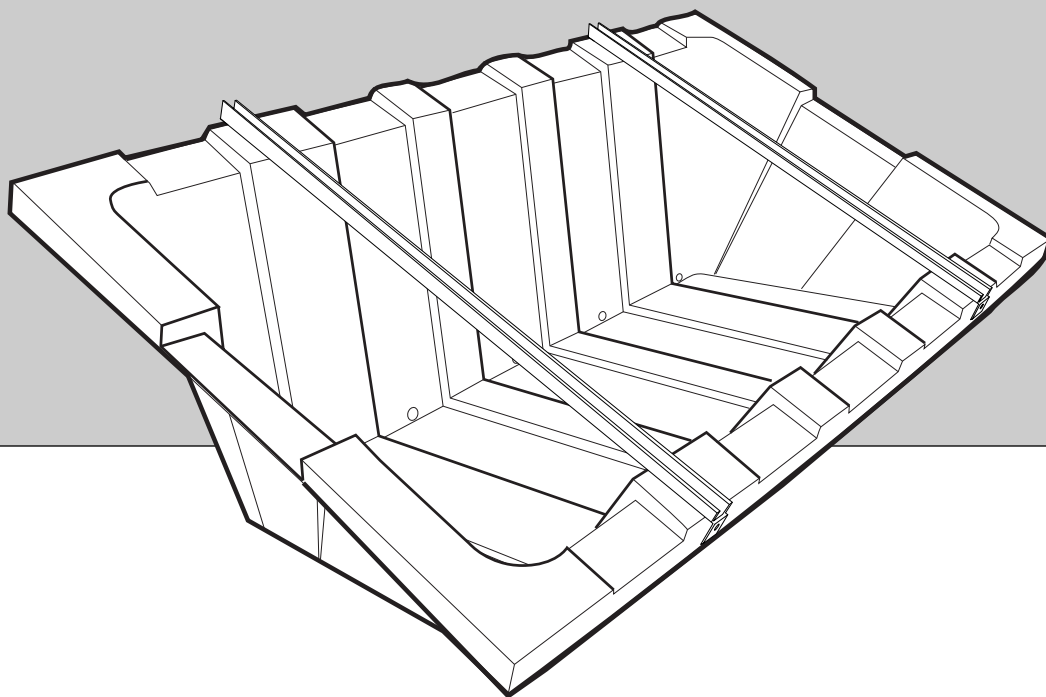


ConSole



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The modular **ConSole** is widely applicable as a support structure for solar modules on flat roofs. Most common solar modules in the 70 to 160 Wp range will fit on one of the ConSole types.

In order to resist wind loading, the ConSole has to be ballasted with tiles or gravel. The amount of ballast depends on the height of the building and its location (see table).

The ConSole is produced from 100% recycled chlorine-free polyethylene (HDPE), has a long lifetime and requires no maintenance. The *energy payback time* is less than one year.

A ConSole weighs approximately 5 kg and has a 65 mm wide mounting border.

The scope of supply has been extended with 2 pieces of aluminium U-profile strips and all necessary mounting materials. The profiles are mounted between the solar module and the ConSole. The profiles strengthen the solar module frame and simplifies the fastening of the solar module.

Please check if this version of the manual is the actual one. You can find the actual version on www.e-conergy.com/console.

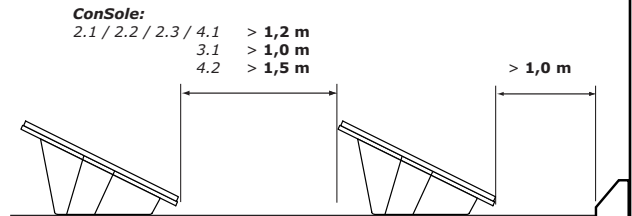


Installation instructions

General

- 1 Before installing the ConSole, ensure the surface is even, clean and not too smooth. Smooth surfaces are e.g. PVC and EPDM.
- 2 Make sure the installation surface (eg. the roof) can withstand the required permanent ballast loading.
Remark: installing a number of ConSoles in a line, creates a barrier for carrying off rainwater. In case of doubt, please consult an acknowledged engineer.

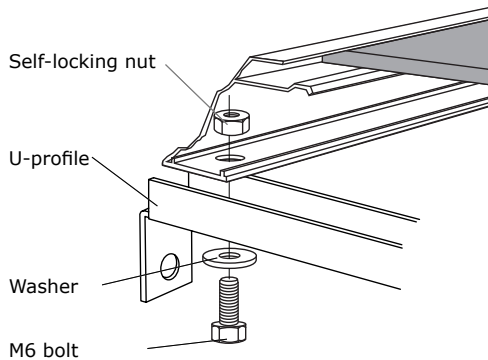
- 3 Position the ConSole with its sloping side facing south. Keep at least 1 meter distance from the roof edge. The distance between parallel rows of ConSoles is as follows:



- 4 Add the corresponding amount of ballast required (see table).

Fastening of the solar module (with the exception of Shell solar modules)

- 5 Attach the U-profile to the solar module (see below drawing). Use the supplied mounting materials. Tighten the screws firmly.



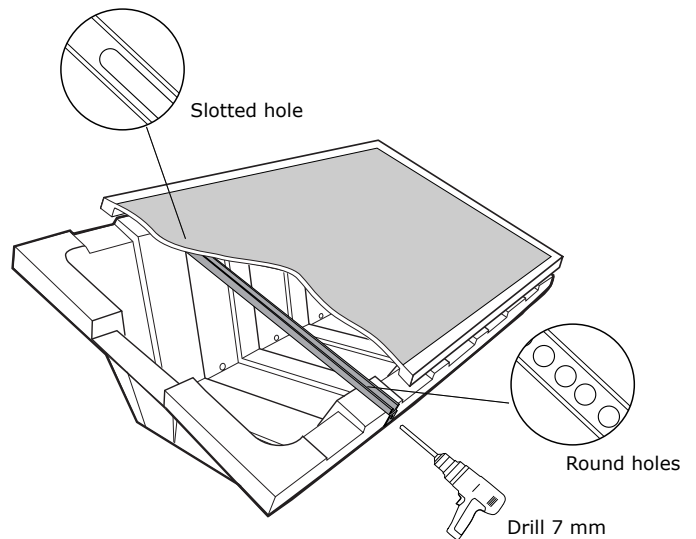
Remark:
You have a free choice of holes in the profile. However we recommend to mount the solar module symmetrical onto the ConSole.

- 6 Interconnect the electric cables.

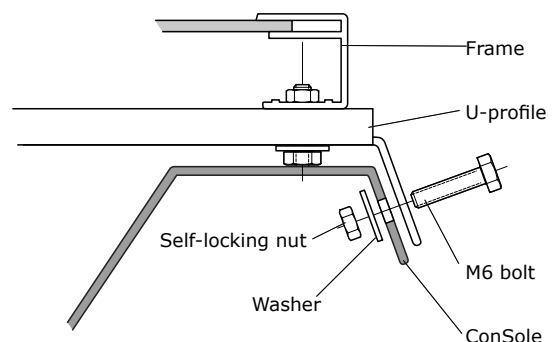
- 7 Position the solar module symmetrical onto the ConSole. The U-profile strips prevent the module from sliding away.

Remark:
Make sure that the slotted hole is positioned on the "higher side" of the ConSole and the round holes are on the "lower side".

- 8 Use the profiles as a jig to drill holes (with diameter 7 mm) into the vertical edges of the ConSole.

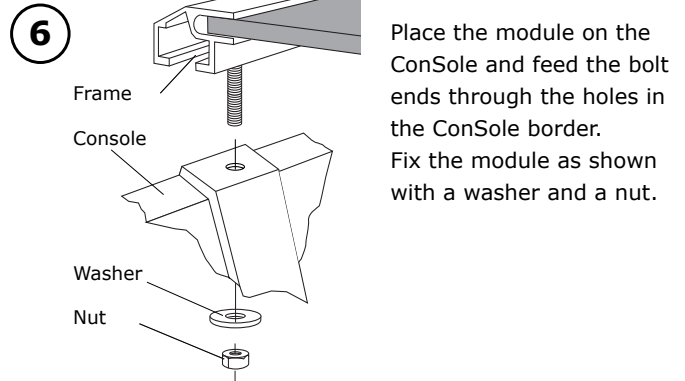
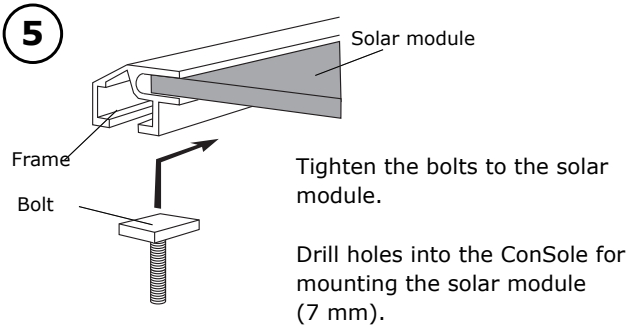


- 9 Fasten the profiles with the supplied mounting materials (see below drawing). Please make sure that the washer is placed in between the nut and the ConSole.



Fastening of the Shell solar module

Some Shell solar modules are supplied with reinforcement cross bars already integrated in the module frame. For these modules we advise the following mounting method:



Required ballast

In order for the ConSole to withstand wind loads it is necessary to put ballast inside the ConSoles. Indicative ballast values are given in the table below. The values for ballast correspond to the Dutch norm for wind loading NEN 6702 and have been verified through years of experience.

Suitable ballast are gravel, stones, tiles or rubble.

	H<8 m	8<H<20 m
ConSole 2.1	57 kg	91 kg
ConSole 2.2	56 kg	90 kg
ConSole 2.3	58 kg	93 kg
ConSole 3.1	47 kg	74 kg
ConSole 4.1	70 kg	112 kg
ConSole 4.2	64 kg	103 kg

The ballast values safeguard the ConSole from flying away or tipping over. The resistance against sliding depends on the friction coefficient between the roofing material and the ConSole. If you are not sure about the situation of the location we recommend to do a static calculation according to the national norms and regulations.

Safety first! Please work according to local rules and regulations.

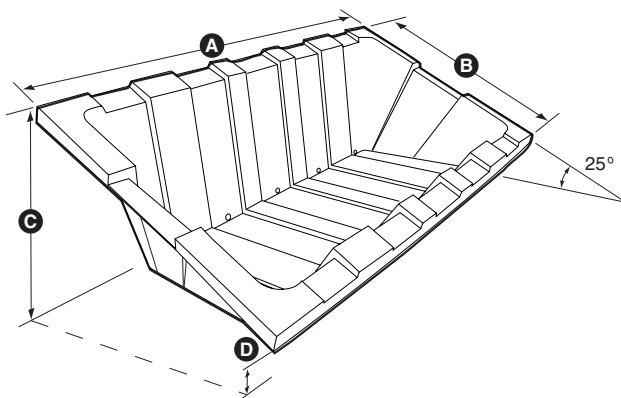
Scope of supply

Scope of supply

- 1 ConSole
- 2 aluminium U-profile
- 8 hexagonal bolts M6 x 20 mm (Stainless Steel)
- 8 self-locking nuts M6 (Stainless Steel)
- 8 washers 18 mm (Stainless Steel)

Necessary tools:

- Battery drilling tool with hexagonal bit for 10 mm bolt (M6)
- 7 mm drill
- 10 mm spanner (open-end, or ring)



A list with actual modules you will find on www.e-conergy.com/console.

All dimensions in cm

	A	B	C	D	Module width	
					min	max
ConSole 2.1	135	73	44	10	62	73
ConSole 2.2	144	67	39	10	56	67
ConSole 2.3	125	86	48	9	75	86
ConSole 3.1	125	60	39	11	49	60
ConSole 4.1	160	80	45	8,5	69	80
ConSole 4.2	120	105	55	8	94	105

Frequently asked questions

What is the maximum roof angle allowed for placing ConSoles? The ConSole is suited only for flat roofs. An angle of 5° is acceptable only when the friction coefficient between the roof and the ConSole is higher than 0,6.

Is it necessary to place roof protection between the roof and the Consoles? The ConSoles have no sharp edges, they spread out the weight over an area on the roof and are made of relatively soft material. Based on our widespread experience no roof protection is required, provided that the roof surface is flat and clean.

Is earthing required? The ConSole is made of HPDE, non-conductive material. Therefore it is not necessary to earth the ConSole. If the PV system has to be earthed according to the instructions, this can be done directly to the module. It is very important to make sure that if you use the fixing points for earthing, that the earthing cannot become loose due to vibrations.

Is it possible to connect the ConSoles? Normally the ConSoles are not connected, because the ballast will keep the ConSole in place. However in some cases such as in extreme wind regions or when the surface is very slippery or for aesthetic reasons (alignment), it may be necessary to connect the ConSoles. If this is the case, the holes for fixing the modules can be used or extra holes can be drilled (not included in delivery).

How much time is needed for installation? When the recommended fixing method is followed (fasten the U-profile strips to the solar module, position the module onto the ConSole, tighten with self-locking nuts) then 2 minutes is sufficient according to our experience.

Can modules be placed in portrait orientation? The ConSole is designed for modules placed in landscape orientation. Portrait orientation is not recommended.

How many modules fit on one ConSole? The ConSole is suited for 1 module. In some exceptional cases, two smaller modules may fit on one large ConSole.

Which material can be used as ballast? We recommend the use of gravel, stones or tiles as ballast. However, in principle, any material with a high density and long lifetime may be used.

Under which temperature range can the ConSole be used? The ConSole can be used at temperature ranging between -40°C to 85°C.

Is the material UV-resistant? The ConSole is made of black regranulated HDPE (high-density polyethylene). This material has excellent UV-resistance characteristics. In addition extra UV-stabilisation agents are added. The UV-characteristics are tested according to ISO 4892.

How long is the guarantee? The guarantee period is 10 years. The expected lifetime of a ConSole is 30 years.

When and where have the first ConSoles been placed? The first ConSoles were installed in 1996 in the Netherlands.

How many ConSoles have been installed to date? Till July 2002 more than 80.000 ConSoles have been installed. This is equivalent to an installed PV power of approximately 10 MWp. ConSoles have been installed mainly in Germany and the Netherlands, but also in Denmark, Portugal, Italy, Switzerland, Spain, Australia, USA, Africa and Japan.

What is the angle of the ConSole? The irradiation angle is 25°. By reducing the angle slightly (w.r.t. the optimal irradiation angle for PV systems) the ConSole becomes lower, is thus exposed to less wind and therefore requires less ballast. Also the distance between rows can be reduced. The loss of energy production is negligible.

What is the maximum temperature in a ConSole? Tests in the Netherlands and Portugal indicate that the temperature of a module placed on a ConSole is at most 3°C higher than on a free support. This difference is even smaller at lower temperatures, so that the effect on the net yearly energy production is negligible.

How is the module ventilated? There are ventilation slots along all sides of the ConSole, enabling free circulation of air. The temperature inside the ConSole is limited by the consequent chimney-effect, causing hot air to rise to the top of the ConSole and sucking in cooler air from the bottom (natural convection).

How are ConSoles produced? The ConSole is a thermo-vacuum formed product. Sheets of HPDE are used with a thickness of approximately 4 - 4,5 mm.

Which flame protection class is applicable for the ConSole? The ConSole material (HDPE) complies with Flame protection specification DIN 4102 class B2.

Does the ConSole contain chemical substance that might react with the roof skin? The ConSole exists in 100% recycled, chloride free Poly-ethylene (HDPE). So far no harmful reaction with the roof skin whatsoever has been reported.

What is the function of the holes in the lower part of the ConSoles? These are drainage holes.

What material are the U-profile strips made of and for what purpose are they used? The U-profiles are made of Aluminium. The profiles provide mechanical stability to the module frame and enable customers a very simple and easy installation.

Could existing installations be overhauled with U-profile sets? Fundamentally the U-profiles will simplify the overall installation. Overhaul of existing installations is always possible; however not required.

Your ConSole dealer:

