Installation Manual

Flat Plate Collectors



Logasol SKS 4.0 Mounting on sloped roofs

For Contractors

Please read carefully prior to installation.





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1 General information

This chapter details which technical rules and regulations apply to this installation.



USER NOTE

Observe all standards and guidelines applicable to the installation and operation of this system in your country. Installations must be made in accordance with the Uniform Plumbing Code, and any other codes and regulations applicable to the installation site.



The installation of solar heating systems might be governed by individual local rules and regulations for this type of product, which must be observed.

Lightning protection

If the building height (installation height) exceeds 60 ft (20 m), and there is no lightning grounding rod installed, ask your local electrical contractor to connect the components on the roof which conduct electricity with an electrical earth cable of at least AWG 6 (16 mm²) to the earth bonding.

Special measures regarding lightning protection are not required for building heights (installation heights) of less than 60 ft (20m).

Where there is a lightning grounding rod system installed, ask your local electrical contractor to check the inclusion of the solar heating system into the lightning protection system.

Specifications 2

SKS 4.0			
Certificates			
Length		81.48 in (2070 mm)	
Width		45.12 in (1145 mm)	
Depth		3.52 in (90 mm)	
Clearance between collectors		0.98 in (25 mm)	
Absorber contents, vertical version	V _f	0.23 gal (1.43 L)	
Absorber contents, horizontal version	V _f	0.33 Gal (1.76 l)	
Gross absorber surface area	A _G	25.6 ft ² (2.37 m ²)	
Net absorber surface area		22.6 ft ² (2.1 m ²)	
Net weight, vertical version	m	101.5 lbs (46 kg)	
Net weight, horizontal version	m	103.6 lbs (47 kg)	
Permissible operating pressure of the collector	p _{max}	145 psi (10 bar)	

Tab. 1 Specifications

3 Safety

This chapter details how the notes for the installation instructions, as well as the general safety instructions, necessary for safe and trouble-free operation, are arranged in this manual.

You will find the safety and user notes, which specifically refer to the installation, in the installation manual immediately following the individual installation steps.

Carefully read the safety instructions before commencing the installation.

Severe injury and even death, as well as material losses and environmental damage, may follow if you ignore safety instructions.

About this manual

This installation manual contains important information for the safe and appropriate installation of sloped roof mounted systems as well as plumbing connections.

The illustrations in this manual show the collectors installed vertically. Instructions for horizontal installation are the same as for vertical unless stated otherwise.

These technical documents should be retained in a safe place. These may also be inspected at the manufacturer's premises.

The activities described in the installation manual assume expertise based on completed vocational training in gas or water-related installation. Only carry out these installation steps, if you possess these skills.

- Hand these installation instructions to the customer.
- Explain to the customer the function and operation of the related devices.

3.1 Correct use

This installation mounting set holds the thermal solar collectors (vertical and horizontal), which are installed on pitched roofs with a slope of 25° to 65° . The collectors can be installed on corrugated and metal steel roofs with slopes of between 5° and 65° .

Operating conditions

Only erect the installation mounting set on roofs whose construction can support the weight. If necessary, consult a structural engineer or a roofer. Install components only on roofs with sufficient strength. Please take the additional roof load including the solar collector, into consideration. If necessary, ask a structural engineer for assistance.

The installation set is suitable for a max. standard snow load of 25 lbs/sqft (2.0kN/m²) and an installation height of max. 60 ft (20 m). Using appropriate accessories, the installation set can be used for a max. standard snow load of 35 lbs/sqft (3.1kN/m²) and a max. installation height of 100 m. See Chapter 5.7 "Installing additional rails (accessory)".

The roof installation set must not be used for installing any other objects to the roof. The kit is intended exclusively for the safe installation of solar collectors.

3.2 **Notes structure**

Two levels of safety are identified by the following symbols:



RISK TO LIFE

Identifies possible dangers emanating from a product, which might lead to WARNING! serious injury or death if appropriate care is not taken.



RISK OF INJURY/ SYSTEM DAMAGE/ **BUILDING DAMAGE**

CAUTION!

Identifies potentially hazardous situations, which could lead to medium or slight injuries or to material losses.

Additional symbol for designating user notes:



USER NOTE

Tip for the optimum installation and setting of the control(s) plus other useful information.

3.3 Please observe these safety instructions



WARNING!

RISK TO LIFE

through a fall or falling parts.

- Take appropriate action to prevent • accidents when working on roofs.
- While working on the roof, take all necessary precautions against a possible fall.
- Always wear protective clothing and safety equipment.
- After completing the installation, always check the secure positioning of the installed set and that of the collectors.



RISK OF INJURY

Injury and operating faulty system operation can result from making changes to the system construction.

Never change the system construction.



RISK OF INJURY

Some parts may cause burns, if the collector and installation materials are exposed to solar radiation for longer periods of time.

- Always wear protective clothing and safety equipment.
- Cover the collector (e.g. with a covering sheet - available as an accessory) and the installation material during the installation as protection against high temperatures resulting from solar irradiation.



Observe maximum load and distance from edge before installing the substructure supports to the roof. If necessary, consult with a structural engineer to determine if the structure is suitable for installing solar collectors. The collectors must be securely mounted so that the mountings can withstand intense wind conditions and local snow loads. Buderus warranty does not cover any storm related damages.



Solar panel connection pipes and solar heating fluid can become hot enough to cause severe burns. Extreme caution must be taken if panels have been in a stagnant condition (no flow of fluid).



Avoid scratching or sudden shocks to the glass cover of the solar panel.



Never step on collectors or solder in close proximity to the glass surface of the solar panel.



Pool water or potable water cannot be filled and pumped directly through the Buderus collectors. Damage to collectors caused by corrosion or scaling will void warranty.

4 Before installation

4.1 General notes



USER NOTE

We recommend that you engage the services of a roofing company, as they are experienced in working on roofs and will be aware of the risk of falling.

Make yourself familiar with the on-site conditions and local regulations before commencing the installation.



RISK OF INJURY

WARNING! If the collector and its installation material is left exposed to the sunlight for a long period, the parts will become hot and may cause burns.

- Wear protective clothing.
- Cover the collector (e.g. with a covering sheet – available as an accessory) and the installation material during the installation as protection against high temperatures resulting from solar irradiation.

Check

- the delivery for completeness and perfect condition.
- the optimum arrangement of the solar collectors. Take account of the direction of the sunlight (angle of inclination, southerly direction). Avoid the shade of high trees or structures and match the collector array to the shape of the building (e.g. flush with windows, doors, etc.).



USER NOTE

Only use OEM components and replace any faulty parts immediately.



USER NOTE

Remove broken tiles, shingles or sheeting in the area of the collectors and replace them.



Fig. 1 General overview of a two collector – roof mounting

4.2 Component description

4.2.1 Installation set for the collectors



USER NOTE

The installation sets are for mounting and fixing the collectors in place.



Fig. 2 Installation set for 2 collectors – 1 basic installation set, 1 extended installation set and 2 roof connection installation sets

Basic installation set for each collector array and for the first collector (Fig. 2):

Item 1:	Profile rail	2 ×
Item 3:	One-sided collector clamp	4 ×
Item 7:	Anti-slip protection	2 ×
Item 8:	M8 screw	4 ×

Roof connection, roof tiles, per collector (Fig. 2):

Item 4:	Roof jack, adjustable	4 ×
Item 5:	Sliding nut	4 ×

Extended installation set for each additional collector (Fig. 2):

tem 1:	Profile rail	2 ×
tem 2:	Double-sided collector clamp	2 ×
tem 7:	Anti-slip protection	2 ×
tem 6:	Plug connector with threaded studs	2 ×
tem 8:	M8 screw	4 ×

4.2.2 Water connection



USER NOTE

You will require one connection kit for each collector array. The collectors are connected together by solar hoses (connection set).



Fig. 3 Connection kit and connection set (illustration shows 2 upright collectors)

Connection kit, per collector array (Fig. 3)

Item 1:	Profile rail	2 ×
Item 3:	One-sided collector clamp	4 ×
Item 7:	Anti-slip protection	2 ×
Item 8:	M8 screw	4 ×

Connection set between the collectors, for each collector (in two carrying angles, Fig. 4)

Item 1:	Corrugated pipe connector	2 ×
Item 2:	Bracket	4 ×

Item 1:	Profile rail	2 ×
Item 2:	Double-sided collector clamp	2 ×
Item 7:	Anti-slip protection	2 ×
Item 6:	Plug connector with threaded studs	2 x



Fig. 4 Two carrying angles with one connection set

4.3 Other equipment

- Level
- String line
- Suction pump
- Vest with safety rope
- Pipe insulation
- Scaffolding
- Roofing ladder or equipment for flue gas inspection work
- Crane or mobile hoist



USER NOTE

When installing the roof mounting set and water connection, the only tool you will need is the size 5 Allen wrench from the connection kit.

4.4 Transport and storage

All components are protected by transport packaging.



USER NOTE

Dispose of the transport packaging in an environmentally friendly recycling system.

Transport protection for collector connections

The collector connections are protected against damage by plastic caps.



SYSTEM DAMAGE

through damaged sealing faces.

WARNING! • Do not remove the plastic caps (Fig. 5, Item 1) until immediately prior to installation.

Storage

The collectors must be stored in dry conditions.



USER NOTE

Do not store collectors outside without protection from the rain.



Fig. 5 Plastic caps on collector connections

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4.5 Technical documentation

The solar heating system consists of various components (Fig. 6). Installation, operation and maintenance documentation is provided for each component. Accessories may be accompanied by a separate document.

- Item 1: Collector: instructions for roof installation are enclosed with the connection kit
- Item 2: Pump station: instructions enclosed with the pump station
- Item 3: DHW storage tank: instructions enclosed with the DHW storage tank



Fig. 6 Solar heating system components and technical documentation

4.6 Determining space required on roof

Please note the following minimum space requirements.

Dimension A and B

Area required for the collector array.

Dimension C

At least two tiles to the ridge or chimney. Otherwise there is a risk of damaging the tiles, particularly if the tiles are laid in mortar.

Dimension D

Roof overhang including gable wall thickness.

Dimension E

Minimum 12 in (30 cm) for installing the connection cables in the attic.

Dimension F

Minimum 16 in (40 cm) for installing the connection cables in the attic (if installing a vent, sufficient space must also be allowed for in the vicinity of the supply outlet).

Dimension G

Minimum 20 in (50 cm) left and right of the collector array for the connection cables under the roof.

Dimension H

Dimension H is 75 in (1,900 mm) (39.4 in (1,000 mm) for horizontal collectors) and is the minimum distance from the upper edge of the collector to the lower profile rail, which is installed first.

Space requirements for vertical collectors:

Number of collectors	Dimension A	Dim. B
2	91 in (2.32 m)	81 1/2 in (2.07 m)
3	134 3/8 in (3.49 m)	81 1/2 in (2.07 m)
4	183 3/8 in (4.66 m)	81 1/2 in (2.07 m)
5	229 1/2 in (5.83 m)	81 1/2 in (2.07 m)
6	278 in (7.06 m)	81 1/2 in (2.07 m)
7	321 5/8 in (8.17 m)	81 1/2 in (2.07 m)
8	368 in (9.34 m)	81 1/2 in (2.07 m)
9	414 in (10.51 m)	81 1/2 in (2.07 m)
10	460 in (11.68 m)	81 1/2 in (2.07 m)

Tab. 2 Space requirement for vertically installed collectors





Space requirements for horizontal collectors:

Number of collectors	Dimension A	Dim. B
2	164 in (4.17 m)	45 5/16 in (1.15 m)
3	245 1/2 in (6.26 m)	45 5/16 in (1.15 m)
4	329 in (8.36 m)	45 5/16 in (1.15 m)
5	411 in (10.45 m)	45 5/16 in (1.15 m)
6	494 in (12.55 m)	45 5/16 in (1.15 m)
7	576 7/16 in (14.64 m)	45 5/16 in (1.15 m)
8	659 in (16.74 m)	45 5/16 in (1.15 m)
9	733 in (18.61 m)	45 5/16 in (1.15 m)
10	824 in (20.93 m)	45 5/16 in (1.15 m)

Tab. 3 Space requirement for horizontally installed collectors

5 Installing the roof connection and profile rails



RISK TO LIFE

While working on the roof, take all necessary precautions against a possible fall.



WARNING!

RISK OF INJURY

through a fall or falling parts.

- Take appropriate action to prevent accidents when working on roofs.
 - Always wear your personal protective clothing and safety equipment.



USER NOTE

For better access to the roof use a roofing ladder or slide the tiles at the edge of the collector array up.



Fig. 8 Installed profile rails for two collectors

5.1 Setting clearances

The dimensions given are guide values that should be approximately maintained.



USER NOTE

On tile roofs the tile valleys determine the true distance between the roof jacks.

Distances of roof jacks

Every profile rail is fastened using two roof jacks (Fig. 9). See the table for the approximate distance between the roof jacks.

Installation type	Distance w	Distance x	Distance z
vertical	approx. 46 in (1 170 mm)	24-51 in (610 – 1030 mm)	6 5/8 - 25 1/4 in (170 – 540 mm)
horizontal	approx. 82 5/16 in (2090 mm)	60 - 77 in (1520 – 1950 mm)	6 5/8 - 21 1/4 in (170 – 540 mm)

Tab. 4 Distance between roof jacks



USER NOTE

Distances x and z should always be approximately equal to distance w.

Distances of profile rails

Set the distance between the top and bottom profile rails (Fig. 10). Use the table values.

Installation type	Distance y		
	from	to	
vertical	52 in (1320 mm)	67 5/16 in (1710 mm)	
horizontal	23 5/8 in (600 mm)	32 5/16 in (820 mm)	

Tab. 5 Distance (centre-centre) between bottom and top profile rail



USER NOTE

Horizontal installation is only possible if roof battens are max. 16 1/2 in (420 mm) apart.



Fig. 9 Distance between roof jacks



Fig. 10 Distance between profile rails

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5.2 Roof Tiles

First install all roof jacks according to the guide values shown in tables 4 and 5 on page 14.



USER NOTE

Do not modify the roof construction and avoid damaging the roof covering. In the case of tiles laid in mortar, lift the tiles starting with the 3rd row under the ridge.



USER NOTE

Carefully cut away the base of the tile to ensure the tile lies correctly over the roof jack.



SYSTEM DAMAGE

through subsequent loosening of the long hex- nut on the roof jack. When the nut is tightened, adhesive is activated which bonds the joint securely after one hour.

 If the nut becomes loose after this time, it must be tightened on-site (e.g. lock washer).

5.2.1 Hooking the roof jacks into the roof batten

In its delivered state, the lower part of the roof jack is folded.

- Loosen the long hexagon nut (Fig. 12, **Item 2**) on the roof jack and move the lower part of the roof jack (Fig. 12, **Item 1**) to the correct position.
- Push the tile upwards according to the roof jack positions shown in (Tab. 4 and Tab. 5, page 14).
- Jack in the roof jack in such a way that the front brace lies in a tile valley (Fig. 13, **Item 4**).
- Push the lower part of roof jack (Fig. 13, **Item 3**) upwards until it touches the roof batten (Fig. 13, **Item 2**).
- Tighten the long hex- nut (Fig. 13, **Item 1**). To do this, insert the size 5 Allen wrench into one of the holes in the hex- nut and turn.



USER NOTE

The toothed washer (Fig. 13, **Item 5**) must grip the teeth on the lower part of the roof jack.



Fig. 11 Installed roof jacks for two collectors







Fig. 13 Roof jack located in place (some tiles have been removed for a better view)

5.2.2 Fastening roof jacks to rafters

Alternatively, the roof jack can also be used as a rafter anchor for fastening to the rafter.

According to the roof jack positions shown in (Tab. 4 and Tab. 5, page 14), sufficiently strong boards/planks must be attached to the rafters (cut out counter-battens) so that the roof jacks can be installed between the rafters.



USER NOTE

With some roof coverings it may be necessary to underlay the lower part of the roof jack (Fig. 14, **Item 4**) with boards/planks so that the upper part of the roof jack lies on top of the tile.

- Loosen the long hex- nut (Fig. 14, Item 2).
- Insert bolt into upper hole (Fig. 14, Item 3).
- Loosely fasten lower part of roof jack (Fig. 14, Item 1). Do not tighten the connection yet.



SYSTEM DAMAGE

through breakage of the roof jack if the bolt is not positioned in the upper hole, resulting in uneven load distribution.

• Lay front brace onto the tile so that when subjected to a load it lies in a tile valley (Fig. 15, **Item 3**).

The roof jack must have some clearance along the upper edge of the tile (Fig. 15, **Item 4**). Adjust the top of the tile if necessary.

• Push the lower part of the roof jack down until it lies on the rafter or on the boards/planks (Fig. 15, **Item 6**).



USER NOTE

The toothed washer (Fig. 15, **Item 5**) must grip the teeth on the lower part of the roof jack.

- Tighten the long hex- nut (Fig. 15, **Item 1**). To do this, insert the size 5 Allen wrench into the hole in the hexnut and turn.
- Using suitable screws, fasten the lower part of the roof jack into the first (Fig. 15, **Item 2**) and second holes (at least) of the rafter.



Fig. 14 Fastening roof jacks to rafters

- Item 1: Lower part of roof jack
- Item 2: Long hex- nut
- Item 3: Upper hole for fastening the lower part
- Item 4: Underlay if necessary
- Item 5: Cut off if necessary



Fig. 15 Roof jack installed (some tiles have been removed for a better view)

- Item 1: Long hex- nut
- Item 2: Screw for fastening roof jack
- Item 3: Front brace
- Item 4: Adjust the tile as necessary to install the roof jack
- Item 5: Toothed washer
- Item 6: Board/plank

5.3 Flat Shingle Tile



USER NOTE

Consult a roofer when installing on a roof with flat shingle tiles.

During installation, please maintain the required distances (w, x and y) between the roof jacks as detailed in (Tab. 4 and Tab. 5, page 14).

According to the roof jack positions shown in (Tab. 4 and Tab. 5, page 14), sufficiently strong boards/planks (Fig. 16, **Item 1**) must be attached to the rafters (cut out counter-battens) so that the roof jack can be installed between the rafters.



USER NOTE

If the roof has been installed with counterbattens, you can also use the roof jack according to the pantile tiles (page 15).

Preparing roof jack

Before installing, the lower part must be moved to the correct position.

- Loosen the long hex- nut (Fig. 17, Item 2).
- Insert bolt into upper hole (Fig. 17, Item 3).
- Loosely fasten lower part of roof jack (Fig. 17, Item 1). Do not tighten the connection yet.



SYSTEM DAMAGE

through breakage of the roof jack if the bolt is not positioned in the upper hole, resulting in uneven load distribution.



Fig. 16 Install boards/planks if necessary



- Fig. 17 Repositioning lower part of roof jack
- Item 1: Lower part of roof jack
- Item 2: Long hex- nut
- Item 3: Upper hole for fastening the lower part
- Item 4: Cut off if necessary

Installing the roof jack



BUILDING DAMAGE

caused by leaks.

 Install each roof jack centrally on a shingle tile.



USER NOTE

If the roof battens are too close together, remove the lower part of the roof jack between the second and third holes.

 Push the lower part of the jack down until it lies on the rafter or on the board/plank (Fig. 18, Item 1).



USER NOTE

The toothed washer (Fig. 18, **Item 2**) must grip the teeth on the lower part of the roof jack.

- Tighten the long hex- nut (Fig. 19, Item 1). To do this, insert the size 5 Allen wrench into the hole in the hexnut and turn.
- Using suitable screws, fasten the lower part of the roof jack into the first (Fig. 19, Item 3) and second holes (at least) of the rafter or board/plank.

 Cut the adjacent shingles (Fig. 20, Item 1) to size (dashed line, Fig. 20, Item 2).



Fig. 18 Installed roof jack



- Fig. 19 Installed roof jack cross section showing shortened lower part of roof jack
- Item 1: Long hex- nut
- Item 2: Toothed washer
- Item 3: Screw for fastening roof jack



Fig. 20 Roof jack with covered roof

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5.4 Corrugated sheeting



RISK TO LIFE

through inhalation of fibers containing asbestos.

- Work with materials containing asbestos must only be carried out by experts or persons who have been fully instructed on the proper procedures.
- The measures laid down in OSHA Asbestos Standards must be strictly observed.

Post screws must be used instead of roof jacks for fastening the profile rails.

Standard delivery (Fig. 21):

Item 1:	M8 screw	4 ×
Item 2:	Holding bracket	4 ×
Item 3:	M12 nut	4 ×
Item 4:	Washer	4 ×
Item 5:	Sealing disc	4 ×
Item 6:	M12 post screw	$4 \times$

On corrugated roofs, the peaks determine the true distance between the post screws. During installation, please maintain the required distances (w, x and y) between post screws as detailed in (Tab. 4 and Tab. 5, page 14).



CAUTION!

SYSTEM DAMAGE

due to an insufficiently strong subframe.

- Check that the subframe is strong enough. To fasten the post screws, lumber supports of at least 1 1/2 x 1 1/2 in (40×40 mm) thickness are required.
 - If necessary, installadditional lumber supports to maintain the measurements shown in Tab. 4 and Tab. 5.



Fig. 21 Roof connector for corrugated sheets

Additional tools required

- Cordless screwdriver
- Tape measure
- Wood drill, Ø 6 mm (drill bit length see Chapter "Installing the post screws", page 20)
- Metal drill, Ø13 mm
- Wrench size 15 and 19

19

Installing the post screws



USER NOTE

Using the wood drill, drill precisely at a 90° angle through the roof subframe to obtain a flat, level surface between the holding bracket and profile rail. It may be a good idea to prepare a drill guide or template.

- Find a piece of lumber approx. 197/10"- 3.3 ft (0.50-1.00 m) in length. Vertically drill a hole (Ø 6 mm) right through the lumber (Fig. 22).
- Determine the length of the drill bit for the wood drill as follows:





BUILDING DAMAGE

caused by leaks.



Never drill into a tile valley.

- Drill through the corrugated metal roof using a metal drill (Ø 13 mm) taking note of the positions of the post screws (see Tab. 4 and Tab. 5). Do not drill into the wood beneath!
- Feed wood drill (Ø 6 mm) through the template and drill vertically into the subframe (timber support).
- When installing the post screws, note the sequence of the individual parts (Fig. 23).
- Turn holding bracket (Fig. 23, Item 1) until it touches the post screw (Fig. 23, Item 5).
- Screw the preassembled post screws into the roof using a size 15 monkey wrench until distance B is reached (Tab. 6).



USER NOTE

When screwing in post screws, ensure that the distance B (Tab. 6 and Fig. 24) is the same for all post screws.



Fig. 22 Creating a drilling template



Fig. 23 Installing the post screws – sequence

- Item 1: Holding bracket
- Item 2: M12 nut
- Item 3: Washer
- Item 4: Sealing disc
- Item 5: M12 post screw

• Tighten the nuts (Fig. 24, **Item 2**) until the gasket (Fig. 24, **Item 3**) is lying completely flush on the roof.



USER NOTE

• The holding bracket must be screwed fully onto the post screw.

Height of peak, dimension A	Dim. B
1 7/16 in (35 mm)	2 7/10 in (70 mm)
1 5/8 in (40 mm)	2 1/2 in (65 mm)
1 7/8 in (45 mm)	2 3/8 in (60 mm)
2 in (50 mm)	2 3/16 in (55 mm)
2 3/16 in (55 mm)	2 in (50 mm)
2 3/8 in (60 mm)	1 7/10 in (45 mm)

Tab. 6Mounting dimensions for corrugated roof.Dimensions depend on height of peak.

Fastening the profile rail

Please also note Chapter 5.8.1 "Connecting profile rails".

• Fasten each profile rail (Fig. 25, **Item 2**) with two bolts (Fig. 25, **Item 1**).



USER NOTE

The profile rails must not sag due to differences in level of the rafters.

• Use a string line to check. If necessary, underlay the profile rails at the holding bracket.



- Fig. 24 Post screw installed to corrugated roof
- Item 1: Holding bracket

Item 2: Nut, M12

Item 3: Gasket



Fig. 25 Fastening the profile rail to the holding bracket

- Item 1: Screw
- Item 2: Profile rail
- Item 3: Holding bracket

5.5 Slate or Composite Shingles



USER NOTE

A roofer must carry out the installation on slates or composite shingles.

Here is an example of the installation of the special roof jacks and the watertight seal with customer-supplied flashing (Fig. 26, **Item 1** and **2**) with a Slate or composite shingle.

During installation, please maintain the required distances (w, x and y) between the special roof jacks as detailed in (Tab. 4 and Tab. 5, page 14).

- Install special roof jack (Fig. 26, Item 5) and gasket (Fig. 26, Item 4) to the shingles using screw (Fig. 26, Item 6).
- To ensure that the installation is watertight, flashing (Fig. 26, **Item 1**, **2**) must be installed on the building above and below the special roof jacks.



User note:

The special roof jacks must be positioned on the front of a multiple shingle (Fig. 26, **Item 3**).





- Item 1: Flashing (on building)
- Item 2: Flashing (on building)
- Item 3: Multiple tiles
- Item 4: Gasket (on building)
- Item 5: Special roof jacks
- Item 6: Screw



- Fig. 27 Properly mounted roof jack
- Item 1: Screw
- Item 2: Roof jack
- Item 3: Roof cover
- Item 4: Rufter

5.6 Metal Sheet Roofing



USER NOTE

A roofer must carry out the installation on a sheet steel roof.

Post screws (Fig. 28, **Item 5**) must be used instead of roof jacks for fastening the profile rails. During installation, please observe the distances (w, x and y) between post screws as detailed in (Tab. 4 and Tab. 5, page 14).

To ensure the roof is leakproof, sleeves provided by the customer (Fig. 28, **Item 6**) for the post screws (Fig. 28, **Item 5**) must be soldered onto the metal sheet roof.



USER NOTE

For the installing sequence for post screws and profile rails, and the relevant instructions, see Chapter 5.4 "Corrugated sheeting".



Fig. 28 Mounting on sheet steel roof

Item 1: Holding bracket

- Item 2: M12 nut
- Item 3: Washer
- Item 4: Sealing disc
- Item 5: M12 post screw
- Item 6: Sleeve (provided by customer)

5.7 Installing additional rails (accessory)

Additional measures are needed for installation heights of 20 to 100 m and/or with standard snow loads of 0.29 (2.0) to 0.45 psi (3.1 kN/m^2).



USER NOTE

The example here shows an installation on tile. The additional rails can also be installed on other types of tiles described in this manual.

Installing additional roof jacks

Additional roof jacks must be installed for attaching the snow load profiles.

• Fasten additional roof jacks (Fig. 29, **Item 1**) as centrally as possible between the upper and lower roof jacks already installed.



USER NOTE

There must be at least one free row of tiles between the upper, middle and lower roof jacks.

Fastening the snow load profile to the roof jacks

- Push sliding nut (Fig. 30, **Item 1**) onto the roof jack in the direction of the arrow.
- Place the snow load profile (Fig. 30, Item 2) onto the roof jacks and tighten using an M8 bolt (Fig. 30, Item 3).
- Make sure snow load profiles are level and flush (use string line).

Installing the profile rails

The profile rails must be joined before they are fastened. Please see Chapter 5.8.1 "Connecting profile rails".

- Place the profile rails (Fig. 31, Item 1) into the indentations (Fig. 31, Item 2) on the snow load profiles and loosely fasten using bolt and aluminium nut (Fig. 31, Item 3) so that the profile rails can still be aligned.
- Carry out the same procedure for the other profile rails.

To continue with the installation, see Chapter 5.8.3 "Aligning the profile rails".



Fig. 29 Additional roof jacks for the snow load profile (here: for two collectors)



Fig. 30 Fastening the snow load profile



Fig. 31 Installing horizontal profile rails

5.8 Installing profile rails

The profile rails must be joined together using plug connectors. Each collector has been provided with an upper and lower profile rail.

5.8.1 Connecting profile rails

- Push plug connector (Fig. 32, **Item 1**) as far as it will go into both profile rails (Fig. 32, **Item 2**).
- To lock, tighten both installed M10 threaded studs (Fig. 32, **Item 3**) in the plug connector using a size 5 Allen wrench.



- Fig. 32 Connecting profile rails
- Item 1: Plug connector
- Item 2: Profile rail
- Item 3: M10 threaded stud



Fig. 33 Fastening profile rails to the roof jack

- Item 1: Sliding nut
- Item 2: Profile rail
- Item 3: Bolt

5.8.2 Installing profile rails

- Push sliding nut (Fig. 33, **Item 1**) onto the roof jack in the direction of the arrow.
- Place the lower profile rails (Fig. 33, Item 2) onto the roof jacks and loosely fasten M8 bolt (Fig. 33, Item 3) so that the profile rails can still be aligned.
- Carry out the same procedure for the upper profile rails.



USER NOTE

To check the distance between the profile rails, we recommend that you make a tool out of battens.

5.8.3 Aligning the profile rails

• Align the upper and lower profile rails to the side flush with each other and level them (Fig. 34, use a spirit level).



USER NOTE

Measure the diagonals or place a roof batten (Fig. 34, **Item 1**), for example, at the ends of the profile rails. The angle between roof batten and profile rail must be 90°. Align the profile rails over the slotted holes.

• Tighten the screws.



USER NOTE

The profile rails must not sag due to differences in level of the rafters.

Check using a string line. If necessary, underlay profile rails at the roof jack.

5.8.4 Installation of anti-slip protection

To prevent the collectors from slipping, you must fasten two anti-slip protectors to the lower profile rails for each collector.

 Push each anti-slip protector (Fig. 35, Item 3) into the innermost slotted holes (Fig. 35, Item 1) over the profile rails until it clicks into place (Fig. 35, Item 2).



Fig. 34 Aligning the profile rails



Fig. 35 Attaching anti-slip protection

- Item 1: Fixing holes for the anti-slip protection
- Item 2: Clicking the anti-slip protection into place
- Item 3: Anti-slip protection

6 Collector installation

Observe the following safety and user instructions when commencing the collector installation.



RISK TO LIFE

through a fall or falling parts.

- WARNING!
- Take appropriate action to prevent accidents when working on roofs.
- Whilst working on the roof, take all necessary precautions against a possible fall.
- Always wear your personal protective clothing and safety equipment.
- After completing the installation, always check the secure positioning of the installed set and that of the collectors.



SYSTEM DAMAGE

through damaged sealing faces.

 Do not remove the plastic caps on the collector connections until immediately prior to installation.



USER NOTE

Use lifting equipment as used by roofing contractors, sufficiently strong 3-point vacuum cups or special grippers (available as accessories) for the installation (for easier lifting).



USER NOTE

Unsecured collectors may fall during handling and installation.



Fig. 36 View of roof mounting with collectors

27

6.1 Preparing to install the collectors

Before beginning actual installation on the roof, preassemble the locking caps on the ground to make work on the roof easier.

To secure the locking caps (and later the corrugated pipe connectors and connecting pipes as well), attach brackets to the connections.



CAUTION

SYSTEM DAMAGE

through leaks in the collector connections.

The corrugated pipe connectors, connecting pipes and collector connections must not display any signs of damage or contamination.

• The collector connections have had special grease applied in the factory to make installation easier. Do not use any other grease.

6.1.1 Water connections

The collectors must be installed in such a way that the sensor bushings that receive the collector sensor (Fig. 38, **Item 1**) are at the top.



USER NOTE

The water connection pipes can be connected on the right (Fig. 37) or left (Fig. 38). In this manual, the connection pipes are shown on the right.

The pipework in the collector is designed as a double meander, which enables you to carry out two different water connections:

One-sided connection of up to 5 collectors

Up to 5 collectors can be connected one side of a collector array (Abb. 37 and Abb. 38).

Two-way connection of up to 10 collectors

If there are more than 5 collectors installed in one collector array, the water connection must be two-way (Tichelmann principle, Abb. 39).

The two-way connection can also be made if there are fewer than 6 collectors (Fig. 39).



Fig. 37 Water connection (right) up to max. 5 collectors

- Item 1: Corrugated pipe connector
- Item 2: Flow line
- Item 3: Return line
- Item 4: Locking cap



Fig. 38 Water connection (left) up to max. 5 collectors



Fig. 39 Two-way water connections

6.1.2 Fitting the locking cap

Not all the connections are needed when connecting a collector array. Those that are not used must be closed.

- Remove rubber caps (transport protection) from the relevant collector connections.
- Push locking cap with the O-rings (Fig. 40, **Item 1**) onto the collector connection.
- Push bracket (Fig. 40, **Item 2**) over the locking cap and collector connection to secure the connection.

6.1.3 Dummy plug installation



Fig. 40 Securing locking cap with bracket

6.2 Fastening the collectors

The collectors are fastened to the profile rails using the one-sided collector clamps (Fig. 40, **Item 2**) at the beginning and end of a collector array, and double-sided clamps (Fig. 40, **Item 1**) between each collector.

In addition, the anti-slip protectors prevent the collector from slipping.



USER NOTE

The plastic parts on the collector clamps do not have any support function. They are simply intended to make installation easier.

Pushing on the one-sided collector clamp on the right

• Push one-sided collector clamps (Fig. 41, **Item 1**) into the profile rails at the right-hand end of the collector array until they click into place in the first slotted hole on the profile rails.



USER NOTE

Do not fit the one-sided collector clamps to the left-hand side of the collector array until the last collector has been installed.



Fig. 41 Fasteners for the collector



Fig. 42 Pushing on the one-sided collector clamp

Putting the first collector in place

Lay the collector on the profile rails in such a way that the sensor bushing is at the top to receive the collector sensor. Begin by laying the collectors on the right-hand side of the profile rails.



CAUTION!

RISK OF INJURY

Install collectors with at least one assistant.

• Place the first collector onto the profile rails and allow it to slide into the anti-slip protectors (Fig. 43).

The lower collector edge must lie in the opening of the anti-slip protector (Fig. 43, **Item 1**).

- Carefully push collector (Fig. 43, **Item 1**) up against the one-sided collector clamp and align horizontally.
- Screw in one-sided collector clamp (Fig. 43, Item 2) using size 5 Allen key.



USER NOTE

When the screw is tightened, the plastic lugs at the pre-determined cut-off points break away.

The grip on the collector clamp (Fig. 43, **Item 2**) now grips the lower collector edge.

Inserting a double-sided collector clamp

- Insert the double-sided collector clamp, nut first, into the opening made by the profile rail and plug connector so that the plastic spacer (Fig. 45, **Item 1**) surrounds the profile rail.
- Push double-sided collector clamp up against the collector frame.



USER NOTE

Do not tighten the screw until the second collector has been pushed up against the double-sided collector clamp.



Fig. 43 Laying the first collector on the profile rails



Fig. 44 One-sided collector clamp screwed in place



Fig. 45 Fitting a double-sided collector clamp

Fitting corrugated pipe connectors to the first collector

- Removing rubber caps from the connections.
- Push corrugated pipe connectors (Fig. 46, **Item 1**) onto the left-hand connections on the first collector.
- Push bracket (Fig. 46, **Item 2**) over the corrugated pipe connector and collector connection to secure the connection.



• Place the second collector onto the profile rails and allow it to slide into the anti-slip protectors.



SYSTEM DAMAGE

through damaged corrugated pipe connectors.

- Do not use any tools, e.g. pliers (Fig. 47, **Item 2**). These could render the corrugated pipe connector unusable.
- Push the second collector on to the first in such a way that the collector connections are pushed into the preassembled corrugated pipe connectors (Fig. 47, Item 1) on the first collector.
- Place second bracket (Fig. 47, **Item 3**) over the corrugated pipe connector and collector connection.



SYSTEM DAMAGE

through unsecured corrugated pipe connectors and locking caps.

• Secure each locking cap with one bracket and each corrugated pipe connector with two brackets (Fig. 48, **Item 1**).



Fig. 46 Fitting corrugated pipe connectors to the first collector



Fig. 47 Pushing second collector towards the first



Fig. 48 Corrugated pipe connector secured with brackets

 Tighten the screw on the double-sided collector clamp using the size 5 Allen key.



USER NOTE

When the screw is tightened, the plastic lugs at the pre-determined cut-off points break away.

The grip (Fig. 49, **Item 1**) on the collector clamp now grips the lower collector edges.

Repeat the procedure for all the other collectors.

Fitting the one-sided collector clamp on the left

Once all collectors are fitted, the two remaining onesided collector clamps can be attached.

- Push one-sided collector clamp (Fig. 50, **Item 1**) into upper and lower profile rails.
- Push collector clamp up against the collector frame and screw in place using size 5 Allen key (Fig. 50, Item 2).



USER NOTE

When the screw is tightened, the plastic lugs at the pre-determined cut-off points break away.



Fig. 49 Double-sided collector clamp between two collectors



Fig. 50 One-sided collector clamp (left)

7 Collector sensor connection



USER NOTE

The collector sensor is part of the compact station or the control unit delivery.

Observe the installation location for single or dual row collector systems (Fig. 51).



SYSTEM DAMAGE

through faulty sensor cable.

• Protect the cable from possible damage (e.g. by martens).

Insertion point

The collector sensor must be fitted in the collector connected to the flow line (Fig. 51, **Item 2**).

- Insertion point (Fig. 51, Item A) for single row collector systems.
- Insertion point (Fig. 51, Item B) for dual row collector systems.

Installing the collector sensor

For perfect functioning of the solar heating system, the collector sensor (Fig. 52, **Item 1**) needs to be inserted into the sensor guide tube as far as it will go (approx. 250 mm).

- Using the collector sensor or screwdriver, push through the sealing membrane on the sensor bushing (Fig. 52, **Item 3**).
- Screw clamped joint (Fig. 52, Item 2) into sensor bushing.
- Insert collector sensor approx. 250 mm into the sensor guide tube (as far as it will go).
- Tighten clamped joint (Fig. 52, Item 2), counterhold if necessary.



USER NOTE

If you accidentally push through the sensor bushing (Fig. 52, **Item 3**) on the wrong collector, it can be resealed using the plug from the connection kit. You must first remove the nut in the sensor bushing using the cable gland (Fig. 52, **Item 2**).





Item 1: Return line

Item 2: Flow line



Fig. 52 Pushing the collector sensor into the collector

- Item 1: Collector sensor
- Item 2: Clamped joint
- Item 3: Sensor bushing

8 Header connection

Information on laying the header pipes can be found in the complete station installation instructions.

The water connection to the header pipes is made using the long flexible connection pipes. It is not permitted to connect a fixed header pipe directly to the collector.



USER NOTE

Use standard ventilation tiles or antenna barrels when laying the connection pipes under the roof.

Use a specialist company to route the connection pipes under the roof.



USER NOTE

Feed the sensor cable together with the flow line through the ventilation tile under the roof.



USER NOTE

If you intend to vent the solar heating system with an automatic air-vent valve (accessory) at the highest point of the system, run the flow line rising to the airvent valve and the return line rising to the collector array.

8.1 Ventilation through pressure filling

If venting of the solar heating system is carried out using a pressure filling pump, no vent is required on the roof.

- Push connection pipe (1.000 mm, Fig. 54, **Item 1**) onto the flow connection on the collector array and fix in place using bracket (Fig. 54, **Item 4**).
- Feed connection pipe together with the sensor cable through the ventilation tile (Fig. 54, **Item 3**) and through the roof insulation.
- Connect header pipe to the compression fitting (Fig. 54, Item 2).

Perform the same procedure with the return connection.





- *Item 1:* Flow line (shown without insulation)
- Item 2: Return line (shown without insulation)
- Item 3: Sensor cable



Fig. 54 Fitting flow line (with no vent on roof)

8.2 Ventilation through air vent (accessory) on roof

If you intend to vent the solar heating system with an automatic air-vent valve (accessory) at the highest point of the system, run the flow line rising to the air-vent valve (Fig. 55, **Item 2**) and the return line rising to the collector array (Fig. 55).

Avoid frequent changes in direction.



USER NOTE:

For each change of direction downwards and each new rise, install an additional air pot with air vent.

If you cannot provide an automatic air vent valve due to space restrictions, install a manual air vent valve.



USER NOTE:

On solar heating systems, we recommend you always use metallic air vent valves, since these can withstand the prevailing temperatures.

Function of the grub screw and weather protection cap on the automatic air vent valve

The solar heating system is vented through the opened grub screw. When in operation, the weather protection cap (Fig. 56, **Item 1**) must always be positioned over the grub screw to prevent moisture entering through the opened grub screw into the solar heating system).

Open the air vent valve by unscrewing the grub screw one full revolution.

Universal air vent set scope of supply (Fig. 56):

Item 1:	Weather protection cap	1 ×
Item 2:	Automatic air vent	1 ×
Item 3:	Ball valve	1 ×
Item 4:	Gasket	1 ×
Item 5:	Vent pot	1 ×
Item 6:	Double nipple with O-ring	1 ×
Item 7:	Nipple R ³ / ₄	1 ×
Item 8:	Union nut	2 ×
Item 9:	Gasket	1 ×
Item 10:	Large diameter washer	1 ×
Item 11:	Clamping disc	1 ×





Item 1: Collector sensor

Item 2: Automatic air vent valve on roof



Fig. 56 Universal air vent set

8.2.1 Fitting the air vent valve under the roof

- Push connection pipe (Fig. 57, Item 3) onto the flow connection on the collector array and fix in place using bracket (Fig. 57, Item 5).
- Feed connection pipe together with the sensor cable through the ventilation tile (Fig. 57, **Item 4**) and through the roof insulation.

Perform the same procedure with the return connection.

- Remove union nut and clamping ring from connection pipe.
- Firmly screw connection pipe (Fig. 57, **Item 3**) and double nipple (Fig. 57, **Item 1**) into air pot (O-ring gasket).
- Connect header pipe to double nipple with compression fitting (Fig. 57, **Item 1**).



Fig. 57 Fitting the air vent valve under the roof

- Item 1: Double nipple with O-ring
- Item 2: Air pot
- Item 3: Connection pipe
- Item 4: Ventilation tile
- Item 5: Bracket

8.2.2 Fitting the air vent valve on the roof

To connect the connection pipe to the air vent (flow connection), the elbow must be removed from the connection pipe and the double nipple fitted.

- Cut elbow (Fig. 58, **Item 1**) from connection pipe using pipe cutter.
- Push union nut over the connection pipe.

Making the sealing face:

- Place clamping disc (Fig. 58, **Item 2**) behind the first rib and press together. The clamping disc must lie evenly on the collar of the union nut.
- Put large diameter washer (Fig. 58, **Item 3**) into the union nut in front of the cut surface of the connection pipe.
- Firmly screw double nipple (Fig. 58, **Item 4**) into union nut, so that a flat sealing surface is created on the connection pipe.
- Remove double nipple and large diameter washer and check that a flat sealing surface has been created.
- Remove any burrs as required.
- Insert gasket (Fig. 58, **Item 5**) and screw in double nipple.

Connection to the collector:

- Firmly screw nipple (Fig. 59, **Item 5**) and connection pipe (Fig. 59, **Item 2**) into air pot (O-ring gasket).
- Push air pot (Fig. 59, Item 1) and nipple onto collector connection and secure with bracket (Fig. 59, Item 6).
- Feed connection pipe together with the sensor cable through the ventilation tile (Fig. 59, **Item 4**) and through the roof insulation.
- Connect header pipe to the compression fitting (Fig. 59, **Item 3**).



USER NOTE

Install return connection as described in Kapitel 8.1 "Ventilation through pressure filling".



Fig. 58 Preparing the connection pipe

Item 1: Bracket

- Item 2: Clamping disc
- Item 3: Large diameter washer (for making sealing face)
- Item 4: Double nipple

Item 5: Gasket



- Item 3: Compression fitting 18 mm
- Item 4: Ventilation tile
- Item 5: Nipple R³/₄
- Item 6: Bracket

9 Fitting the connection set for two rows (accessory)

The connection set (Fig. 60, **Item 9**) is available as an accessory, and connects two rows of collectors.



USER NOTE

Fit as many connection parts as possible to the collectors on the ground. This makes installation on the roof easier.

Scope of supply (Fig. 60)

Item 1:	Locking cap	2 x
Item 2:	Connection pipe	1 ×
Item 3:	Bracket	1 ×
Item 4:	Gasket	1 ×
Item 5:	Large diameter washer	1 ×
Item 6:	Clamping disc	1 ×
Item 7:	Clamping ring	2 ×
Item 8:	Union nut G1	1 ×

Fitting additional locking caps

Use the locking caps to close up any collector connections not in use (Fig. 60, **Item 1**, siehe Kapitel 6.1.2 "Fitting the locking cap", Seite 28).

Installing the connection set

 Remove double nipple and compression fitting from connection pipe.



USER NOTE

If you need to shorten the connection pipe (Fig. 61, **Item 1**), observe the installation steps described in "Making the sealing face:", Seite 36.

- Insert gasket (Fig. 61, Item 2) into union nut.
- Insert bracket (Fig. 61, Item 3) into union nut G1, align and screw tight.
- Push connection pipe (Fig. 61, Item 1) onto the collector connections and fix in place using brackets (Fig. 61, Item 4) from the connection kit.

Extending the connection set

- Fit clamping ring (Fig. 62, Item 2) and union nut to bracket (Fig. 62, Item 3).
- Push copper pipe (cut to appropriate length) (18 mm, Abb. 62, **Pos. 1**) into compression fittings.
- Tighten the fittings.



Fig. 60 Schematic diagram and scope of supply



Fig. 61 Connection set between two collector rows



Fig. 62 Lengthening the connection pipe

10 Final activities

10.1 Checking the installation



SYSTEM DAMAGE

through corrosion if water remains in the solar heating system for an extended period after it has been flushed or after a pressure test.

• Start up the solar heating system immediately after flushing/pressure test with solar fluid (for instructions on flushing/pressure test see complete station instructions). Otherwise, carry out flushing/pressure test later.



USER NOTE

Carry out the final insulating work only once the appropriate checks have been performed.

Checks

1.	Corrugated pipe connector, locking caps and connection pipes secured with brackets?	
2.	Profile rails connected to roof hook and sliding nut?	
3.	Anti-slip protection installed and clicked into place in profile rails?	
4.	Sensor inserted as far as it will go and secured with clamped joint?	
5.	Pressure test carried out and all connections leak-proof (see complete station instructions)?	



USER NOTE

If you are venting the solar heating system with an automatic air vent valve (accessory), you must close the ball valve after the venting procedure (see complete station installation instructions).

10.2 Insulating the connection and header pipes

• Cut enclosed insulation (710 mm long) into 88 mm lengths and place around the corrugated pipe connectors between the collectors.

Insulation of the manifolds in internal or external installations

- For the insulation of external pipework, use only UV and high temperature resistant insulating materials.
- For the insulation of internal pipework, use only high temperature resistant insulating materials.
- Make the insulation bird-proof.

11 Quick reference guide for pantile roof and pressure filling

p. 15

p. 24

These instructions are only intended as an overview of the work to be carried out. You MUST follow the detailed descriptions for the work on the pages mentioned, and all safety and user instructions.

Fitting roof hooks and profile rails

- Turn lower part of roof hook and hook complete roof hook into a tile valley, observing the distances given in (Chapter 5.1 "Setting clearances", page 14).
- 2. Lift lower part of roof hook and tighten fitting.
- 3. Connect profile rails together using plug connectors. p. 24
- 4. Fasten profile rails to roof hook
- 5. Align profile rails horizontally and laterally flush with p. 25 each other.
- 6. Install anti-slip protectors into the two inner slotted p. 25 holes on the lower profile rails.

Preparing to install the collectors

7. Push locking caps onto those connections that are not p. 28 required and secure using brackets.

Fastening the collectors

8.	Push one-sided collector clamp (right) into profile rails.	p. 28
9.	Place first collector (right) onto profile rails and push onto collector clamp.	p. 29
10.	Screw up collector clamp on the right.	p. 29
11.	Place double-sided collector clamp into profile rail and push onto first collector.	p. 29
12.	Push corrugated pipe connectors onto the connections on the first collector and secure with brackets.	p. 30
13.	Push second collector towards the first and fit second bracket.	p. 30
14.	Tighten screws on the double-sided collector clamp.	p. 31
15.	Repeat the procedure for all other collectors.	p. 31
16.	Fit one-sided collector clamps on the left	p. 31

Header connection

Insert collector sensor as far as it will go into the collector with the flow line to be connected, and screw tight.	p. 32
Push connection pipes onto flow and return connections and secure with brackets.	p. 33
Feed flow connection pipe together with sensor cable through ventilation tile and roof insulation.	p. 33
Perform installation checks.	p. 38
Insulate header pipes and corrugated pipe connectors with UV and high temperature resistant material.	p. 38
	Insert collector sensor as far as it will go into the collector with the flow line to be connected, and screw tight. Push connection pipes onto flow and return connections and secure with brackets. Feed flow connection pipe together with sensor cable through ventilation tile and roof insulation. Perform installation checks. Insulate header pipes and corrugated pipe connectors with UV and high temperature resistant material.











Fig. 65 Fitting the collector sensor and header pipes



67910057-00-Type of collectors and rating label

Item	Part Number	Description	Weight
20	7747021972	SKN 3.0-S Solar Flat Plate Collector	93 1/2
30	7747021974	SKN 3.0-W Solar Flat Plate Collector	95 1/2
40	7747021975	SKS 4.0-S Solar Flat Plate Collector	104 1/2
50	7747021976	SKS 4.0-W Solar Flat Plate Collector	106 1/2



67910060-00-On roof mounting hardware vertical - horizontal

Item	Part Number	Desciption	in lb
10	63045246	Collector adjuster simple	0.2
20	63045239	Frame profile ÜD vertical	3.1
21	63045240	Frame profile ÜD horizontal	5.5
30	63045243	Slipping safety device	0.22
40	63045241	Connector frame profile kpl with threaded pins	0.25
50	63045244	Collector adjuster double	0.26
60	63045233	Roof jacks adjustable kpl	0.66
		Available individual part:	
70	63045237	Snapnat Roof jacks M8	0.06
80	х	Truss head screw M8x25 m. Imbuss	





67910165-00-Slate roof mounting hardware

Item	Part Number	Description	Weight
			, rroigin
		Mounting kits for snow support:	
10	63045254	Snow profile vertical	5.5
		Mounting kits Welleternit and	
		Motal sheet roof:	
		Metal-Sheet 1001.	
30	63020003	Mounting-Set Welleternit	0.44
		consists of:	
40	(x)	Truss head screws 8x16 10,9 A2	*
		2 pieces	
50	63020008	Retaining support M8/M12 f Welleternit	0.1
60	(x)	Hexagonal nut DIN439 M12 A2	*
		1 piece	
70	(x)	Disk DIN125 13 A2	*
		1 piece	
80	63020009	Seal f Welleternit/Bitumen	0.02
90	63020010	Grub screw M12x180	0.3
		Mounting kits for Slate- and	
		Shingle roofs	
100	63017467	Mounting-Set for Roof jacks SSB for slate roofs	0.88
		consists of:	
110	(x)	Roof jacks SSB for slate roofs	*
120	(x)	Truss head screw M8x25	*
0			
130	(x)	Disk DIN125 8 4 V2A	*
100			
140	(x)	Hexagonal nut DIN985 M8 A4	*
	. /	1 piece	
150	(x)	Wooden screw 6x70	*
	× /	1 piece	
		1	



67910062-00-Connection set SKN3.0

Item	Part Number	Description	Weight
10	63046151	Angle bracket G1x18 Clamp G3/4 kpl	0.4
		Available individual parts:	
90	87182237040	Compression ring 18 mm	0.05
		Set 5 pieces	
70	63045310	O-Ring 21x3,0 Shore70	0.01
		Set 5 pieces	
15	63046195	Fastening-parts kit connection SKN consists of:	0.1
120	(x)	Cap nut G1 D25x17Ms	
100	(x)	Lock washer G1x21 slotted	
20	63045247	Hose clamp DN30 Steel tape	0.2
		Set 5 pieces	
30	х	Solarhose 3/4x55	
		Pos. 60 use and accordingly	
		cut to length	
40	63045248	Blank plug D21	0.16
80	85336132	Solar hose 3/4"x1000	1.65
110	63045249	Hose connector 18 Clamp G3/4xD21 kpl	0.2
		Available individual parts:	
50	63045301	O-Ring 25x3,0 Shore70	0.02
		Set 5 Pieces	
90	87182237040	Compression ring 18 mm	0.05
		Set 5 pieces	
60	63045253	Angle sleeve G1xD21 Ms kpl	0.27
		Available individual parts:	
70	63045310	O-Ring 21x3,0 Shore70	0.01
		Set 5 pieces	
15	63045306	Fastening-parts kit Row SKN consists of:	*
120	(x)	Cap nut G1 D25x17Ms	
100	(x) (x)	Lock washer G1xD21slotted	
	(**)		



Item	Part Number	Description	Weight
10	87182237030	Angle bracket SKS 18 Clamp G3/4 kpl	0.3
		Available individual parts:	
15	63045264	O-Ring 15x3 SHORE70 EPDM291	0.008
20	87182237040	Set 5 pieces Compression ring 18 mm Set 5 pieces	0.05
40	63045256	Cover SKS kpl	0.1
		Available individual parts:	0.1
15	63045264	O-Ring 15x3 SHORE70 EPDM291 Set 5 pieces	0.008
50	63045255	Retaining clip f Corrugated pipes SKS Set 5 pieces	0.05
60	x	Isolation f. Corrugated pipes connector SKS	
80	87182237050	Connecting piece VL/RL SKS kpl	2.6
		Available individual parts:	
15	63045264	O-Ring 15x3 SHORE70 EPDM291 Set 5 pieces	0.008
90	63045258	Connection set Corrugated pipes SKS	0.05
		Available individual parts:	
15	63045264	O-Ring 15x3 SHORE70 EPDM291 Set 5 pieces	0.1
50	63045255	Retaining clip f Corrugated pipes SKS Set 5 pieces	0.05



Item	Part Number	Description	Weight
		Row connecting set SKN	11
10	63045253	Angle sleeve G1xD21 Ms kpl	2.5
		Available individual parts:	
20	63045310	O-Ring 21x3,0 Shore70	0.01
		Set 5 pieces	
80	63045306	Fastening-parts kit Row SKN/SKS consists of:	*
30	x	Lock washer G1x21 slotted	
85	Х	Cap nut G1 D25x17Ms	
40	63045247	Hose clamp DN30 Steel tape	0.19
		Set 5 pieces	
50	85336132	Solar hose 3/4"x1000	1.65
60	х	Solarhose 3/4x55	
		Pos. 50 use and accordingly	
		cut to length	
70	63045248	Blank plugs D21	0.14
		Row connecting set SKS	
90	63045266	Angle bracket SKS 18 Clamp G3/4 kpl	0.3
		Available individual parts:	
100	63045264	O-Ring 15x3 SHORE70 EPDM291 Set 5 pieces	0.008
110	87182237040	Compression ring 18 mm Set 5 pieces	0.05
120	63045255	Retaining clip f Corrugated pipes SKS Set 5 pieces	0.04
130	87182237050	Connecting pipe VL/RL SKS kpl	2.46



Item	Part Number	Description	Weight
20	63045247	Hose clip DN30 Steel tape	0.19
-		Set 5 pieces	
30	85336132	Solar hose 3/4"x1000	1.54
40	63015362	Quick Vent Valve autom R3/8 Solar	0.86
50	85103282	Ball valve 3/8" I/A Wing grasp	0.55
60	63012692	Cover D17x24x2 AFM34 (5x)	0.04
70	63045299	Exhauster pot Cast Housing	0.88
80	87182237060	Double nipple 18 Clamp G3/4 kpl	0.17
		Available individual parts:	
130	63045301	O-Ring 25x3,0 Shore70	0.02
		Set 5 pieces	
160	63020599	Stainless steel-Half-disk DN16x1,5	0.033
		Set 10 pieces	
90	х	Solar hose 3/4"x55	
		see Pos. 30, Part accordingly	
		cut to length	
100	87182237070	Hose clip 18 ClampG3/4xD21 kpl	0.02
		Clamp ring and Cap nut are not used here!	
		Available individual parts:	
130	63045301	O-Ring 25x3,0 Shore70	0.02
		Set 5 pieces	
110	63045249	Hose clip 18 ClampG3/4xD21 kpl	0.2
		Available individual parts:	
130	63045301	O-Ring 25x3,0 Shore70	0.02
		Set 5 pieces	
140	87182237040	Compression ring 18 mm	0.05
		Set 5 pieces	
120	63045263	Nipple SKS 18 Clamp G3/4 kpl	0.21
-			
		Available individual parts:	
130	63045301	O-Ring 25x3,0 Shore70	0.02
		Set 5 pieces	
150	63045264	O-Ring 15x3 SHORE70 EPDM291	0.01
		Set 5 pieces	

SOLAR RATING & CERTIFICATION CORPORATION

AWARD OF COLLECTOR CERTIFICATION

The solar collector listed below has been evaluated by the Solar Rating and Certification Corporation (SRCC) in accordance with SRCC Document OG-100, *Operating Guidelines and Minimum Standards for Certifying Solar Collectors*, and has been certified by the SRCC as specified in SRCC Standard 100-94, *Test Methods and Minimum Standards for Certifying Solar Collectors*. Certification and thermal performance ratings are based on the successful durability and performance testing of a sample unit where said tests have been conducted by an independent laboratory accredited by the SRCC.

Collector Certification Number: 100-2007006A

Date Certified: November 14, 2007

Test Laboratory: Bodycote

Report Number: 06-08-0533-2 Report Date: October 24, 2007

5-2 Report Date. October 24, 2007

Expiration Date: October 24, 2019

-0.17 (S)

(Linear Fit)

Product: Glazed Flat-Plate

Certified Model: SKS 4.0-s+w (Vert-Horiz) Model Tested: SKS 4.0-s

Supplier: BBT North America Corp 50 Wentworth Ave Londonderry, NH 03053 USA (603) 216-3449

Description: Fiberglass frame. Low Iron Tempered Glass glazing. Copper absorber with Selective Coating coating. Mineral Wool side insulation and Mineral Wool back insulation. Water was the fluid for performance tests. Gross Area: 2.41 m² (25.95 ft²). Aperture Area: 2.09 m² (22.49 ft²)

M	legajoules Per	r Panel Per Da	ay	Thousands of Btu Per Panel Per Day			
Category (Ti-Ta)	CLEAR	MILDLY CLOUDY	CLOUDY	Category (Ti-Ta)	CLEAR	MILDLY CLOUDY2	CLOUDY
	$23 \text{ MJ/m}^2 - d$	$17 \text{ MJ/m}^2\text{-d}$	11 MJ/m ² -d		2 kBtu/ft ² -d	1.5 kBtu/ft ² -d	1 kBtu/ft ² -d
A (-5 °C)	38	29	19	A (-9 °F)	36	27	18
B (5 °C)	35	25	16	B (9 °F)	33	24	15
C (20 °C)	30	21	12	C (36 °F)	28	20	11
D (50 °C)	20	12	4	D (90 °F)	19	11	4
E (80 °C)	11	4		E (144 °F)	10	4	

Efficiency Equation [NOTE: (P) = Ti-Ta] Y Intercept Slope -0.0120 (P)²/I W/m².°C SI Units: -3.2609 (P)/I 0.715 -3.97 $\eta = 0.709$ **IP** Units: -0.5747 (P)/I -0.0012 (P)²/I 0.715 -0.700 $\eta = 0.709$ Btu/hr.ft².°F

Incident Angle Modifier [NOTE: (S) = $1/\cos \theta - 1$] $\mathbf{K}_{\alpha\tau} = 1.0 -0.0058$ (S) -0.1652 (S)² $\mathbf{K}_{\alpha\tau} = 1.0$

This award of certification is subject to all terms and conditions of the Program Agreement and the documents incorporated therein by reference. It must be renewed annually. Any change in collector design, materials, specifications, parts, or construction must be reported to SRCC for evaluation of continued certification.

Technical Director

November 20, 2007

OG-100 SRCC COLLECTOR CERTIFICATION

Solar Rating and Certification Corporation, c/o FSEC, 1679 Clearlake Road, Cocoa, FL 32922

<u>Buderus</u>

Bosch Thermotechnology Corporation

50 Wentworth Avenue Londonderry, NH 03053 Tel: (603) 552-1100 Fax: (603) 584-1681 www.buderussolar.com

Buderus is a trade mark of the Robert Bosch (Bosch) Corporation

Manufactured by: Bosch Thermotechnik GmbH D-35573 Wetzlar www.heiztechnik.buderus.de info@heiztechnik.buderus.de