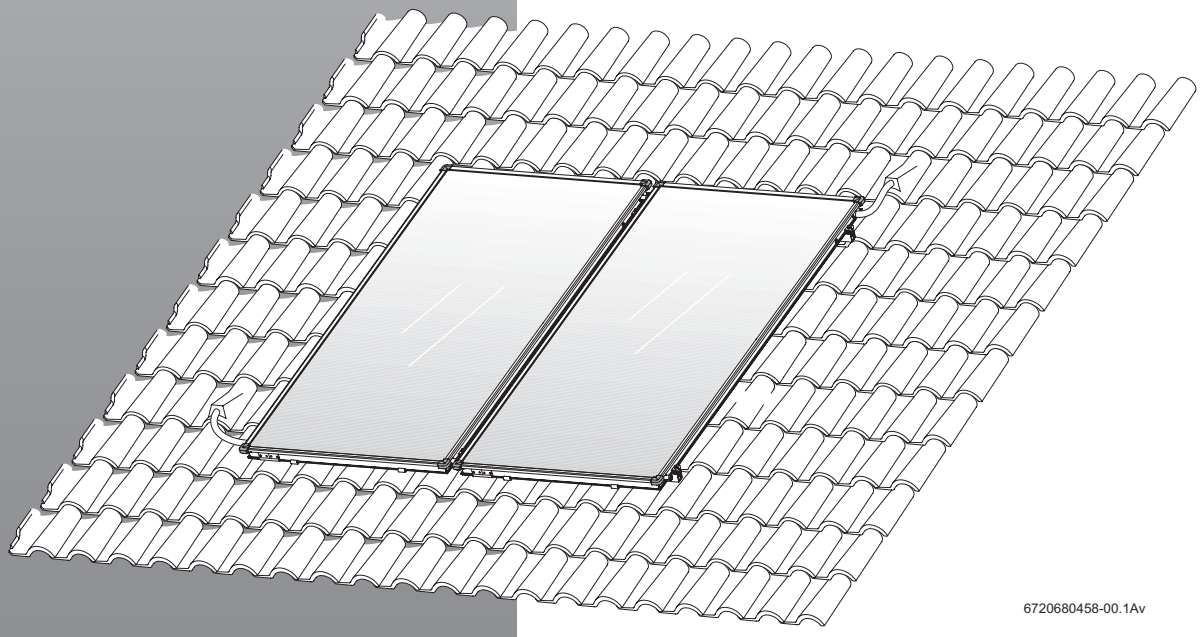
INSTALLATION INSTRUCTIONS

FLAT PANELS

GREENSKIES SOLAR-LITO AND LITO MINI

ROOF MOUNTING



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WORCESTER
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CONTENTS

INFORMATION ABOUT TECHNICAL DOCUMENTATION

ABOUT THIS MANUAL

This installation manual contains important information for the safe and appropriate installation of the set.

The illustrations in this manual show the collectors which can only be installed vertically.

Notes are included with important information for situations in which there is no danger for persons or equipment.
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.

TECHNICAL DOCUMENTATION

The solar heating system consists of various components (Fig. 1). Installation, operation and maintenance documentation is provided for each component. Accessories may be accompanied by a separate document.

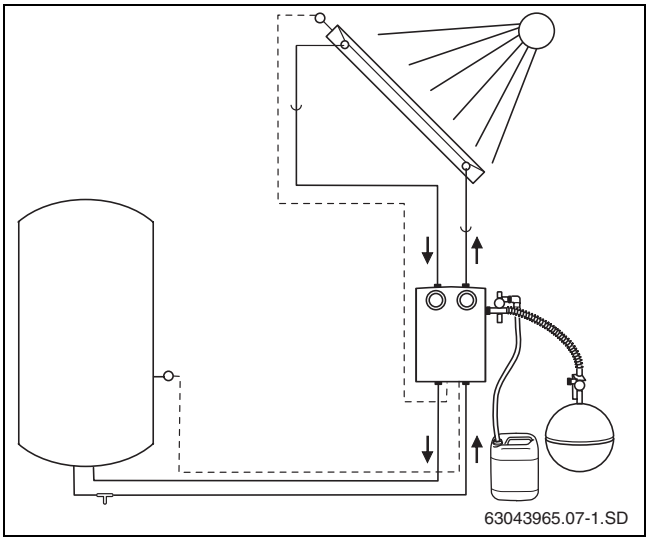

Fig. 1 Solar heating system components and technical documentation

1 KEY TO SYMBOLS AND SAFETY INSTRUCTIONS

1.1 EXPLANATION OF SYMBOLS

WARNINGS

Warnings in this document are framed and identified by a warning triangle which is printed on a grey background.

Electrical hazards are identified by a lightning symbol surrounded by a warning triangle.

Keywords indicate the seriousness of the hazard in terms of the consequences of not following the safety instructions.

- **NOTICE** indicates that material damage may occur.
- **CAUTION** indicates that minor to medium injury may occur.
- **WARNING** indicates that serious injury may occur.
- **DANGER** indicates possible risk to life.

IMPORTANT INFORMATION

Important information in cases where there is no risk of personal injury or material losses is identified by the symbol shown on the left. It is bordered by horizontal lines above and below the text.

ADDITIONAL SYMBOLS

Symbol	Meaning
▶	a step in an action sequence
→	a reference to a related part in the document or to other related documents
•	a list entry
–	a list entry (second level)

Table 1

1.2 SAFETY INSTRUCTIONS

This chapter explains how the information in these installation instructions is laid out, and gives general safety instructions for safe and trouble-free operation. Safety instructions and user notes relating specifically to installation are found in the installation instructions alongside the specific installation steps. Please read the safety instructions carefully before starting the installation. If safety instructions are ignored, severe or even fatal injuries may result, as well as material losses and environmental damage.

DANGER WHEN WORKING ON ROOFS

- Take appropriate action to prevent accidents during all work on roofs.
- Take precautions against a possible fall while working on roofs.
- Always wear your own protective clothing and safety equipment.
- After completing the installation, check the installation set, the collectors and the cylinder are securely positioned.

INSTALLATION AND MAINTENANCE

- Only have the appliance installed or modified by competent persons.
- Only use the cylinder for heating domestic hot water.

RISK OF SCALDING!

Always monitor operation if temperatures are above 60 °C.

- Where there is a possibility of domestic hot water reaching higher than 60 °C, we recommend installing a thermostatic mixing valve.

RISK OF BURNS!

If the collector and installation material have been exposed to the sun's rays for a prolonged period, touching certain components may cause burns.

- Always wear your own protective clothing and safety equipment.
- Before and during installation, cover the collector (for example with a blanket) and installation material to protect against high temperatures caused by the sun's rays. Where possible, always leave the equipment covered until the system is commissioned.

MAINTENANCE

- **Customer recommendation:** Worcester recommend that this appliance is serviced by a competent person at periods not exceeding 2 years.
- Only use genuine Worcester or Bosch spare parts.

INSTRUCTING THE CUSTOMER

- Instruct the customer in the functions and operation of the appliance.
- Inform the customer that they must not carry out any modifications or repairs.

RISK OF DAMAGE DUE TO OPERATOR ERROR

Operator errors can result in injury and damage to property.

- Ensure that children never operate this appliance unsupervised or play with it.
- Ensure that only personnel who are able operate this appliance correctly have access to it.

2 INFORMATION ABOUT THE INSTALLATION MOUNTING SET

2.1 INTENDED USE

This installation mounting set is designed to support vertical solar thermal collectors, which are installed on pitched roofs with an angle of 25° to 65°. The installation on a corrugated iron roof can be done with a roof inclination of 5° to 65°.

Only fit the installation mounting set on roofs with sufficient load bearing capacity. If necessary, request the help of a structural engineer or professional roofer for guidance.

The installation set is suitable for a maximum standard snow load of 2,0 kN/m² and and a maximum wind speed of 151 km/h.

Never use the rooftop installation set to fix any other objects to the roof. The set is designed only to enable the secure fixing of the Solar-Lito family of collectors.

CONDITIONS OF USE

Consult standard IE-62305 for detailed information on “Recommendations on Lightning Protection”.

All installations must be carried out in accordance with all local building, plumbing and electrical regulations.

GENERAL INFORMATION

Installation work on roofs

The Health and Safety at Work Act 1974
The Management of Health and Safety at Work Regulations 1999
The Construction (Health Safety and Welfare) Regulations 1996
The Construction (Design and Management) Regulations 1994
The Lifting Operations and Lifting Equipment Regulations 1998

Connection of thermal solar heating systems

EN 12976: Thermal solar heating system and their components (prefabricated systems).
ENV 12977: Thermal solar heating system and their components (bespoke systems).
BS 6795: Code of practice for solar heating systems for swimming pools.

Installation and equipment of DHW cylinders

BS5546: 2000 Specification for installation of hot water supplies for domestic purposes, using gas-fired appliances of rated input not exceeding 70 kW.
BS6700: 1997 Specification for design, installation, testing and maintenance, of servicing supplying water for domestic use within buildings and their curtilages.

Lightning protection

If the building height (installation height) exceeds 20 m, and there is no lightning conductor installed, ask your local electrical contractor to connect the components on the roof which conduct electricity with an electrical earth cable of at least 16 mm^2 to the earth bonding. Special measures regarding lightning protection are not required for building heights (installation heights) of less than 20 m.
Where there is a lightning conductor system installed, ask your local electrical contractor to check the inclusion of the solar heating system into the lightning protection system.

2.2 DESCRIPTION OF COMPONENTS

2.2.1 INSTALLATION SET FOR COLLECTORS

The installation sets are designed to hold and secure the collectors.

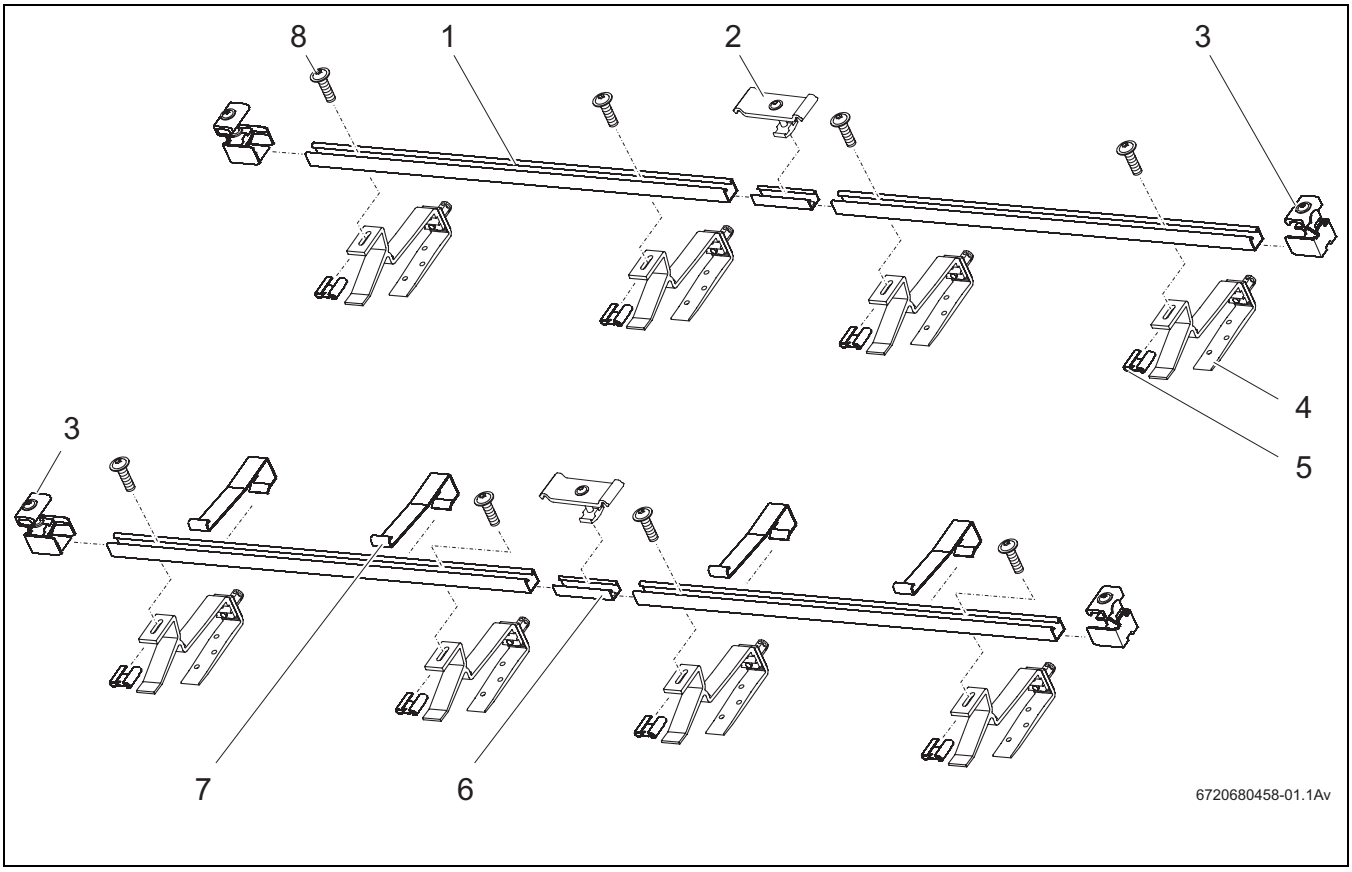

Fig. 2 Installation set for 2 collectors – 1 standard installation set, 1 extension installation set and 2 roof hook installation sets to fix to rooftop

Standard installation set for each collector array and for the first collector:

1 Profile rail 2x
3 Single-sided collector clamp 4x
7 Anti-slip bracket 2x
8 M8 Screw 4x

Connection for roofs with pan tiles, per collector:

4 Roof hook, adjustable 4x
5 Sliding nut 4x

Set for additional collectors:

1 Profile rail 2x
2 Double-sided collector clamp 2x
6 Rail connector with threaded studs 2x
7 Anti-slip bracket 2x
8 M8 screw 4x

2.2.2 HYDRAULIC CONNECTIONS

Each collector array requires a conection set. Collectors are connected to each other with solar hoses (connection set).

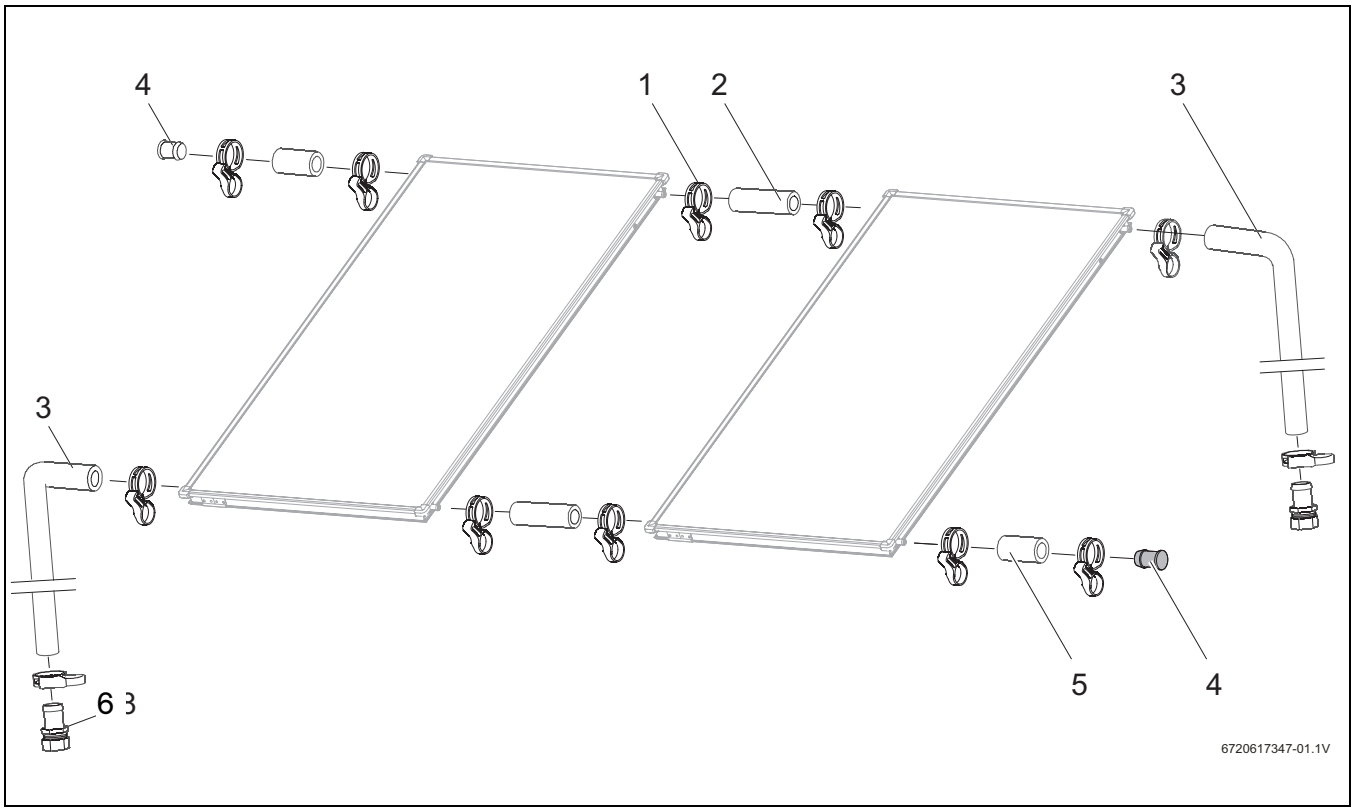

Fig. 3 Connection set and joining set (diagram with 2 vertical collectors)

Connection set for each collector array::

1 Hose clip (1 spare) 5x
2 Solar hose 95mm 2x
3 1,000 mm solar hose 2x
4 Dummy plug 2x
5 55 mm solar hose 2x
6 R¾ hose retainer with 15 mm locking ring 2x

The collector joining set is contained within the four transport corners. Please do not throw away the corner piece until you have removed each set.

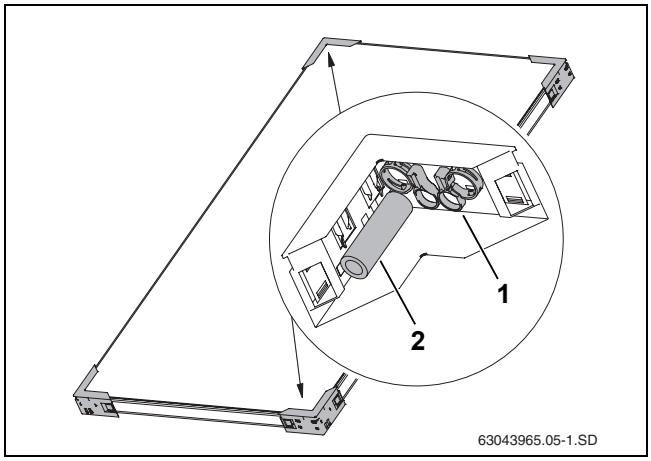

Fig. 4

Joining set between collectors for each collector (in the four transport corners):

1 Hose clip 4x
2 Solar hose 95 mm 2x

3 TECHNICAL SPECIFICATIONS

		Solar-Lito Mini	Solar-Lito
Certificates			CE 0036
Length		1,032 mm	2,026 mm
Width		1,032 mm	1,032 mm
Height		67 mm	67 mm
Clearance between collectors		85 mm	85 mm
Collector capacity, vertical version	Vf	0.62 l	0.8 l
External surface area (gross)	AG	1.06 m²	2.09 m²
Absorber surface area (net)		0.96 m²	1.92 m²
Net weight, vertical version	m	18 kg	30 kg
Permissible collector operating pressure	pmáx	6 bar	6 bar
Solar Fluid - only use the solar fluid provided by the manufacturer.			

Table 2

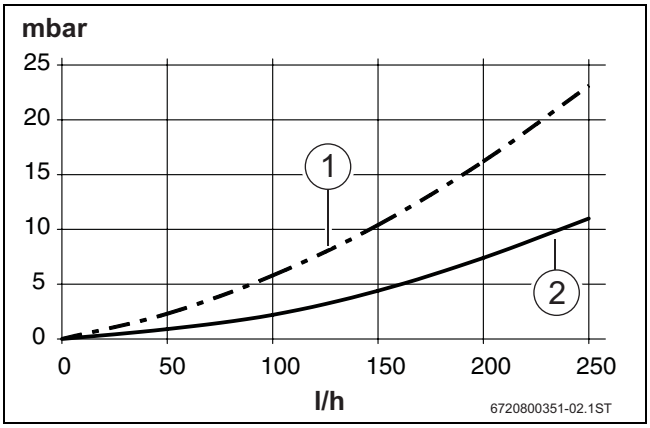

Fig. 5 Collector pressure drop

1 Pressure drop curve for Solar-Lito
2 Presseur drop curve for Solar-Lito mini

4 TRANSPORT AND STORAGE

All components must be protected by transport packaging.

TRANSPORT PROTECTION FOR COLLECTOR CONNECTIONS

The collector connections should be protected against damage with plastic caps.

NOTE: Risk of system leaks due to damaged pipe connections!

- Do not remove the plastic caps (Fig. 6, [1]) until immediately prior to installation.

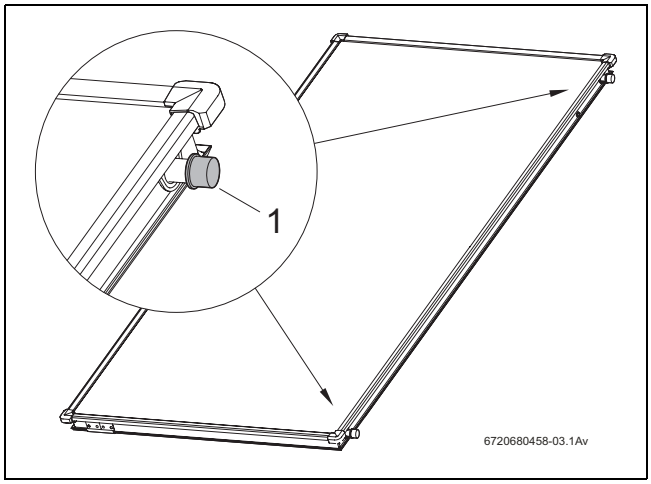

Fig. 6 Plastic caps and collector connections

STORAGE

Collectors must be stored in a dry location.

Do not store collectors in open air without protection against rain.

5 BEFORE INSTALLATION

Ensure roof bearing capacity and distance between edges before installing the subframe to the roof.
If necessary, consult a structural engineer to ensure that the structure is appropriate for the installation of solar collectors.
The collectors must be securely fixed to ensure resistance under strong wind conditions and snow load. Damages caused by bad weather are not covered by the guarantee.

5.1 GENERAL RECOMMENDATIONS

We recommend that you engage the services of a roofing contractor, as they are experienced in working on roofs and are aware of the risks involved.

Before installation, familiarise yourself with the on-site conditions and local regulations.

WARNING: Risk of burning!
If the collector and installation materials are exposed to sun rays for over an extended period of time, there is risk of burning/ scalding.

- Always use personal protective clothing or equipment.
- Cover the collector and the installation material (for example with a towel) before and after installation, to protect it from high temperatures caused by sun rays. We recommend only removing the cover when the system is commissioned.

Check

- That the delivered consignment is complete and undamaged.
- The optimum orientation of the solar collectors. Take into account solar radiation (bias angle, southerly orientation). Avoid shade from tall trees or similar obstructions and adapt the collector array to the shape of the building (for example, alignment with windows, doors, etc.).

Only use authorised Worcester Bosch components and replace any damaged or faulty parts immediately.

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

It is advised to make a note of the serial number on each of the collectors to enable registration of guarantee. Use the notes section of the manual to record the information.

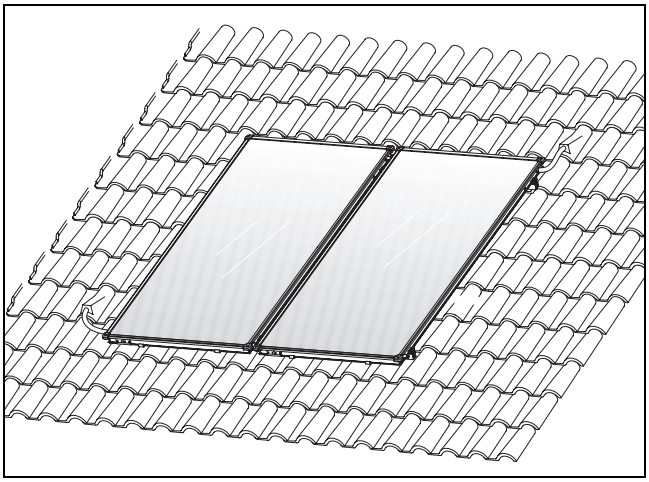

Fig. 7 View of 2 collectors, rooftop installation

Decide if you require an Auto Air Vent (Accessory) for the installation.

Auto Air Vents are required to purge air from the system when commissioning.

If filling the system with an electric filling pump, an Air Vent is not normally required.

An Auto Air Vent may make servicing a system easier at a later date though.

5.2 OTHER REQUIRED EQUIPMENT

- Spirit level
- Plumb line
- Filling pump
- Safety harness with safety line
- Material for pipe insulation
- Scaffolding
- Roofing ladder
- Crane or mobile hoist

When fitting the roof installation set and pipework connection, the only tool required is the size 5 Allen key from the connection kit.

5.3 ESTIMATING SPACE ON THE ROOFTOP

Make sure that you have the following clearance space to install the equipment.

DIMENSION A AND B

Surface area required for collectors.

DIMENSION C

At least two free rows of tiles to the roof peak 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

At least 30 cm should be cleared for the installation of the connection cables in the attic.

DIMENSION F

At least 40 cm for the installation of the connection cables in the attic (If installing a vent, sufficient space must also be allowed for in the vicinity of the flow outlet).

DIMENSION G

At least 50 cm on the left and on the right of the collector array for the connection of pipework and safe area around the collectors.

DIMENSION H

Dimension H corresponds to 1,900 mm (2m^2 collectors) or 900 mm (1m^2 collectors), and is the minimum distance from the upper corner of the collector until the middle of the lower rail, which is fixed first.

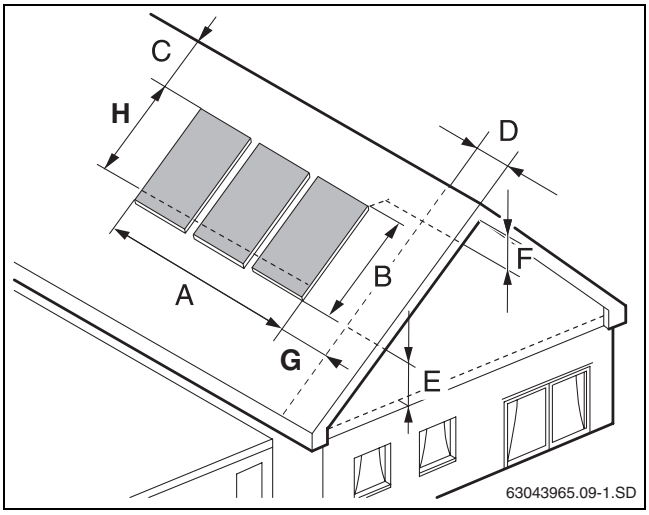

Fig. 8 Dimensions to be maintained

REQUIRED DISTANCE FOR VERTICAL COLLECTORS

Number of collectors	Dimension A	Dimension B	
1	1.095 m	1.032 m[1)]	2.026 m
2	2.196 m		
3	3.296 m		
4	4.397 m		
5	5.497 m		
6	6.598 m		
7	7.698 m		
8	8.799 m		
9	9.899 m		
10	11.000 m		

Table 3 Space requirements for vertical collectors

1) Dimensions for 1m^2 collectors

The collectors MUST be fitted with the sensor pocket on the right hand side of the collector and towards the top corner.

Please ensure that you plan the collector installation with this in mind and make sure that the collector is the correct way up. (Sensor pocket right hand side near the top).

6 INSTALLING THE ROOF CONNECTION AND PROFILE RAILS

DANGER: Risk to life due to falls or falling parts!

- Take appropriate action to prevent accidents during all work on roofs.
- Always use appropriate clothing or personal protection equipment.
- After completing installation, check the installation set, collectors and cylinder are securely positioned.

CAUTION: Modifications to the installation can cause injuries and/or malfunctions!

- Do not make any changes to the installation.

Whilst working on the roof take all necessary safety precautions to avoid a possible fall.

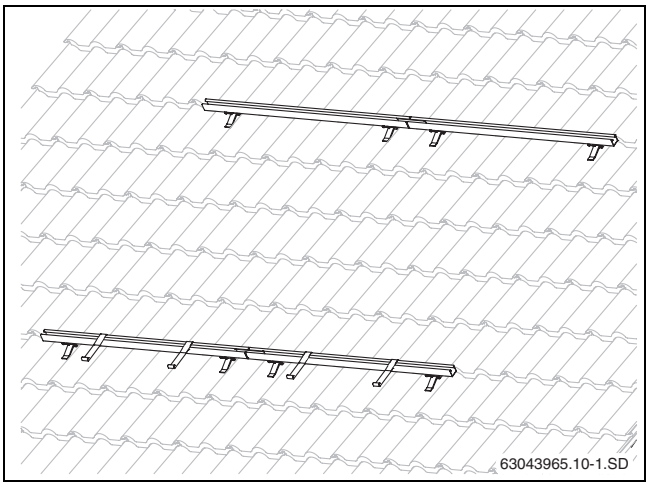

Fig. 9 Pre-assembled profile rails for two collectors

6.1 DETERMINING CLEARANCES

The dimensions given in the tables are guide values that should be approximately followed.

On tiled roofs, the corrugations determine the real distance between the roof hooks.

DISTANCE BETWEEN ROOF HOOKS

Each profile is fixed with two roof hooks (Fig. 10). The approximate distance between the roof hooks is provided in the table.

Type of assembly	Dimension w	Dimension x	Dimension z
portrait	aprox. 1,100	560–960	170–540

Table 4 Required clearance for portrait collectors (mm)

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

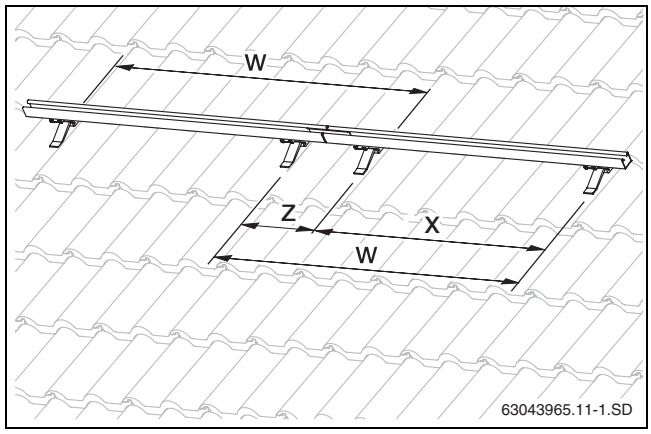

Fig. 10 Distance between roof hooks

CLEARANCE BETWEEN THE PROFILE RAILS

Determine the distance between the upper and lower profile rails (Fig. 11). Use the values in the table as guidance.

Type of assembly	Dimension y	
	from	to
vertical (1m^2 collectors)	370	715
vertical (2m^2 collectors)	1,320	1,710

Table 5 Distance (centre-centre) between the lower and upper profile rail (mm)

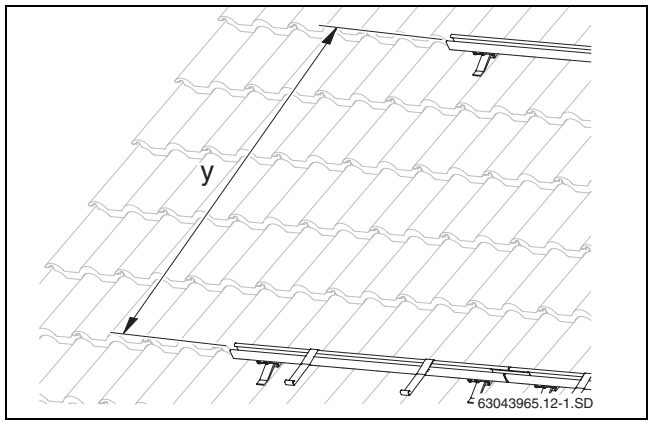

Fig. 11 Clearance between profile rails

6.2 PAN TILED ROOFS

First, assemble all the roof hooks according to the reference values in tab. 4 and tab. 5 on page 13.

Do not modify the roof construction and avoid damaging the roof covering.

To secure the tile to the roof hook, you should carefully cut the tile's points of support.

NOTE: System damage due to loosening of the long hexagon nut on the roof hook

When the nut is tightened, a glue is activated which bonds the joint securely after an hour.

- If the nut becomes loose after an hour, the screws must be tightened on site (e.g. lock washer).

6.2.1 FIT THE ROOF HOOK IN THE BATTEN

The lower part of the roof hooks is provided folded.

- Loosen the long hexagon nut (Fig. 13, [2]) on the roof hook and place the lower part of the hook (Fig. 13, [1]) in the correct position.
- Slide the tile up according to the positions of the roof hooks (Tab. 4 and Tab. 5, page 13).
- Fit the roof hook so that the load rests in the front in a tile hollow (Fig. 14, [4]).
- Slide the front part of the roof hook (Fig. 14, [3]) until it rests in the batten (Fig. 14, [2]).

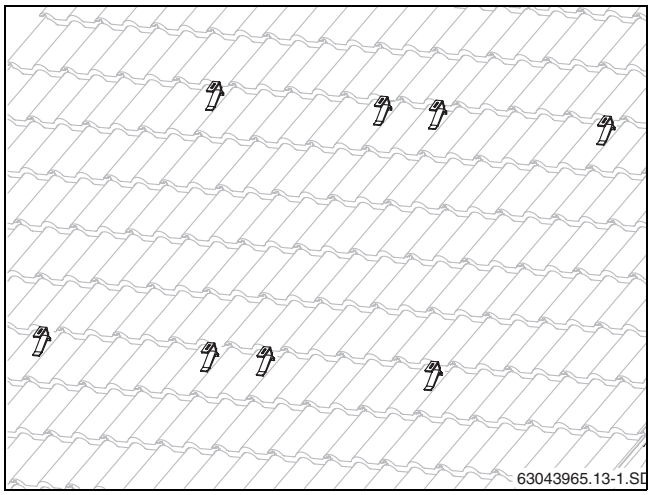

Fig. 12 Roof hooks assembled for two collectors

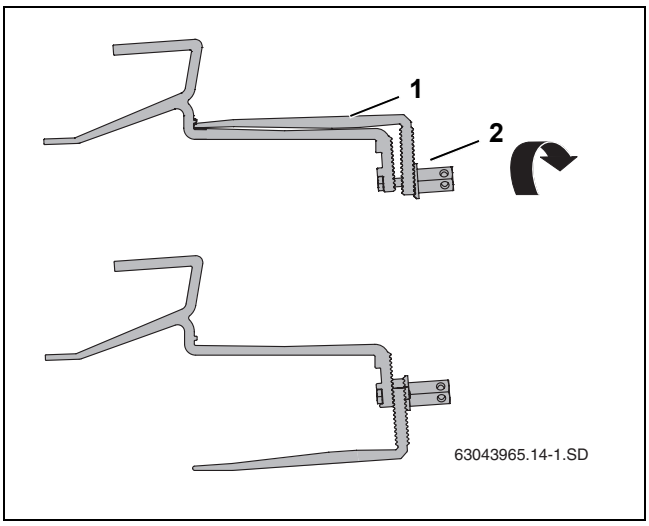

Fig. 13 Rotate lower part of roof hook

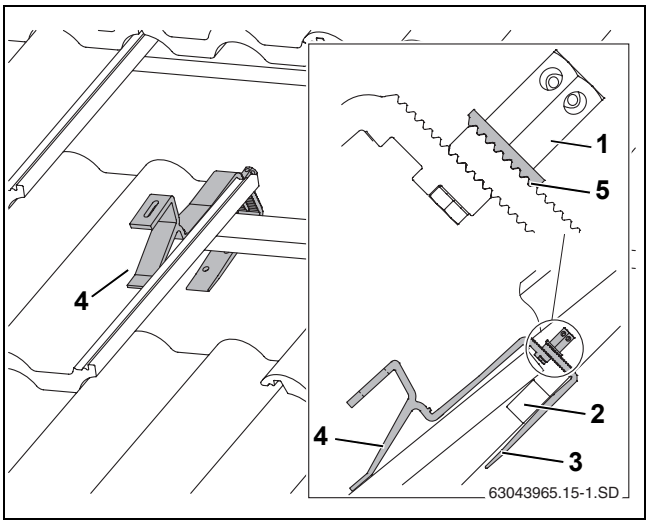

Fig. 14 Fixed roof hook (some tiles have been removed to show the example in more detail)

- Tighten the long hexagon nut (Fig. 14, [1]). To do this, insert a size 5 Allen key into the hole of the hexagon nut and turn.

The serrated washer (Fig. 14, [5]) must fit into the lower part of the roof hook.

6.2.2 FIXING ROOF HOOKS TO RAFTERS

The roof hook can be used alternatively as the rafter support for fixing to the rafter.

According to the roof hook positions (Tab. 4 and Tab. 5, page 13) it may be necessary to attach boards with adequate load bearing capacity to the rafters (horizontal battens) to fit the roof hooks between the rafters.

- With some roof coverings it may be necessary to pack the lower part of the roof hook (Fig. 14, [4]) with boards so that the upper part of the roof hook lies on top of the tile.

- Loosen the long hexagon nut (Fig. 15, [2]).
- Insert the screw in the upper hole (Fig. 15, [3]).
- Loosely fasten the lower part of the roof hook (Fig. 15, [1]). Do not tighten the connection yet.

NOTE: System damage due to breaking of roof hook!

- Position the screw in the upper hole to prevent an adverse application of force.

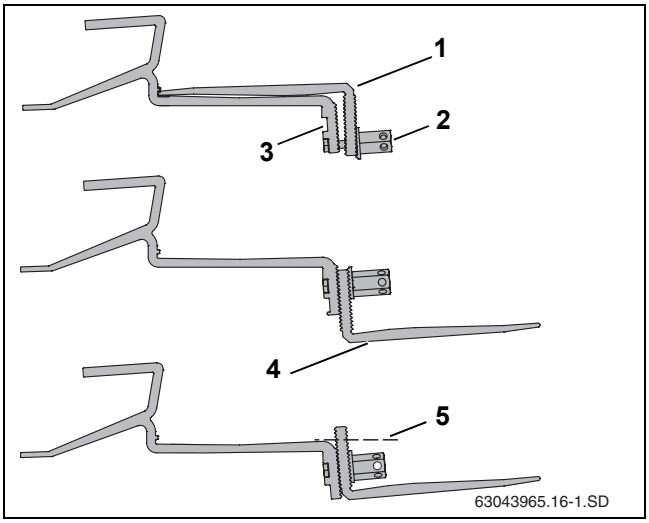

Fig. 15 Fastening roof hooks to rafter

1 Lower part of roof hook
2 Long hexagon nut
3 Upper hole for fastening the lower part
4 Apply covering if necessary
5 Trim if necessary

- Lay support in front in such a way that it will lie in a tile valley when subject to a load (Fig. 16, [3]).

The roof hook must have some looseness at the upper edge of the tile (Fig. 16, [2]). Adjust the top of the tile if necessary.

- Push the roof hook down until it comes to rest on the rafter or boards (Fig. 16, [6]).

The serrated washer (Fig. 16, [5]) must grip the serrations on the lower part of the roof hook.

- Tighten the long hexagon nut (Fig. 16, [1]). To do so, insert a size 5 Allen key in the hexagon nut and turn.
- Secure the lower part of the roof hook to the rafter in at least the first (Fig. 16, [2]) and second holes using suitable screws.

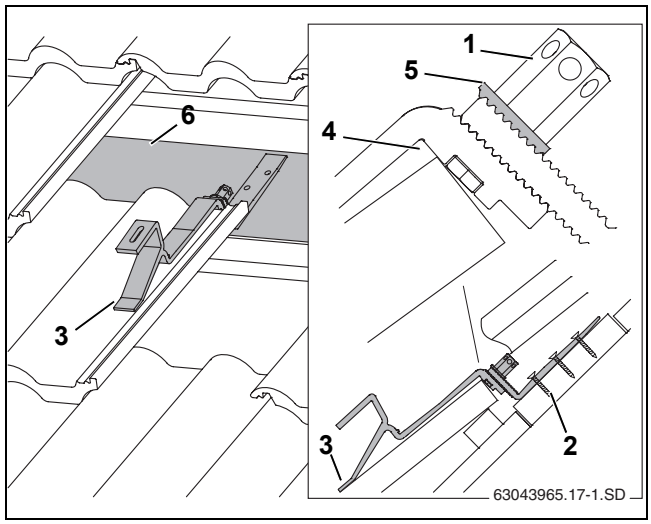

Fig. 16 Fixed roof hook (some tiles have been removed for a better view)

1 Long hexagon nut
2 Screws to secure the roof hooks
3 Front support
4 Adjust roof tile to roof hook if necessary
5 Serrated washer
6 Board

6.3 CROWN TILE ROOFS

We recommend consulting a professional roofer to install a crown tile installation.

During installation, pay attention to the dimensions which need to be maintained (w, x and y) for the roof hooks (Tab. 4 and Tab. 5, page 13).

According to the roof hook positions (Tab. 4 and Tab. 5, page 13), it may be necessary to attach boards with adequate load bearing capacity (Fig. 17, [1]) to the rafters (horizontal battens) in order to fit the roof hooks.

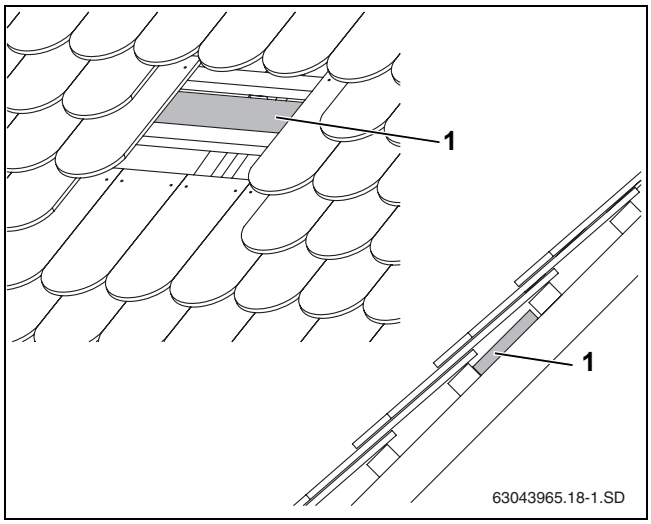

Fig. 17 Install boards if required

When the roof is built with horizontal battens, you may also use the roof hook according to the type of flat tile applied (page 14).

PREPARING THE ROOF HOOK

Before installation, the lower part must be placed in the correct position.

- Loosen long hexagon nut (Fig. 18, [2]).
- Insert the screw in the upper hole (Fig. 18, [3]).
- Loosely fasten the lower part of the roof hook (Fig. 18, [1]). Do not tighten the connection yet.

NOTE: System damage due to subsequent loosening of the hexagon nut on the roof hook!

- Position the screw in the upper hole to prevent adverse application of force.

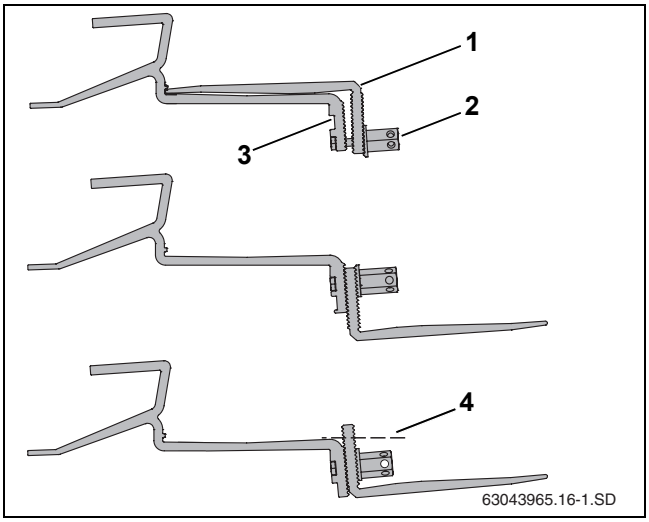

Fig. 18 Position lower part of roof hook again

1 Lower part of roof hook
2 Long hexagon nut
3 Upper hole for fastening the lower part
4 Separate if necessary

FITTING THE ROOF HOOK

NOTE: Building damage due to leaking roof!

- Fit each roof hook in the centre of a flat tile.

If roof hook clearance is reduced, you may trim the lower part of the roof hook between the second and third holes.

- Push down the lower part of the roof hook as much as possible until it comes to rest on the rafter or boards (Fig. 19, [1]).

The serrated washer (Fig. 20, [2]) must grip the serrations on the lower part of the roof hook.

- Tighten the long hexagon nut (Fig. 20, [1]). To do so, insert the size 5 Allen key into the hexagon nut and turn.
- Using suitable screws, fasten the lower part of the roof hook into the first (Fig. 20, [3]) and second holes (at least) of the joist or board.

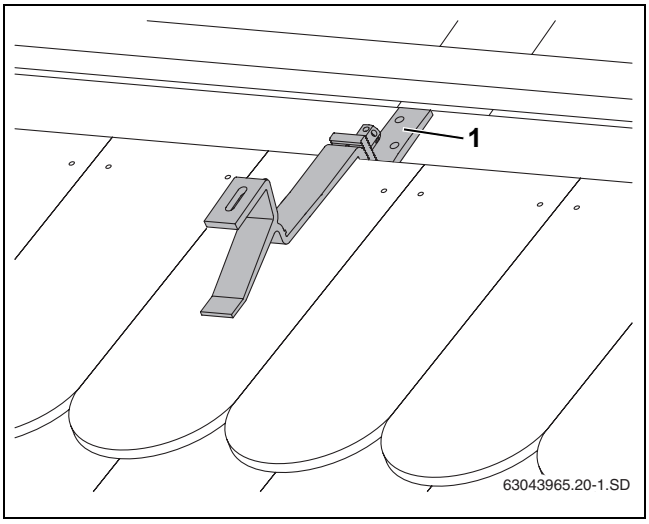

Fig. 19 Assembled roof hook

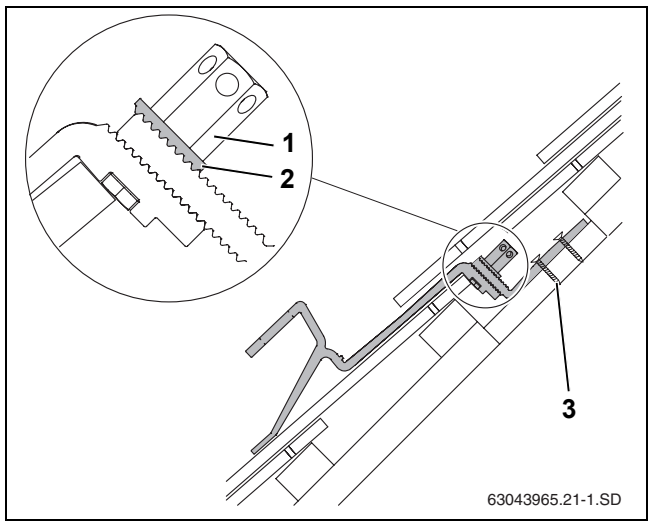

Fig. 20 Assembled roof hook. View of section with trimmed lower part of roof hook

1 Long hexagon nut
2 Serrated washer
3 Screw for securing roof hooks

- Cut adjacent crown tiles (Fig. 21, [1]) (dotted line, Fig. 21, [2]).

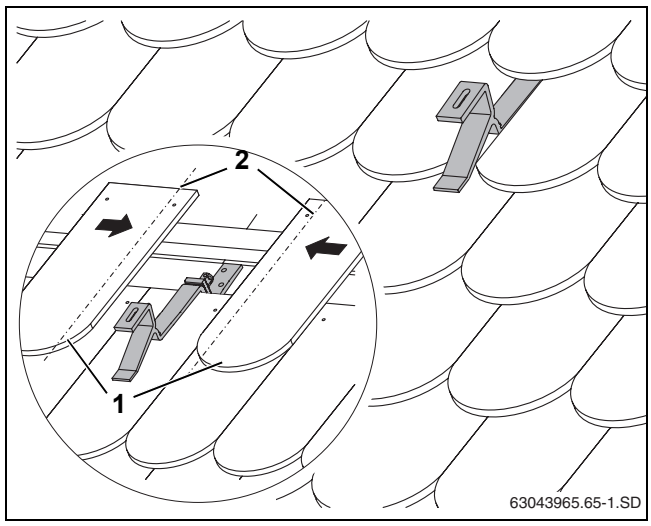

Fig. 21 Roof hook with covered roof

6.4 CORRUGATED ROOF

DANGER: Risk to life due to breathing in fibres containing asbestos!

- ▶ Work with materials containing asbestos must only be carried out by certified or licensed experts or persons who have been fully instructed on the correct procedures and current regulations.

Instead of roof hooks, fit carriage bolts to secure the profile rails.

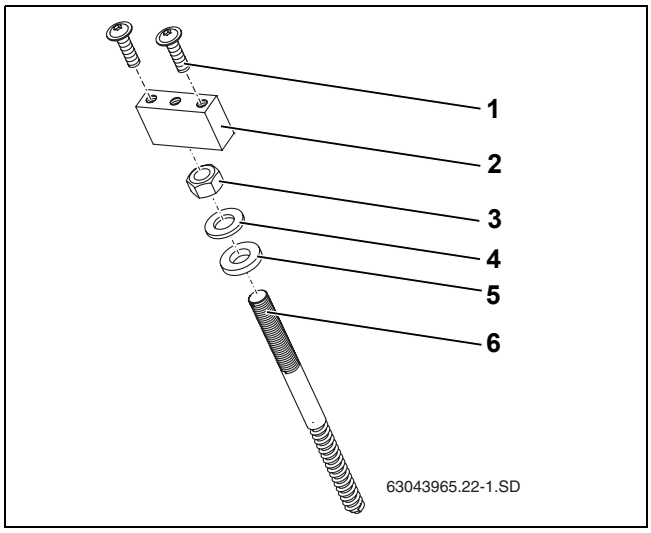

Fig. 22 Corrugated roof connection

1 M8 screw (4x)
2 Holding Bracket (4x)
3 M12 nut (4x)
4 Washer (4x)
5 Sealing disc (4x)
6 M12 carriage bolts screw (4x)

On corrugated rooftops, the corrugations determine the distance between the carriage bolts. During installation, keep in mind the dimensions of the carriage bolts (Tab. 4 and Tab. 5, page 13) to be maintained (w, x and y).

NOTE: subframe with inadequate load bearing capacity!

- ▶ Check that the subframe collector rails have adequate load bearing capacity. To secure the carriage bolts, timber supports at least 40 x 40 mm thick are required.
- ▶ If necessary, install additional timber supports in order to comply with the measurements in Tab. 4 and Tab. 5, page 13.

OTHER EQUIPMENT REQUIRED

- Cordless screwdriver
- Tape measure
- Wood drill, Ø 6 mm (for length of drill, see paragraph on “Fitting the carriage bolts”, page 19)
- Metal drill, Ø 13 mm
- Spanner sizes 15 and 19

FITTING THE CARRIAGE BOLTS

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 (Fig. 23).

- Determine the length of the drill bit for the wood drill required according to the following calculations.

	90 mm
Height of tile peak	+
Height of drilling template	+
Required wood drill bit length from drill chuck (Ø 6 mm)	=

Table 6

NOTE: Building damage due to leaking roof!

- Never drill into a tile valley.

- Drill through the corrugated roof using a metal drill bit (Ø 13 mm), taking into account the positions of the carriage bolts (see tab. 4 and tab. 5, page 13). Do not drill into the wood beneath!
- Feed wood drill bit (Ø 6 mm) through the template and drill vertically into the subframe (timber support).
- When fitting the carriage bolts, pay attention to the sequence of the individual parts (Fig. 24).
- Turn Holding Bracket (Fig. 24, [1]) as far as it will go onto the double ended screw (Fig. 24, [5]).
- Using the size 15 spanner, turn the pre-assembled carriage bolts into the roof until dimension B is achieved (tab. 7, page 20).

When turning the carriage bolts, ensure that distance B (tab. 7 and Fig. 25) is the same for all carriage bolts.

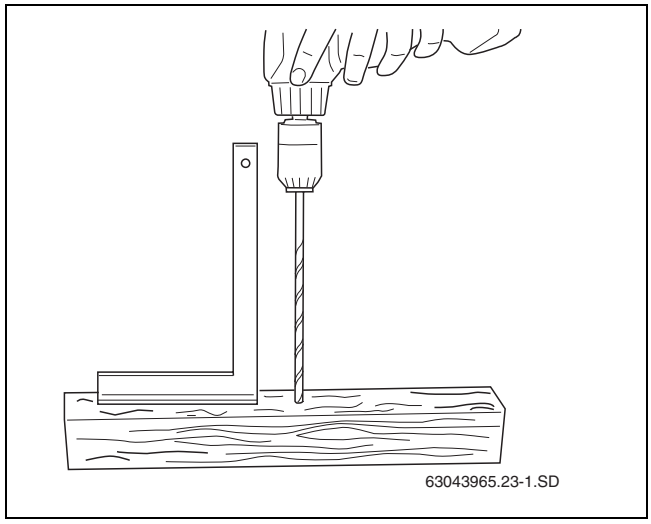

Fig. 23 Creating a drilling template

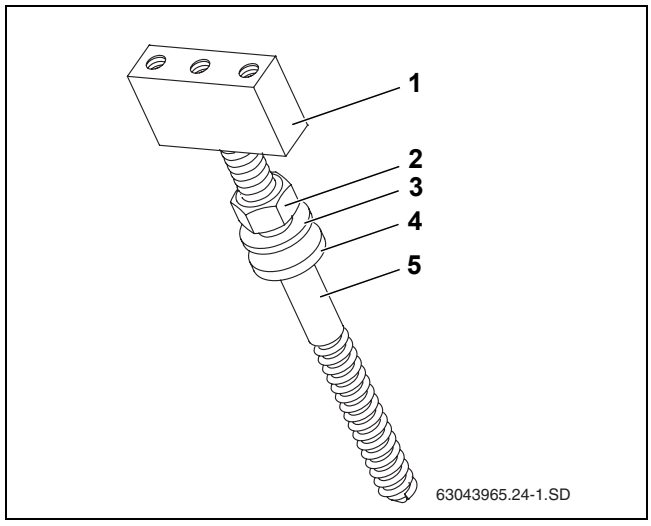

Fig. 24 Fitting the carriage bolts - sequence

1 Holding Bracket
2 M12 nut
3 Washer
4 Sealing disc
5 M12 double ended screw

- Tighten the nut (Fig. 25, [2]) until the sealing disc (Fig. 25, [3]) fully touches the roof.

The Holding Bracket must be turned fully onto the double ended screw.

Height of tile peak Dimension A	Dimension B
35 mm	70 mm
40 mm	65 mm
45 mm	60 mm
50 mm	55 mm
55 mm	50 mm
60 mm	45 mm

Table 7 Dimensions for corrugated rooftops.

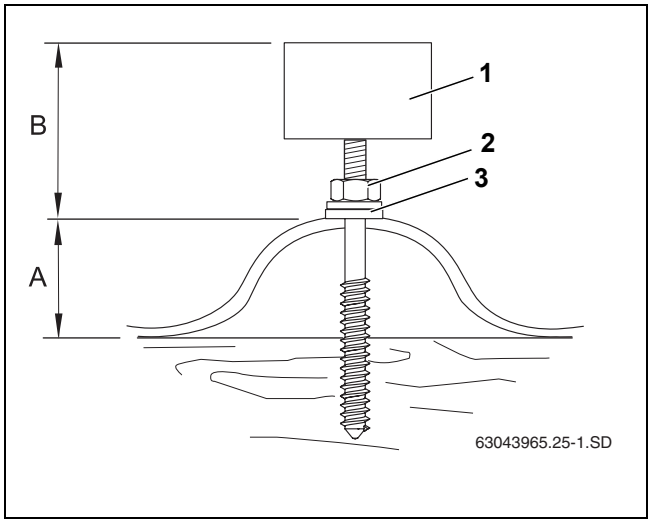

Fig. 25 Carriage bolt fitted to corrugated roof

1 Holding bracket
2 M12 nut
3 Sealing disk

SECURING THE ROOFTOP PROFILE RAILS

- Secure each profile rail (Fig. 26, [2]) with two screws each (Fig. 26, [1]).

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

- Use a plumb line to check. If necessary, pack the profile rails at the holding bracket.

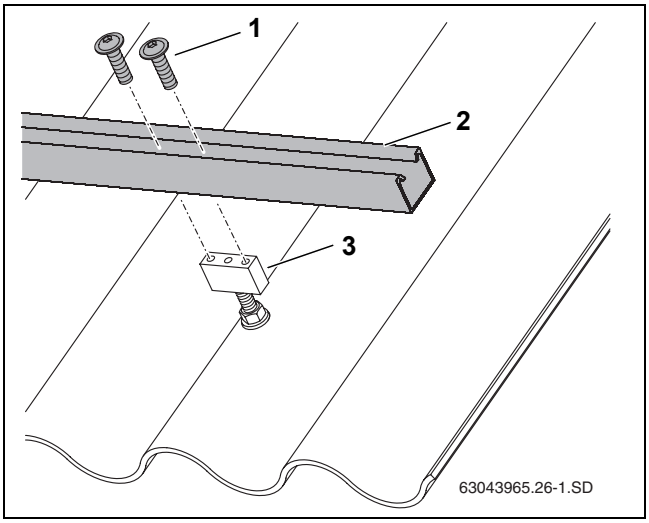

Fig. 26 Fastening the profile rail to the Holding Bracket

1 Screw
2 Profile rail
3 Holding bracket

6.5 SLATE/SHINGLE ROOFS

Assembly on slate slabs or wood should be carried out by a professional roofer.

The diagrams show the installation of a roof hook for special roofs and a sealed covering with boards to be applied by the customer (Fig. 27, [1] and [2]) on a slate or batten roof.

When installing, take into account the distances to be maintained (w, x and y) between the roof hooks with special fittings for roofs (tab. 4 and tab. 5, page 13).

- Secure the special roof hooks (Fig. 27, [5]) and the insulation (Fig. 27, [4]) with the screw (Fig. 27, [6]) to the slate or batten roof.
- To ensure sealed installation, the customer should underlay the special roof hooks with boards (Fig. 27, [1] and [2]).

The special roof hook must be supported by a multiple layers (Fig. 27, [3]).

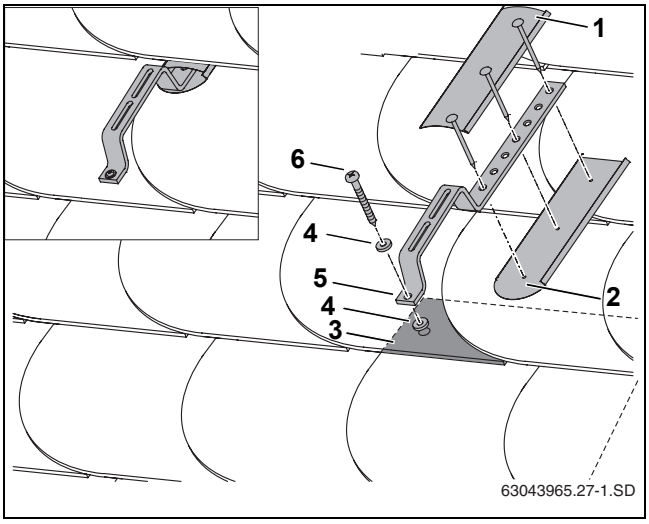

Fig. 27 Assembly for slate or batten roofs

1 Flashing (On building)
2 Flashing (On building)
3 View of multiple covers/roofing
4 Insulation Gasket (On building)
5 Special roof hooks
6 Screw

6.6 CORRUGATED SHEET ROOFS

Installation on corrugated roofs should be done by a professional roofer.

Instead of roof hooks, carriage bolts should be used (Fig. 28, [5]) to secure the profile rails. During installation, pay attention to the distances to be maintained (w, x and y) between the carriage bolts (tab. 4 and tab. 5, page 13).

To guarantee that there are no leaks, you must (Fig. 28, [5]) weld sleeves (Fig. 28, [6]) to the board.

You may consult the assembly sequence of the carriage bolts, as well as the recommendations, in chapter 6.4 “Corrugated roof”.

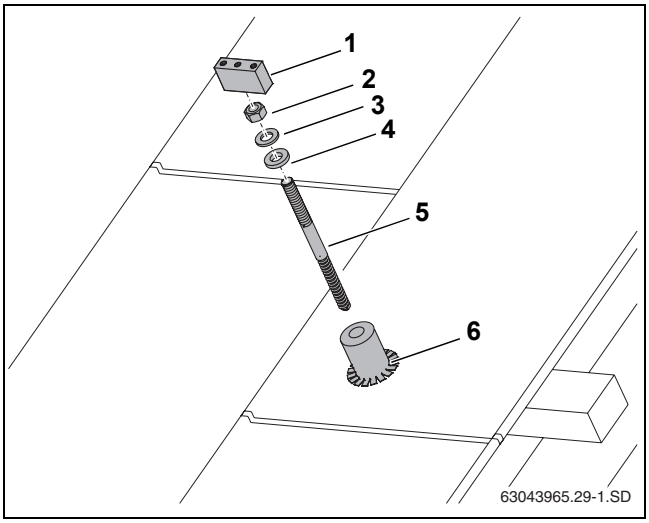

Fig. 28 Assembly on corrugated rooftop

1 Holding Bracket
2 M12 nut
3 Washer
4 Sealing disc
5 M12 double ended screw
6 Sleeve (installer)

6.7 INSTALLING PROFILE RAILS

The profile rails must be joined together using rail connectors. The rail set is supplied with an upper and lower profile rail.

6.7.1 CONNECTING PROFILE RAILS

- Push rail connector (Fig. 29, [1]) as far as it will go into both profile rails (Fig. 29, [2]).
- To lock, tighten both fitted M10 threaded studs (Fig. 29, [3]) in the rail connector using a size 5 Allen key.

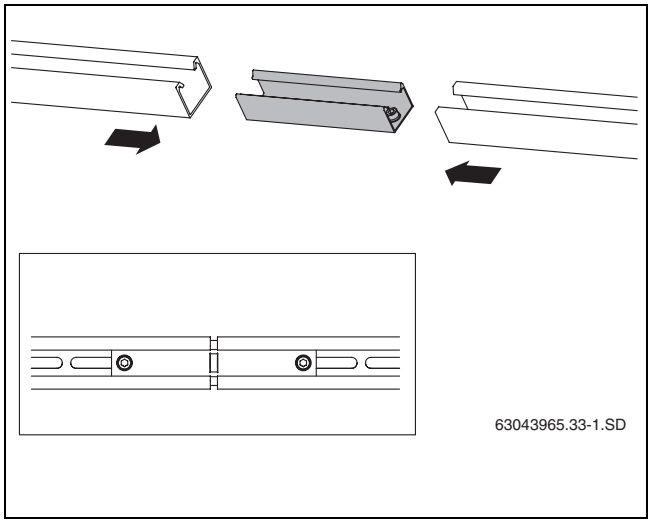

Fig. 29 Connecting profile rails

1 Rail connector
2 Profile rail
3 M10 threaded stud

6.7.2 INSTALLING PROFILE RAILS

- Push sliding nut (Fig. 30, [1]) onto the roof hook in the direction of the arrow.
- Place the lower profile rails (Fig. 30, [2]) onto the roof hooks and loosely fasten M8 bolt (Fig. 30, [3]) so that the profile rails can still be aligned.
- Carry out the same procedure for the upper profile rails.

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

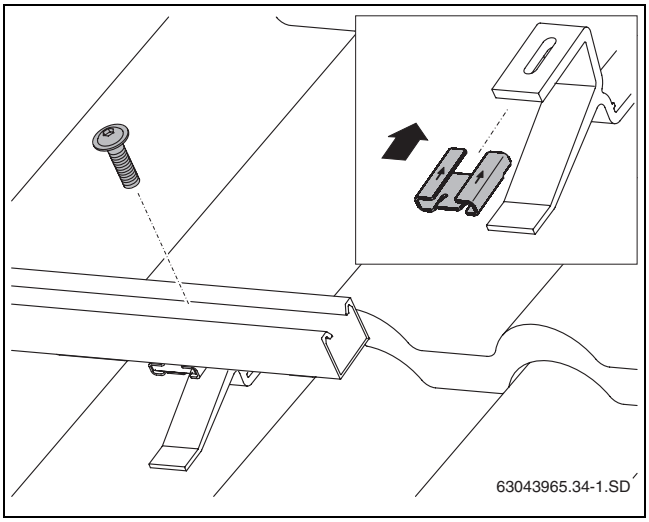

Fig. 30 Fastening profile rails to the roof hook

1 Sliding nut
2 Profile rail
3 Bolt

6.7.3 ALIGNING THE PROFILE RAILS

▸ Align the upper and lower profile rails to the side flush with each other and level them (Fig. 31, use a spirit level).

Measure the diagonals or place a roof batten (Fig. 31, [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.

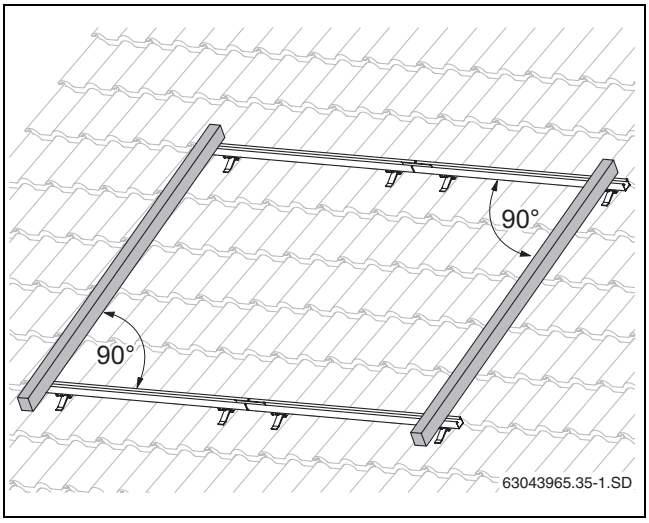

Fig. 31 Aligning the profile rails

▸ Tighten the screws.

The profile rails must not sag due to differences in level of the joists. Check using a plumb line.

6.7.4 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. 32, [3]) into the innermost slotted holes (Fig. 32, [1]) over the profile rails until it clicks into place (Fig. 32, [2]).

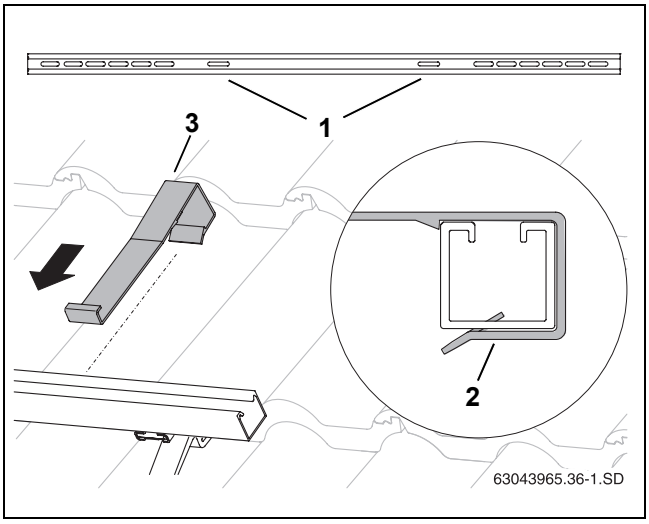

Fig. 32 Attaching anti-slip protection

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

7 COLLECTOR INSTALLATION

Before installing the collectors, observe the following safety instructions and installation information.

DANGER: Risk to life due to falling parts!

- Take appropriate action to prevent accidents during all work on roofs.
- Take precautions against possible fall while working on roofs.
- Always wear protective clothing and safety equipment.
- After completing installation, check the installation set and collectors are securely positioned.

WARNING: Risk of scalding!

If the collector and installation material have been exposed to sun rays over a long period of time, there is the risk of burns when touching the components.

- Always wear protective clothing and safety equipment.
- Before and during installation, cover the collector and the installation material to protect against high temperatures caused by sun rays. We recommend keeping the equipment covered until the system is commissioned. Accessory 8718530331 panel cover is available for this use.

DANGER: Risk of injury due to falling collectors!

- During transport and installation, secure the collectors to prevent them from falling.

CAUTION: Risk of injury due to contact with solar fluid!

- Always wear protective clothing when handling solar fluid (gloves and goggles).
- If solar fluid comes into contact with skin, wash skin with soap and water.
- If solar fluid comes into contact with eyes, rinse eyes thoroughly under running water.

NOTE: Risk of damage to property due to the use of inappropriate solar fluid!

- Only use the solar fluid provided by the manufacturer.

NOTE: Risk of system damage due to damaged sealing faces!

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

ADDITIONAL PRECAUTIONS TO BE OBSERVED DURING INSTALLATION:

- Avoid scratches or sudden impacts on the glass cover of the solar panel.
- Never step on the collectors.
- Never weld in the vicinity of the glass surface of the solar panel.
- Use a mobile hoist such as those used by professional roofers or three point suction handles with load bearing capacity.
- Check that the collector is installed with the sensor positioned in the upper right corner.

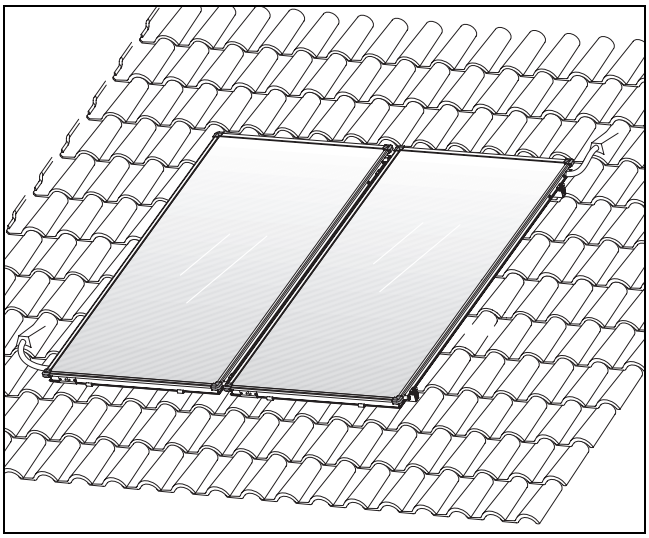

Fig. 33 View of collectors installed on the roof

7.1 PREPARING TO INSTALL COLLECTORS

Before beginning actual installation on the roof, pre-assemble the short solar hoses and dummy plugs on the ground to make work on the roof easier.

To secure the solar hoses, hose clips should be fixed with the locking ring.

NOTE: System damage through leaks in the solar hoses!

- It is very important that the hose clip is positioned correctly before removing the locking ring (Fig. 34, itm 1 and 2). Subsequent loosening using pliers can impair resilience.

CAUTION: Risk of injury!

- Only release the locking ring once the hose clip is positioned over the solar hose.

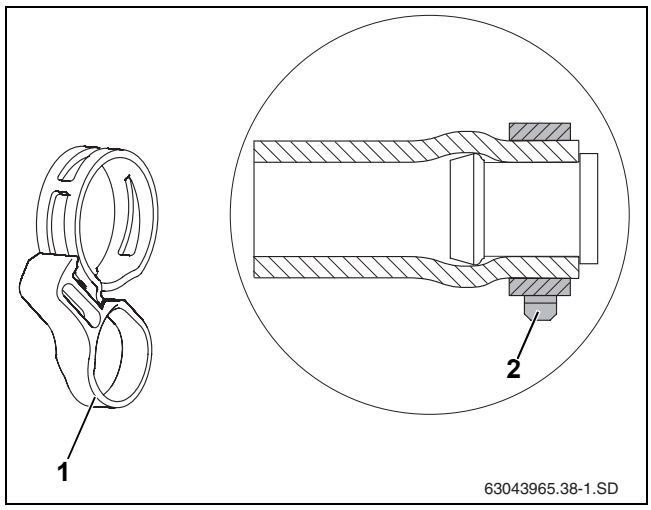

Fig. 34 Hose clip with locking ring fixed to the pre-assembled dummy plug

NOTE: Reduction of efficiency!

Condensation on collector glass surface.

- When applying insulation to solar hoses, check that the vent openings are not obstructed.

7.1.1 HYDRAULIC CONNECTION ACCORDING TO THE TICHELMANN PRINCIPLE (NON-RETURN)

The pipes in the collector array should follow the Tichelmann principle (Non-return). This guarantees that each collector receives the same flow (Fig. 35).

The flow line must always be positioned on the right side of the collector due to the sensor pocket position (Fig. 35). In these instructions, the flow line is shown on the right accordingly.

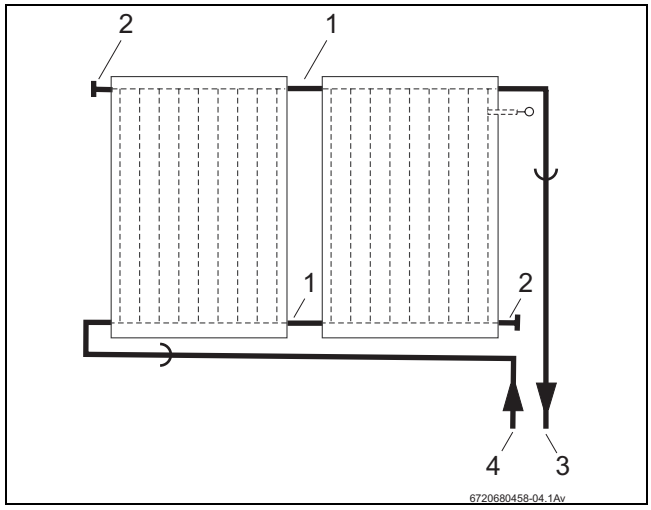

Fig. 35 Hydraulic connection– flow line always on the right

1 95 mm solar hose
2 55 mm solar hose and dummy plug
3 Flow line
4 Return line

DIAMETER OF PIPEWORK (FIG. 35, [3] AND [4]) FOR < 20 M LENGTH

No. of collectors	Diameter
up to 5	15 mm
from 6 to 10	22 mm

Table 8

Take time to plan the hydraulic routing of the panel configuration to ensure that the flow is on the right hand side in correspondence to the sensor pocket position.

If you are using an automatic air vent valve accessory (required when using a manual filling pump) at the highest point of the system, run the flow line rising to the air vent valve and return line rising to the collector array.

7.1.2 PRE-ASSEMBLING THE CONNECTION SET

The hydraulic connection between the two collectors is made using the joing set (95 mm solar hoses and hose clips from the transport corners).

To make installation easier, we recommend that you place the solar hoses in hot water, especially when the ambient temperature is low.

The diagrams show the connection set with the first collector being installed on the right.

- Remove plastic caps (transport protection) from the collector connections.
- Push the 95 mm solar hoses (Fig. 36, [2]) to the hoses on the right side of the second collector and then to all other following collectors.
- Push the hose clips (Fig. 36, [1]) over the solar hose (the second clip secures the connection of the other collector).
- When the hose clip has been correctly fixed, pull the locking ring to secure the connection (Fig. 36, [3]).

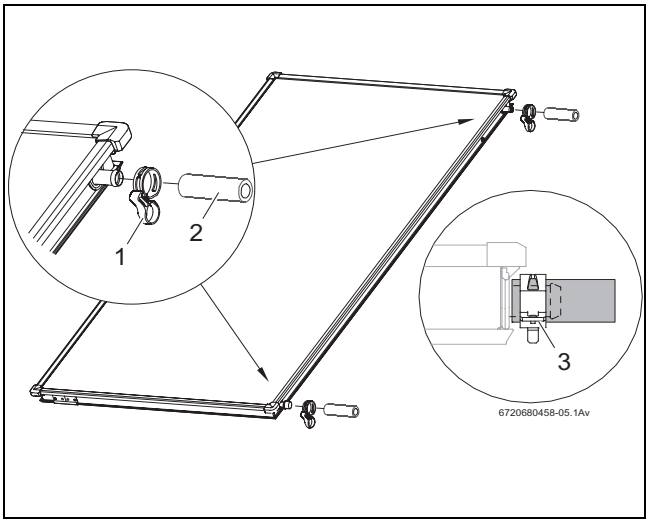

Fig. 36 Pre-assembly of the joining set on the second collector

7.1.3 ASSEMBLING THE DUMMY PLUG

Not all connections are required for the assembly of the collector array and should therefore be closed.

- Remove plastic caps (transport protection) from collector connections.
- Place the 55 mm solar hoses (Fig. 37, [2]) with the pre-assembled dummy plug over the two free connections of the collector array
- When the hose clips are correctly fixed, tighten the locking ring to secure the connection.

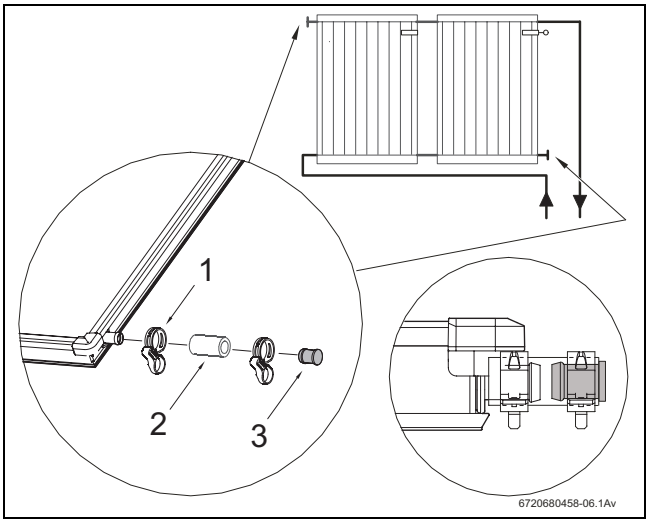

Fig. 37 Assemble the dummy plug and the hose clip

1 Hose clip
2 55 mm solar hose
3 Dummy plug

7.2 SECURING THE COLLECTORS

The collectors are secured to the profile rails using the single sided collector clamps (Fig. 38, [2]) at the beginning and at the end of a line of collectors and the double sided clamps (Fig. 38, [1]) between each collectors.

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

The plastic parts on the single sided clamps do not have support functions. They are designed to facilitate installation.

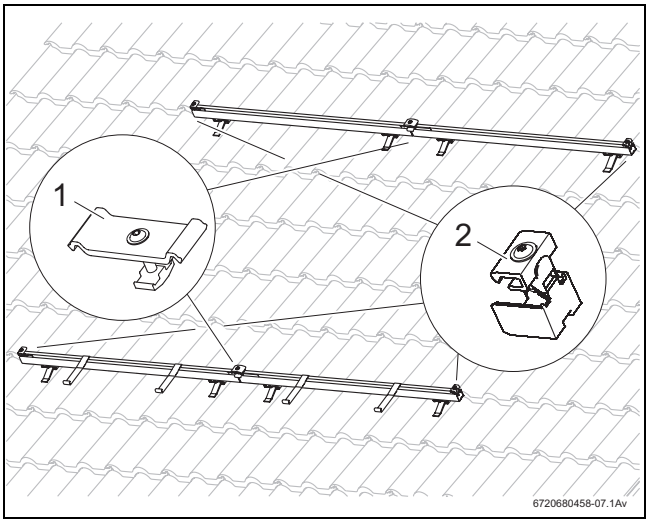

Fig. 38 Collector fixing elements

INSERTING THE SINGLE-SIDED COLLECTOR CLAMP ON THE RIGHT

- Insert the single sided collector clamp on the profile rails (Fig. 39, [1]) on the right hand end of the collector array until they click into place in the first slotted hole on the profile rails.

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

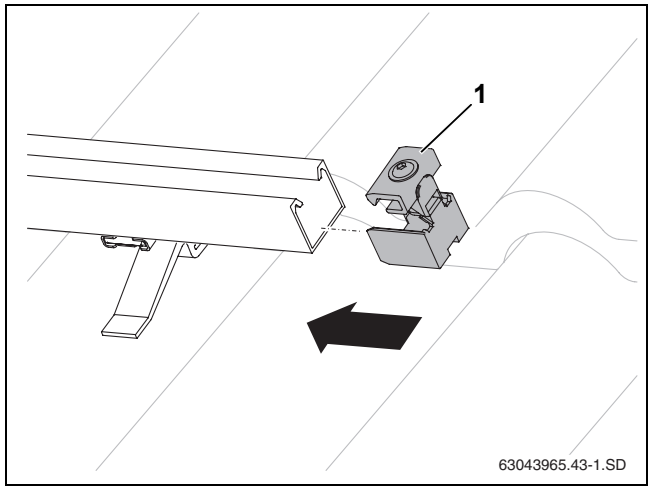

Fig. 39 Fitting the single sided collector clamp

SECURING THE FIRST COLLECTOR

Secure the collector in such a way that the sensor pocket is located at the top right hand side of the collector. Start securing the collectors to the profile rails on the right side.

CAUTION: Risk of injury!

- Collectors must always be assembled by two people.

- Position the first collector on the profile rail and into the anti-slip brackets (Fig. 40).

Position the lower collector edge in the opening of the anti-slip bracket (Fig. 40, [1]).

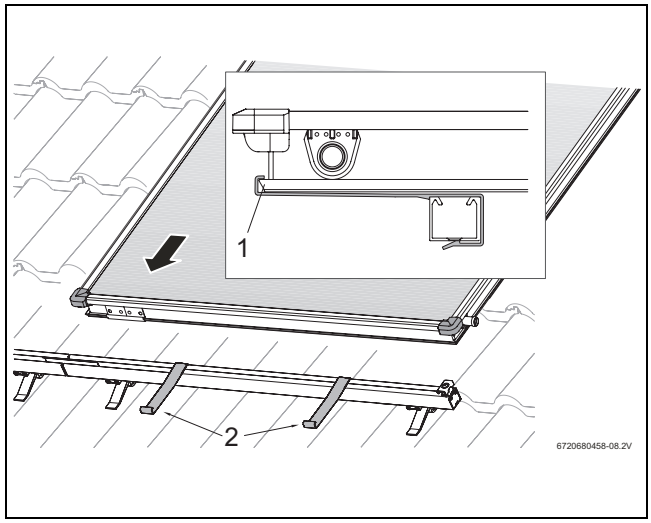

Fig. 40 Lay the first collector on the profile rails

- Push (Fig. 41, [1]) the collector carefully up against the single sided collector clamp and align horizontally.
- Tighten the single sided collector clamp with a size 5 allen key (Fig. 41, [2]).

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

The single sided collector clamp (Fig. 41, [2]) now secures the lower corner of the collector.

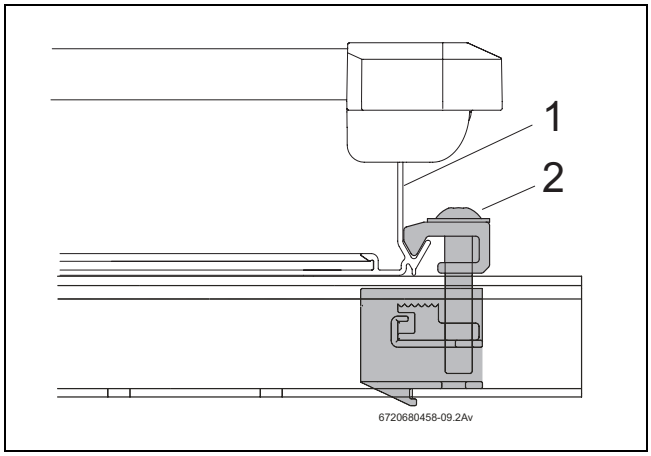

Fig. 41 Single Sided Collector Clamp

INSERTING THE DOUBLE-SIDED COLLECTOR CLAMP

- Place the double-sided collector clamp with the attached nut in the aperture of the profile rail and joiner (Fig. 42, [1]) in such a way that it surrounds the profile rail.
- Push the double sided collector clamp up against the collector frame.

Do not tighten the screw until the second collector is pushed up against the double sided collector clamp.

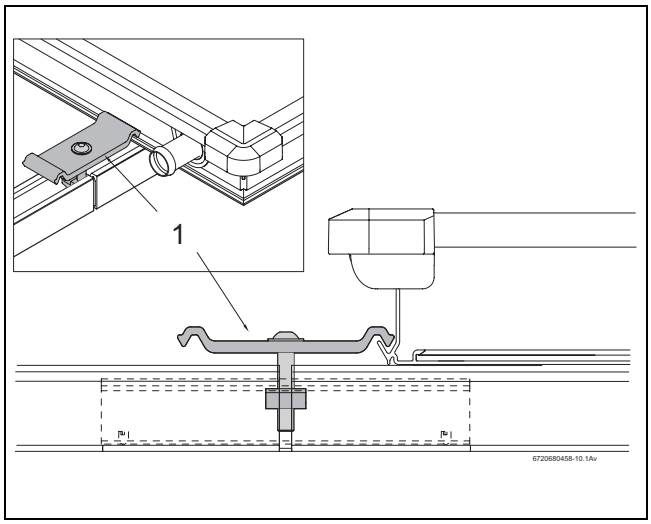

Fig. 42 Fitting the double sided collector clamp

POSITIONING THE SECOND COLLECTOR

- Place the second collector with the pre-assembled solar hoses (Fig. 43, [1]) on the profile rails and let it slide into the anti-slip brackets.
- Push the second hose clip (Fig. 43, [3]) over the solar hose.
- Push the second collector up against the first collector (Fig. 43, [2]) in such a way that the pre-assembled solar hoses are pushed onto the left hand connections of the first collector.

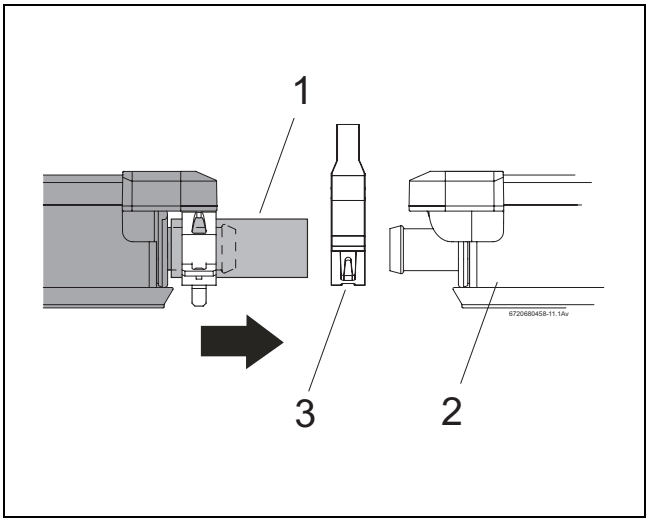

Fig. 43 Pushing the second collector towards the first

- Push the hose clip over the bead on the collector and pull the locking ring.

NOTE: System damage due to leaking hose connections or loose dummy plugs!

- Secure every solar hose to the collector connection with the hose clip (Fig. 44).

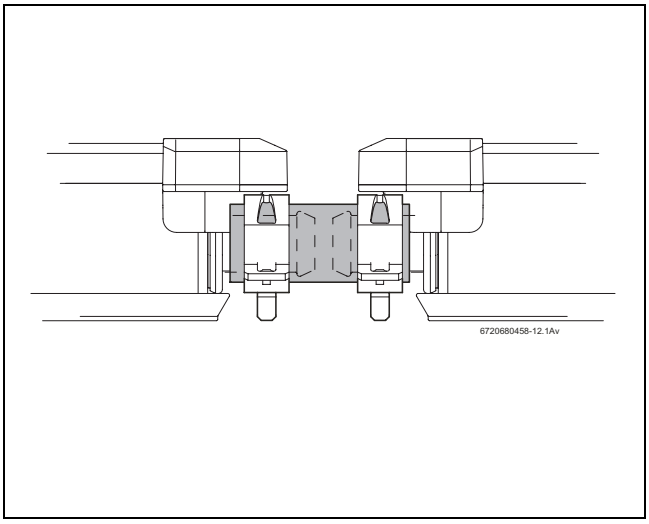

Fig. 44 Solar hose with secured jubilee clips

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

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

The single sided collector clamp (Fig. 45, [1]) now secures the lower corner of the collector.

Follow the same procedure with all other collectors.

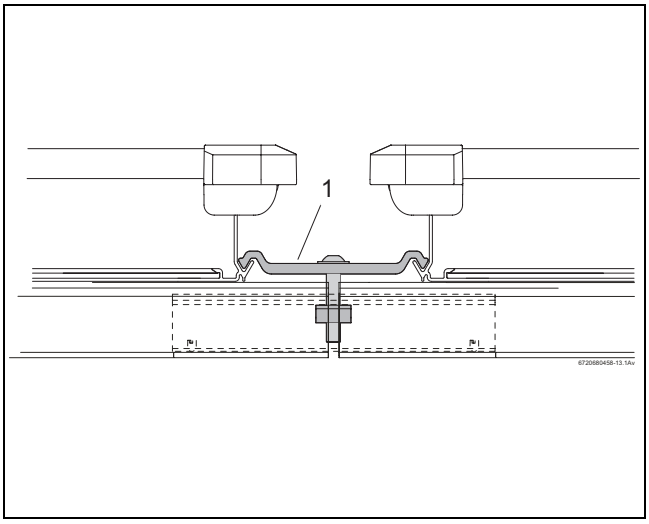

Fig. 45 Double sided collector clamp between two collectors

COMBINING LITO AND LITO MIN PANELS

When combining Lito and Lito Mini panels, an extension rail is not used, only a standard roof rail.

- Please ensure that the collector rails used for Lito and Lito Mini are aligned correctly at the bottom as per (Fig. 10, page 13).
- The same roof hook clearances should also be observed.

INSERTING THE SINGLE SIDED COLLECTOR CLAMP ON THE LEFT

Once all collectors are fitted, the two remaining one-sided collector clamps can be attached.

- Push the single-sided collector clamp (Fig. 45, [1]) into the ends of the upper and lower profile rails.
- Push the collector clamp up against the collector frame and secure in place with a size 5 Allen key (Fig. 45, [2]).

When the screw is tightened, the plastic lug at the pre-determined cut-off point breaks away and can be discarded.

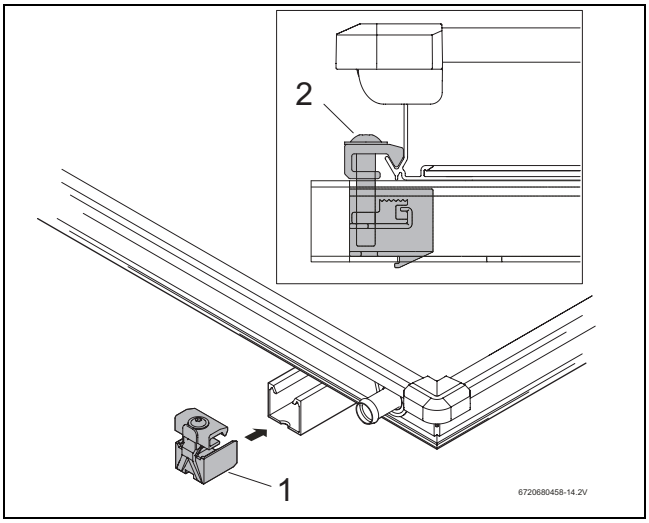

Fig. 46 Single sided collector clamp on the left

8 FITTING THE COLLECTOR SENSOR

The collector sensor is part of the control unit if installation items are ordered separately and can also be found in standard Lito roof kits if ordered as part of a 2 phase installation (Roof Kit and Plumb Kit)

- Take note of the location of the sensor pocket for single or multi row installations, ensuring that it is always on the top right hand side of the collector (Fig. 47, [1]).

NOTE: System damage due to faulty sensor!

- ▸ Protect the cable from possible damage (for example, animals or birds. Always ensure that the sensor cable is fully inserted and secured).

SENSOR POCKET LOCATION

The collector sensor must be inserted with flow pipework connected - always on the top right hand side of the collector (Fig. 47, [2]).

- Insertion location (Fig. 47, [A]).

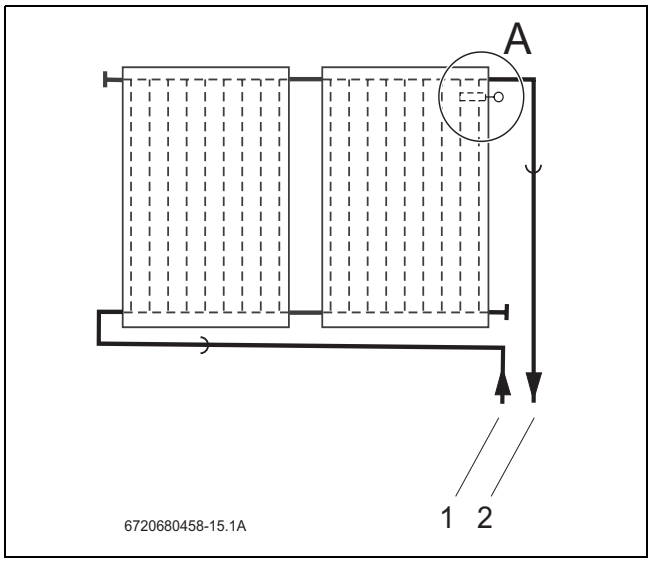

Fig. 47 Insertion location for the collector sensor (schematic view)

1 Return pipework
2 Flow pipework

MOUNTING THE COLLECTOR PROBE

To guarantee optimum performance of the solar installation, the collector sensor (Fig. 48, [1]) must be pushed until it fully touches the sensor guide pipe (corresponding to aprox. 160 mm).

- ▸ Carefully make a hole in the lining layer of the sensor pocket first (Do not try to push through the sensor unless the lining layer seal has been broken). A screwdriver can be used for this (Fig. 48, [2]).
- ▸ Insert the collector sensor aprox. 160 mm into the sensor pocket (as far as it can go).

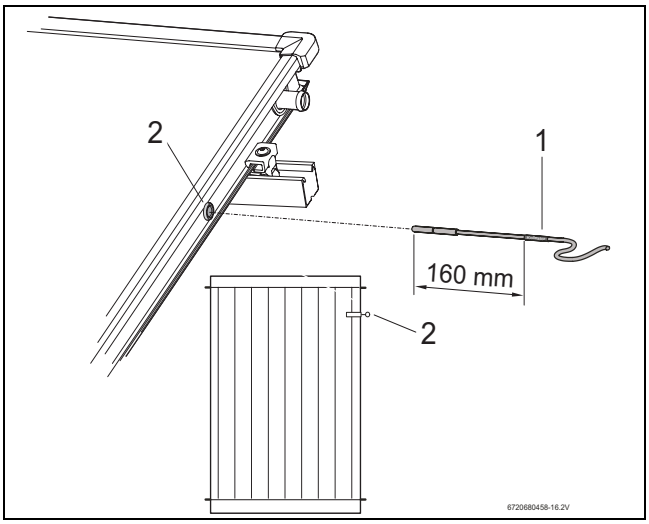

Fig. 48 Push the collector sensor into the collector

1 Collector sensor
2 Collector sensor passage

9 FITTING THE COLLECTOR HEADER PIPE

Information concerning the installation of the collector pipes can be found in the instructions of the pump station.

The hydraulic connection of the collector pipes is done through the long and flexible solar hoses. It is not permitted to connect a fixed header pipe directly to the collector.

Use standard ventilation tiles or pipe conduits when laying the connection pipes (solar hoses) under the roof.

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

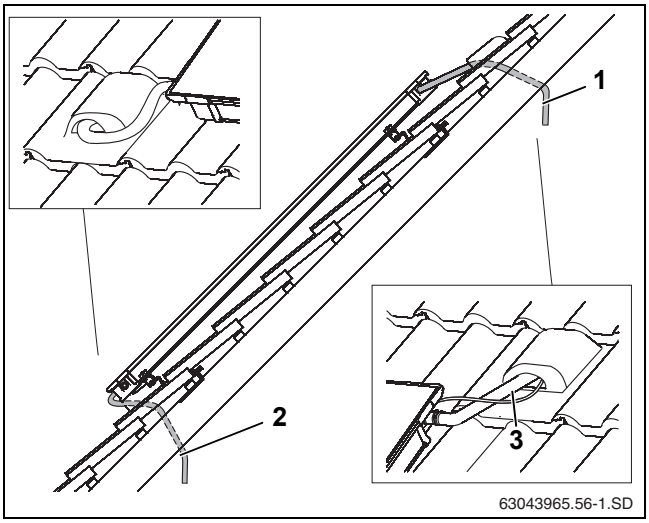

Fig. 49 Run the cables under the rooftop

1 Flow pipework
2 Return pipework
3 Sensor cable

9.1 INSTALLATION WITHOUT AN AUTO AIR VENT

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

- Connect the long solar hose (1,000 mm, Fig. 50, [3]) to the collector array flow connection and secure with hose clip (Fig. 50, [4]).
- Fit the end of the hose into the solar hose with the compression fitting (Fig. 50, [2]) as far as it can go and secure with hose clip.
- Run the hose together with the probe cable along the ventilated tile (Fig. 49, [1]) and through the rooftop insulation.
- Connect the collector pipe to the end of hose R¾ with threaded locking ring (18 mm) (Fig. 50, [2]). Follow the same procedure for the return connection.

NOTE: System damage due to leaking!
- Check sealing of all connections.

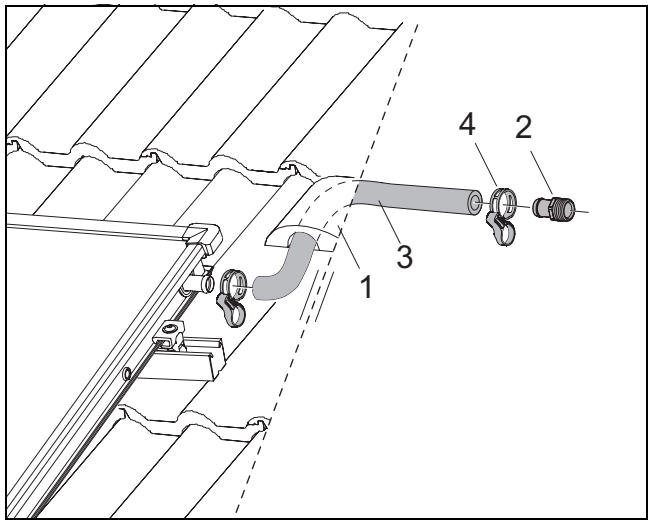

Fig. 50 Assemble the flow pipework (without purging device on the rooftop)

1 Ventilated tile
2 End of R¾ hose with compression fitting
3 1,000 mm solar hose
4 Hose clip with locking ring

9.2 INSTALLATION WITH AN AUTO AIR VENT (ACCESSORY) AT THE HIGHEST POINT IN THE SYSTEM

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. 51, [2]) and return line rising to the collector array (Fig. 51).

Avoid frequent changes of direction.

Whenever there is a change from a downward direction to an upwards direction, we recommend the installation of an additional air vent.

If there is not enough room to install an automatic air vent, you must install a manual purging device.

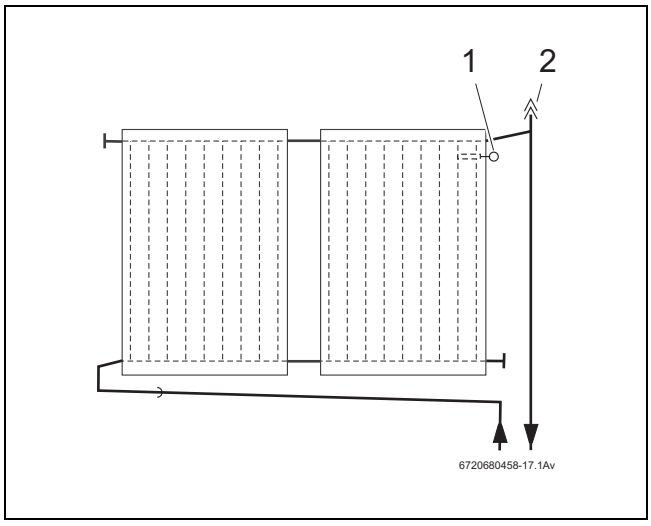

Fig. 51 Diagram showing air vent for flow connection

1 Collector sensor
2 Automatic air vent valve on roof

THE WEATHER PROTECTION CAP EXPLAINED: PROTECTION COVER OF THE AUTOMATIC PURGE

The solar heating system is vented through the opened weather protection cap during filling. When the solar system is in operation, the weather protection cap (Fig. 52 [1]) must always be in the close position to prevent moisture entering into the solar heating system.

Open the air-Vent valve by unscrewing the weather protection cap one full revolution.

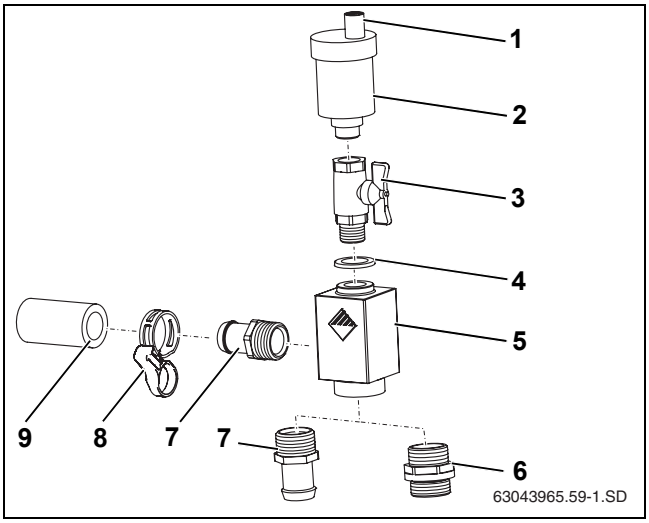

Fig. 52 Universal air vent set

1 Weather protection cap 1x
2 Automatic Air vent 1x
3 Ball valve 1x
4 Gasket 1x
5 Vent pot 1x
6 Double threaded fitting 1x
7 Hose nozzle with O-ring 2x
8 Hose clip 2x
9 55 mm solar hose 1x

9.2.1 FITTING THE AIR VENT VALVE UNDER THE ROOF

- Push the long solar hose (1,000 mm, Fig. 53, [2]) to the flow connection of the collector array and fix in place with hose clip.
- Feed solar hose together with the sensor cable through the ventilation tile (Fig. 53, [1]) and through the roof insulation.

Follow the same procedure for the return connection.

- Firmly screw R¾ hose nozzle with O-ring (Fig. 53, [5]) and double threaded fitting with O-ring (Fig. 53, [3]) in the air pot (Fig. 53, [4]).
- Push the hose end as far as it can go into the solar hose and fix with hose clip (Fig. 53, [6]).

For the return connection, you must fit the hose nozzle and compression fitting (from the connection kit) into the long solar hose.

- Connect the header pipe to the compression fitting (Fig. 53, [3]).

NOTE: System damage!

- Remove the pull ring from the hose clip to guarantee the sealing of the connection.

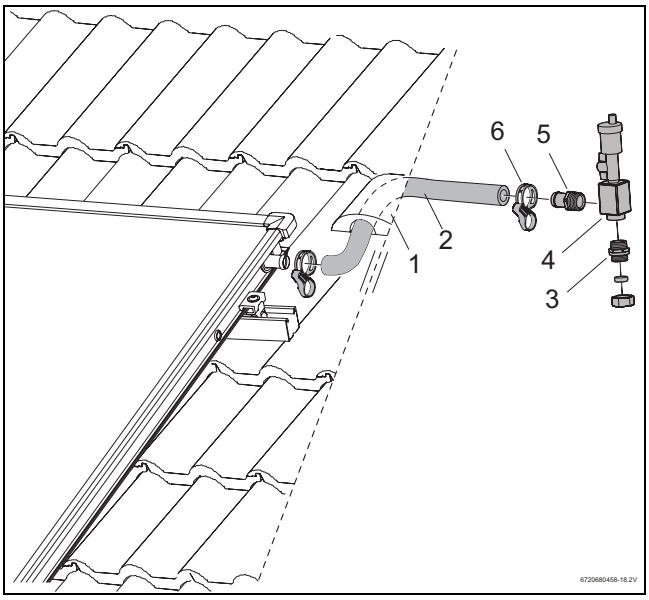

Fig. 53 Fitting the solar hose to the flow connection

1 Ventilation tile
2 1,000 mm solar hose
3 Double threaded fitting with O-ring
4 Air pot
5 R¾ hose nozzle with O-Ring
6 Hose clip

9.2.2 FITTING THE AIR VENT ON THE ROOF

- Push short solar hose (55 mm, Fig. 54, [1]) on to the flow connection of the collector array and fix in place using hose clip.
- Firmly screw the R¾ hose nozzles with the O-rings (Fig. 54, [3]) in the air pot (Fig. 54, [4]).
- Insert the hose nozzles (Fig. 54, [3]) as far as they can go into the solar hose (Fig. 54, [1] and [5]) and secure with hose clip (Fig. 54, [2]).
- Insert hose nozzle with compression fitting (Fig. 54, [6]) into the solar hose as far as it will go and fix in place with hose clip.
- Feed the solar hose together with the sensor cable through the ventilation tile (Fig. 54, [7]) and through the roof insulation.
- Connect header pipe to the hose nozzle with compression fitting (15 mm) (Fig. 54, [6]).

For the return connection, you must fit the hose nozzle and compression fitting (from the connection kit) into the long solar hose.

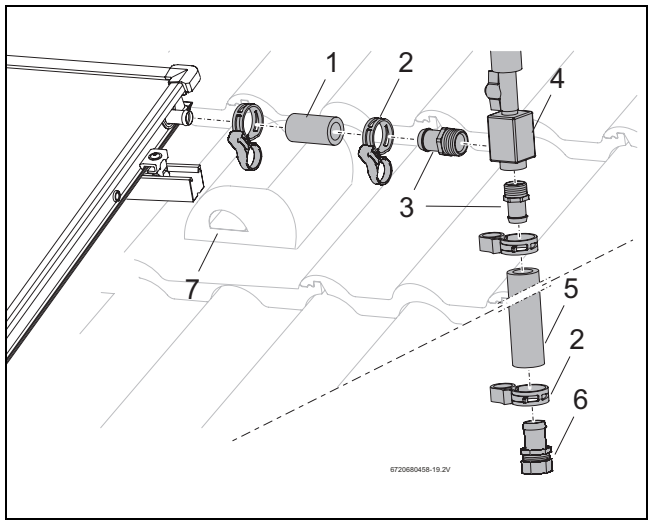

Fig. 54 Connecting the air vent valve on the roof top

1 55 mm solar hose
2 Hose clip
3 R¾ hose nozzle with O-Ring
4 Air pot
5 1,000 mm solar hose
6 15 mm hose nozzle with threaded locking ring
7 Ventilation tile

10 FITTING THE SERIES CONNECTION SET (ACCESSORY)

The series connection set is available as an accessory (Fig. 55, [8]) and connects additional-rows of collectors.

The diagram below is valid for a maximum of 5 collectors in each row.

Fit all connection parts to the collectors on the ground.

CONTENT OF SUPPLY/DELIVERY

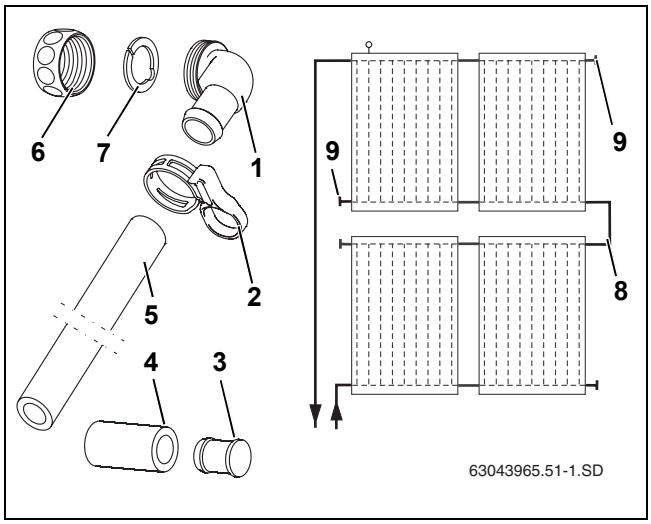

Fig. 55 Schematic view and supply

1 Angled nozzle 2x
2 Hose clip 2x
3 Dummy plug 2x
4 55 mm solar hose 2x
5 2,000 mm solar hose 1x
6 Union nut g1 2x
7 Clamping disc 2x

FITTING ADDITIONAL DUMMY PLUGS

Use the dummy plugs to close up any collector connections not in use (Fig. 56, [1]).

- Insert the 55 mm solar hoses (Fig. 56, [3]) with the pre-assembled dummy plug onto the two free connections.
- Once the hose clips are sitting correctly, pull the locking rings to secure the connection.

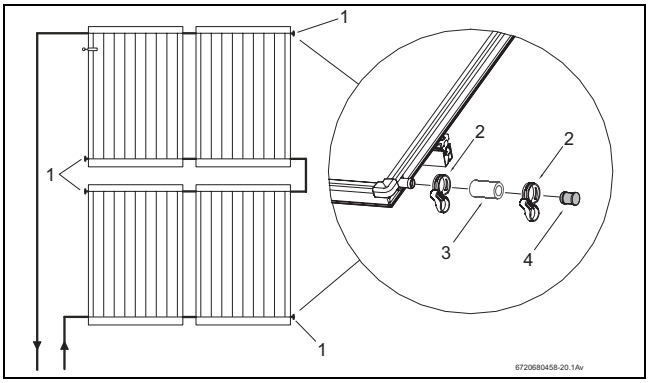

Fig. 56 Fitting the pre-assembled dummy plugs

INSTALLING THE CONNECTION SET

- Remove the plastic caps (transport protection) from the relevant collector connections.
- Push union nut (Fig. 57, [1]) over the collector connections.
- Place the clamping disc (Fig. 57, [2]) behind the bead on the collector connection and press together.
- Press angled nozzle with O-ring (Fig. 57, [3]) onto the connection, align and secure with a union nut.
- Measure the distance between the angled nozzle (measurement X) once the collectors are installed and trim the hose (Fig. 57, [5]) accordingly.
- Attach solar hose to the angled nozzles and secure with hose clips (Fig. 57, [4]).

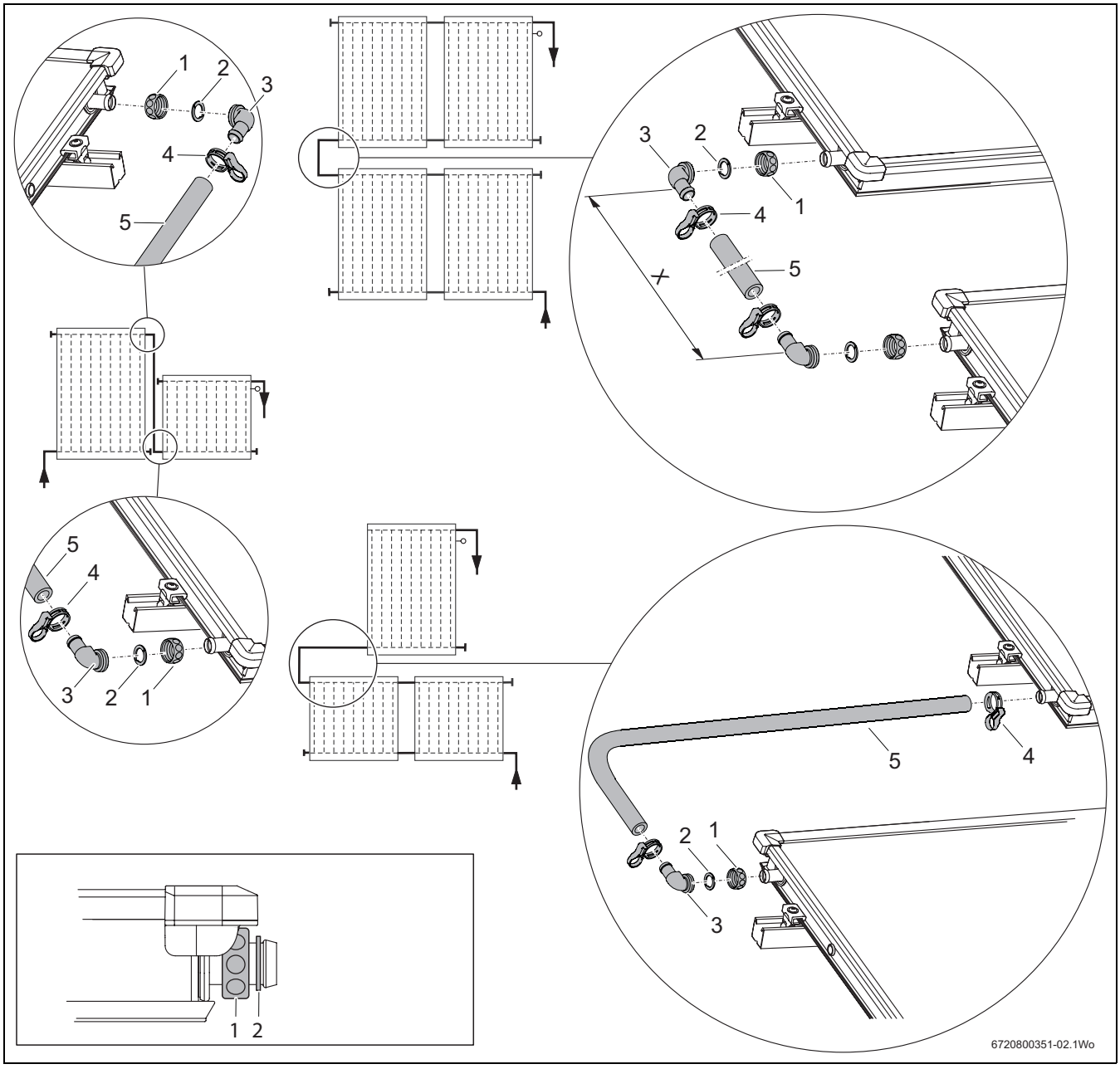

Fig. 57 Connection set

1 Union nut G1
2 Clamping disc
3 Angled nozzle
4 Hose clip
5 Hose (All hoses straight length)

11 CHECKS FOLLOWING COMMISSIONING AND MAINTENANCE

Only carry out the final insulating work once the points in the checklist have been ticked off.

11.1 CHECK-LIST

1.	Solar hoses secured with hose clips (Quick release rings pulled)?	☐
2.	Screws on the collector clamp (single sided and double sided) tightened?	☐
3.	Profile rails secured with roof hooks and sliding nuts?	☐
4.	Anti-slide protection installed and clicked into place in the profile rails?	☐
5.	Sensor inserted as far as it can go into the pocket (Hole seal broken with screwdriver)?	☐
6.	Pressure test carried out and all connections leak proof? (see pump station instructions)?	☐

Table 9

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

11.2 INSULATING THE CONNECTION AND HEADER PIPES

INSULATION OF THE MANIFOLDS IN INTERNAL OR EXTERNAL INSTALLATIONS

- For the insulation of external pipework, use only UV and high temperature resistant insulating materials rated to 150 °C.
- For the insulation of internal pipework, use only high temperature resistant insulating materials, rated to 150 °C.
- Protect the insulated pipework from birds.

12 MAINTENANCE

INSTALLATION SET AND COLLECTOR

- Check all threaded connections and tighten if necessary.

SOLAR FLUID

- Check and analyse the frost protection level.

13 GUARANTEE

The Worcester Greenskies Solar-Lito and Solar-Lito Mini carry a fully transferable 10 year warranty against faulty material or manufacture subject to Terms and Conditions. To read the full Terms and Conditions, please visit us online at www.worcester-bosch.co.uk/guarantee.

The guarantee registration form is available on this page and can be submitted electronically. Alternatively please telephone one of our guarantee registration advisers on 0844 8922552.

Your statutory rights are not affected by the manufacturer's guarantee.

14 ENVIRONMENTAL PROTECTION/RECYCLING

Environmental protection is a fundamental corporate strategy of the Bosch Group.
The quality of our products, their economy and environmental safety are all of equal importance to us and all environmental protection legislation and regulations are strictly observed.
We use the best possible technology and materials for protecting the environment taking account of economic considerations.

PACKAGING

In regard to packaging, we participate in country-specific recycling processes that ensure optimum recycling.

All packaging materials are environmentally compatible and can be reused.

USED APPLIANCES

Used appliances contain materials that should be recycled.

The components are easy to separate and the types of plastic are identified. This allows the various assemblies to be appropriately sorted for recycling or disposal.

NOTES

INSTALLER NAME:_____

DATE OF INSTALLATION:_____

SERIAL NUMBER COLLECTOR 1:_____

SERIAL NUMBER COLLECTOR 2:_____

SERIAL NUMBER COLLECTOR 3:_____

SERIAL NUMBER COLLECTOR 4:_____

SERIAL NUMBER COLLECTOR 5:_____

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