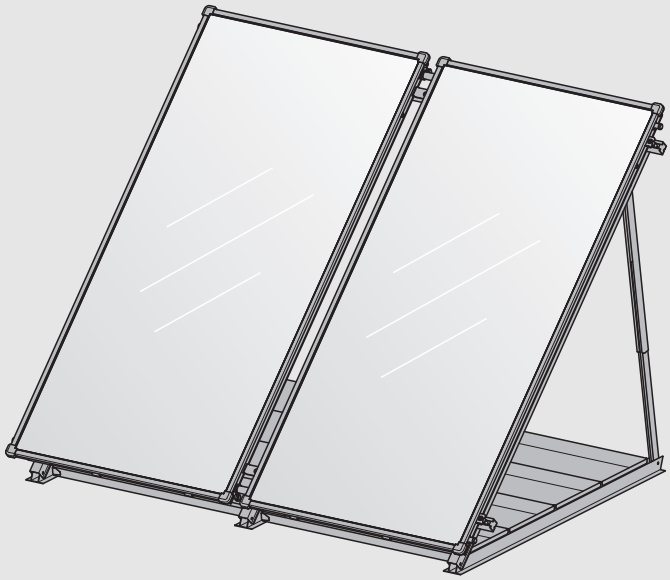

6 720 800 417-00.1ITL

Flat-plate collector for solar thermal systems

Solar 3000 TF/ Solar 4000 TF

Flat roof installation – FCC-1S/FCB-1S/FCC220-2V/FCB220-2V

BOSCH

Installation and Service Instructions

6 720 808 647 (2013/09) AU

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1 Key to symbols and safety instructions

1.1 Key to symbols

Warnings

Warnings in this document are identified by a warning triangle printed against a grey background.
Keywords at the start of a warning indicate the type and seriousness of the ensuing risk if measures to prevent the risk are not taken.

The following keywords are defined and can be used in this document:
- **NOTICE** indicates a situation that could result in damage to property or equipment.
- **CAUTION** indicates a situation that could result in minor to medium injury.
- **WARNING** indicates a situation that could result in severe injury or death.
- **DANGER** indicates a situation that will result in severe injury or death.

Important information

This symbol indicates important information where there is no risk to people or property.

Additional symbols

Symbol	Meaning
▶	Action step
1., 2.	Numbered action steps
→	Cross-reference to another part of this document
•	List/list entry
–	List/list entry (second level)

Table 1

1.2 General safety instructions

These installation instructions are intended for gas fitters and plumbers.

- ▶ Read the installation instructions (collector, solar pump station, solar controller, etc.) before installation.
- ▶ Observe safety instructions and warnings.
- ▶ Observe national and regional regulations, technical rules and guidelines.
- ▶ Keep a record of any work carried out.

Determined use

The collectors are designed to produce heat in solar thermal systems. The installation set is exclusively designed for the safe installation of collectors.

- ▶ Only operate collectors in fail-safe sealed unvented solar systems (exclusion of oxygen).
- ▶ Only operate collectors with suitable solar controllers.

Collector storage

The collectors and the installation material may cause burns when exposed to solar radiation.

- ▶ Protect the collectors and installation material from solar radiation (e.g. with a tarpaulin).
- ▶ Store the collectors in dry conditions (if stored outside, use a rain cover).
- ▶ Do not stand on the collectors.

Work on the roof

There is a danger of falling when working on the roof if measures are not taken to prevent accidents.

- ▶ If there are no general anti-fall safety devices available, wear personal protective clothing or safety equipment.
- ▶ Observe accident prevention regulations.

Load bearing capacity of the roof

- ▶ Only install collectors on roofs with sufficient load bearing capacity.
- ▶ If in doubt, consult a structural engineer and/or roofer.

Handover to the user

When handing over the solar system, explain the operating conditions to the user.

- ▶ Explain how to operate the solar system, with particular emphasis on all safety-related actions.
- ▶ Explain that conversions and maintenance must only be carried out by an authorised contractor.
- ▶ Point out the need for inspections and maintenance for safe and environmentally friendly operation.
- ▶ The installation and operating instructions must be given to the user for keeping. This involves:
  - Keeping the instructions in a visible place, protected from heat, water and dust
  - Passing them on to subsequent owners/end customers

2 Information about the collector and its accessories

In these instructions, the FCC/FCB flat-plate collector is simply referred to as the collector.

2.1 Collector

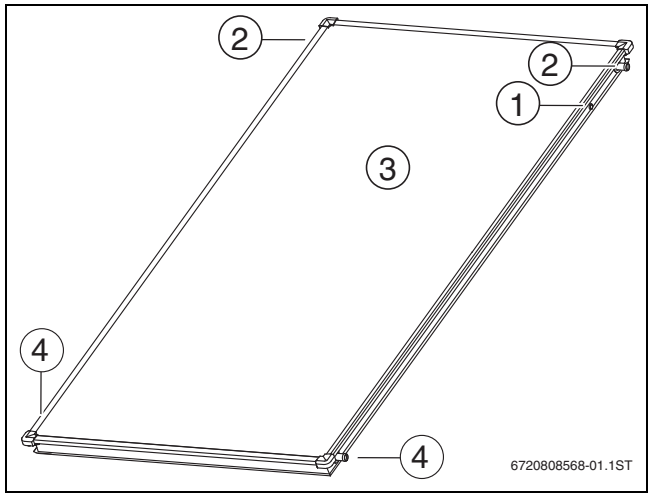

Fig. 1 Cross-section of collector version

[1] Sensor pocket for collector sensor
[2] Collector connection, flow
[3] Glass cover
[4] Collector connection, return

2.1.1 Technical Data

FCC/FCB	
Certificates (CE-designation, Solar Keymark)	CE
Length	2025 mm
Width	1030 mm
Height	67 mm
Clearance between collectors	69 mm
Absorber content (Vf)	0.8 l
External area (gross area, AG)	2.09 m^2
Absorber area (net area, A_A)	1.92 m^2
Aperture area (translucent area, A_a)	1,94 m^2
Net weight	30 kg
Permissible collector operating pressure (pmax)	6 bar

Table 2

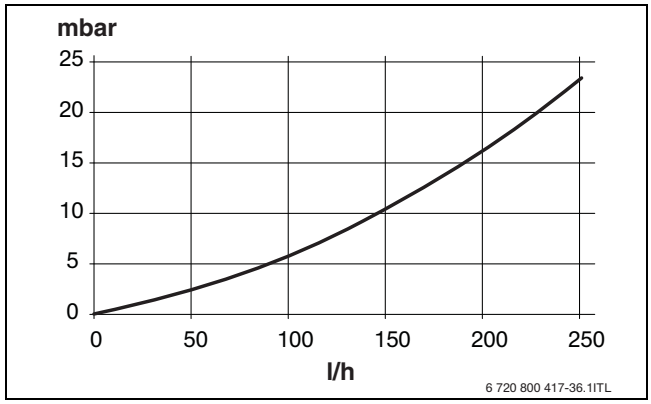

Fig. 2 Collector pressure loss (with glycol/water mixture)

2.1.2 Data plate

The collector data plate is located on the collector casing and includes information in the form of symbols.

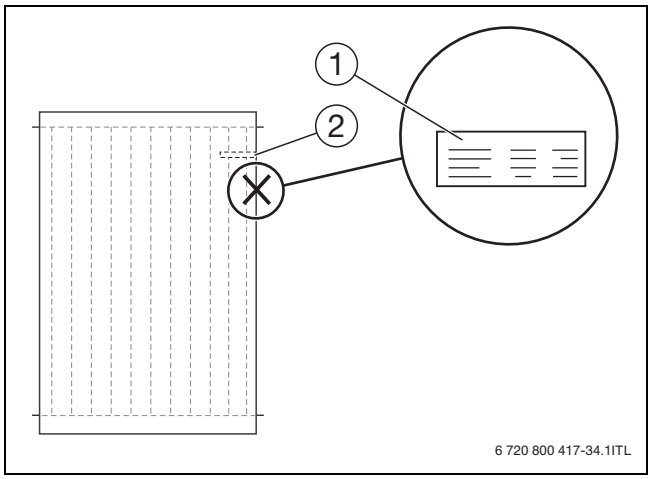

Fig. 3 Position of type plate

[1] Data plate on the collector casing
[2] Sensor pocket for collector sensor

2.2 Determined use

The collectors are designed to produce heat in solar thermal systems.

The installation set is exclusively designed for the safe mounting of collectors.

- Only operate collectors in conjunction with suitable solar controllers and in fail-safe sealed unvented solar thermal systems (exclusion of oxygen).

Permissible heat transfer medium

- To protect the collectors against damage through frost and corrosion, operate them with 'L' solar heat transfer medium.

Permissible types of roof

These instructions describe the installation of collectors on flat roofs.

- Only use the installation set on such roofs.

Permissible roof inclinations

- Fit the installation set only on flat roofs or those with a shallow pitch up to 25°.

Collector supports

- When installing collectors on a flat roof: Never use the collector supports to secure other parts of the roof structure.

Permissible loads

- Only install collectors in locations with lower values than those shown in tab. 3. If necessary, consult a structural engineer.

The installation set is suitable for the following maximum loads (with reference to DIN 1055, Parts 4 and 5):

Maximum snow load	Maximum wind speed
2.0 kN/m²	151 km/h[1)]

Table 3 Permissible loads

1) corresponds to a dynamic pressure of 1.1 kN/m²

- To determine the maximum wind speed, take into account the following factors:
  - Location of the solar thermal system
  - Geographical height of the terrain
  - Topography (terrain/buildings)
  - Height of building

The maximum snow load is calculated using regional zones (snow load zones) and the ground level elevation.

- Enquire about the locally applicable snow loads.

Prevent an accumulation of snow above or on the collector:

- Fit a snow guard above the collector.
- Regularly clear snow build-up.

To prevent snow loads, see also: Roof height differentials → page 10.

2.3 Components and technical documentation

A solar thermal system is designed to heat domestic hot water (DHW) and can also provide central heating backup where required. It is made up of various components which also include installation instructions. Further instructions may be found with the accessories.

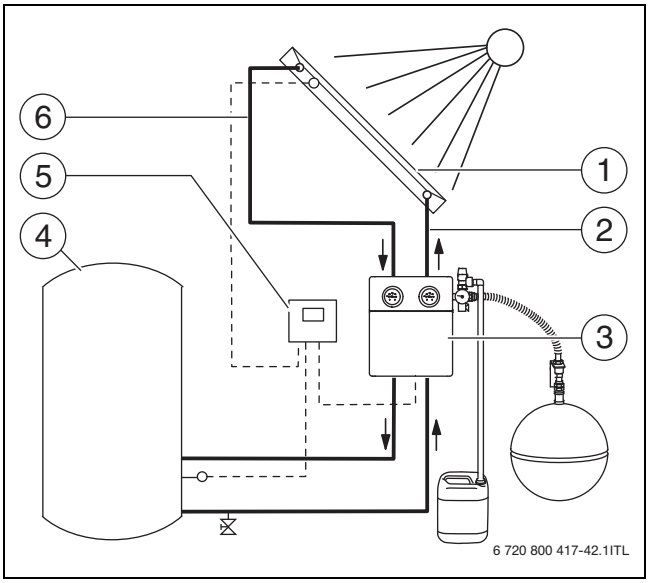

Fig. 4 Solar thermal system components

[1] Collector with collector sensor at the top
[2] Pipework (return)
[3] Solar pump station with expansion vessel, temperature and safety equipment
[4] Solar cylinder
[5] Solar controller
[6] Pipework (flow)

2.4 Accessories

The general catalogue and the technical guide provide a comprehensive overview.

2.5 EC Declaration of Conformity

Design and operation of this product conform to European Directives and the supplementary national requirements. Its conformity is demonstrated by the CE designation. The Declaration of Conformity can be requested from the manufacturer (see the back cover for the address).

2.6 Standard delivery

▶ Check that the delivered material is complete and undamaged.

2.6.1 Collector installation set

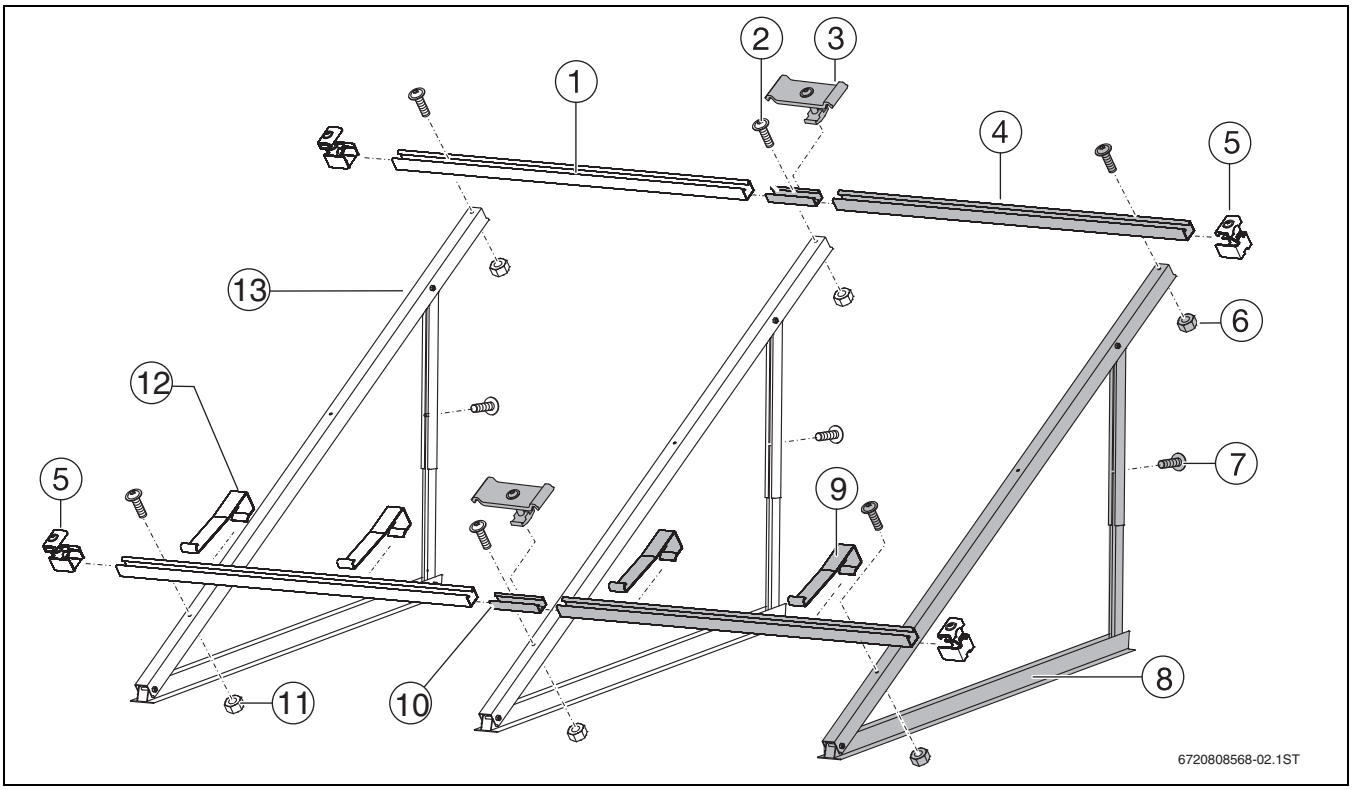

Fig. 5 Installation set for 2 vertical collectors: 1 standard installation set, 1 extension installation set (grey)

Standard installation set, per collector row and for the first collector:

Pos. 1	Profile rail	2 x
Pos. 2	Screw M8x20	6 x
Pos. 5	Single sided collector clamp	4 x
Pos. 11	M8 nut	4 x
Pos. 13	Flat roof frames	2 x
Pos. 12	Anti-slip protector	2 x

Table 4

Extension installation set, for each additional collector:

Pos. 4	Profile rail	2 x
Pos. 10	Joiner	2 x
Pos. 7	Screw M8x20	3 x
Pos. 3	Double sided collector clamp	2 x
Pos. 6	M8 nut	2 x
Pos. 8	Flat roof frames	1 x
Pos. 9	Anti-slip protector	2 x

Table 5

Subject to the installation conditions, additional flat roof frames may be required. Reference is made to these in the following chapters.

2.6.2 Connection set

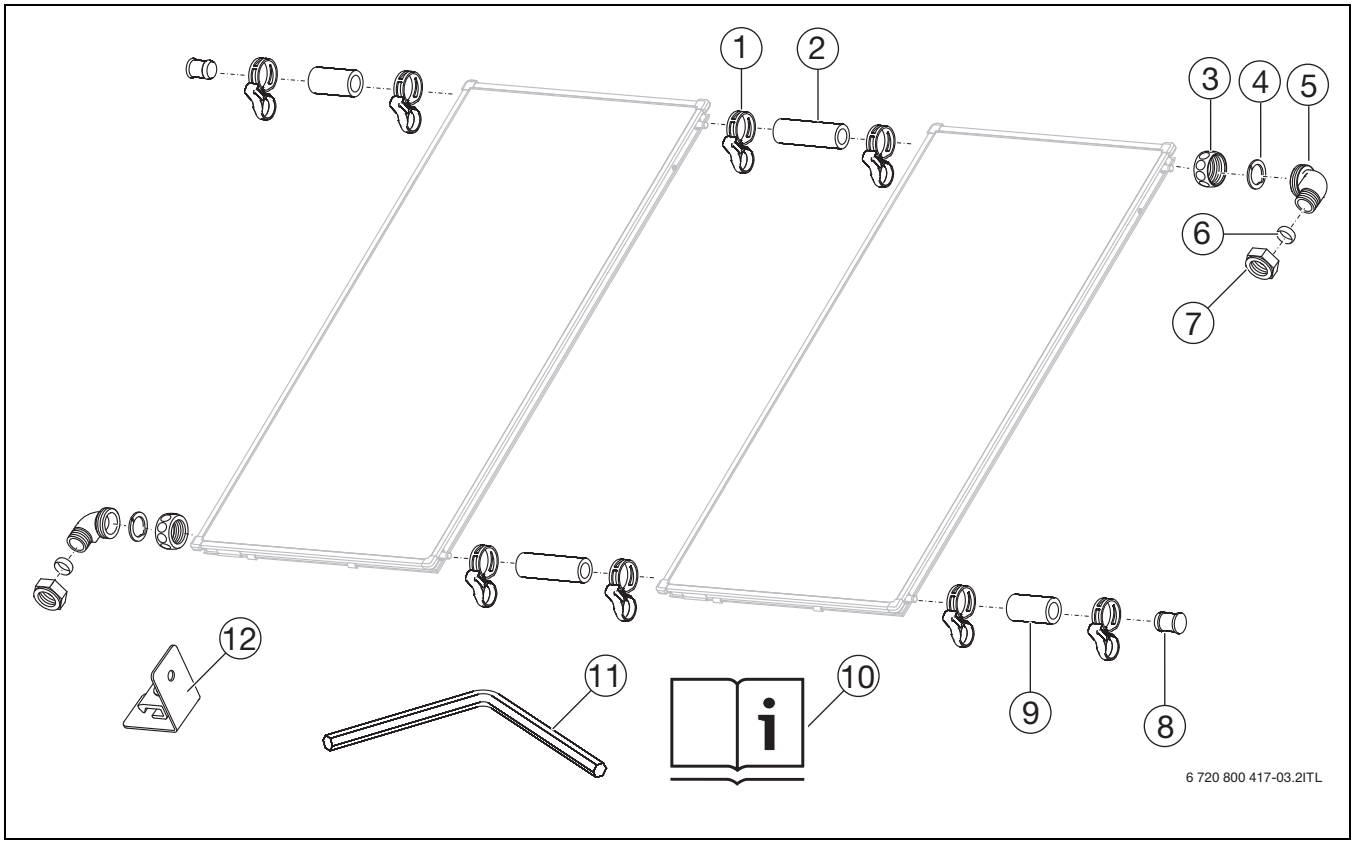

Fig. 6 1 flat roof connection set and 2 interconnection sets

Connection set for one collector array:

Pos. 1	Hose clip (1 x as spare)	5 x
Pos. 3	G1 nut	2 x
Pos. 4	Clamping washer	2 x
Pos. 5	Angle	2 x
Pos. 6	18 mm locking ring	2 x
Pos. 7	Union nut R¾	2 x
Pos. 8	Plug	2 x
Pos. 9	Solar hose 55 mm	2 x
Pos. 10	Installation and servicing instructions	1 x
Pos. 11	5 mm Allen key	1 x
Pos. 12	Holder for header pipe	2 x

Table 6

2.6.3 Collector with 2 interconnection sets

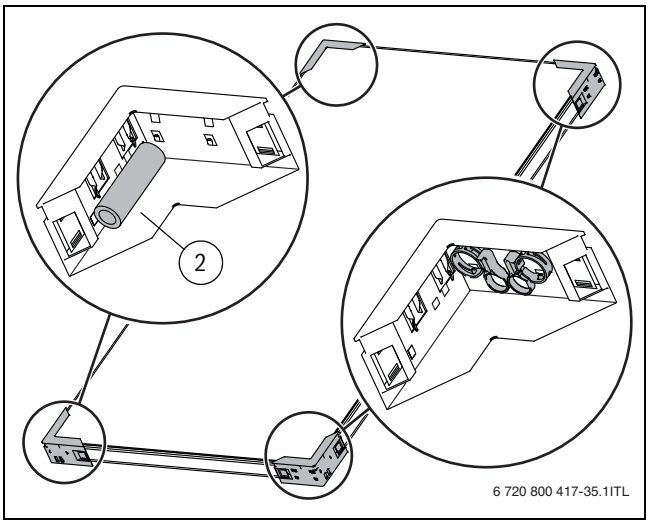

Fig. 7 2 protective shipping corners comprising 2 hose clips each; the other 2 shipping corners include 1 solar hose each (95 mm)

3 Regulations

3.1 Validity of regulations

▶ Observe updated regulations or supplements. These regulations also apply at the time of installation.

3.2 Standards, regulations, directives

▶ Observe all standards and guidelines applicable to the installation and operation of the system in your country and region.

Technical regulations applicable in Germany for the installation of collectors:

- Rooftop installation:
  - DIN 18338, VOB, Part C[1)]: Roofing and sealing work
  - DIN 18339, VOB, Part C: Plumbing work
  - DIN 18451, VOB, Part C: Scaffolding work
  - DIN 1055: Actions on structures
- Connection of solar thermal systems:
  - EN 12976: Solar thermal systems and components (pre-assembled systems)
  - ENV 12977: Solar thermal systems and components (bespoke systems)
  - DIN 1988: Technical Regulations for Drinking Water Installations (TRWI)
- Electrical connection:
  - DIN EN 62305 Part 3 / VDE 0185-305-3: Protection against lightning, injury and structural damage

4 Transport

DANGER: Risk to life by falling from roof!
▶ Never use a ladder to move components to the roof because the installation material and collectors are heavy and difficult to handle.
▶ Whilst working on the roof, take all necessary precautions against a possible fall.
▶ If there are no general anti-fall safety devices available, wear personal protective equipment.

WARNING: Risk of injury through falling parts.
▶ During transport, secure the collectors and installation materials to prevent them falling.

The collector shipping corners include important parts (→ Fig. 7, page 6).

All of our packaging materials are environmentally compatible and can be recycled.

▶ Dispose of shipping packaging by environmentally responsible means.

NOTICE: Damage to the collector connections through incorrect use.
▶ Never use the collector connections as lifting points.

NOTICE: Leaks through damage to the sealing face at the collector connections.
▶ Do not remove the caps until immediately prior to installation on the roof.

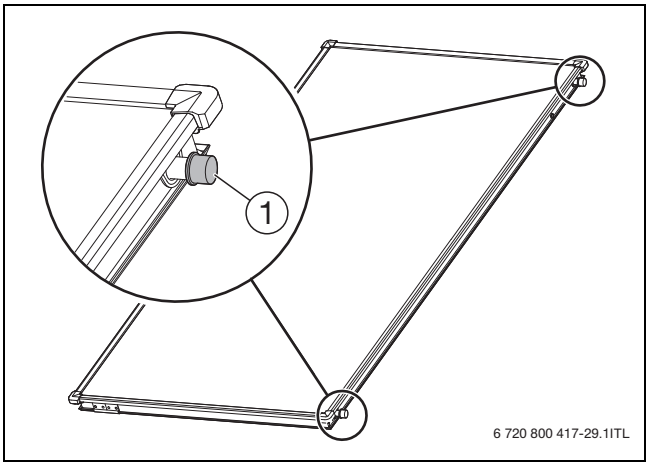

Fig. 8 Only remove caps once on the roof

[1] Caps on collector connections

▶ To make it easier to transport the collectors and the installation materials, the following aids, which have sufficient load-bearing capacity, can be used:
  - Lifting belt
  - 3-point suction lift
  - Roofing ladder or equipment for sweeping chimneys
  - Lean-to lift
  - Scaffolding

1) VOB: Contract procedures for construction work, Part C: General technical conditions of contract for construction services (ADV)

5 Before installation

5.1 General notes

WARNING: If the collector and installation material are exposed to solar radiation for prolonged periods of time, they may cause burns.
- ▶ Protect yourself with personal protective equipment.
- ▶ Protect the collector and installation material from solar radiation.

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

- ▶ Obtain information about on-site conditions and local regulations.
- ▶ Arrange collectors in the optimal position on the roof.
  For this, pay particular attention to the following:
  - Align the collector array facing as close to north as possible (→ Fig. 9).
  - Align the collector array so that it is in line with windows, doors etc. (→ Fig. 9).
  - Prevent possible shading (→ Fig. 10 and 17).
  - Prevent height differentials (→ Fig. 12).
  - Observe the hydraulic connection to the pipework (→ chapter 9).
  - Take the space required on the roof into account (→ chapter 5.4).

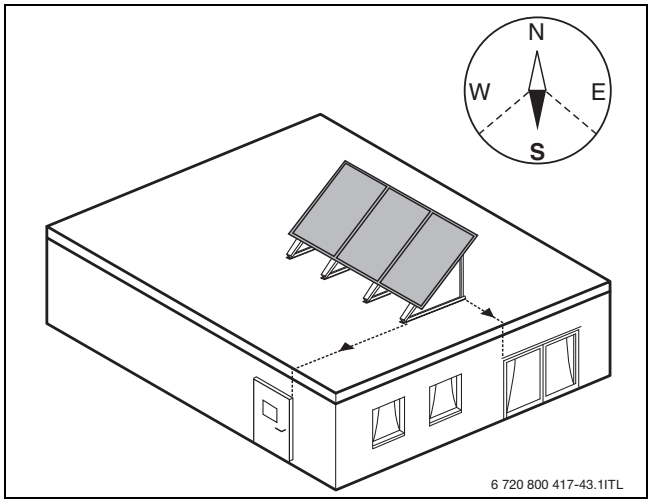

Fig. 9 Aligning collector array

- ▶ Prevent shading of the collector array through adjacent buildings, trees, other rows of collectors etc.

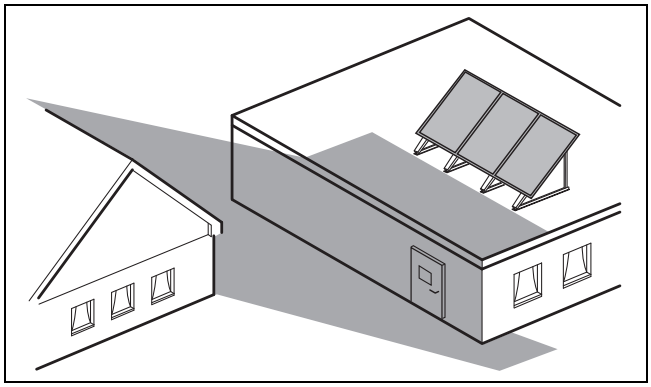

Fig. 10 Avoiding shade

Solar pump station not underneath the collector array

In some cases, the solar pump station [1] cannot be sited underneath the collector array (e.g. in the case of attic heating centres).

To prevent superheat in these systems:
- ▶ Firstly, route the flow to the height of collector return connection [2]. Then route it to the solar pump station.

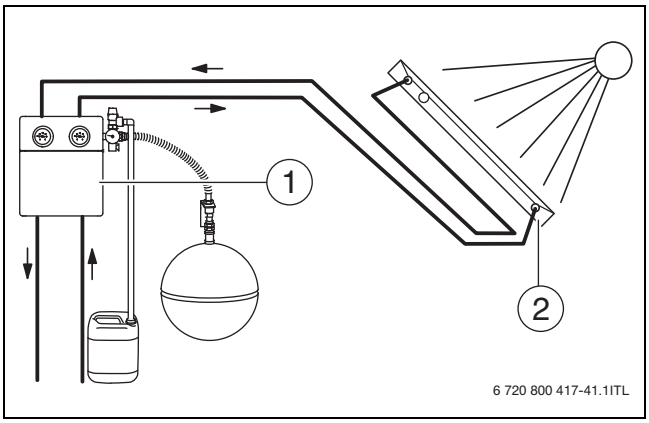

Fig. 11

Height differentials in roofs

Where there are height differentials in the roof, snow loads must be prevented from sliding down from a roof slope of $\alpha > 15°$. The length of the additional load through sliding snow loads results from the height differential (→ Fig. 12): $l_s = 2 \times h$

- ▶ Avoid installing collectors within the l_s area (roof length calculated for additional snow drift load) below height differentials.
- ▶ In case of installation below a height differential:
  - Fit a snow guard to the higher roof area.
  - Observe additional loads during the installation.

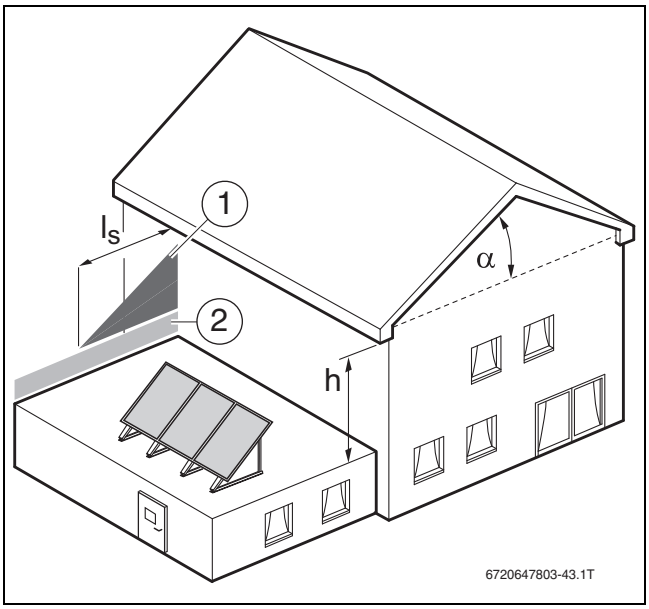

Fig. 12 Avoid installation below a height differential

[1] Additional loads through sliding snow
[2] Standard snow load
[α] Roof pitch
[h] Height differential
[l_s] Length of the additional load

5.2 Collector layout

The flow must be located on the right hand side of the collector array.

- ▶ Connect the collector array alternately (→ Fig. 13).
- ▶ Plan the routing of the collector sensor lead so that the collector sensor (Fig. 13 [3]) can be fitted to the collector to which the flow [4] has been fitted.
- ▶ Arrange the collector so that the sensor pocket for the collector sensor [3] is located at the top of the collector.

Refer to the solar technical guide for detailed information on designing the system hydraulics and components.

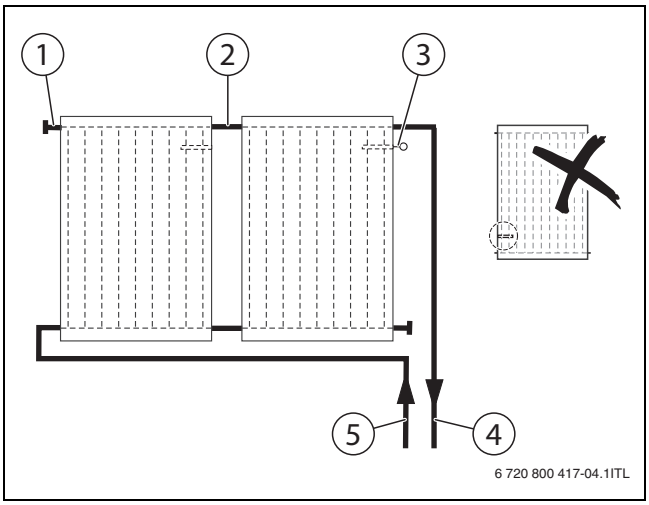

Fig. 13 Arranging the collectors

[1] 55 mm solar hose and plug
[2] Solar hose 95 mm
[3] Collector sensor inside sensor pocket (always at the top of the collector where the flow is connected)
[4] Flow (to the cylinder)
[5] Return (from the cylinder)

Maximum number of collectors and collector arrays with several rows

- ▶ Allow for no more than 10 collectors per row.

In collector arrays of multiple rows, ensure that the pressure drop is the same for every collector row.

- ▶ For flow and return, use pipe runs of the same length from branch to collector array.

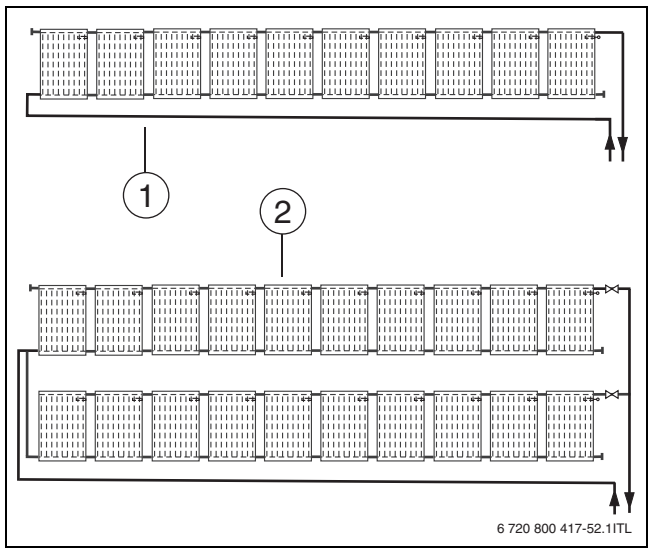

Fig. 14 Collector arrays with one or more rows

[1] Connection of a single row
[2] Connection of more than 10 collectors: two rows connected in parallel according to the Tichelmann principle

5.3 Collector angle of incidence

The collectors' angle of incidence depends on the relevant application and on the roof pitch. The angle of inclination of the flat roof frame is subject to the application area, roof slope and angle of incidence.

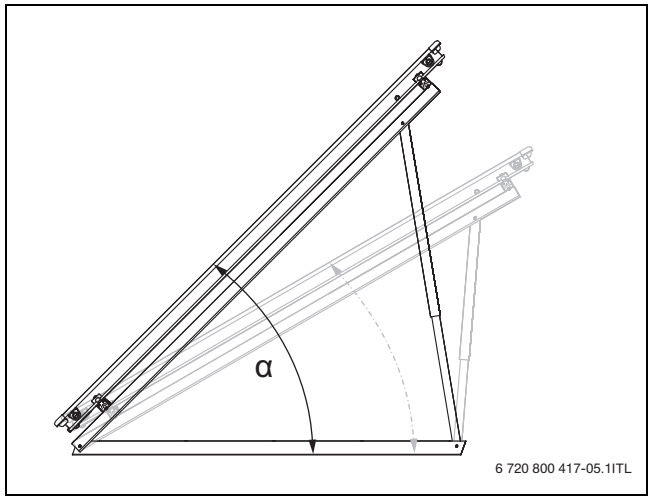

Fig. 15 Collector angle of incidence

[α] Angle of incidence

5.3.1 Determining the range of incidence

The different areas of application of solar thermal systems provide various angles of incidence that ensure an optimum solar yield depending on season.

Application	Range of incidence
DHW	30–45°
DHW + central heating	45–60°
DHW + swimming pool	30–45°
DHW + central heating + swimming pool	45–60°

Table 7

- ▶ Determining the range of incidence according to application.

5.3.2 Determining the angle of incidence and angle of inclination on pitched roofs.

On roofs with a slight inclination towards the south:
Angle of inclination [2] = Angle of incidence [1] – Roof pitch [3]

On roofs with a slight inclination towards the north:
Angle of inclination [2] = Angle of incidence [1] + Roof pitch [3]

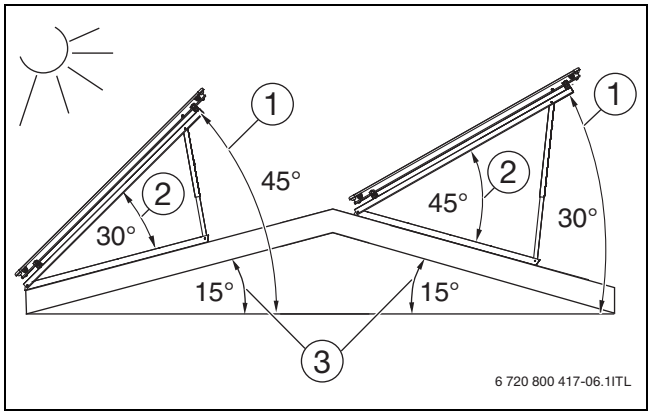

Fig. 16 Angle of incidence on pitched roofs

[1] Collector angle of incidence (absolute angle to the horizontal plane)
[2] Angle of inclination of the flat roof frames
[3] Roof pitch (up to 25°)

5.4 Space required on roof

5.4.1 Determining the clearance between rows of collectors

The minimum clearance X between the collector rows results from the collector angle of incidence and prevents shading.

Angle of incidence α	Clearance X	Angle of incidence α	Clearance X
30°	5.06 m	50°	6.37 m
35°	5.45 m	55°	6.58 m
40°	5.80 m	60°	6.74 m
45°	6.11 m	–	–

Table 8 Clearance between the rows of collectors at minimum solar altitude of 17°

▶ The minimum clearance X can be calculated or taken from tab. 8.

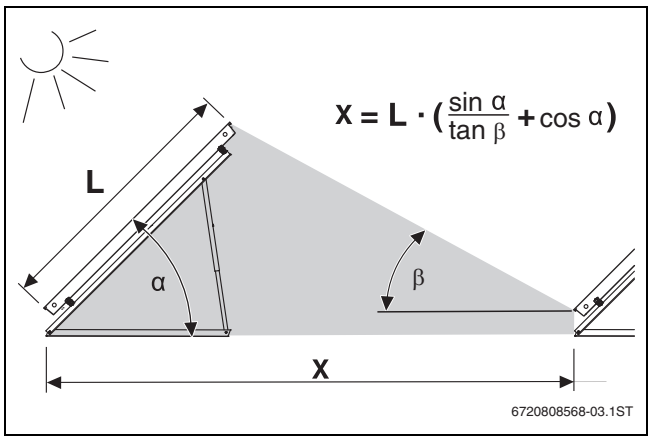

Fig. 17 Clearance and shading, flat roof installation

[α] Angle of incidence
[β] Minimum solar altitude
[X] Clearance between collector rows

5.4.2 Determining the space required

DANGER: Risk to life through collectors that cannot withstand high winds and peak suction forces!
▶ Maintain the minimum clearance to the edge of the roof (dim. a).

- **Dim. a:** Either formula can be used. The lower value can be applied.
- **Dim. A, B and C:** → tab. 9 and 10

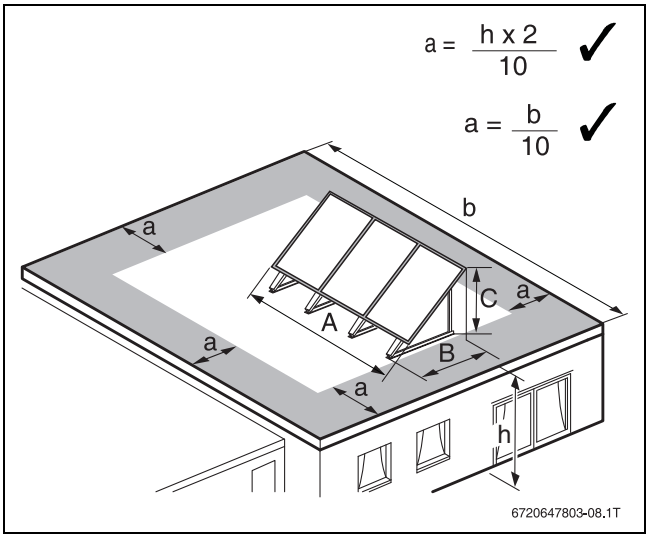

Fig. 18 Clearances to be maintained, flat roof

Number of collectors	Dim. A	Number of collectors	Dim. A
–	–	6	6.59 m
2	2.19 m	7	7.69 m
3	3.29 m	8	8.79 m
4	4.39 m	9	9.89 m
5	5.49 m	10	10.99 m

Table 9

Angle of inclination	Dim. B	Dim. C
30°	1.78 m	1.16 m
35°	1.69 m	1.30 m
40°	1.59 m	1.44 m
45°	1.56 m	1.55 m
50°	1.56 m	1.67 m
55°	1.56 m	1.77 m
60°	1.56 m	1.86 m

Table 10

5.5 Lightning protection

▶ Check regional regulations as to whether a lightning protection system is required.

Lightning protection is frequently required for buildings higher than 20 m, for example.

▶ Have a qualified electrician install the lightning protection.
▶ If a lightning protection system is installed, check whether the solar thermal system is included in this system.

5.6 Required tools and materials

- 27 and 30 mm open-ended spanner for connecting the pipework
- 24 and 37 mm open-ended spanner for interconnection set (2 rows, accessories)
- Material for pipe insulation

Fitting the installation set and the connection set only requires the 5 mm Allen key from the connection set.

5.7 Installation sequence

To fasten the collectors to the roof, install in the following order:

1. Determine the collector angle of incidence.
2. Determine the space requirement for the collector array.
3. Fit telescopic rails.
4. Fit the flat roof frames.
5. Connect and fit collector rails.
6. Fit the collectors and collector sensors.
7. Connect the pipework to the collectors.

6 Fitting the flat roof frames

DANGER: Risk to life by falling from roof!
- ▶ Whilst working on the roof, take all necessary precautions against a possible fall.
- ▶ If there are no general anti-fall safety devices available, wear personal protective equipment.

6.1 Fitting telescopic rails

▶ From the determined angle of incidence (→ chapter 5.3.1, page 9), determine the angle of inclination of the flat roof frames.

The collector angle of incidence and the angle of inclination of the flat roof frames may be different subject to roof slope and installation location.

6.1.1 Selecting mounting holes

▶ Select holes in accordance with the determined angle of inclination (→ chapter 5.3.2) as well as the installation orientation and location of the collector.

▶ Select hole [1] in the lower rail and a corresponding hole in the upper rail:

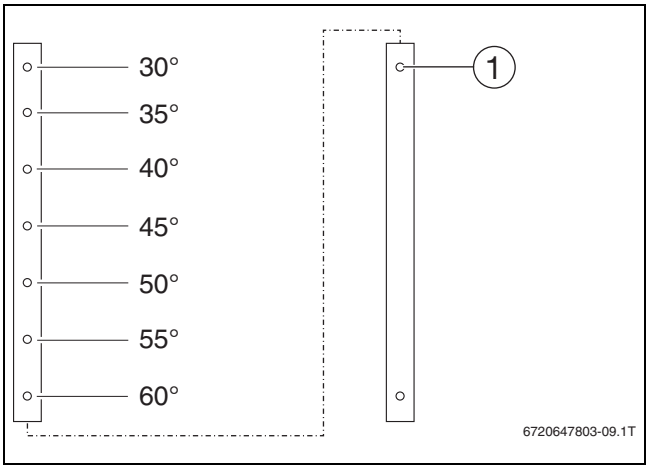

Fig. 19 Selecting holes

6.1.2 Fitting telescopic rails

1. Push telescopic rails together.
2. Secure telescopic rails with M5 screw in the selected holes. For a 30° angle of inclination, secure screw on site with a nut.

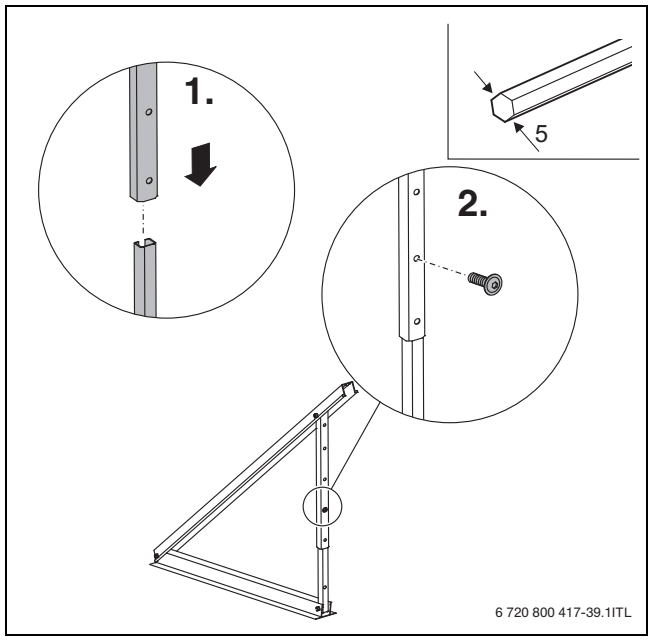

Fig. 20 Fitting telescopic rails

6.2 Determining clearances for the flat roof frames

The clearances of the flat roof frames depend on the type of installation:
- Installation with on-site base anchors
- Stabilisation with ballast troughs

6.2.1 Determining the base anchor centres

The first collector requires 2 flat roof frames.

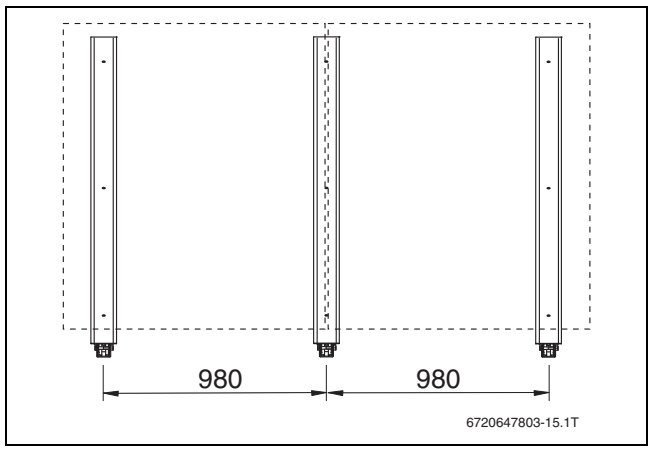

Fig. 21 2 collectors

A further flat roof frame is required for every additional vertical collector, → Fig. 22 and 23.

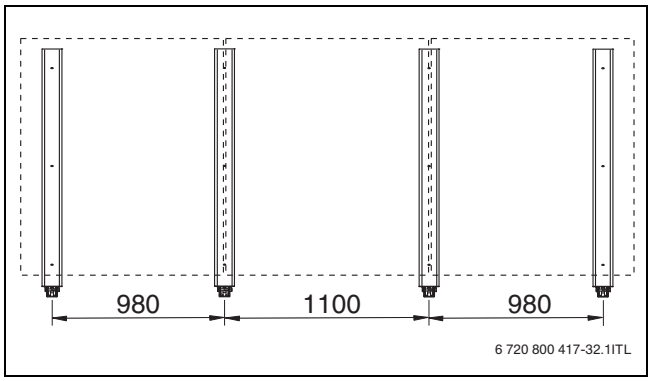

Fig. 22 3 collectors

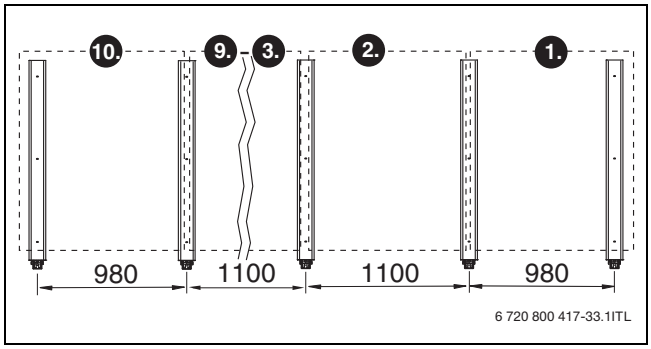

Fig. 23 >3 collectors

6.2.2 Determining centres in the case of ballast troughs

The first two collectors require 3 flat roof frames. At least one further flat roof frame is required for every additional collector. Collectors are arranged in arrays → Fig. 24.

Take the clearance between arrays from tab. 11.

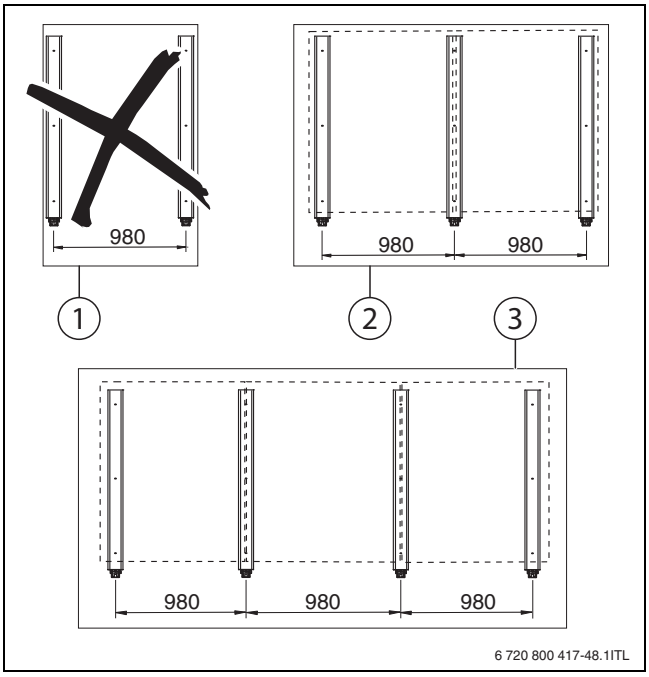

Fig. 24 Collector arrangement in arrays

[1] Array with 1 collector; not applicable
[2] Array with 2 collectors
[3] Array with 3 collectors

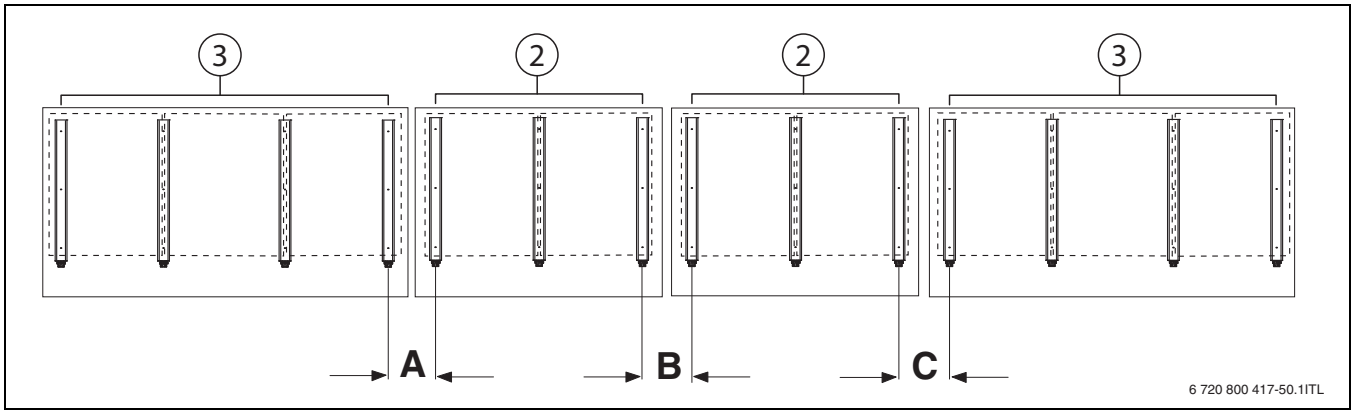

Fig. 25 Example 10 collectors: array combination 3 + 2 + 2 + 3

Number of collectors	Array combination	Number of supports	A [mm]	B [mm]	C [mm]
1	1	Not applicable	–	–	–
2	2	3	–	–	–
3	3	4	–	–	–
4	2 + 2	6	240	–	–
5	3 + 2	7	240	–	–
6	3 + 3	8	240	–	–
7	3 + 2 + 2	10	240	240	–
8	3 + 2 + 3	11	240	240	–
9	3 + 3 + 3	12	360	360	–
10	3 + 2 + 2 + 3	14	240	240	240

Table 11 Array combinations and clearances

6.3 Installing flat roof frames on a flat roof

The following details refer to a single collector. They are based on DIN 1055, Part 4 "Assumed loads for building structures".

The installation may take 3 different forms:

- Base anchor (on-site fixing)
- Ballast troughs (with concrete slabs, gravel and similar)
- Securing with ropes plus ballast troughs

NOTICE: Damage to the roof from incorrect form of stabilisation.

▶ Consider the roof statics when selecting the form of stabilisation.

NOTICE: Damage to the roof and the collectors through inadequate fixing on pitched roofs.

▶ On sloped roofs, provide adequate fixings for the flat roof frames on site.

NOTICE: Roof leaks through puncturing the roof membrane.

▶ To protect the roof membrane, put down conventional protective mats.

▶ Put down profiles, flat roof frames and additional installation materials only on protective mats.

When using ballast troughs with gravel, a ballast weight of up to 320 kg per collector is feasible.

The values in the following table refer to the stabilisation of a single collector.

▶ Observe clearances and number of flat roof frames subject to the version in use.

Speed pressure q	Wind speed	Base anchor	Ballast without additional securing			Ballast secured with ropes			Rope tension force
		Number and type of screwsPer[1)]	Weight in ballast trough at an angle of incidence α			Weight in ballast trough at an angle of incidence α			
			30°	45°	60°	30°	45°	60°	
0,50 kN/m²	102 km/h	2x M8/8.8	200 kg	234 kg	246 kg	133 kg	152 kg	165 kg	2,0 kN
0,60 kN/m²	111 km/h	2x M8/8.8	255 kg	292 kg	310 kg	183 kg	196 kg	215 kg	2,0 kN
0,70 kN/m²	120 km/h	2x M8/8.8	304 kg	351 kg	373 kg	222 kg	241 kg	260 kg	2,0 kN
0,80 kN/m²	129 km/h	2x M8/8.8	356 kg	409 kg	427 kg	266 kg	285 kg	291 kg	3,0 kN
0,90 kN/m²	137 km/h	2x M8/8.8	409 kg	469 kg	496 kg	310 kg	329 kg	348 kg	3,0 kN
1,00 kN/m²	144 km/h	2x M8/8.8	460 kg	529 kg	556 kg	355 kg	374 kg	393 kg	3,0 kN
1,10 kN/m²	151 km/h	3x M8/8.8	516 kg	586 kg	616 kg	404 kg	418 kg	431 kg	4,0 kN

Table 12 Stabilising a collector

1) flat roof frame

6.3.1 Base anchor

The following describes by way of example how to secure the installation onto the double T-beam girders.

▶ Ensure that the substructure is designed so that the collectors can withstand the snow loads and wind forces affecting them.

▶ Ensure that the on-site fixings stabilise the solar thermal system and do not damage the roof.

NOTICE: Damage to the solar system through structural modifications on the flat roof frames.

▶ Never drill through the flat roof frame profiles or make structural changes.

▶ Position the flat roof frames in accordance with the determined clearances (→ chapter 6.2.1, page 11).

▶ Transfer the hole dimensions from the lower profile [2] to the double T-beam girders and pre-drill the necessary holes.

▶ Secure the profile to the double T-beam girders [3] using screws (→ tab. 12), nuts and washers [1].

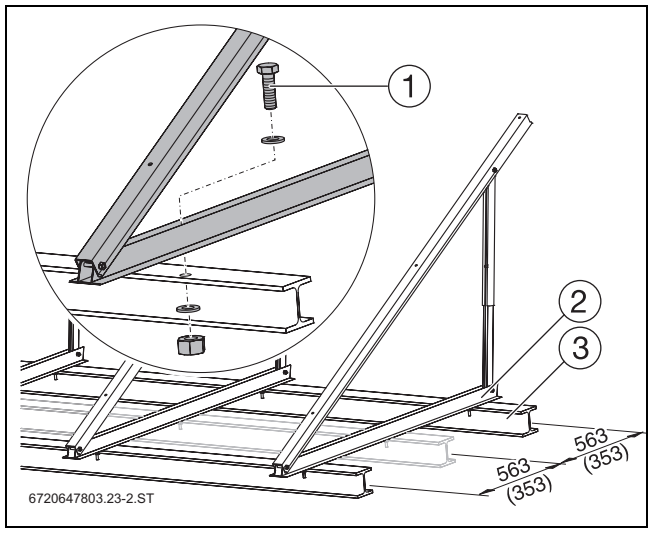

Fig. 26 Flat roof frame on double T-beam girders, dimensions in mm

6.3.2 Ballast troughs

- ▶ Position the flat roof frames in accordance with the determined clearances (→ chapter 6.2.2).
- ▶ For each collector, hook 4 ballast troughs [2] onto the bottom profile [1] and into each other [3].
- ▶ Place ballast (concrete slabs, gravel or similar) into the ballast troughs (weight: → tab. 12, page 13).

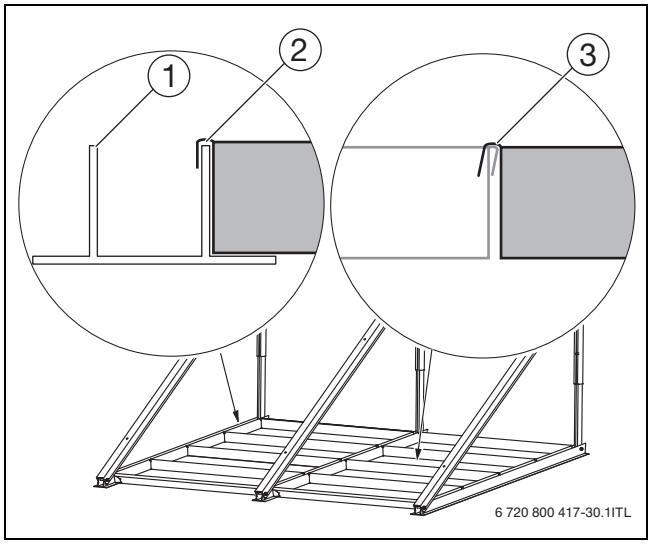

Fig. 27 Flat roof frames with ballast troughs for 2 collectors

6.3.3 Securing with ropes

- ▶ Position the flat roof frames in accordance with the determined clearances (→ chapter 6.2.2, page 12).
- ▶ Use a wire rope [1] on site to fasten each flat roof frame at the back to the screw from the lower profile.
- ▶ Insert ballast troughs (→ chapter 6.3.2, page 14).
- ▶ Anchor the wire ropes at a suitable point on the roof.

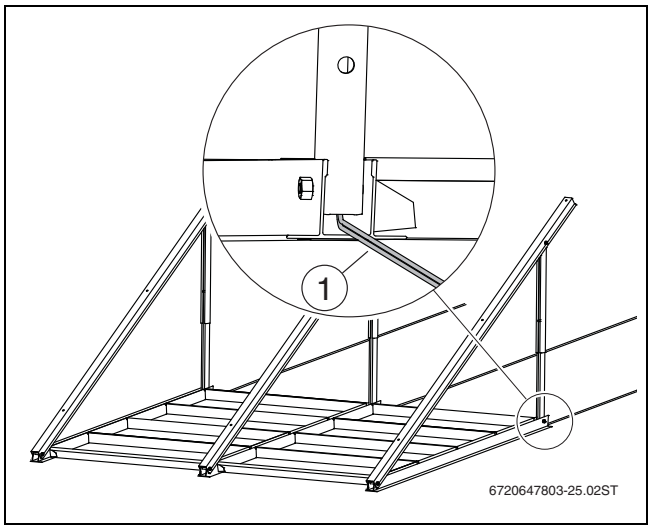

Fig. 28 Flat roof frames secured with ropes

7 Fitting the profile rails

7.1 Connecting profile rails

- ▶ Push profile rails [1] onto joiner [2] and secure with grub screws [3].

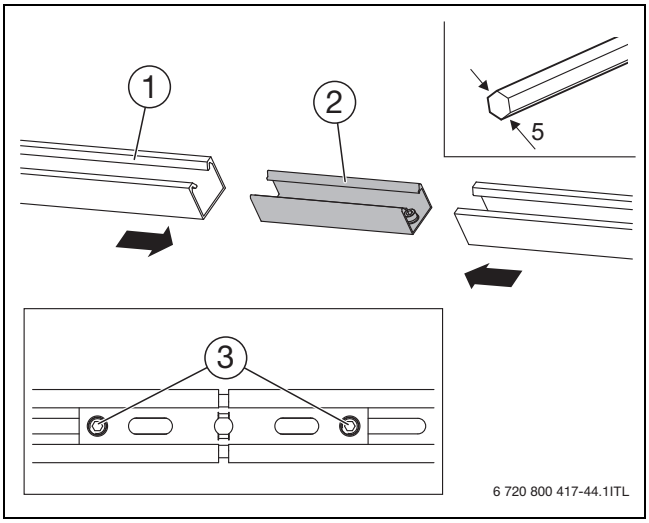

Fig. 29 Connecting profile rails

7.2 Fitting the profile rails

Positioning the profile rails

- ▶ Position the profile rails on the flat roof frames, beginning as shown in → Fig. 30.

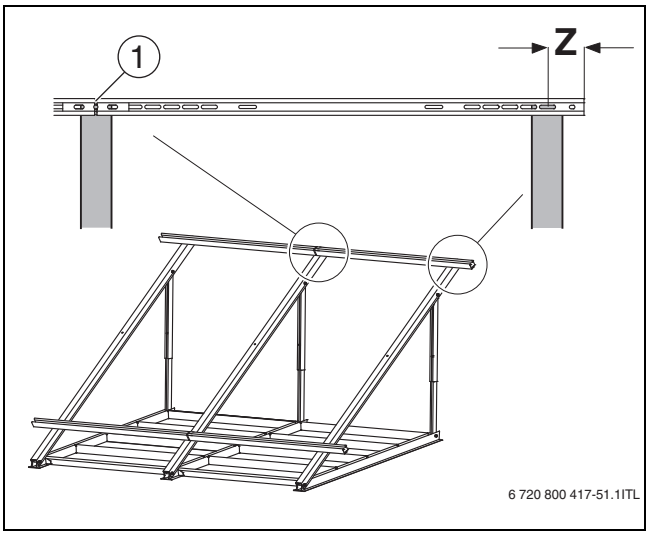

Fig. 30 Fitting the profile rails

[1] Centre hole of joiner
[Z] End of profile rail to slot centre

Number of collectors	Dim. Z
2 - 4	2nd slot from the right
5 - 10	5th slot from the right

Table 13 Ballast troughs

Number of collectors	Dim. Z
2 - 10	2nd slot from the right

Table 14 Base anchor

Installing profile rails on the flat roof frames

- Secure the pre-assembled profile rails [2] with M8 screws [1] to the flat roof frames. Do not as yet tighten the screws to enable the profile rails to be aligned.

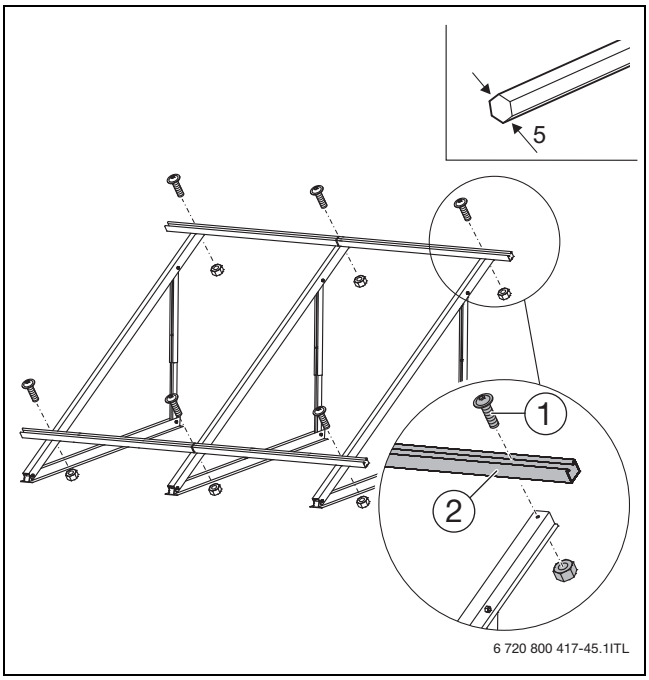

Fig. 31 Profile rail installation (here: 2 collectors)

7.3 Aligning the profile rails

It is important for the subsequent collector installation that the profile rails are accurately aligned.

- Level the profile rails horizontally and with the stated clearance. Use a spirit level.
- Align sides of the upper and lower profile rails with each other.
- Check that they are at right angles. Measure the diagonals or place a roof batten, for example, at the ends of the profile rails.
- Tighten screws M8.

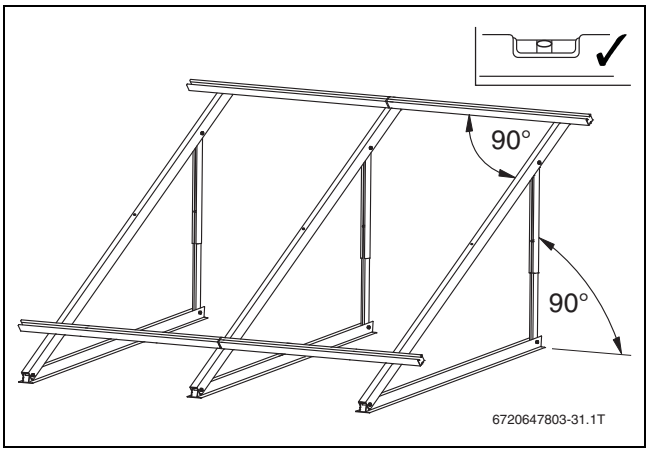

Fig. 32 Aligning the profile rails

7.4 Fitting the anti-slip protectors

Use both internal slots [1] to fit the two anti-slip protectors.

- Push the anti-slip protector over the profile rail and let it click into slot [2].

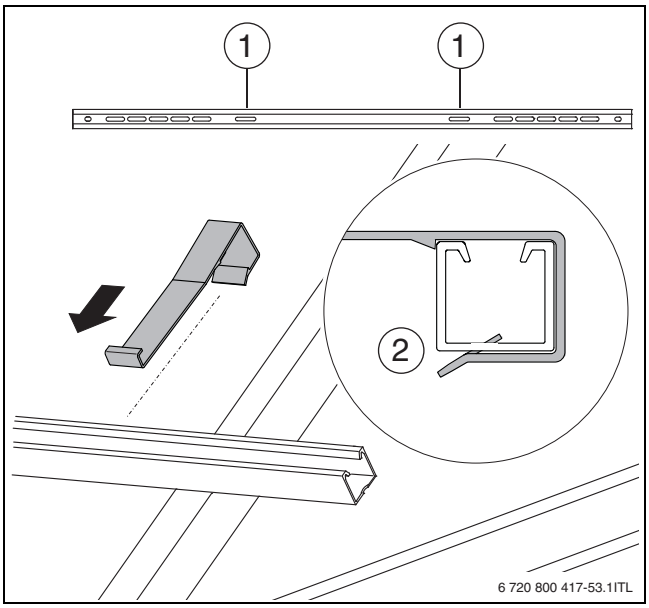

Fig. 33 Fitting the anti-slip protectors

8 Installing the collectors

DANGER: Risk to life by falling from roof!
- The installation on the roof must be performed by at least 2 people.

WARNING: Risk of injury through falling collectors.
- Secure the collectors against falling during handling and installation.
- After completing installation, check that the installation set and collectors are securely positioned.

Important information on handling solar hoses and hose clips

CAUTION: Risk of injury through tightened circlip prior to installation.
- Tighten the circlip only after the hose clip has been placed over the solar hose.

The solar hose [2] is secured with the hose clip [1] by tightening the circlip [3].

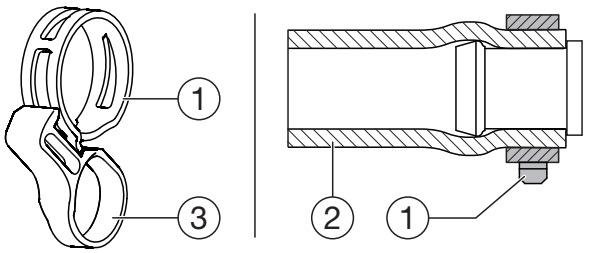

Fig. 34 Securing solar hoses

NOTICE: Leaks at the collector connections.
Subsequent loosening of the hose clip can impair its tensioning capacity.
- Push the hose clip immediately in front of the bead of the collector connection. Only then should the circlip be tightened.

We recommend placing the solar hoses in hot water prior to fitting. This makes the installation easier, especially in cold weather.

8.1 Preparing the collector installation on the ground

- Observe the information in chapter 5.2, page 9, concerning the collector layout.

The process for the right hand side of the collector array is shown in the following by way of example, with the first collector being installed on the right hand side.

The connection set (accessories) for two collector rows can also be pre-assembled on the ground.

8.1.1 Fitting the plug

- Push solar hose [2] with prefitted plug [3] onto the available collector connections.
- Tighten the circlip when hose clip [1] is located directly in front of the bead.

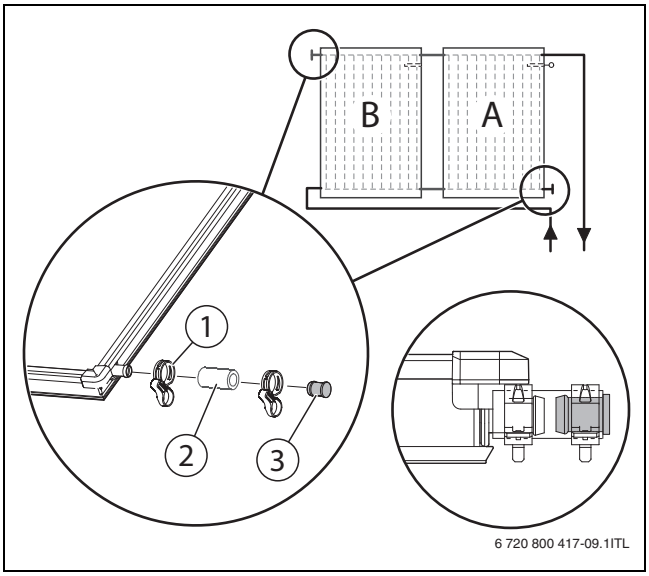

Fig. 35 Fitting the plug

8.1.2 Fitting the connection set

- Remove the interconnection set from the protective corners.
- Push solar hose [2] with hose clips onto the collector connection.
- Tighten the circlip when hose clip [1] is located directly in front of the bead.

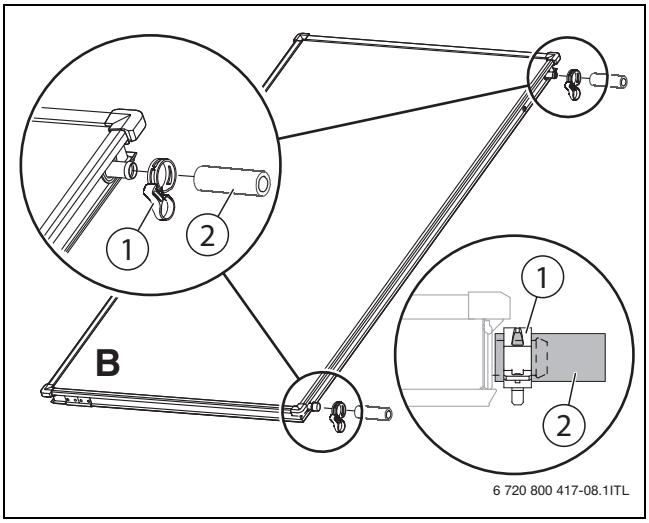

Fig. 36 Connection set on the second (collector B → Fig. 35) and all further collectors

8.2 Securing the collectors

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

8.2.1 Fitting single sided collector clamps on the right hand side

Fit the single sided collector clamp on the left hand side only after the final collector has been installed.

- Push collector clamp [1] into the profile rail and let it click into the slot.

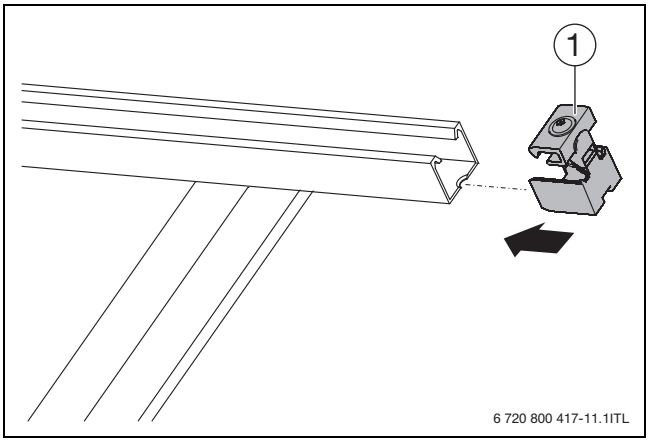

Fig. 37

8.2.2 Placing the first collector on the profile rails

- Turn the collector so that the sensor pocket for the collector sensor is located at the right hand side of the collector near the **top**.
- Place the collector onto the profile rails and allow it to slide into the anti-slip protectors [1].

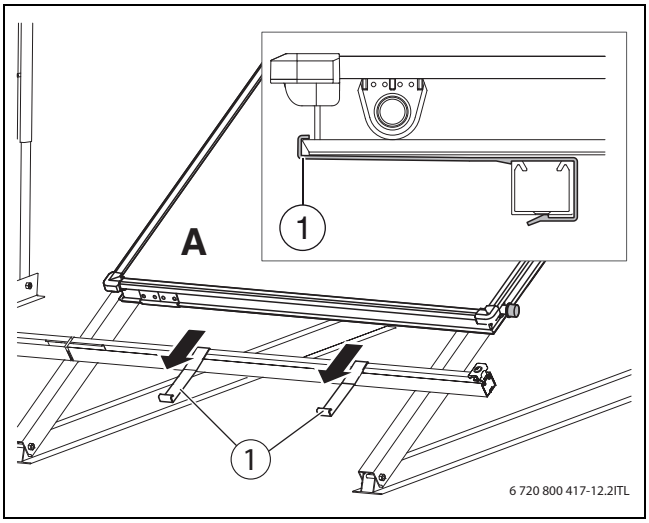

Fig. 38 Fitting the first collector

- Carefully push the collector up against the collector clamp and level horizontally.
- Tighten screw [2] of the collector clamp with an Allen key and secure collector [1].

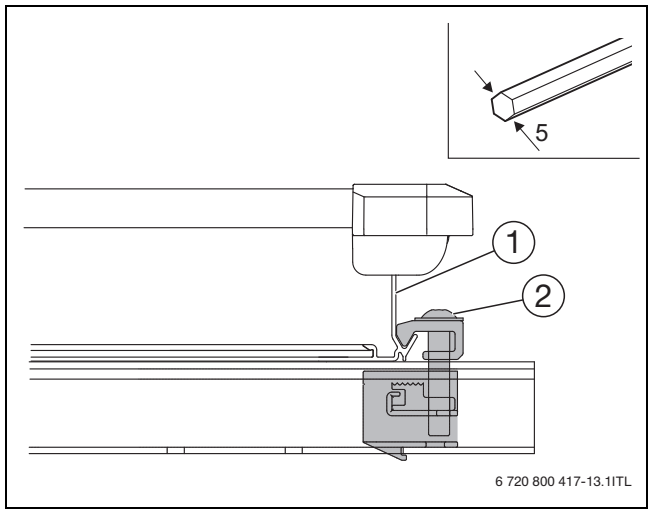

Fig. 39

8.2.3 Inserting a double sided collector clamp

- Place the double sided collector clamp [1] onto the profile rail and push up to the collector.

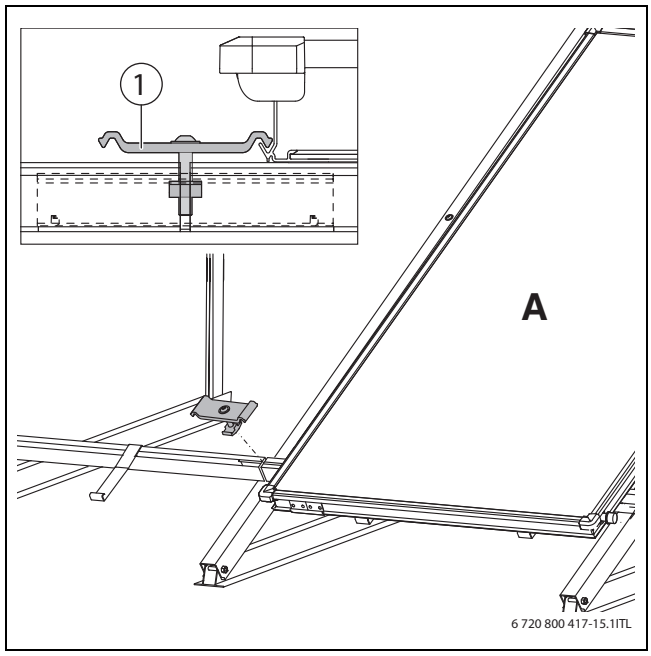

Fig. 40 First collector (collector A →Fig. 35)

8.2.4 Placing the second collector on the profile rails

- ▶ Place second collector along with the pre-assembled solar hoses [1] onto the profile rails and let it slide into the anti-slip protectors.
- ▶ Push two hose clips [3] onto the solar hoses.

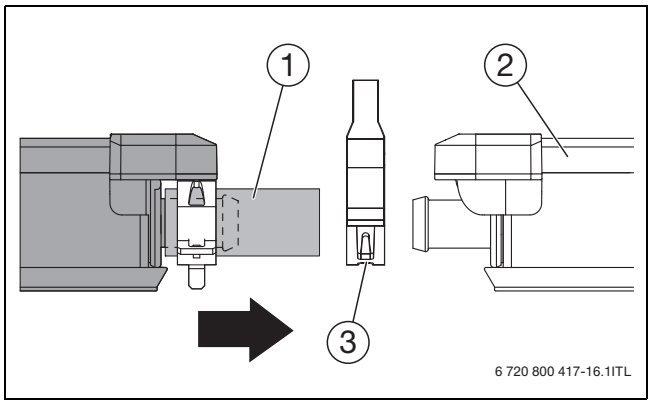

Fig. 41 Fitting the second hose clip

- ▶ Push the collector up to the first collector [2] so that the solar hoses are pushed onto the collector connections.
- ▶ Tighten the screw of the double-sided collector clamp with an Allen key.

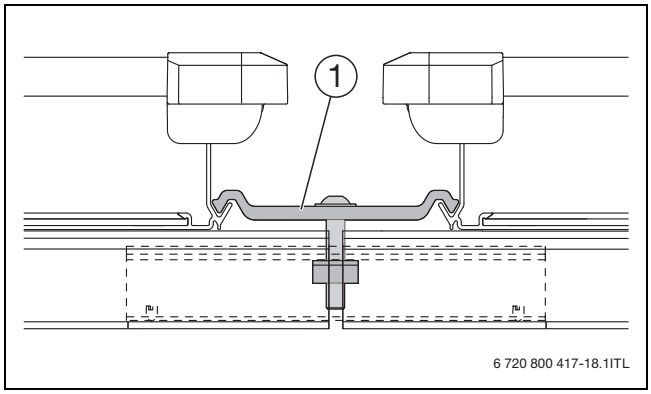

Fig. 42 Fitted double sided collector clamp

[1] Collector clamp

CAUTION: Risk of injury and leaks through escaping solar heat transfer medium as a result of unsecured solar hoses.

- ▶ Secure every solar hose to the collector connection using a hose clip.

- ▶ Tighten the circlip when the hose clip is located directly in front of the bead.

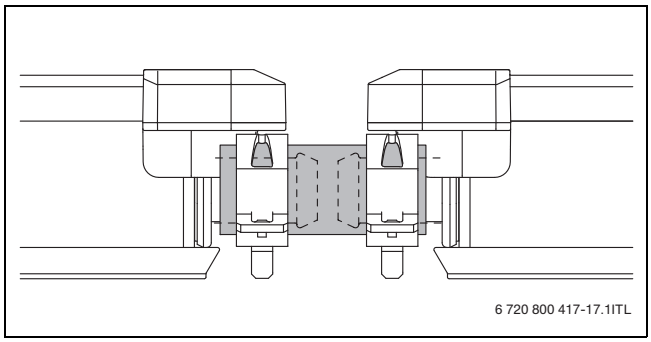

Fig. 43 Fitted solar hose

- ▶ Fit all other collectors in the same way.

8.2.5 Fitting the single sided collector clamp on the left hand side

- ▶ Push the collector clamp into the profile rail and let it click into the slot.
- ▶ Tighten the screw of the collector clamp with an Allen key.

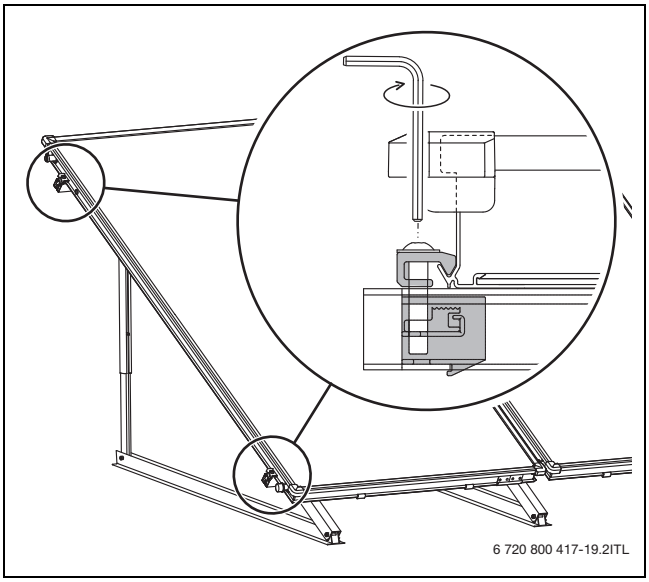

Fig. 44 Fitting the collector clamp on the left

8.3 Installing the collector sensor

The collector sensor is part of the solar controller.

NOTICE: System failure through faulty sensor lead.
- ▶ Protect the sensor lead against possible damage, e.g. from rodents.

▶ Fit the collector sensor with connected flow into the collector.

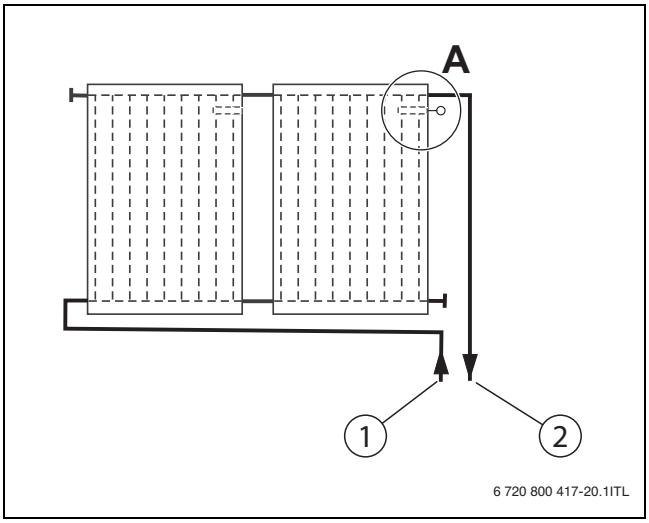

Fig. 45 Position of the collector sensor

[A] Collector sensor position
[1] Return
[2] Flow

▶ With a screwdriver, for example, puncture the sealing membrane of the sensor pocket and insert the collector sensor as far as it will go (equal to 160 mm).

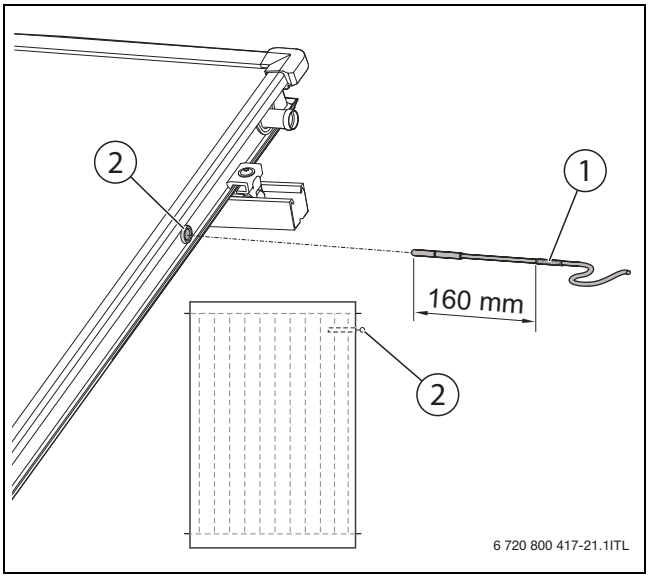

Fig. 46 Installing the collector sensor

[1] Collector sensor
[2] Position of the sensor pocket for the collector sensor

9 Hydraulic connection

The solar pump station instructions include information on the routing of pipework to the collector.

NOTICE: Leaks at the collector connections.
Subsequent loosening of the hose clip can impair its tensioning capacity.
- ▶ Push the hose clip immediately in front of the bead of the collector connection. Only then should the circlip be tightened.

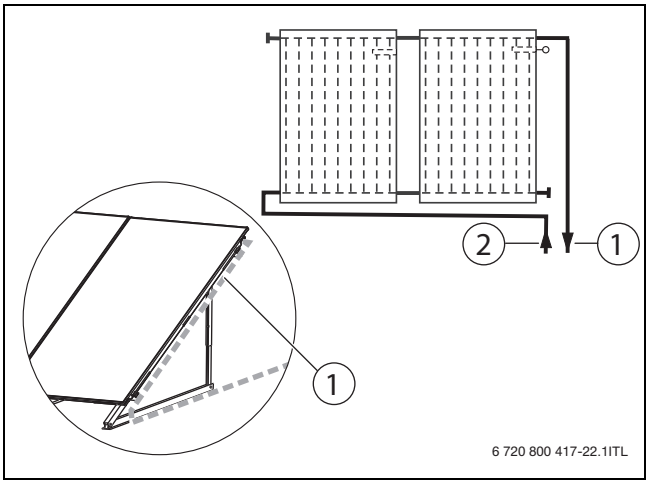

Fig. 47 Collector array pipework

[1] Flow pipe
[2] Return pipe

9.1 Pipework installation

NOTICE: Leaks at the collector connections.
In vertical flow pipe runs, thermal movements can result in leaks.
- ▶ Route the on-site flow pipe along the collector and **not** vertically.

9.1.1 Fitting the flow pipe retaining bracket

- ▶ Position retaining bracket [3] at the bottom into the edge that runs around the collector.
- ▶ Tighten the screw with the Allen key.

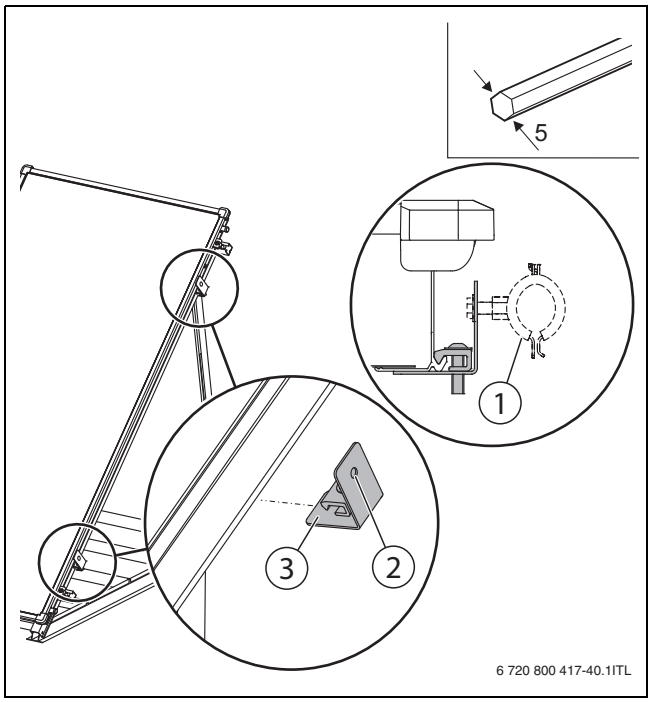

Fig. 48 Fitting the holder

[1] Pipe clip (on site)
[2] Hole for fitting a pipe clip
[3] Retaining bracket

9.1.2 Fitting the flow pipe

- ▶ Secure the thermally insulated flow pipe on site using a hose clip on the retaining bracket.

9.1.3 Fitting the return pipe

- ▶ Route the return pipe along the collector array.

9.2 Connecting the pipework without air vent valve

The flow and return pipes are connected to the collector in the same way as described in the following.

- ▶ Remove caps from the collector connections.
- ▶ Push union nut [1] over the collector connection.
- ▶ Place clamping washer [2] behind the bead on the collector connection and press together.

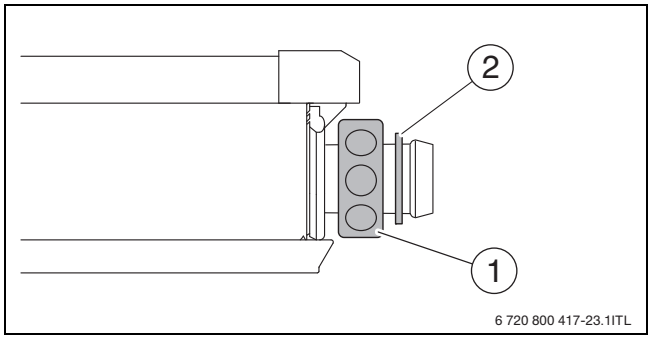

Fig. 49

NOTICE: Collector damage through twisted pipes.
- ▶ When tightening the screw fittings on the angled ferrule [3], counterhold with a 24 mm spanner.

- ▶ Offer angled ferrule [3] with O-ring to the collector connection and secure with union nut [1].
- ▶ Connect pipe to locking ring fitting [4, 5].

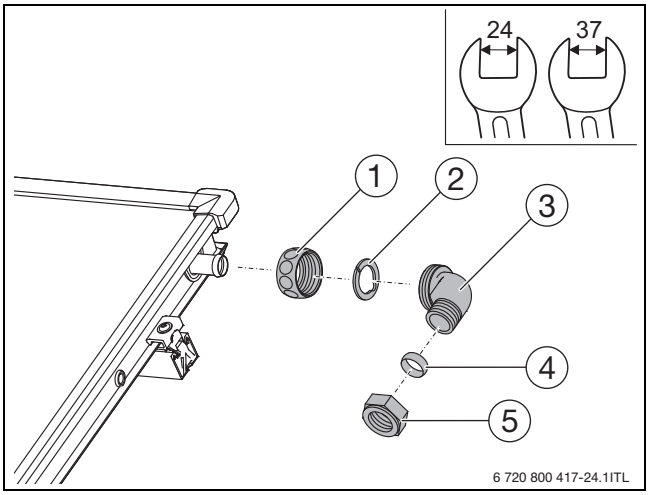

Fig. 50 Fitting the angled ferrule

[1] Union nut
[2] Clamping washer
[3] Angled ferrule
[4] 18 mm locking ring
[5] Union nut for locking ring

9.3 Connecting pipework with air vent valve (accessory)

To ensure the perfect function of automatic air vent valve, take the following into account:

- ▶ Route flow with a rise towards the air vent valve [2] at the highest point of the system.
- ▶ Route the return with a rise towards the collector array.
- ▶ For every change of direction downwards and renewed rise, fit an additional air vent valve.

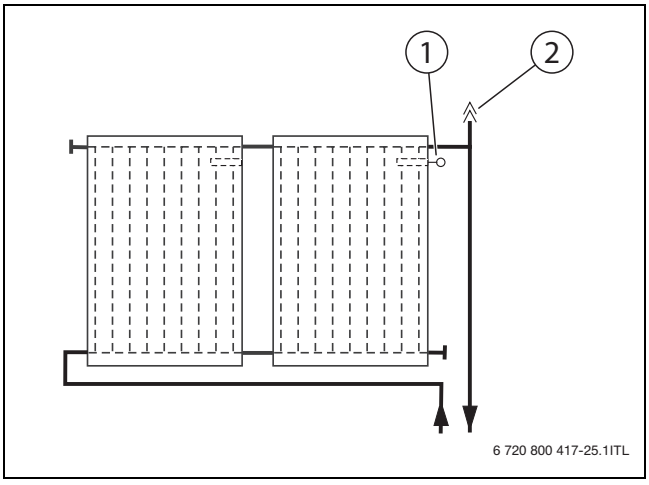

Fig. 51 Pipework with automatic air vent valve

[1] Collector sensor
[2] Automatic air vent valve

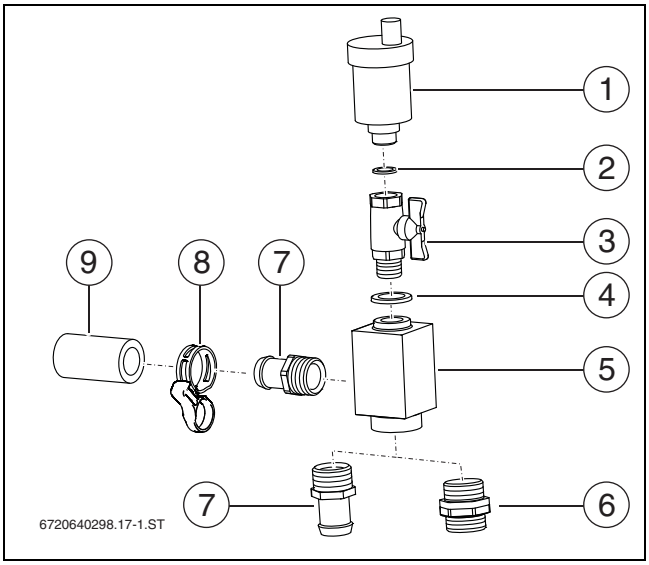

Fig. 52 Standard delivery, air vent valve set

[1] Automatic air vent valve with locking screw (1x)
[2] Gasket 9 x 15 mm (1x)
[3] Ball valve (1x)
[4] Gasket 17 x 24 mm (1x)
[5] Air separator (1x)
[6] Twin nipple G¾ with O-ring (1x)
[7] Hose ferrule (2x)
[8] Hose clip (2x)
[9] Solar hose, 55 mm (1x)

Fitting the air vent

- Push short solar hose [1] with hose clip [2] onto the collector connection.
- Route the solar hose and sensor lead through the roof.
- Fit the solar hose for the return in the same way.
- Insert the hose ferrule R¾ with O-ring [3] and twin nipple [5] into the air separator.¾
- Push hose ferrule R¾ [3] as far as it will go onto the solar hose and secure with hose clip [2].
- Push pipe [7] into the 18 mm locking ring fitting and tighten the fitting.

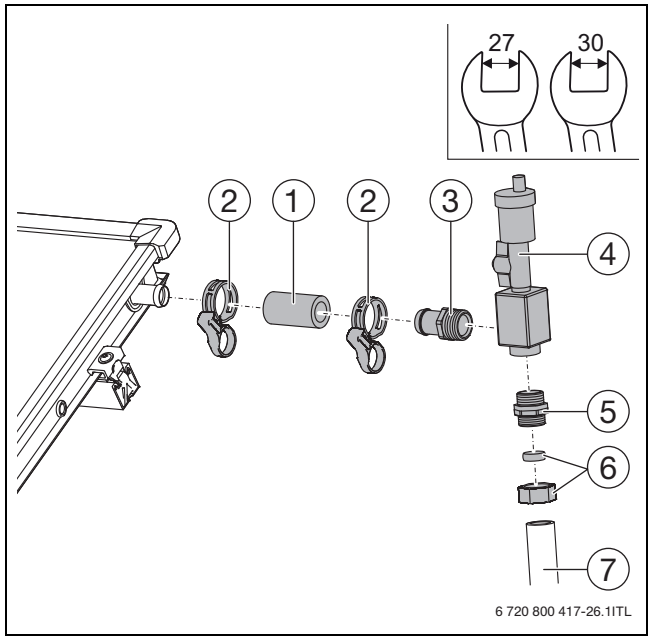

Fig. 53 Fitting the automatic air vent valve

[1] Solar hose 55 mm
[2] Hose clip
[3] Hose ferrule with O-ring
[4] Air vent valve set
[5] Twin nipple G ¾ with O-ring
[6] Locking ring and union nut (take from the connection set)
[7] Pipework (on site)

9.4 Fitting the connection set for 2 rows (accessory)

Connecting 2 rows of collectors requires a second connection set (→ chapter 2.6.2, page 6).

- Fit additional solar hose [3] with plug [4] and secure with hose clips [2], → chapter 8.1.1, page 16.

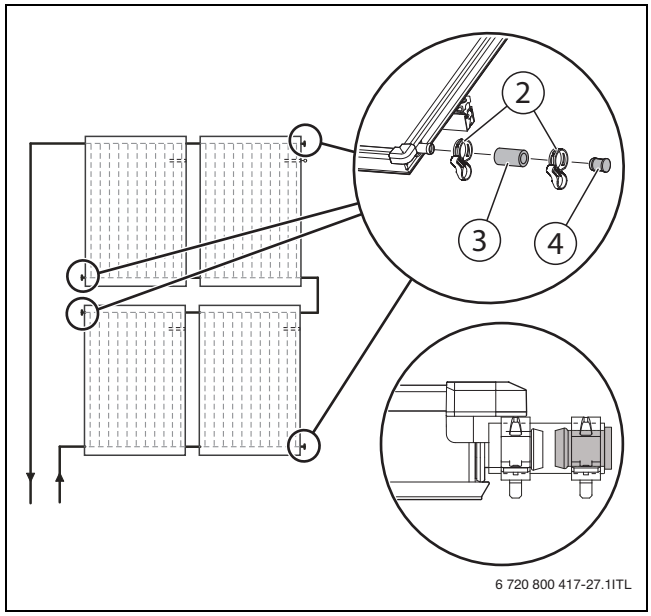

Fig. 54 Fitting the connection set for 2 rows

- ▶ Connect angled ferrules to collector connections (→ chapter 9.2, page 20).
- ▶ Check the clearance between collector rows and trim pipework to that dimension.
- ▶ Make on-site connection [1] between collector rows using copper pipe.

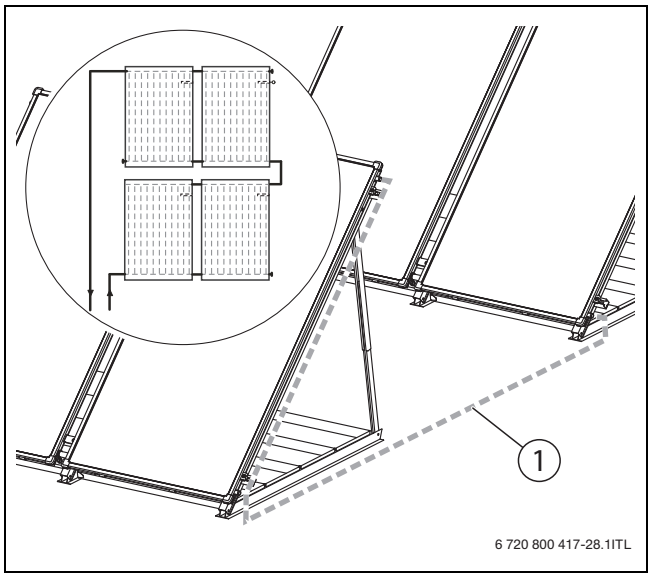

Fig. 55 Connecting the collector arrays on site

10 Final steps

10.1 Checking the installation

NOTICE: System damage through corrosion.
Corrosion may result if residual water is allowed to stand for prolonged periods in the solar thermal system following flushing or a tightness test.

- ▶ Immediately following a tightness test, commission the solar thermal system (→ solar pump station instructions) with solar heat transfer medium.

After completing the checks, carry out the thermal insulation to complete the work.

Checks:

1.	Profile rails connected to flat roof frames and screws tightened?	❍
2.	Anti-slip protectors fitted?	❍
3.	Collector clamps fitted and screws tightened?	❍
4.	Solar hoses secured with hose clips (circlip tightened)?	❍
5.	Collector sensor inserted up to the end-stop?	❍
6.	Tightness test carried out and all connections checked for leaks (see solar pump station instructions)?	❍

Table 15

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

Commission the solar thermal system in accordance with the details in the solar pump station installation and maintenance instructions.

10.2 Insulating the connection lines and pipework

- ▶ Thermally insulate the pipework in the entire solar circuit in accordance with regulations.
- ▶ Thermally insulate the external pipework using material which is resistant to UV rays, weather influences and high temperatures (150 °C).
- ▶ Insulate internal pipework with high temperature-resistant (150 °C) material.
- ▶ Protect the insulation against damage from birds if required.
- ▶ Observe local conditions (e.g. sand).

11 Cleaning the collectors

DANGER: Risk to life through falling!

- ▶ Whilst working on the roof, take all necessary precautions against a possible fall.
- ▶ Always wear personal protective equipment.

Cleaning glass panes

At an angle of incidence of 15° and steeper, glass panes are generally self-cleaning.

NOTICE: System damage through thermal shock.
Glass may break if a hot collector is cleaned with cold water.

- ▶ Only clean glass panes if there is no direct solar radiation and the collector is cool.

- ▶ In the case of more stubborn contamination, clean with a glass cleaner. Never use acetone.

Cleaning the vent

Moisture created during the night (condensation) can escape from the collector through the vents [1] located at each collector corner.

Environmental influences can cause these vents to become blocked.

- ▶ Should the collector still be misty after 4 hours' intensive solar radiation, clean the vents [1] with a thin nail, for example.

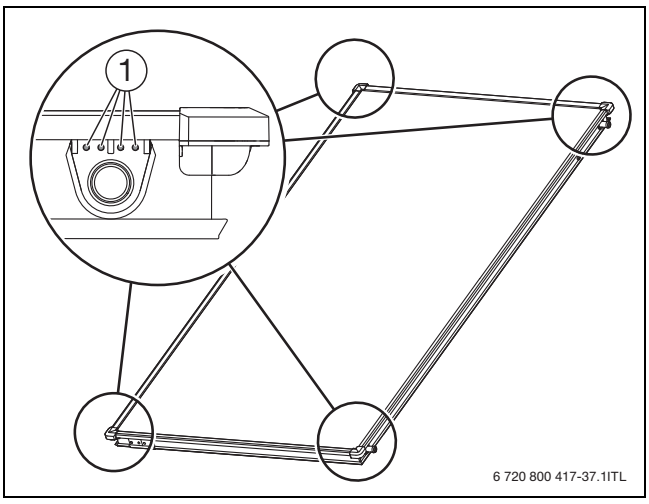

Fig. 56 Cleaning the vents

12 Environmental protection and disposal

Environmental protection is one of our principal policies.

Quality of products, efficiency and environmental protection are equally important objectives for us. Statutory and other regulations concerning environmental protection are strictly applied. To protect the environment we use the best possible technology and materials, subject to economic considerations.

Removing collectors

DANGER: Risk to life through falling!
- ▶ Whilst working on the roof, take all necessary precautions against a possible fall.
- ▶ Always wear personal protective equipment.

- ▶ Drain the pipework.
- ▶ Undo the collector clamps on the side and in between collectors.
- ▶ Remove solar hoses.
- ▶ Use lifting gear to transport the collectors (→ chapter 4, page 7).

Disposing of collectors

At the end of their service life, recycle the collectors using the most environmentally responsible process.

13 Maintenance/inspection

DANGER: Risk to life through falling!
- ▶ Whilst working on the roof, take all necessary precautions against a possible fall.
- ▶ Always wear personal protective equipment.

The installation and maintenance instructions of the solar pump station include details regarding the maintenance of the entire system. Also observe these details.

We recommend conducting the first service/inspection after about 500 hours of operation, and then every 1-2 years.

Use the table as a copy template so that you will have documentation available even after the third service.

- ▶ Check the collector array regularly (inspection). Immediately remedy all faults (maintenance).
- ▶ Fill out the report and tick off the tasks performed.

User:	System location:

Table 16

Maintenance and inspection tasks		Page	Maintenance/inspection		
Date:					
1.	Visual inspection of collectors carried out (safe seating, visual impression)?		❍	❍	❍
2.	Collector sensor positioned correctly and inserted into the sensor pocket as far as it will go?	19	❍	❍	❍
3.	Visual inspection of the installation system carried out?		❍	❍	❍
4.	Visual inspection for leaks carried out at the joints between the installation and the roof?	19	❍	❍	❍
5.	Visual inspection of pipework insulation carried out?	22	❍	❍	❍
6.	Visual inspection of glass panes. Cleaning in the case of severe contamination.	22			
Notes					
	The collector array has been serviced as specified by these instructions.		❍	❍	❍
			Date, stamp, signature	Date, stamp, signature	Date, stamp, signature

Table 17

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