

Installation manual On roof mounting/ Flat roof mounting

Vacuum tube collectors

WIKOSUN HP 70 – 8 WIKOSUN HP 70 – 16 WIKOSUN HP 70 – 24

for roof angles from 5° to 90°



Installation and commissioning should be undertaken by a specialist.

General terms and conditions of warranty state that all installations must be performed by a suitably trained and qualified plumber by taking into account local norms and regulations.

Factory warranty will only be covered if the installation instructions are followed.

Warranty does not cover any damages, caused by non-observance of this manual.

The correct functioning is only guaranteed if the installation instructions are followed.

The system is to be checked annually by a specialized company. Independently, occurring defects must be repaired immediately.

This document should be handed over to the client on completion of works.

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1 Transport and storage of collectors

Collectors should be transported in their packaging horizontally (glass facing upward) or vertically. It must be ensured that collectors can at any time be safely put down (e.g. tilting danger by wind, endangering of other people). Collectors should never be put down over the edge! Please take special precaution while transporting the collectors on the roof. If collectors can not be put down at any time and/or if a risk of slipping exists, auxiliary material like safety ropes should be used. Store collectors in closed and sun-protected areas either horizontally with the glass facing upward or in an upright position. Do not stack collectors on their connectors.

2 Installation in general

Prior to installation:

- Check the content of the delivery with the delivery note!
- Read the installation instructions carefully and pay attention to the different steps!
- Respect the safety instructions!
- If the collectors are installed on roofs with high wind or snow loads (> 1.0 kN/m²), the load must be distributed across additional mounts.

3.1.1 Snow/wind load

- For structural analysis purposes, we recommend calculations according to DIN 1055. Calculations of the pressure coefficients (wind) and shape coefficients (snow) are carried out with reference to DIN 1055 -100, DIN 1055-4 and DIN 1055-5. Determine the values of local snow loads according to country-specific data.
- Determine the values of local wind loads according to country-specific data. The loads that exist locally (in kN/m²) must be determined according to the nationally applicable norms. In the case of intermediate values, no interpolation should be done; instead, the next higher value should be selected.

Calculation of snow and wind load

w	=	Wind load
c_p	=	Pressure coefficient
q	=	Dynamic blast pressure for the reference weight kn
ρ	=	Density
V	=	Wind speed
W_k	=	Wind speed on collector
W	=	Lifting force
1600	=	Coefficient from vdi

At certification the collectors are tested with 1000 Pa.

In snowy areas with snow fall exceeding 1 m, the use of additional collector rails for stabilization is mandatory.

The relevant surface of HP 70-24 is A=4,3 m², weight 78,0 kg ⇒ 0,780 kN

$$W_k = A \times w = 4,3 \text{ m}^2 \times 1,0 \text{ kN/m}^2$$

$$W_k = 4,3 \text{ kN}$$

reduced by collector weight

$$W = W_k 4,3\text{kN} - 0,780 \text{ kN} = 3,52 \text{ kN}$$

The relevant surface of HP 70-16 is A=2,92 m², weight 56 kg ⇒ 0,56 kN

$$W_k = A \times w = 2,92 \text{ m}^2 \times 1,0 \text{ kN/m}^2$$

$$W_k = 2,9 \text{ kN}$$

reduced by collector weight

$$W = W_k 2,92 \text{ kN} - 0,56 \text{ kN} = 2,36 \text{ kN}$$

The relevant surface of HP 70-8 is A=1,4 m², weight 28 kg ⇒ 0,28 kN

$$W_k = A \times w = 1,4 \text{ m}^2 \times 1,0 \text{ kN/m}^2$$

$$W_k = 1,4 \text{ kN}$$

reduced by collector weight

$$W = W_k 1,4 \text{ kN} - 0,28 \text{ kN} = 1,12 \text{ kN}$$

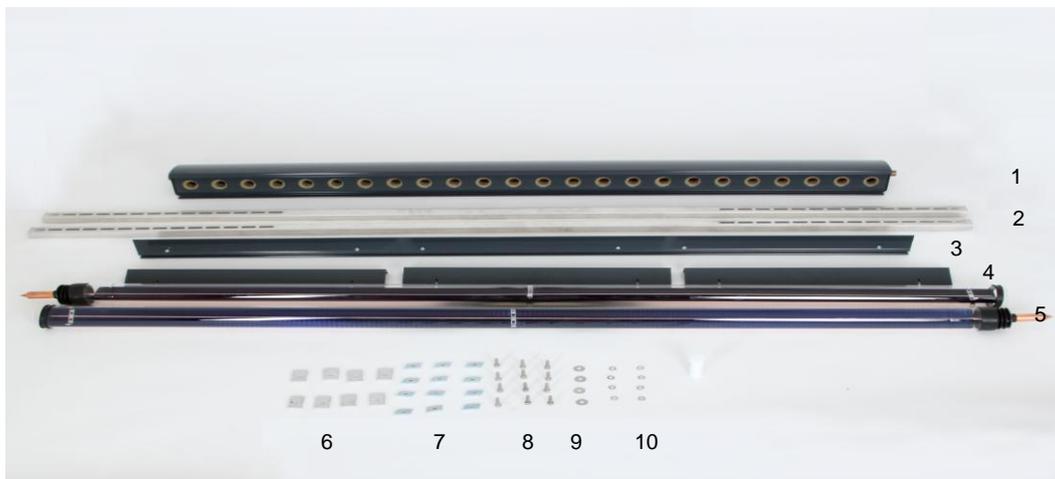
3 Installation

3.1 Kits vacuum tube collector HP 70

Collector modules for 8, 16 and 24 tubes (excl. tubes) as well as a vacuum tube set of 8 tubes are offered for the vacuum tube collector WIKOSUN HP 70.

Kits	Content	Nr.
Module WIKOSUN HP 70 – 8/16/24	Manifold casing for HP –tubes	1
	Side bar	2
	Toe bar	3
	Cover toe bar	4
	Cage nut	6
	Clamp	7
	Hex socket head screw M8x25	8
	Lock washer M8	9
	Flat washer M8	10
	Set vacuum tubes	Heatpipe vacuum tube HP 70

Chart 1: Kits vacuum tube collector HP 70



3.1.1 Connection accessories

Connection accessories	Content
Connection kit ST-AVS-2.1DF	Compression cross piece 22 x R3/4FD x Rp1/2 x Rp 1/2
	Compression elbow 22 x 3/4FD
	Vent valve R1/2
	Copper seals
	Collector sensor pocket 1/2" x 160mm with cable fitting
Extension kit ST-AVS-1.1S	Compression fitting 22 x 22 mm

Chart 2: Connection accessories

3.1.2 Necessary tools

Necessary tools	Application
Socket key or ratch with extension SW 13	Installation of carriers, profile rails and Z-clamps
Combination spanner SW 13	
Open-ended spanner SW 21	Sensor pocket
Open-ended spanner SW 32	Parallel compression fitting
Pipe tongs	Pre-drill of rafter brackets Removal of drainage area
Drill d=5,5 mm	
Angle grinder	

Chart 3: Tools list

3.2 On roof mounting – vertical installation

3.2.1 Fastening sets „on roof mounting“ – vertical installation – roof angles from 5°- 90°

Various fastening sets (tile, adjustable tile, slate, plain tile, corrugated fibre cement, profiled sheeting, stair bolts, standing seam clamp) are offered for the vertical/horizontal installation of WIKOSUN HP 70. Each fastening set consists of two mounting anchors. The total quantity of anchors needed is defined by the number of collectors to be installed and the rafter spacing.

Fastening set	Content
ST-BFS-Z	2 roof hooks tile , 6 wood screws 8x80, 6 washers
ST-BFS-ZV	2 roof hooks adjustable tile, 6 wood screws 8x80, 6 washers
ST-BFS-B	2 roof hooks plain tile, 6 wood screws 8x80, 6 washers
ST-BFS-S	2 roof hooks slate, 6 wood screws 8x80, 6 washers
ST-BFS-BL	2 clamps for rolled steel joist , 2 screws M8, 2 nuts M8
ST-BFS-ST	2 stair bolts M10, 2 ears, 6 nuts, 2 seals
ST-BFS-T	2 roof hooks profiled sheeting
ST-BFS-W	2 roof hooks corrugated sheet iron roofs
ST-BFS-BL/ST/T/W	2 nuts M8, 2 washers, 2 tubular stiffeners, 2 screws M8

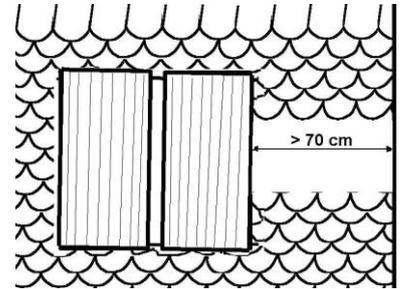
Chart 4: Fastening sets „on roof mounting“ – vertical installation

3.2.2 Positioning of collectors

Wind loads on roofs can create suction forces on the solar collectors. In order to minimize suction forces, the distance between the outer edge of the roof and the collector should be minimum 70 cm (about 3 tiles). The distance from the roof ridge should be approx. 2 tile rows.

ATTENTION:

Before assembling, the collector pipes can become very hot at the top end from diffuse sun radiation (>200 °C). Therefore, the pipes should be covered before assembly and also to be protected against impact.
Allowed operating pressure: 6 bar.

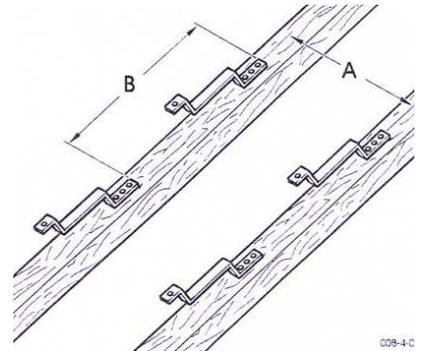


3.2.3 Evaluation of the mounting place

The roof covering and static should be observed while choosing the adequate sockets. Establish the position of the equipment, possible shadow sources (trees, higher roofs etc.).

Mark the corner positions of the collector field, as well as the position of the sockets, i.e. fastening spots according to the following measure default:

Wikosun HP 70-8	A	500 mm	600 mm
	B	1600 mm	1800 mm
Wikosun HP 70-16	A	600 mm	800 mm
	B	1600 mm	2000 mm
Wikosun HP 70-24	A	1200 mm	1680 mm
	B	1600 mm	2000 mm



To assemble several modules in a line, the following external dimensions are valid:

HP 70		HP 70		HP 70	
tubes	~ external dimensions	tubes	~ external dimensions	tubes	~ external dimensions
8	700 mm	32	2600 mm	56	4500 mm
16	1300 mm	40	3200 mm	64	5100 mm
24	1900 mm	48	3800 mm	72	5700 mm

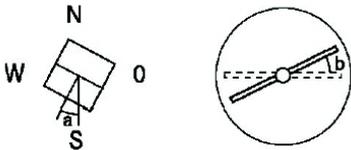
- The roof should be penetrated above the collector
- Maximum 72 tubes can be installed in line, in case of further tubes a parallel connection is required.
- When parallel connection is applied, the collector fields should show the same surface and a connection according to Tichelmann or control valves must be foreseen in order to guarantee a continuous flow of the different collector fields

For the connections and connecting tubes, an additional lateral distance of 30 cm should be taken into consideration.

In case of several lines one after another, we recommend a distance of min. 50 cm to ensure an easy access.

3.2.4 Positioning of collectors

If the roof is not exactly South oriented, but presents a deviation angle **a**, the collector pipes should be horizontally turned to the angle **b**, direction of the sun at noon.

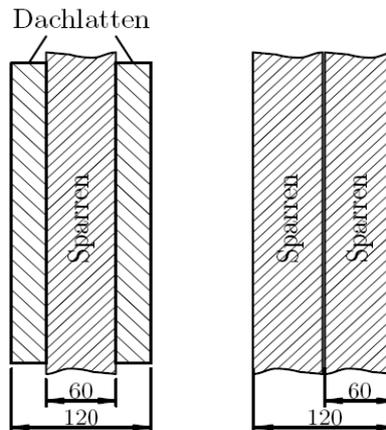


Roof inclination 45 °
 Deviation from south **a** 10° 20° 45°
 Pipes rotation **b** 7° 14° 30°

Roof inclination 30 °
 Deviation from south **a** 10° 20° 45°
 Pipes rotation **b** 5° 10° 26°

If the rafter width is greater than 80mm, brackets can be fixed without any problems. Smaller rafters should be doubled or trebled in width at the point where brackets are to be fixed to them.

If a foil under the roof tiles exist and is harmed during installation, the opening should be sealed accordingly. Remove the drainage area of the tiles where brackets are located and close the roofing.



3.2.5 Installation of brackets

Mount the upper, left bracket first by removing the tile from the rafter. Fix the bracket with two screws M8x60. Mark the position of the tile, cut the opening with an angle grinder and insert the tile again.

Apply the same method for the remaining three brackets. The brackets should be aligned horizontally and vertically.



3.2.6 Installation of side bars

Take one side bar (2) and install it in a vertical position on the brackets by using two hex socket head screws M8 x 25 (8), two cage nuts (6) and two flat washers M8 (10).

Arrange the bar as much as possible centrally. We recommend to mount the brackets preferably in the 7th/8th punching measured from the end of the side bar.



Repeat the procedure for the second side bar (2).

3.2.7 Installation of manifold casing and toe bar

Mount the clamp in the 1st and 5th punching at the upper part of both bars by using one hex socket head screw M8 x 25 (8), one lock washer M8 (9), one clamp (7) and one cage nut (6) each. Screw the clamp loose.



Put the manifold case (1) on top of the side bar (3) and arrange it centrally. Clamp the manifold casing between the joists and tighten the screws.



Take the lower part of the toe bar (3) and arrange it centrally on the side bars (2).

Fix the toe bar (3) loose in the first punching at the lower part of both side bars (2) by using one hex socket head screw M8 x 25 (8), one flat washer (7) and one cage nut (6).



Tighten the toe bar between the clamps and fix it by tightening the screws.

3.2.8 Installation of vacuum tubes

Put the tube bottom into the pre-cut master plate of the toe rail. Make sure that only the rubber band of the tube lays on the metal edge.

We recommend to install the outer tubes first and to verify the correct alignment of the toe rails afterwards.

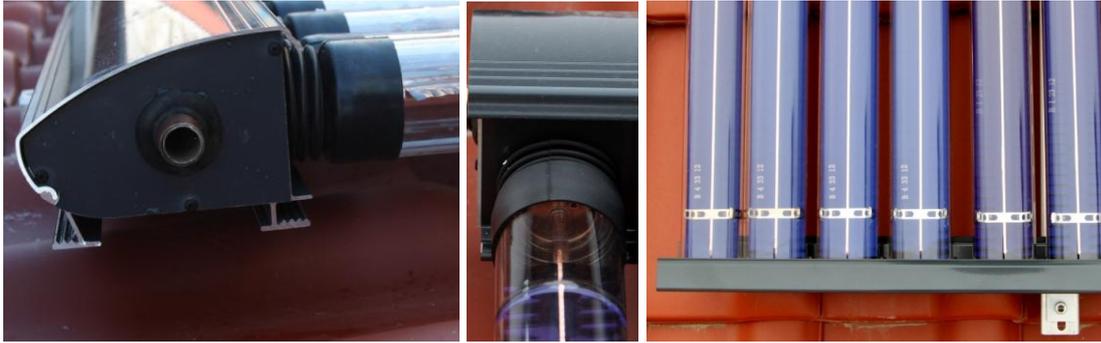


Proceed with the installation of further tubes in the exact same manner.

The toe bar cover is delivered in parts for 8 vacuum tubes. Take the first part of the toe bar and insert it from ahead into the designated gap of the bottom part. Hook the cover at the bottom part. Make sure that both parts of the toe bar are justified. Fix the cover of the toe bar in the front and continue with the remaining cover parts accordingly.

Remark: Avoid to strongly depress the cover of the toe bar as this may damage the tubes or the side bars respectively.

Hint: Always take the cover of the toe bar on the edges.



3.2.9 Connection of the collector

Mount the T-pieces to the flow and return of the manifold casing. Fix the immersion sleeve for the temperature sensor at the collector exit (hot side).

Remarks: Due to different sensor types, the system may work without a directly inserted immersion sleeve. Please consider the technical data of the temperature sensor.

Connect the flexible metal tubes to the T-pieces. Install an air relief valve at the highest possible collector point.

Put the metal tubes through the roof penetration into the building by using special ventilation tiles for the roof penetration.



3.2.10 Installation of several collectors in line

For further collectors, begin with the roof construction. Fix the side bars and install the clamp before connecting the casings.

Put the compression fitting on the connecting piece of the manifold casing and tighten the nut.

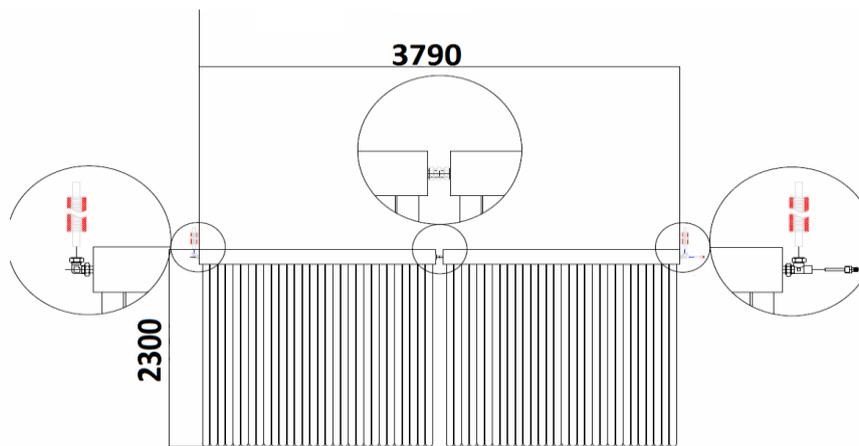
Put a second nut and the clamp ring on the connecting piece of the manifold casing to be mounted.

Put the two elements together and align them. Make sure that both connecting pieces have got enough play.

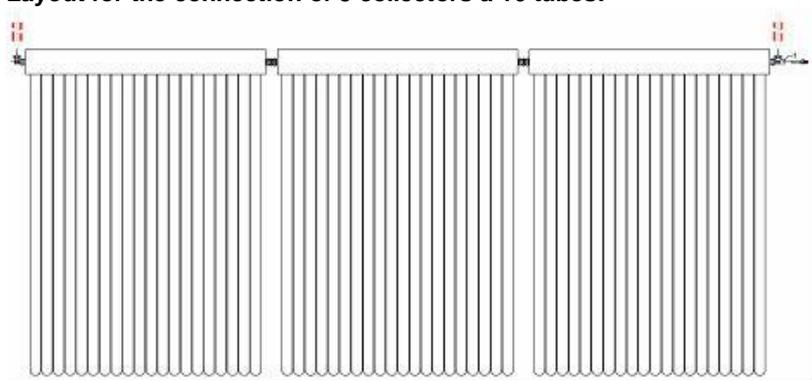
Tighten the nut of the connection and the clamp of the second collector element. Make sure that the connection of both collectors is stable.

Finally, install and fix the vacuum tubes.

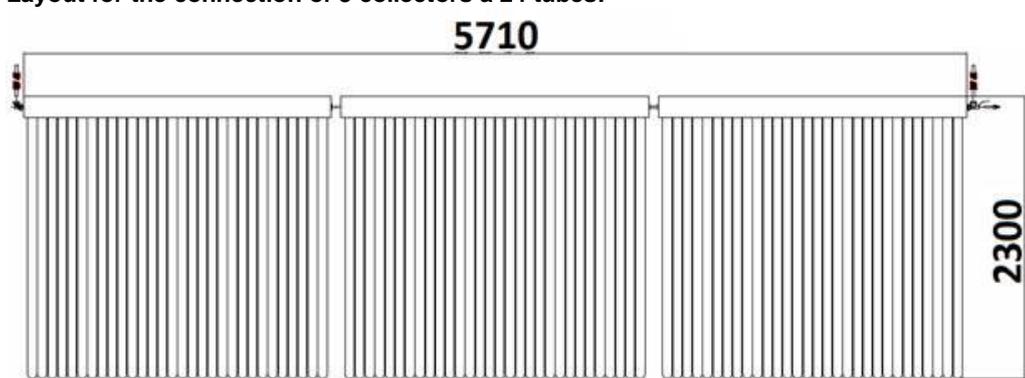
Layout for the connection of 2 collectors:



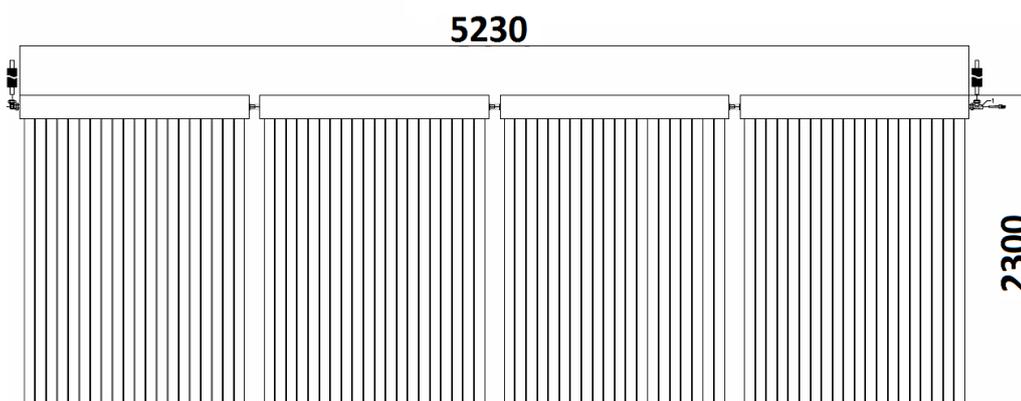
Layout for the connection of 3 collectors à 16 tubes:



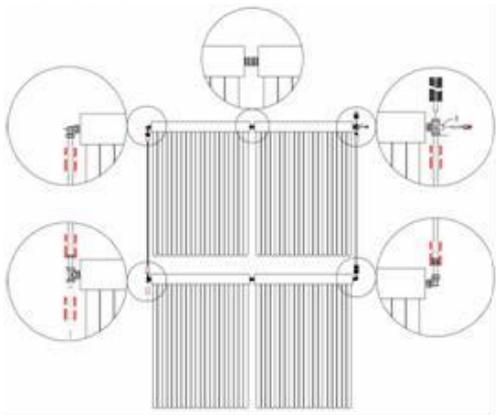
Layout for the connection of 3 collectors à 24 tubes:



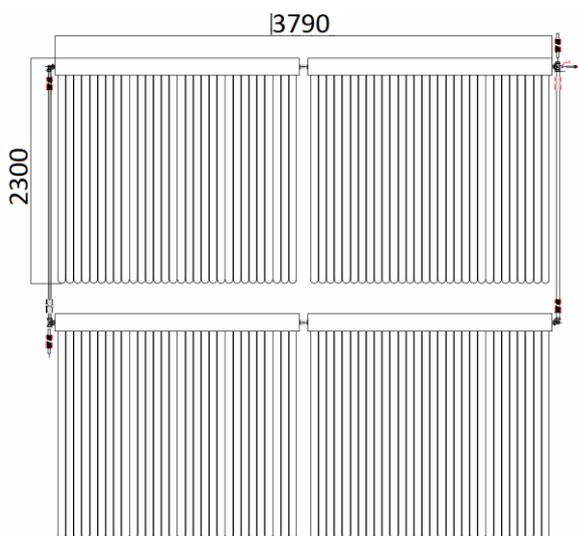
Layout for the connection of 4 collectors à 16 tubes – in line :



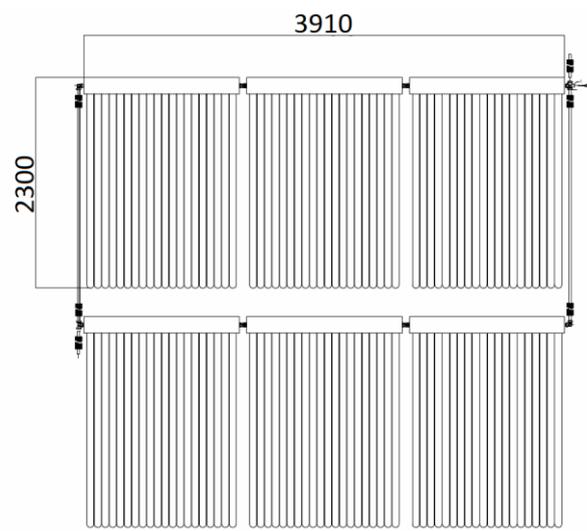
Alternative



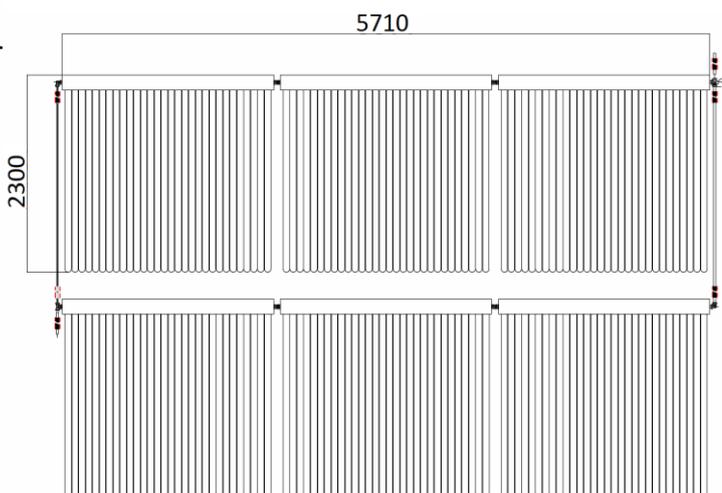
Layout for the connection 4 collectors à 24 tubes:



Layout for the connection 6 collectors à 16 tubes:



Layout for the connection 6 collectors à 24 tubes:



3.3 Flat roof mounting – vertical installation

3.3.1 Mounting sets „flat roof mounting“ – vertical installation – roof angles from 30 - 60°

A basic kit (for 1-2 collectors) and an extension kit (for 1 collector) are offered for the vertical installation of HP 70.

The basic kit consists of two carriers comprising angle sections with an adjustable tilt angle (30/45/60°), two back bars comprising flat sections, and a screw set.

The extension kit consists of a carrier comprising angle sections with an adjustable tilt angle (30/45/60°), a back bar comprising a flat section and a screw set.

Fastening set	Content
Basic kit for 1-2 collectors WIKOSUN HP 70 ST-BFS-1FVG	2 Angle sections aluminum 40 x 40 mm, s = 4 mm, l = 1875 mm
	2 Angle sections aluminum 40 x 40 mm, s = 4 mm, l = 2140 mm
	4 Angle sections aluminum 35 x 55 mm, s = 8 mm; l = 50 mm
	2 Flat sections aluminum l = 500 mm, s = 5 mm
	2 Flat sections aluminum l = 1920 mm, s = 5 mm
	15 Hex head screws, stainless steel M8 x 20 mm
	15 Hex nuts, stainless steel M8
Extension kit for 1 collector WIKOSUN HP 70 ST-BFS-1FVE	1 Angle section aluminum 40 x 40 mm, s = 4 mm, l = 1875 mm
	1 Angle section aluminum 40 x 40 mm, s = 4 mm, l = 2140 mm
	2 Angle sections aluminum 35 x 55 mm, s = 8 mm; l = 50 mm
	1 Flat section aluminum 40x5, l = 500 mm
	1 Flat section aluminum 40x5, l = 1920 mm
	7 Hex head screws, stainless steel M8 x 20 mm
	7 Hex nuts, stainless steel M8
7 Lock washers M8	

Profile rail set	Content
ST-ADM-1.3P	2 Profile rails 35x35x700mm, 4 screws M8x35, 4 nuts M8, 4 washers
ST-ADM-2.3P	2 Profile rails 35x35x1300mm, 4 screws M8x35, 4 nut M8, 4 washers,
ST-ADM-3.3P	2 Profile rails 35x35x1900mm, 4 screws M8x35, 4 nuts M8, 4 washers
ST-ADM-V	2 Alu angle 180mm, 8 screws M8x20, 8 nuts M8, 8 lock washers

Chart 5: Fastening sets and profile rail sets „flat roof mounting“ – vertical installation

3.3.2 Mounting possibilities

Wind loads on roofs can create suction forces on the solar collectors. In order to minimize suction forces, the mounting frame must be installed as follows.

The subsurface must be sufficiently sustainable and appropriate for the weights to be installed. Hence, it is important to verify in advance the static appropriateness as well as the allowed distributed load.

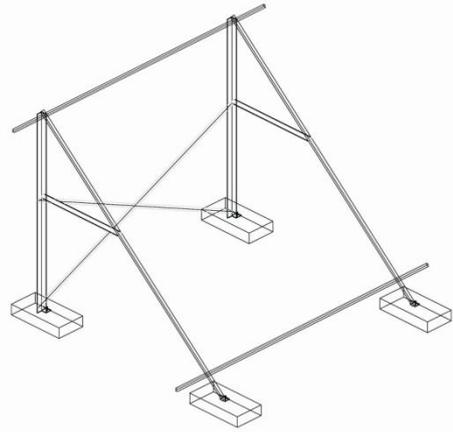
If the mounting frame will not be connected with the subsurface (structure, roof sub-construction), a loading of at least 200 kg per collector is required (see chart 6). Additionally, the mounting frame can be connected with wire-ropes at fixed hold points. Support elements and fasteners must be provided by the installer. Moreover, in order to avoid wind noise to a large extent, the mounting frame must be installed at least 1 m from the roof edge. In areas with high wind speed or big construction heights, the loading must be unconditionally calculated.

Height of construction	Vertical installation
0 – 5m	300 kg
5 – 10 m	350 kg
10 – 20 m	400 kg
> 20 m	Calculation necessary

Chart 6 : Loading per collector

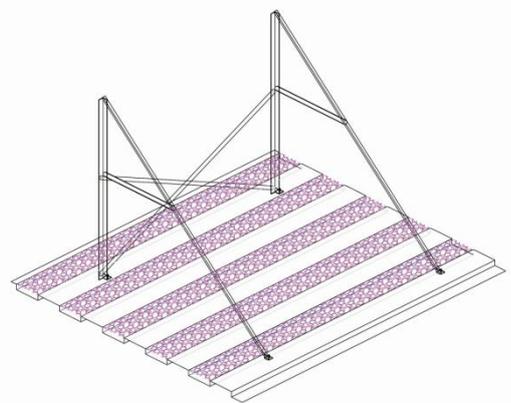
3.3.3 Installation of the mounting frame on mass elements e.g. concrete slab

The frame base can be installed e.g. on large concrete slabs (e.g. ST-GWE-20). Please note that the concrete slabs (mass elements) must be degenerated by an additional separating layer (bitumen felt, e.g. ST-BSM-40) from the roof surface to avoid damages or leakage.



3.3.4 Installation of the mounting frame on large surface e.g. galvanized trapezoidal sheet

The charge can also be installed on a weather-resistant sheet (e.g. galvanized trapezoidal sheet) which is weighed with pebble or substrate. Please note that the frame base must be connected with the surface with min. power socket wrenches M8 and large discs.



3.3.5 Connection of the mounting frame with the roof sub-construction

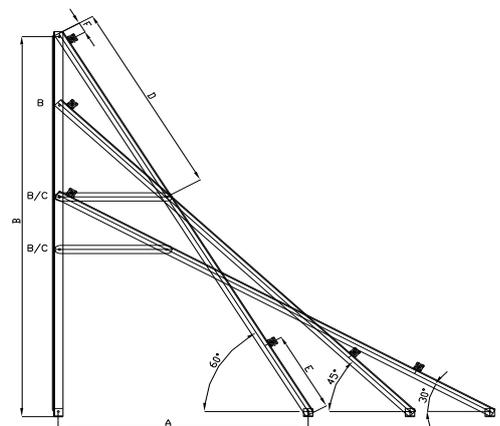
If the mounting frame is directly connected with the roof sub-construction (not recommended), perforations must be professionally sealed and established permanently leak proof against humidity. Damages that are caused due to storms or unprofessional sealing are not part of the warranty.

3.3.6 Alignment and installation

The collectors should be aligned southward and show an ideal angle according to latitude and application. The mounting frame can be installed with different angles (30/45/60°). In addition, a variable angle adjustment between 30 and 60° can be carried out on site.

According the angle, the measures A and B (distance of mounting points) change. The lengths A and B for different collectors and angles are indicated in the chart below:

Distances – vertical installation (mm)										
Angle	A	B	C	D	E	F	G	H	I	J
30°	1840	1070	810	540	385	50	50	1825 or 1100	1000* or 2000	2000
45°	1500	1515	1070	655						
60°	1065	1850	1515	920						
45°	875	880	625	385						
60°	620	1085	880	550						



*If only one vacuum tube collector WIKOSUN HP 70-8 is installed, shorten the cross strut or drill new holes into the vertical strut.

3.3.7 Mounting procedure

Define the angles of the collectors and install the mounting frame.

If the system is to be installed with another angle as foreseen, additional holes can be added. The distances of the holes must then be calculated and measured. For roof angles smaller than 60°, the vertical angle section must be cut 25 mm above the hole.

Install the base of the frame, the cross bars and the back bars and connect the angle section. Bases' screws should be fitted with the head on the side of the angle.

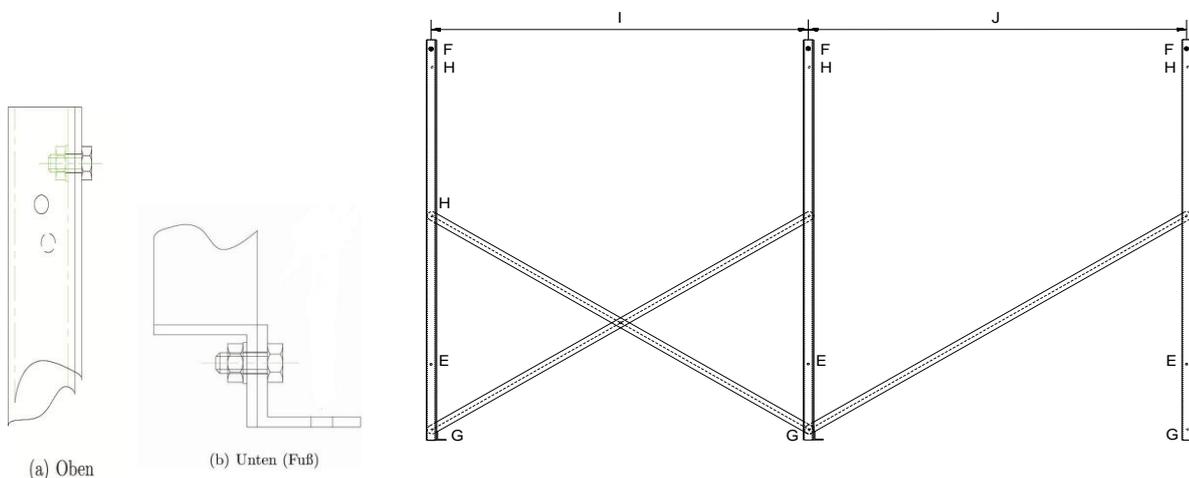
Define the leading edge of the mounting frame and mark the holes accordingly.

Distance of the carriers of the first mounting frame - vertical installation (I): 1000*/2000 mm
Distance of additional carriers - vertical installation (J): 2000 mm

The holes of the vertical angle sections should be marked with the distance A in a right angle (use chalk line and angle). It is also possible to mark the holes after the assembling of the mounting frame.
Put the mounting frame on the fixing points and tighten all screws.

The base must be connected and fixed with the surface.

The distance of the collectors from the surface should be about 20 cm to guarantee that collectors remain free from snow during winter and that no dirt from the ground reaches the glass during strong rain.



3.4 Flat roof mounting – horizontal installation

3.4.1 Mounting sets „flat roof mounting“ – horizontal installation – roof angles from 30 - 60°

For the horizontal installation of WIKOSUN HP 70 following mounting sets are available:

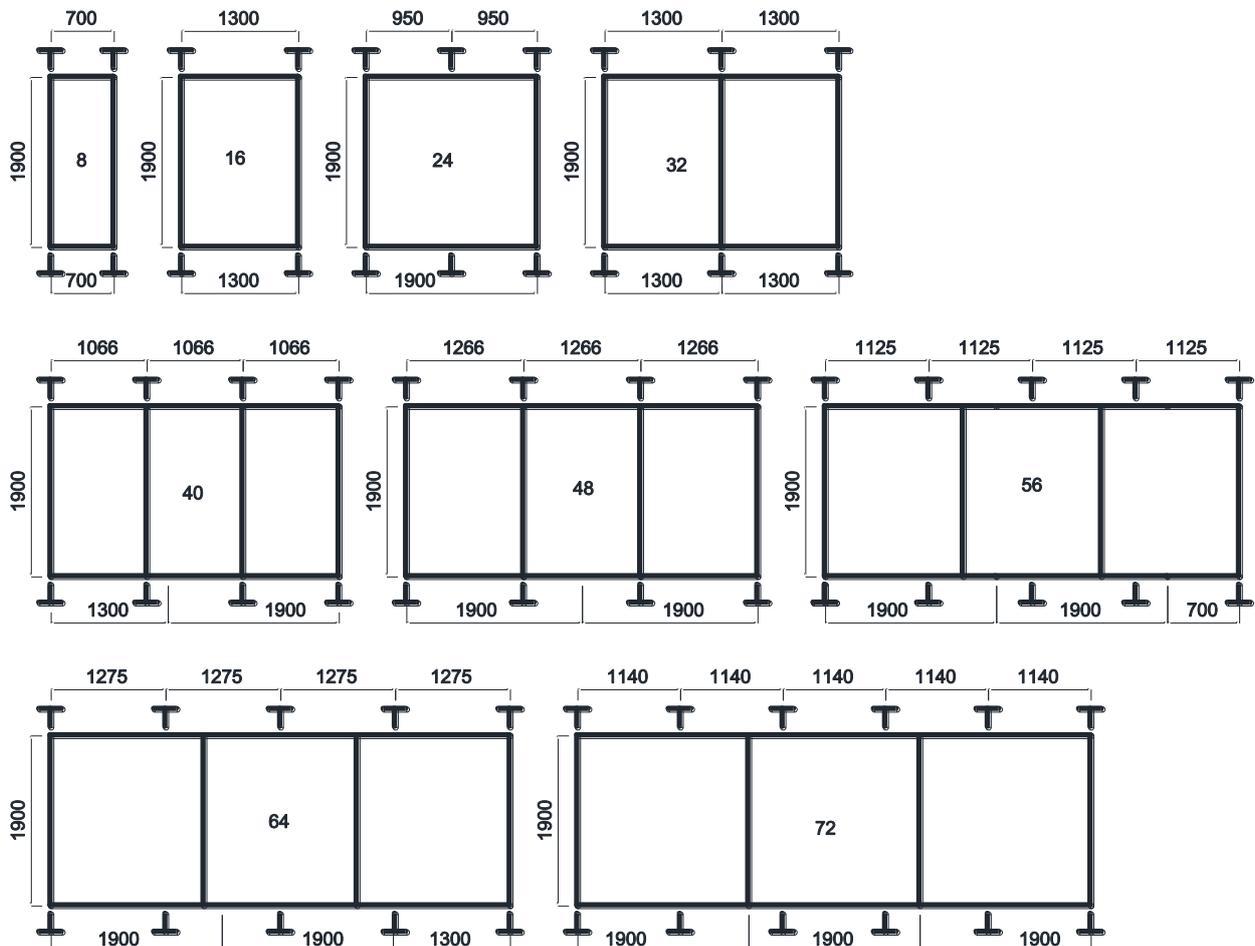
Mounting set	Content
Profile angle set ST-ADM-2BW	Profile angle 40x40x25 mm, hex socket head screw M8, screw M8
Fastening set ST-ADM- 2BM	Screw M8, nut M8, washer M8, spacer d=16 mm
Set basic plate Alu ST-FDM-1BG300	Alu-pedestal, screw M8, nut M8, washer M8, profile rail 300 mm, profile angle, hex socket head screw M8, nut M8
Set basic plate Alu ST-FDM-1BG470	Alu-pedestal, screw M8, nut M8, washer M8, profile rail 470 mm, profile angle, hex socket head screw M8, nut M8
Mat for preservation of structures ST-BSM-40	
Weight element ST-GWE-20	

Profile rail set	Content
ST-ADM-1.3P	2 Profile rails 35x35x700mm, 4 screws M8x35, 4 nuts M8, 4 washers
ST-ADM-2.3P	2 Profile rails 35x35x1300mm, 4 screws M8x35, 4 nut M8, 4 washers,
ST-ADM-3.3P	2 Profile rails 35x35x1900mm, 4 screws M8x35, 4 nuts M8, 4 washers
ST-ADM-V	2 Alu angle 180mm, 8 screws M8x20, 8 nuts M8, 8 lock washers

Chart 7: Fastening sets and profile rail sets „flat roof mounting“ – horizontal installation

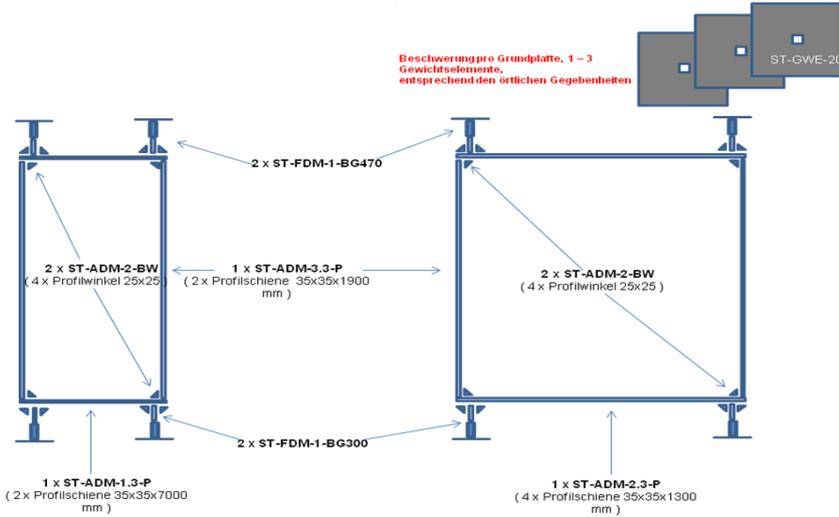
3.4.2 Alignment

Layout mounting frames for fields of 8/16/24/32/40/48/56/64/72 tubes WIKOSUN HP 70

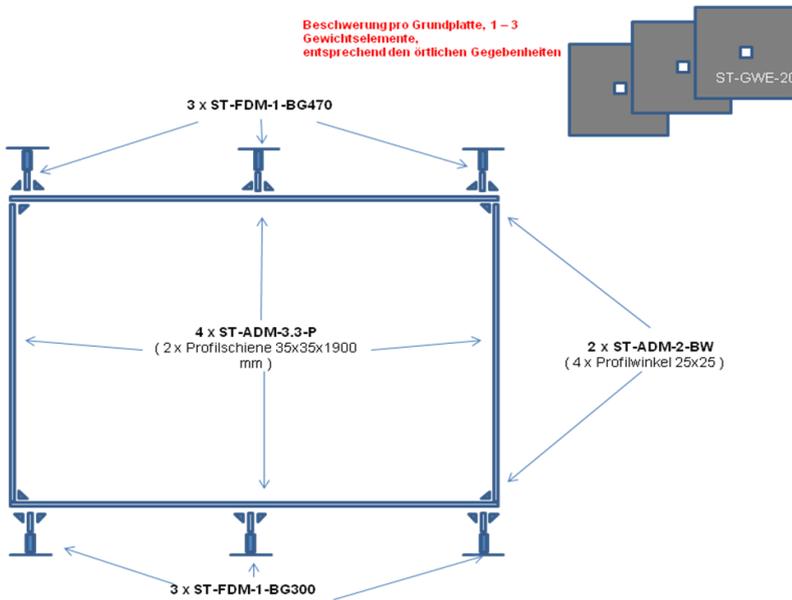


3.4.3 Installation layouts

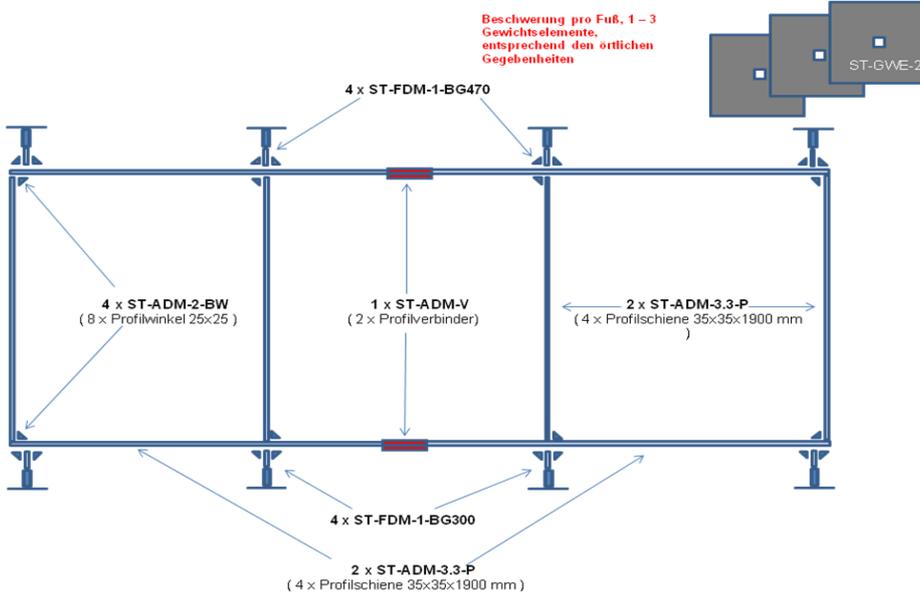
Flat roof for 1 x WIKOSUN HP 70 – 8, horizontal and flat roof for 1 x WIKOSUN HP 70 – 16, horizontal



Flat roof for 1 x WIKOSUN HP 70 - 24, horizontal



Flat roof for 2 x WIKOSUN HP 70 - 24, horizontal



3.4.4 Installation

Put the longitudinal rails ST-ADM-1.3P / 2.3P / 3.3P (700/1300/1900mm) parallel to each other on the ground by taking into consideration the connection rails ST-ADM-3.3-P (1900mm). Depending on the number of HP70 moduls to be mounted, several longitudinal rails must be linked with the connecting set ST-ADM-V.



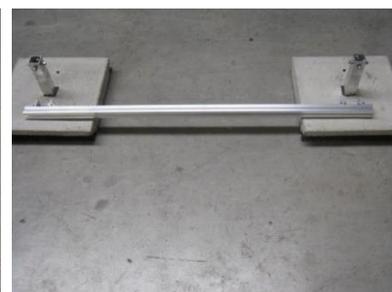
Define the position of the basic plate ST-FDM-1-BG 300 (toe side) and ST-FDM-1-BG 470 (manifold side). The distance between the toe side and manifold side amounts to 1900mm (ST-ADM-3.3P). Position one mat for preservation of structures ST-BSM-40 in each corner. Put on the basic plate and 1 to 3 weight elements ST-GWE-20 according to the local conditions in each corner. Apply the same distance for additional plates.



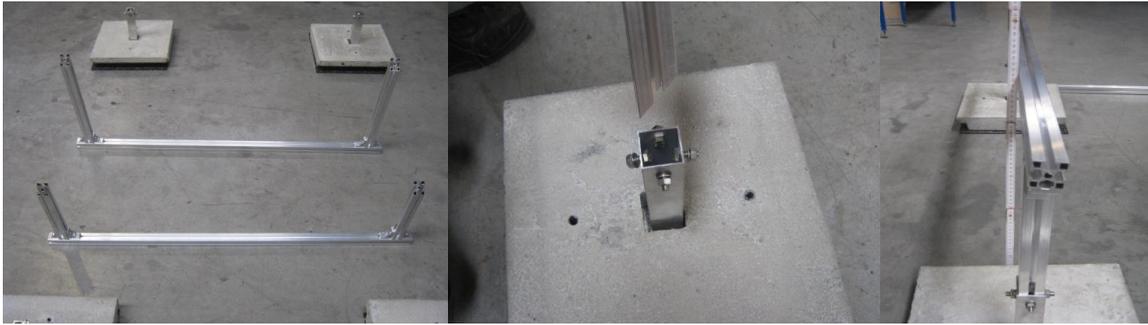
Insert the screw (nut + washer are always located outside) and furnish the profile angle with enclosed screws and nuts.



Insert the profile angles into the top notch of the longitudinal rail and align them to the position of the basic plates.



Insert the stand rails 300 mm (toe side) and 470 mm (manifold side) with the 5° cut in direction of the toe bar into the pre-mounted profile angles of the longitudinal rails and fix them. Then insert the stand rails with the 45° cut into the basic plate and adjust the height (toe bar - bottom longitudinal rail min. 300 mm, manifold side – bottom longitudinal rail min. 470 mm). Please take into consideration that an inclination of 5° (from manifold side towards toe side) is necessary.



Connect the longitudinal rails of the toe and manifold side with the profile rail set ST-ADM-3.3P (1900 mm) and the profile angle set ST-ADM-2BW to a rectangle. Insert the screws M8x40 into the longitudinal rails and fit the spacer (Fastening set ST-ADM-2BM).



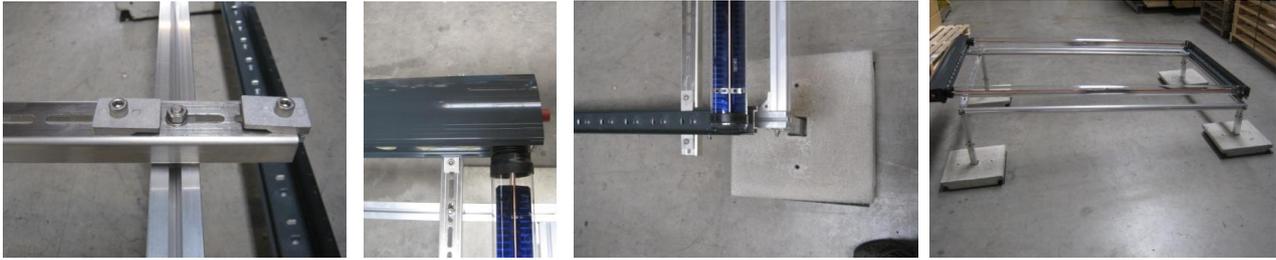
Mount the module side bars (U-profile) and fix them loose with washer and nuts (Fastening set ST-ADM-2BM).



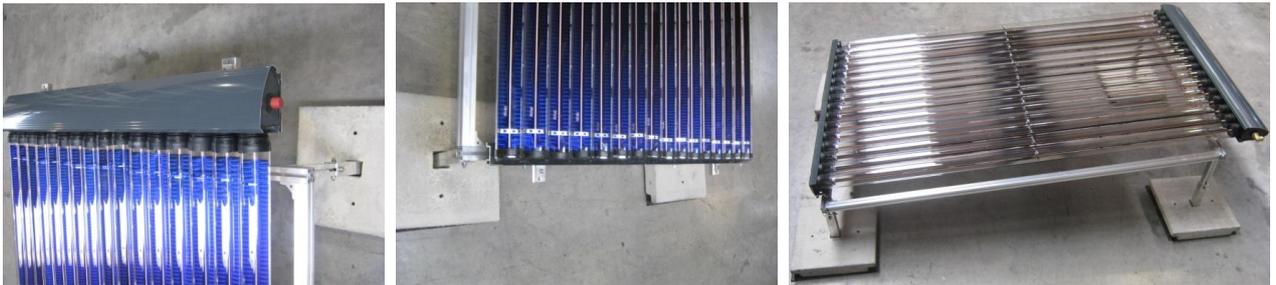
For the installation of the manifold case, mount the clamp in the 1st and 5th punching at the upper part of both bars by using one hex socket head screw M8 x 25, one lock washer M8, one clamp and one cage nut each. Screw the clamp loose. Put the manifold case on top and arrange it centrally. The side bars should be positioned between the second and third tube. Then tighten the clamps.



For the installation of the toe bar, mount the clamp in the 1st and 3d punching at the lower part of both bars by using one hex socket head screw M8 x 25, one lock washer M8, one clamp and one cage nut each. Screw the clamp loose. Put the toe bar on top and install the tubes on the left and on the right. Then arrange the manifold case and toe bar parallel to each other. Tighten the clamps.



Insert the remaining tubes by using copper paste and align them by rotating the tubes as required (max. 30°). Mount the cover of the toe bar and tighten the screws.



Install the connection set ST-AVS-1.1DF. If several modules are installed (max. 72 tubes), connect the modules by using the extension set ST-AVS-1.1S.



3.5 Installation of collector temperature sensor

The collector temperature sensor is to be installed at the flow of the system (hot water side). Put the sensor into the sensor pocket as far as it will go. Apply a heat-conductive paste onto the sensor to improve the heat transfer. Screw carefully the cable sheet on the sensor pocket.

The 1 m cable is laid with the pipe work through the roofing. The cable can be extended in the interior (2 x 0,75²). For the connection of the temperature sensor cable with the controller the use of an over voltage protection (protection against over voltage damages) is recommended.

If there is a lightning protection system, the collector system is to be integrated professionally. If there is no lightning protection system, the solar flow and return are generally to be connected to the equipotential bonding. In every case, the regulations of the local energy provider / network operator should be observed here. Electrical and lightning protection work may only be carried out by authorized professionals.

3.6 Installation of pipe work

Install the pipe work:

- on shortest way to minimize losses.
- with a complete high temperature insulation (100% according to EnEv).
- rising to the collector to prevent air cushions.

3.7 Hydraulic pressure test

- After a successful installation, rinse the entire collector circulation with water!
- Before commissioning, the collector circulation must be checked with a water pressure of 6 bar!
- If the solar heating system is not commissioned immediately after installation, the collector area must be covered!
- Before filling the system with heat transfer fluid, the system must be completely purged!

Open the lower plug at the collector field to purge the system.
Subsequently, the system is to be filled with solar fluid.

Important:

Please note that only a solar concentrate released by Wikora may be refilled. Solar concentrate must be prepared according to manufacturer's specifications with clean, ph-neutral and lime-free water. Please use an antifreeze controller to ensure the antifreeze capacity. If another solar concentrate is applied, the warranty expires automatically. Moreover, damages that are due to an insufficient antifreeze protection are not part of the warranty.

3.8 Regulation of flow rate (flow regulation)

The set-up of the flow rate is important for an efficient functioning of the system. The lower the flow rate chosen, the higher the temperature difference between collector flow and return.

When setting the flow rate, it is absolutely essential to refer to the instruction manuals of the pump groups / temperature difference controller used (scale).



4 Planning and layout data for collectors

Recommendation:

System pressure	3,0 bar
Primary pressure of expansion vessel	2,5 bar
Flow rate	100 l/m ² /h
Switch-on temperature difference of controller	7 to 15 K *
Switch-off temperature difference of controller	3 to 8 K * (*internal to the plant)

Please note that for the layout of the collector circuit, the solar tube circuit and the heat exchanger circuit, the corresponding pressure losses and the total pressure loss in combination with the desired flow rate must be considered. Furthermore, please note that the calculation of the piping cross-sections must be carried out under the aspect of the necessary flow velocity for solar installations from min. 0.4 m/s up to max. 1,5 m/s with the required flow rate liter/h.

Moreover, it must be considered that the hydraulic faulty wiring results in a system specific and demand specific flow rate which involves a loss of pressure. This again has an influence on the layout of piping cross-sections, solar medium capacities, pump pressures, flow-meter set-ups and flow-meter configurations as well as on their number. The values indicated in chart 7 apply only for pipe works up to an overall length of 50 m.

Recommendation for the collector connection:

Overall length Flow & return	Diameter of the copper pipe depending on the number of collectors			Alternative: Flexible connection tube depending on the number of collectors		
	1-2 collectors	3-4 collectors	5-6 collectors	1-2 collectors	3-4 collectors	5-6 collectors
10 m	15	18	22	DN 16	DN 20	*
20 m	15	18	22	DN 16	DN 20	*
30 m	15	22	28	DN 16	DN 20	*
40 m	18	22	28	DN 16	DN 20	*
50 m	18	22	28	DN 16	DN 20	*

Chart 7: Reference for pipe work size

* it is recommended to calculate the pipe work sizes for more than 4 collectors

Each solar system needs an adequate and competent planning and execution. Please note that only a specialized company is responsible for the layout of piping cross-sections, the layout of diaphragm type expansion vessel, the determination of the solar pump group as well as the necessary flow-meter. Our data do not relieve of a special planning.

5 Technical data

Description	WIKOSUN HP 70 - 8	WIKOSUN HP 70 - 16	WIKOSUN HP 70 - 24
System	Vacuum tube collector	Vacuum tube collector	Vacuum tube collector
Collector gross surface	1,40 m ²	2,92 m ²	4,30 m ²
Absorber surface	1,00 m ²	2,00 m ²	3,00 m ²
Aperture surface	1,04 m ²	2,10 m ²	3,14 m ²
Frame	Aluminum extruded profile		
Dimensions:			
Length x width x height	2300 x 615 x 125 mm	2300 x 1268 x 125 mm	2300 x 1868 x 125 mm
Weight	28 kg	56 kg	78 kg
Vacuum tubes	Boron silicate hard glass d=71 mm x 2,0 mm		
Connections Cu-tube	d=22mm	d=22mm	d=22mm
Insulation manifold casing	Mineral wool compressed and laminated		
Absorber:			
Material	Copper on copper plate		
Absorber coating	Tinox	Tinox	Tinox
Flow rate per collector:			
Minimum	100 l/h	100 l/h	100 l/h
Maximum	300 l/h	300 l/h	300 l/h
Pressure loss:			
50 l/h	392 Pa/collector	645 Pa/collector	937 Pa/collector
100 l/h	1162 Pa/collector	2026 Pa/collector	2890 Pa/collector
150 l/h	2309 Pa/collector	4084 Pa/collector	5859 Pa/collector
Efficiency	$\eta = 83,8$	$\eta = 83,6$	$\eta = 83,5$
Peak power	843 Watt per collector	1681 Watt per collector	2520 Watt per collector
Capacity	0,40 Liter	0,84 Liter	1,25 Liter
Max. working pressure	6/9 bar	6/9 bar	6/9 bar
Stagnation temperature	269°C	269°C	269°C
Installation	on-roof, flat-roof, roof angles from 5-90°	on-roof, flat-roof, roof angles from 5-90°	on-roof, flat-roof, roof angles from 5-90°

Return:

Collectors can be returned to WIKORA after use. All collector material will be recycled accordingly by WIKORA.

6 Safety instructions

The installation of collector and solar components must comply with the local regulations and conditions. Technical standards and rules have to be respected.

7 General operation and maintenance instruction

Present operation and maintenance instruction and the compliance with it in combination with the installation and maintenance record is part of the guarantee and warranty!

Operation

- Your Wikora solar heating system is preset according to the present installation and maintenance record. In general, there is no need of changing the preset parameters.
- Please do not change the preset parameters by yourself. You will lose any warranty and guarantee claim.
- If you do not conform to the preset parameters, please let them change and document by a specialist.
- The various system parameters can be accessed according to enclosed instruction manual of the controller.
- It is recommended to vent the solar heating system approx. 4 weeks after the initial operation. This should be undertaken by a specialist. If you wish to vent the system by yourself, you can do it one-time at the central vent of the solar pump group.

Venting procedure

- Please switch off your solar heating system in the evening.
- Open the air valve at the central vent by using a radiator vent key. Once liquid pours out, close this air valve. The procedure is terminated.
- Switch on again your solar heating system.
- Please never vent at sunshine or running pump!
- Please do not undertake an additional venting process. If the system's working pressure drops later on or if the system does not give any heat, please call a specialist.

Maintenance of solar heating system

- Your Wikora solar heating system is a closed heating system. It corresponds to the safety regulations of DIN 4751, DIN 702 and DIN 721.
- Such systems have to be built and maintained exclusively by qualified and specialized companies.
- Please do not refill water in case of pressure loss but call a specialist for assistance.
- Only a solar concentrate released by Wikora may be refilled.
- The valid system working pressure is shown in the installation and maintenance record and corresponds to 3.0 bar, in general.
- Please do never remove the drain bottle under the exhaust line of the safety valve which is to collect the blast solar liquid in case of over pressure.
- The solar heating system and the condition of the solar concentrate are to be checked and documented annually by a specialist. Otherwise, any guarantee and warranty claim expires.

7.1 Evidence of maintenance

	Date	Name / Company	Executed activity	Kg refilled sole	Color medium
1					<input type="checkbox"/> uncolored <input type="checkbox"/> brown <input type="checkbox"/> black <input type="checkbox"/> cloudy
2					<input type="checkbox"/> uncolored <input type="checkbox"/> brown <input type="checkbox"/> black <input type="checkbox"/> cloudy
3					<input type="checkbox"/> uncolored <input type="checkbox"/> brown <input type="checkbox"/> black <input type="checkbox"/> cloudy
4					<input type="checkbox"/> uncolored <input type="checkbox"/> brown <input type="checkbox"/> black <input type="checkbox"/> cloudy
5					<input type="checkbox"/> uncolored <input type="checkbox"/> brown <input type="checkbox"/> black <input type="checkbox"/> cloudy

8 Solar fluid

8.1 Product information Solarliquid ready for use (WIK-PE20)

Environmentally friendly, ready-to-use long-term antifreeze with corrosion inhibitors especially for flat plate and vacuum tube collectors with a high thermal load (up to 260 °C).

Product data:

Appearance:	clear, amber liquid
Base:	superior glycol
Flashpoint (°C):	> 100 (ASTM D 51758)
Boiling point (°C):	> 102 (ASTM D 1120)
Density (20 °C):	1.02 – 1.04 g/cm ³ (DIN 51757)
Antifreeze (crystallization point):	approx. -23 °C
Antifreeze (solidification point):	approx. -29 °C
pH value (20 °C):	7.5 – 8.5 (ASTM D 1287)
Viscosity (20 °C):	approx. 15.0 mm ² /s

Product properties:

SOLARLIQUID HT ready for use is an odorless liquid that is used as antifreeze or heat transfer fluid for thermal solar installations (flat plate and vacuum tube collectors) with a high thermal load. The special corrosion inhibitors protect the metal and plastic materials commonly used in construction, including aluminium, against corrosion and deposits. The sealing materials commonly used in heating installations are not affected by Solarliquid HT ready for use.

SOLARLIQUID HT ready for use

- cannot be mixed with any other type of antifreeze
- is inhibited nitrite-, amine- and phosphate-free
- is biodegradable

According to the German Ordinance on Hazardous Substances, no specific labeling is required for Solarliquid L concentrate ready for use and HT ready for use (see safety data sheet).

General information:

The systems must conform to DIN standard 4757, part 1, and be implemented as a closed system, since there must be no atmospheric oxygen in the system. It must be ensured that the circulating pump is suitable for operation with antifreeze agents. Before being filled, the system should be flushed with water and the tightness of all connections checked through pressure testing. The system must be free of impurities and free of other liquids. There must be no deposits on the metal surfaces. After pressure testing, the system must immediately be filled with Solarliquid HT ready for use. Do not allow any air to enter! Galvanized system components should be avoided since zinc is not resistant to glycols. In the case of leakage, only top up with the same product, never utilize different solar liquids in the same system. In our experience, Solarliquid HT ready for use can be stored or used for several years. Nonetheless, the concentration (frost resistance) should be checked annually. In the case of a loss of liquid, never top up with water.

Use only Solarliquid HT ready for use for topping up!

Recommendation for use:

The optimum temperature for use is between -23 °C and 230 °C. For prolonged temperatures of more than 230 °C we recommend installing adequately large expansion tanks so that the heat transfer fluid can flow out of the collectors.

Method of testing corrosion properties:

We recommend that the solar fluid with which the system is filled be checked regularly (roughly annually). With the pH value you can test the corrosion properties of our solar fluid. The pH value should be > 7.5. This is measured using pH test strips. If the value is lower than this, the solar fluid should be replaced.

Method of testing frost protection:

Frost protection	Krüss device		Refractometer	
	Brix	RI	MEG scale	MPG scale
-8 °C	22.3	1.3676	-17 °C	-13 °C
-15 °C	29.6	1.3807	-29 °C	-22 °C
-23 °C	35.7	1.3915	-46 °C	-35 °C

8.2 Safety Data Sheet

According to 1907/2006/EG, article 31– extract
Printing date:: 27.02.2013

revised on: 27.02.2013

Product information:

Commercial name: Solarliquid HT gebr.
Article code: 1004081523000
Application: Antifreeze / Solar liquid of solar heating systems
Decomposition products:: Carbon monoxide and carbon dioxide
Supplier: Staub & Co. Chemiehandelsgesellschaft mbH
Ostendstraße 124
90428 Nürnberg
Tel.: 0911/5482- 0

Emergency: Giftnotruf Universität Mainz - Tel.: 06131/19240

General safety and hygienic measures

The usual precautionary measures while handling chemicals are to be considered

- Soiled and soaked clothes should be taken off immediately.
- Wash your hands before breaks and after end of work.
- Don't eat, drink and smoke during work.
- Don't inhale gases, vapors and ensure sufficient ventilation.
- Wary perfection equipment; unprotected persons should be kept away.
- Eye protection: wear safety glasses during the filling procedure.
- Respiratory protection: wear respiratory protection during aerosol or fog formation.
- Hand protection: Use protection gloves of butyl rubber, nitril rubber/nitrillatex

The product doesn't require any specific labeling according to the last version of the „Allgemeinen Einstufungsrichtlinie für Zubereitungen der EG“.

Keep the liquid out of the reachability of canalizations or waters. If the product enters the soil, waters or canalization, please inform the local authority in charge.

Cleaning: clean with liquid binding material (sand, kieselguhr, acid binder or universal binder). Recycle contaminated material separately.

Keep the concentrate in a cool and dry environment. Protect against humidity and water. Provide sufficient ventilation during work.

First aid

If the product gets in contact with the eye, a slight irritation can occur.

- After inhalation: take fresh air and consult a doctor in case of medical condition.
- After skin contact: wash immediately with water and soap.
- After eye contact: wash the open eye for several minutes. Consult a doctor in case of medical condition.
- After swallowing: rinse the mouth and drink plenty of water. Consult a doctor in case of medical condition.
- After contact with cloths: remove soiled clothes immediately.

Fire fighting

- Suitable fire extinguishing agents: CO₂, solid extinguishing agent or water. Fight larger fire with water jet or alcohol-steady foam. Cool tanks at risk with water jet. Collect contaminated fire water separately. It must not reach canalization.
- Combustion products: carbon monoxide (CO); carbon dioxide (CO₂).
- Special protection equipment: carry protective respirator that is not depending on the ambient air.

Recycling

Recycling must be carried out according to local regulations. The waste code number (according to AVV) is to be determined separately.

The product is only designated for commercial processing / use. The data is based on our today's knowledge but does not represent any confirmation of product properties and does not constitute a legal position.

All data according to manufacturer data of Fa. Staub & CO Chemiehandelsgesellschaft mbH

9 Warranty

Warranty conditions for Wikora vacuum tube collectors. All deliveries and services are carried out according to our general terms and conditions.

1. The warranty period for the collector function amounts to **5 years**. Within that period, all parts proven to be useless or considerably reduced in their usability due to production or material defects are repaired or replaced ex works. At expiration of the legal warranty period, we have the choice between rectification or replacement.
2. The warranty begins with the delivery of the collectors to the end user and under condition that the system has been installed and setup by a specialised company according to our installation and operating instructions as well as the locally valid norms and regulations. Further, the warranty is dependent on a carefully completed installation and maintenance record which must be filled out by the installer and kept by the system owner.
3. The guaranteeing implies that
 - the collectors are transported, installed, operated and maintained according to our installation and operating instructions,
 - all system components originate from WIKORA GmbH,
 - the collector system is exclusively operated with our solar liquid.
4. The guaranteeing does not refer to damages due to
 - wear and tear, excessive wear, inappropriate operation or inappropriate use,
 - use of a unsuitable solar fluid or results of corrosion provoked by a solar fluid,
 - chemical or electro-chemical influences,
 - incorrect system layout.
5. Moreover, the warranty does not apply for
 - damages as a result of an inappropriate storage of the collectors prior to installation and
 - damages that are ascribed to force majeure,
 - The warranty regarding the safety glass refers to its condition, and here only to manufacturing and material defects.
6. The warranty expires
 - if arising and obvious defects are not notified in writing within 10 days after receipt or hidden defects immediately after emerging. In case of hidden defects it is only valid for the warranty exceeding the legal warranty period,
 - if the collectors are changed or maintained by non-specialised persons or companies or undertaken without our prior agreement,
 - if the possibility to peer the entire system is not granted or if the collectors are removed without our agreement,
 - if original Wikora components are exchanged by other components or if inappropriate installation material and system components as well as nonauthorized solar fluid are used,
 - if the annual inspection is not realized within the time limit. The proper execution is to be documented by the specialized company in charge.
7. Transport damages are to be notified immediately, stipulated on the delivery note and signed by the sub-contractor. §447b BGB remains untouched.
8. After the expiration of the legal warranty period, the warrantee must provide the necessary aide in case of reparation work and is obliged to assume the necessary services like transport, installation etc. In the event of warranty, we recompense max. 200.00 € + VAT for the first collector and max. 80.00 € for each additional collector, incl. all consumables.
9. This warranty does not justify claims exceeding the legal liability for physical or personal injuries that have been caused by the defects of the purchased object. Redhibitory actions and abatements exceeding legal regulations are not justified either.
10. Other legal claims for warranty and damages in respect of BGB and ProdHaftG remain untouched by this warranty.
11. The exchange or rectification of the collectors or other parts of the solar system must be carried out by the installer and only after having consulted Wikora. Otherwise an entitlement to compensation does not exist.
12. Notifications of claim are to be announced in writing to WIKORA GmbH and by presenting the installation and maintenance record as well as the respective proofs immediately after the damage is occurred.
13. Solar accessories are subject to the legal warranty.

*) flat rate only valid for Germany

10 Installation and maintenance record

Please complete carefully.

The installation and maintenance record is part of the warranty and will be requested in case of complaints with the corresponding invoice.

Installation Maintenance

Contact Data	Final customer	Installer
Name		
Company		
Street No		
ZIP / Town		
Phone		
Mobile		
E-mail		
	First installation	Last maintenance
Date		
Installer		

Material overview	Brand (designation)	Type (serial no.)	Characteristics (dimensions)	Material	For stainless steel tank(s): Additional corrosion protection needed? (please consider indications of the local water supplier)	
Collector						
Pipeline (single)			Ø , m			
Insulation			Thickness mm			
Heat exchanger					Yes	No
Tank 1			Vol.	m ²	<input type="checkbox"/>	<input type="checkbox"/>
Tank 2			Vol.	m ²	<input type="checkbox"/>	<input type="checkbox"/>
Controller						
Solar pump			Level	I II III		
Expansion vessel			Vol.			

System - settings (Controller setting = *)	Type	Max. temperature	Difference in temperature	Hystere = Delta t off
Consumer 1* = e.g. DHW		°C	K	K
Consumer 2* = e.g. buffer tank 1		°C	K	K
Consumer 3* = e.g. buffer tank 2		°C	K	K
Consumer 4* = e.g. swimming pool		°C	K	K
Max. collector temperature*	°C	Cooling function * from		°C
Backup heat target temperature*	°C	Flow rate	Target : l/min	Actual: l/min
System working pressure at	°C	bar	Primary pressure exp. vessel	Target : bar Actual : bar

Solar liquid				
Visual control		<input type="checkbox"/> colour unchanged <input type="checkbox"/> brown <input type="checkbox"/> black <input type="checkbox"/> cloudy		
Brand / type		Minimum value	Actual value	System <input type="checkbox"/> rinsed <input type="checkbox"/> filtered <input type="checkbox"/> purged
Filling capacity	Liter	ph-value	7	
Mixing ratio	%	antifreeze upto	-25°C	

DHW system	yes / no	Number of collectors	
Space heating	yes / no	Mounting type	OR / IR / FR / horizontal / vertical
DHW-mixing valve	yes / no	Hydr. connection	single row / double row / parallel / series
		Orientation/Pitch	S / SE / SW / E / W ca. Grad
How is the solar ventilation system designed?			
<input type="checkbox"/> with AIR-Stop in the solar circuit		In case of quick vent valve, please add drawing.	
<input type="checkbox"/> with quick vent valve at collectors			

General checklist			
Collector is clean	<input type="checkbox"/> ok	Operation of pumps checked	<input type="checkbox"/> ok
Collector fastening is stable	<input type="checkbox"/> ok	Temperature sensores indicate realistic values	<input type="checkbox"/> ok
Collector interior is not fogged	<input type="checkbox"/> ok	System is grounded	<input type="checkbox"/> ok
Return valves	<input type="checkbox"/> ok	Solar liquid for re-filling is available	<input type="checkbox"/> ok
DHW-mixing valve	<input type="checkbox"/> ok	Anode(s) checked	<input type="checkbox"/> ok

Meter reading	Pump 1	h	Pump 2	h	Heat quantity meter	kWh

User has been instructed	<input type="checkbox"/> yes	<input type="checkbox"/> no	
Maintenance contract	<input type="checkbox"/> yes	<input type="checkbox"/> no	
Inspection interval	<input type="checkbox"/> annually	<input type="checkbox"/> every 2 years, no later than	

Drawing of collector array

Date, signature and stamp of solar company

Datum, signature of customer

Remark : Please add proof of invoice.