



Tindo Karra

Installation and Specifications Manual

Introduction

Thank you for choosing a Tindo Solar Module.

Background to our name “TINDO” – Tindo is a word from the Kurna warra Aboriginal language which is the language of the peoples indigenous to the Adelaide plains on which our solar panel manufacturing plant sits.

Tindo s. sun; or watch; clock; day

Karra s. sky ; or height; heaven

For our purposes we have taken Tindo as meaning the “SUN” and Karra as “Sky”, thus you have purchased a panel made by the Sun and a panel that comes from the Sky.

Tindo solar modules transform the sun’s light energy into electricity. Please read the following instructions carefully. Failure to observe them may result in bodily injury and property damage.

This manual only applies for installations in Australia.

This manual provides information on safety precautions to be used during the handling and installation of the Tindo Karra panel along with technical instructions to be followed during installation, mounting, wiring and commissioning.

General Warning

- There is a serious risk of various types of injury occurring during the installation.
- The Tindo Karra solar panel should only be installed and maintained by a qualified and licensed electrician with Clean Energy Council Solar PV accreditation.
- Contact local authorities to determine local laws, permits and codes to make sure your installation is fully compliant.
- **DANGER! Danger due to electric shock! A solar module generates electricity and voltage even at a low intensity of illumination. Arcing can occur when contacts in a live electrical circuit are physically disconnected. This can result in grave or mortal injury. The severity increases when several modules are connected.**
- Appropriate safety practices, suitable protective clothes and safety equipment must be used
- Appropriate safety practices and equipment for working at heights must be used.
- Make sure to strictly follow the local and national regulations for work safety and accident prevention.



- Observe local regulations concerning fire protection classification for rooftop installations.
- Do not work under rain, snow, hot or windy conditions.
- Use proper electrically rated insulated tools and do not use wet tools
- Do not drop tools or hard objects on PV modules
- Make sure flammable gases are not generated near the installation site. Do not install the modules near open flame and flammable materials. Solar modules are not explosion-proof operating equipment.
- Completely cover the PV module surface with an opaque material during the entire installation and wiring of the PV module. Only then the module is reliably de-energised.
- Make sure the PV connectors are tightly sealed and connected properly. Do not disconnect or unplug the PV connectors when the solar system is under load. Ensure that the modules are first disconnected from the inverter prior to opening any contacts in the solar installation. Be absolutely certain to observe the time intervals specified by the manufacturer after switching off the inverter and prior to starting subsequent work such that the energized components can be discharged
- Do not work alone. Always work with a team of at least two people
- Tindo Karra modules must not be connected in series and parallel with other modules.
- For series connections, make sure the maximum open circuit Voltage is less than the specified maximum system Voltage and use a safety factor of 1.25
- For parallel connections, make sure cables are connected according the Australian electrical wiring standards and take proper measures to prevent reverse current flows. Use a safety factory of 1.25
- Only use compatible connectors
- Panels must not be installed flat and need a minimum tilt of 5 degrees.
- Do not expose PV modules to concentrated sunlight with mirrors or lenses.
- The PV panels are primarily made of glass and should be handled with caution
- In the case of the glass surface of the PV modules is broken, make sure to be using the appropriate safety for the safe removal of the panels. The panel could live so ensure it is safely disconnected and isolated before touching the panel.
- Solar panels must be installed in accordance with AS-5033 Installation of PV arrays. Other relevant standards are AS-3000 Electrical Wiring Rules, AS-1768 Lightning Protection, AS-1170.2 Wind Loads, AS-4777 Grid Connections of Energy Systems via Inverters.
- Do not twist the frame of the module or subject the module to mechanical stress as the glass or solar cells may break.
- Do not stand or step on the module. Do not drop or place objects on the modules.
- Be very careful with the back of the module as the delicate thin solar cells may break
- Do scratch or hit the back sheet or damage it
- Do not scratch the aluminum frame as it will cause corrosion of the frame
- Do not rest the module on its unprotected edges
- Do not pull the cables on the junction box as the cable may disconnect and could



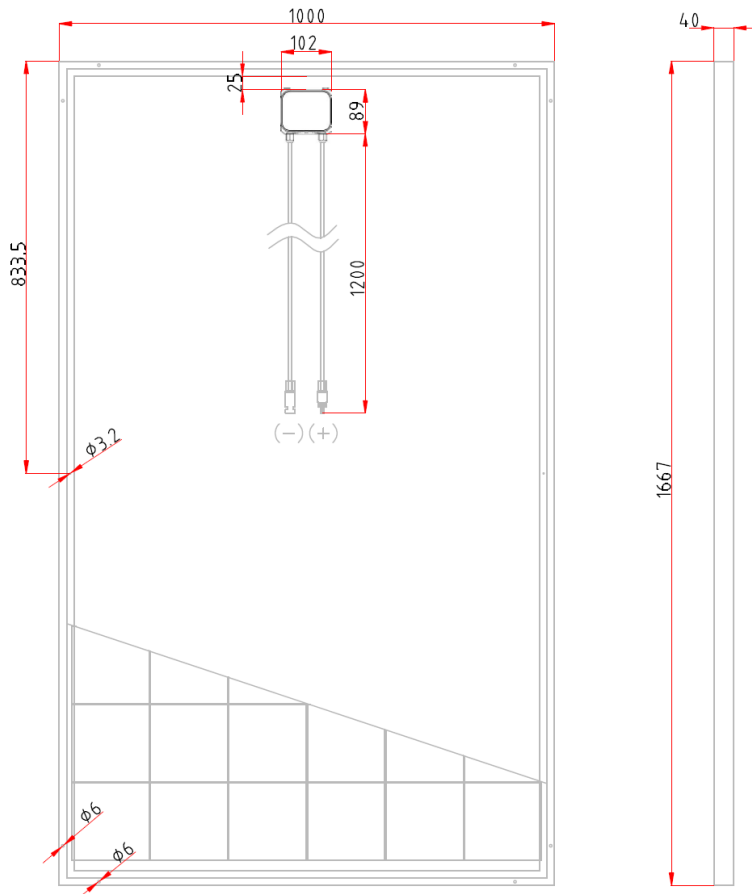
cause electric shock

- Do not lift the modules by the cables or by the junction box
- Never touch the end of the connectors. Do not insert electrically conductive parts into the plugs and junction box. Do not touch the contacts or exposed terminals.
- Do not open the junction box under any circumstances
- Do not over bend the output cable as the insulation may break down
- Do not drill holes in the aluminium frame
- Do not touch the PV module with bare hands as the frame has sharp edges and may cause injury
- During installation at heights, there is a danger that tools, panels or other materials could fall and injure people so take necessary precautions by blocking off danger areas before beginning work
- Keep children and unauthorised people away from the modules and work site.
- Carry out work so that people are not endangered and that no damage can occur.
- The solar panels, tools and other materials must be dry during installation.
- Bind cables to ensure cables are not drooping behind the panels
- Make sure cables are not exposed to direct sunlight as they could be UV damaged.
- Store the modules in cool dry rooms
- Only install undamaged modules. Ensure that the junction box, cable and connectors are undamaged prior to installation
- Transport the modules in its original packaging
- Ensure that adequate ventilation exists below the module to help avoid elevated module temperatures.
- Do not expose the modules to chemicals.
- Do not place the modules in standing water. The junction box is splash-proof only.
- The modules are not suitable for mobile usage or for indoor installations.
- Observe the local requirements for functional grounding or earthing
- Observe the local requirements and regulations for lightning protection
- Ensure a safety factor of 1.25 when determining permitted voltages for components, cable sizes, fuse sizes and inverter sizes.

Specification

Model	Tindo Karra-290
Voc	39.5V
Isc	9.55
Pmax	290W
Vmp	32.19V
Imp	9.01A
Cell	156x156mm Mono-crystalline
No. of Cells	60 in series
Dimensions	1000 x 1667 x 40mm
Weight	18.2kg
Limited Warranty	25 year 80% nominal power output

Drawing



Site Selection

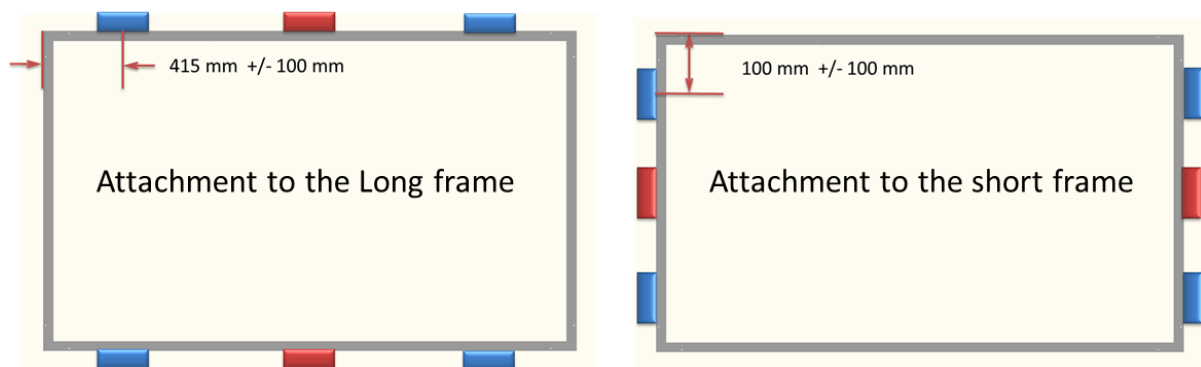
- Make sure panels are installed in an un-shaded location throughout the year. Take into account both summer and winter sun paths and shading. This will ensure maximum yield from your solar panel. Avoid shading from chimneys, trees, air conditioners and other objects.
- If you are planning to install the PV modules in a salty environment such as near the beach, please consult with Tindo local agent first to determine whether or not the installation is appropriate for the PV module.
- Make sure to tilt the solar panel so that the energy yield throughout the year is maximized. As a rule of thumb, the tilt angle should be approximately equal to the latitude of the installation location.
- The modules are certified according to the norm IEC 61215, IEC 61730-1 and IEC 61730-2 for safe operation in moderate climates.
- The permitted module temperatures lie between $-40\text{ }^{\circ}\text{C}$ and $+85\text{ }^{\circ}\text{C}$.

Mounting the Panel

Only use genuine Tindo Mounting hardware for mounting the solar panel. Support structures that the PV modules are mounted to must be absolutely rigid.

Approved clamping areas are shown in the following drawing. The dimensions refer to the distance from the edge of the module to the centre of the clamp. This applies to both portrait and landscape installation orientations.

The middle clamps shown are for high wind areas.

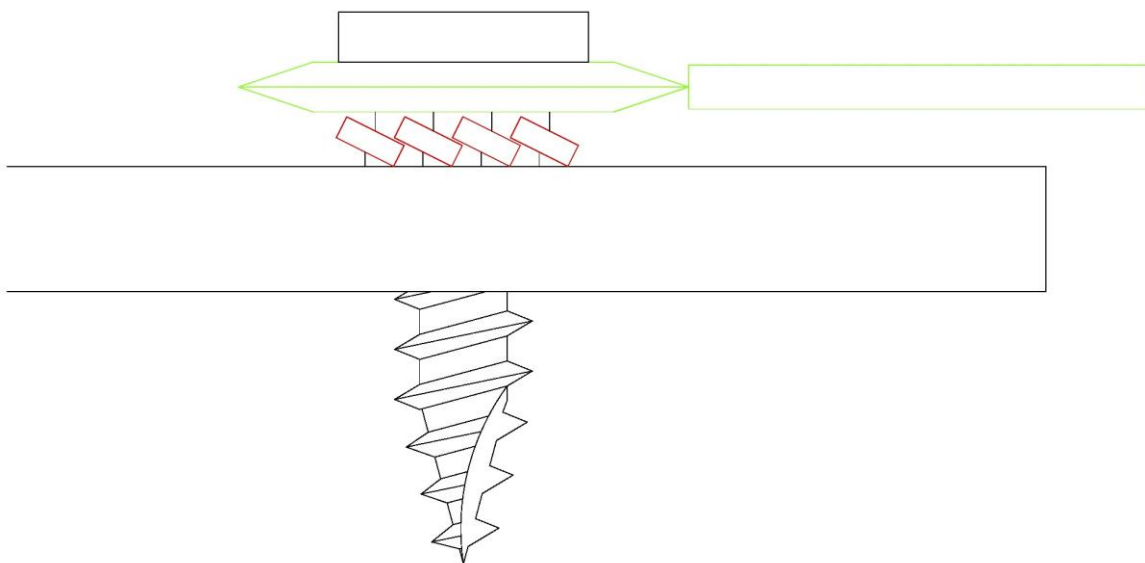


- The modules can be installed in landscape or portrait. Make sure the junction box is positioned in the upper area of the modules with the wires hanging down.
- Ensure the drain holes in the solar panel frame are unobstructed to allow drainage of water.
- Install panels with a minimum tilt of 5 degrees
- Install panels with a minimum distance of 10mm between modules
- Ensure the panel and array conforms to local environmental codes especially for wind loading
- Do not allow dissimilar metals to be in contact with each other giving rise to galvanic corrosion.

Grounding or Earthing

Grounding is required as per local regulations and standards. It is especially important that a PV module frame earth is provided when connected to non-isolated or transformer-less inverters.

Earth each of the modules with Parker screws (4.2 x 16mm), stainless washer with cable lug and a stainless serrated lock washer to the grounding points on the solar panel as per the following figure.



Cleaning & Maintenance

Tindo panels are designed and built for long life and require minimal maintenance.

Most dirt is washed off the panel by rain. If dirt build up becomes excessive, clean the glass surface only with soft cloth using warm water.

The solar system should be inspected annually by a specialist installer for:

- secure fastening and corrosion-free system components
- secure connection, cleanliness and integrity of all electrical components
- the contact resistances of the grounding.