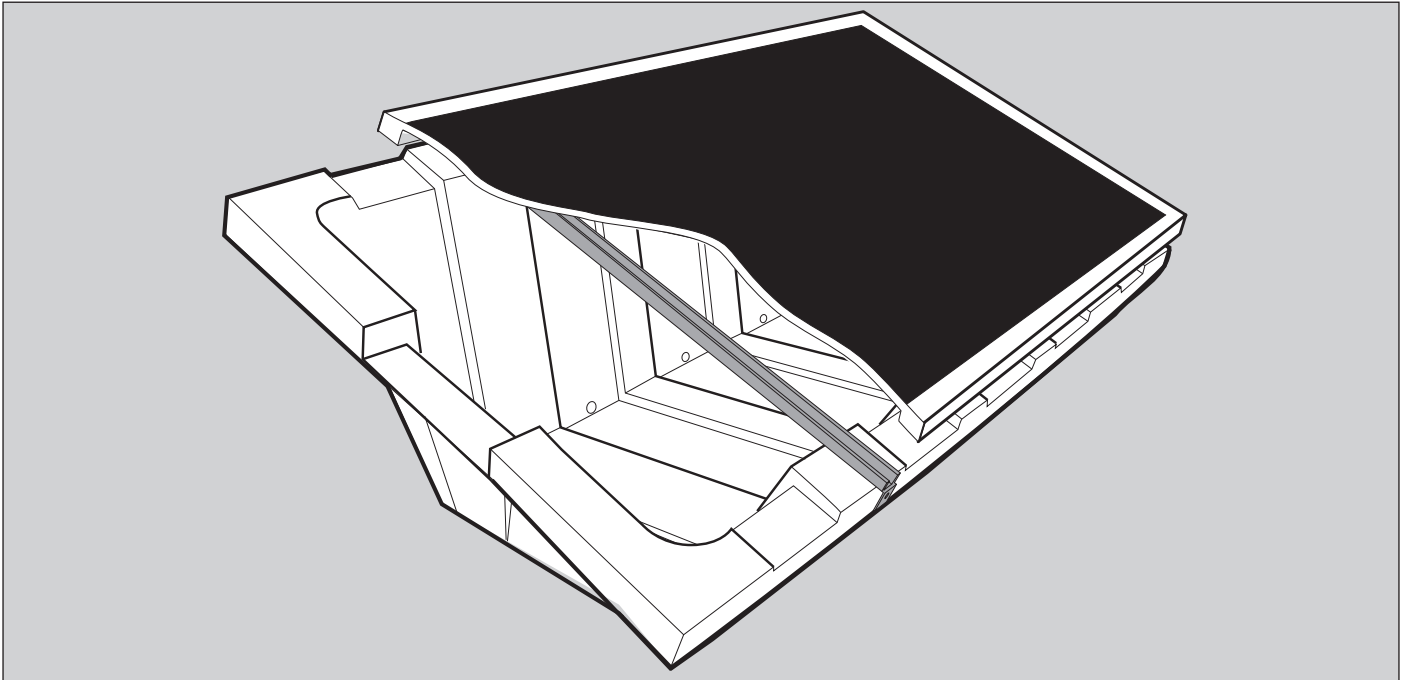


ConSole



The ConSole is the ideal solution for mounting solar panels on flat roofs. Most common solar panels in the 70 to 260 range can be mounted on the ConSole.

The ConSole is filled with ballast (gravel, flagstones, etc.), in order to provide greater resistance to wind loading. The amount of ballast is determined according to the height of the building, its location and the nature of the installation surface. Please refer to the enclosed table for reference values with regard to the amount of ballast.

The ConSole is made of 100 % recycled, chlorine-free high-density polyethylene (HDPE). The raw materials of the ConSole comply with fire protection standards in accordance with DIN 4102 Class B2. The energy payback time for the ConSole is less than one year.

The ConSole weighs between 3-6 kg, is stackable (40 ConSoles per pallet) and has a continuous mounting border.

We would like to point out that the valid safety provisions must be observed in order to avoid accidents. Please take the necessary safety precautions.

Please check for any updated versions of the installation guide on www.renusol.com.

**We hope that you will enjoy using your ConSole
Your Renusol Solar Team.**



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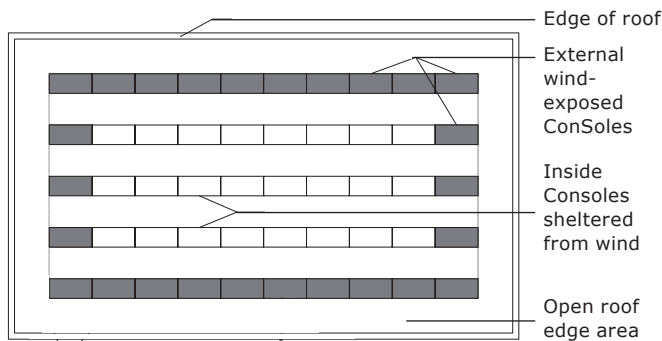
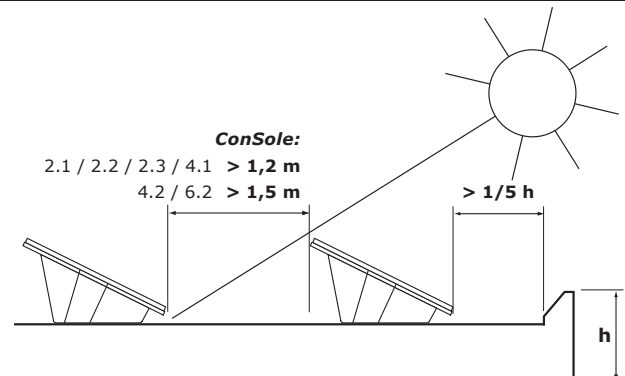
Installation Preparations

Scope of Supply

- 1 ConSole
- 2 Aluminium U Profiles
- 8 M6 x 20mm Stainless Steel Hexagonal Bolts
- 8 M6 Stainless Steel Self-Locking Nuts

Please check whether the installation surface (e.g. the roof) has been designed to sustain the required additional permanent ballast loading.

Make sure the installation surface (e.g. the roof) is even, clean and not too slippery. In the case of slippery surfaces (e.g. PVC roofing membranes or suchlike), a non-slip mat should also be used.



Required Tools

- Electric Screwdriver with a Hexagonal Bit for a 10 mm Bolt
- 7 mm Drill
- 10 mm Open-End or Ring Spanner

Position the ConSole with the opening in a southward direction. Maintain a distance from the edge of the roof of at least one fifth of the building height 'h'. (e.g. building height of 10 metres => minimum distance of 2 metres).

The minimum distance between the ConSoles is illustrated in the diagram. Add the required amount of ballast (please refer to table on page 3 for reference values).

Installation

1

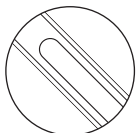
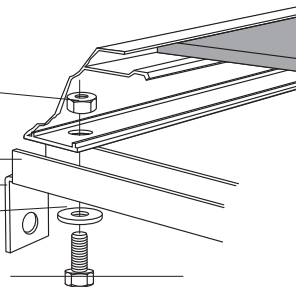
Self-Locking Nut

U-Profile

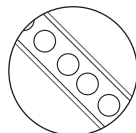
Strip

Washer

M6 Bolt



Slotted Hole



Round Hole

Mount U-profile solar onto the panel (please refer to drawing). Please make sure that the slotted hole is positioned on the higher side of the ConSole and that the small round holes are on the lower side. Please use the supplied mounting materials. Screw the bolts tight.

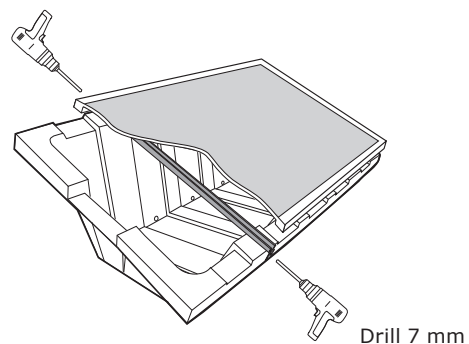
2

Connect the cables.

3

Position the solar panel symmetrically onto the ConSole. If positioned correctly, the U-profile strips should prevent the solar panel from sliding away.

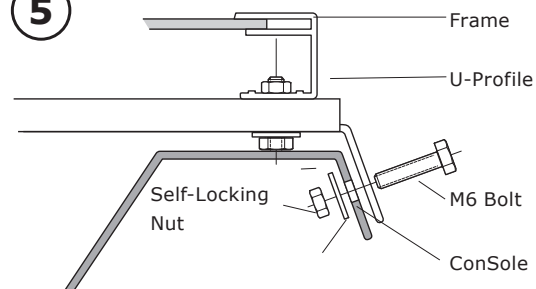
4



Drill 7 mm

Use the profiles to drill 4 holes (7 mm) in the edges of the ConSole (please refer to diagram).

5



Frame

U-Profile

Self-Locking Nut

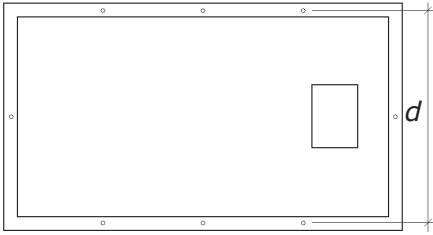
M6 Bolt

ConSole

Mount the profiles onto the ConSole with the supplied mounting materials (please refer to drawing). Please make sure that the washer is placed between the nut and the ConSole.

Finding the Right ConSole for Your Solar Panel

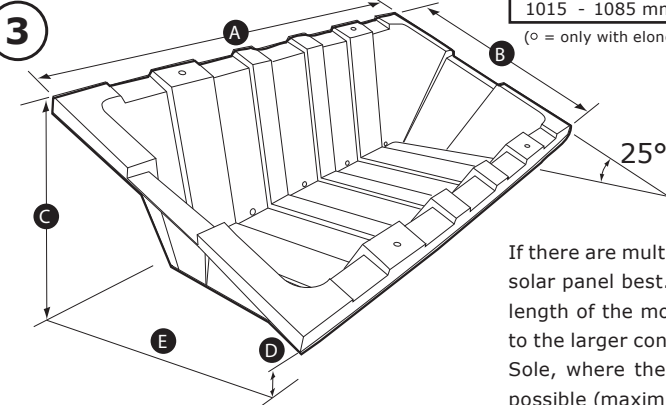
- 1** First measure the distance "d" for the mounting drill holes on the back of the solar panel.



- 2** Determine the required ConSole for the **width** of your solar panel using the table. Any elongation for rails that may be required should be listed as a separate item on the order.

Distance „d“	ConSole 2.1	ConSole 2.2	ConSole 2.3	ConSole 4.1	ConSole 4.2	ConSole 6.2
511 - 591 mm		•				
591 - 631 mm	•	•				
631 - 661 mm	•	◦				
661 - 701 mm	•	◦		•		
701 - 721 mm	◦			•		
721 - 781 mm	◦		•	•		
781 - 841 mm			•	◦		
841 - 851 mm			◦	◦		
851 - 895 mm			◦			
895 - 911 mm			◦		•	•
911 - 1015 mm					•	•
1015 - 1085 mm					◦	◦

(◦ = only with elongation rail)



If there are multiple possibilities, then select the ConSole, which fits the **length** of your solar panel best. Dimension **A** of the ConSole should correspond approximately to the length of the module. Overhanging solar panels require larger amounts of ballast due to the larger contact surface that is exposed to the wind. Please always select the ConSole, where the surface area of the solar panel extends over the edges as little as possible (maximum 12 cm on either side of Length "A").

	Hauptmaße (cm)					außen (cm)		(m ²)	innen (cm)			Höhen (cm)	
	A	B	C	D	E	A _{Boden i.M.}	E _{Boden}	Fl. _{Boden}	A _{Boden vorn}	A _{Boden hinten}	E _{Boden}	Innen _{vorn}	Innen _{hinten}
ConSole 2.1	135	73	43	13	68	107	39	0,43	110	102	39	19	36
ConSole 2.2	144	67	39	10	60	120	35	0,43	122	117	34	17,5	34
ConSole 2.3	125	86	47	11	80	98	48	0,52	110	94	48	19	38
ConSole 4.1	160	80	45	8,5	73	125	48	0,31	132	119	44	13,5	37,5
ConSole 4.2	120	105	55	10	98	94	51	0,48	97	89	50	19	42
ConSole 6.2	168	105	54	10	98	138	65	0,93	144	138	63	17,5	45,5

Determining the Amount of Ballast Required for ConSole

In order for the ConSole to withstand wind loads, it is necessary to fill the ConSole with ballast. Suitable ballast are gravel, stones, slabs or similar. Please refer to the table here for indicative ballast values. These values have been calculated according to DIN1055-4:2005-03 and Eurocode. Years of experience have proved the reliability of the system. The outer rows of Consoles have to be ballasted with higher loads according to the table. The specified values ensure that the Consoles do not tip over, slide or lift off. In order to make sure that they do not slide away, one should ensure that the friction coefficient between the roof surface and the ConSole is higher than 0.6. This value can easily be determined using a spring balance. (A ConSole filled with 100kg of ballast may only be moved with a horizontal tensile force of more than 60kg of the spring balance.)

Ballstwerte für ConSolen (kg)

Windlastzone I für Deutschland nach DIN 1055-4: 2005-03

Geländekategorie III: Vorstädte, Industrie- oder Gewerbegebiete, Wälder

Gebäudehöhe	bis 8 Meter		bis 12 Meter		bis 16 Meter	
	Innen	Außen	Innen	Außen	Innen	Außen
ConSole 2.1	50	78	59	91	66	101
ConSole 2.2	46	73	55	86	61	95
ConSole 2.3	51	82	60	96	68	106
ConSole 4.1	62	99	73	115	82	128
ConSole 4.2	58	94	68	110	77	122
ConSole 6.2	83	134	98	156	110	173

Zuschläge

Höhere Windlastzone: 30 % mehr Ballast je Stufe

Bei Einsatz der Verlängerungsschiene: 10 % mehr Ballast

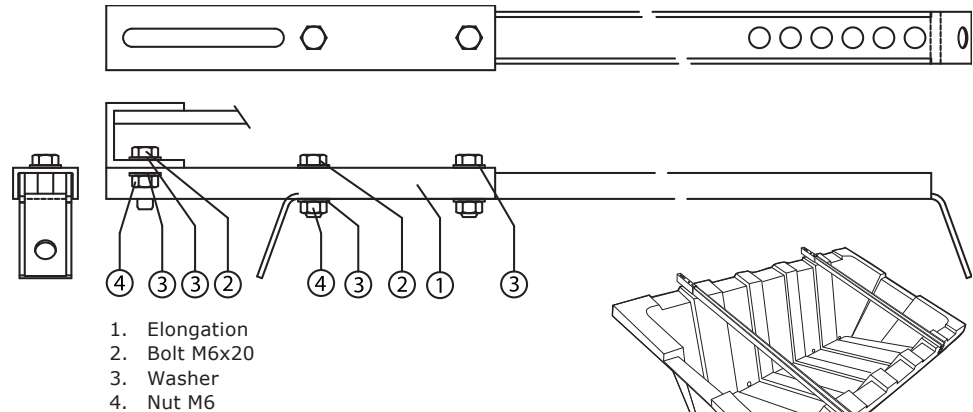
Bei seitlichem Überstand der Module: Mehrballast im Verhältnis zum Überstand

*Wind direction correction factor according to simulation model of the TNO Delft Institution

Optional elongation rails

Mount the elongation rails onto the ConSole system rails as per the diagram.

Use the screws, washers and nuts which are supplied to tighten.



Frequently Asked Questions

What is the maximum roof angle allowed for the ConSoles?

The ConSole has been designed only for flat roofs. An angle of up to 5° is acceptable.

Is it necessary to place roof protection between the roof and the ConSoles?

The ConSoles have no sharp edges, they spread the weight out over a large area of the roof and are made of relatively soft material. Based on these reasons, as well as our widespread experience, no roof protection is required, provided that the roof surface is flat and clean, unless it is to increase the friction coefficient.

Is earthing required?

The ConSole is made of HPDE, a non-conductive material. Therefore it is not necessary to earth the ConSole itself. However, if due to statutory regulations, the frame of the solar panel itself must be earthed, then these should be connected to each other so that they conduct electricity.

How much time is needed for the installation of the ConSole?

If the recommended installation method is applied (fasten the U-profile to the solar module, position the module onto the ConSole, tighten with self-locking nuts) then, in our experience, two minutes suffice per solar panel.

Can modules be placed in portrait orientation?

The ConSole is designed for installation in landscape orientation. Portrait orientation is not recommended. The top overhang must not exceed 7 cm.

How many modules fit on one ConSole?

The ConSole is designed to carry one 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 or flagstone. However, in principle, any material that has a high density and can be stored in the open air for many years without being or causing any damage may be used.

What is the operating temperature range for the ConSole?

The ConSole can be used or stored at temperatures ranging between -40 °C and 85 °C.

Does ConSole contain chemical substances that might react with the roofing?

The ConSole is made of 100% recycled HDPE (high-density polyethylene). To date no damaging reactions with the roof have been reported.

Is the material UV resistant?

The ConSole is made of blackened recycled HDPE (high-density polyethylene). This material has excellent UV-resistance characteristics. In addition extra UV-stabilisation agents have been added to the raw material. The UV-resistance characteristics have been tested according to ISO 4892.

How long is the warranty period?

The warranty period is 10 years. The expected lifetime of a ConSole is 30 years.

How many ConSoles have been installed to date?

By January 2008 more than 500,000 ConSoles had been installed. This is equivalent to an installed power of approximately 70 MWp.

Where and when was the first ConSole installed?

The first ConSole was installed in 1996 in The Netherlands.

What is the angle of the ConSole?

The irradiation angle is 25°. This is perfect for flat roofs and does not compromise unobstructed sunlight and exposure to light and wind.

How is the module ventilated?

There are unsparring ventilation slots along all sides of the ConSole, enabling free circulation of air. The temperature increase inside the ConSole is limited by the chimney-effect, which ensures the ventilation of the entire surface of the module by natural convection. This ventilation is even further improved by the extra air space of 1.5 cm provided by mounting the modules on the U-profiles. Due to its good ventilation tests have shown that there is no relevant reduction in the module performance with the use of ConSoles.

How are ConSoles manufactured?

The ConSole is a thermo-vacuum formed product manufactured using HPDE sheets with a thickness of approximately 3.5 to 4.5 mm.

Which fire protection class is applicable for the ConSole?

The material (HDPE) of the ConSole complies with fire protection standards in accordance with DIN 4102 Class B2.

What is the function of the holes at the base of the ConSole?

These are drainage holes.

What materials are the U-profiles made of and what are they for?

The U-profiles are made of aluminium. They enable customers a very simple and easy installation and provide mechanical stability for the module frame