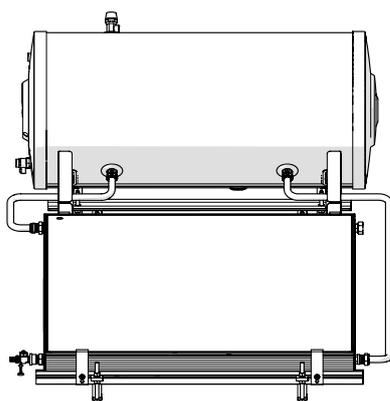
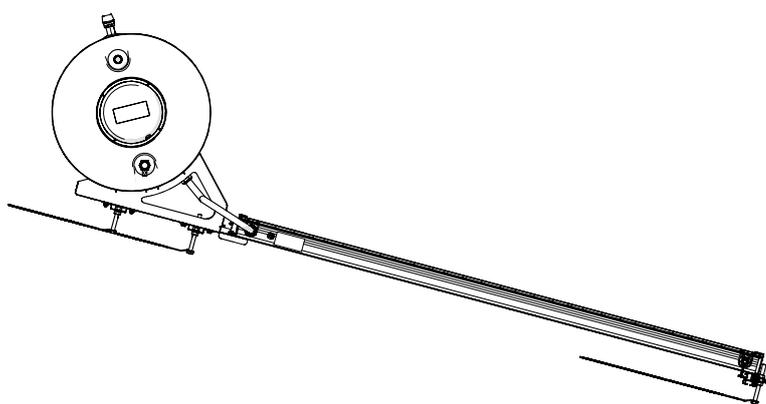


NB-SOL TI

Solar | Natural Circulation Systems



EN Installation and Operation Manual



Dear Customer,

Thank you for choosing a **Beretta** Natural circulation system. You have purchased a modern, quality product that is designed to give dependable and safe service and to provide comfort in the home for many years to come. Arrange for your Natural circulation system to be serviced regularly by an authorised **Beretta** Technical Assistance Centre. Their personnel are specially trained to keep your product efficient and cheap to run. Your **Beretta** Technical Assistance Centre will also stock any original spare parts that might be required.

This instruction manual contains important instructions and precautions that must be observed to ensure the trouble-free installation and efficient functioning of your **Beretta** solar water heating system.

Please accept our renewed thanks for your purchase.

CONFORMITY

The solar collectors used in **Beretta** natural circulation systems conform to EN standard 12975. **Beretta** storage cylinders conform to DIN 4753-3 and UNI EN 12897 standards.

RANGE

MODEL	CODE
NB-SOL 150/1 TI	20098606
NB-SOL 200/1 TI	20098607
NB-SOL 220/2 TI	20099128
NB-SOL 300/2 TI	20099129
NB-SOL 300/3 TI	20099130

ACCESSORIES

For a complete list of accessories and details of their compatibility, refer to the Catalogue.

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At the end of its life, the product should be not be disposed of as solid urban waste, but rather it should be handed over to a differentiated waste collection centre.

The following symbols are used in this manual:

 **CAUTION!** = Identifies actions that require caution and adequate preparation.

 **STOP!** = Identifies actions that you MUST NOT do.

1 GENERAL SAFETY INFORMATION

-  Check that the product is complete, undamaged and as ordered as soon as you receive it. Report any discrepancies or damage to the **Beretta** dealer who sold it.
-  This product must be installed by a legally qualified heating engineer. On completion of the installation, the installer must issue the owner with a declaration of conformity confirming that the installation has been completed to the highest standards in compliance with the instructions provided by **Beretta** in this instruction manual, and that it conforms to all applicable laws and standards.
-  This product must only be used for the purpose for which it is designed and made, as specified by **Beretta**. **Beretta** declines all responsibility, contractual or other, for damage to property or injury to persons or animals caused by improper installation, adjustment, maintenance or use.
-  Make sure that the roof is strong enough to support the weight of the solar water heating system under operating conditions. Also make sure that the section of roof chosen for the installation enjoys a high level of insolation, and is not shaded during the day by tall plants, trees, other houses, hills, etc..
-  The installation of a solar water heating system modifies the existing structure of the roof. Verify the suitability of all roof elements and if necessary adapt them to avoid leaks or damage by wind and/or snow loads.
-  If the system is installed in an area subject to gusting winds or snow loads in excess of the limits given in the technical specifications, consult your supplier for advice.
-  Snow can build up in the sheltered area behind the solar water heating system. Provide adequate protection to avoid increasing the static load on the roof.
-  The system must be serviced at least once a year.
-  The water supply circuit must permit the storage cylinder to be filled and emptied in safety. Shut-off valves must therefore be easily accessible to the user and the operation of emptying the storage cylinder must not create any risk of flooding or other damage.
-  Insulate the domestic water pipes (hot and cold) and the pipes of the solar collector circuit. Provide suitable insulation for all outdoor accessories.
-  The point through which the water pipes enter the building must be rain-proof and damp-proof.
-  If you notice any water or heat transfer liquid leaks, disconnect the system immediately from the mains electricity supply (if a supplementary heating element is installed), shut off the water supply, and notify **Beretta's** Technical Assistance Service or a qualified heating engineer immediately.

-  Make sure that the water-glycol mix in the solar collector circuit is able to resist the minimum temperatures likely to occur in the place of installation.
-  The system can reach very high temperatures. Safety valves can therefore discharge extremely hot liquids. Make sure that the expansion vessel is of a suitable size and design for use in solar water heating systems.
-  Use proper slings to lift and move the elements of the system. Never lift the collector or storage cylinder by their fittings. Avoid subjecting the collector to impacts or mechanical strain, and take care to protect the glass panel. Use the personal protection equipment required by applicable safety standards.

2 PRECAUTIONS

-  Never attempt to install the system without using the personal protection equipment and without following the safety precautions specified by applicable occupational safety standards.
-  Never install solar collectors on roofs without an adequate lightning protection system.
-  Never install the system without providing proper drainage for the two safety valves: that of the domestic hot water circuit and that of the primary (solar collector) circuit.
-  If the storage cylinder is equipped with a supplementary heating element, never attempt any cleaning or maintenance without first disconnecting it from the mains power supply.
-  Do not allow children or infirm persons to operate the system unsupervised.
-  Do not tamper with or adjust the safety or control devices without prior authorisation and instructions from the manufacturer.
-  Never use anti-freeze other than that supplied by **Beretta** to fill or top up the solar collector circuit. Mixing different products can reduce the anti-freeze protection provided.
-  Never drain the solar collector circuit under sunny conditions or when the collector is hot.
-  Do not dispose of packaging material into the environment, or leave it within the reach of children, since it can become a potential hazard. Dispose of packaging material in compliance with applicable legislation.

3 DESCRIPTION OF THE SYSTEM

The **NB-SOL TIS 0°** system is a solar hot water heating system that functions on the principle of natural circulation. The heat transfer liquid therefore circulates by normal convection.

The system comprises one or more solar collectors and a jacket type storage cylinder, located above the collector/s.

The system does not require any pumps or adjustments. A supplementary heating element is also available for use if needed.

The system comprises:

- Solar collector/s
- A jacket type solar storage cylinder
- Box of water pipes and fittings
- Mounting brackets
- Anti-freeze liquid.

4 SAFETY DEVICES

The system is equipped with the following safety devices:

- A primary circuit safety valve that opens if pressure in the primary (solar collector) circuit rises above a 2.5 bar threshold.
- A secondary circuit safety valve that opens if pressure in the secondary (DHW) circuit rises above a 10 bar threshold.

 Water may come out of the primary and secondary circuit safety valves as a result of variations in temperature and pressure during the course of the day. Ensure that proper drainage is provided. For the same reason, avoid standing near the safety valves during the day.

 Safety devices must only be replaced by **Beretta's** Technical Assistance Service using original spare parts.

 Over-temperature protection requires an adequate supply of cold water from the mains.

5 IDENTIFICATION

Beretta NB-SOL TIS 0° systems are identified by:

Storage cylinder data plate



Beretta Caldaie
Via Risorgimento, 13
23900 Lecco (LC)

SISTEMA SOLARE A CIRCOLAZIONE NATURALE
NATURAL CIRCULATION SOLAR WATER HEATING SYSTEM

Mod. _____
Cod. _____
Serial N° _____
Tipo/Type _____

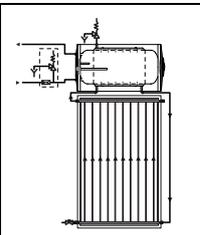
Anno _____
Year _____

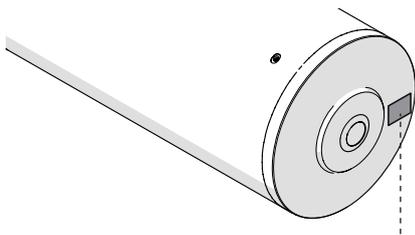
Capacità bollitore _____ l
Storage cylinder capacity _____ l

Pressione di progetto acqua sanitaria _____ bar
DHW circuit operating pressure _____ bar

Pressione max circuito solare _____ bar
Max solar heating circuit pressure _____ bar

La protezione da sovratemperatura dipende dalla fornitura di acqua fredda sanitaria
Over - temperature protection requires an adequate supply of cold water





Collector data plate

CODICE : xxxxxxxx

S/N : **13000000**

Anno di produzione _____

TIPO : CP20TSS

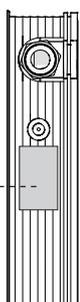
COLLETTORE SOLARE PIANO

DIMENSIONI: 1818X1048X70 mm
SUPERFICIE LORDA: 1,91 m²
SUPERFICIE DI APERTURA: 1,78 m²
PESO A VUOTO: 34 kg

MAX PRESSIONE ESERCIZIO: 10 bar
TEMPERATURA DI STAGNAZIONE: 192°C
CONTENUTO LIQUIDO: 1,6 l
MAX CONCENTRAZIONE GLICOLE: 50%
LIQUIDO TERMOMETTORE:
ACQUA+GLICOLE PROPYLENICO

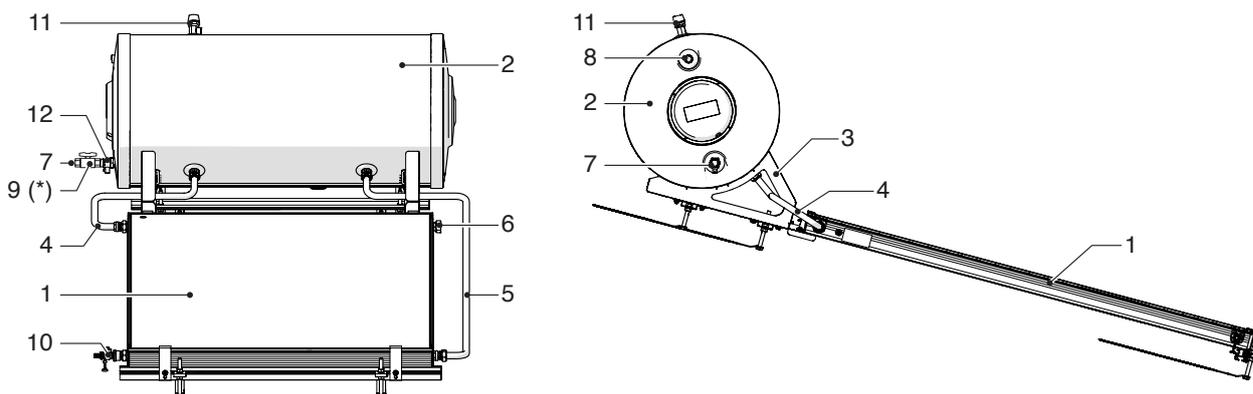
EN 12975
Certif. 0117S2400F

20092406_E2



 If these plates or any other means of clearly identifying the product are defaced, removed or lost, proper installation and servicing may be rendered difficult.

6 SYSTEM LAYOUT



Components

- 1 Solar collector/s
- 2 Storage cylinder
- 3 Mounting frame

Pipes and fittings

- 4 Collector outlet
- 5 Collector return
- 6 Plug

External connections

- 7 Domestic cold water inlet - 3/4"
- 8 Domestic hot water outlet - 3/4"
- 9 Domestic cold water inlet cock
- 10 Filling/drain cock

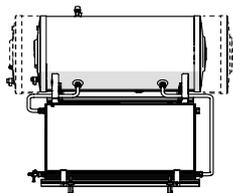
Safety devices

- 11 Primary circuit safety valve (2.5 bar)
- 12 Non-return valve - Secondary circuit safety valve (10 bar)

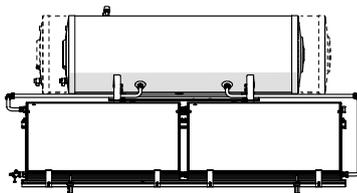
(*) (Not supplied. To be provided by installer.)

POSSIBLE CONFIGURATIONS

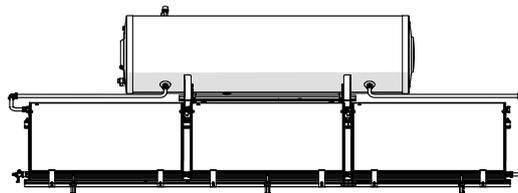
NB-SOL TIS 0°
150/1÷200/1



NB-SOL TIS 0°
220/2÷300/2



NB-SOL TIS 0°
300/3



7 TECHNICAL SPECIFICATIONS

Description	NB-SOL TIS 0°					
	150/1	200/1	220/2	300/2	300/3	
Collector surface area	1,91 x 1	1,91 x 1	1,91 x 2	1,91 x 2	1,91 x 3	m ² x n. of pan.
Exposed area	1,78 x 1	1,78 x 1	1,78 x 2	1,78 x 2	1,78 x 3	m ² x n. of pan.
Absorption area	1,77 x 1	1,77 x 1	1,77 x 2	1,77 x 2	1,77 x 3	m ² x n. of pan.
Stagnation temperature	192					°C
Storage cylinder capacity	153	202	223	278	278	l
Magnesium anode	22 x 300	22 x 300	22 x 300	22 x 400	22 x 400	∅ x mm
Heat transfer liquid capacity	8,5	13,6	16,3	20,3	22,2	l
Maximum wind and snow load	1900	1900	1500	1900	1500	Pa
DHW circuit safety valve operating pressure	10					bar
Solar collector circuit safety valve operating pressure	2,5					bar
A sol (*)	1,78	1,78	3,56	3,56	5,34	m ²
η0 (*)	0,778	0,778	0,778	0,778	0,778	
a1 (*)	4,96	4,96	4,96	4,96	4,96	W/(m ² K)
a2 (*)	0,0005	0,0005	0,0005	0,0005	0,0005	W/(m ² K ²)
IAM (50°) (*)	0,87	0,87	0,87	0,87	0,87	
ηcol (**)	58	58	58	58	58	%
S	78	86	89	95	95	W
V	153	202	223	278	278	l
Qnonsol M (***)	858	854	606	605	494	kWh/a
Qnonsol L (***)	1906	1884	1351	1331	1032	kWh/a
Qnonsol XL (***)	3434	3404	2630	2596	2077	kWh/a
Qnonsol XXL (***)	4599	4566	3692	3654	3009	kWh/a

(*) Tested according to EN 12975, referred to a 33,3% water-glycol mix, flow rate of 140 l/h , and irradiation G = 800 W/m².

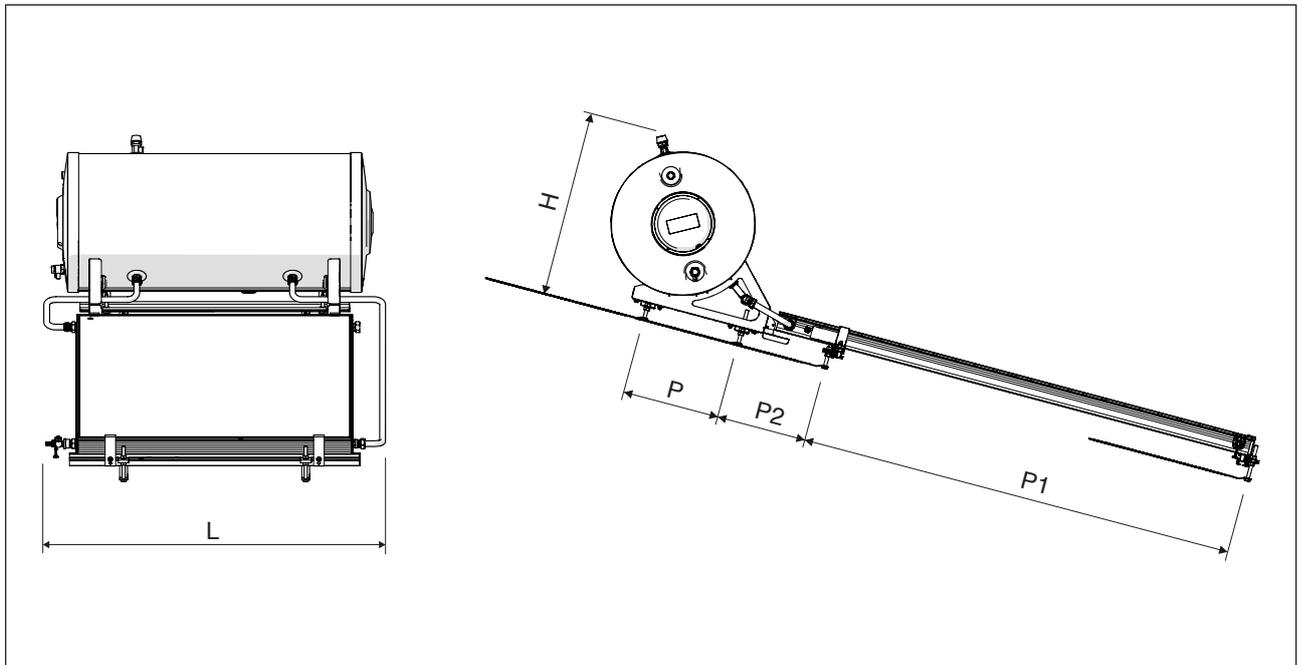
$$T_m = (\text{Coll.}_{inlet_temp.} + \text{Coll.}_{outlet_temp.})/2$$

$$T^*m = (T_m - T_{ambient})/G$$

(**) Calculated with a temperature difference of 40K between the solar collector and the surrounding air, and with total solar radiation of 1000 W/m² referred to the exposed area.

(***) Value calculated in terms of primary electrical energy and/or calorific content of fuel under average climatic conditions, in load profiles M, L, XL and XXL, with permanent backup and storage cylinder outside the building.

8 OVERALL DIMENSIONS AND WEIGHTS

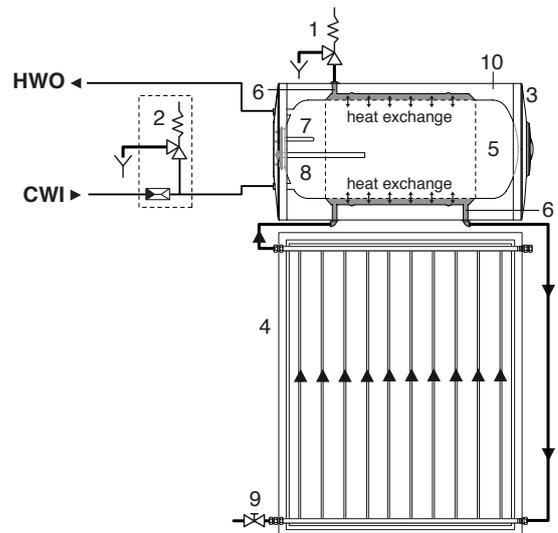


Description	NB-SOL TIS 0°					
	150/1	200/1	220/2	300/2	300/3	
Empty weight	94	122	143	193	200	kg
Full weight	256	338	382	491	500	kg
L	1300	1300	2410	2410	3510	mm
P	270	270	360	360	360	mm
P1	1965	1965	1619	1619	1619	mm
P2	-	-	332	332	332	mm
H	720	720	720	720	720	mm

9 WATER CIRCUIT

UAC Domestic hot water outlet
EAF Domestic cold water inlet

- 1 Primary (solar collector) circuit safety valve (2.5 bar)
- 2 Non-return valve - safety valve of secondary (DHW) circuit (10 bar)
- 3 Storage cylinder
- 4 Collector
- 5 DHW tank (secondary circuit)
- 6 Primary circuit
- 7 Temperature sensor socket
- 8 Magnesium anode
- 9 Primary circuit filling/drain cock
- 10 Insulation



10 UNPACKING THE PRODUCT

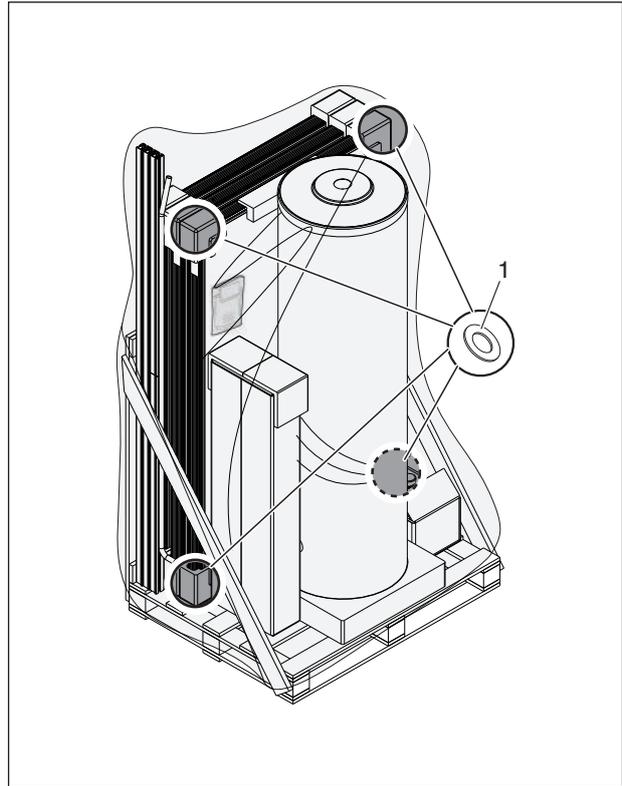
Contents of packing:

- Solar collector/s
- Storage cylinder
- Box of accessories containing fittings and a container of glycol anti-freeze
- Mounting kit for flat roofs (see the assembly section for details of kit contents).

A plastic pouch containing:

- Instruction manual
- Bar code label
- Serial number plate.

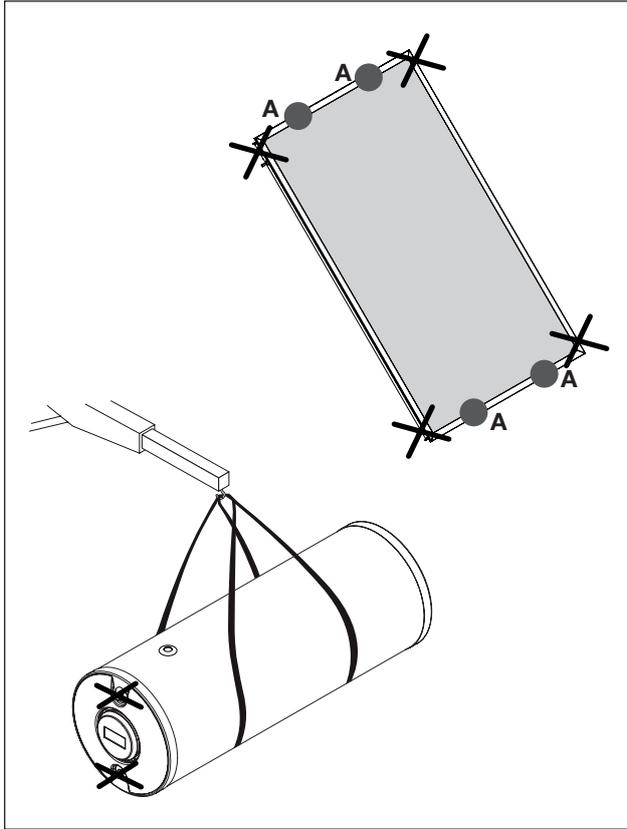
-  This instruction manual is an integral part of the **NB-SOL TIS 0°** system. Once located, read it thoroughly and keep it safe.
-  **A protective film is applied to the glass of the solar collector. On completion of installation, only remove this film if you are going to put the system into service immediately.**
-  Take care not to lose the four flat seal rings (1) located in the corner profiles of each collector.



Description	NB-SOL TIS 0°					
	150/1	200/1	220/2	300/2	300/3	
WEIGHT						
Total weight of supply	See the transport document					kg
COLLECTOR/S package	34	34	2 x 34	2 x 34	3 x 34	kg
STORAGE CYLINDER package	62	76	84	106	116	kg
DIMENSIONS						
Total supply package	2034 x 1246 x 770	2034 x 1246 x 770	2053 x 1246 x 870	2160 x 1250 x 870	2174 x 1246 x 870	mm
COLLECTOR/S package	1865 x 1200 x 95	1865 x 1200 x 95	2 x (1865 x 1200 x 95)	2 x (1865 x 1200 x 95)	3 x (1865 x 1200 x 95)	mm
STORAGE CYLINDER package	1250 x 600 x 600	1250 x 600 x 600	1250 x 600 x 600	2050 x 600 x 600	2050 x 600 x 600	mm

11 HANDLING

Hold solar collectors at the points shown (A) to move them. Lift and move the storage cylinder in a horizontal position. Make sure that the slings and lifting gear used are suitable for the weight.



-  Do not lift the solar collector by its water fittings.
-  Do not lift the storage cylinder by its water fittings.
-  Wear suitable personal protective equipment and use suitable safety devices.

12 PREPARING FOR INSTALLATION

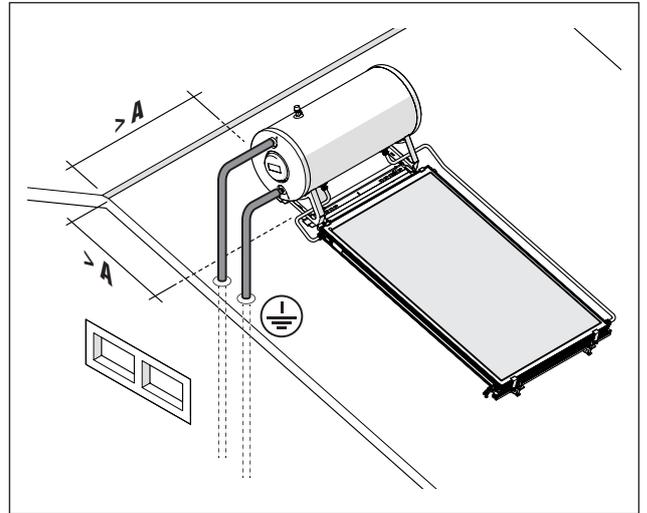
Select the best possible orientation for the solar collectors (ideally facing south). Avoid positions that are shaded by plants, trees, buildings or hills, etc. during the day.

Maintain the minimum distance (A) between the system and the edge of the roof.

Remove all gravel and detritus from the surface on which the system is to be installed.

The mounting kit must not be used to install other super-structures. It is designed only for use with **Beretta** solar water heating systems.

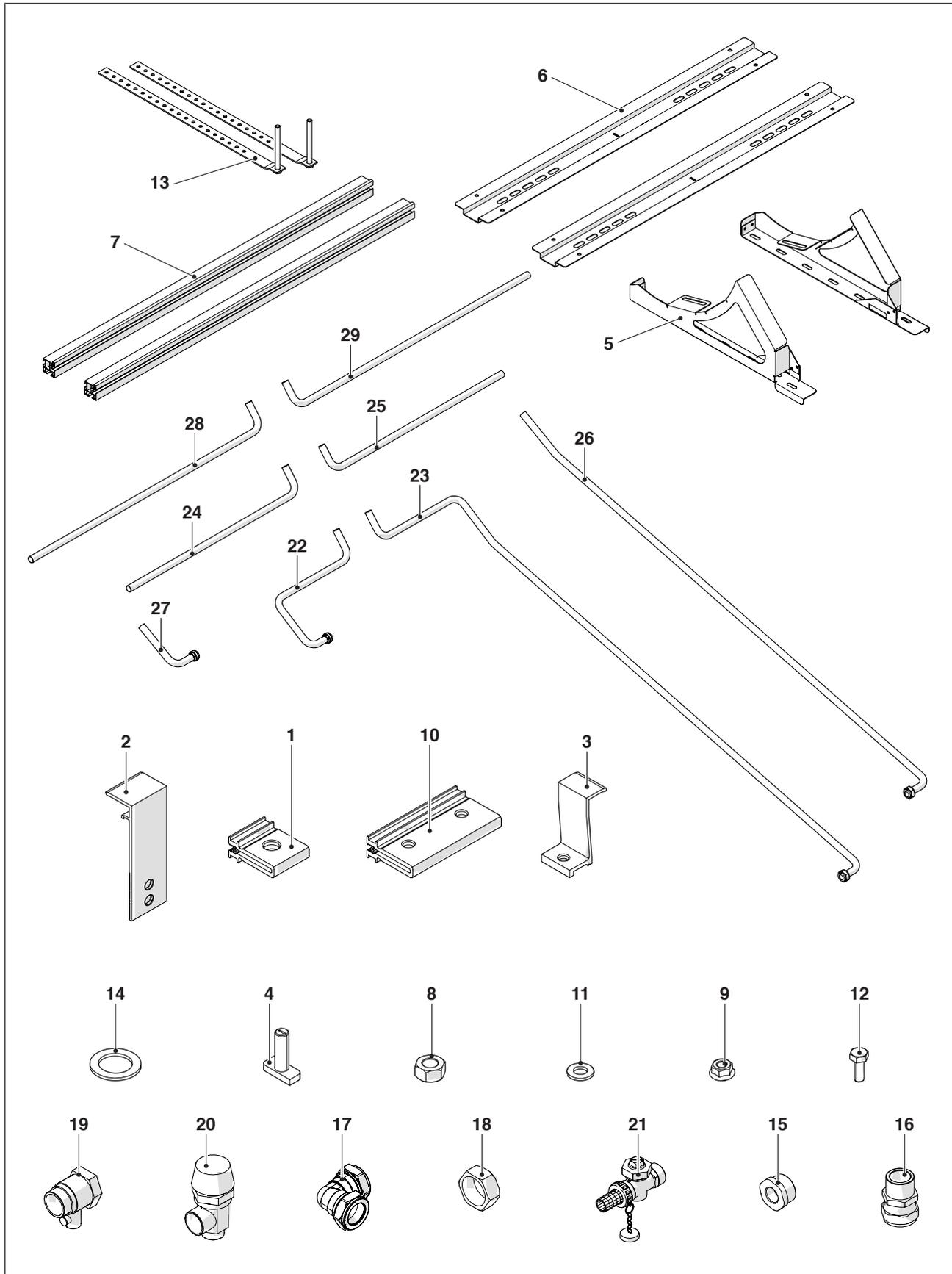
The installation of a solar water heating system modifies the existing structure of the roof. Verify the suitability of all roof elements and if necessary adapt them to avoid leaks or damage by wind and/or snow loads.



	NB-SOL TIS 0°					U.M.
	150/1	200/1	220/2	300/2	300/3	
A	1	1	1,5	1,5	1	m

13 ASSEMBLY

Start installing the system by assembling the mounting frame for sloping roofs. To do so, follow the instructions given below.



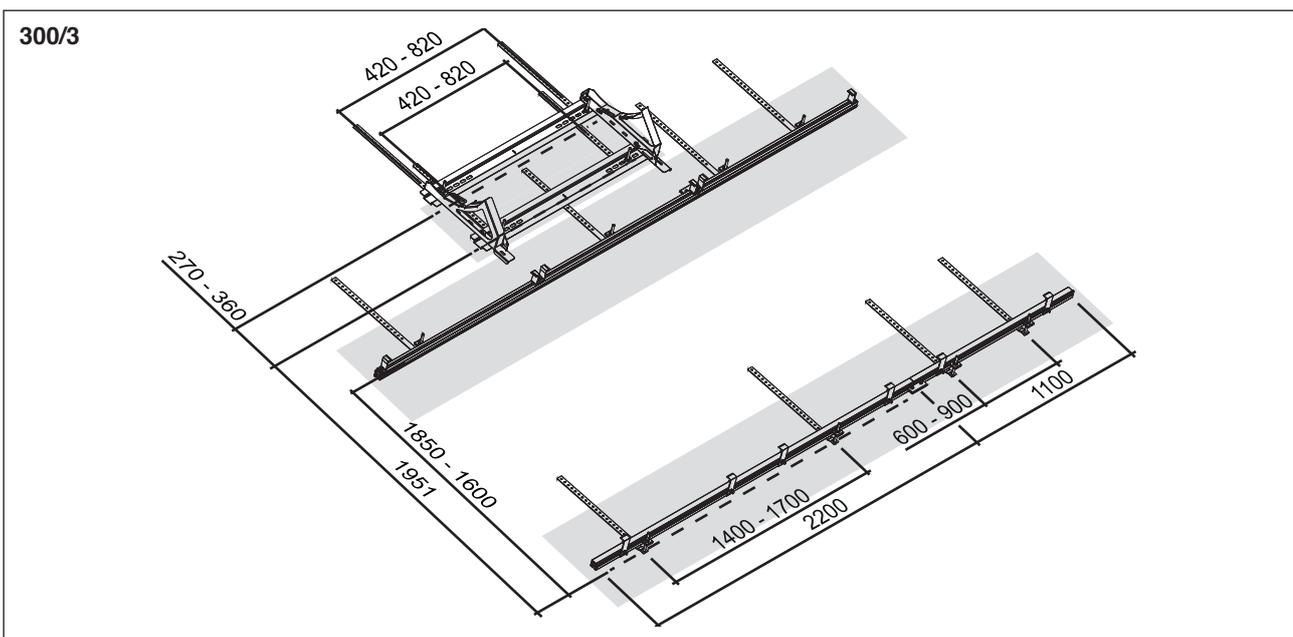
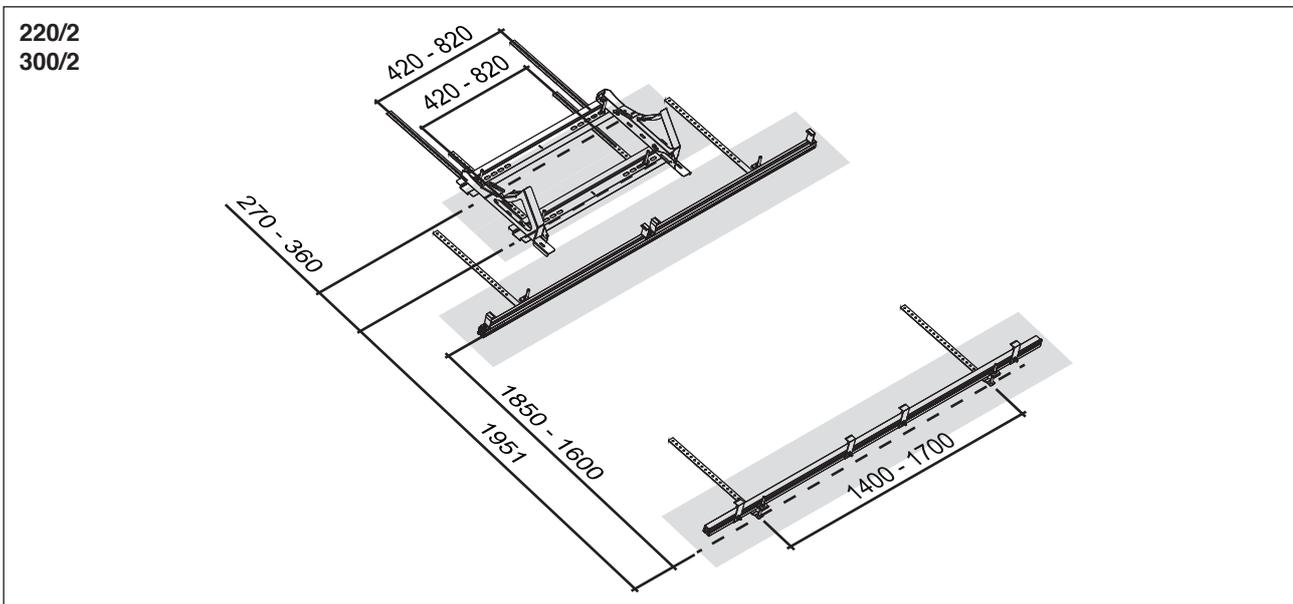
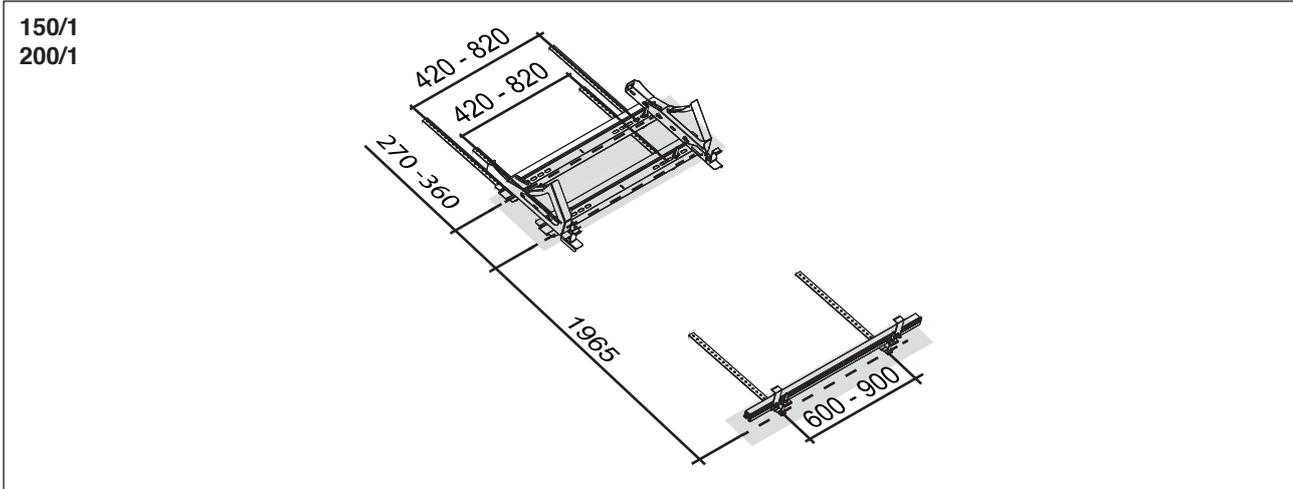
CONTENTS OF MOUNTING KIT

Description	NB-SOL TIS 0°				
	150/1	200/1	220/2	300/2	300/3
1 Clamp	2	2	4	4	6
2 Collector fixing bracket	2	2	4	4	6
3 Collector fixing bracket	2	2	4	4	6
4 Rectangular head screw	4	4	8	8	12
5 Mounting brackets	2	2	2	2	2
6 Profiles	2	2	2	2	2
7 Support bars	1	1	2	2	4
8 M12 nut	12	8	8	8	8
9 M8 flanged nut	12	16	16	16	24
10 Join clamps	-	-	-	-	2
11 M12 washer	12	16	16	16	24
12 M8 screw	12	12	12	12	12
13 Stud strips	6	6	6	6	6
14 1" seal (in corner profiles of collector)	4	4	6	6	8
15 1/2" F x 1" M straight union	1	1	1	1	1
16 3/4" straight union	2	2	2	2	2
17 Elbow union	-	-	2	2	2
18 Collector plug	1	1	1	1	1
19 10 bar safety valve	1	1	1	1	1
20 2.5 bar safety valve	1	1	1	1	1
21 Cock	1	1	1	1	1
22 150-200 return pipe	1	1	-	-	-
23 150-200 flow pipe	1	1	-	-	-
24 200-300 return pipe	-	-	1	1	-
25 200-300 flow pipe	-	-	1	1	-
26 Additional flow pipe	-	-	1	1	1
27 Additional return pipe	-	-	1	1	1
28 300 return pipe	-	-	-	-	1
29 300 flow pipe	-	-	-	-	1

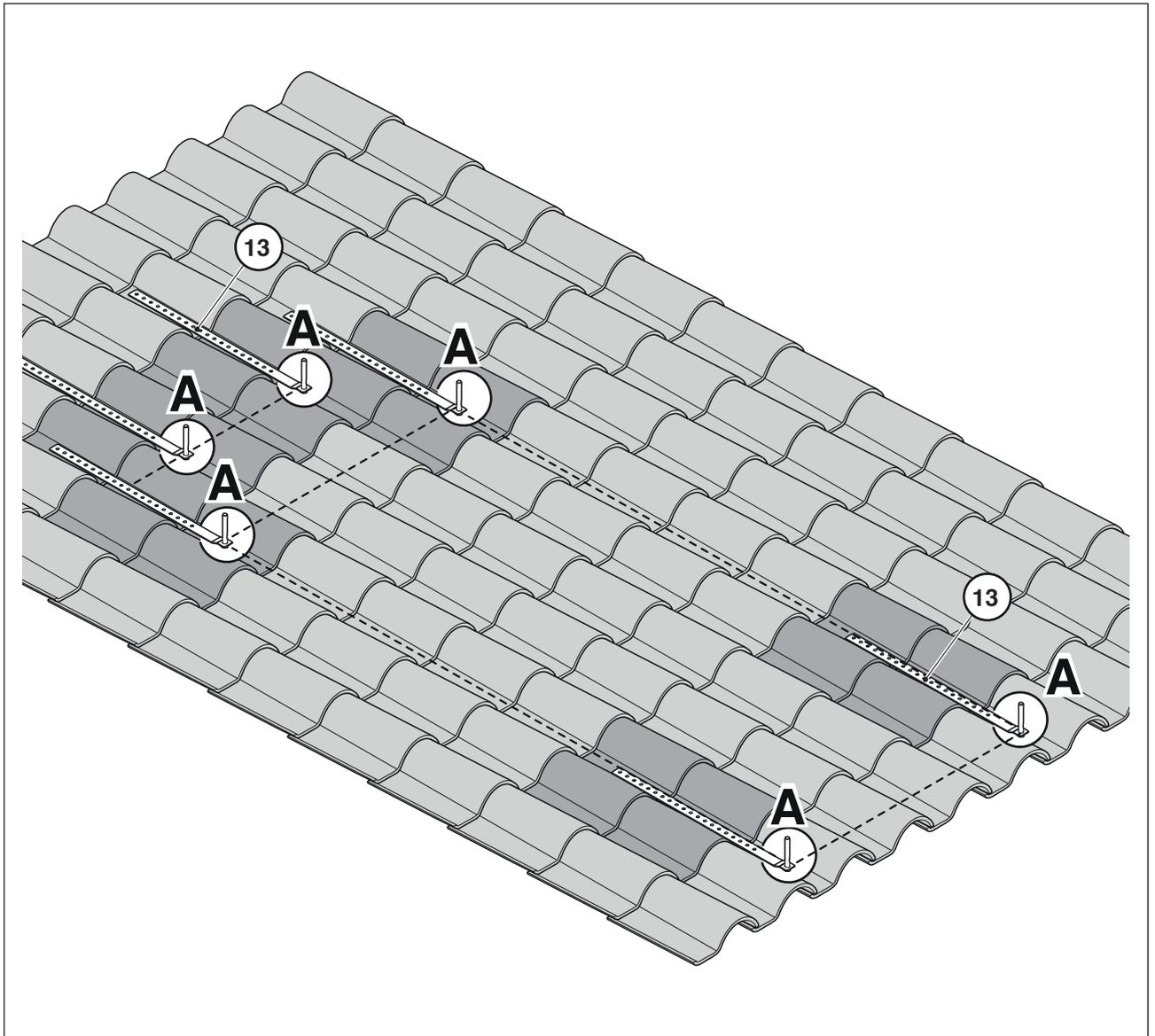
13.1 Steps valid for all models

- Mark the anchoring points

 Check that the marks are square.



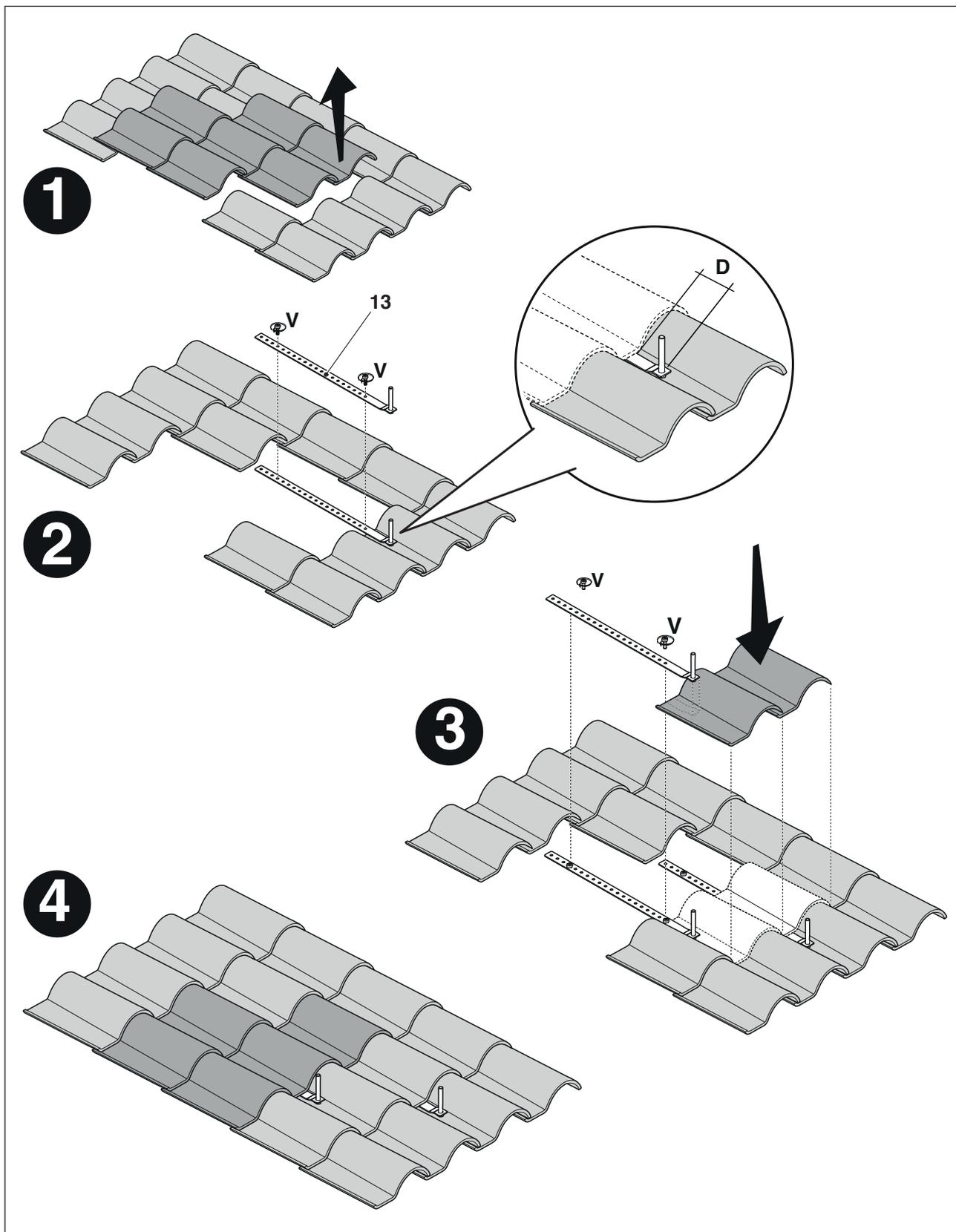
- Position the stud strips (13) in the concave section of the tiles. Maintain the distances specified in the previous point between the studs "A"



Fix the front and rear stud strips to the roof. Secure each strip at a minimum of two points, and check for tightness. The screws "V" are NOT SUPPLIED and must be provided on installation. Only use screws that are suitable for the characteristics of the roof.

Proceed as follows:

- Remove the tiles
- Fit the stud strip (13) in close contact with the roof, minimising the distance "D". If necessary bend the strip as needed
- Replace the roof tiles



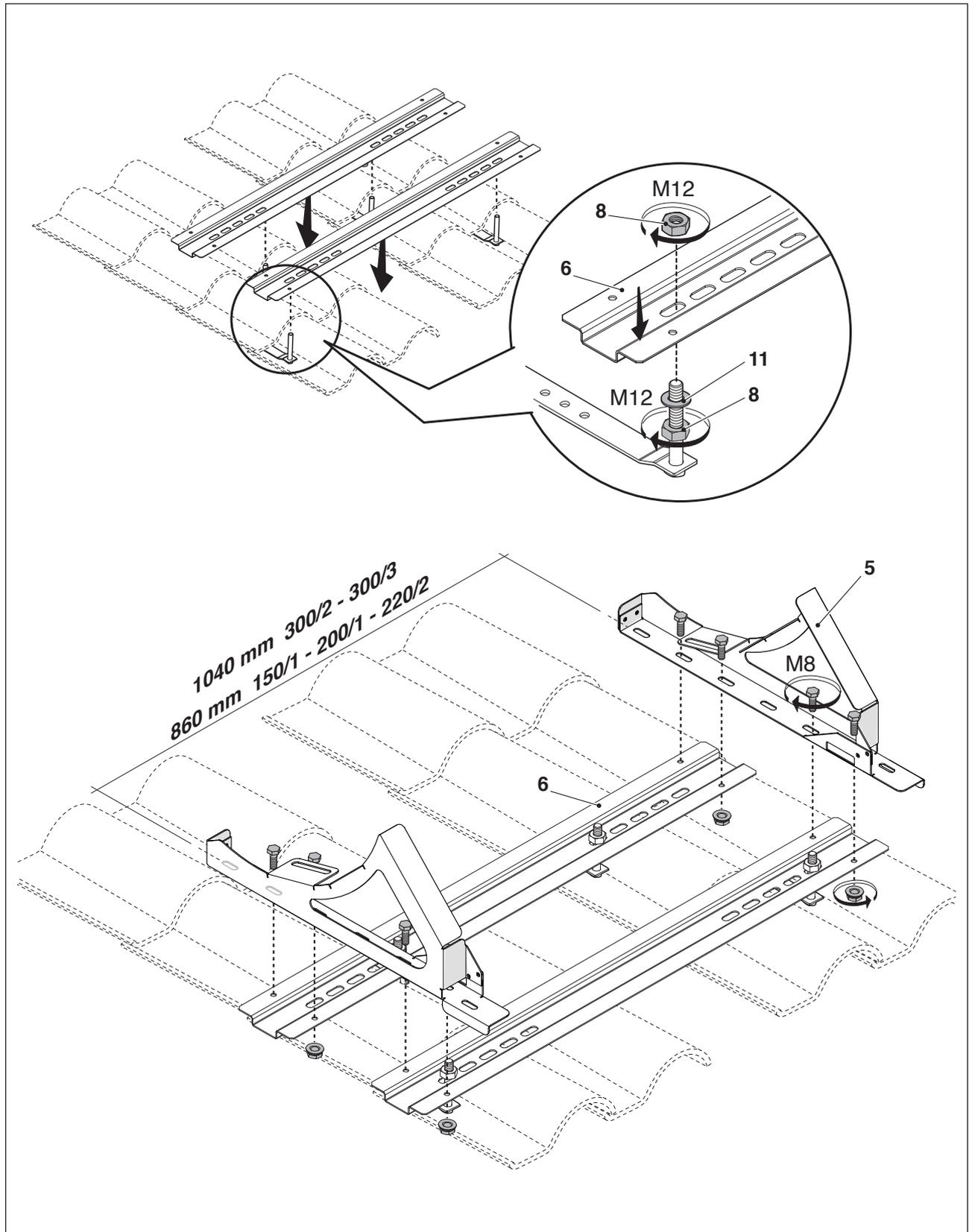
13.2 Steps valid for the following models: 150/1 - 200/1

Fix the profiles to the front studs.

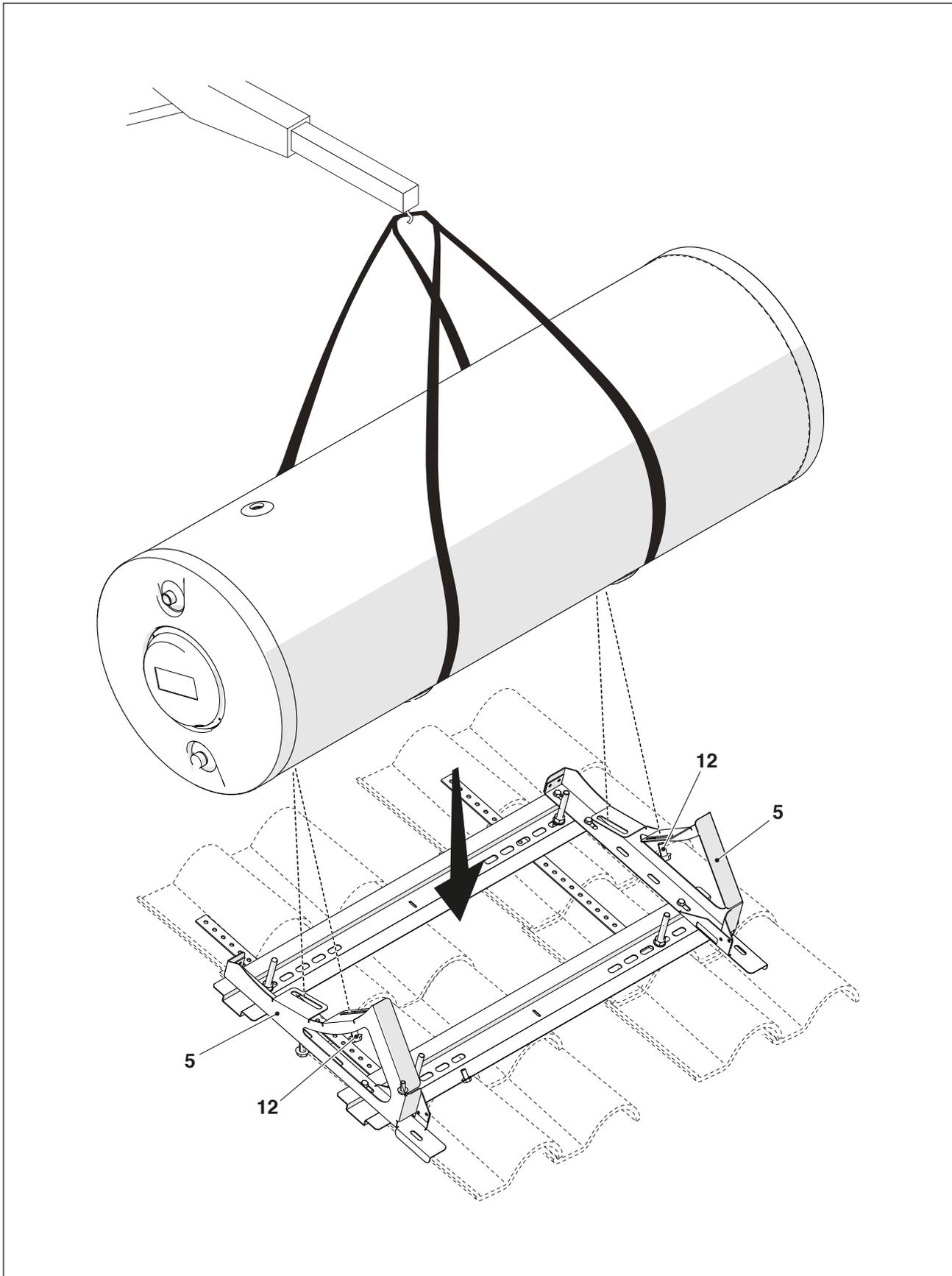
Proceed as follows:

- Screw the nuts (8) and washers (11) as far down as possible over the studs
- Fit the profiles (6) over the studs
- Fix the profiles in place with the nuts (8)

Fix the mounting brackets (5) to the profiles (6) with the M8 screws (12) and nuts (9).



Position the storage cylinder on the mounting brackets (5) and fix it in place with the M8 bolts (12).

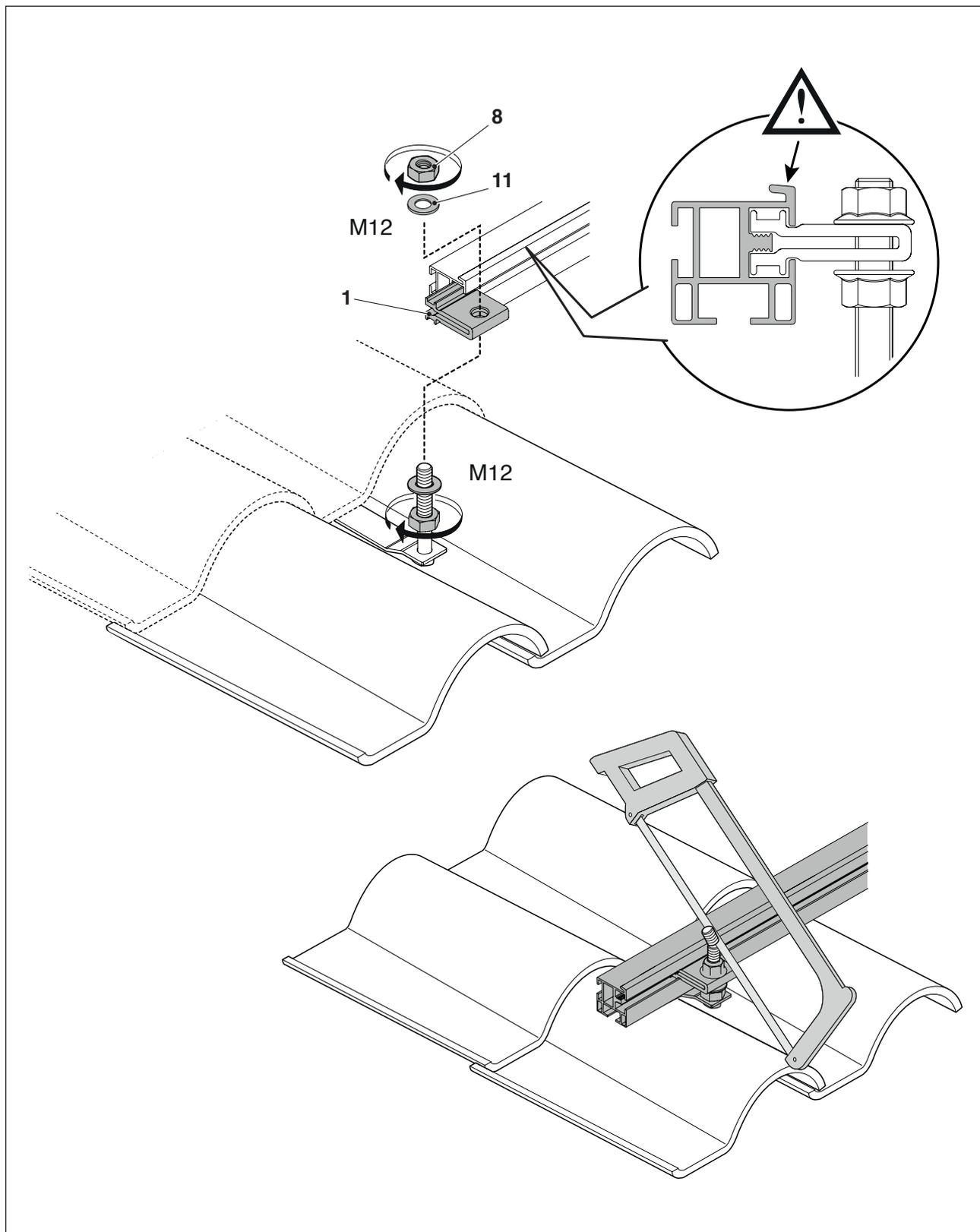


Fit the support bar to the rear studs.

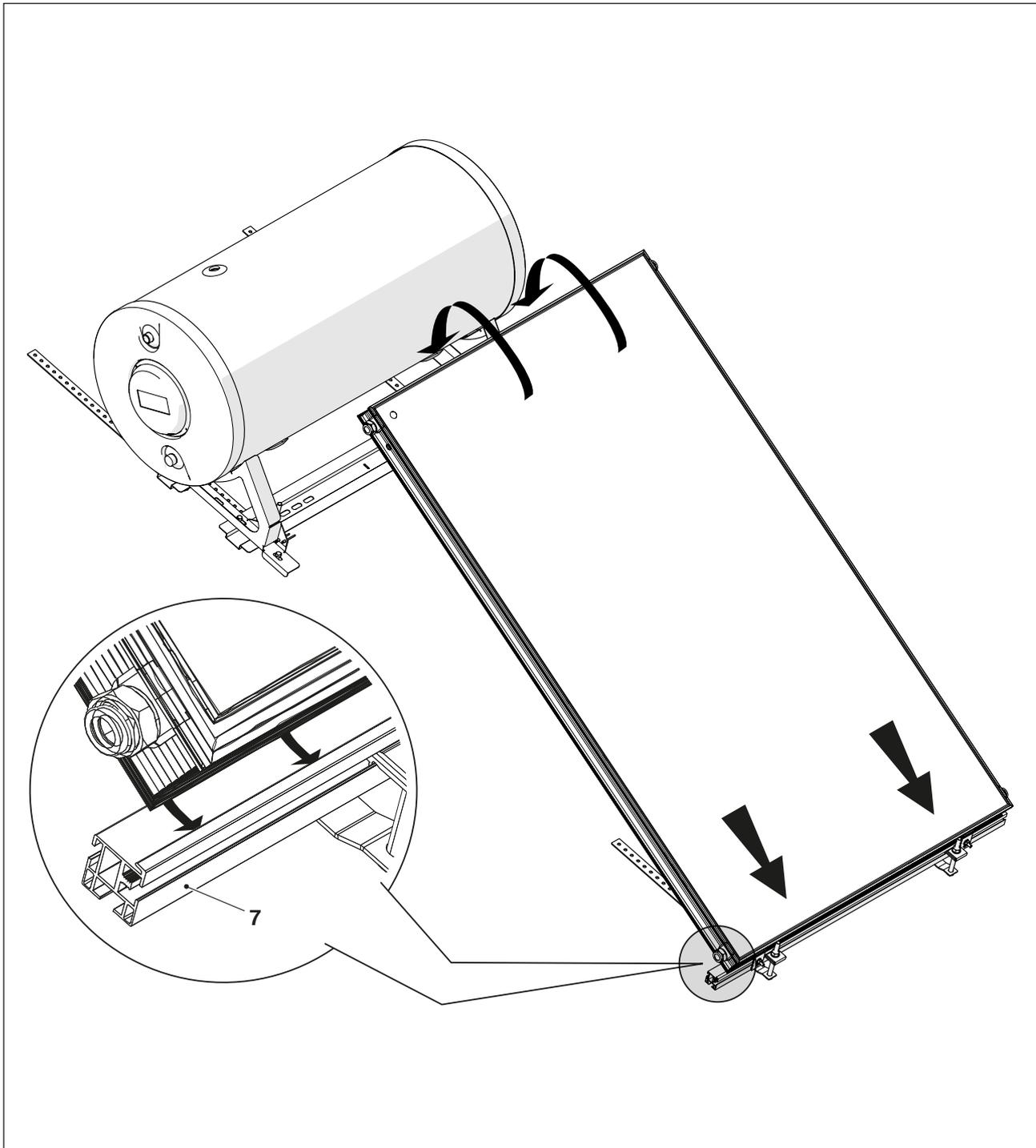
Proceed as follows:

- Screw the nuts (8) and washers (11) as far down as possible over the studs
- Fit the clamps (1) to the studs on the strips
- Engage the support bar (7) in the clamps (1)
- Fix the support bar (7) in place with the nuts (8) of the clamps (1)

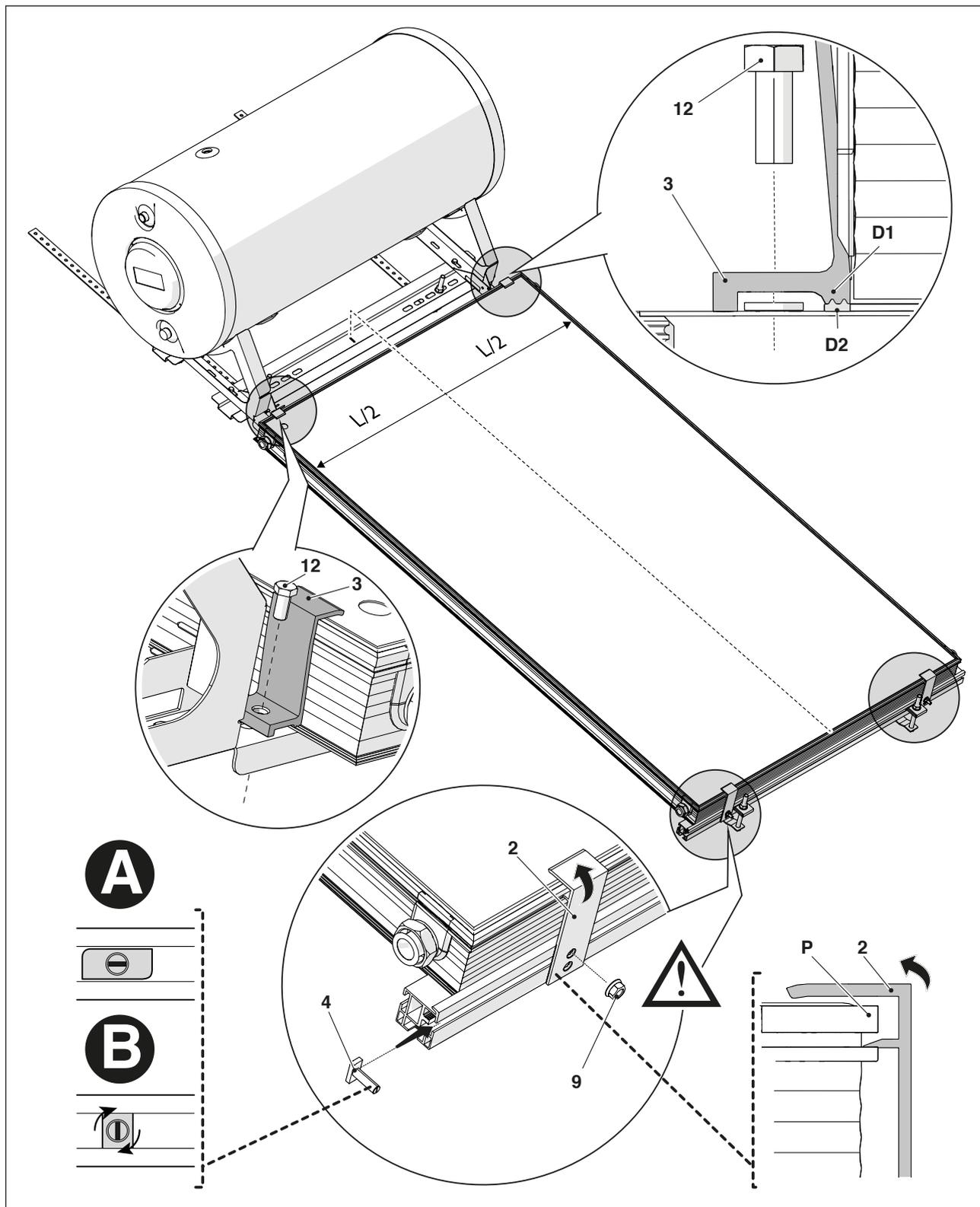
Adjust the clamps to the same height and fix them in place (about 20-30 mm from the top of the tiles), then saw off the protruding lengths of stud.



Position the collector, pivoting it on the support bar (7).



Secure the collector with the top fixing brackets (3).
 Make the water connections.
 Secure the collector with the bottom fixing brackets (2), using the top hole.



- ⚠ Arrange the rectangular head screw (4) in position (A) in the bottom support rail and fit the fixing bracket (2) or (3) over it. Fit the fixing bracket (2) to the profile (P) of the collector, turning it slightly. Turn the rectangular head screw into position (B) and tighten the nut (9) on to it. After tightening, check that the groove in the screw is PERPENDICULAR to the support rail.
- ⚠ Engage the ridges on the clamp (D1) with the ridges on the frame of the collector (D2)

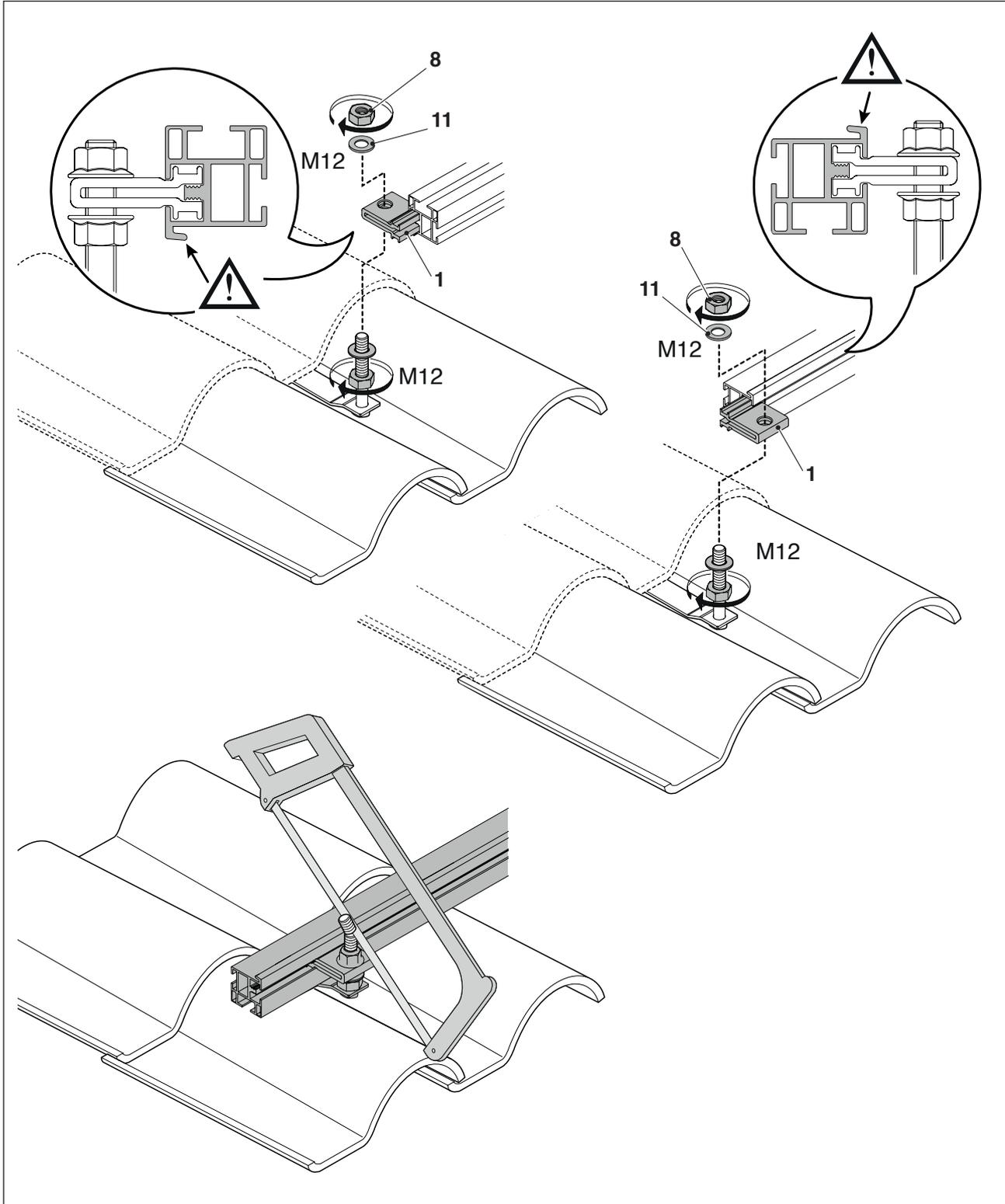
13.3 Steps valid for the following models: 220/2 - 300/2 - 300/3

Fit the support bars to the front and rear studs.

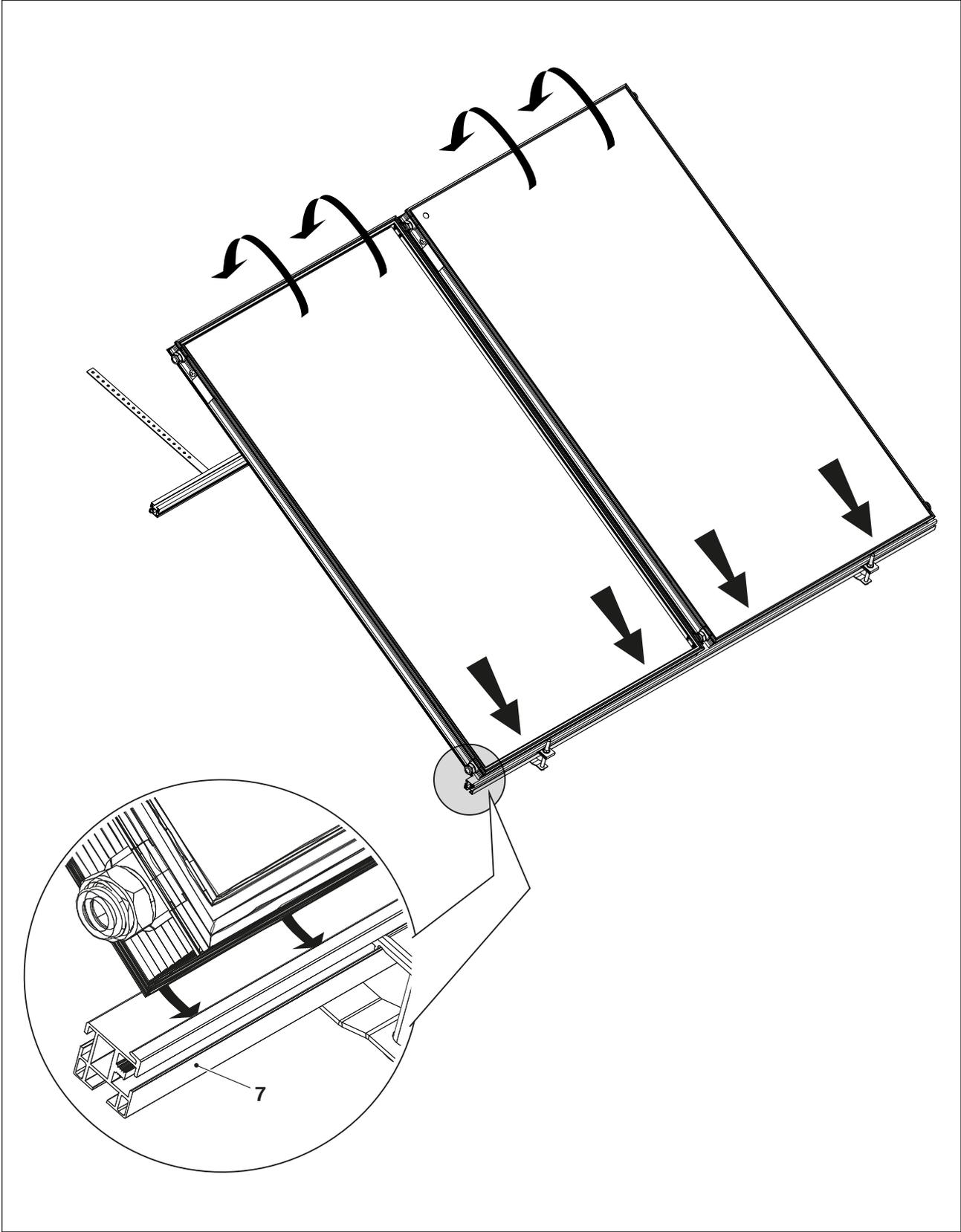
Proceed as follows:

- Screw the nuts (8) and washers (11) as far down as possible over the studs
- Fit the clamps (1) to the studs on the strips
- Engage the support bar (7) in the clamps (1)
- Fix the support bar (7) in place with the nuts (8) of the clamps (1)

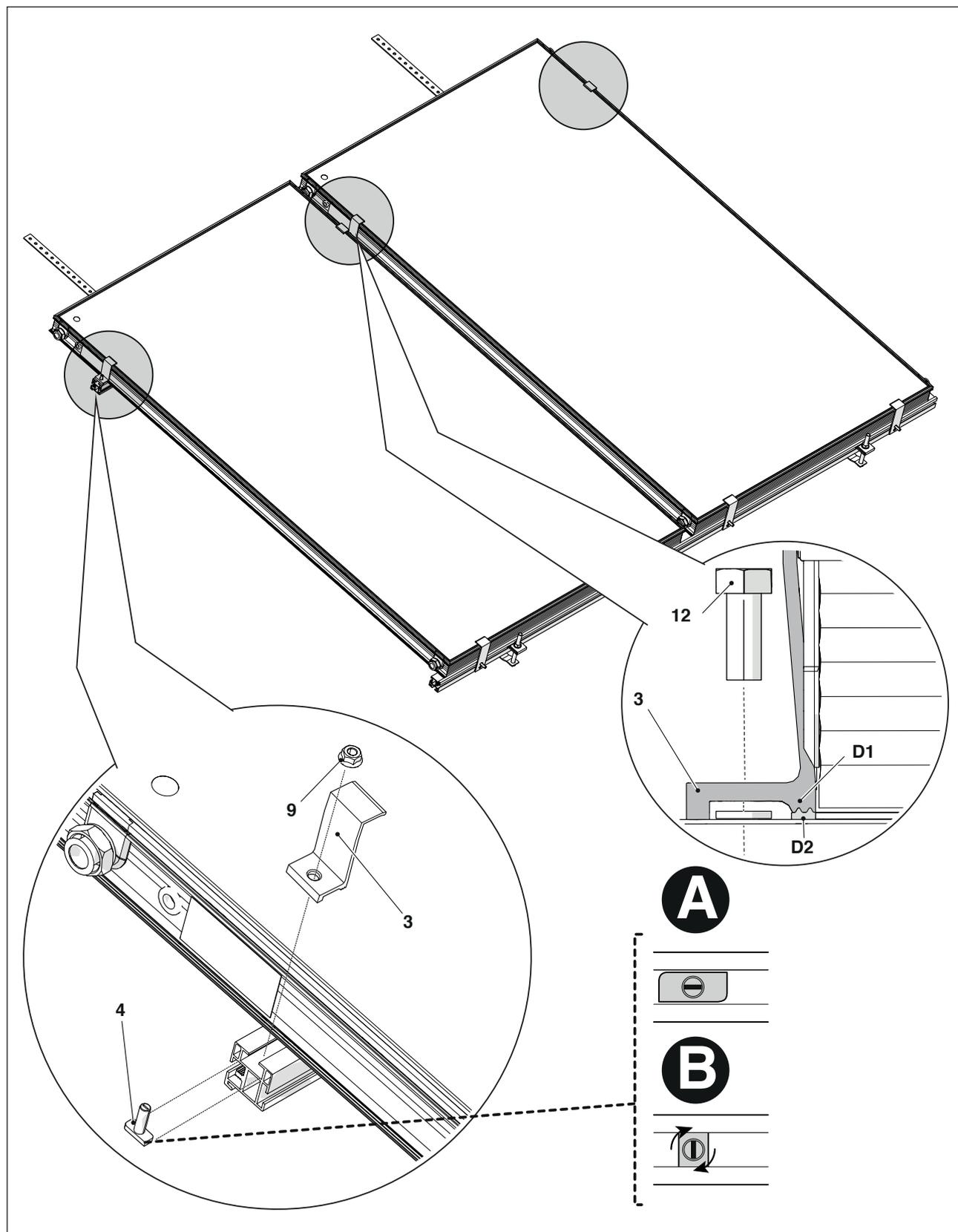
Adjust the clamps to the same height and fix them in place (about 20-30 mm from the top of the tiles), then saw off the protruding lengths of stud.



Position the collector, pivoting it on the support bar (7).



Secure the collector with the top fixing brackets (3).



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 Arrange the rectangular head screw (4) in position (A) in the top support rail and fit the fixing bracket (3) over it. Fit the fixing bracket to the profile of the collector, turning it slightly. Turn the rectangular head screw into position (B) and tighten the nut (9) on to it. After tightening, check that the groove in the screw is PERPENDICULAR to the support rail.

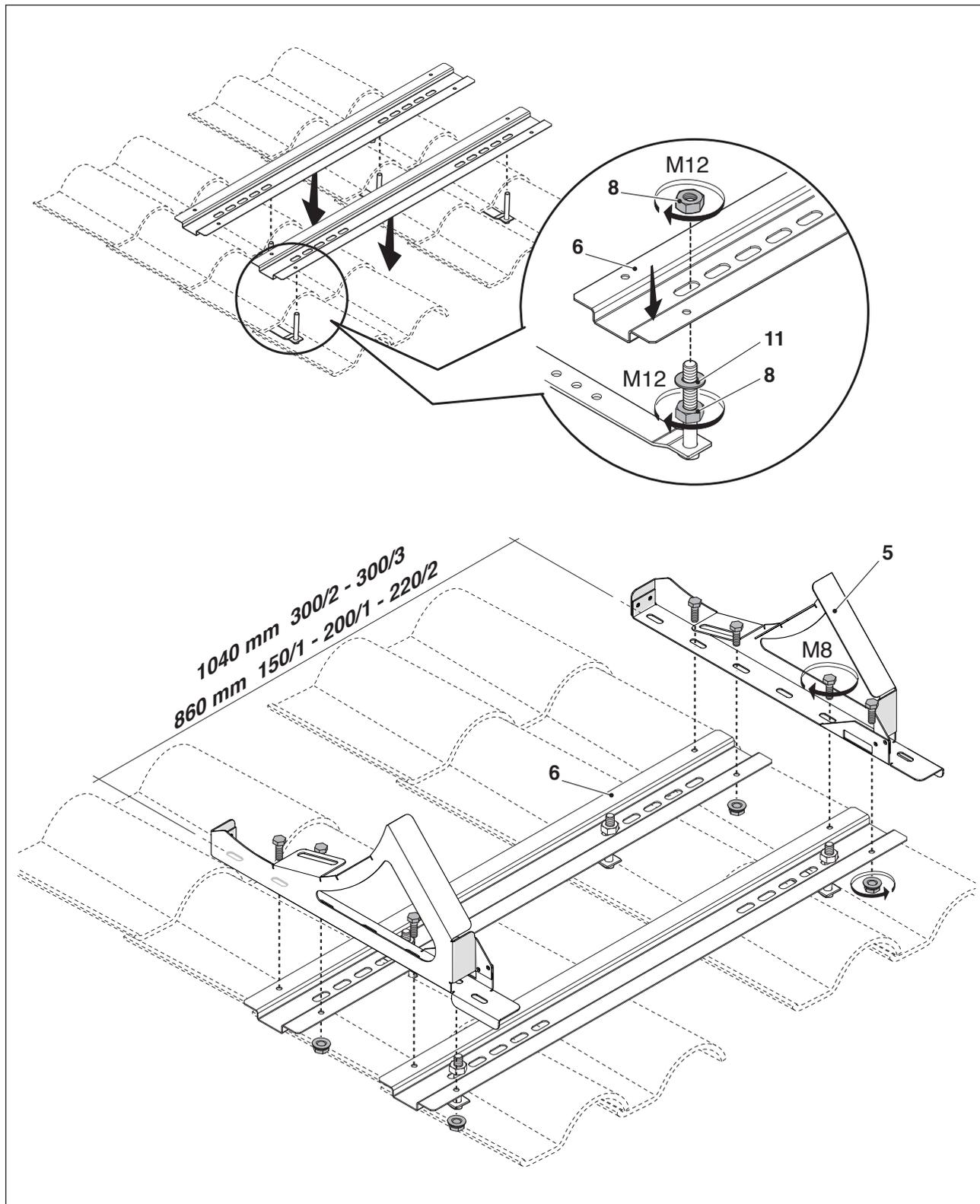
 Engage the ridges on the clamp (D1) with the ridges on the frame of the collector (D2)

Fix the profiles to the front studs.

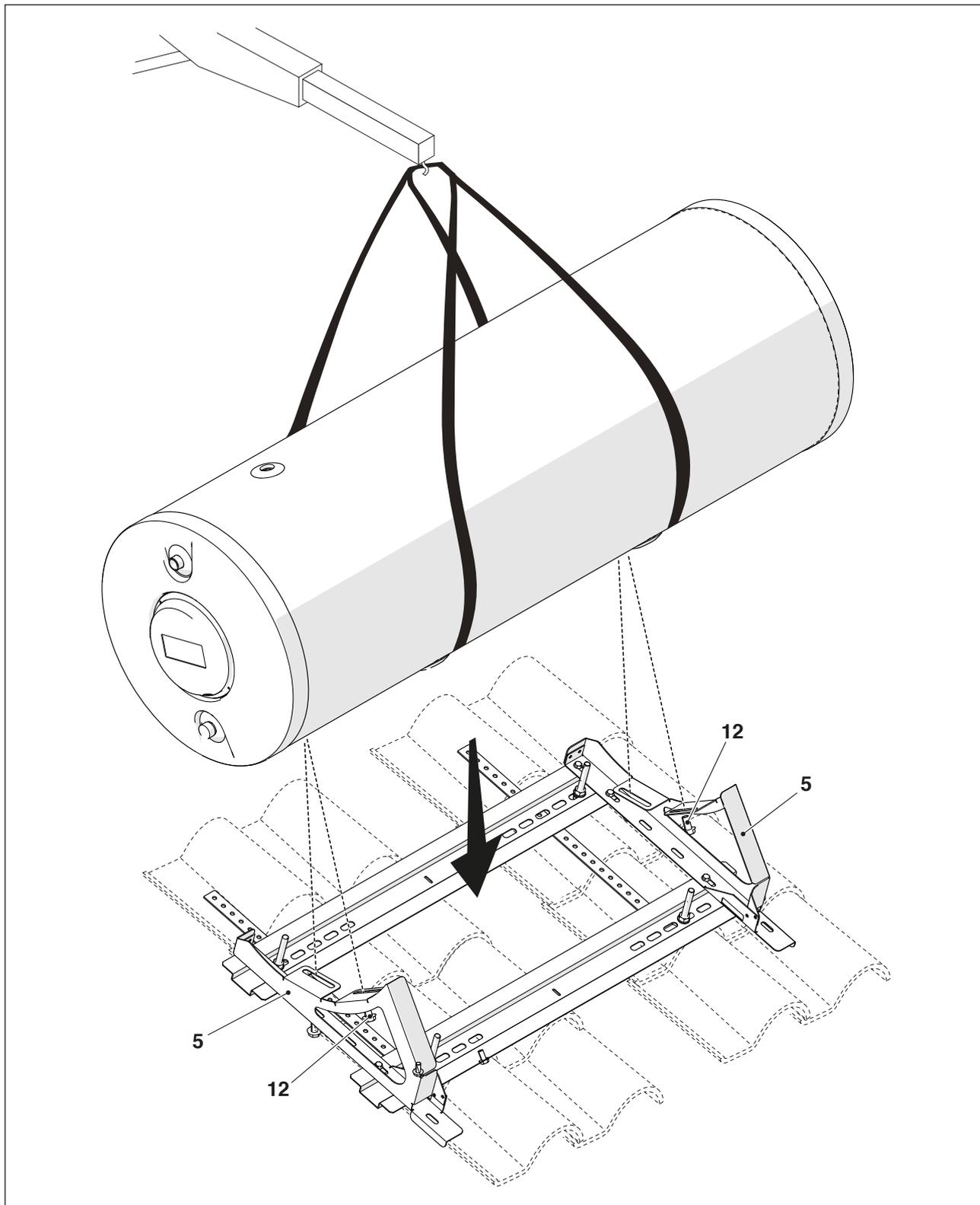
Proceed as follows:

- Screw the nuts (8) and washers (11) as far down as possible over the studs
- Fit the profiles (6) over the studs
- Fix the profiles in place with the nuts (8)

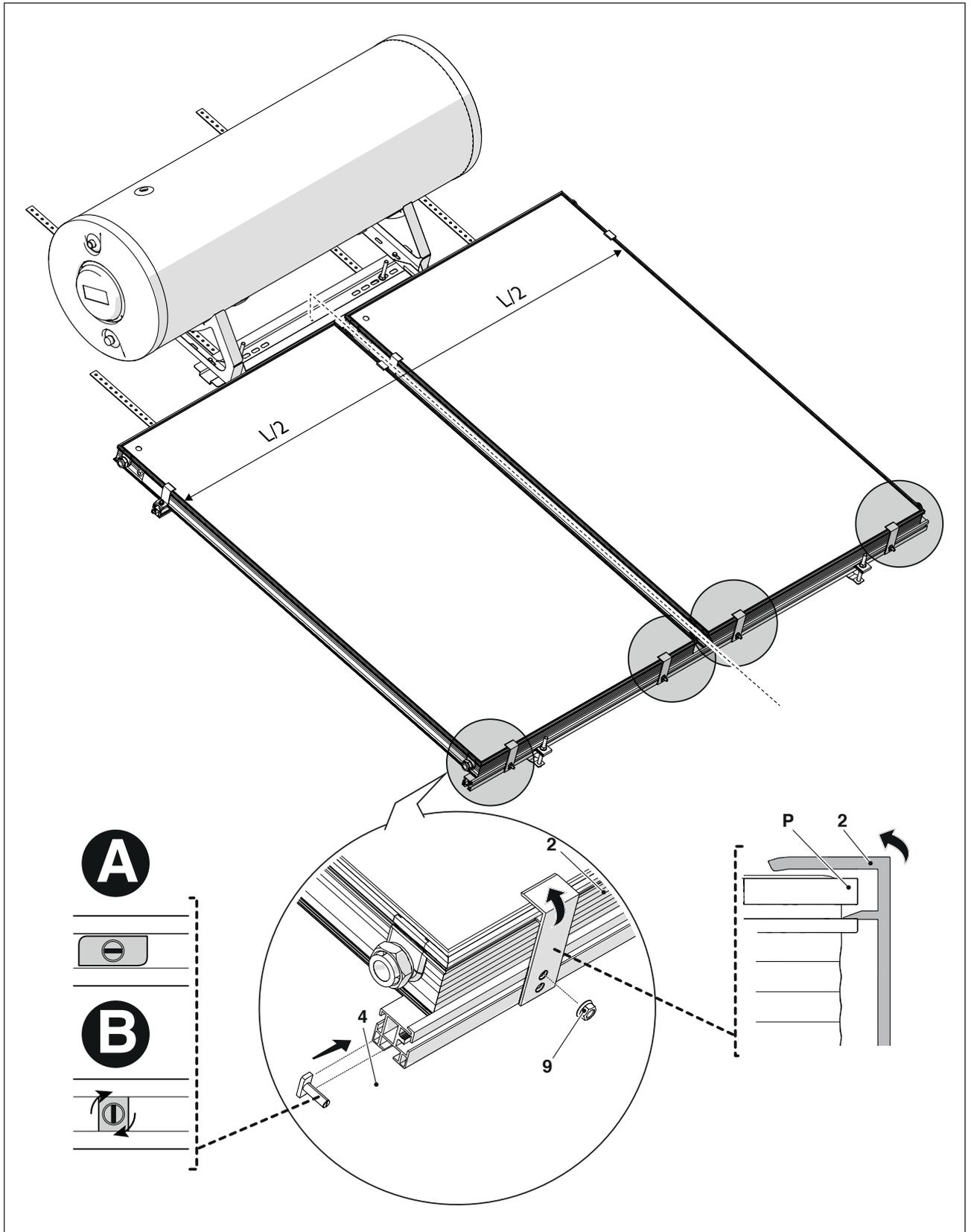
Fix the mounting brackets (5) to the profiles (6) with the M8 screws (12) and nuts (9).



Position the storage cylinder on the mounting brackets (5) and fix it in place with the M8 bolts (12).



Make the water connections.
Secure the collector with the bottom fixing brackets (2), using the top hole.



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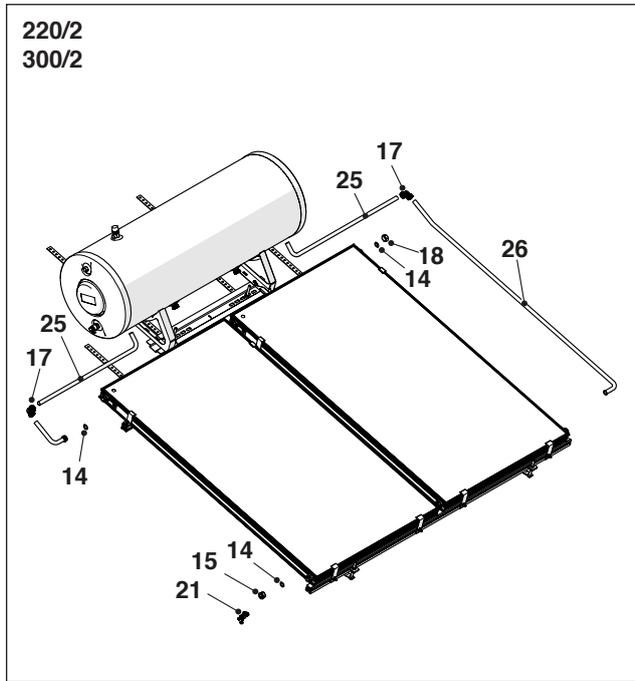
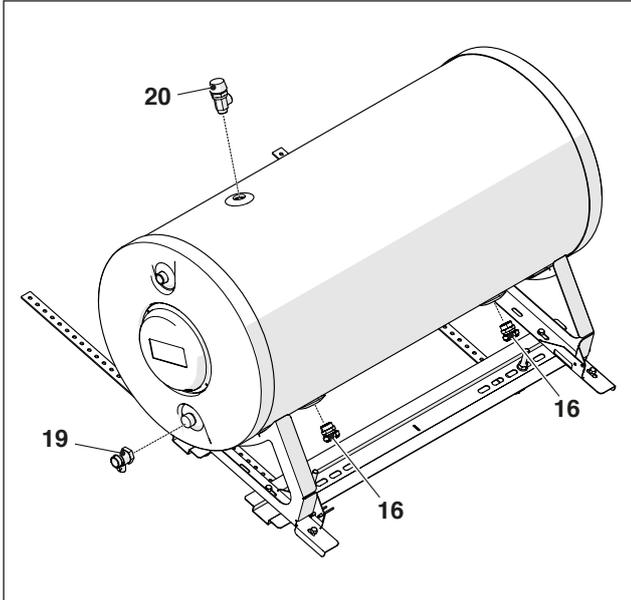
 Arrange the rectangular head screw (4) in position (A) in the bottom support rail and fit the fixing bracket (2) over it. Fit the fixing bracket (2) to the profile (P) of the collector, turning it slightly. Turn the rectangular head screw into position (B) and tighten the nut (9) on to it. After tightening, check that the groove in the screw is **PERPENDICULAR** to the support rail.

13.4 Steps valid for all models

Make the following connections:

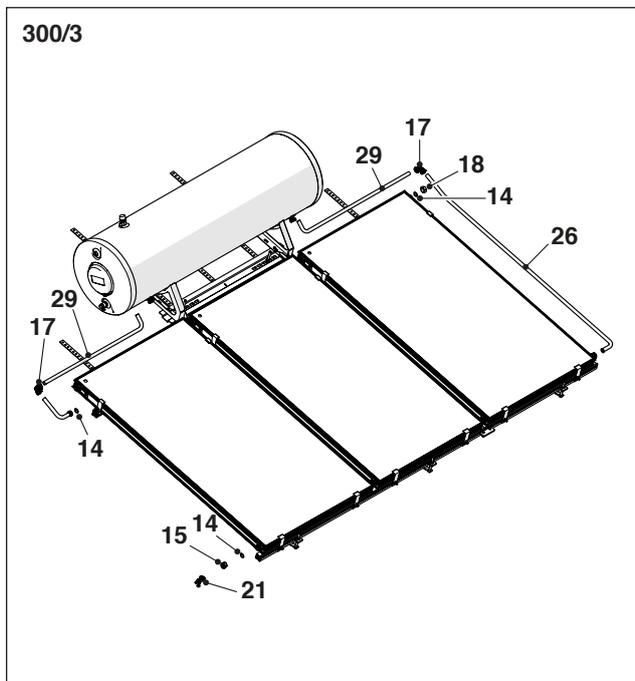
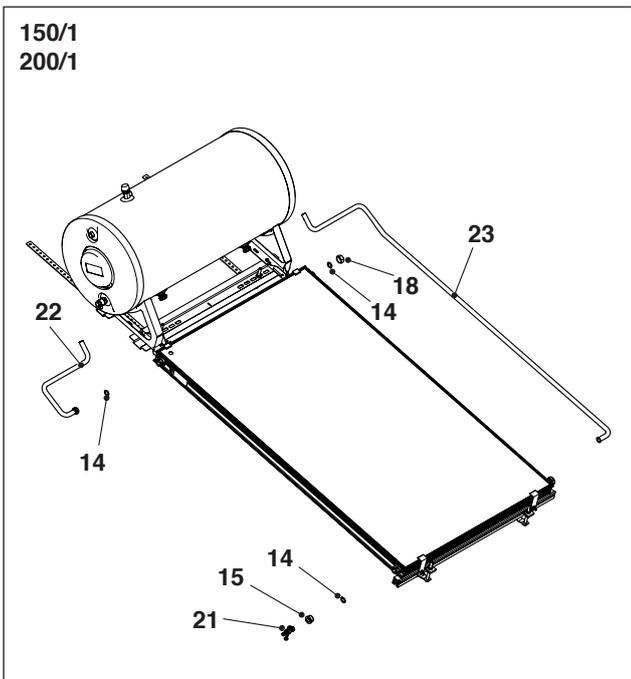
- 2.5 bar safety valve (20)
- 10 bar safety valve (19)
- straight flow and return unions (16)

 The seals are located inside the collector's corner profiles.



Complete the collector water connections:

- flow pipes
- return pipes
- drain cock
- plug

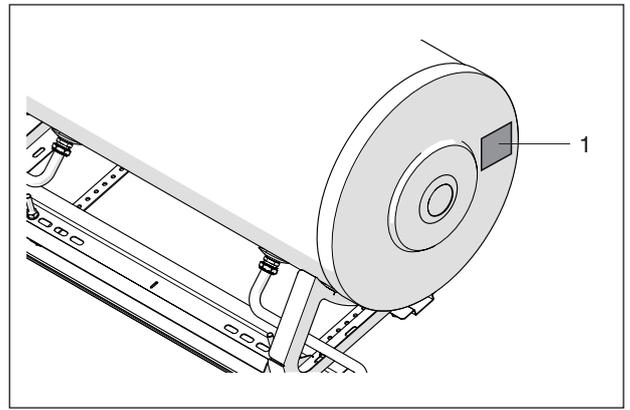


Make sure that you comply with all applicable lightning protection and building potential compensation legislation.

On completion of assembly, make sure that the **Beretta** solar water heating system is perfectly stable, then remove the protective film from the storage cylinder. Apply the data plate (1) and the **Beretta** label to the storage cylinder.

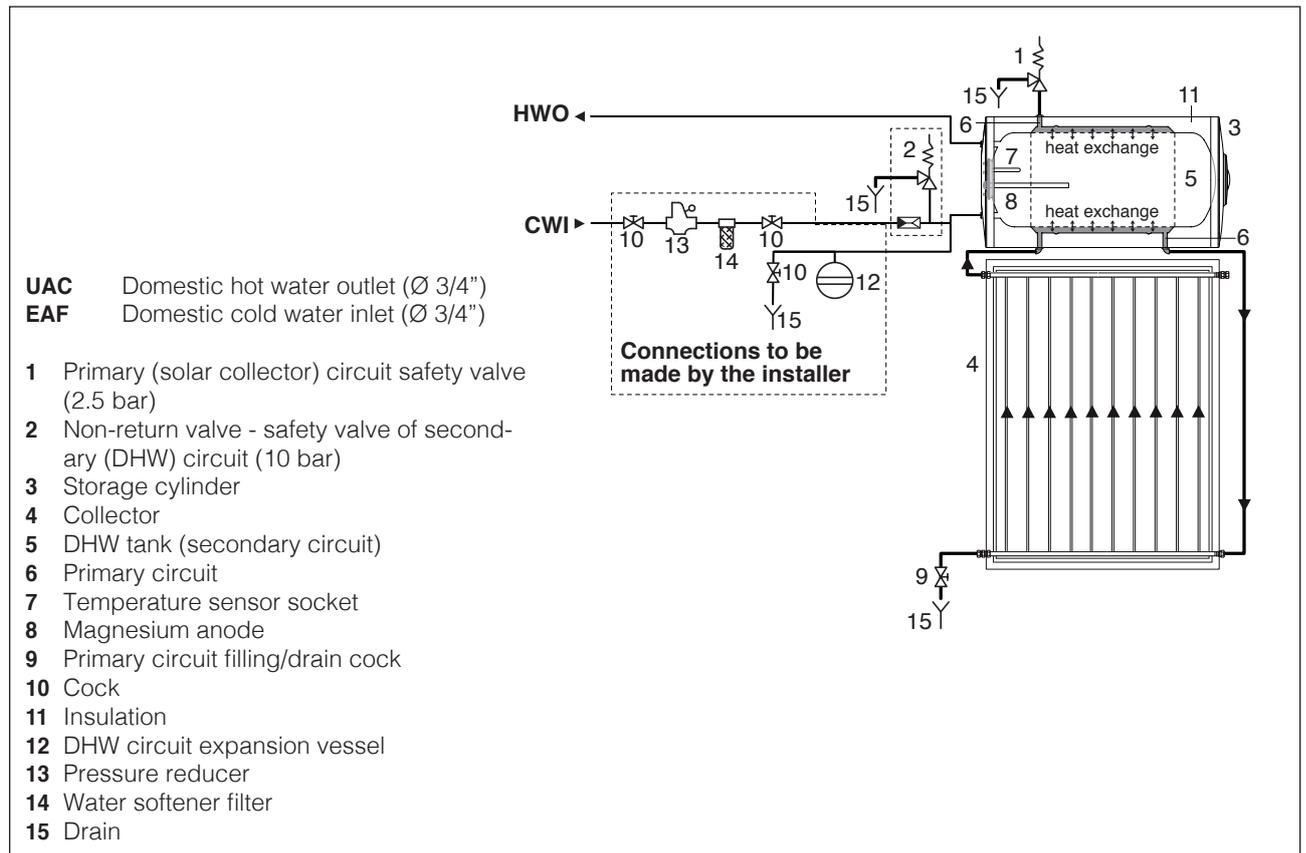


Never attempt to install the system without using the personal protection equipment and without following the safety precautions specified by applicable occupational safety standards.



A protective film is applied to the glass of the solar collector to protect the absorber against solar irradiation and prevent the solar collector from becoming too hot if it is not going to be put into service immediately. **Fill the system, but do not remove the film until you are ready to put the system into service.** Take care when removing the film as it may be electrostatically charged. Do not leave the protective film in place for longer than 12 months. Once removed, the protective film cannot be re-used. Dispose of the protective film in compliance with legislation governing the disposal of PVC.

14 SYSTEM WATER CONNECTIONS



The water supply circuit must permit the storage cylinder to be filled and emptied in safety. Shut-off valves must therefore be easily accessible to the user and the operation of emptying the storage cylinder must not create any risk of flooding or other damage.



All water pipe connections must conform to applicable standards.



The operating pressure limits specified on the data plate must never be exceeded. It may therefore be necessary to fit a pressure reducer.

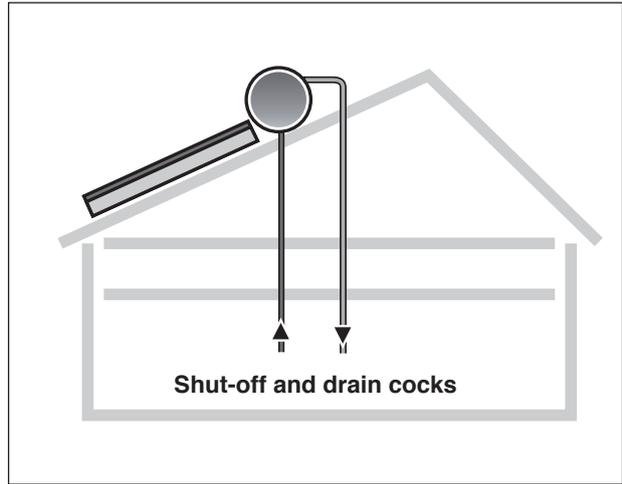


A thermal mixing valve must always be connected to the hot water outlet to control the temperature of hot at the taps.



The point through which the water pipes enter the building must be rain-proof and damp-proof.

 All shut-off cocks and drain cocks must be easily accessible. Make sure that the end user fully understands how they function.



15 PREPARING FOR INITIAL STARTUP

Proceed as follows to fill the primary and secondary circuits.

- Fill the DHW tank.
- Flush out the solar collector circuit.
- Fill the solar collector circuit.

 Fill the DHW tank before filling the solar collector circuit.

 Only fill the solar collector circuit when the collectors are cold.

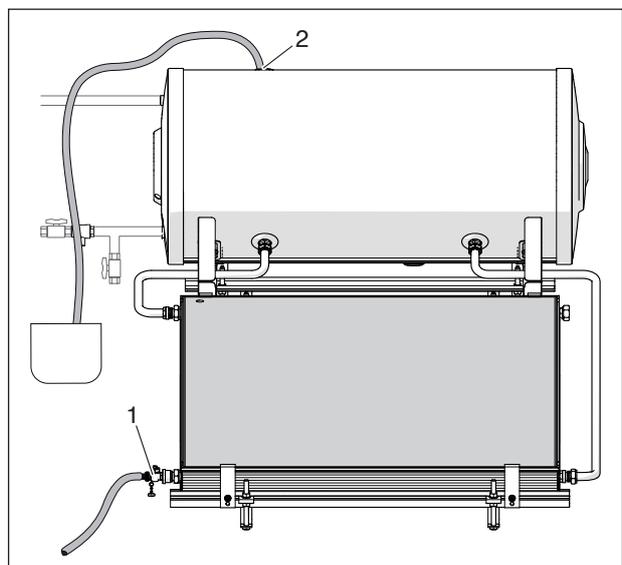
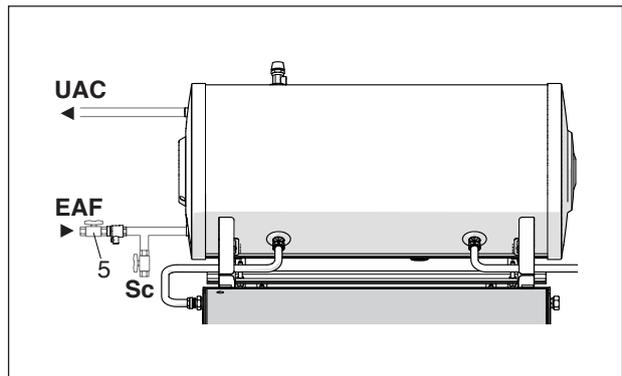
FILLING THE DHW TANK

- Open and leave open the cock (5) for the domestic cold water inlet (CWI).
- Open a hot water tap and fill the storage cylinder with cold water from the mains supply. When water starts coming out of the hot water tap, leave it run until you obtain an even flow then close the tap. The DHW tank is now full.

FLUSHING THE SOLAR COLLECTOR CIRCUIT

Carefully check all connections and unions for leaks before filling the system with the water and glycol mix. Use the following procedure to test for water tightness. The same procedure can also be used to flush out the circuit to remove any residues.

- Connect the hose union on the filling/drain cock (1) to a cold water tap using a length of hose pipe.
- Connect the union (2) on the storage cylinder to a drain.
- Open the cock (1) and the cold water tap and leave water flow into the solar collector circuit for a few minutes.
- Close the cold water tap and the cock (1).
- Check all connections and unions for leaks.



FILLING THE SOLAR COLLECTOR CIRCUIT

Heat transfer liquid

The anti-freeze supplied contains non-toxic, biodegradable and environmentally friendly propylene glycol. Mix the propylene glycol with water (preferably demineralised). Establish the necessary concentration of propylene glycol using the table alongside on the basis of the temperatures for which anti-freeze protection is required.

 Only use the products listed in the **Beretta** Catalogue to top up the circuit.

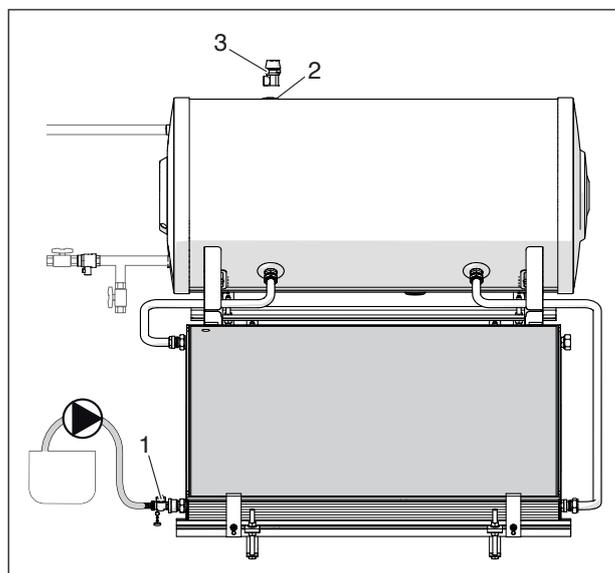
Anti-freeze	Temperature	Density (20 °C)
55%	-40 °C	1,048 kg/dm ³
50%	-32 °C	1,045 kg/dm ³
45%	-26 °C	1,042 kg/dm ³
40%	-21 °C	1,037 kg/dm ³
35%	-17 °C	1,033 kg/dm ³
30%	-14 °C	1,029 kg/dm ³
25%	-10 °C	1,023 kg/dm ³

Pressure and gravity filling

- Premix a sufficient volume of water and glycol solution in a suitable container, selecting the right concentration according to the table above.

Pressure filling

- Use lengths of rubber hose to connect a pump between the container and the hose union on the filling/drain cock (1). Open the cock.
- Start up the pump and fill the solar heating circuit until the heat transfer liquid starts to flow out of the fitting (2) at the top of the storage tank.

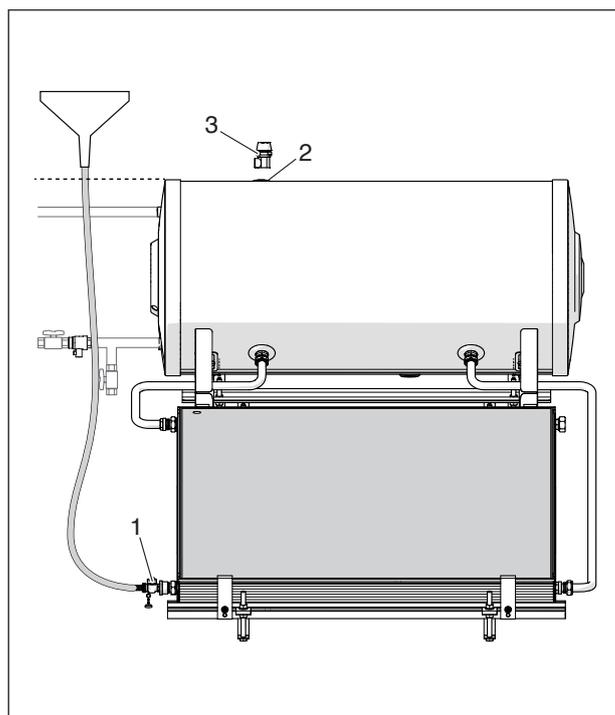


Gravity filling

- Use a length of rubber hose to connect the container to the filling/drain cock (1). Open the cock.
- Fill the solar heating circuit under gravity until the heat transfer liquid starts to flow out of the fitting (2) at the top of the storage tank.

When the storage cylinder is full:

- Close the cock (1).
- Fit the safety valve (3) to the fitting (2).



16 INITIAL STARTUP

Checks and preparations for initial start-up

Fill the storage cylinder with (potable) water.	
Fill the solar collector circuit.	
Make sure that the domestic cold water inlet cock is open.	
Make sure that the safety valves are functioning.	
Check the system for leaks.	

Check the concentration of the anti-freeze.	
Uncover the solar collectors and clean them if necessary.	
Make sure that the system is securely fixed to the mounting frame.	
Make sure that the roof does not leak.	
Inspect the insulation.	

17 MAINTENANCE

- ⚠ The solar water heating system must be serviced periodically by **Beretta's** Technical Assistance Centre or by a qualified heating engineer.
- ⚠ The system should be serviced at least once a year, ideally in the autumn.
- ⚠ Check the condition of the magnesium anode.

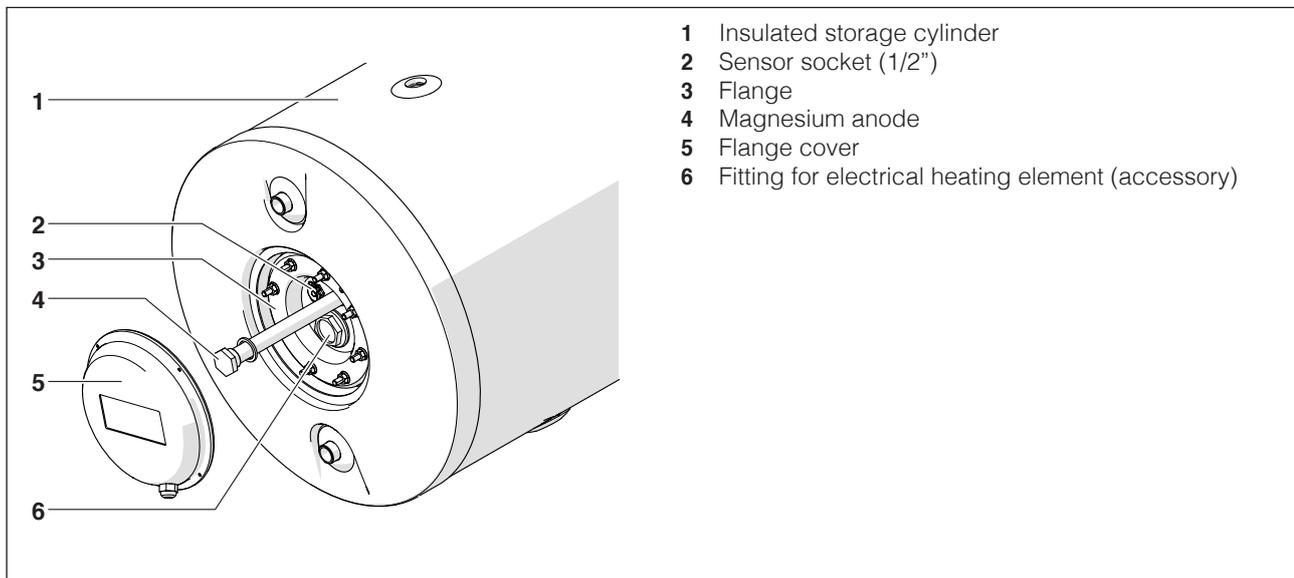
Visually inspect the collectors for damage/dirt.	
Visually inspect the storage cylinder.	
Visually inspect the mounting frame and roof anchor points.	
Inspect the insulation.	
Make sure that the roof does not leak.	
Make sure that the safety valves are functioning.	

Check the system for leaks.	
Check the concentration of the anti-freeze.	
Check the pH of the anti-freeze with litmus paper.	
Topping up or changing the heat transfer liquid	
Clean inside the storage cylinder (every 2 years or more frequently in hard water/high temperature areas)	

Checking the heat transfer liquid

- Use an instrument like a refractometer or densimeter to check the density of the anti-freeze. If the value is below that necessary to protect the system at the minimum temperature selected, replace the heat transfer liquid or add anti-freeze.
- Use litmus paper to check the pH (nominal value approx. 7.5). If the measured value is below 7, change the heat transfer liquid.

Storage cylinder components



- 1 Insulated storage cylinder
- 2 Sensor socket (1/2")
- 3 Flange
- 4 Magnesium anode
- 5 Flange cover
- 6 Fitting for electrical heating element (accessory)

Topping up or changing the heat transfer liquid

For certain maintenance operations (such as replacing pipes or unions or changing the heat transfer liquid) the solar collector (primary) circuit may have to be drained.

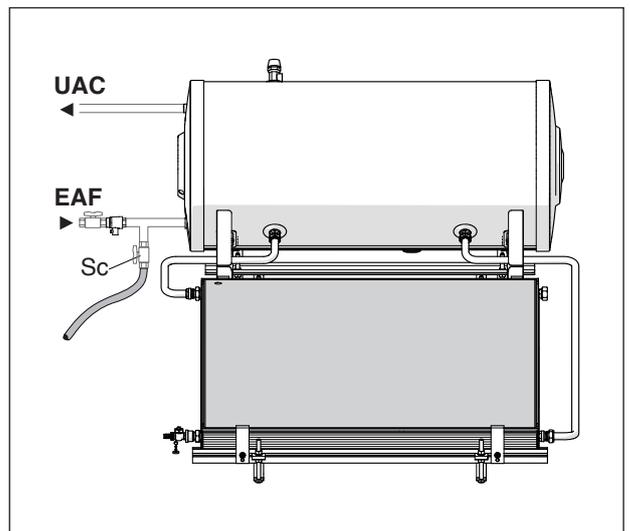
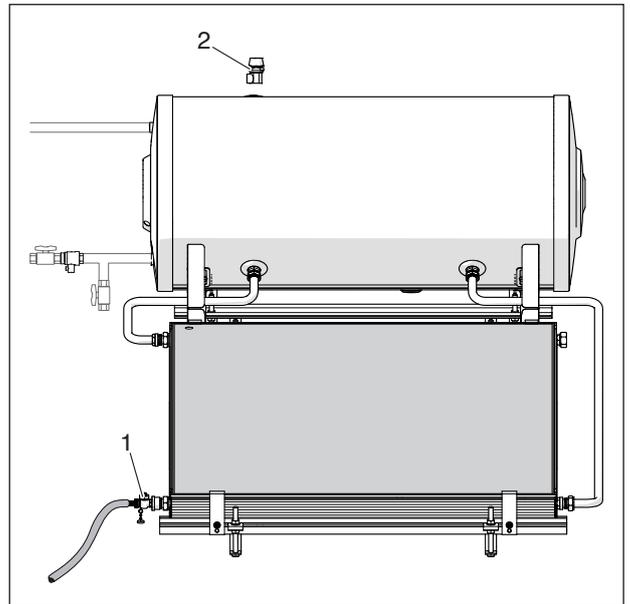
Proceed as follows:

- Connect a hose to the hose union on the filling/drain cock (1).
- Open the cock (1).
- Remove the safety valve (2) to allow air into the primary circuit and allow the heat transfer liquid to flow out.

 Only use the products listed in the **Beretta** Catalogue to top up the circuit.

 In areas where there is a significant risk of freezing, take particular care over tightness testing and flushing with water.

 DO NOT drain the solar collector circuit under sunny conditions or when the collectors are hot.



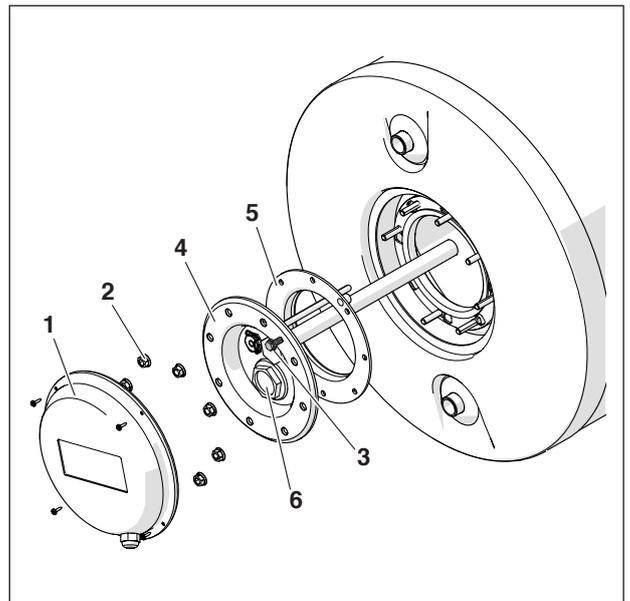
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Cleaning inside the storage cylinder

Proceed as follows to clean inside the storage cylinder:

- Close the domestic cold water inlet cock.
- Connect a hose to the storage cylinder drain cock (D) fitted on installation, and open the cock. Leave the water run out until the tank is completely empty.
- Unscrew the fixing screws and remove the flange cover (1) from the left of the storage cylinder.
- Remove the nuts (2) and screw the bolt (3) in to release the flange (4) from the tank.
- Remove the flange (4). Check and clean the inside of the tank. Check the condition of the seal (5). Replace if necessary.
- Check the magnesium anode (6) for wear and replace it if necessary.
- On completion of cleaning, follow the above steps in the reverse order to refit all removed parts.

 Screw the bolt (3) out until the flange fits snugly against the tank. Tighten the nuts (2) to secure the flange (4), proceeding diagonally around the flange to apply pressure uniformly around the seal.



END USER INSTRUCTIONS

The **NB-SOL TIS 0°** system is a solar hot water heating system that functions on the principle of natural circulation. The heat transfer liquid therefore circulates by normal convection. The system comprises one or more solar collectors and a jacket type storage cylinder, located above the collector/s. The system does not require any pumps or adjustments.

18 PUTTING INTO SERVICE

The system must be put into service for the first time by **Beretta's** Technical Assistance Centre. After this it will continue to function automatically.

19 MAINTENANCE

If the system is easily accessible, regularly check the cleanliness of the glass panel/s of the collector/s. If necessary, clean the glass, but only when it is cold, preferably in the early morning. If access is difficult, contact your local Technical Assistance Centre.

Once a year, check the condition of the insulation around the pipes.

If the system is not going to be used for an extended period of time, contact your local Technical Assistance Centre to have it made safe.

-  The solar water heating system must be serviced periodically by **Beretta's** Technical Assistance Centre or by a qualified heating engineer.
-  The system must be serviced at least once a year.
-  If no domestic hot water is drawn off from the system, the safety valves of the domestic hot water and solar collector circuits may open to discharge pressure and ensure correct functioning.
-  These safety valves present a risk of burns or scalding. If a pressure in excess of 2.5 bar builds up in the solar collector circuit, the safety valve opens.
-  Check the condition of the magnesium anode regularly as it provides protection against corrosion.
-  The system can reach very high temperatures (>150°C) under normal operating conditions. Take the greatest care to avoid burns or scalding.
-  In the event of any malfunctioning or failure, and to have parts replaced, contact **Beretta's** Technical Assistance Centre.

20 TROUBLESHOOTING

FAULT	CAUSE	SOLUTION
No or insufficient domestic hot water production	Unusually high draw of DHW.	- Check.
	Water leaks in the DHW distribution circuit.	- Check.
	Collector glass covered in dust or leaves.	- Clean.
	The level of heat transfer liquid in the circuit has dropped as the result of leaks from the unions or because of over-temperature during extended periods of disuse.	- Top up the circuit with water/glycol mix and bleed any air out.
	Air bubbles have formed inside the circuit and are impeding natural circulation.	- Bleed the circuit by loosening the uppermost union on the short pipe until liquid comes out. - Top up to replace any lost liquid.
Vibrations	Loose screws.	- Tighten the screws.

21 DISPOSAL

When the system is no longer needed, do not abandon it in the environment, but dispose of it through appropriate channels and in compliance with applicable legislation.

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The manufacturer strives to continuously improve all products. Appearance, dimensions, technical specifications, standard equipment and accessories are therefore liable to modification without notice.

