

Solar Collector (Flat Panel)

Installation Guide, Operation & Maintenance Manual

Mounting parallel bench screw attachment system, 45° elevation. Collector FK7300



















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a cleaner future



Contents

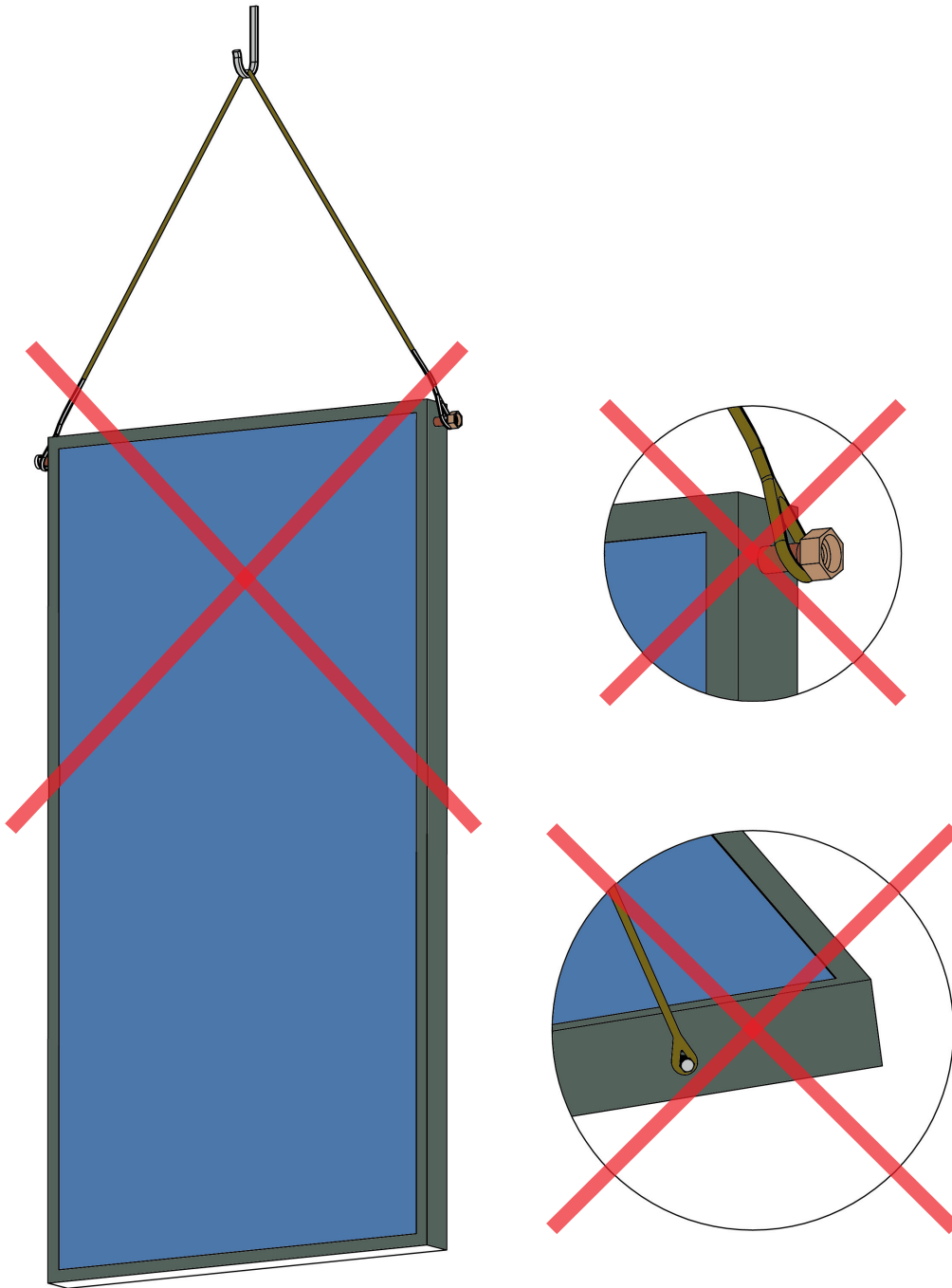
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	<p>Safety precautions: Before commencing mounting work on roofs, it must be ensured in all cases that the non-personal fall protection and fall-arrest systems required by DIN 18338 (Roof Covering and Roof Sealing Works) and DIN 18451 (Scaffolding Works) are in place. See also Builders' Protection Ordinance [Bauarbeiterschutverordnung], Federal Law Gazette 340/1994, paragraphs 7-10! Other country-specific regulations must be observed!</p>		<p>Safety harnesses should be fixed above the users whenever possible. Safety harnesses should only be fastened to sufficiently load-bearing structures or fixing points!</p>
	<p>If non-personal fall protection or fall-arrest systems cannot be installed for technical reasons, all personnel must be secured by means of suitable safety harnesses!</p>		<p>Never use damaged ladders (e.g., wooden ladders with split runners or rungs, or bent or buckled metal ladders). Never try to repair broken runners, rungs or steps on wooden ladders!</p>
	<p>Only use safety harnesses (safety belts, lanyards and straps, shock absorbers, fall arresters) that were tested and certified by authorized testing bodies.</p>		<p>Ensure that ladders are put up safely. Observe the correct leaning angle (68° - 75°). Prevent ladders from sliding, falling over or sinking into the ground (e.g. using wider feet, feet suited to the ground or hooking devices).</p>
	<p>If non-personal fall protection or fall-arrest systems are not provided, working without the use of suitable safety harnesses may lead to falls from heights and therefore cause serious or lethal injuries!</p>		<p>Only lean ladders against secure points. Secure ladders in traffic areas by suitable cordoning.</p>
	<p>Ladders not properly secured against sinking in, sliding or falling over may lead to dangerous falls!</p>		<p>Contact with live electric overhead cables can be lethal.</p>
 <p>Whenever you are near live overhead electric cables where contact is possible, only work if:</p> <ul style="list-style-type: none"> - it is ensured that they are voltage-free and this is secured for the duration of work. - the live parts are secured by covering them or cordoning them off. - the prescribed safety distances are maintained <p>Voltage radius:</p> <p>1m withvoltages up to 1000V 3m withvoltages from 1000V to 11000V 4m withvoltages from 11000V to 22000V 5m withvoltages from 22000V to 38000V > 5m in case of unknown voltages</p>			<p>Wear protective goggles when drilling and handling evacuated tube collectors (danger of implosion)!</p>
			<p>Wear safety shoes when carrying out installation work!</p>
			<p>Wear cut-proof safety gloves when mounting collectors and handling evacuated tube collectors (danger of implosion)!</p>
	<p>The manufacturer hereby guarantees to take back products identified with an eco-label and to recycle the materials used.</p> <p>Only the heat transfer medium specified may be used!</p>		<p>Wear a helmet when carrying out installation work!</p>

Transport note

ATTENTION:

Do not lift collectors by the connections or the screw threads!



Instructions for installation and transport

The installation may only be carried out by qualified personnel. Only the supplied material should be used for the installation. Please inform yourself about the applicable local norms and regulations before mounting and operating the solar system. Note: Installing a collector array signifies an intervention into an existing roof. Roof coverings, e.g. tiles, shingle and slate, especially in the case of converted and inhabited loft spaces or roofs with less than the minimum slope (with regards to the covering), require additional on-site measures, e.g. sarking, as security against water penetration caused by wind pressure and driving snow. For large collector arrays it is often advantageous to mount the collectors on a special supporting structure made of steel channels. This substructure and its connections to the main building structure should be designed on-site in accordance with the local conditions. Alternatively, it is possible to install the collectors without perforating the roof membrane by using concrete ballast with guys. The collectors are mounted on concrete blocks. Rubber mats should be used if necessary to protect the roof membrane against damage and to increase the friction between the roof and the ballast blocks. In addition, it is necessary to secure the collectors with 5mm steel cables (minimum tensile strength 1450N/mm²) to absorb any peak wind loads. The permissible roof loading and the fixing points on the building for the steel cables should be verified on-site by a structural engineer.

The use of a carrying strap is recommended for transporting the collector. The collector must not be lifted at the connections or on the threading. Avoid impacts and mechanical action on the collector, especially on the solar glass and the pipe connections. If the aluminium tray collectors have a protective coating, this must be protected from sunlight and removed just before installation.

Structure

The collectors may only be mounted on sufficiently load-bearing roof surfaces and substructures. The structural load-bearing capacity of the roof and the substructure must be tested on-site before mounting the collectors. Here, particular attention should be paid to the quality of the timber substructure in terms of the stability of the screw joints necessary for installing the collectors. In particular, it is essential to have the entire collector structure verified at the installation site according to DIN 1055, Part 4 & 5 or according to country-specific regulations in regions with heavy snowfalls (Note: 1m³ powder snow ~ 60kg/1m³ wet snow ~ 200kg) or in regions with high wind speeds. The assessment should also take into account any special features of the particular site that could lead to increased loads (foehn wind, air jets or eddy formations, etc). Collector arrays should always be installed in such a way that any possible snow piles caused by snow trap grids (or the position of the collectors) do not reach the collectors. Here must be at least 1m distance from roof ridging or edges.

Lightning protection / Equipotential bonding of the building

It is not necessary to connect collector arrays to the lightning protection of the building (please observe the country-specific regulations). For installations on metal substructures at the installation site, authorized lightning protection specialists must be consulted. The metal tubes of the solar circuit must be connected to the main potential equalization bus by means of a conductor (green/yellow) with a cross-section of at least 16mm² CU (H07 V-U or R). It is possible to ground the collectors to a ground rod. The grounding line must be laid outside the house. The ground rod must also be connected to the main potential equalization bus by a line with the same cross-section as above.

Connections *(screw connections)*

Depending on the design, the collectors must be connected with one another and/or the connection pipes using screw fittings (1" internal/external thread) with flat-face sealing. Ensure correct placement of the flat gaskets. If flexible pipes are not used as connectors, precautions must be taken to protect the connection pipes against temperature fluctuations caused by heat expansion (expansion bends/flexible piping). In this case, no more than 6 collectors may be connected in series. Larger collector arrays must be assembled with expansion bends or flexible members inserted in the links (IMPORTANT: check the pump design). When tightening the connections, always apply counter-pressure with a wrench or another spanner to prevent damage to the absorber.

Collector inclination / General notes

The collector is suitable for angles between 15° (minimum) and 75° (maximum).

Steps must be taken to ensure that water and other contaminants such as dust, etc. are prevented from getting into the collector connections and ventilation holes.

Connecting support rails

If several support rails are to be mounted in series, they must be connected with the connectors above and below.

Warranty

Warranty claims can only be made if the supplier's own antifreeze is used and maintenance is carried out correctly.

Overview of tools



Measuring tape



Drill



Ø 8 mm twist drill (wood)



Ø 14 mm stone drill (brick)



Hex spanner



Angle grinder



Hacksaw



Installation wrench

Overview of materials



Bench screw M12*350



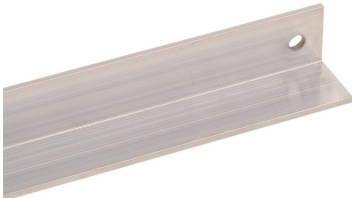
Rubber seal



Washer, hex nut M12



Ø 9 mm clamping piece



Base bracket, Support bracket



Attachment bracket



Support rail



Connecting piece



M8*30, hex bolt, washer, hex nut

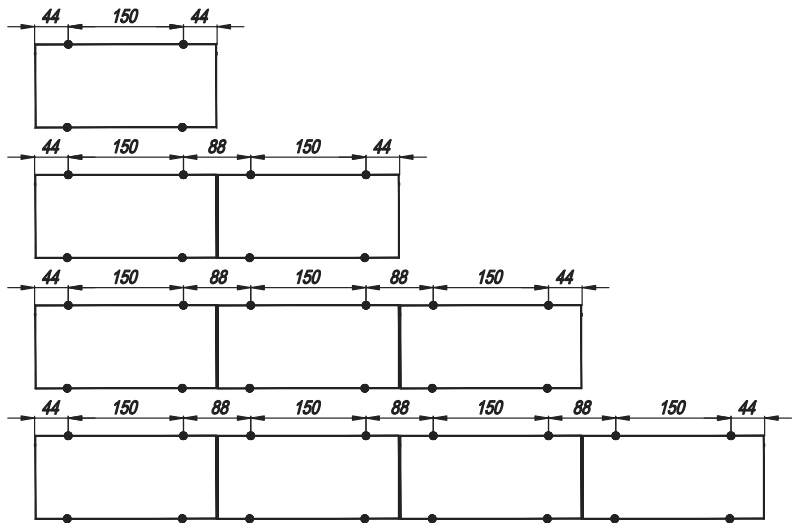
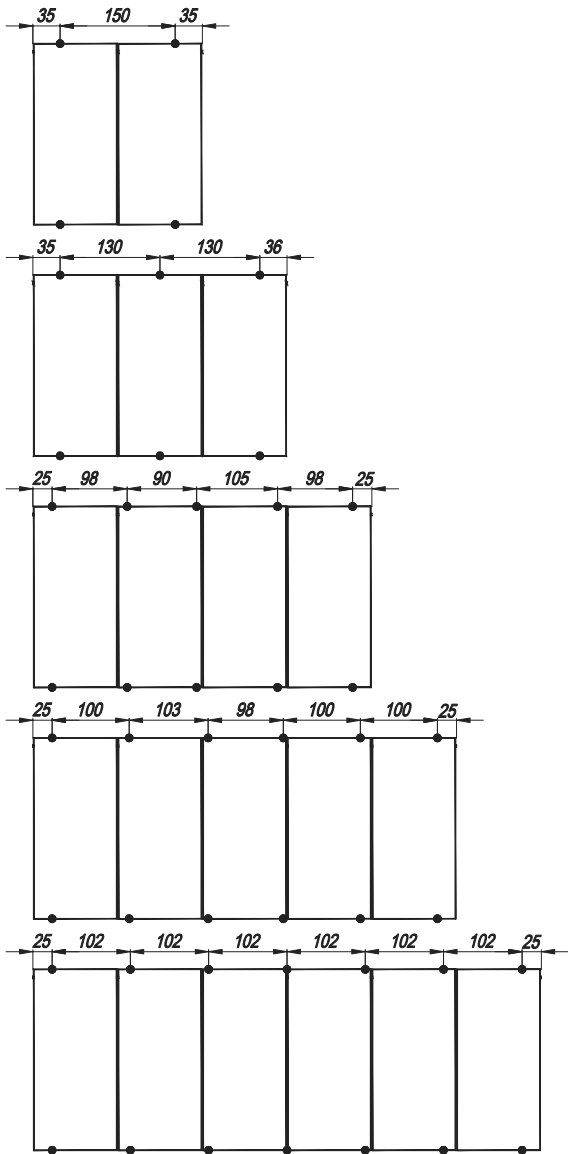


Flat gasket

Suggestion for attachment points

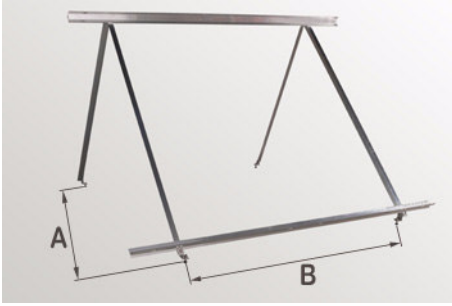
COLLECTOR vertical		
Collectors	Total length	Attachment points
2	220cm	4
3	332cm	6
4	441cm	10
5	551cm	12
6	662cm <td 14	

COLLECTOR horizontal		
Collectors	Total length	Attachment points
1	238cm	4
2	476cm	8
3	714cm	12
4	952cm	16



Mounting system, 45° elevation

1



The attachment points must be measured precisely for this type of installation

- 1: A = COLLECTOR in a vertical position: 167cm
A = COLLECTOR in a horizontal position: 92cm

Generally, the following applies:
one support per vertical collector,
two supports per horizontal collector

- 2: Drill background / Ø 8 mm timber , concrete as required

2



3

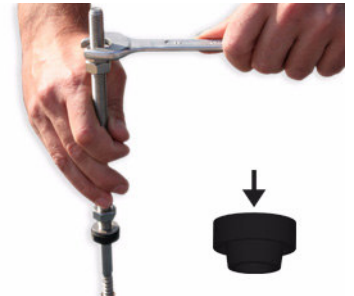


- 3: Attach rubber seal. Screw in and tighten.

Assemble in following sequence: rubber seal – washer – nut

- 4: Fasten bench screw, minimum screw depth Βετριεβσεμπεηλυνην
100mm

4



Mounting system, 45° elevation

5: Set fixing angle to a common height and secure in place (dimension C is approx. 45mm).

Sequence: Nut - attachment bracket - washer - nut

5



6



6: Cut off excess length of bench screw

7: Mount the clamping pieces on both sides of the support brackets

Sequence: screw - washer - clamping piece - base bracket - nut

7



8



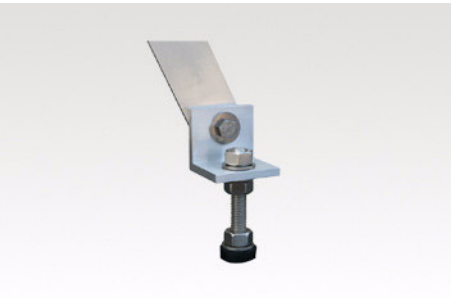
8: Secure the base brackets with screws to the attachment brackets at the front.

Sequence:

screw - attachment bracket - base bracket - washer - nut

Mounting system, 45° elevation

9



9: Secure the support brackets with screws to the attachment brackets at the back.

Sequence:

screw - attachment bracket - support bracket - washer - nut

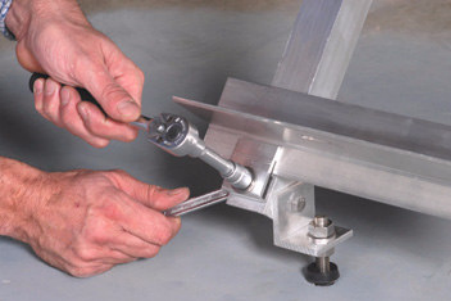
10: Secure the base brackets with screws to the attachment brackets.

Sequence: screw - washer - base bracket - support bracket - nut

10



11

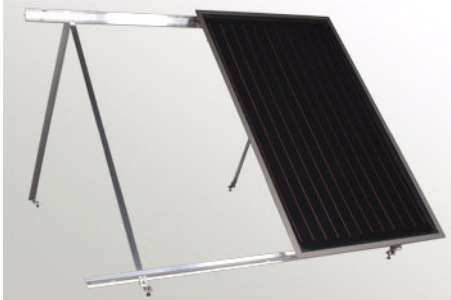


11: Align the support rails at the top and bottom and attach to the grooved surface using the clamping pieces.

Sequence: screw - washer - clamping piece - nut

Mounting system, 45° elevation

12a



12b



12c



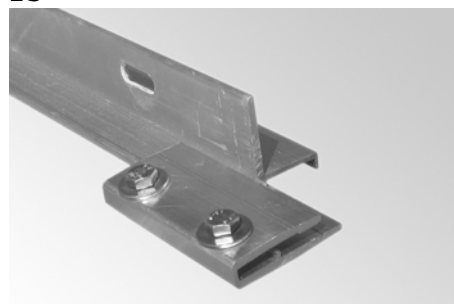
12: Insert the collectors and attach them to the support rails with screws.

Sequence: screw - washer - support rail - collector

13: Connecting other support rails

Sequence: screw - washer - connecting piece - nut

13



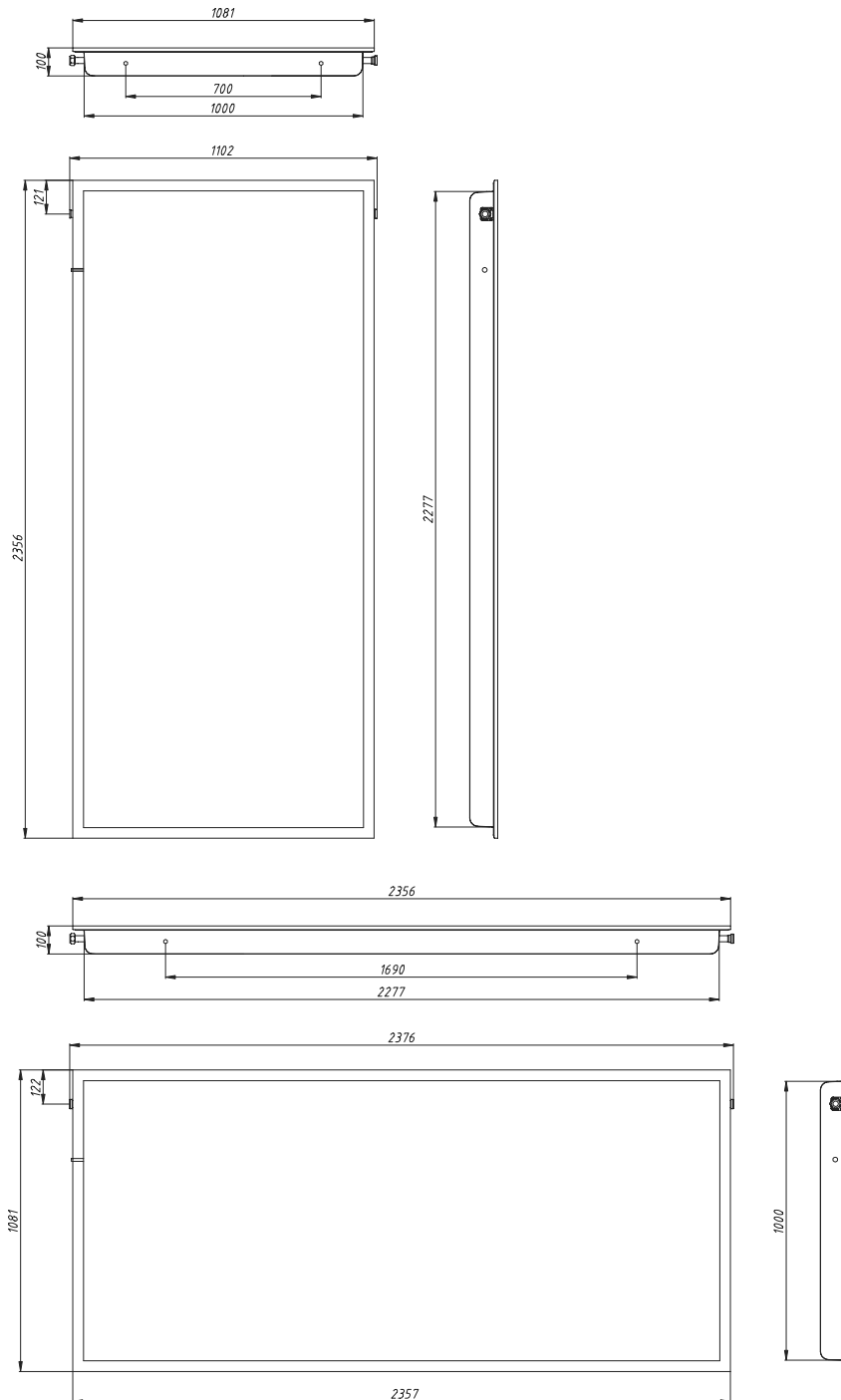
14



14: Hydraulically connecting collectors to one another

Information about the collector

Technical data					
Gross area	m ²	2,55	Weight	kg	48
Net area	m ²	2,21	Contents	l	1,5
Apertur	m ²	2,29	max. Pressure	bar	10



Operating tips

Flushing and filling

For safety reasons, you should only fill the collectors when there is no direct irradiation from the sun (or cover the collectors). Especially in regions exposed to frost, for flat plate collectors you should use a mixture of (FS) antifreeze with water (40% antifreeze).

Attention: Antifreeze must be mixed with water before filling!

Recommended antifreeze for flat plate collectors: FS

Note: 40% proportion of antifreeze - freezing point: -22° C/solidification point: -26° C
50% proportion of antifreeze - freezing point: -32° C/solidification point: -44° C

It may not be possible to completely empty collectors once they have been filled. For this reason, collectors exposed to frost should only be filled with a water/antifreeze mixture, also for pressure and function tests. Alternatively, the pressure test can also be carried out using compressed air and leak detection spray.

Installing the temperature sensor

The temperature sensor should be installed in the sensor sleeve nearest to the collector array flow. To ensure optimal contact between the sensor and the surrounding environment, the gap between the sensor sleeve and the sensor element should be filled with a suitable conducting compound. All materials used for installing temperature sensors (sensor element, conducting compound, cables, sealing and insulating materials) must be suitably temperature resistant (up to 250° C).

Operating pressure

The maximum operating pressure is 10 bar.

Bleeding

The system must be bled:

- when commissioning the system (after filling the collectors)
- 4 weeks after commissioning
- when necessary, e.g. if there are malfunctions

Warning: Risk of scalding due to steam and hot heat transfer fluid!

Only operate the bleeding valve if the temperature of the heat transfer fluid is < 60° C.

When bleeding the system, the collectors must not be hot! Cover the collectors and, if possible, bleed the system in the morning.

Check heat transfer fluid

The heat transfer fluid must be checked every two years with regard to its antifreeze and pH value.

- Check antifreeze using antifreeze tester and replace or refill if necessary!
Target value is ca. - 25° C and - 30° C depending on climatic conditions.
- Check pH value with a pH indicator rod (target value approx. pH 7.5):
If the limit pH value is less than \leq pH 7, replace the heat transfer fluid.

Maintenance of the collector

The collector or the collector array must be inspected visually, once a year, for any damage, leaks and contamination.

Additional recommendations on operation and maintenance can be found in the supplier's general documentation and instructions on commissioning and maintenance.

Connecting the collectors to one another

The diagram below is an example of how the collectors can be connected to one another. However, the actual connection may be different depending on structural conditions. A maximum of 6 collectors may be connected in a series! If a collector panel is made up of more than 6 collectors, the panel must be connected several times in parallel

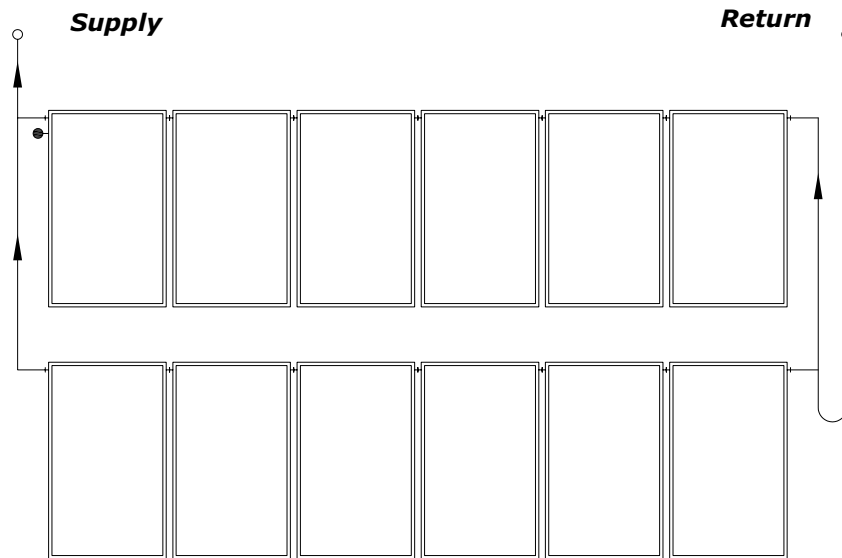


Figure 1

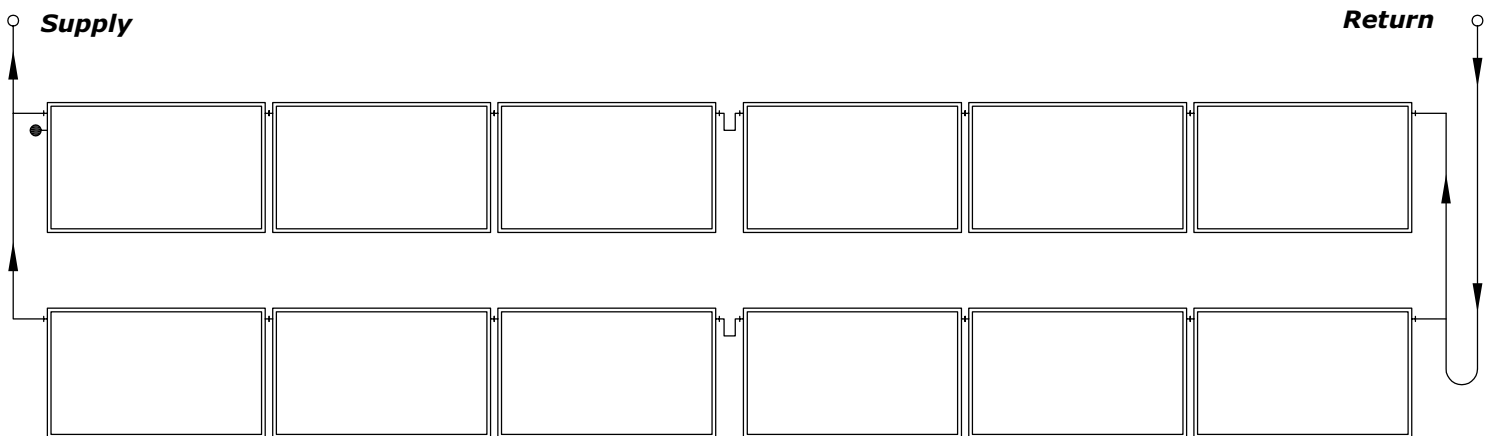


Figure 2

Operating tips

Mass flow rate

To ensure the performance of the collector, a specific flow rate of 30 l/m²h is to be selected up to a collector panel size of approx. 25m².

Pipe diameters

Dimensions table with a specific flow rate of 30 l/m²h

Collector panel size [m ²]	approx. 5	approx. 7.5	approx. 12.5	approx. 25
Pipe diameter / copper [mm]	10 - 12	15	18	22
Pipe diameter / stainless steel corrugated pipe	DN16		DN20	

Pressure loss collector (Figure1-vertical) for anti-freeze / water mixture (40% / 60%) at a thermal conducting temperature of 50° C.

Pressure loss curve: $\Delta p = 0,00003x^2 + 0,0284x$

Mass flow rate [kg/h]	0	50	100	150	200	250	300	350	400	450	500
Pressure loss [mbar]	0	2	6	11	18	26	36	47	59	74	89

Pressure loss collector (Figure2-horizontal) for anti-freeze / water mixture (40% / 60%) at a thermal conducting temperature of 50° C.

Pressure loss curve: $\Delta p = 0,00008x^2 + 0,0018x$

Mass flow rate [kg/h]	0	50	100	150	200	250	300	350	400	450	500
Pressure loss [mbar]	0	1	2	4	6	8	10	13	16	19	23

Guarantee and Warranty

No liability is accepted for incorrect use, unauthorized changes to the assembly components, or the resulting consequences.

All information and instructions in this manual refer to the current state of development. Please always use the respective assembly instructions supplied with the collectors.

Figures and illustrations used. Due to the possibility of setting and printing errors, and to the need for continuous technical change, please understand that we cannot accept liability for the correctness of the data.

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