## **Installation Manual**



# Logasol SKS 4.0 Flat roof and wall-mounted installation

For Contractors

Please read carefully prior to installation.







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## 1 General

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.

### Lightning protection

If the solar heating equipment protrudes above the roof ridge or the building height (installation height) exceeds 65 ft (20 m), and there is no lightning grounding rod installed, ask your local electrical contractor to connect any components on the roof that conduct electricity to the earth bonding with an electrical earth cable of at least  $0.25 \text{ in}^2$  (16 mm<sup>2</sup>).

Special measures regarding lightning protection are not required for building heights (installation heights) of less than 65 ft (20 m).

Where there is a lightning grounding rod system installed, ask your local electrical contractor to check that the solar heating system is included in the lightning protection system.



At the end of their service life, collectors may be returned to the manufacturer. Materials will be recycled in an environmentally appropriate manner.

## 2 Specifications

SKS 4.0					
Certificates		SACLAR SRCC			
Length		81 1/2 in (2070 mm)			
Width		45 1/8 in (1145 mm)			
Depth		3 1/2 in (90 mm)			
Clearance between collectors		1 in (25 mm)			
Absorber contents, vertical version	V <sub>f</sub>	0.33 gal (1.2 I )			
Absorber contents, horizontal version	V <sub>f</sub>	0.48 gal (1.8 l)			
Gross absorber surface area	A <sub>G</sub>	25.95 ft <sup>2</sup> (2.411 m <sup>2</sup> )			
Net absorber surface area		22.49 ft <sup>2</sup> (2.09 m <sup>2</sup> )			
Net weight, vertical version	m	101 lbs (46 kg)			
Net weight, horizontal version	m	103.6 lbs (47 kg)			
Permissible operating pressure of the collector	p <sub>max</sub>	145 psi (10 bar)			

Tab. 1 Specifications

## 3 Safety

This chapter explains the meaning of the notes you will find in this manual and provides general safety instructions for safe and trouble-free operation.

You will find the installation-specific safety and user notes next to the appropriate 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 stored in a safe they manufacturer's premises.

The activities described in this manual assume expertise based on completed 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

Install components only on roofs with sufficient strength. Please take the additional roof load per flat roof support, including solar collector, into consideration. If necessary, ask a structural engineer for assistance.

Only install this system on flat roofs or roofs with a shallow pitch ( $\leq 25^{\circ}$ ).

If there is a risk that larger quantities of snow might accumulate behind the collectors (towards the roof ridge), prevent this by fitting a suitable protective grille.

On roofs with a shallow pitch, attach the system to the roof on site.

#### Application conditions for flat roof supports

Only erect the installation mounting set on roofs whose construction can support the weight.

The installation mounting set is suitable for a max. standard snow load of 28 lbs/sqft (2.0 kN/m<sup>2</sup>) and an installation height of max. 65 ft. Using appropriate accessories, the installation set can be used for a max. standard snow load of 43 lbs.sqf 3.8 kN/m<sup>2</sup> and a max. installation height of 328 ft (100 m).

The flat 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.

Conditions of use for wall mounting supports

Install the wall mounting support only on wall structures with sufficient structural strength. If necessary, ask a structural engineer for assistance.

The wall mounting support must only be installed at a maximum height of 65 ft (20 m) and with a maximum snow load of 28 lbs/sqft (2.0 kN/m<sup>2</sup>).

#### 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 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.

#### Please observe these safety 3.3 instructions



## **RISK TO LIFE**

through a fall or falling parts.

- WARNING! 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 collectors are fastened securely the installed set and the collectors are fastened securely.



## **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 radiation.



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.

## Check

- the delivery for completeness and perfect condition.
- the roof structure for sufficient strength and possible damage (e.g. leaks).
- the building height and determine the type of fixings required for the flat roof supports (see section 5.3 "Stablizing the flat roof supports", page 21).
- the optimum arrangement of the solar collectors. Take the solar radiation into consideration (angle of incidence, southerly orientation). 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.).
- the stability of the support surface. Remove gravel or similar material.



## **USER NOTE**

Only use OEM components and replace any faulty parts immediately.



## USER NOTE

Let a professional roofer carry out all difficult roof repairs, particularly weatherproofing of bitumen layers.



Fig. 1 General overview of collector pair – flat roof mounting



Fig. 2 General overview of collector pair – wall mounted installation

#### 4 Before installation

## 4.2 Component description

#### 4.2.1 Installation set for the collectors

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



Fig. 3 Installation set for 2 collectors - 1 basic installation set, 1 extended installation set

## Basic installation set for each collector array and for the first collector (Fig. 3):

Item 1:	Profile rail	2 ×
Item 3:	M8 screw × 20	6 ×
Item 5:	One-sided collector clamp	4 ×
Item 6:	M8 nut	4 ×
Item 7:	Collector brace	2 ×
Item 8:	Anti-slip protection	2 ×

## Extended installation set for each additional collector (Fig. 3):

Item 1:	Profile rail	2 ×
Item 2:	Plug connector with threaded studs	2 ×
Item 3:	M8 screw × 20	3 ×
Item 4:	Double-sided collector clamp	2 ×
Item 6:	M8 nut	2 ×
Item 7:	Collector brace	1 ×
Item 8:	Anti-slip protection	2 ×



## USER NOTE

Depending on the use of the flat roof support, auxiliary braces and additional profile rails may be needed, and are dealt with in the relevant sections.

#### 4.2.2 Water connection

You will require one connection kit for each collector array. The collectors are connected together by a connection set.



Fig. 4 Connection kit and connection set (illustration shows 2 upright collectors)

### Connection kit, per collector array (Fig. 4)

Item 2:	Bracket (spare)	2 ×
Item 3:	Pipe bend	2 ×
Item 4:	Clamping ring	2 ×
Item 5:	Union nut	2 ×
Item 6:	Insulation for flex-pipe connector 28 in (710 mm)	1 ×

## Connection set between the collectors, for each collector (in two carrying angles, Fig. 5)

Item 1:	Flex-pipe connector	2 ×
Item 2:	Bracket	4 ×

Item 7:	Holder for header pipe	2 ×
Item 8:	Compression fitting for collector sensor	1 ×
Item 9:	Size 5 wrench	1 ×
Item 10:	Locking cap	2 ×



Fig. 5 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
- Instrument for fastening on site

## 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 rubber caps.



## SYSTEM DAMAGE

through damaged sealing faces.

**CAUTION!** • Do not remove the rubber caps (Fig. 6, **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. 6 Rubber caps on collector connections

## 4.5 Technical documentation

The solar heating system consists of various components (Fig. 7). Installation, operation and maintenance documentation is provided for each component. Accessories may be accompanied by a separate document.

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



Fig. 7 Solar heating system components and technical documentation

## 4.6 Determining the angle of incidence of the collectors

The collectors' angle of incidence to be selected depends on the desired area of application. It can be adjusted using the telescopic rails (Fig. 8).

#### 4.6.1 Determining the area of application

The different areas of application of solar heating systems provide angles of incidence that ensure an optimum solar yield for every season.

Applications	Angle of incidence range
DHW	$30-45^{\circ}$
Domestic hot water + central heating	$45-60^{\circ}$
Domestic hot water + swimming pool	$30-45^{\circ}$
Domestic hot water + central heating + swimming pool	45 – 60°

Tab. 2 Area of application, angle of incidence range



Fig. 8 Angle of incidence of the collector on a flat roof

#### 4.6.2 Sloping roofs

On roofs that slope slightly in a southerly direction, the pitch angles are deducted from the angle of incidence. On roofs that slope slightly in a northerly direction, the pitch angles are added to the angle of incidence (Fig. 9).



WARNING!

## **RISK TO LIFE**

If there is a risk that larger quantities of snow might accumulate behind the collectors (towards the roof ridge), prevent this by installing a suitable protective grille on site.



CAUTION!

## SYSTEM DAMAGE

through strong wind. On sloping flat roofs the flat roof supports must be secured on site.

• Ask a roofing contractor to carry out the installation on sloping flat roofs.

#### 4.6.3 Walls

The horizontal collector braces can be used as flat roof supports or wall-mounting supports.



## **RISK TO LIFE**

from falling collectors, due to incorrect use.

 The collector angle of incidence (Fig. 10, Item 1) to the horizontal must be between 45° and 60° (or the angle of inclination Fig. 10, Item 2 of the collectors must be between 30° and 45°)



Fig. 9 Angle of incidence of the collector on a flat roof

- *Item 1:* Angle of incidence (absolute angle to the horizontal plane)
- Item 2: Collector angle of inclination
- Item 3: Roof pitch



Fig. 10 Angle of incidence of the collector on a wall

- *Item 1:* Angle of incidence (absolute angle to the horizontal plane)
- Item 2: Collector angle of inclination

### 4.6.4 Installing telescopic rails

Different angles of incidence can be set using the telescopic rails.

- Select holes on the upper and lower telescopic rails as shown in Fig. 12 and Fig. 13.
- Insert telescopic rails into each other and fasten with M8 (13 mm) × 20 screw (Fig. 11).



Fig. 11 Connecting telescopic rails



## **USER NOTE**

For vertical installation of a collector with an angle of inclination of 30° to 60°, use the uppermost hole on the lower telescopic rail (Fig. 12, **Item 1**).

For an angle of inclination of  $25^{\circ}$ , you must shorten the top of the lower rail by 5.5 in (140 mm) and use the lower hole (Fig. 12, **Item 2**).



Fig. 12 Adjust angle of inclination for vertical collectors



## **USER NOTE**

For horizontal installation of a collector with an angle of inclination of 35° to 60°, use the uppermost hole on the lower telescopic rail (Fig. 13, **Item 3**).

For an angle of inclination of  $25^{\circ}$  and  $30^{\circ}$ , you must shorten the top of the lower rail by 5 1/2 in (140 mm) and use the lower hole (Fig. 13, **Item 2**).



## **RISK TO LIFE**

from falling collectors, due to incorrect use.

 For wall-mounted installation, use only the positions for the collector angles of inclination 30°, 35°, 40° and 45° (Fig. 13, Item 1).

## 4.7 Determining space requirements

## 4.7.1 Ascertaining the clearance between collector arrays

The minimum spacing between the collector arrays is determined by the angle of inclination of the collector.



## USER NOTE

When using multi-row arrays, note that the clearance X (Fig. 14) between the arrays must be large enough to avoid shadows falling over adjacent collectors.

Maintain the clearance stated in the tables or calculate the require clearance (Technical Guide).

Angle of	Clearance X			
inclination- collector	Vertical installation	Horizontal installation		
25°	186 in (4.74 m)	103 3/16 in (2.63 m)		
30°	204 in (5.18 m)	112 7/8 in (2.87 m)		
35°	219 5/8 in (5.58 m)	121 1/2 in (3.09 m)		
40°	234 in (5.94 m)	129 5/8 in (3.29 m)		
45°	246 in (6.26 m)	136 3/16 in (3.46 m)		
50°	256 7/8 in (6.52 m)	141 5/8 in (3.61 m)		
55°	264 in (6.74 m)	146 7/16 in (3.73 m)		
60°	271 in (6.90 m)	150 7/10 in (3.82 m)		

Tab. 3
 Dependency of clearance X on the angle of incidence and the minimum altitude of the sun (17°)



Fig. 13 Adjusting angle of inclination for horizontal collectors



Fig. 14 Shadow – clearance X

## 4.7.2 Estimating your space requirements



## SYSTEM DAMAGE

through wind, eddies and pressure peaks around the roof edges.

• Before commencing the installation, ensure that at least one metre is allowed between the flat roof supports and the edge of the roof (Fig. 15).



Fig. 15 Distance from the edge of the roof

Allow sufficient installation space for the different forms of installation (horizontal, vertical).

These dimensions (Tab. 4 and Tab. 5) relate to the roof surface area which must be available.

The quoted dimensions are simply the width of the collector array. In addition, allow at least 1.5 ft (0.5 m) on either side of the collector array for pipework.

Space requirements for vertical collectors:

Number of collectors 2

3

4

5

6

7

8

9

10



Fig. 16 Space requirements – collector array – vertical version

#### Space requirements for horizontal collectors:

Dimension A	Angle of inclination	Dim. B	Number of collectors	Dime
7' 8 3/8" (2.34 m)	25°	6' (1.84 m)	2	13' (4.1
11' 6" (3.51 m)	30°	5' 8 2/5" (1.75 m)	3	20' (6.2
15' 3 5/8" (4.68 m)	35°	5' 6" (1.68 m)	4	27 (8.3
19' (5.85 m)	40°	5' 2 2/5" (1.58 m)	5	34' (10.
23' (7.02 m)	45°	4' 10 4/5" (1.48 m)	6	41' (12.
26' 10 4/5" (8.19 m)	50°	4' 10 4/5" (1.48 m)	7	48' (1
30' 8 2/5" (9.36 m)	55°	4' 10 4/5" (1.48 m)	8	55' (1
34' 6" (10.53 m)	60°	4' 10 4/5" (1.48 m)	9	62' (1
38' 4 4/5" (11.70 m)			10	67' (2

 Tab. 4
 Space requirement for vertically installed collectors

Number f collectors	Dimension A	Angle of inclination	Dim. B
2	13' 8 3/8" (4.18 m)	25°	3' 6" (1.06 m)
3	20' 7 1/5" (6.28 m)	30°	3' 3 5/8" (1.02 m)
4	27' 6" (8.38 m)	35°	3' 1 1/5" (0.96 m)
5	34' 4 4/5" (10.48 m)	40°	3' (0.91 m)
6	41' 3 5/8" (12.58 m)	45°	2' 9 3/5" (0.85 m)
7	48' (14.68 m)	50°	2' 9 3/5" (0.85 m)
8	55' (16.78 m)	55°	2' 9 3/5" (0.85 m)
9	62' (18.88 m)	60°	2' 9 3/5" (0.85 m)
10	67' (20.98 m)		

Tab. 5 Space requirements for horizontally installed collectors

## 5 Installing flat roof and wall mounting supports



## RISK TO LIFE

Whilst 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**

Please observe all national and local safety regulations, as well as the safety instructions in this manual when working on roofs.

Ensure sufficient stability at the installation surface, and removing any gravel and similar material.



## USER NOTE

To protect the roof skin, lay commercially available building protection mats, onto which you can position the profiles. The sealing membrane must not be damaged.

## This installation method also applies to the flat roof support for horizontal collectors.

The following describes the installation of flat roof supports for vertical collectors. The horizontal version is installed in the same way.

Notes identify any variations.



Fig. 17 Vertical flat roof supports for 2 collectors



Fig. 18 Horizontal flat roof supports for 2 collectors

## 5.1 Distances between collector braces for on-site base anchoring

The distances between the collector braces (middle/middle, in mm) depend on:

- the collector version (vertical, horizontal)
- and the maximum snow and wind loads.



## USER NOTE

You must strictly observe the clearances between the collector braces so that the profile rails can still be installed at a later stage.

#### 5.1.1 Basic version

Two collector braces are required for the first collector. For every additional vertical collector, another collector brace is required (Fig. 19). For every additional horizontal collector, two further collector braces are required (Fig. 21).

The basic version can be used for the following loads:

- Building height max. 66 ft (20 m) (installation height)
- max. 28 lbs/sqft (2.0 kN/m<sup>2</sup>) snow load



Fig. 19 Basic version for 2 vertical collectors



Fig. 20 Basic version for 3 – 10 vertical collectors



Fig. 21 Basic version for 2 horizontal collectors

## 5.1.2 Version with auxiliary brace (accessory)

For greater loads, an auxiliary brace (and additional profile rails, page 26) is required for vertical installation for the second and all further collectors (Fig. 22). This version can be used for the following loads:

- Building height max. 328 ft (100 m) (installation height)
- max. 43 lbs/sqft (3.8 kN/m<sup>2</sup>) snow load



## **USER NOTE**

For horizontal installation, a max. building height of 328 ft (100 m) and a max. snow load of 43 lbs/sqft (3.8 kN/m<sup>2</sup>) are permitted using the basic version (Fig. 21, provided that an additional rail is installed, page 17).



Fig. 22 Auxiliary braces for 3 vertical collectors

## 5.2 Clearances between the collector braces when using loading trays (accessory)

The distances between the collector braces (middle/middle, in inches) depend on:

- the collector version (vertical, horizontal)
- and the maximum snow and wind loads.

For vertical installation, an auxiliary brace must be erected for the 4th, 7th and 10th collectors (Fig. 23, **Item 1**).



## USER NOTE

You must strictly observe the clearances between the collector braces so that the profile rails can be installed.

## 5.2.1 Basic version

The basic version can be used for the following loads:

- Building height max. 66 ft (20 m) (installation height)
- max. 28 lbs/sqft (2.0 kN/m<sup>2</sup>) snow load

Number of collectors	lumber of collectors Dim. A		Dimension C
4	15 in (381 mm)	-	-
5	15 in (381 mm)	-	-
6	22 1/2 in (571 mm)	-	-
7	22 1/2 in (571 mm)	15 in (381 mm)	-
8	22 1/2 in (571 mm)	15 in (381 mm)	-
9	22 1/2 in (571 mm)	22 1/2 in (571 mm)	-
10	22 1/2 in (571 mm)	22 1/2 in (571 mm)	15 in (381 mm)

Tab. 6 Distances between auxiliary braces





#### **USER NOTE**

Horizontal installation can be carried out using only the auxiliary brace (accessory).

For horizontal installation, 3 collector braces must be fitted for each collector (Fig. 24).



Fig. 24 Basic version for 2 horizontal collectors

## 5.2.2 Version for maximum loads (accessory, Fig. 25)

For greater loads, ropes (page 22) and additional rails (page 26) are also required. This version can be used for the following loads:

- Building height max. 328 ft (100 m) (installation height)
- max. 43 lbs/sqft (3.8 kN/m<sup>2</sup>) snow load



## USER NOTE

For distances between the horizontal collector braces for maximum loads, refer to Fig. 24.



Fig. 25 Version for maximum loads, 3 vertical collectors

## 5.3 Stablizing the flat roof supports

The following details refer to a single collector. These details are based on DIN 1055, part 4 "Design loads for buildings".

Individual flat roof supports may be secured in the following three ways to prevent slippage or tipping of the structure due to the effect of the wind:

- Securing flat roof supports with anchor bolts (onsite).
- Weigh down flat roof supports with concrete slabs, gravel or similar material (loading trays required).
- Weigh down flat roof supports with concrete slabs, gravel or similar material (loading trays required) and make more secure using rope as necessary.

For all methods, please consider the structural integrity of the roof.



## USER NOTE

Using gravel in the loading trays, a maximum load of 705 lbs (320 kg) is possible per collector (Tab. 7).



## USER NOTE

For the following table, please also consider the clearances and number of additional collector braces (Section 5.1 "Distances between collector braces for on-site base anchoring").

Stablizing a collector					
	Wind velocity	Base anchor		Ropes	
Height of building			Weighting	Securing against tipping	Securing against slippage
		Number and type of screws <sup>2</sup>	Weight (e.g. concrete slabs)	Weight (e.g. concrete slabs)	Maximum rope tension
0-26 ft (0 m to 8 m)	60 mph (102 km/h)	2 × M8/8.8	595 lbs (270 kg)	397 lbs (180 kg)	360 lbs-ft (1.6 kN)
above >26 -65 ft (8 m up to 20 m)	80 mph (129 km/h)	2 × M8/8.8	992 lbs (450 kg)	705 lbs (320 kg)	562 lb-ft (2.5 kN)
above >65-328 ft (20 m up to 100 m <sup>1</sup> )	90 mph (151 km/h)	3 × M8/8.8	_	992 lbs (450 kg)	742 lbs-ft (3.3 kN)

Tab. 7 Values to stabilize one collector

<sup>1</sup> With additional rail only

<sup>2</sup> Per collector brace

## 5.3.1 Securing flat roof supports on site with base anchoring

You can fasten the flat roof supports with anchor bolts. As an example, we describe fastening onto girders (Fig. 26, **Item 3**).

Design the substructure so that the collectors can withstand the snow loads and wind forces placed upon them.

In addition, a means of fixing should be provided on site that stabilises the structure and prevents damage to the roof.



## SYSTEM DAMAGE

through modifications to the design of the flat roof supports.

- For example, never drill the flat roof support profiles.
- Transfer the lower profile hole clearances (Fig. 26, **Item 2**) onto the girders, and drill the corresponding holes.
- Insert screws (see Tab. 7 and Fig. 26, Item 1) through the profiles and girders and screw tight with nuts and washers.

#### 5.3.2 Securing flat roof supports with ballasts

- Erect collector braces (see Section 5.1 "Distances between collector braces for on-site base anchoring").
- Insert loading trays (Fig. 27, Item 2) into lower profiles (Fig. 27, Item 1) and into each other (Fig. 27, Item 3).
- Insert concrete slabs or similar into loading trays (for required weight, see Tab. 7).

## 5.3.3 Providing extra security for the flat roof supports using guy lines

You may also additionally secure the weighted flat roof support with guy lines.

Select the type of guy line depending on the expected loads (see Tab. 7).

• Fasten each collector on site to the screw on the lower profile and to a suitable point on the roof, using at least 2 wire guy lines (Fig. 28, **Item 1**).



Fig. 26 Flat roof support on girders, dimensions in mm (value in brackets = horizontal version)



Fig. 27 4 loading trays per collector



Fig. 28 Flat roof support with ropes

## <u>Buderus</u>

## 5.4 Wall mounting supports - installation

The horizontal collector braces can also be used for wall-mounted installation.



## RISK TO LIFE

from falling collectors, due to incorrect use.

- Only horizontal collector braces are allowed for wall-mounted installation.
- Collectors may only be installed on walls of buildings with a height up to 66 ft (20 m) (wind velocity = 80 mph (129 km/h)) and a snow load of up to 27 lbs/sqft (2.0 kN/m<sup>2</sup>).
- Each collector brace must be fastened to the holes provided, using 3 screws (provided by customer) (Tab. 8).
- Install only on a sealed, windproof outside wall.
- Before installing the wall mounting support, check the load-bearing capability of the load bearing wall (i.e. of the wall base). If necessary, ask a structural engineer for assistance.
- Never modify the wall mounting structure.
- Never place objects in the space underneath the wall mounting support.
- Never install facing to the collectors.
- Fasten as follows:

19	
	01
	<b>A</b> 7
<i>M</i>	
	// 79
<i>M</i>	
DI I	
IL TOTAL	
	hat
	**
	1
	63043970 05-1 SD
	00040070.00-1.00

Fig. 29 Wall mounting support

Wall structure <sup>3</sup>	Screws/dowels per collector brace	Distance from the edge of the wall
Steel-reinforced concrete min. B25	$3 \times$ UPAT MAX Express anchors, type MAX 8 (A4) <sup>1</sup> and $3 \times$ washers <sup>2</sup> acc. to DIN 9021	> 4 in (100 mm)
(min. 5 in (120 mm))	3 $\times$ Hilti HST-HCR-M8 $^1$ or HST-R-M8 $^1$ and 3 $\times$ washers $^2$ acc. to DIN 9021	> 4 in (100 mm)
Steel base structure (e.g. girder truss)	$3 \times M8$ (4.6) and $2 \times$ washers <sup>2</sup> according to DIN 9021	-

#### Tab. 8 Fasteners

<sup>1</sup> A tensile strength of 366 lbs-ft (1.63 kN) or a shear strength of at least 350 lbs-ft (1.56 kN) must be able to be applied to each dowel/screw.

- <sup>2</sup> 3 × Screw diameter = outside diameter of washer.
- <sup>3</sup> Brickwork on request

 Use 3 screws to fasten each collector brace to the wall (see Tab. 8, Fig. 30, Item 1).



Fig. 30 Fastening collector braces to the wall (for 2 collectors, dimensions in mm and inches)

## 5.5 Installing the profile rails

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

## 5.5.1 Connecting profile rails

- Push plug connector (Fig. 31, **Item 1**) as far as it will go into both profile rails (Fig. 31, **Item 2**).
- To lock, tighten both installed M10 threaded studs (Fig. 31, **Item 3**) in the plug connector using a size 5 spanner.





## 5.5.2 Installing profile rails

Positioning the profile rails depends on

- whether they are being installed vertically or horizontally
- and on the clearances between the collector braces.

If using base anchoring, begin fastening the profile rails as follows:

	Base anchoring	
	Basic version	Auxiliary brace
vertical:	Aling with middle hole on plug connector (Fig. 32, <b>Item 1</b> )	Aling with second slotted hole from right (Fig. 32, <b>Item 3</b> )
horizontal:	Aling with third slotted hole from right (Fig. 32, <b>Item 2</b> )	

Tab. 9Aligning the lower and upper profile rails when using<br/>base anchoring

If using loading trays, begin fastening the profile rails as follows:

	Loading trays	
	2 collectors	3 to 10 collectors
vertical:	Aling with middle hole on plug connector (Fig. 33, <b>Item 1</b> )	Aling with sixth slotted hole from right (Fig. 33, <b>Item 2</b> )
horizontal:	Aling with second slotted hole from right (Fig. 33, <b>Item 3</b> )	Aling with second slotted hole from right (Fig. 33, <b>Item 3</b> )

Tab. 10 Aligning the lower and upper profile rails when using loading trays



Fig. 32 Aligning the profile rails for on-site base anchoring



Fig. 33 Aligning the profile rails for loading trays

#### 5 Installing flat roof and wall mounting supports

- Lightly tighten the pre-assembled profile rails (Fig. 34, **Item 2**) with M8 x 20 bolts (Fig. 34, **Item 1**) so that the profile rails can still be aligned.
- Align the sides of the upper and lower profile rails.
- Tighten bolts.

## 5.5.3 Installing additional profile rails (accessory)

If the collector array is exposed to greater loads (building or installation height of over 66 ft (20 m) and/or snow load of over 27 lbs/sqft (2.0 kN/m<sup>2</sup>)), additional rails must be installed.

- Fasten additional profile rails as described in Section 5.5.2 "Installing profile rails", using the middle hole on the profile (Fig. 35, Item 1).
- Align sides of the profile rails.
- Tighten bolts.

#### 5.5.4 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. 36, Item 3) into the innermost slotted holes (Fig. 36, Item 1) over the profile rails until it clicks into place (Fig. 36, Item 2).



Fig. 34 Installing profile rails (for two vertical collectors in this example)







- Fig. 36 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.

- 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 that the installed set and the collectors are fastened securely.



## **RISK OF INJURY**

through interruption of work.

- Secure the collectors against falling.
- Stabilise the collector array.



## SYSTEM DAMAGE

through damaged sealing faces.

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



## USER NOTE

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



## USER NOTE

Unsecured collectors may fall during handling and installation.



Fig. 37 Flat roof installation: 2 collectors



Fig. 38 Wall mounted installation

## 6.1 Preparing to install the collectors SKS 4.0

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.



## 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.

## 6.2 Water connections

The collectors must be installed in such a way that the sensor bushings for taking up the collector sensor (Fig. 40, **Item 1**) are at the top.



## USER NOTE

The water connection pipes can be connected on the right (Fig. 39) or left (Fig. 40). 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 to one side of a collector array (Fig. 39 and Fig. 40).

## 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, Fig. 41).

The two-way connection can also be made if there are fewer than 6 collectors (Fig. 41).



Fig. 39 Water connection (right) up to max. 5 collectors

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



Fig. 40 Water connection (left) up to max. 5 collectors



Fig. 41 Two-way water connections

## 6.3 Installing the locking cap

Not all the connections are needed when connecting a collector array, so 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. 42, **Item 3**) onto the collector connection.
- Push bracket (Fig. 42, Item 2) over the locking cap and collector connection to secure the connection.



## SYSTEM DAMAGE

from unsecured locking caps.

- CAUTION!
- Secure each locking cap with a bracket (Fig. 42, Item 1).



Fig. 42 Securing locking cap with bracket

## 6.4 Fastening the collectors

The collectors are fastened to the profile rails using the one-sided collector clamps (Fig. 43, **Item 2**) at the beginning and end of a collector array, and double-sided clamps (Fig. 43, **Item 1**) between each collector.

In addition, the anti-slip protectors (Fig. 43, **Item 3**) 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.

## Installing the one-sided collector clamp on the right

• Push one-sided collector clamps (Fig. 44, **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 install the one-sided collector clamps to the left-hand side of the collector array until the last collector has been installed.



Fig. 43 Fasteners for the collector



Fig. 44 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 to receive the collector sensor is at the top. Begin by laying the collectors on the right-hand side of the profile rails.



### **RISK OF INJURY**

**CAUTION!** 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. 45, **Item 2**) (Fig. 45).

The lower collector edge must lie in the opening of the anti-slip protector (Fig. 45, **Item 1**).

- Carefully push collector (Fig. 46, **Item 1**) up against the one-sided collector clamp and align horizontally.
- Screw in one-sided collector clamp using size 5 wrench (Fig. 46, Item 2).



## **USER NOTE**

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

The grip (Fig. 46, **Item 2**) on the collector clamp 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. 47, **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. 45 Laying the first collector on the profile rails



Fig. 46 One-sided collector clamp screwed in place



Fig. 47 Installing a double-sided collector clamp

## 6.4.1 Installing flex-pipe connectors to the first collector

- Remove the rubber caps from the connections.
- Push corrugated pipe connectors (Fig. 48, **Item 1**) onto the left-hand connections on the first collector.
- Push bracket (Fig. 48, **Item 2**) over the corrugated pipe connector and collector connection to secure the connection.

## 6.4.2 Putting the second collector in place

• Slide the second collector into the anti-slip protector.



## SYSTEM DAMAGE

through damaged corrugated pipe connectors.

- Do not use any tools, e.g. pliers (Fig. 49, **Item 2**). These could render the corrugated pipe connector unusable.
- Push the second collector on to the first so that the collector connections are pushed into the preassembled corrugated pipe connectors (Fig. 49, Item 1) on the first collector.
- Place second bracket (Fig. 49, **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. 50, Item 1).



Fig. 48 Installing corrugated pipe connectors to the first collector



Fig. 49 Pushing second collector towards the first



Fig. 50 Corrugated pipe connector secured with brackets

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



## USER NOTE

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

The grip (Fig. 51, **Item 1**) on the collector clamp now grips the lower collector edge.

Repeat the procedure for all the other collectors.

#### Installing the one-sided collector clamp on the left

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

- Push one-sided collector clamp (Fig. 52, **Item 1**) into upper and lower profile rails.
- Push collector clamp up against the collector frame and screw in place using size 5 wrench (Fig. 52, Item 2).

The grip (Fig. 52, **Item 2**) on the collector clamp now grips the lower collector edge.



### **USER NOTE**

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



Fig. 51 Double-sided collector clamp between two collectors



Fig. 52 One-sided collector clamp (left)

<u>Buderus</u>

## 7 Collector sensor connection SKS 4.0



## USER NOTE

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

Observe the installation location for single or dual row collector systems (Fig. 53).



### SYSTEM DAMAGE

through faulty sensor cable.

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

#### Insertion point

The collector sensor must be installed in the collector connected to the supply line (Fig. 53, **Item 2**).

- Insertion point (Fig. 53, Item A) for single row collector systems.
- Insertion point (Fig. 53, Item B) for dual row collector systems.

#### Installing the collector sensor

For perfect functioning of the solar heating system, the collector sensor (Fig. 54, **Item 1**) needs to be inserted into the sensor guide tube as far as it will go (10 in approx. 250 mm).

- Using the collector sensor or screwdriver, push through the sealing membrane on the sensor bushing (Fig. 54, **Item 3**).
- Screw compression fitting (Fig. 54, Item 2) into sensor bushing.
- Insert collector sensor approx. 10 in (250 mm) into the sensor guide tube (as far as it will go).
- Tighten compression fitting (Fig. 54, **Item 2**), counterhold if necessary.



## USER NOTE

If you accidentally push through the sensor bushing (Fig. 54, **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. 54, **Item 2**).





Item 1: Return line

Item 2: Supply line



Fig. 54 Inserting the collector sensor into the collector

- Item 1: Collector sensor
- Item 2: Compession fitting
- Item 3: Sensor bushing

## 8 Header connection SKS 4.0

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

# $\underline{\mathbb{A}}$

## SYSTEM DAMAGE

• Feed the on-site supply line (Fig. 55, **Item 1**) alongside the collector, rather than vertically downwards.

from leaks in the collector connection, due to movements caused by heat.



Fig. 55 Feeding header pipes to the collector array

Item 1: Supply line Item 2: Return line

## 8.1 Installing holder for supply line

Use the holder to fasten the insulated supply line to the collector.



## User note:

We recommend commercially available hose clamps (Fig. 56, **Item 1**) for fastening the header to the M8 thread on the holder (Fig. 56, **Item 2**).

Select the diameter on the hose clamp according to the outside diameter of the flow line, incl. insulation.

- Place holder (Fig. 56, **Item 3**) onto collector frame and tighten with size 5 wrench.
- Fasten insulated header to holder on site.



Fig. 56 Fastening holder to the collector frame

- Item 1: Hose clamp (on building)
- Item 2: M8 thread
- Item 3: Holder

## 8.2 Venting 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.

- Remove rubber caps (transport protection) from the relevant collector connections.
- Push pipe bend (Fig. 57, **Item 2**) with clamping ring and union nut onto collector connection.
- Secure pipe bend with bracket (Fig. 57, **Item 1**).

Perform the same procedure with the return connection.



Fig. 57 Installing supply line (with no vent on roof)

Item 1: Bracket

- Item 2: Pipe bend
- Item 3: Clamping ring 7/10 in (18 mm)
- Item 4: Union nut for clamping ring

## 8.3 Venting through air vent (accessory)

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 supply line rising to the air-vent valve (Fig. 58, **Item 2**) and the return line rising to the collector array (Fig. 58).

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.



Fig. 58 View – air pot with vent valve for supply connection

Item 1: Collector sensor

Item 2: Automatic air-vent valve on roof



### 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. 59, **Item** 1) must always be positioned over the grub screw to prevent moisture entering the solar heating system through the opened grub screw.

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

#### Universal air vent set scope of supply (Fig. 59):

Item 1:	Weather protection cap (grub screw)	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 <sup>3</sup> / <sub>4</sub>	1 ×
Item 8:	Union nut (not required here)	2 ×
Item 9:	Gasket (not required here)	1 ×
Item 10:	Large diameter washer (not required here)	1 ×
Item 11:	Clamping disc (not required here)	1 ×



Fig. 59 Universal air-vent set

### Installing the air vent

- Firmly screw nipple (Fig. 60, Item 6) and double nipple (Fig. 60, Item 4) into air pot (O-ring gasket).
- Push air pot (Fig. 60, **Item 5**) and nipple onto collector connection and secure with bracket.
- Connect header pipe to the compression fitting (0.7 in (18 mm)) (Fig. 60, **Item 2**).



Fig. 60 Connecting the air vent

Item 1: Bracket

- Item 2: Union nut for 7/10 in (18 mm) compression fitting
- Item 3: Clamping ring
- Item 4: Double nipple with O-ring
- Item 5: Vent pot
- Item 6: Nipple

## 8.4 Connecting two arrays

If connecting two collector arrays (Fig. 61, **Item 1**) you will need a second connection kit.

- Install individual parts as described in Section 8.2 "Venting through pressure filling".
- Make on-site connection between collector arrays using copper pipe.



Fig. 61 Two collector arrays, one behind the other

## 9 Final activities

## 9.1 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**

Do not carry out the final insulating work until the appropriate checks have been performed.

## Checks

1.	Corrugated pipe connector, locking caps and connecting pipe bends secured with brackets?	
2.	All collector braces connected to profile rails?	
3.	Anti-slip protection installed and clicked into place in profile rails?	
4.	Sensor inserted as far as it will go and secured with compression fitting?	
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).

## 9.2 Insulating the connection and header pipes

• Cut enclosed insulation (28 in (710 mm) long) into 3.5 in (88 mm) lengths and place around the corrugated pipe connectors between the collectors.

## Insulation of the header pipes 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.

## 10 Quick reference guide for base anchoring and pressure filling

page 26

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 obey all safety and user instructions.

#### Installing braces and profile rails

- 1. Insert telescopic rails into each other according to page 13 the selected angle of inclination, and fasten.
- 2. Drill holes in girder (or similar), and fasten collector page 22 braces with screws.
- 3. Connect profile rails together using plug connectors. page 25
- 4. Fasten profile rails to collector braces. page 26
- 5. Align sides of the profile rails.
- 6. Install anti-slip protectors into the two inner slotted page 26 holes on the lower profile rails.

## Preparing to install the collectors

7. Push locking caps onto those connections that are page 29 not required and secure using brackets.

## Fastening the collectors

8.	Push one-sided collector clamp (right) into profile rails.	page 29
9.	Place first collector (right) onto profile rails and push onto collector clamp.	page 29
10.	Screw up collector clamp on the right.	page 29
11.	Place double-sided collector clamp into profile rail and push onto first collector.	page 29
12.	Push corrugated pipe connectors onto the connections on the first collector and secure with brackets.	page 30
13.	Push second collector towards the first and fix in place with brackets.	page 31
14.	Tighten screws on the double-sided collector clamp.	page 29
15.	Repeat the procedure for all other collectors.	page 32
16.	Install one-sided collector clamps on the left.	page 32

## Header connection

17. Insert collector sensor as far as it will go into the page 33 collector with the supply line to be connected, and screw tight. 18. Place holder for supply line onto collector frame and page 34 screw in place. 19. Fasten pipe bend to supply and return connections page 35 using union nut and clamping ring. page 35 20. Fix pipe bend with brackets. page 38 21. Perform installation checks. 22. Insulate header pipes with UV and high page 38 temperature resistant material.



Fig. 62 Installing on a flat roof



Fig. 63 Water connections



Fig. 64 Installing the collector sensor and connection parts



67910057-00-Type of collectors and rating labels

Item	Part Number	Description	Weight in Ib
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



67910059-00-Flat Roof Installation - Horizontal/Vertical, Facade Horizontal

Item	Part Number	Description	Weight in Ib
10	83077590	Telescopic Rail for Flat Roof Installation	14.5
20	63045309	Ballast Pan for Flat Roof Installation	6.7
30	63045239	Profile Rail - Cross Support - Vertical	2.95
31	63045240	Profile Rail - Cross Support - Horizontal	5.5
40	63045244	Double-sided Collector Clamp	2.5
50	63045246	One-sided Collector Clamp	0.2
60	63045241	Plug connector with threaded studs	0.24
70	63045243	Anti-slip protection	0.2
80	63046150	Holder for Inflow Line	0.24



67910062-00-Connection Sets SKN

Item	Part Number	Description	Weight in Ib
10	63046151	Angled nozzle G3/4 kpl	0.4
		Available Parts:	
90	63045250	Hose Clip 18 mm	0.05
		Set 5 Each	
70	63045310	O-Ring 21x3,0 Shore70	0.01
		Set 5 Each	
15	63046195	Connection Assembly SKN	0.1
		Includes:	
120	(x)	Union nut G1 D25x17Ms	
100	(x) (x)	Clamping disc G1x21	
20	63045247	Spring Clips	0.2
		Set 5 Each	
30	x	Solar Hose 3/4x55	
40	63045248	Dummy plug	0.16
80	85336132	Solar Hose 3/4"x1000	1.65
110	63045249	Hose Nozzle Assembly G3/4xD21 kpl	0.2
		Available Parts:	
50	63045301	O-Ring 25x3,0 Shore70	0.02
		Set 5 Each	
90	63045250	Compression Ring 18 mm	0.05
		Set 5 Each	
60	63045253	Angled Nozzle G1xD21 Ms kpl	0.27
		Available Parts:	
70	63045310	O-Ring 21x3,0 Shore70	0.01
		Set 5 Each	
15	63045306	Union Assembly SKN/SKE	*
		Available Parts:	
120	(x)	Union Nut G1 D25x17Ms	
100	(x)	Clamping Ring G1xD21	



Item	Part Number	Description	Weight in Ib
10	63045266	Angle Nozzle SKT 18 Clamp G3/4 kpl	0.28
		Available Parts:	
15	63045264	O-Ring 15x3 SHORE70 EPDM291 Set 5 Each	0.01
20	63045250	Clamping Ring 18 mm Set 5 Each	0.05
40	63045256	Plug SKS	0.1
		Available Parts:	0.1
15	63045264	O-Ring 15x3 SHORE70 EPDM291 Set 5 Each	0.01
50	63045255	Clamp SKS Set 5 Each	0.05
60	x	Insulation Tube SKS	
80	63045259	Connection Flex-Pipe SKS kpl	2.6
		Available Parts:	
15	63045264	O-Ring 15x3 SHORE70 EPDM291 Set 5 Each	0.01
90	63045258	Connection Flex-Pipe Set SKS	0.05
		Available Parts:	
15	63045264	O-Ring 15x3 SHORE70 EPDM291 Set 5 Each	0.09
50	63045255	Clip SKS Set 5 Each	0.05



Item	Part Number	Description	Weight in lb
		Collector Row Connection Kits SKN	
10	63045253	Elbow Compression Fitting G1xD21 Ms kpl	2.5
		Available Parts:	
20	63045310	O-Ring 21x3,0 Shore70	0.01
80	63045306	Set 5 Each Connection Set, Row SKN	*
		Includes:	
30	x	Locking Washer G1x21	
85	х	Washer G1 D25x17Ms	
40	63045247	Spring Clip DN30	0.19
50	95226122	Set 5 Each	1 65
50 60	x	Solar Hose $3/4x55$	1.05
00	~		
70	63045248	Dummy Plug D21	0.14
		Row Connection Kit SKS	
90	63045266	Elbow Compression Fitting SKS 18 Clamp G3/4 kpl	0.3
		Available Parts:	
100	63045264	O-Ring 15x3 SHORE70 EPDM291 Set 5 Each	0.008
110	63045250	Clamping Ring 18 mm Set 5 Each	0.05
120	63045255	Clamp SKS Set 5 Each	0.04
130	63045259	Connection Flex-pipe VL/RL SKS kpl	2.46
		Available Parts:	
100	63045264	O-Ring 15x3 SHORE70 EPDM291 Set 5 Each	0.008



67910064-00-Air vent valve set SKN, SKS

Item	Part Number	Description	Weight in Ib
20	63045247	Spring Clamps	0.19
		Set 5 Each	
30	85336132	Solar Hose 3/4"x1000	1.54
40	63015362	Automatic Air Vent R3/8 Solar	0.86
50	85103282	Ball Valve 3/8"	0.55
60	63012692	Gasket D17x24x2 AFM34 (5x)	0.04
70	63045299	Air Pot Housing	0.88
80	63045252	Double Nipple 18 Clamp G3/4 kpl	0.17
		Available Parts:	
130	63045301	O-Ring 25x3,0 Shore70	0.02
		Set 5 Each	
160	63020599	Locking Washer, Stainless DN16x1,5	0.033
		Set 10 Each	
90	x	Solar Hose 3/4"x55	
100	63045249	Hose Nozzle 18 ClampG3/4xD21 kpl	0.2
		Compression Ring and Nut are not required	
		Available Parts:	
130	63045301	O-Ring 25x3,0 Shore70	0.02
		Set 5 Each	
110	63045249	Hose Nozzle 18 ClampG3/4xD21 kpl	0.2
		Available Parts:	
130	63045301	O-Ring 25x3.0 Shore70	0.02
		Set 5 Each	
140	63045250	Compression Ring 18 mm	0.05
		Set 5 Each	
120	63045263	Nipple SKS 18 Clamp G3/4 kpl	0.21
		Available Parts:	
130	63045301	O-Ring 25x3,0 Shore70	0.02
		Set 5 Each	
150	63045264	O-Ring 15x3 SHORE70 EPDM291 Set 5 Each	0.01

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		Collecte	or Certification	Number: 100-	2007006A		
Date Certified	d: November	14, 2007		Е	xpiration Date	e: October 24,	2019
Test Laborato	ory: Bodycote	Report	Number: 06-08	8-0533-2 R	eport Date: O	ctober 24, 200	17
Product: Glaz	zed Flat-Plat	e Certifie	d Model: SKS	4.0-s+w (Vert	-Horiz)	Model Tested	d: SKS 4.0-s
Supplier:	BBT North 50 Wentwo Londonder (603) 216-3	n America Co orth Ave rry, NH 03053 3449	rp 3 USA				
performanc	e tests. Gros	s Area: 2.41 r	n <sup>4</sup> ( 25.95 ft <sup>2</sup> ).	Aperture Are	ea: 2.09 m <sup>2</sup> ( 2	2.49 ft <sup>2</sup> )	
	GLAZED	COLLECT	OR THERM	MAL PERF	ORMANC	E RATING	
M	GLAZED egajoules Pe	COLLECT	OR THERM	MAL PERF	ORMANC	E RATING	Day
M Category (Ti-Ta)	GLAZED egajoules Pe CLEAR	COLLECT r Panel Per D MILDLY CLOUDY	ay CLOUDY	MAL PERF Tho Category (Ti-Ta)	ORMANC	E RATING Per Panel Per MILDLY CLOUDY2 1.5 kPtn/0 <sup>2</sup> d	Day CLOUDY
M Category (Ti-Ta)	GLAZED egajoules Pe CLEAR 23 MJ/m <sup>2</sup> -d 38	COLLECT r Panel Per D MILDLY CLOUDY 17 MJ/m <sup>2</sup> -d 29	ay CLOUDY 11 MJ/m <sup>2</sup> -d 19	MAL PERF Tho Category (Ti-Ta) A (-9 °F)	ORMANC	E RATING Per Panel Per MILDLY CLOUDY2 1.5 kBtu/ft <sup>2</sup> -d 27	Day CLOUDY 1 kBtu/ft <sup>2</sup> -d
M Category (Ti-Ta) A (-5 °C) B (5 °C)	GLAZED egajoules Pe CLEAR 23 MJ/m <sup>2</sup> -d 38 35	COLLECT r Panel Per D MILDLY CLOUDY 17 MJ/m <sup>2</sup> -d 29 25	OR THERM ay CLOUDY 11 MJ/m <sup>2</sup> -d 19 16	MAL PERF Tho Category (Ti-Ta) A (-9 °F) B (9 °F)	ORMANC usands of Btu CLEAR 2 kBtu/ft <sup>2</sup> -d 36 33	E RATING Per Panel Per MILDLY CLOUDY2 1.5 kBtu/ft <sup>2</sup> -d 27 24	Day CLOUDY 1 kBtu/ft <sup>2</sup> -d 18 15
M Category (Ti-Ta) A (-5 °C) B (5 °C) C (20 °C)	GLAZED egajoules Pe CLEAR 23 MJ/m <sup>2</sup> -d 38 35 30	COLLECT r Panel Per D MILDLY CLOUDY 17 MJ/m <sup>2</sup> -d 29 25 21	A CLOUDY 11 MJ/m <sup>2</sup> -d 19 16 12	AL PERF           Tho           Category           (Ti-Ta)           A (-9 °F)           B (9 °F)           C (36 °F)	ORMANC usands of Btu CLEAR 2 kBtu/ft <sup>2</sup> -d 36 33 28	E RATING Per Panel Per MILDLY CLOUDY2 1.5 kBtu/ft <sup>2</sup> -d 27 24 20	Day CLOUDY 1 kBtu/ft <sup>2</sup> -d 18 15 11
M Category (Ti-Ta) A (-5 °C) B (5 °C) C (20 °C) D (50 °C)	GLAZED egajoules Pe CLEAR 23 MJ/m <sup>2</sup> -d 38 35 30 20	COLLECT r Panel Per D MILDLY CLOUDY 17 MJ/m <sup>2</sup> -d 29 25 21 12	OR THERM ay CLOUDY 11 MJ/m <sup>2</sup> -d 19 16 12 4	AL PERF           Tho           Category           (Ti-Ta)           A (-9 °F)           B (9 °F)           C (36 °F)           D (90 °F)	ORMANC usands of Btu CLEAR 2 kBtu/ft <sup>2</sup> -d 36 33 28 19	E RATING Per Panel Per MILDLY CLOUDY2 1.5 kBtu/ft <sup>2</sup> -d 27 24 20 11	Day           CLOUDY           1 kBtu/ft²-d           18           15           11           4
M Category (Ti-Ta) A (-5 °C) B (5 °C) C (20 °C) D (50 °C) E (80 °C) A.Paol Heatin	GLAZED egajoules Pe CLEAR 23 MJ/m <sup>2</sup> -d 38 35 30 20 11 9. (Warm Clim	COLLECT r Panel Per D MILDLY CLOUDY 17 MJ/m <sup>2</sup> -d 29 25 21 12 4 ate) B-Pool He	ay CLOUDY 11 MJ/m <sup>2</sup> -d 19 16 12 4	MAL PERF           Tho           Category           (Ti-Ta)           A (-9 °F)           B (9 °F)           C (36 °F)           D (90 °F)           E (144 °F)           water	ORMANC usands of Btu CLEAR 2 kBtu/ft <sup>2</sup> -d 36 33 28 19 10 Leating (Warm	E RATING Per Panel Per MILDLY CLOUDY2 1.5 kBtu/ft <sup>2</sup> -d 27 24 20 11 4 Climate) B-Wate	Day CLOUDY 1 kBtu/ft <sup>2</sup> -d 18 15 11 4 er Hesting (Co
M Category (Ti-Ta) A (-5 °C) B (5 °C) C (20 °C) D (50 °C) E (80 °C) A-Pool Heatin Climate) E-Ai Efficiency H S I Units: I P Units: I ncident An	GLAZED egajoules Pe CLEAR 23 MJ/m <sup>2</sup> -d 38 35 30 20 11 g (Warm Clim r Conditioning Equation [NCC $\eta = 0.7$ $\eta = 0.7$ orgen Modifier	COLLECT r Panel Per D MILDLY CLOUDY 17 MJ/m <sup>2</sup> -d 29 25 21 12 4 ate) B-Pool He DTE: (P) = Ti- 709 - 3.2609 109 - 0.5747 INOTE: (S)	ay         CLOUDY           11 MJ/m²-d         19           16         12           4         -           eating (Cool Clim           -Tal         (P)/I -0.           (P)/I -0.         -11           = 1/cos θ - 11         -11	MAL PERF           Tho           Category           (Ti-Ta)           A (-9 °F)           B (9 °F)           C (36 °F)           D (90 °F)           E (144 °F)           nate)         C-Water F           0120         (P) <sup>2</sup> /1           0012         (P) <sup>2</sup> /1	ORMANC usands of Btu CLEAR 2 kBtu/ft <sup>2</sup> -d 36 33 28 19 10 Heating (Warm <u>V Intercept</u> 0.715 0.715	E RATING Per Panel Per MILDLY CLOUDY2 1.5 kBtu/ft <sup>2</sup> -d 27 24 20 111 4 Climate) D-Wate <u>Slope</u> -3.97 M -0.700 H	r Day CLOUDY 1 kBtu/ft²-d 18 15 11 4 er Heating (Co W/m².°C Btu/hr-ft².°F
$\begin{tabular}{ c c c c c }\hline & M\\ \hline Category\\ \hline Category\\ \hline (Ti-Ta)\\ \hline \\ A (-5 \ ^\circ C)\\ \hline \\ B (5 \ ^\circ C)\\ \hline \\ C (20 \ ^\circ C)\\ \hline \\ D (50 \ ^\circ C)\\ \hline \\ C (20 \ ^\circ C)\\ \hline \\ D (50 \ ^\circ C)\\ \hline \\ C (20 \ ^\circ C)\\$	GLAZED           egajoules Pe           CLEAR           23 MJ/m <sup>2</sup> -d           38           35           30           20           11           g (Warm Clim r Conditioning           Equation [NC $\eta = 0.7$ $\eta = 0.7$ clige Modifier 1.0         -0.	COLLECT r Panel Per D MILDLY CLOUDY 17 MJ/m <sup>2</sup> -d 29 25 21 12 4 ate) B-Pool He DTE: (P) = Ti- 709 - 3.2609 109 - 0.5747 [NOTE: (S) - 0058 (S)	OR THERM           ay           CLOUDY           11 MJ/m²-d           19           16           12           4           cating (Cool Clim           -Tal           (P)/I -0.           = 1/cos θ - 1]           -0.1652 (S)	MAL PERF           Tho           Category           (Ti-Ta)           A (-9 °F)           B (9 °F)           C (36 °F)           D (90 °F)           E (144 °F)           nate)         C-Water H           0120         (P) <sup>2</sup> /1           0012         (P) <sup>2</sup> /1           012         K <sub>at</sub> =	ORMANC usands of Btu CLEAR 2 kBtu/ft <sup>2</sup> -d 36 33 28 19 10 feating (Warm <u>V Intercept</u> 0.715 0.715 0.715	E RATING Per Panel Per MILDLY CLOUDY2 1.5 kBtu/ft <sup>2</sup> -d 27 24 20 11 4 Climate) D-Wate <u>Slope</u> -3.97 M -0.700 H	Day CLOUDY 1 kBtu/ft <sup>2</sup> -d 18 15 11 4 er Heating (Co W/m <sup>2</sup> .°C Btu/hr-ft <sup>2</sup> .°F (Linear Fit)
$\begin{tabular}{ c c c c c }\hline & M\\ \hline Category\\ (Ti-Ta)\\ \hline \\ A (-5 °C)\\ \hline B (5 °C)\\ \hline C (20 °C)\\ \hline D (50 °C)\\ \hline E (80 °C)\\ \hline \\ A-Pool HeatinClimate) E-Ai\\ \hline \\ B (50 °C)\\ \hline \\ E (80 °C)\\ \hline \\ A-Pool Heatin\\ Climate) E-Ai\\ \hline \\ B (50 °C)\\ \hline \\ E (50 °C)\\ \hline \\ C (20 $	GLAZED egajoules Pe CLEAR 23 MJ/m <sup>2</sup> -d 38 35 30 20 11 1 g (Warm Clim r Conditioning Cquation [NC $\eta = 0.7$ $\eta = 0.7$ r o.9 certification is s us be renewed a ation of continue	COLLECT r Panel Per D MILDLY CLOUDY 17 MJ/m <sup>2</sup> -d 29 25 21 12 4 ate) B-Pool He OTE: (P) = TH 709 -3.2609 709 -0.5747 [NOTE: (S) 90058 (S) ubject to all term mually. Any cha ad certification.	OR THERM           ay           CLOUDY           11 MJ/m <sup>2</sup> -d           19           16           12           4           eating (Cool Clim           -Ta]           (P)/I           -0.           = 1/cos $\theta$ - 1]           -0. and conditions surge in collector definitions of the state of the	MAL PERF           Tho           Category           (Ti-Ta)           A (-9 °F)           B (9 °F)           C (36 °F)           D (90 °F)           E (144 °F)           nate)         C-Water H           00120         (P) <sup>2</sup> /I           0012         (P) <sup>2</sup> /I           0) <sup>2</sup> $K_{\alpha\tau}$ =           of the Program A           esign, materials, sp	ORMANC usands of Btu CLEAR 2 kBtu/ft <sup>2</sup> -d 36 33 28 19 10 reating (Warm <u>Y Intercept</u> 0.715 0.715 0.715 = 1.0 greement and the pecifications, parts	E RATING Per Panel Per MILDLY CLOUDY2 1.5 kBtu/ft <sup>2</sup> -d 27 24 20 11 4 Climate) D-Wate <u>Slope</u> -3.97 V -0.700 H -0.17 (S) (c) e documents incorp s, or construction n	r Day CLOUDY 1 kBtu/ft²-d 18 15 11 4 er Heating (Co W/m²·°C Btu/hr·ft²·°F (Linear Fit) porated therein nust be reported

## **Bosch Thermotechnology Corporation**

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