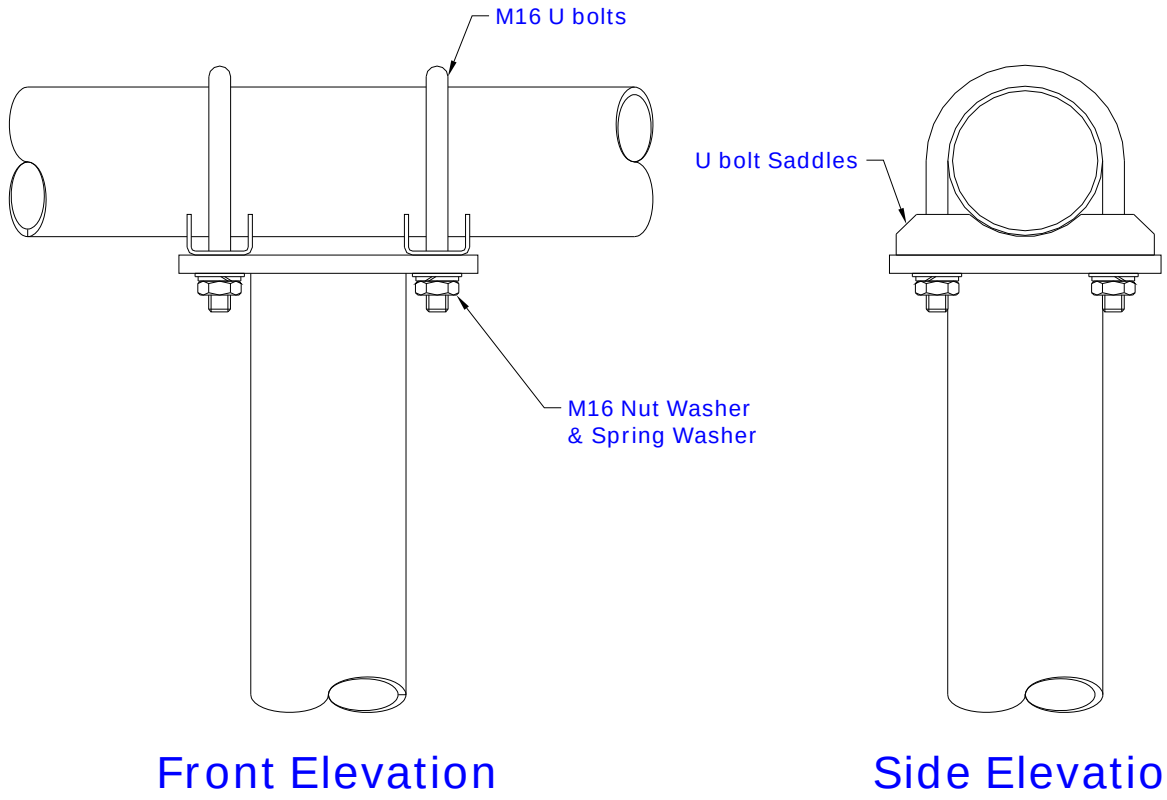
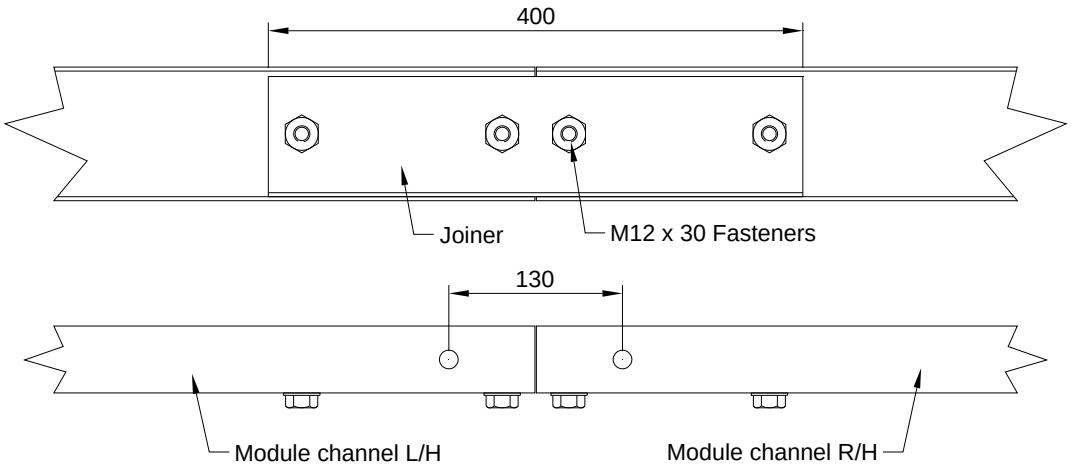


Figure 2 Fitting Horizontal Tube

Module rail Assembly (2 module structures)

The module rails supplied have a row of slots for mounting various sizes of solar panels, for the 2 module structure where the modules are fitted side by side, these rails can be pre-fitted onto the rear of the modules first, by laying the modules face down onto a clean flat surface and attaching the modules centrally using the M6 or M8 fasteners supplied (depending on module mounting hole diameters).

The 2 module structure with the modules one above the other can also have the modules pre-mounted onto the rails, by first joining two rails together using the joining plate and the M12 fasteners as shown below. Once the rails are joined together these can be attached to the modules as described above making sure there is at least a 10mm gap between the modules.



Fitting Sub-Array Assemblies (2 module structures)

Once the sub-arrays are assembled, these can be fitted onto the horizontal tubes. If only one sub-array is required then the array is fitted centrally onto the horizontal tube. For the 2 module side by side structure, you are required to fit two sub-arrays with the module rails side by side in the centre of the structure. You will require at least 2 people to install the sub-arrays due to the weight of these units. All general rules apply with regards to PPE for this operation, as the arrays are to be lifted onto the high level tubes. Place the assembly centrally over the tube with the assembly horizontal to help with balance. Fit the M12 U bolts c/w saddles around the horizontal tube onto each of the rails and just tighten by hand. You can now skip to “Setting the tilt angle”

Sub-Array Assembly (2 module)

The structures are designed for a range of solar panels, therefore this section shows the basic assembly of the 2 module sub-array. For single column portrait structures, the 2 rails are mounted onto the back of each solar panel.

Lay the 2 modules face down on a flat clean surface end to end making sure that the module junction boxes are next to each other, with a gap of around 10mm between them. The structure rails attach to the mounting holes in the back of each module using either M6 or M8 fasteners depending on type of module. Each module must be mounted using all 4 mounting holes. Select the holes to be used on the back of each panel and using the "Super glue" affix one of the Nylon washers on each of the 4 holes on the back of the panel, this method will help the with the assembly. The Nylon washers are placed between the Aluminium module frame and the Galvanised steel structure to prevent corrosion between dissimilar metals. Position all the fasteners before tightening. Once all the fasteners are in place you can now tighten as required.

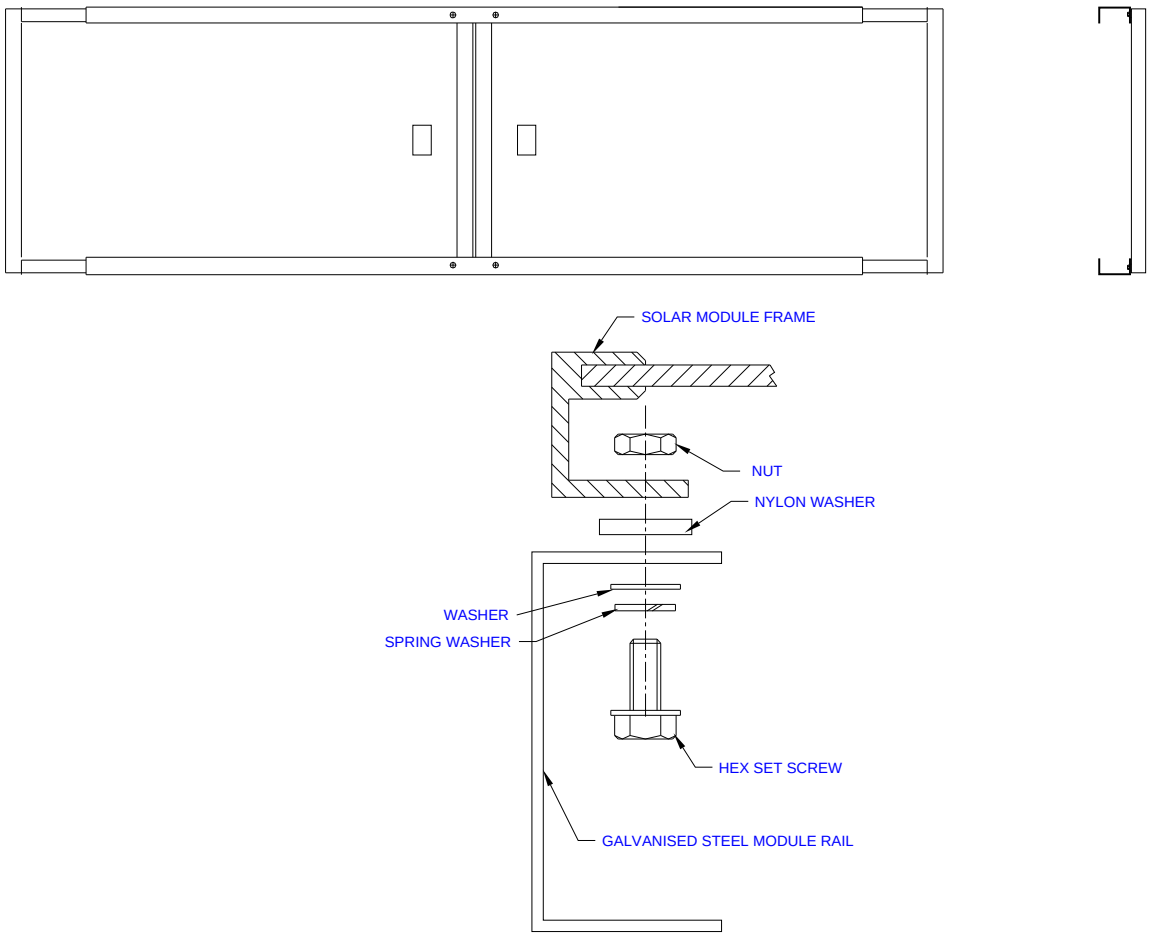
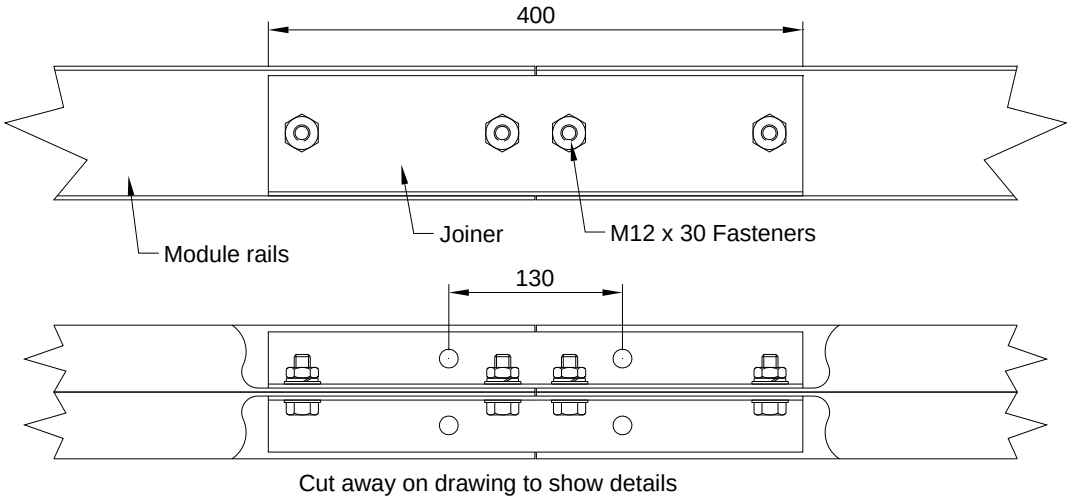


Figure 3 Sub-Array Assembly

Module rail Assembly (4 module structures)

With the 4 module structure the assembly process differs from that of the 2 module assembly due to the weight of the fully assembled array. For the 4 module structure you will have 8 module rails and 4 joining plates, for the outside rail assemblies you will need to join the 2 module rails as shown on page 6 of this manual for the 4 central rails, these need to be joined as one assemble as shown below.



Cut away on drawing to show details

Fitting the modules

Now that all the module rails are assembled, place the larger assembly as shown above onto the horizontal tube centrally and attach using the U bolts and saddles, fit this rail assembly horizontally as this will help with the fitting of the modules. The other 2 rail assemblies will need to be fitted onto the horizontal tube using the U bolts and saddles near to each end of the horizontal tube. These also need to be fitted horizontally and it is now a good time to set the distance between the rails by measuring the hole centres across the module and making sure that the slots on the module rails are of an equal distance apart. The modules can now be placed one at a time onto the rails using the M6 or M8 fasteners provided, making sure to place a nylon washer between the galvanised steel module rail and the Aluminium module frame. It is best to fit all the modules prior to fully tightening the fasteners to ensure that all the modules are fitted and lined up correctly, once you are happy this is the case tighten all module fixing fasteners.

Setting the Tilt Angle

Now that the N type structure is fully assembled and the modules are horizontal, with all the fasteners fully tightened, with one person at the front of the array holding the modules, the second person can now loosen the two U bolts attached to the structure leg making sure not to remove any nuts as this will make the structure unstable, the array can now be gently rotated into the desired tilt angle, we recommend no less than 15º and no more than 50º from the horizontal.

Maintenance

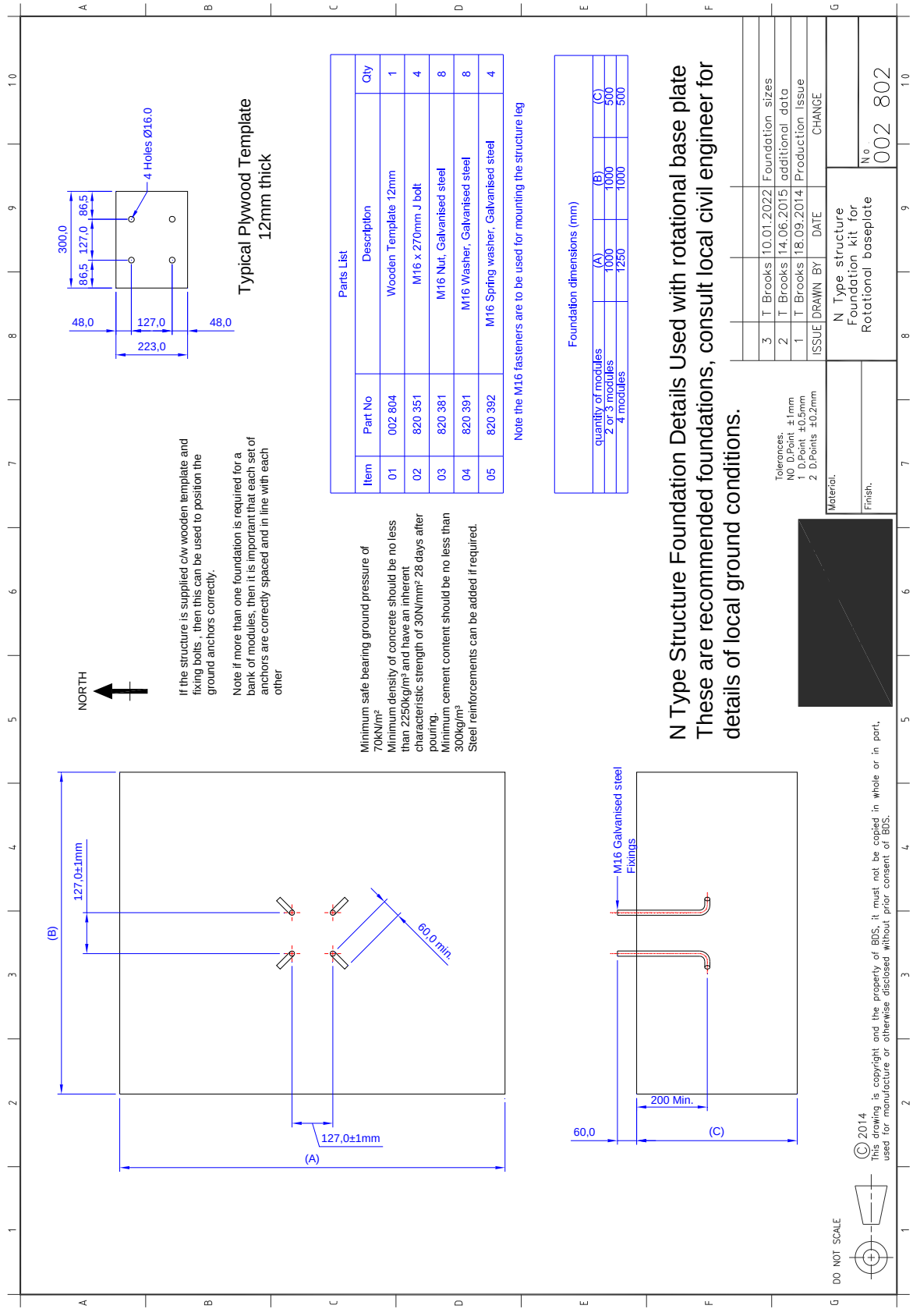
The structures should require little maintenance once installed. It is good practice to inspect the array occasionally checking for signs of rust etc. Should rust appear, brush off the rust using the wire brush and apply galvafroid paint or similar to the area. Make sure that all the fasteners are tight and secure, taking special care to check the U bolts and ground anchors, there should be no movement in the leg base plate as this would cause damage to the structure leg.

Guarantee

The galvanized steel structure is guaranteed against corrosion for a period of 5 years, subject to conditions. Should you experience any problems then please contact your supplier as soon as possible. Failure to install the structure as per these instructions may invalidate any warranty.

Parts List

Description	2 Module side by side	2 module	4 module
N structure stand 1.5m	1	1	1
U bolt saddle	4	6	6
Module rail 1.5m	4	4	8
Module rail joiner	0	2	4
Horizontal tube 1180mm long	0	1	0
Horizontal tube 2350mm long	1	0	1
M6 x 20 hex set screw A4 stainless steel	9	9	18
M6 washer A4 stainless steel	9	9	18
M6 Nyloc nut A4 stainless steel	9	9	18
M6 Penny washer Stainless steel	9	9	18
M6 nylon washer	9	9	18
M8 x 25 hex set screw A4 stainless steel	9	9	18
M8 washer A4 stainless steel	18	18	36
M8 Nyloc nut A4 stainless steel	9	9	18
M8 nylon washer	9	9	18
M12 x 30 hex set screw, galvanised	0	8	14
M12 U bolt, galvanised	4	2	4
M12 washer, galvanised	9	22	34
M12 spring washer, galvanised	9	14	22
M12 Nut, galvanised	9	14	22
M16 U bolt, galvanised	2	2	2
M16 washer, galvanised	4	4	4
M16 spring washer, galvanised	4	4	4
M16 Nut, galvanised	4	4	4


N Type Structure Foundation Details Used with rotational base plate
These are recommended foundations, consult local civil engineer for details of local ground conditions.
Typical Plywood Template
12mm thick
4 Holes Ø16.0
300,0
86,5
127,0
86,5
48,0
127,0
48,0
223,0
NORTH
If the structure is supplied c/w wooden template and fixing bolts , then this can be used to position the ground anchors correctly.
Note if more than one foundation is required for a bank of modules, then it is important that each set of anchors are correctly spaced and in line with each other
Minimum safe bearing ground pressure of 70kN/m²
Minimum density of concrete should be no less than 2250kg/m³ and have an inherent characteristic strength of 30N/mm² 28 days after pouring.
Minimum cement content should be no less than 300kg/m³
Steel reinforcements can be added if required.
Parts List
Item | Part No | Description | Qty
01 | 002 804 | Wooden Template 12mm | 1
02 | 820 351 | M16 x 270mm J bolt | 4
03 | 820 381 | M16 Nut, Galvanised steel | 8
04 | 820 391 | M16 Washer, Galvanised steel | 8
05 | 820 392 | M16 Spring washer, Galvanised steel | 4
Note the M16 fasteners are to be used for mounting the structure leg
Foundation dimensions (mm)
quantity of modules | (A) | (B) | (C)
2 or 3 modules | 1000 | 1000 | 500
4 modules | 1250 | 1000 | 500
(B)
127,0±1mm
60,0 min.
127,0±1mm
(A)
M16 Galvanised steel Fixings
200 Min.
60,0
(C)
Tolerances
NO D.Point ±1mm
1 D.Point ±0.5mm
2 D.Points ±0.2mm
Material:
Finish.
3 T Brooks 10.01.2022 Foundation sizes
2 T Brooks 14.06.2015 additional data
1 T Brooks 18.09.2014 Production Issue
ISSUE DRAWN BY DATE CHANGE
N Type structure
Foundation kit for
Rotational baseplate
No
002 802
DO NOT SCALE
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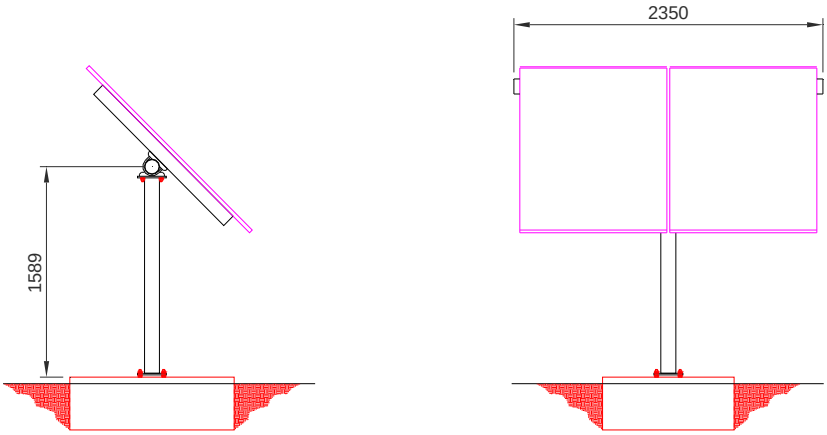
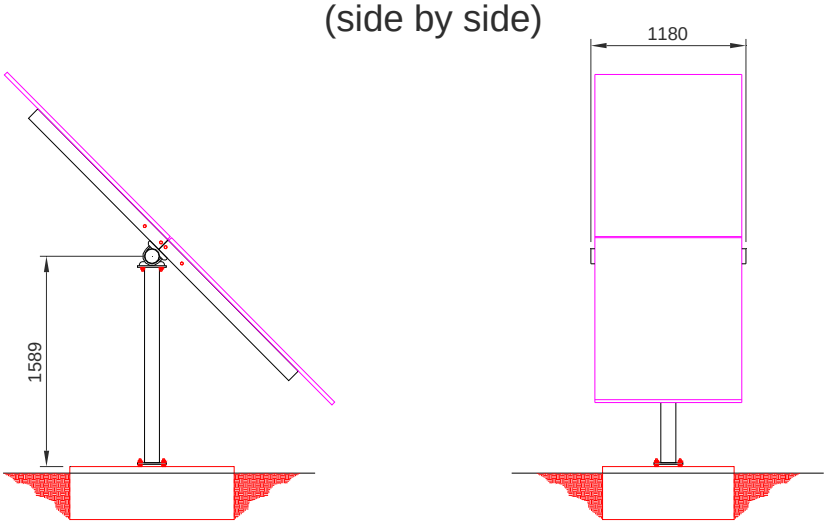
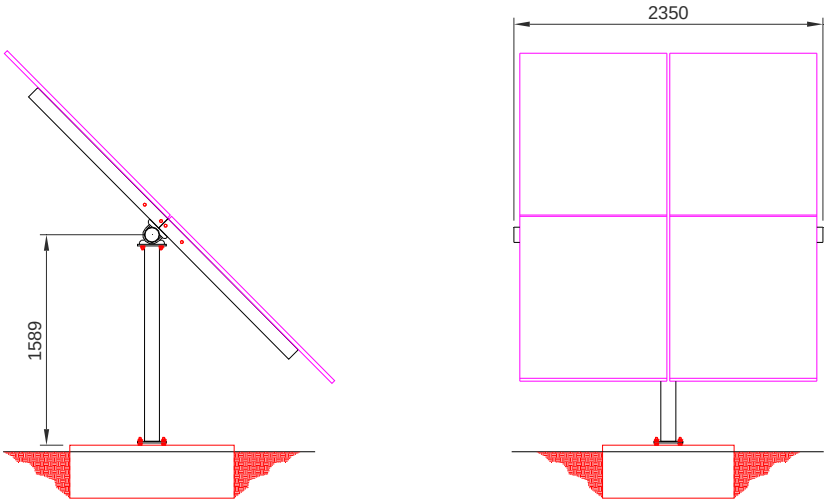


2 Module structure
(side by side)



2 Module structure



4 Module structure