

# MANUAL

## Pole mounted Solar Panel frames

AIRWELL GROUP PTY LTD  
DESIGNED AND MANUFACTURED IN AUSTRALIA  
A.B.N. 46 009 323 871

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<b>Contents</b>	<b>Page</b>
Contents	1
Introduction	2
General precautions	3
Drawings	5
Foundations	6
Installation	9
Maintenance	16
<b>Appendix</b>	
Tightening torque tables	17
Warranty details	18
Warranty registration card	19

## Introduction

The pole mounted solar panel frames described here are constructed in Australia by AirwellGroup Pty LTD, specifically for the tough Australian conditions.

All the parts of the frame are constructed from galvanised carbon steel.

There is a single model which can hold 4 solar panels (310W each) and can be tilted to 3 different angles (15°, 25°, 35°).

The construction is strong and durable, suitable for all Australian regions.



### Caution

Indicates a hazardous condition which, if not avoided, can result in minor or moderate injury.



### Warning

Indicates a hazardous situation which, if not avoided, can result in death or serious injury or moderate injury.

## General precautions



### Protect yourself:

- Wear protective glasses.
- Wear protective gloves.
- Wear non – slip shoes. Ensure your footing is stable and do not lean on anything while you are working.
- Do not wear loose clothing or jewellery. They may get caught in protruding parts.
- If you have long hair, wear a cap or hair-net to ensure that it does not get caught.

### Attend to your workplace:

- Untidy work areas cause accidents.

### Operate all the equipment correctly:

- Do not place undue force when you are tightening the bolts.
- Use the solar panel frame only for the designed purpose.
- Avoid impact to the panels because this may diminish its operation.
- Do not remove the plug from the socket by pulling on the cable.

### Electricity:

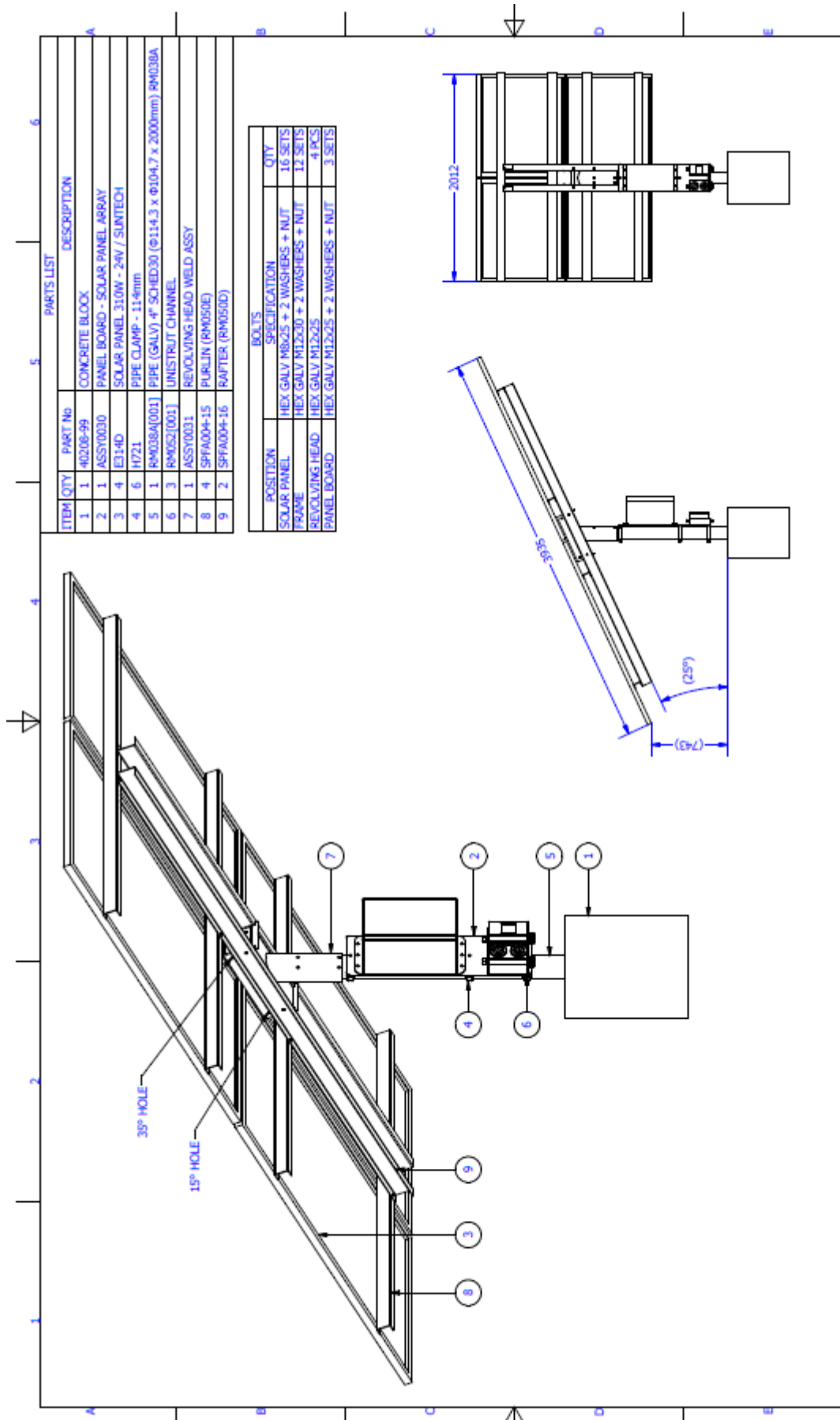
- The installation of electric components is only to be carried out by qualified persons (electricians, engineers) or other persons specially trained from Airwell Group for this purpose.
- A part of the equipment and hardwiring is working with 240VAC. You will die if you touch live wires.
- Do not touch any live cables, unless the equipment has been fully disconnected.
- Wet ground creates a risk of electrocution.
- Avoid contact with grounded surfaces, (e.g. the frame).
- It is advised that at least two persons work together during installation, maintenance or regular service.
- Be sure the frame and electrical installation are properly grounded (for electrical and lightning purposes).
- If you are not sure for the operation you are planning to do, ask first.
- Check the cables regularly and replace them, even with the slightest sign of wear and tear.

- Protect the cables from heat and sharp or pointy edges.
- Disconnect the equipment from the power supply when not in use or when you are servicing or maintaining it.
- Prior to plugging in the pump, be sure that the main switch is in the OFF position.



**Caution**

Accidents can be avoided by observing the safety regulations in the workplace.



PARTS LIST	
ITEM	DESCRIPTION
1	CONCRETE BLOCK
2	PANEL BOARD - SOLAR PANEL ARRAY
3	SOLAR PANEL 310W - 24V / SUNTECH
4	PIPE CLAMP - 114mm
5	PIPE (GALV) 4" SCHED30 (Ø114.3 x Ø104.7 x 2000mm) RM030A
6	UNISTRUT CHANNEL
7	REVOLVING HEAD WELD ASSY
8	PURLIN (RM050E)
9	RAFTER (RM050D)

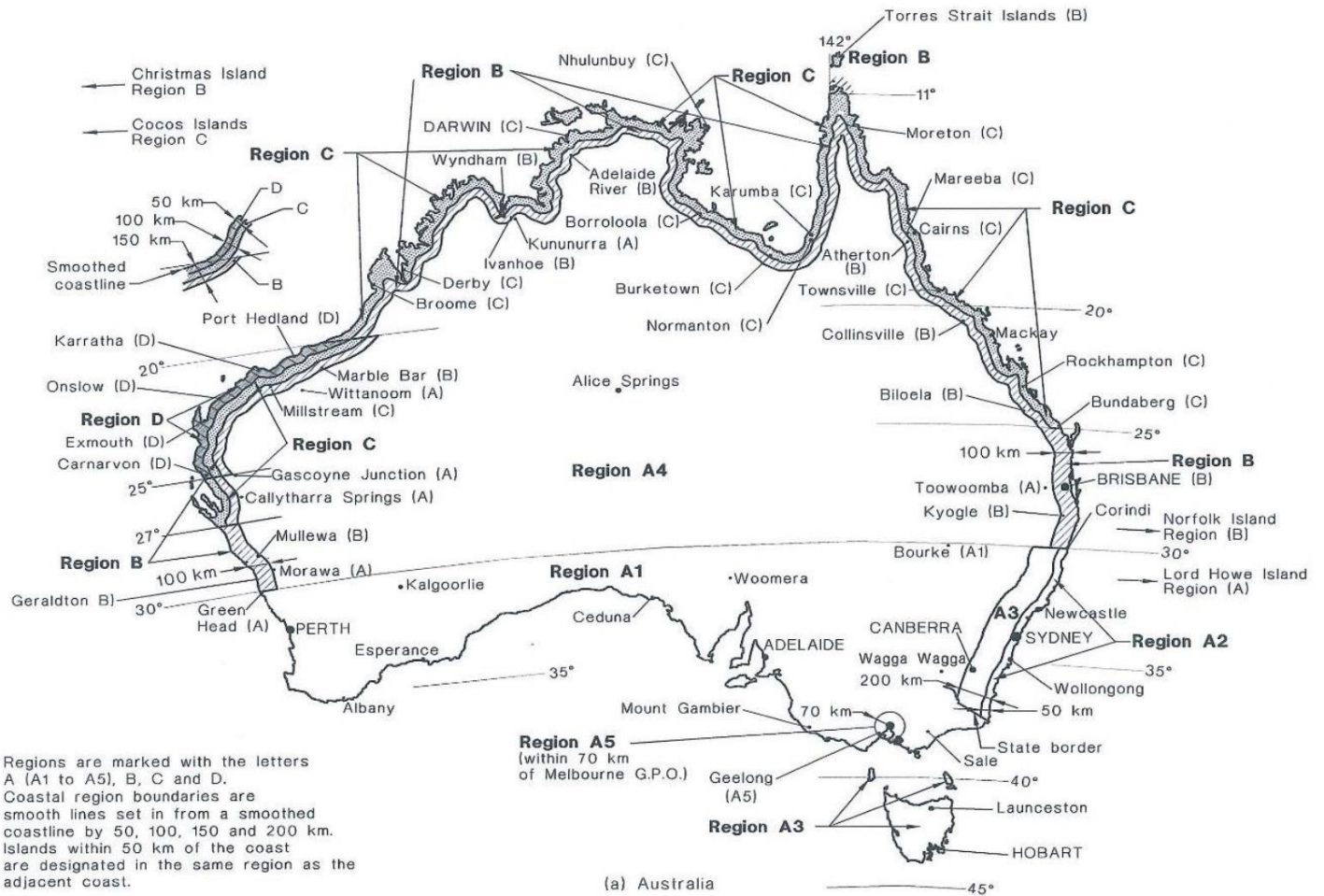
BOLTS		
POSITION	SPECIFICATION	QTY
SOLAR PANEL	HEX GALV M8x25 + 2 WASHERS + NUT	16 SETS
FRAME	HEX GALV M12x30 + 2 WASHERS + NUT	12 SETS
REVOLVING HEAD	HEX GALV M12x25	4 PCS
PANEL BOARD	HEX GALV M12x25 + 2 WASHERS + NUT	3 SETS

DRAWING TITLE SOLAR PANEL FRAME ASSY (4 PANEL ADJUSTABLE)	
CUSTOMER FILE NAME: SPFA004.dwg	DRAWN GA
ISSUED 01/03/16	GA
CHECKED 01/03/16	KW
APPR. 2	REV. 2
SCALE NTS	
SHEET 1	SIZE A3
WEIGHT 332.584 kg	
MATERIAL DRAWING / PART NUMBER SPFA004	
FORM AW001200.IDW REV1 10/06/15	

APPROVED FOR MANUFACTURE	01/03/16	GA	KW
INITIAL RELEASE	01/03/16	GA	KW
DESCRIPTION	DATE	SIGNED	CHECKED / APPROVED

Frame for 4 x 310W solar panels at 25°

# Foundation



According to AS/NZS - 1170.2/2011 – Table 3.1 (page 14), Australia is divided in 4 wind regions as shown above. The average maximum expected wind speed in 100 years interval is:

- Wind region A →  $U_a = 41\text{m/sec}$  (=148km/h)
- Wind region B →  $U_b = 48\text{m/sec}$  (=172km/h)
- Wind region C →  $U_c = 56\text{m/sec}$  (=202km/h)
- Wind region D →  $U_d = 66\text{m/sec}$  (=238km/h)



## Caution

The ground where the solar panel frame is proposed to be mounted must be able to accept the load produced by the concrete's mass.



## Caution

The concrete pad must be carefully reinforced (mostly on top) to accept the high shearing forces produced by the pole. Failure of the concrete pad will make the frame unstable.

Depending on the location you are, the frame tilting angle and the pole's length you must use the amount of concrete indicated below.



Wind zone	zone A	zone B	zone C	zone D
1.0m pole / 15°	0.67	0.78	0.89	1.01
1.0m pole / 25°	0.84	0.96	1.08	1.23
1.0m pole / 35°	0.95	1.08	1.22	1.38
1.5m pole / 15°	0.79	0.90	1.02	1.16
1.5m pole / 25°	0.97	1.10	1.24	1.40
1.5m pole / 35°	1.09	1.23	1.39	1.56
2.0m pole / 15°	0.88	1.00	1.13	1.28
2.0m pole / 25°	1.07	1.21	1.36	1.54
2.0m pole / 35°	1.21	1.36	1.52	1.71
Diameter of foundation	m	m	m	m
1.0m pole / 15°	0.18	0.24	0.31	0.40
1.0m pole / 25°	0.28	0.36	0.46	0.59
1.0m pole / 35°	0.35	0.46	0.58	0.75
1.5m pole / 15°	0.24	0.32	0.41	0.53
1.5m pole / 25°	0.37	0.47	0.60	0.77
1.5m pole / 35°	0.47	0.59	0.76	0.96
2.0m pole / 15°	0.30	0.39	0.50	0.64
2.0m pole / 25°	0.45	0.57	0.73	0.93
2.0m pole / 35°	0.57	0.73	0.91	1.15
Volume of foundation	m <sup>3</sup>	m <sup>3</sup>	m <sup>3</sup>	m <sup>3</sup>

Table A - Cylindrical shape foundation (0.5m deep)

Wind zone	zone A	zone B	zone C	zone D
1.0m pole / 15°	0.63	0.73	0.83	0.94
1.0m pole / 25°	0.78	0.89	1.01	1.14
1.0m pole / 35°	0.89	1.01	1.13	1.28
1.5m pole / 15°	0.74	0.84	0.95	1.08
1.5m pole / 25°	0.90	1.02	1.15	1.30
1.5m pole / 35°	1.02	1.15	1.29	1.45
2.0m pole / 15°	0.82	0.93	1.05	1.19
2.0m pole / 25°	1.00	1.12	1.26	1.42
2.0m pole / 35°	1.12	1.26	1.41	1.59
Size of base (x · x)	m	m	m	m
1.0m pole / 15°	0.20	0.27	0.34	0.44
1.0m pole / 25°	0.30	0.40	0.51	0.65
1.0m pole / 35°	0.40	0.51	0.64	0.82
1.5m pole / 15°	0.27	0.35	0.45	0.58
1.5m pole / 25°	0.41	0.52	0.66	0.85
1.5m pole / 35°	0.52	0.66	0.83	1.05
2.0m pole / 15°	0.34	0.43	0.55	0.71
2.0m pole / 25°	0.50	0.63	0.79	1.01
2.0m pole / 35°	0.63	0.79	0.99	1.26
Volume of foundation	m <sup>3</sup>	m <sup>3</sup>	m <sup>3</sup>	m <sup>3</sup>

Table B – Rectangular shape foundation (0.5m deep)



### Warning

- The indicated values assume the concrete density is  $\approx 2400\text{kg/m}^3$ .
- The indicated values are the **minimum** required. More concrete is acceptable and of course makes the construction safer against bad weather conditions.



### Warning

Never use the solar panel frame as a shelter.  
If the wind exceeds the assumed values, the construction will start tilting, the face of the effective area against the wind will increase and as a result, capsizing will occur.

For different combinations (pipe length, foundation depth) please contact Airwell Group.

## Installation

- Clean and level the mounting area. This will make your job easier.
- Dig a hole with the appropriate dimensions for the foundation.
- Place the forms (if required).



### Caution

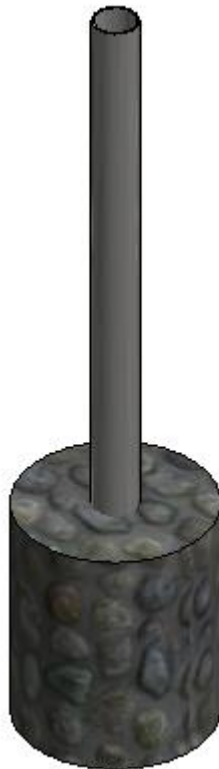
- The concrete amount is critical for the stability of the frame.
- The concrete reinforcing depends on the pad shape and is subject to be done by the installer.



### Warning

If you have not purchased the pole from Airwell Group please note:

- The pipe must be 4" Sched 30 or higher.
  - The bottom part of the pipe which lies in the concrete must have an attachment mounted for gripping and holding in the concrete.
- Mount the pole at the appropriate height.
  - Level the pole vertically.
  - Pour the concrete.

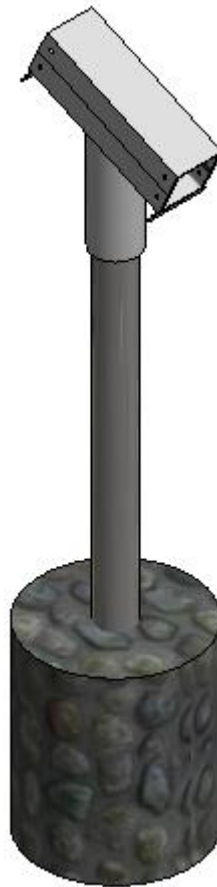




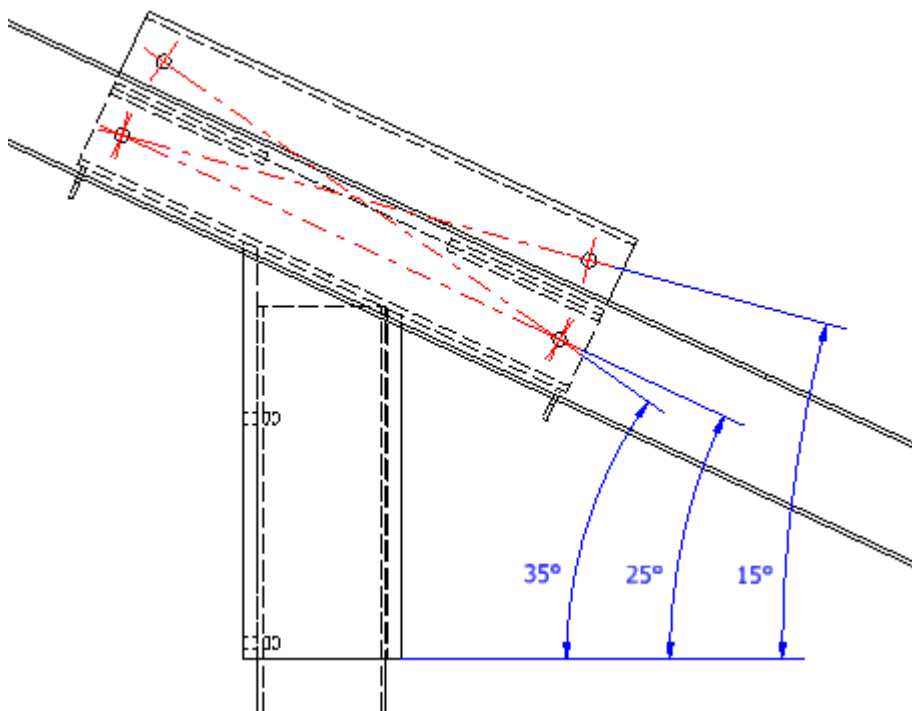
### Caution

It is suggested to leave the concrete at least 1 day before proceeding. If not, the connection between the pipe and the concrete will become loose.

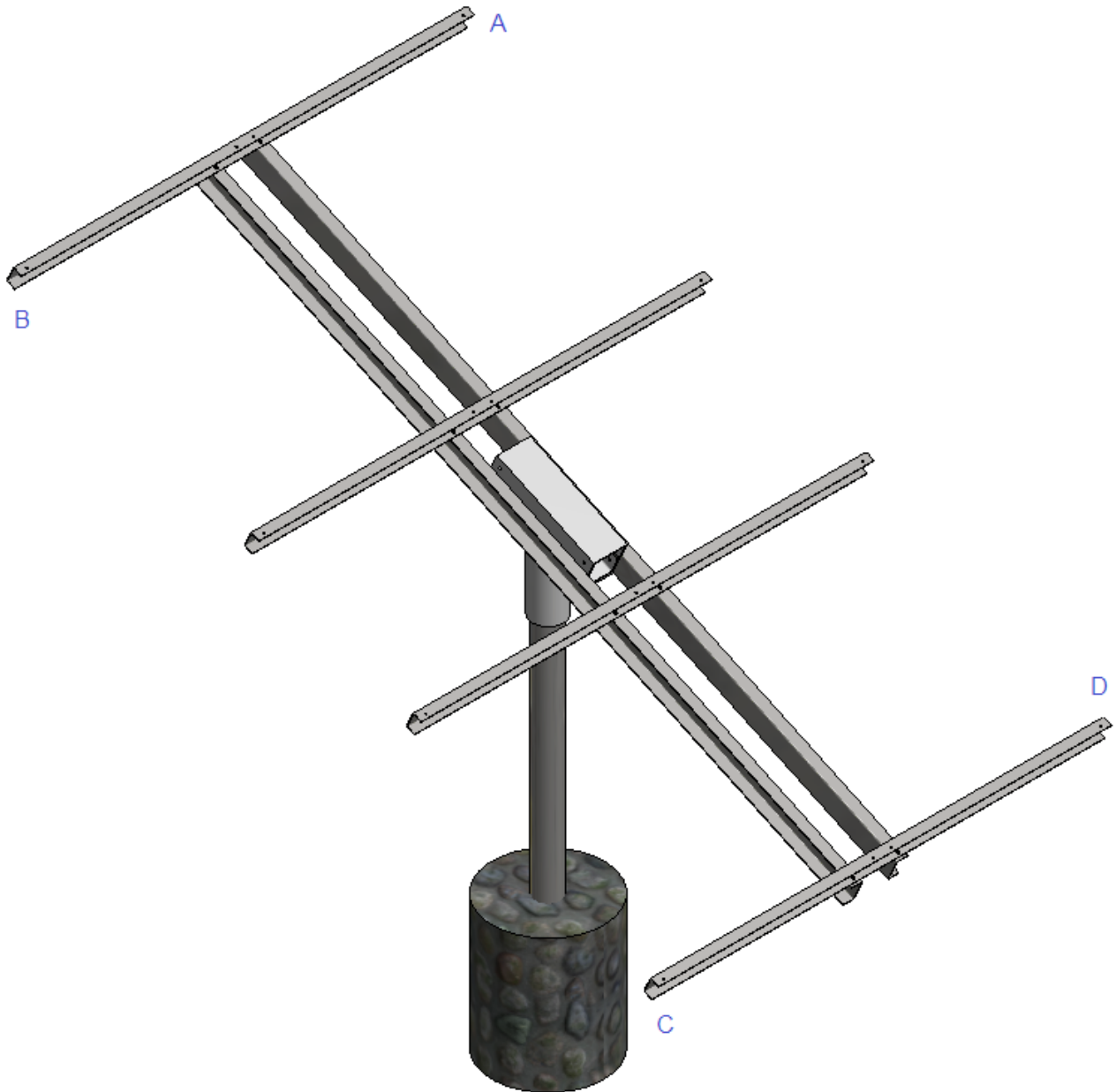
- Mount the revolving head.
- Use the M12x25 bolts supplied (4 pcs).
- Rotate the head to face north.
- Tighten the 4 bolts to grip on the pipe.



- Mount the rafters.
- Use the M12x30 bolts supplied.
- Select the right pair of holes depending on the tilting angle you want.
- Leave the bolts a bit loose at this stage.



- Assemble the purlins.
- Use the M12x30 bolts supplied.
- Leave the bolts a bit loose at this stage.

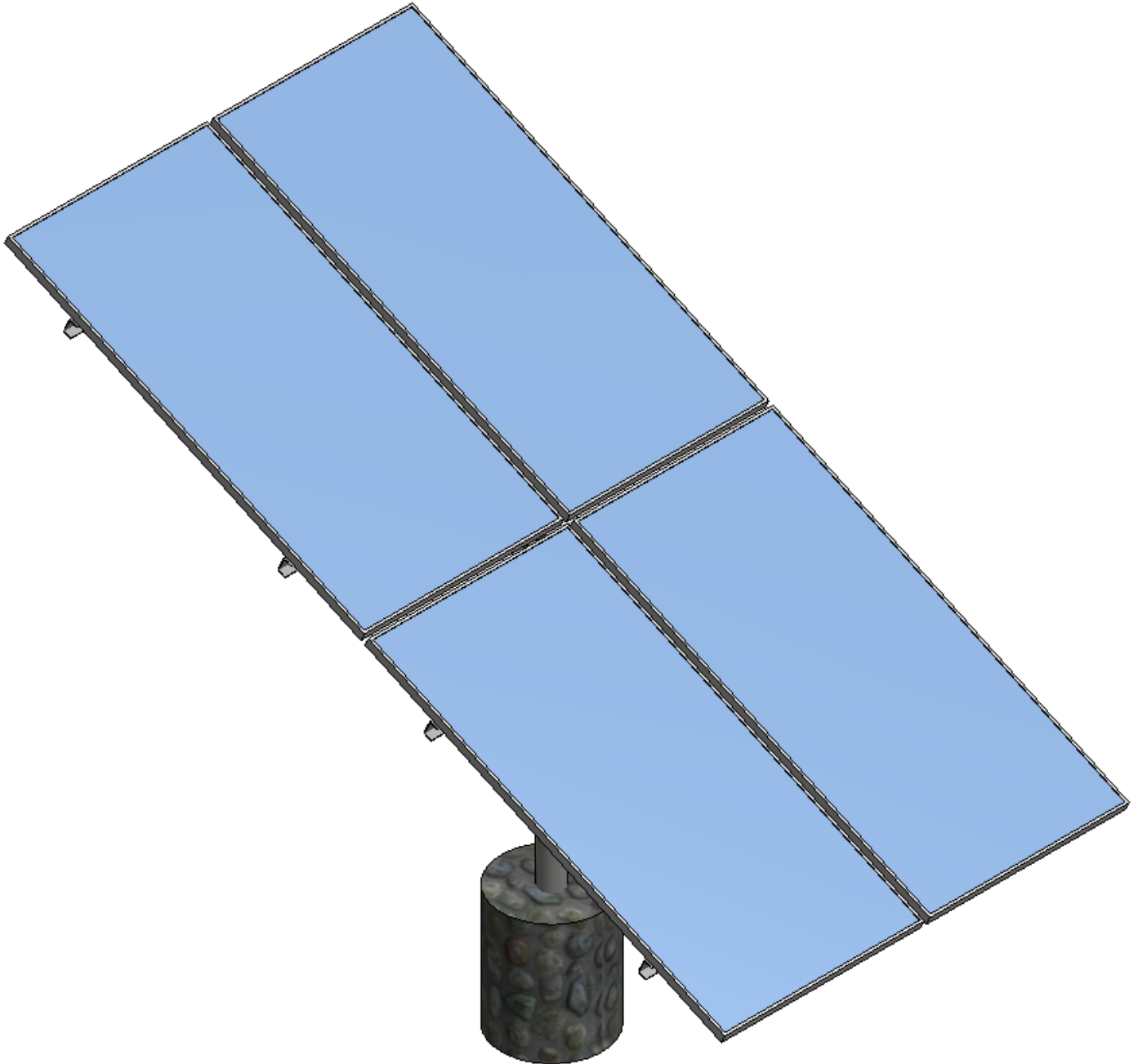


- Check the points ABCD to be all levelled.
- Check the diagonal distances AC & BD to be equal.
- Tighten all the bolts.



### Warning

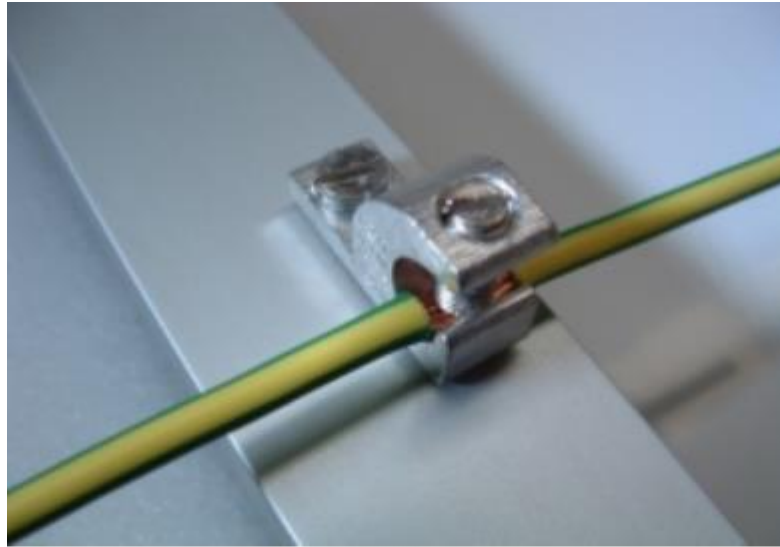
By mounting the panels on the frame, it becomes sensitive to windy weather. Concrete needs 28 days to reach 95% of its final hardening. Leave the concrete at least 2 weeks to strengthen before continuing to solar panel assembly. Risk of serious accident or death!



### Caution

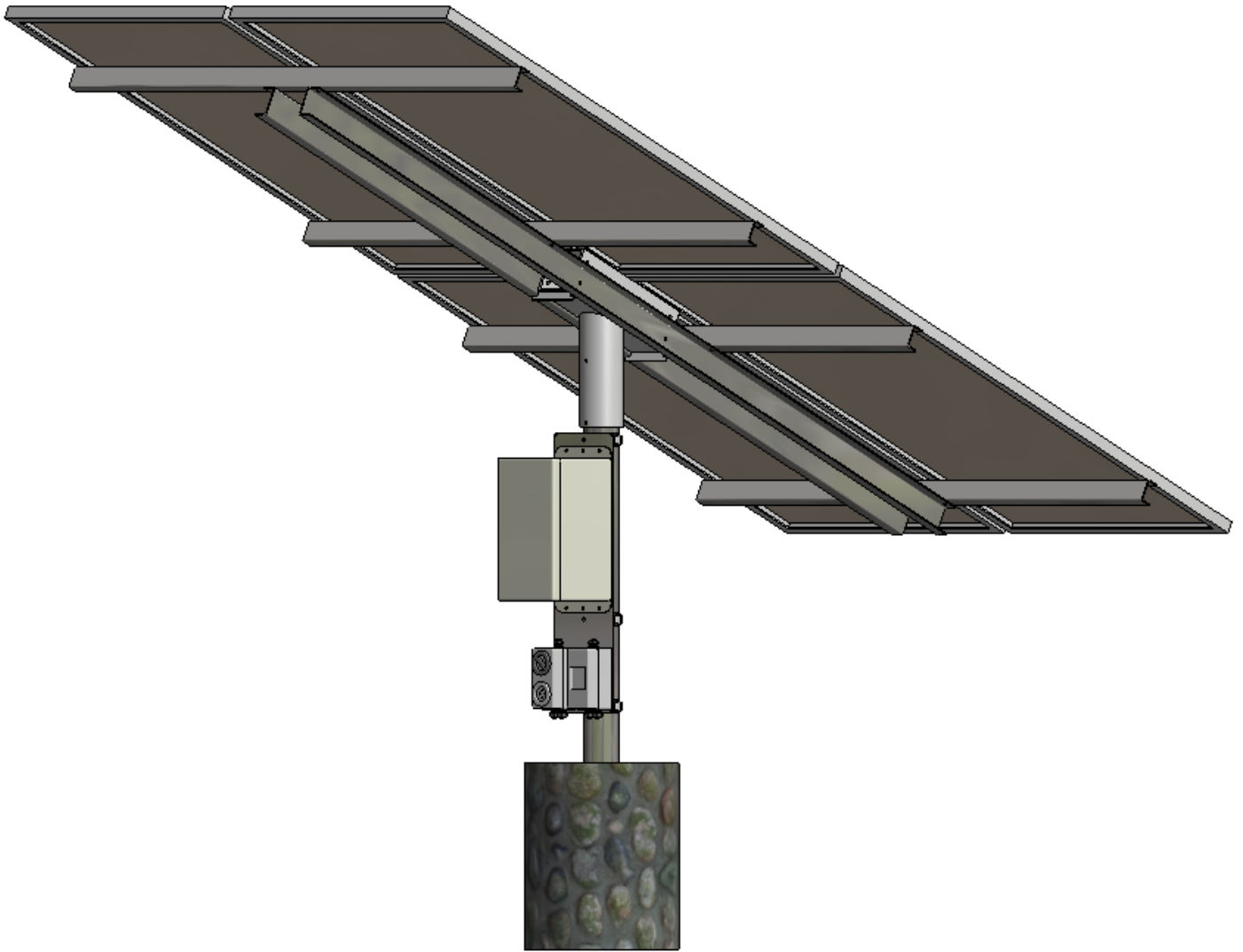
Handle the solar panels with care. Impacts and scratches may reduce their expected life & void the warranty.

- Mount one earthing lay – in lug (provided), at the flange on the back of each solar panel.
- Connect a continuous grounding cable through all the solar panels.





- Mount the electric panel board.
- Use the unistrat rail and clamps plus the M12x25 bolts supplied.



- A qualified electrician must carry out all electrical connections and lightning protection. The electric connections are not included in the scope of this manual.

## **Maintenance**

As a solid construction, the solar panel frame does not need any particular maintenance.

However, it is advised to wash the solar panel screens from time to time, as the dust prevents the sun light from entering the solar cells.

It is also advisable to make a visual inspection once a year for any loose bolts, cracks at the concrete foundation and the condition of cables.

## Tightening torque tables:

Metric threads		Strength grade				
		4.6	6.8	8.8	10.9	12.9
Bolt size (mm)	Pitch	Fastening torque (N·m)				
3	0.5	0.51	1.01	1.35	1.90	2.27
4	0.7	0.95	1.91	2.54	3.57	4.29
5	0.8	2.28	4.56	6.09	8.56	10.3
6	1.0	3.92	7.85	10.5	14.7	17.7
8	1.25	9.48	18.9	25.3	35.5	42.7
10	1.5	19.1	38.1	50.9	71.5	86.8
12	1.75	32.6	65.1	86.9	122	146
14	2	51.9	104	139	195	234
16	2	79.9	160	213	299	359
18	2.5	110	220	293	413	495
20	2.5	156	312	416	585	702
22	2.5	211	422	563	792	950
24	3	270	539	719	1010	1213
27	3	398	795	1060	1490	1789
30	3.5	540	1080	1440	2025	2430

NPT threads	Material			
	C/S	S/S304	S/S316	Brass
Bolt size (mm)	Fastening torque (N·m)			
1/8"	16	14	16	11
1/4"	34	31	34	24
3/8"	54	49	54	38
1/2"	73	66	73	51
3/4"	106	95	106	74
1"	152	137	152	106
1+1/4"	209	188	209	146
1+1/2"	286	257	286	200
2"	407	366	407	285

BSPP threads	Material			
	C/S	S/S304	S/S316	Brass
Bolt size (mm)	Fastening torque (N·m)			
1/8"	18	16	18	13
1/4"	50	45	50	35
3/8"	63	57	63	44
1/2"	160	144	160	112
3/4"	200	180	200	140
1"	340	306	340	238
1+1/4"	450	405	450	315
1+1/2"	560	504	560	392

### Notes:

- Always lubricate zinc plated and stainless steel bolts.
- To convert N·m to lb·fts, multiply by 0.7375

# Airwell Group Pty Ltd

## WARRANTY

**Airwell Group Pty Ltd** is committed to providing our customers with hardware whose manufacture, selection of materials and inbuilt quality exceeds our customers product expectations. The Airwell system is designed to provide long-term, sustainable service in a wide variety of applications.

Airwell Group Pty Ltd warranty terms and conditions are not intended to restrict your rights or guarantees afforded to you under the Australian Consumer Laws.

Provided the system has been installed in accordance with the instructions incorporated in the 'Installation and Operations' manual, and periodically maintained, the following warranty is applicable:

1. Equipment manufactured by Airwell Group Pty Ltd is warranted to be free from manufacturing and material defects for **5 years** from date of purchase from Airwell Group or one of its recognised distributors.
2. Should a problem arise, **any defective parts are to be returned to the point of purchase at the expense of the owner**, for examination.
3. Replacement parts will be issued under warranty, provided the equipment has not been;
  - i. repaired or altered by anyone other than an Airwell technician, or;
  - ii. the equipment was improperly installed, abused, misused, neglected or accidentally damaged.
4. All repaired or replaced items covered under warranty will be returned to the owner at the owner's expense.
5. Return of the faulty parts for analysis also enables us to continually improve the Airwell product. Please ensure that the returned items are suitably packaged. **Transit damage is not warrantable.**
6. All third-party equipment is supplied in good faith, however, Airwell does not provide warranty on any third-party goods supplied. If required, Airwell will assist our clients with warranty claims on third party goods with the original equipment manufacturer/s. The final decision and responsibility of the warranty claim is reserved by the original equipment manufacturer/s.

### **Damage due to corrosion:**

Airwell Group uses new first grade 316L stainless steel as a standard minimum specification in the manufacture of down hole pumping equipment. (Wire rope 304).

Every effort is made to maximise corrosion tolerance on all down hole equipment, however due to the unpredictable corrosive nature of ground water, Airwell Group Pty Ltd will not provide a warranty on corrosion.

The exception where a warranty would apply would be if the corrosion is caused by a piece of substandard or incorrect grade material being included in a pump unit. (If more than one section of material in a pump has corroded it is assumable that it is a general corrosion problem and not a particular piece of material).

It is the responsibility of the customer to advise Airwell Group staff if the pump is to be installed in areas whereby the system may be subjected to damage caused by chemicals, or the area is deemed 'Hazardous', whereby the environment is potentially explosive.

Airwell Group Pty Ltd shall not be liable for incidental or consequential damages, including any damage to equipment or the environment caused by the failure of the Airwell system.

Please return the warranty registration card either by fax or post to your point of purchase at your earliest convenience. Alternatively, you can email the warranty registration card to [sales@airwellgroup.com.au](mailto:sales@airwellgroup.com.au)

**WARRANTY REGISTRATION CARD**

PLEASE POST OR FAX TO:  
AIRWELL GROUP PTY. LTD.  
30 Harris Road,  
Malaga  
Western Australia 6090

Please note: Warranty is conditional upon correct installation and operation of the product as per the Installation and Operations Manual provided with the unit and the warranty disclosure contained within the Installation and Operations Manual.

Pump serial number: - .....

Controller serial number: - .....

Company name: - .....

Address: - .....

Phone number: - (.....)..... Fax number: - (.....).....

Contact name: - .....

Equipment purchased from: - .....

Commissioned by: - ..... Date: -  
...../...../.....

**ARE YOU HAPPY WITH THE PRODUCT?**

We appreciate your comments regarding our products and service and welcome any suggestions that may help to improve them.

Was there any transport damage?  Yes  No

Were you happy with the quality and presentation of the equipment?  Yes  No

Were you happy with the sales and service personnel?  Yes  No

Comments: