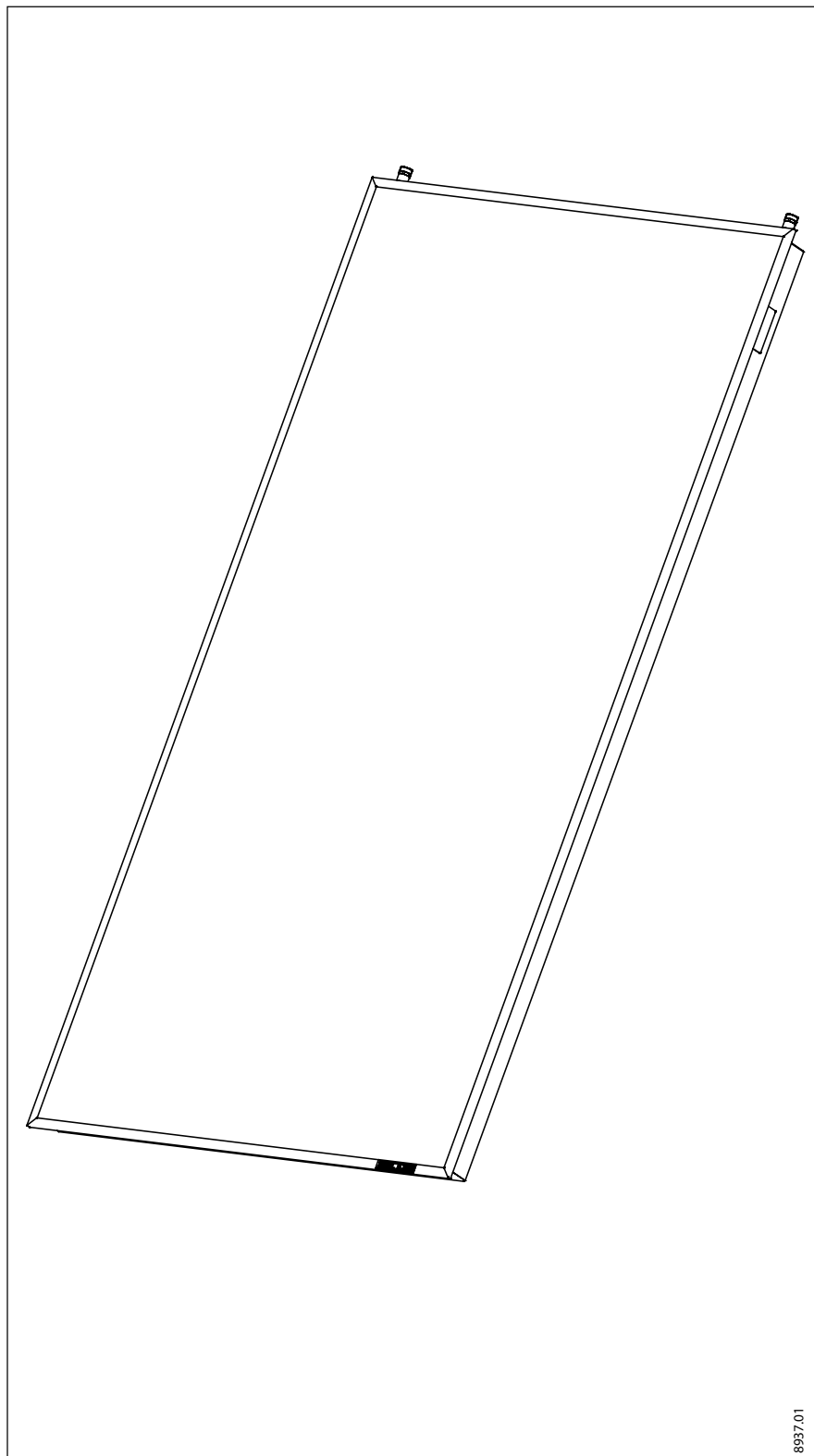

SOL25Plus

High-Performance Flat-Collector Operating and Assembly Instructions



Contents

Safety instructions	2
1 Assembly instructions	3
1.1 Equipment Description	3
1.2 Important information	3
1.3 Technical data	3
2 Installation Instructions	4
2.1 Accessories	4
2.2 Installation	4
2.3 Roof Installation	6
2.4 Wall Installation	8
2.5 Frame Splice Kit	8
2.6 15-30° Tilt	9
2.7 Lightning Protection and Bonding	10
2.8 Setting Up and Interconnecting the Collectors	11
2.9 Filling the Heat Transfer Fluid Loop	12
2.10 Pressure Test	12
2.11 Start-up	12
3 Maintenance and Troubleshooting	13
3.1 Maintenance and Care	13
3.2 Troubleshooting	13
Startup Checklist	15
Contact	16
Certification	17

Assembly (water and electrical installation) as well as the initial start-up and maintenance of the appliance may be performed only by authorised, skilled personnel in accordance with these instructions.

Safety instructions

Stiebel Eltron Solar Collectors should only be installed by Qualified installers. These are not do-it-yourself appliances.

Please hand this Operation and Installation Manual to the home or building owner when the installation is complete

Collector

 A solar collector generates heat from sunlight and all other types of light. This leads to collector connectors getting very hot, even when they are not filled. This creates a risk of burning. Cover the collectors with opaque material until the installation has been completed. It is recommended you leave the collector inside its packaging until it is installed.

Safety

 Never install any shut-off valves in the line between the collectors and the safety valve. The safety valve responds at 87 PSI pressure.

 Never set the Solar loop pressure greater than potable pressure

Solar system must not bypass auxiliary system safety devices.

Check valve

The Flowstar is equipped with two check valves that are designed to prevent thermosyphon heat loss from the tank to the solar loop.

Drain facility

Install a drain valve at the lowest point of the system.

Expansion vessel

The expansion vessels are designed for an operating pressure of 87 PSI and are resistant to Propylene Glycol. The inlet pressure is set to 5 PSI to 7 PSI less than Start-up pressure ; check it when the system has not been filled. This pressure must not be reduced.



Neither drop the collector nor anything onto the collector.



Never step onto or stand on the collector.



Never leave the collector unsupported or unsecured. The glass could break if the collector falls over.



Setting the maximum tank temperature higher than 140 f at the control unit is only permissible in conjunction with a thermostatically controlled DHW mixer. Otherwise there would be a risk of scalding at the draw-off point.



All sensor wiring needs to be rated for expected temperatures. All sensor wiring needs to be protected from degradation and false signals

Solar Loop

50% GRAS Propylene Glycol and already mixed deionized Water
Heat Exchanger type SW, AWWA Fluid Class II

See MSDS for handling instructions

Warning: Fluid may be discharged at high temperature and or pressure.

Warning: No other fluid shall be used that would change the original classification of this system. Unauthorized alterations to this system could result in a hazardous health condition.

The control unit and the pump must stay on except for Repair and/or Emergency. The Controller and solar pump remains activated in order to avoid overheating the collectors!

To SHUT-DOWN for repair, cover collectors or work at night.

If EMERGENCY SHUT-DOWN is needed you can put the System into manual operating mode, (HAND: OFF see SOM manual) Then call for service.

There are three Isolation Valves on the Flowstar. (see Flowstar manual P7,P9)



Assembly Instructions for the Professional

1.1 Equipment description

Flat-plate collector SOL 25 plus.

The flat-plate collector converts light (radiation) into heat. Light penetrates the glass cover. It is made from pre-stressed, highly transparent single pane safety glass. The light strikes the absorber and is converted into heat. The highly selective vacuum coating of the absorber and the thermal insulation on the back of the absorber reduce heat losses to the ambience to a minimum. The thermal energy yielded by the collector is transported by the circulating heat transfer medium and a pump to the DHW tank. The inside of the collector can mist up under certain operating condition (e.g. large tank with low temperature level compared to the ambience or high relative humidity). Vent plugs are provided at the collector sides for venting purposes.

1.2 Important information

System pressure

Regularly check the pressure gauge of the heat transfer circuit at the SE Flowstar; display indication (set value): 30-50 Psi when the system is cold (below 86 °f).

2 tank system should includes bypass valves to bypass the solar storage tank and labeled all valves with operating position indicated.

Backup heater needsto be of adequate capacity

Backup water heater must be listed and labeled by an accredited listing organization

Expansion tank is sized for up to 10 Gal and up to 60'.

1.3 Technical data

TYPE		SOL 25 plus
Order no.		18 55 41
Height	inches	87 15/16
Width	inches	48 1/8
Depth	inches	3 1/16
Grid dimension (incl. fitting)	inches	48 1/8 x 91.46
Weight, empty	lb	108
Standstill temperature (at 1000W/m ²)	°f	410
Operating pressure, min.	psi	50
Permissible operating overpressure	psi	87
Test pressure (absorber)	psi	160(ex factory)
Test medium		Water (ex factory)
Pressure test of compl. solar plant	psi	115 with Tyfocor LS
Rated capacity	gal h	13-80
Pressure drops of collector (26 gal/h)	Psi	ca. 29 (68° f) heat-transfer medium temperature)
Pressure drops of collector (52 gal/h)	Psi	ca. 87 (68° f) heat-transfer medium temperature)
Connection		G 3/4" male
Heat-transfer medium		Propylene Glycol, already mixed
Heat-transfer medium content, incl. distributor	.43 gal	
Total area	sq ft	29.06
Effective collector area (aperture area)	sq ft	26.91
Absorber area	sq ft	26.91
Installation angle	°	20°- 90°
Housing		aluminium (saltwater-proof)
Cover		toughened, 0.15" safety glass with structuring (interior), super-transparent, poor in iron
Absorber		copper, highly-selectively vacuum-coated
Pipe		copper, header pipe Ø 3/4, pot pipe Ø 5/16
Thermal insulation, rear wall		mineral wool, 1.57 inches thick
Thermal insulation, side wall		mineral wool, 0.39 inches thick
Seal		EPDM
Connection fittings		pipe bend (stainless steel) with union nut (brass) G3/4"
Power capacity *	W/col.	0 to 2000
Conversion factor h ₀		0,781
Heat loss value a ₀	W/(m ² K ²)	2,838
Heat loss value a ₁	W/(m ² K ²)	0,0154
* Dependent on solar and daylight radiation, installation conditions, temperature of heat transfer fluid and system characteristics.		



Installation Instructions for the Professional

2.1 Accessories

2.1.1 Mounting accessories

Item	Standard delivery	Part no.
R1 frame for one SOL 25 plus collector, vertical installation. In combination with the mounting hardware sets, permits installation on pantile roofs, corrugated sheet roofs, flat roofs or walls.	2 x profile rails, 4 x anchor brackets, 1 x set M10 nuts and bolts, 1 x set M6 nuts (width across flats 10)	18 55 45
R2 frame for one collector, horizontal installation, or two collectors vertical. In combination with the mounting hardware sets, permits installation on roofs, flat roofs or walls.	2 x profile rails, 8 x anchor brackets, 1 x set M10 nuts and bolts, 1 x compensator with vent screw, 2 x seals	18 55 46
Frame Connector kit for SOL 25 Plus	2 x frame connectors 8, M10 bolts and nuts	SFC 001
mounting hardware for vertical installation on a flat roof or a wall Flush mount for SOL 25 Plus	2 x collector rails (vertical), 4 L brackets, 8 x set M10 nuts and bolts,	SFM 001
mounting hardware for horizontal installation on a flat roof or a wall Flush mount horizontal for SOL 25 Plus	2 x collector rails (horizontal), 4 L brackets, 8 x set M10 nuts and bolts,	SFM 001H
mounting hardware for Frame tilt installation for SOL 25 Plus vertical TWO NEEDED PER FRAME	1x Adjustable riser strut set 4 x L brackets 1 x Brace 1 x Collector rail 5 x sets M10 nuts and bolt 5 x sets M6 x 2 nuts and bolts	SFT 004
mounting hardware for Frame tilt installation for SOL 25 Plus HORIZONTAL TWO NEEDED PER FRAME	1x Adjustable riser strut set 4 x L brackets 1 x Brace 1 x Collector rail 5 x sets M10 nuts and bolt 5 x sets M6 x 2 nuts and bolts	SFT 004 H
mounting hardware for 45° installation for SOL 25 Plus vertical TWO NEEDED PER FRAME	1X Support, vertical 1x Support, horizontal 1x support transverse 1x Brace 1 set each M10 & M6 nuts and bolts	185543 BF S
mounting hardware for 45° installation for SOL 25 Plus HORIZONTAL TWO NEEDED PER FRAME	1X Support, vertical 1x Support, horizontal 1x support transverse 1x Brace 1 set each M10 & M6 nuts and bolts	074324 BF W
mounting hardware for 60° installation for SOL 25 Plus vertical TWO NEEDED PER FRAME	1X Support, vertical 1x Support, horizontal 1x Collector rail 1x Brace 1 set each M10 & M6 nuts and bolts	SE 60
Clamp for metal roof	1x clamp	S 5

2.1.2. Solar heating system accessories

Item	Part no.
SE Flowstar Pump Station, expansion tank, pressure relief, 2 drains,	
Pressure gauge, check valve, return line thermometer, air vent, sensors	22 13 39
SOM 6 SI, temperature differential controller for one function	22 21 40
SOM 7 SI, temperature differential controller for two functions	22 21 41
SOM 8 SI, temperature differential controller for two functions	074350-115
Collector sensor well, 1 no. per control unit	18 53 07
Purgomat, air vent	S 10043
Propylene Glycol, heat transfer medium, 20 litre can	07 32 22
Expansion vessel, 18 litres	07 40 30
SBB 300 plus, vertical solar tank for DHW heating, two HX	18 78 73
SBB 400 plus, vertical solar tank for DHW heating, two HX	18 78 74
SBB 600 plus, vertical solar tank for DHW heating, two HX	18 78 75
SBB 300 S, vertical solar tank for DHW heating, one HX	22 12 19
SBB 400 S, vertical solar tank for DHW heating, one HX	22 12 22
Red indicator anode rod /SBB Tank	140919
Anode SBB 300-400	249041
Anode SBB 600	249042
Anode SBB Flexible	143499
Gasket for anode rod	036770
Thermometer for SBB Tanks	165967

2.2 Installation

To protect the system against frost and corrosion, fill the solar heating system exclusively with Propylene Glycol (section 2.1.2). The type-testing is limited to single hydraulic assemblies of no more than 30 individual collectors. Larger systems require individual approval.

Commercial systems, check local regulations].

Pipework installation

Use copper pipes, stainless steel pipes or corrugated stainless steel pipes for the flow and return lines.

Recommended pipe diameter

- up to 5 collectors: Ø 3/4

Provide all pipe runs to the building interior on site. Ventilation tiles are recommended as roof ducts for tiled roofs with a more severe inclination; for flat roofs and corrugated roofs with lesser inclinations routing the pipes through an external wall is recommended. Hangers must provide correct pipe support, pitch and meet code. Hangers must not compress insulation.

Provide for the thermal contraction and expansion of

Pipework. Installers must comply with all Local, State and National Codes

We recommend trimming pipes with pipe cutters, to avoid the creation of metal filings. Ground the pipework in accordance with current regulations. Connect all pipework with the building ground over the shortest possible distance.

Insulation

All hot water and final 5 feet of cold water piping requires insulation equal to or greater than R-2.6. All exterior piping also requires UV and moisture protection

Alternative lines

Seal lines made with locking ring fittings, press fittings and corrugated hoses with suitable sealants. Seals must be resistant to glycol and temperatures up to 356°F.

Nominal flow rate

The nominal flow rate for a collector array (max. 5 collectors) is 26 to 73 gal/h.

All collector arrays must be connected in parallel. The flow rate in every additional collector array is added to the total, in a system with 3 x 3 collectors, the flow rate would be 73 to 238 gal/h.

Thermal insulation

Use temperature and UV-resistant thermal insulation to insulate the external pipework,

- Polyisocyanurate, PVC cover

-Armaflex®

-mineral wool backed by aluminium mesh foil

- flexible EPDM hose (e.g. type Aeroflex®,)
A rigid aluminium sheath is recommended as protection for the mineral wool. The EPDM hose can be finished with UV-resistant paint. Where required, protect the thermal insulation against bird or rodent attack. Insulate all lines of solar loop .

Apply the thermal insulation after pressure testing and checking the system for leaks.

Tank

In a standard solar heating system, the collectors connected in series are linked to the solar DHW tank 80-163 gal.

Observe the tank installation instructions.

Tank sensor

The tank sensor for the SBB ..plus tank is fitted into the sensor well of the lower internal smooth tube heat exchanger. Coat the collector sensor with heat conducting paste and insert it into the sensor well until it bottoms out.

Secure the sensor and its lead (e.g. cable tie).

Collector sensor well

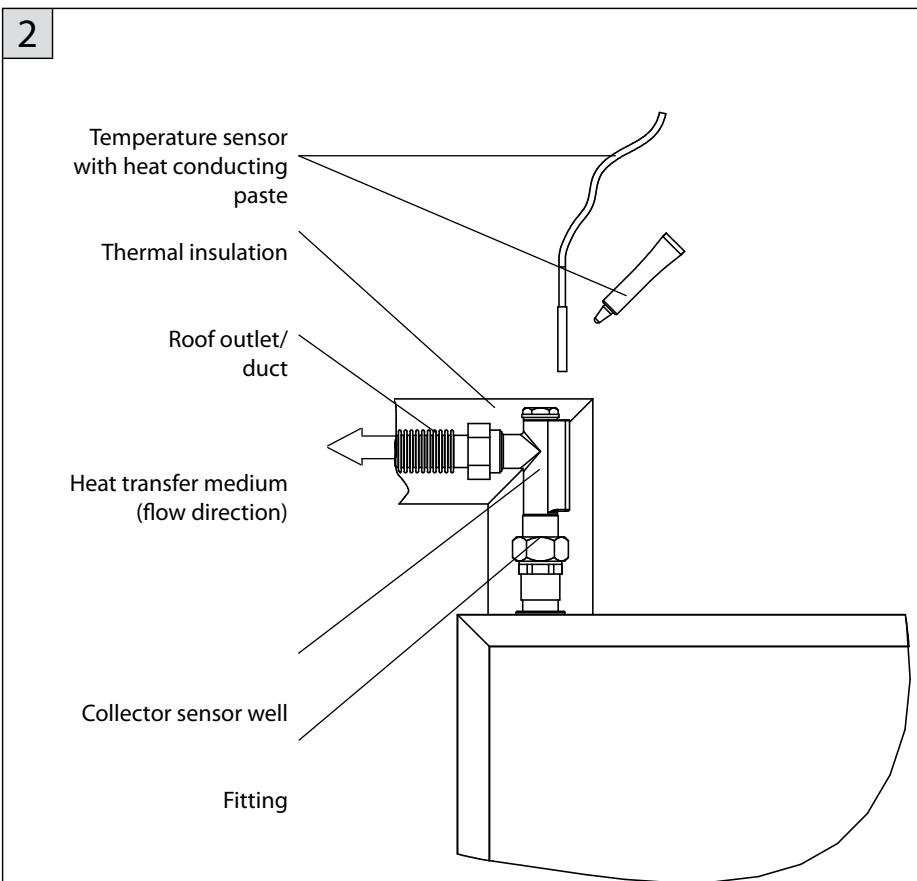
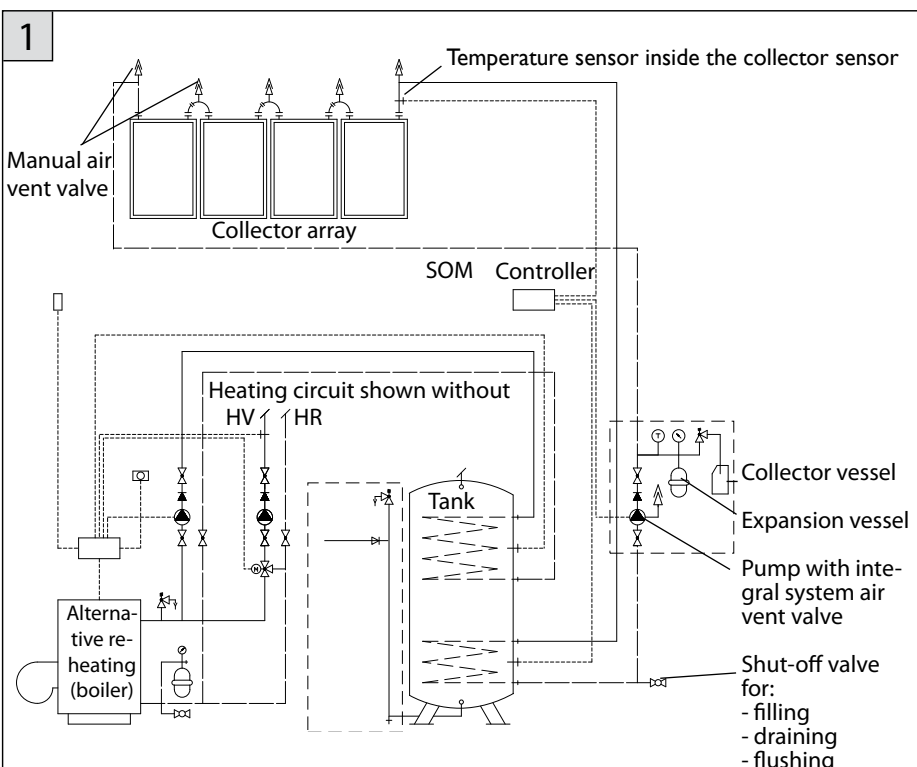
1 **2** The collector sensor well is positioned at the hot side This can be the upper left or right side of the collector. Install collector sensor well on the collector. Coat the collector sensor of the control unit with heat conducting paste and insert it into the collector sensor well until it bottoms out. Secure the lead to outside of insulation and under protective cover..

Provide the collector sensor well and the roof outlet with thermal insulation, which must be tightly sealed and must be temperature and UV-resistant.

Also protect the thermal insulation against bird attack.

Installation example

1 The system diagram shows the general system layout of a solar heating system used for DHW heating.



Min. insulation thickness

Normal dia. of pipes

Min. thickness of insulation layer, related to a calorific conductivity of 0,035 W/(mK)

up to 3/4"

3/4"

greater than 3/4" to 1"

1"

upwards 1" to 4"

identical to pipe

greater than 4"

4"

Installation information



Check the roof construction for perfect condition (static calculation required, if necessary check with the builder). All roofing work must be carried out by a professional roofing contractor. When working on roofs, observe all relevant safety regulations, in particular "Safety regulations for work on roofs" and "Safety and recovery harnesses" [or local regulations].

Select the collector mounting kit that is capable of giving the tilt and azimuth needed and mount the kit to a structure capable of supporting and maintaining its integrity in an area without excessive shading of collectors

Transport

3 The collector can be pulled onto the roof over a ladder. For this, place a rope around the entire collector frame. Never connect this rope to the collector connectors.



For hydraulic reasons, never link up more than 5 collectors in series. Arrange the individual linear arrays parallel to each other.

Building materials adjacent to solar components must not be exposed to elevated temperatures.

Components exposed to public traffic are maintained below 140 F or insulated/isolated. All other exposed areas over 140 F are labeled with appropriate warning



Installers must comply with all Local, State and National Codes

2.3 Roof Installation

Maximum Installed Height 60ft.

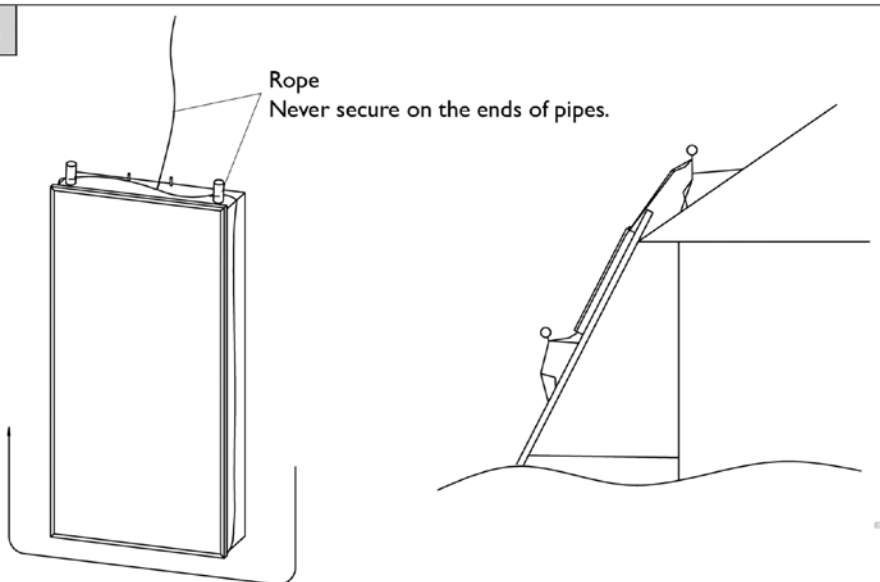
Two mounting frames are available:

7 R1 for one collector installed vertically (18 55 45)

8 R2 for two collectors installed vertically or one collector installed horizontally (18 55 46)

21 For vertical flat-roof or wall installation, two sets of (SFM 001) flat-roof/wall mounting hardware are needed; for two collectors or more, the number of sets required is the same as the number of collectors.

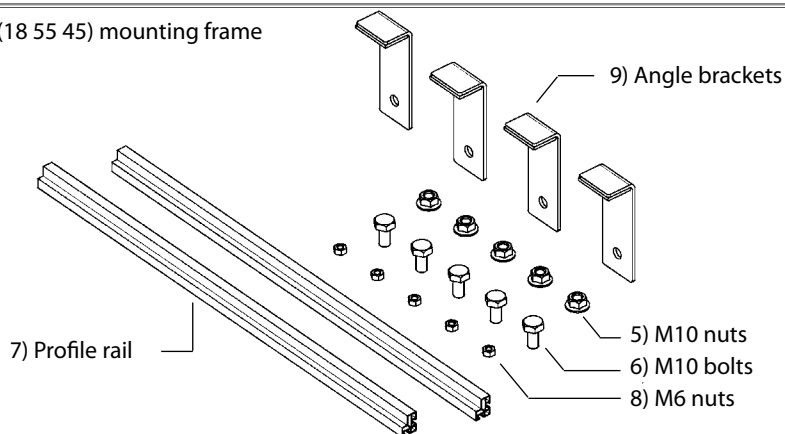
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When working on roofs: Observe the relevant safety regulations.

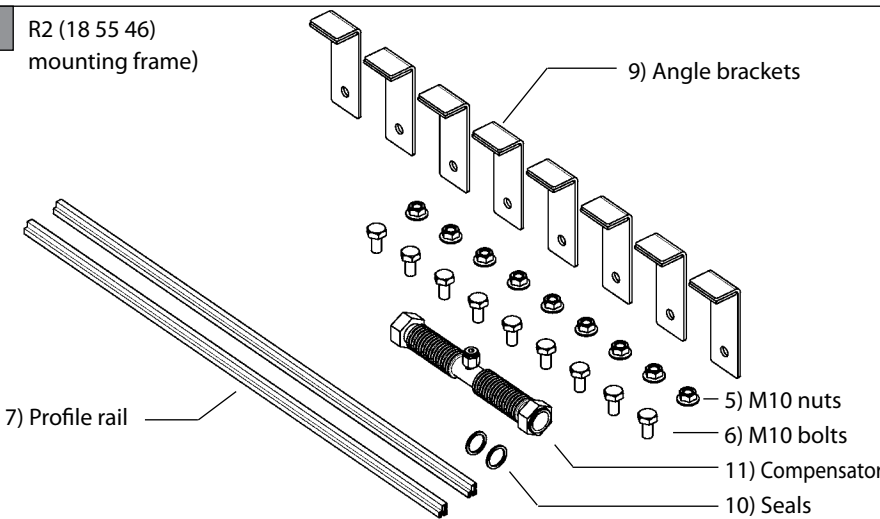
7

R1 (18 55 45) mounting frame



8

R2 (18 55 46) mounting frame



Building penetrations must not impair enclosure integrity or function and must not allow vermin intrusion.

They must meet applicable codes and National Roofing Contractors Assoc. practices. Structural members penetrated by solar system components must not be compromised and penetrations must meet code. Penetrations through fire-rated assemblies must meet code. Do not reduce fire resistance below code. Protect Control sensors wiring.

22 For horizontal mounting on a flat roof or a wall, the number of BF W (07 43 24) flat-roof/wall mounting hardware sets needed is twice the number of collectors.

Procedure:

Choose attachment site, allowing for subsequent pipe penetration.

23 Bolt the horizontal support (18/22), vertical support (19/23) and transverse support (20/24) together to form a triangle.

24 25 Bolt the resulting brace to the upper and lower profile rails.

When installing one collector, the triangles are to be set up at intervals of ≤ 2100 mm for horizontal installation or ≤ 1100 mm for vertical installation.

When installing two or more collectors, the triangles are to be positioned in the middle underneath the collectors.

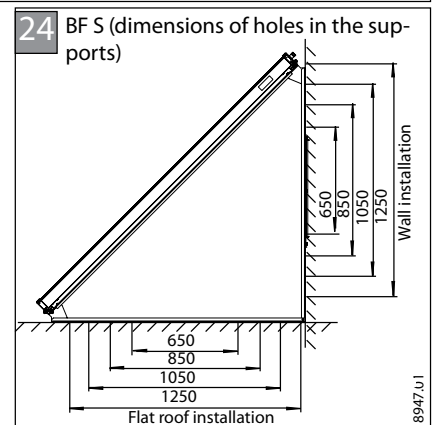
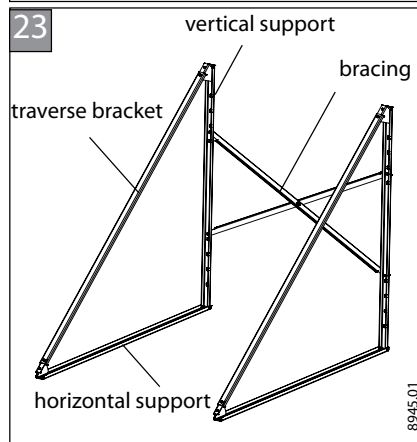
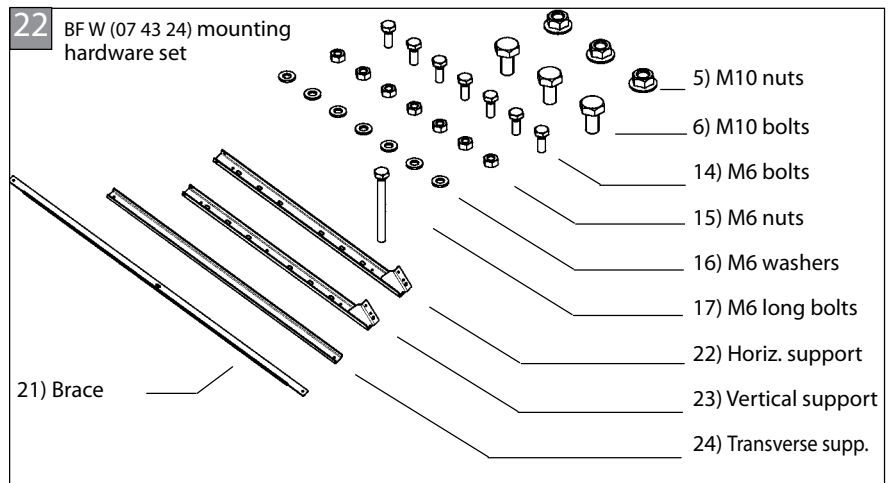
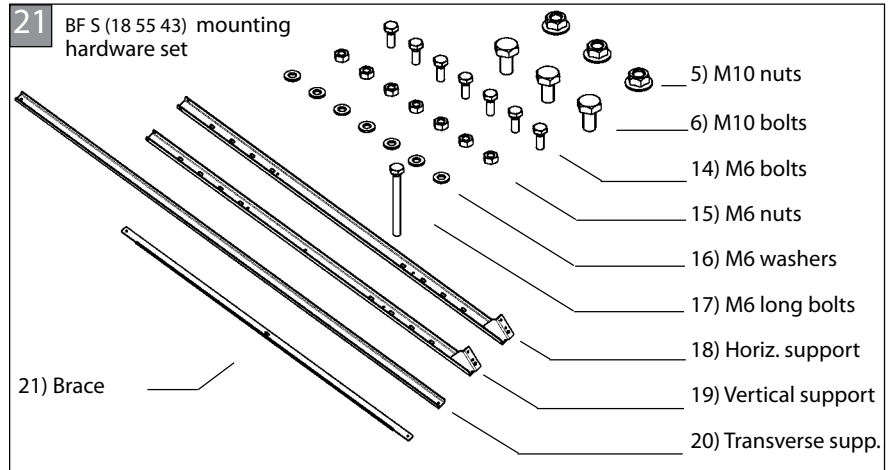
23 28 When installing two or more triangles, brace the centre span. When installing four or more triangles, brace both end spans. With six or more triangles, braces should also be placed in an inside span.

If multiple flat-roof mounting frames are being set up next to one another, use frame splice kits to join them. Line up the mounting supports with a string so that the mounting frames will be in a row.

24 25 Connect the flat-roof mounting racks to the roof in an appropriate manner, or weight them with at least 180 kg (e.g. concrete slab) if the installed height is less than 8 m. Remember to take the statics into account.

With installed heights above 8 m, weighting is not advisable due to the higher load. In this case, the holes in the horizontal support (18/22) are used to make the connection to the roof (six M6 bolts per horizontal support).

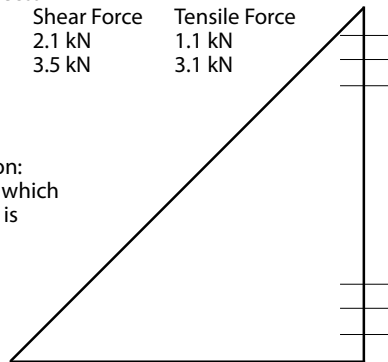
26 27 If multiple flat-roof mounting racks are being set up one behind the other, the spacing between them should be at least 6 m for vertical installation and 3.6 m for horizontal installation.



30 Force data for a collector

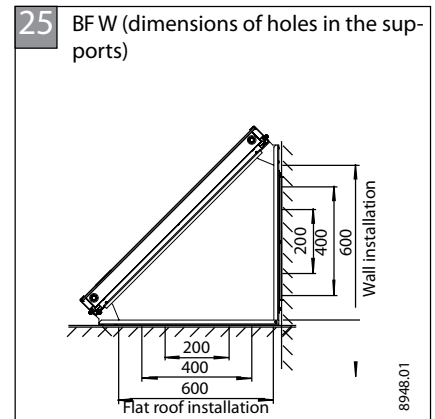
Mounting Height	Shear Force	Tensile Force
Up to 8 m	2.1 kN	1.1 kN
Up to 20 m	3.5 kN	3.1 kN

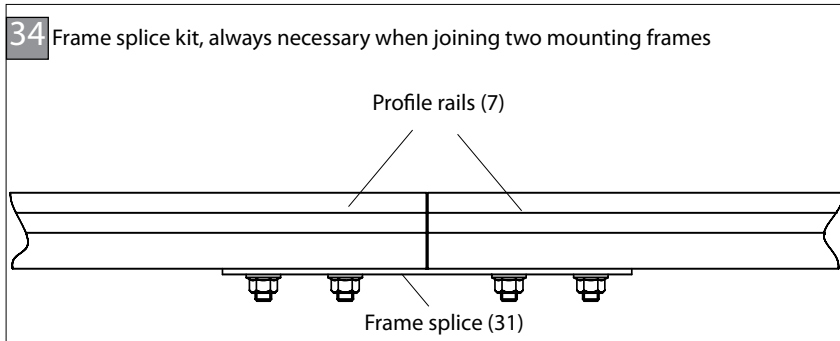
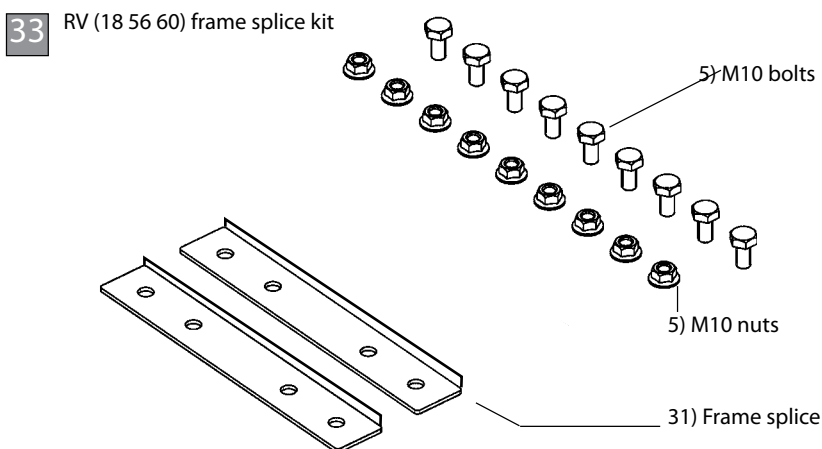
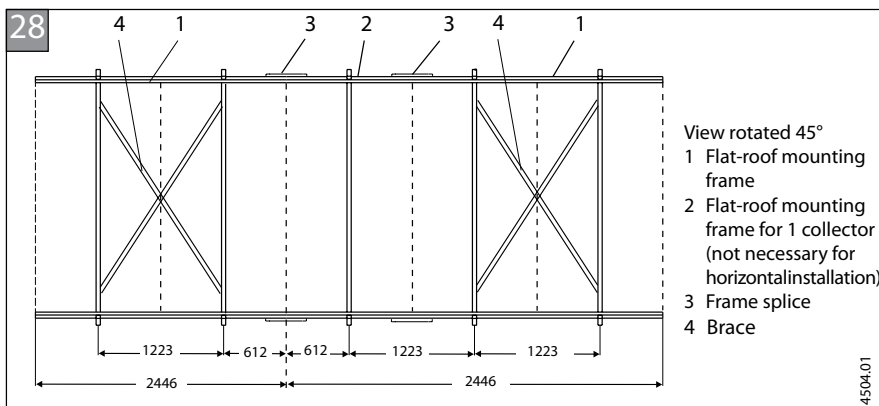
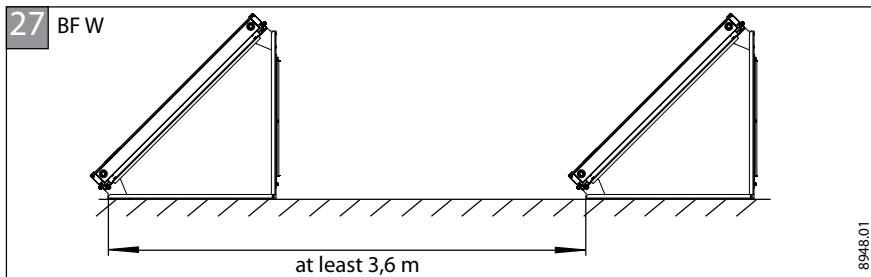
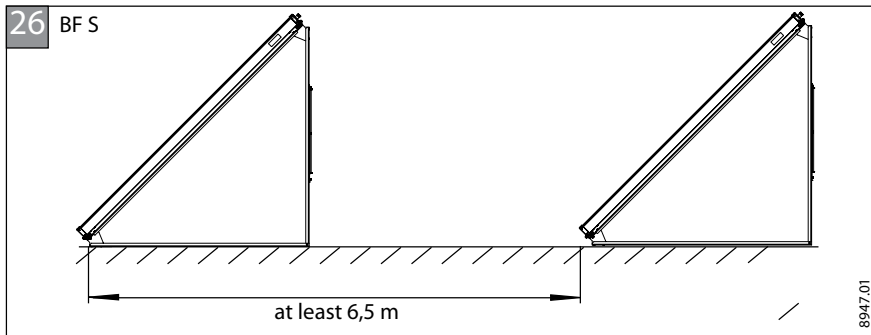
Tensile force:
Recommendation:
6 fasteners over which
the tensile force is
distributed.



Shear force:
Recommendation:
6 fasteners over
which the shear force
is distributed.

The type of wall is a crucial factor in the choice of fasteners. Remember to take the statics into account.





2.4 Wall Installation

Maximum Installed Height 60'

Two mounting frames are available:

7 R1 for one collector installed vertically (18 55 45)

8 R2 for two collectors installed vertically or one collector installed horizontally (18 5546)

21 For vertical flat-roof or wall installation, two sets of BF S (18 55 43) flat-roof/wall mounting hardware are needed; for two collectors or more, the number of sets required is the same as the number of collectors.

22 For horizontal mounting on a flat roof or a wall, the number of BF W (07 43 24) flat-roof/wall mounting hardware sets needed is twice the number of collectors.

Procedure:

Choose attachment site, allowing for subsequent pipe penetration.

23 Bolt the horizontal support (18/22), vertical support (19/23) and transverse support (20/24) together to form a triangle.

24 **25** Bolt the resulting brace to the upper and lower profile rails.

When installing one collector, the triangles are to be set up at intervals of ≤ 2100 mm (for horizontal installation) or ≤ 1100 mm (for vertical installation).

When installing two or more collectors, the triangles are to be positioned in the middle underneath the collectors.

23 **28** When installing two or more triangles, brace the centre span. When installing four or more triangles, brace both end spans. With six or more triangles, braces should also be placed in an inside span.

26 **27** If multiple flat-roof mounting frames are being set up next to one another, use frame splice kits to join them. Line up the mounting supports with a string so that the mounting frames will be in a row.

24 **25** Connect the wall mounting supports to the wall in a suitable manner, using the holes in the vertical support (19/23).

Then tighten all bolts and screws.

The type of wall is a crucial factor in the choice of fasteners. Remember to take the statics into account.

As an aid in sizing the fasteners, the forces for one collector are given in Fig. 30.

Maintain the spacings between connection points (as specified by the manufacturer).

For installed heights of up to 20 m:

For anchoring in concrete:

Per collector, six M8 UPAT Multicones or SM M10 anchors, both of stainless steel.

For anchoring in wood:

Per collector, six wood screws in accordance with DIN 571, at least 10 x 80, of stainless steel.

2.6 15-30° Tilt

(for installed heights of up to 60')

35 The RA (18 56 61) frame standoff kit is used to adjust the collector array by 15° to 30° (30° only, in the case of horizontal mounting) to an ideal incident angle of the sunlight of 30-50°.

For mounting on a roof the RA frame standoff kit is needed in the same number of mounting hardware sets BP or BW. For the installation on a corrugated sheet roof there is also needed the collectorstrip (22 01 94) in the same number of mounting hardware sets BW

The lower roof hooks (3) or U strips (25) are attached as described in sections 2.3, 2.4 or 2.7, depending on the type of installation.

It should be ensured that two bolts are inserted into the channel of the upper and lower profile rails, before the collector strips are bolted to the profile rails.

The distance between the collector strips should be slightly larger than the distance between the upper roof hooks / U strips which have already been installed on the roof.

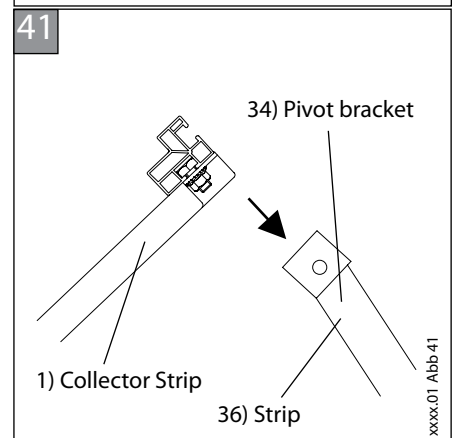
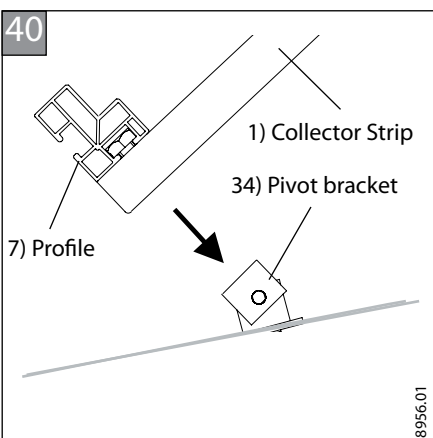
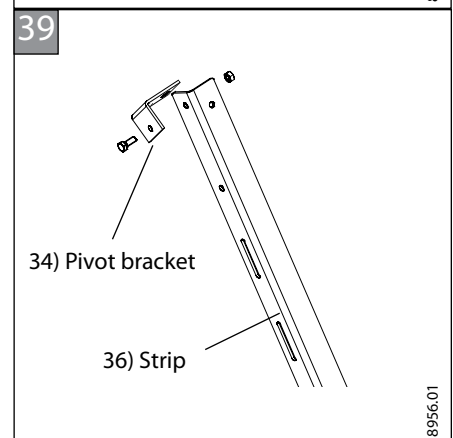
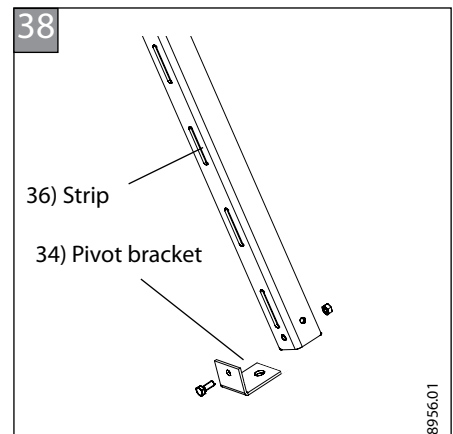
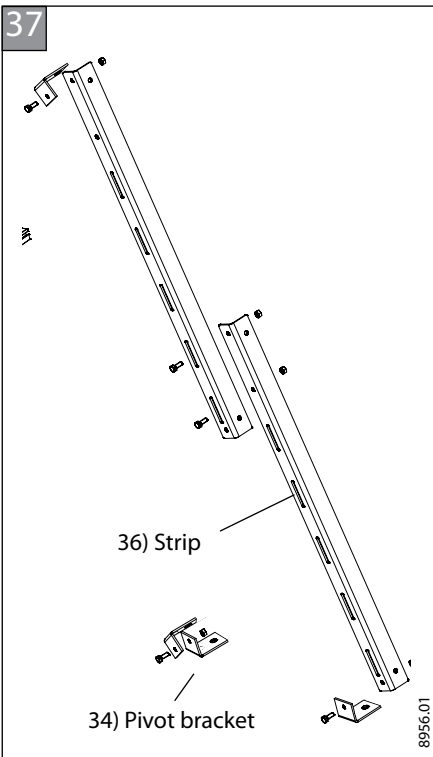
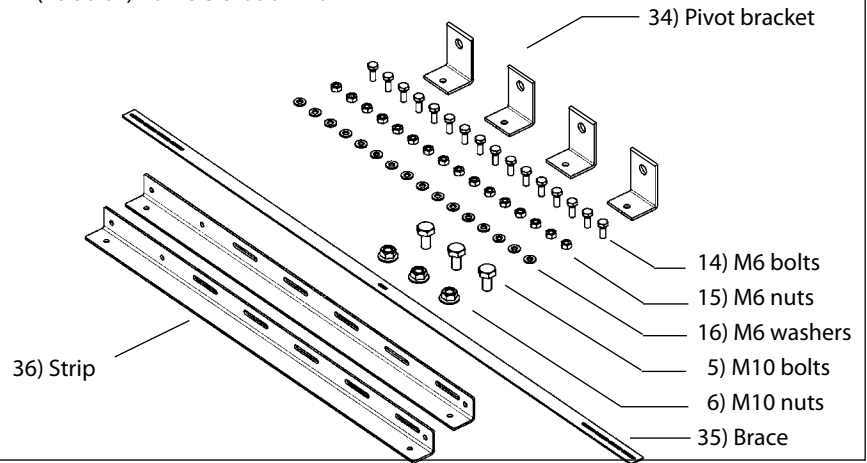
On the roof hooks / U strips, the long sides of the pivot brackets (34) are screwed into the middle drill holes. The short side should be at the top.

On the lower roof hooks / U strips, the short side of the second pivot bracket is bolted to the first pivot bracket (34).

37 Cut the strips (36) of the standoff to the proper length for the required angle. For 15° in the case of vertical installation or 30° in the case of horizontal installation, only one strip is needed for each pivot point. For 30° vertical installation, the strips are bolted together as shown in the illustration.

38 The upwards facing short side of the pivot bracket attached to the upper roof hook / U profile is now bolted to the bottom of the standoff strip.

35 RA (18 56 61) frame elevation kit



39 As illustrated, another pivot bracket is connected to the top of the standoff strip (36).

When installing two or more collectors, brace the centre span. When setting up four or more collectors, brace both end spans. With six or more collectors, braces (35) should also be placed in an inside span.

40 41 The frame created from the collector strips (1) and profile rails (7) is now bolted to the pivot brackets (34). The bolt located in the channel of the profile rails is bolted into the middle hole of the pivot bracket. (Before bolting together the collector strip and profile rails, two bolts were inserted into the channel of each profile rail).

If more than one rooftop frame is used, mount the frames to one another using frame splice kits.

Have lightning protection measures carried out by professionals.

Then tighten all bolts and screws.

 Have lightning protection measures carried out by professionals.

2.7 Lightning Protection and Bonding

If there is an existing lightning protection system, the collector casing, the mounting frames and the piping must be tied into the lightning protection measures by professionals.

Collector Casing

Drill into each collector from the bottom and use screw-type devices to tie it into the lightning protection measures. Use two 6.3 mm diameter stainless-steel sheet-metal screws for each collector. The drill holes should be predrilled to a diameter of 5 mm.

Piping

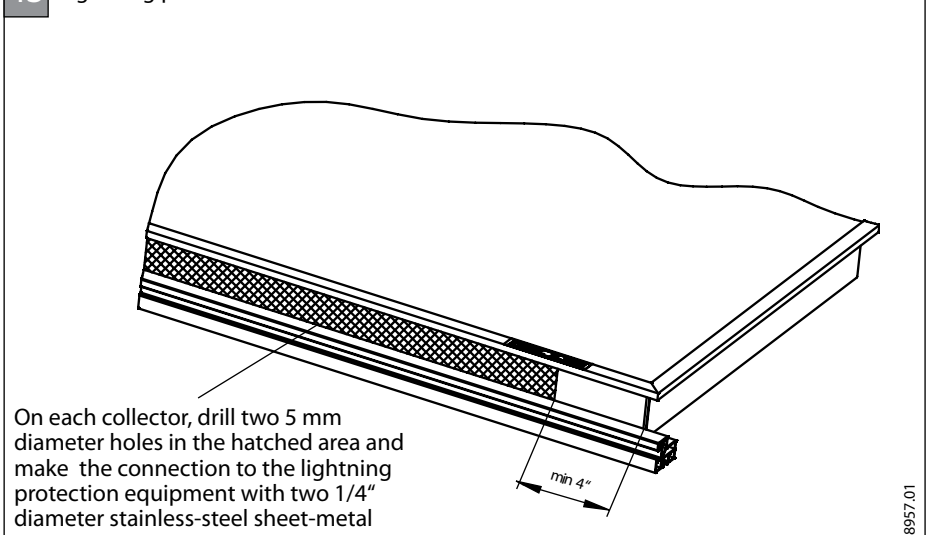
Make the piping connection by means of pipe clamps in the immediate vicinity of the collectors (above the roof). (Note possibility of corrosion.)

Mounting Frame

Connect the mounting frame to the lightning protection equipment separately via screw-type or clamp connections.

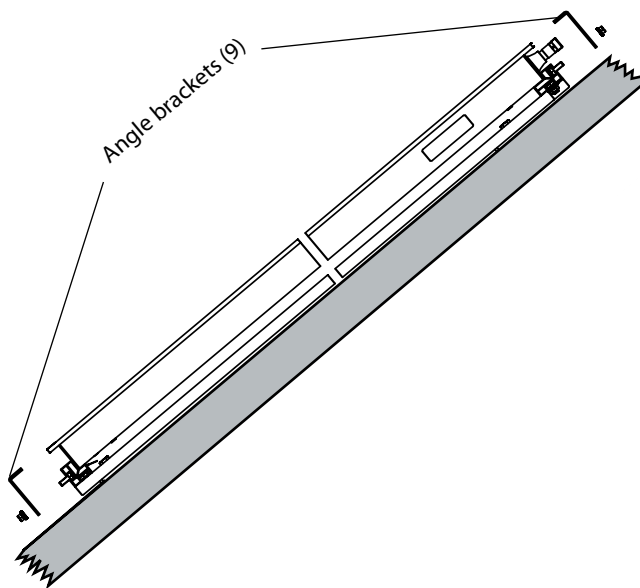
Connect the forward and return piping to the building's equipotential bonding system at frequent intervals.

43 Lightning protection



8957.01

44



8958.02

2.8 Setting Up and Interconnecting the Collectors

44 Secure each collector at the top and bottom with two angle brackets (9). To do this, thread bolt (6) (from set 18 55 45 or set 18 55 46) into bar, then put angle brackets (9) into position and tighten the bolt.

45 The collector connections are located on the top of the collector in the case of vertical mounting or on the sides with horizontal mounting. Collectors are interconnected by means of the compensator (11), which comes with every R2 (18 55 46) mounting frame and every RV (18 56 60) frame splice kit. Assembly of the compensator is followed by placement of the thermal insulation (supplied by the customer). Cut the insulation laterally to size and glue the cut edges together once it is installed.

2 Install the collector immersion sleeve at the outlet of the collector array. Coat the collector sensor with thermally conductive paste and push it into the immersion sleeve as far as it will go.

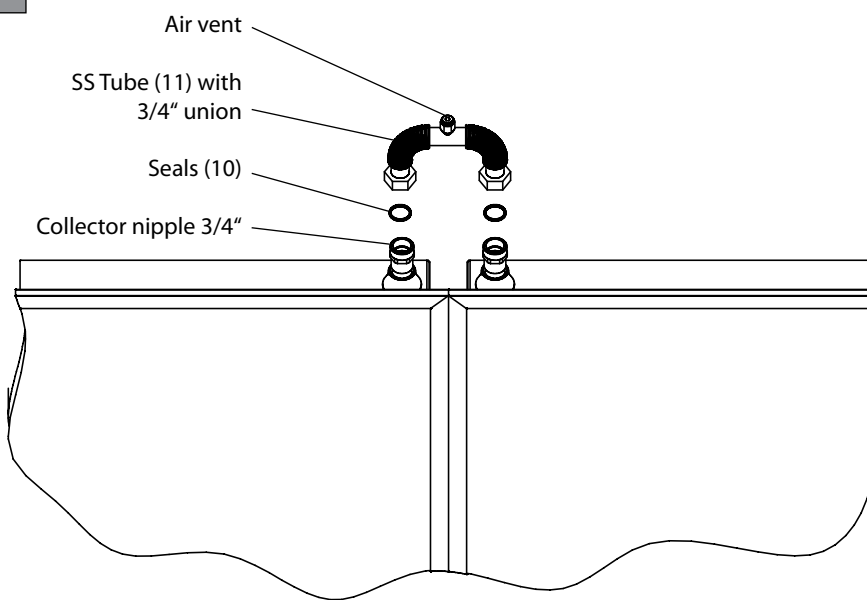
Do not attempt to twist or readjust the connections once they have been installed.

Have lightning protection measures carried out by professionals.

The roof penetrations can now be mounted on the unoccupied external thread of the R3/4" adapter, i.e., on the collector immersion sleeve.

Immediately after installation, fill the system with Propylene Glycol as described in Section 2.9, run a pressure test and put it into service.

45



8959.01

2.9 Filling the heat transfer

Fluid loop



Wear protective gloves and goggles when handling Propylene Glycol. Never fill the system when it is subject to strong solar irradiation. This could lead to steam hammer inside the collectors.

If the sun shines during Start-up, cover the collectors or wait until there is some shade. Never fill and pressure test the system when there is a risk of frost.

Fill the system after connecting the pipework, the collectors and after the tank has been filled. Use a solar filling facility for filling the system.

Flushing the system

Preparations:

Set the pressure vessel prior to filling the system to an inlet pressure of 44 PSI. During all filling and draining procedures, open the air vent valve at the highest point of the system. Close the air vent valve again as soon as liquid is expelled. Potable water without solar medium is generally used for the initial fill for pressure testing.



Never fill the system with water when there is a risk of frost.

Close the flow meter adjusting screw at the pump assembly (horizontal position). Connect a hose to the open fill & drain valve at the top and allow water to stream through the collectors down to the open fill & drain valve at the bottom.

Fill the system slowly and continue this process, until clear water is expelled from the open drain valve.

Drain the water off after flushing has been completed.

Filling and venting the system

Fill the solar heating system exclusively with Propylene Glycol heat transfer medium. The bottles have been premixed and require no further treatment.



Never admix water or alternative process media, otherwise the essential characteristics and corrosion protection can no longer be guaranteed. For that reason, the system may also not be topped up with water.

Connect the hose to the filling pump:

- From the pump (pressure side) to the top fill & drain valve
- From the bottom fill & drain valve into the solar medium container
- From the solar medium container to the pump (inlet side)
- Start the fill pump and pump the solar medium into the system

Flush the system until no more bubbles are expelled from the drain hose.

For an easy removal of any air pockets from the system, close the bottom fill & drain valve during the flushing process and let the fill pump build to a system pressure of approx. 20-44 PSI.

Then open the bottom fill & drain valve fully.

During this process, hold the drain hose firmly to the container.

Repeat this process approx. 3 to 5 times.

Close the bottom fill & drain valve after completing this ventilation step and raise the system pressure to 80 PSI. Then also close the top fill & drain valve.

Now open the air vent valve at the highest point, until only solar medium is expelled.

Raise the system pressure in a cold state to its operating pressure of 80 PSI

Let the solar heating system rest over night and vent again in the morning via the air vent valve before solar radiation affects the collectors. Close the air vent valve again.

Close both fill & drain valves with the caps supplied.

If the system does not start automatically, there may still be air in the system. Repeat the venting process, if required.

of the respective control unit.

Then set the control unit back to automatic mode.

The system should then start automatically subject to all starting conditions being met. If that is not the case, check in chapter "What to do if ..." for a possible cause for this fault.

2.10 Pressure test

After the pipework has been installed and the collectors have been connected, pressure test the system.

The test pressure is 80 PSI .

Only fit the thermal insulation after the leak test has been successfully completed.

Leak test

Close the bottom fill & drain valve and raise the system pressure to 80 PSI and let the system stand a few hours. Check all fittings. Drain the system fully.

In case there is a risk of frost, immediately fill the system with solar medium.

2.11 Start-up

Re-tighten all fittings prior to start-up.

Complete the Start-up report after the first Start-up.

Set the integral control unit to manual to check, whether all required relays of the solar control unit are connected. For this, observe the operating instructions

See that the Solar system puts no excessive temperature or pressure on auxiliary system



Maintenance and Troubleshooting

3.1 Maintenance and care

Specialists should carry out an annual inspection of the solar heating system regarding perfect system function, including the control unit, safety equipment and tank.

System components exposed to the weather must also be checked for perfect condition (fixings, thermal insulation, contamination, etc.).

check the pH value (> 7) and frost protection level (-22° f) of the heat

3.2 Troubleshooting

Fault	Cause	Remedy
Fault/error message at the controller	System fault; sensor faulty or incorrectly connected.	See installation and operating instructions of the controller.
Pressure fluctuations in the system	Immediately after commissioning: Air pockets in the solar circuit.	Vent the system again.
Collectors mist up	Moisture ingress during storage.	The internal mist will evaporate after a few weeks in operation by moisture progressively escaping through the integral ventilation slots.
The pump does not run, even though the collector is warmer than the tank (neither motor noise nor vibrations are discernible).	Maximum tank or collector temperature exceeded. Indicator lamp or display at the controller activated.	The controller has shut down correctly and restarts again automatically when the actual temperatures drop below their selected maximum temperatures.
	No electrical power.	Check cables and fuses.
	Excessive temperature differential (>30 F) selected or the controller does not work.	• Check the controller. • Check the temperature sensor. • Reduce the temperature differential.
	Pump shaft blocked.	Briefly switch over to max. speed or insert a screwdriver into the slot and turn manually.
	Pump contaminated.	Dismantle and clean the pump. Close the throughput limiter and pump ball valve.
	Sensor not OK or incorrectly installed.	Check the sensor position, installation and curves; the collector sensor must be securely and fully inserted into the sensor well.
The pump is running, but no flow rate is discernible at the flow meter with balancing valve. The flow and return temperatures are identical or the tank temperature does not rise or rises only slowly.	There is air in the pipework.	Check the system pressure. Operate the pump in intervals at maximum pump rate. Open the air-vent valves at the collector, at the pump and at the solar tank and vent these items. Should this fail to provide any improvement: • Flush the system in both directions; clean fittings, such as flow meters with balancing valve and dirt traps. • Check the line routing; in case of "up and down", e.g. at balcony protrusions or around water pipes, change the line routing, if required or insert additional air vent valves. • Check the function of the automatic air vent valve. For this, remove the protective cap and check the float movement with a blunt needle. If necessary, replace the air vent valve.
	System pressure too low.	
	System contaminated.	

Fault	Cause	Remedy
The pump is running, but no flow rate is discernible at the flow meter with balancing valve.	Flow meter with balancing valve stuck or faulty. Clog in system Shut-off valve closed.	Check the function of the flow meter with balancing valve. A jammed ring can block the display in the sight glass, even if the flow rate is correctly adjusted. Start the pump in manual mode; the pump piston movement should be discernible. Release the piston through tapping it lightly; in emergencies, replace the flow meter with balancing valve. Open the shut-off valve.
Pump appears to open late and stops early.	The temperature differential between the collector and the tank is too large.	Reduce the temperature differential at the control unit.
The pump starts and switches itself off again shortly afterwards. This is repeated a few times until the system runs correctly. The same happens in the evening.	The solar irradiation is still insufficient for heating up the entire pipework. The flow rate is excessive (pump set too high). The switching temperature differential of the controller is set too low. Pipework not fully insulated. The tank and collector sensors are interchanged (problem occurs after commissioning).	Check for faults again when there is strong solar irradiation. Reduce the pump rate. Increase the switching temperature differential at the controller. Insulate the pipework. Connect the temperature sensors to the correct sensor terminals (see the control unit installation and operating instructions).
The pressure gauge indicates a fall in pressure.	A pressure drop shortly after the system is filled is quite normal, as air is still escaping from the system. A subsequent pressure drop can be caused by an air pocket that has shifted later on. In standard operation, the pressure can fluctuate by 3 Psi to 4 Psi, subject to system temperature. A point in the system leaks, if the pressure falls continuously. Fluid loss through opening of the safety valve, since the expansion vessel is too small or without pressure or faulty. Collector damage (leaking) and frost damage through insufficient frost protection.	• Automatic shut-off valve closed? • First check the fittings, glands at shut-off valves and all threaded connections, then all solder fittings. • Check the expansion vessel inlet pressure and the diaphragm for leaks. • Check the vessel size. • Check the antifreeze level and the pH value.
The pump runs noisily.	Air in the pump. Insufficient system pressure.	Vent the pump. Increase the system pressure.
System is noisy. This is normal in the first few days after filling the system. Two possible causes, if this occurs later:	System pressure too low. The pump draws in air via the air vent valve. The pump rate is set too high.	Increase the system pressure. Change to a lower pump rate and check the flow rate at the flow meter with balancing valve.
The tank cools down over night. After the pump has stopped, the flow and return operate at different temperatures; the collector temperature is higher at night than the outside temperature.	The gravity brake does not close. Single pipe circulation for short pipework with low pressure drop.	• Check the position of the setting handle and check the gravity brake for leaks (jammed swarf, dirt particle in the sealing surface). • Never connect the solar heat exchanger directly, but draw the supply lines first in a U downwards (a siphon assists the gravity brake). If required, install a two-way valve that is switched simultaneously with the pump. Install a gravity brake in the flow or a heat insulating loop.
Re-heating does not work. The boiler runs for a short while, stops and restarts again. This repeats frequently, until the tank has reached its set temperature.	Air in the re-heat heat exchanger. Heat exchanger area too small.	Vent the re-heat heat exchanger. Compare the details supplied by the boiler manufacturer and those of the tank manufacturer. The problem may be resolved by selecting a higher flow temperature at the boiler.
The tank cools down excessively.	Insulation faulty or incorrectly fitted. Re-heating controller setting. DHW circulation runs too frequently and/or at night.	Check the insulation; insulate the tank connections. Check the boiler controller setting. Check the switching times and interval operation.
The pump does not stop.	Sensor or sensor position not OK. Control unit not OK.	Check the sensor position, installation and curves. Note: The variable speed pump does not stop immediately, but only after it reaches its lowest speed.

Check list

On the Start-Up of Solar Installations Provided with Stiebel Eltron-Flat Collectors

Caution:

It is mandatory to perform the work in compliance with the „Safety Regulations for Work on and Involving Roofs“ and the instructions „Safety and Rescue Harnesses“ published by the trade association. These assembly and operating instructions and the assembly and operating instructions for the control of the SOM and the storage system are to be complied with during the assembly work.

Installation operator:	Fitting company:
Name:	Name:
Street	Street
Place	Place

Check list

Solar circuit	Yes	No
Are the flat collectors built in the stand in their proper position and secured free of play with the top and the bottom screws?		
Has the installation of the pipework between the collectors and the SOM been performed in accordance with the Stiebel Eltron installation example?		
Has the pipework been hard-soldered.		
Is the safety valve (87 PSI) and the vent installed in accordance with the installation example?		
Was the pressure test performed?		
Is the heat-transfer loop medium filled and vented using only the Propylene Glycol heat-transfer medium?		
Are the shut-off valves open, and is the non-return valve activated (SOM assembly instructions)?		
Is the collector temperature sensor mounted at the specified position and electrically connected?		
Has the electrical wiring been performed in accordance with the Stiebel Eltron wiring diagram?		
Is the solar control set according to the assembly and operating instructions?		
Has the test run of the circulation pump been performed – Noise? – Thermal transport during insolation?		
Hot water circuit	Yes	No
Has the solar storage system been installed to the water pipes in accordance with the Stiebel Eltron installation example and the appropriate regulations?		
Has the temperature sensor in the solar storage system been mounted and electrically connected in accordance with the Stiebel Eltron installation example?		
Has backup water heater been used and properly installed for re-heating? If so, specify which:		
Is the SOM connected to the existing ground line?		
Was the lightning protection equipment connected by authorised skilled personnel?		

Place / date	Inspected by (Company name):

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SOLAR RATING & CERTIFICATION CORPORATION

AWARD OF COLLECTOR CERTIFICATION

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

Collector Certification Number: **100-2005016A**

Date Certified: **June 26, 2006**

Expiration Date: **June 26, 2011**

Test Laboratory: **FSEC**

Report Number: **00201**

Report Date: **June 20, 2006**

Product: **Glazed Flat-Plate**

Certified Model: **Sol 25 Plus**

Model Tested: **Sol 25 Plus**

Supplier: **Stiebel Eltron**
17 West Street
West Hatfield, MA 01088 USA
(413) 241-3380

Description: Aluminum Extrusion frame. Low Iron Tempered Glass glazing. Copper absorber with Sputtered titanium nitride coating. Mineral Wool side insulation and Mineral Wool back insulation. Water was the fluid for performance tests. Gross Area: 2.73 m² (29.43 ft²). Aperture Area: 2.60 m² (27.94 ft²)

GLAZED COLLECTOR THERMAL PERFORMANCE RATING

Megajoules Per Panel Per Day				Thousands of Btu Per Panel Per Day			
Category (Ti-Ta)	CLEAR	MILDLY CLOUDY	CLOUDY	Category (Ti-Ta)	CLEAR	MILDLY CLOUDY2	CLOUDY
	23 MJ/m ² -d	17 MJ/m ² -d	11 MJ/m ² -d		2 kBtu/ft ² -d	1.5 kBtu/ft ² -d	1 kBtu/ft ² -d
A (-5 °C)	41	31	21	A (-9 °F)	39	29	20
B (5 °C)	37	27	17	B (9 °F)	35	26	16
C (20 °C)	32	22	12	C (36 °F)	30	21	12
D (50 °C)	21	12	4	D (90 °F)	20	11	3
E (80 °C)	10	3		E (144 °F)	10	3	

A-Pool Heating (Warm Climate) B-Pool Heating (Cool Climate) C-Water Heating (Warm Climate) D-Water Heating (Cool Climate) E-Air Conditioning

Efficiency Equation [NOTE: (P) = Ti-Ta]

SI Units: $\eta = 0.649 - 3.1374 (P)/I - 0.0148 (P)^2/I$ Y Intercept 0.660 Slope -4.29 W/m²·°C

IP Units: $\eta = 0.649 - 0.5529 (P)/I - 0.0014 (P)^2/I$ Y Intercept 0.660 Slope -0.755 Btu/hr·ft²·°F

Incident Angle Modifier [NOTE: (S) = 1/cos θ - 1]

$K_{at} = 1.0 - 0.2824 (S) - 0.0111 (S)^2$ $K_{at} = 1.0 + 0.27 (S)$ (Linear Fit)

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


Technical Director

July 6, 2006

OG-100 SRCC COLLECTOR CERTIFICATION