

2Power Solar System



INSTALLATION INSTRUCTIONS

This installation instruction contains important information about how to handle, install and put a 2Power solar system into service. Please carefully read this information prior to installation. Have an authorised technical company to install and initially operate the system! Technically improper installation will void the warranty.

1. Safety instructions

Please strictly adhere to these safety instructions to avoid personal injury as well as property risks and damage.

The symbols and warning signs you will find throughout these installation instructions not only maintain a tidier layout but help to improve the safety of yourself and third parties and to prevent material damage.



Not taking the relevant precautions **may** cause death, grievous bodily harm or considerable material damage.

Also take heed of the safety instructions concerning the other components assembled with the 2Power solar system.



Working on roofs inherently causes a risk of falling. Comply with the accident prevention regulations and use suitable fall protection equipment. Unauthorised persons must not climb onto the roof.

1.1. Regulations and directives

Comply with the applicable accident prevention and environmental regulations, the statutory codes set for assembly, installation and operation, the relevant safety codes pursuant to DIN, EN, DVGW (German Technical and Scientific Association for Gas and Water), VDI (Association of German Engineers) and VDE (German Association for Electrical, Electronic & Information Technologies) as well as the national standards, laws and directives.



Qualified and skilled electricians only are allowed to hook up the system. Comply with applicable directives and the requirements of the competent electric utility.

Qualified and skilled persons only are allowed to install the hydraulic system. Comply with the applicable regulations and codes of practice.

1.2. Intended use

The 2Power solar system described herein is intended for the stationary generation of solar electricity and heat either on roofs of buildings or on open ground. Any other or further use is not considered intended use.



Changes or modifications to the system will void the warranty.

1.3. Handling



Handle the 2Power modules like glass products. They may not be walked on and both front and back must be protected against scratches and other damage. Only pick them up at the aluminium frame for handling.

Keep electrical terminals clean and protect against mechanical loads.



Upon delivery, check the modules and accessories for potential transport damage. Transport damage is subject to the carrier's and not the manufacturer's or supplier's liability. Claims for transport damage shall be excluded following successful goods receiving inspection.

2. Installation

Try to install the 2Power solar system such that it is never in the shade during the day and throughout the year. To ensure proper self-cleaning, the modules should tilt by at least 10°. This is of course subject to on-site conditions.



Focused sunlight or other thermal radiation on the modules must be prevented at all cost. This may be caused by reflection of satellite dishes, windows, mirrors or other reflecting objects in the vicinity of the modules. Reflective items must be removed or be transferred.

Each 2Power solar system will be delivered with one of the 2Power modules fitted with a PT1000 temperature sensor. The electric connecting cable is mounted on the rear side of the module with a tape. In addition, the 2Power module with the integrated sensor is marked on its frame and with a note on the type plate.

The assembly of the modules can be done both vertically and horizontally.

2.1. Mounting rack

To support permanent installation, install the modules on a suitable mounting rack. Check that both the mounting rack and the mounts are stable enough to carry the on-site loads. Take heed of the assembly instructions provided by the manufacturers of the assembly system and the modules.

Qualified and skilled persons only are allowed to do this work.

2.2. Electrical installation

The solar cables feature special, reverse polarity-proof male/female connectors. In case further cables are required, use solar cables only. It is necessarily to check for correct polarity. Reversing the polarity will destroy the protective diodes.

Do not string up 2Power modules in mixed configurations of the same or other module models not designed for heat generation. Such configurations should consist of separate strings with separate MPP-trackers or, better still, use separate inverters.



Never connect or disconnect any elements under load current! To disconnect from the load, turn off (open) the load breaker on the inverter and secure it against being switched on.

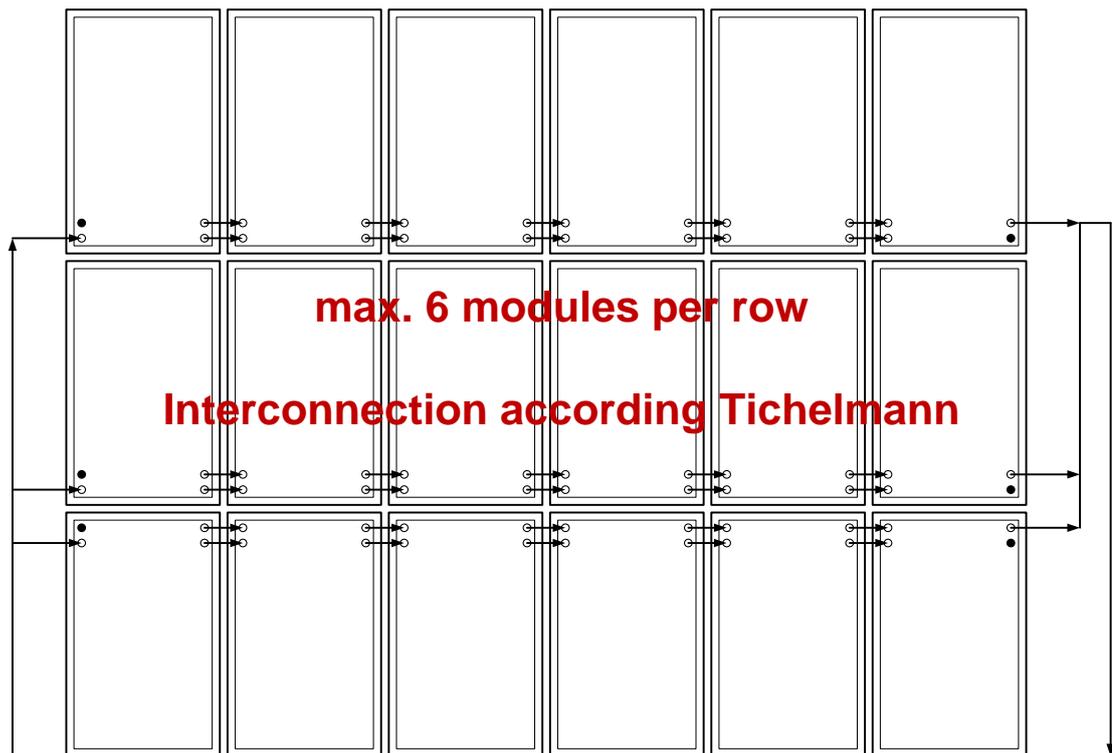
Take heed of the installation instructions provided by the manufacturers of the photovoltaic (PV) module and the inverter(s).

Qualified and skilled persons only are allowed to do this work.

2.3. Hydraulic installation

The 2Power modules are interconnected by flexible plug-type hoses. Check prior to installation that plugs and couplings are clean. Then plug the end of the hoses into the couplings located on the modules. The connection will audibly "click" into place. To test if the hoses are connected in the correct way, switch and pull on the pipe socket with low force. It must not disconnect from doing so. **Mind to connect up properly because otherwise the system will leak.** To disconnect, push the retaining ring towards the coupling and carefully unplug the hose. Remember to depressurise the system beforehand.

Every 2Power module has 4 ports. Connect each flow pipe to a flow pipe and each return pipe to a return pipe (Tichelmann system). Place a dummy plug into the terminations of flow pipe and return pipe.



Plug-type hoses connect the series of modules to the supply lines; each hose terminates in a coupling with a $\frac{3}{4}$ " male thread. Screw these to the supply lines according to best plumbing practices.



Mind not to exert tensile stress and certainly not to bend the hoses prior to, during and after assembly. Do not exceed the admissible bending radiuses. Take heed of the manufacturer's mounting instructions. We recommend you only use hoses in stainless steel sheathing as supplied by our company. They support a minimum bending radius of 35mm. If other manufacturers are used, the warranty expires.

When installing, check both the piping and the modules can be properly vented. Automatic venting of the system is specified to ensure reliable operation. We recommend using an air separator. Alternatively automatic air relief valves can be installed at the topmost point of the system.

A supply line with an inside diameter of at least DN20 must be used for collector rings up to 20m².

2.3.1. Materials suitable for use in the module circuit

After purchasing the 2Power modules, the buyer is responsible for choosing the other system components and for ensuring that they are correctly sized for the application and made of the specified materials.



All system components (fittings, pumps, heat reservoir, pipes, etc.) have to be made of **NON-CORRODING MATERIALS**. Such non-corroding materials include plastic, stainless steel, brass, copper and red brass.

Where on-site constraints disallow the use of non-corroding materials, a heat exchanger or heat exchanger unit should separate the sub-system containing the "corroding" system components from the 2Power circuit.

2.3.2. Anti-freeze

After rinsing and successfully pressure-testing, fill the system with a frost-proof heat transfer fluid. Take heed of the ambient conditions on site. The only heat transfer fluids allowed are ethylene glycol, propylene glycol, ethanol and alkali carbonate. Take heed of the manufacturer's specifications, particularly with regard to the mixing ratio. If the mixture is less concentrated than specified by the manufacturer, there is a risk of microorganism growth. Higher anti-freeze concentrations will reduce the modules' thermal output. We advise you against using special inhibitors.

2.3.3. Other information

Check that the thermal insulation of outdoor pipes must resist UV radiation.

Use solar shingles to duct the pipes to and from the modules inside and under the roof cladding.

Qualified and skilled persons only are allowed to do this work.

2.4. Recommendations for stroke of lightning

The respective rules for a stroke of lightning can be found in the DIN EN 62305 part 3 / VDE 0185-305-3 (lightning protection, protection of buildings and persons) and in the supplementary sheet 2 (Photovoltaic- and solar thermic systems). The lightning protection level of the building defines the requirements that have to be taken into account while planning and installing the thermic solar panels.



If a lightning protection is already installed on the building, the collectors and their mounting shall be included in a way into the lightning protection that protects the collectors from harm in case of a lightning stroke. Therefore all collectors must be inside the mesh of the lightning protection. Between the efferent parts of the protection and the collectors must be a gap of approximately 0,5m. For a more precise calculation regarding the gap we ask you to have a look at the DIN EN 62305 part 3. However if the advised gap can't be adhered do to architectural problems, the collectors and their mounting shall be connected with the efferent parts of the lightning protection over the shortest possible path (Copper cable with at least 16mm² diameter).

If the lightning protection is not up to date or conforming to standards, the provision made to safeguard existing standards expires due to the assembly. The Lightning protection must be reworked in this case to fit current standards.

It is possible to install an overvoltage arrester to protect the collector probe from inducted surge. Lightnings close to the collector probe can induct voltage peaks in the sensors cable that will destroy the probe. This surges are narrowed to a harmless value with the aid of catch diodes. Generally the casing is a surface-mounted-box that serves the proper connection between the sensor and the continuing sensor cable.

The protection of the controller shall be achieved through systems that were created to protect sensible home devices (e.g. computer or television). The pipes of the solar circle **must** be connected with the main equipotential bonding track (Copper cable with at least 16mm² diameter.)

3. Initial operation

Prior to first putting the system into operation, check that it is leak-tight, that all hydraulic piping is properly connected and that the electrical hook-up has been diligently and properly done. We recommend to test for possible leaks by the use of compressed air. This allows you to detect slack plug connectors and leaking screw connections without wasting glycol. Thoroughly and appropriately rinse the system pursuant to DIN 4753. Water must be used for rinsing the system only if the outside temperature is above +5°C. Afterwards completely drain the system and fill up with frost-proof heat transfer fluid.



The pressure test has been progressed factory-provided.

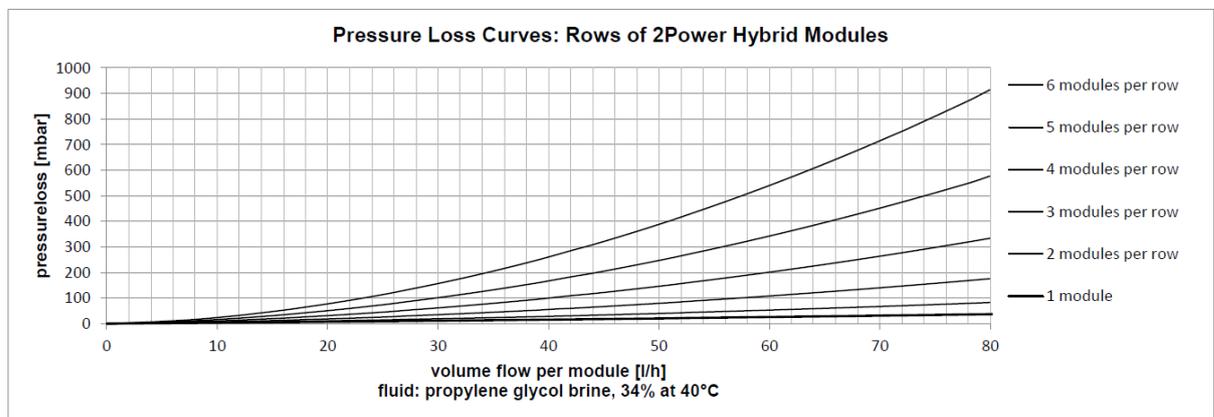
Have trained and skilled persons perform the initial operation cycle. The enclosed commissioning certificate must be completely filled and signed by the approved or executing craft at the initial operation cycle. The trusted licensed trade must explain to the customer in a comprehensible manner how the system works and how it is operated.

When the electrical and hydraulic components of the system have been put into service, use a suitable infrared camera to take a thermographic image. This will help to discover and remove hot spots and other faults such as broken cells, defective by-pass diodes, failed cell sections, etc. Not removing the faults will void the warranty. The thermographic images are to be kept on file for at least as long as the warranty period.

4. Technical data

Dimensions:	992mm x 1640mm x 45mm
Weight:	24kg, filled
Connectors:	Supply line: 3/4" ET male thread Module connect.: DN8 plug-type hoses, 10mm pipe socket
Max. adm. temp. of heat transfer fluid:	+60°C, briefly +84°C (take heed of max. adm. temp. of solar station)
Max. adm. system pressure:	6 bar (remember the opening pressure of safety valve and solar station)
Operating pressure:	< 4 bar
Recommended flow*:	35 l/h (0.58 l/min) per module, up to max. 70 l/h (1.16 l/min) per module *no more than 6 interconnected modules; aim for 4-6°C of temperature differential between the module circuit's flow and return flow sides.
Storage volume:	approx. 70l per module are recommended

Pressure loss:



Thermal output:	719 W* *Module power depends on the temperature of the heat transfer fluid. Under STC conditions, a peak output of 719 W is possible
Product warranty:	10 years
Power warranty:	90% 10 years, 80% 25 years

5. Disposal

When disposing a 2Power system the applicable local rules and regulations of the appropriate disposal area must be observed at the time of disposal.

PA-ID Process GmbH

Bruchtannenstraße 9
D-63801 Kleinostheim
Phone.: +49 (0)6027/40728-0
Fax: +49 (0)602740728-99

info@pa-id.de



PA-ID Process GmbH disclaims any and all responsibility for units damaged after having been operated together with 2Power modules supplied by PA-ID Process GmbH but failing to take heed of technical data sheets and the installation instructions. Subject to technical modifications in the course of product advancement. Mistakes and errors reserved.

Checklist initial operation

2Power solar system

The warranty for 2Power solar systems is only valid if following checklist is completely filled out and signed by the approved or executing craft at the commissioning and is send back to PA-ID GmbH.

per email: info@pa-id.de

Name of the operator and place of the installation:

Date of commissioning: _____

All right
Not all right
Examination not possible

Assembly

Reflecting objects that focus sunlight on the modules are non-existent, have been removed or have been moved.

The assembly frame and the mounting are dimensioned for the locations loading requirements.

Electricity

The modules have been separated in one or more strings.

Plugs and clutches have been checked regarding cleanliness

Electrical connections have been created properly

Open circuit voltage has been checked

Hydraulic

The pipes are connected using the "tichelmann principle" or the system is hydraulically aligned with another approach.

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It is guaranteed that the pipes have not been under tension or were bended before during or after the assembly.

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The connecting tube has not been bend over the tolerable bending radius

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A preliminary examination has been performed with the use of air

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The density of all connections has been checked

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An adequate and accurate flushing of the system has been performed

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The system is filled with a frost proof heat transfer medium

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The system has been vented thoroughly

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The Mixture ratio has been checked (frost resistance: _____ °C)

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Prepressure in expansion vessel (before filling): _____ bar

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System pressure (cold): _____ bar

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The safety vessel is adjusted to 4bar

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Controller

The storage sensor has been attached at the deepest point in the storage

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The parameters have been set according to the enclosed parameter list

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In operation

The controller works properly according to the parameter list

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Temperature difference collector circuit : _____ °C

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Temperature sensors display realistic values

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Solar pump is working

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Float-type flow meter: _____ l/min

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Handover

The systems owner/operator has received extensive information regarding construction, operation and handling.

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Documentations and manuals were handed over

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Initial operation done by company (name/address/phone number):

Name and signature of employee:

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