

Installation, Operating and Service Instructions

VIESSMANN®

Vitosol 200-FM

Models SV, SH

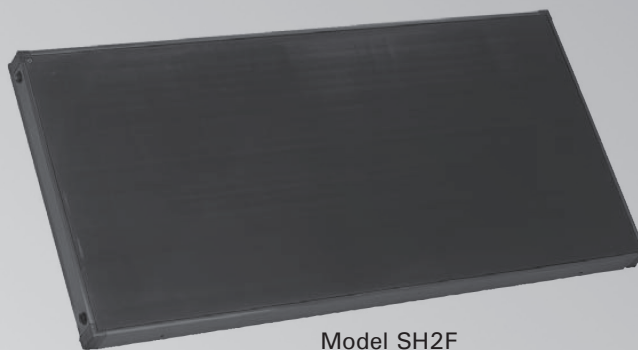
Flat plate solar collectors for sloped roofs, flat roofs, walls and freestanding installation



VITOSOL® 200-FM



Model SV2F



Model SH2F



IMPORTANT

Read and save these instructions for future reference.

Product may not be exactly as shown

Safety, Installation and Warranty Requirements

Please ensure that these instructions are read and understood before commencing installation. Failure to comply with the instructions listed below and details printed in this manual can cause product/property damage, severe personal injury, and/or loss of life. Ensure all requirements below are understood and fulfilled (including detailed information found in manual subsections).

■ Licensed professional heating contractor

The installation, service, and maintenance of this equipment *must be* performed by a licensed professional heating contractor.

u Please see section entitled "Important Regulatory and Installation Requirements" in the Installation Instructions.



■ Product documentation

Read all applicable documentation before commencing installation. Store documentation in a readily accessible location for reference in the future by service personnel.

u For a listing of applicable literature, please see section entitled "Important Regulatory and Safety Requirements"



■ Advice to owner

Once the installation work is complete, the heating contractor must familiarize the system operator/ultimate owner with all equipment, as well as safety precautions/requirements, shut-down procedure, and the need for professional service annually.

■ Warranty

Information contained in this and related product documentation must be read and followed. Failure to do so renders warranty null and void.



■ Grounding/Lightning protection of the solar system

In the lower part of the building, install an electrical conductor on the piping system of the solar circuit in compliance with local regulations.

Connection of the solar system to a new or existing lightning protection or the provision of local grounding should only be carried out by a licensed professional, who must take into account the prevailing conditions on site.

! CAUTION

Observe maximum load and distance from edge before installing the substructure to the roof. If necessary, consult with a structural engineer to determine if the structure is suitable for installing solar collectors. The collectors must be securely mounted so that the mountings can withstand intense wind conditions and local snow loads.

! CAUTION

Gloves and eye protection must be worn when handling solar panels.

! CAUTION

Solar panel connection pipes and solar heating fluid can become hot enough to cause severe burns. Extreme caution must be taken if panels have been in a stagnant condition (no flow of fluid).

! CAUTION

Avoid scratching or sudden shocks to glass cover of the solar panel.

! CAUTION

Never step on collectors or solder in close proximity to the glass surface of the solar panel.

■ Applicability

Vitosol solar collectors are designed for use in closed loop heating systems for domestic hot water heating, space heating and pool heating via a heat exchanger. The use of Viessmann heat transfer medium "Tyfocor-HTL" or equivalent is strongly recommended.

- In areas with extremely cold climate conditions, where outdoor temperatures may drop below -31 °F (-35 °C), the use of Tyfocor-HTL is not recommended. Use a solar propylene glycol mixture with a higher concentration of glycol that provides the level of freeze protection required for the area of the collector installation.

IMPORTANT

Pool water or potable water should not be pumped directly through the Vitosol collectors. Damage to collectors caused by corrosion, freezing or scaling will void warranty.

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Important Regulatory and Installation Requirements

Initial start-up

Initial start-up must be performed by a qualified heating contractor. Completion of the Maintenance Record by the heating contractor is also required.

Note: See the Maintenance Record located on page 57.

Working on the equipment

The installation, adjustment, service and maintenance of this equipment must be done by a licensed professional heating contractor who is qualified and experienced in the installation, service and maintenance of hot water heating systems. There are no user serviceable parts on this equipment.

Note: Please carefully read this manual prior to attempting start-up, maintenance or service. Any warranty is null and void if these instructions are not followed. For information regarding other Viessmann System Technology componentry, please reference documentation of the respective product. Viessmann offers frequent installation and service seminars to familiarize our partners with our products. Please inquire.

Ensure main power supply to equipment, the heating system, and all external controls has been deactivated. Take precautions in all instances to avoid accidental activation of power during service work.

Note: The completeness and functionality of field supplied electrical controls and components must be verified by the heating contractor. These include low water cut-offs, flow switches (if used), staging controls, pumps, motorized valves, air vents, thermostats, etc.

Repair work

IMPORTANT

Repairing components which fulfil a safety function can compromise the safe operation of your heating system. Replace faulty components only with original Viessmann replacement parts. Ancillary components, spare and wear parts.

IMPORTANT

Replacement and wear parts which have not been tested together with the solar system can compromise its function. Installing non-authorized components and non-approved modifications/conversion can compromise safety and may infringe our warranty conditions. For replacement, use only original Viessmann replacement parts or those which are approved by Viessmann.

Instructing the system user

The installer of the system is responsible to ensure the system operator/ultimate owner is made familiar with the functioning of the system, its activation, and its shut-down.

Note: The following topics must be covered:

Proper system operation sequence. Explain the equipment. Demonstrate an emergency shut-down, what to do and what not. Explain that there is no substitute for proper maintenance to help ensure safe operation.

Technical literature

Literature applicable to all aspects of the Vitosol 200-FM:

- Technical Data Manual
- Installation, Operating and Service Instructions
- Solar System Design Guide

Note: Leave all literature at the installation site and advise the system operator/ultimate owner where the literature can be found. Contact Viessmann for additional copies.

About these Installation Instructions



Take note of all symbols and notations intended to draw attention to potential hazards or important product information. These include "WARNING", "CAUTION", and "IMPORTANT". See below.



WARNING

Indicates an imminently hazardous situation which, if not avoided, could result in death, serious injury or substantial product/property damage.

► Warnings draw your attention to the presence of potential hazards or important product information.



CAUTION

Indicates an imminently hazardous situation which, if not avoided, may result in minor injury or product/property damage.

► Cautions draw your attention to the presence of potential hazards or important product information.

IMPORTANT



► Helpful hints for installation, operation or maintenance which pertain to the product.

► This symbol indicates that additional, pertinent information is to be found.

► This symbol indicates that other instructions must be referenced.

Product Information



Refer to the Vitosol 200-FM Technical Data Manual for complete technical information and product description.

Vitosol 200-FM, Models SV2F, SH2F
Flat plate solar collector

Absorber area: 25 ft² (2.3 m²)
Max. stagnation temperature: 293 °F (145 °C)
Max. operating pressure: 87 psig (6 bar)

Intended Use

The appliance is only intended to be installed and operated in sealed pressurized systems with due attention paid to these instructions.

DHW tanks are only designed to store and heat water of potable water quality. Heating water buffer tanks are only designed to hold fill water of potable water quality.

Only operate solar collectors with the heat transfer medium approved by the manufacturer. Intended use assumes that a fixed installation in conjunction with permissible, system-specific components has been carried out.

Commercial or industrial usage for a purpose other than heating the building or DHW shall be deemed inappropriate.

Any usage beyond this must be approved by the manufacturer for the individual case.

Incorrect usage or operation of the appliance (e.g. the appliance being opened by the system user) is prohibited and results in an exclusion of liability.

Incorrect usage also occurs if the components in the system are modified from their intended use (e.g. through direct DHW heating in the collector).

Adhere to statutory regulations, especially concerning the hygiene of potable water.

Notes on Installation

- The entire solar heating system should be installed in accordance with the accepted rules of technology, observing all relevant accident prevention regulations.
- Employ suitable safety measures to prevent falls, falling objects and roof damage due to insufficient load bearing capacity, e.g. by means of scaffolding, ladders, cable ties etc.
- The collectors must be securely mounted so that the mountings can withstand intense wind conditions.



CAUTION

Use only Viessmann supplied mounting clips and mounting hardware. Never drill or screw directly into collector side frames.

- Use only stainless steel screws and bolts when fastening mounting brackets or frames.
- Although the collectors glass surface is hail-resistant, Viessmann recommends users to include storm coverage in their building insurance. Our warranty does not cover storm related damage.
- The collectors should, as far as possible, be oriented towards the south. Solar system performance drops off significantly if collectors face more than 50° off south.

- The collectors should be mounted level, or with a slight ascending slope towards the high point of the piping, so that complete venting of air is assured.
- An air vent valve (c/w shut-off valve) should be installed at the highest point of the solar heating system.
- Filling the solar heating system with Viessmann heat transfer fluid "Tyfocor-HTL" is highly recommended. Tyfocor-HTL is supplied pre-mixed and water must not be added. Other heat transfer fluids may be suitable if they have the same temperature range -31°F to 338°F (-35°C to 170°C) and are non-toxic.
- In areas with extremely cold climate conditions, where outdoor temperatures may drop below -31°F (-35°C), the use of Tyfocor-HTL is not recommended. Use a solar propylene glycol mixture with a higher concentration of glycol that provides the level of freeze protection required for the area of the collector installation.



CAUTION

Pool water or potable water cannot be pumped directly through the Vitosol collectors. Damage to collectors caused by corrosion, freeze damage, or scaling will void warranty.

- The piping inside and outside the building should be insulated to avoid heat loss. Use only high temperature rated pipe insulation. The plastic or metal jacketing or other means of protecting the insulation should also include UV protection.

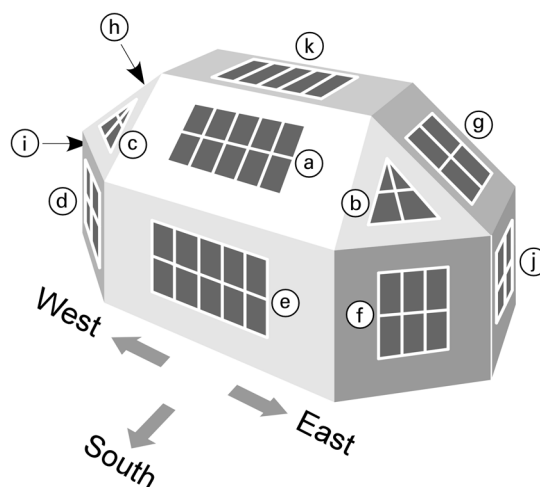
Collector Location



Refer to the Solar System Design Guide, for detailed information on the optimum alignment and inclination of solar collectors.

Optimum alignment and inclination

The solar collector provides the highest solar yield over an annual average when facing due south with an inclination of approximately 30° to 45° from the horizontal plane. However, the installation of a solar heating system is still viable even when the installation deviates quite significantly from the above (South-Westerly to South-Easterly alignment or with an inclination of 25° to 55° from the horizontal plane).

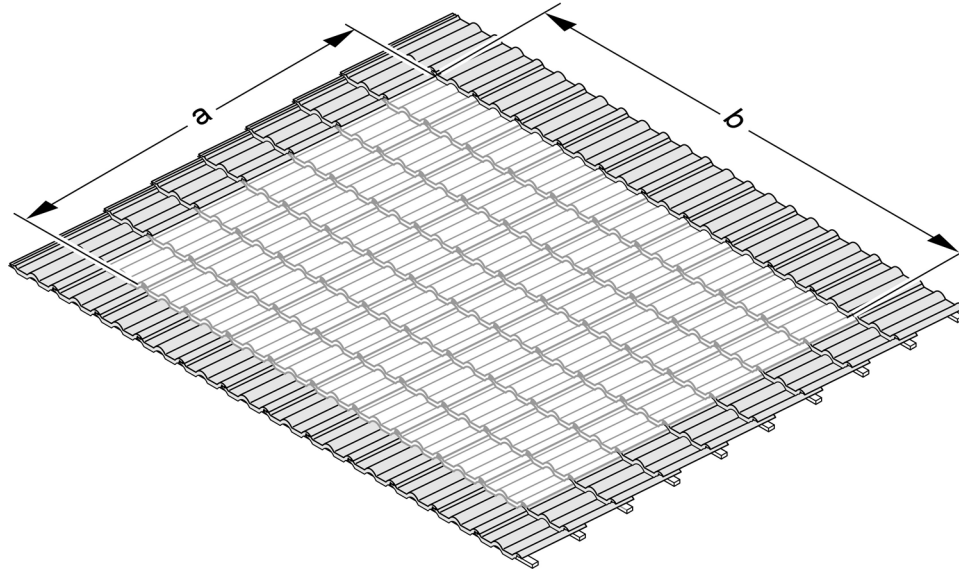


Solar Energy Yield

(a) 100%	(d) 65%	(g) 80%	(j) 50%
(b) 95%	(e) 70%	(h) 80%	(k) 90%
(c) 95%	(f) 65%	(i) 50%	

Required Installation Area (Sloped Roofs) - Vitosol 200-FM, Type SV

For vertical collectors installed between 10° - 80° degrees from the horizontal plane (ground)

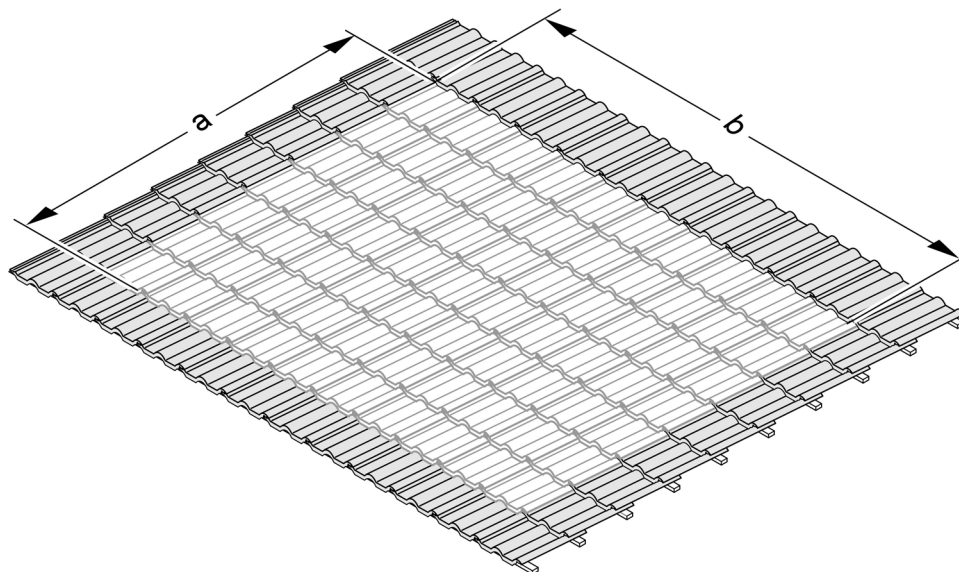


	Vitosol 200-FM SV2F Array Dimensions				Slope Roof Installation Collector Array Weight (Collectors, racking, fittings & fluid)	
Number of Collectors	Dimension "a"		Dimension "b"			
	in.	(mm)	in.	(mm)		
1 Collector	93¾	(2380)	43¼	(1098)	116	(53)
2 Collectors	93¾	(2380)	85¾	(2175)	222	(101)
3 Collectors	93¾	(2380)	128¾	(3273)	328	(149)
4 Collectors	93¾	(2380)	171¼	(4350)	434	(197)
5 Collectors	93¾	(2380)	214½	(5448)	542	(246)
6 Collectors	93¾	(2380)	257	(6525)	653	(296)
7 Collectors	93¾	(2380)	300	(7623)	757	(344)
8 Collectors	93¾	(2380)	342½	(8700)	869	(394)
9 Collectors	93¾	(2380)	385¾	(9798)	971	(440)
10 Collectors	93¾	(2380)	419½	(10654)	1083	(492)
11 Collectors	93¾	(2380)	471½	(11973)	1190	(540)
12 Collectors	93¾	(2380)	513¾	(13050)	1301	(590)

Note: It is recommended that a minimum service clearance of 12 in. (305 mm) should be added to each end of the collector array. This allows for ease of installation and servicing of the solar supply and return connections.

Required Installation Area (Sloped Roofs) - Vitosol 200-FM, Type SH

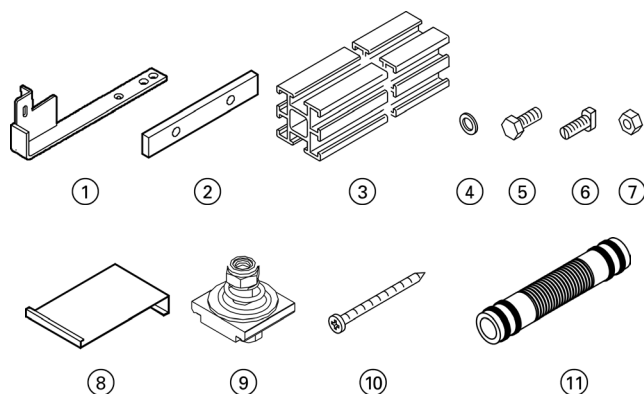
For horizontal collectors installed between 10° - 80° degrees from the horizontal plane (ground)



	Vitosol 200-FM SH2F Array Dimensions				Slope Roof Installation Collector Array Weight (Collectors, racking, fittings & fluid)	
Number of Collectors	Dimension "a"		Dimension "b"			
	in.	(mm)	in.	(mm)		
1 Collector	41¾	(1056)	95¼	(2422)	124	(56)
2 Collectors	41¾	(1056)	190¾	(4844)	240	(109)
3 Collectors	41¾	(1056)	286	(7266)	355	(161)
4 Collectors	41¾	(1056)	381½	(9688)	471	(214)
5 Collectors	41¾	(1056)	476¾	(12110)	587	(266)
6 Collectors	41¾	(1056)	572¼	(14532)	702	(319)
7 Collectors	41¾	(1056)	667½	(16954)	821	(373)
8 Collectors	41¾	(1056)	762¾	(19376)	935	(424)
9 Collectors	41¾	(1056)	858¼	(21798)	1054	(478)
10 Collectors	41¾	(1056)	953½	(24220)	1166	(529)
11 Collectors	41¾	(1056)	1049	(26642)	1285	(583)
12 Collectors	41¾	(1056)	1144¼	(29064)	1400	(635)

Note: It is recommended that a minimum service clearance of 12 in. (305 mm) should be added to each end of the collector array. This allows for ease of installation and servicing of the solar supply and return connections.

Overview of System Components (SV and SH Models)

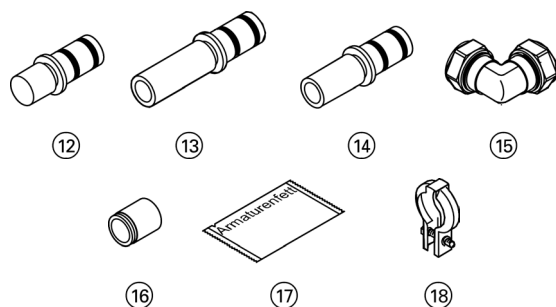


Sloped roof mounting hardware

- ① Roof bracket
- ② Joining element for mounting rail
- ③ Mounting rails,
SV = 43 in. (1093 mm) or 85 ½ in. (2170 mm)
SH = 95 ½ in. (2426 mm)
- ④ Washer, Ø 8.4 mm
- ⑤ Hexagon bolt, M8 x 10
- ⑥ Locking bolt w/threaded stud, M8 x 20
- ⑦ Hexagon nut M8
- ⑧ Mounting plate
- ⑨ Clamping bracket
- ⑩ Stainless steel countersunk screws, 3.1 in. (80 mm)

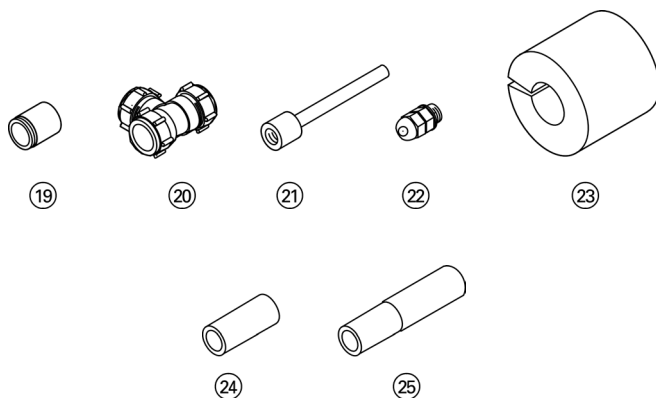
Hydronic connection accessories for multiple panel arrays

- ⑪ Interconnection pipes



General connection set

- ⑫ Plug
- ⑬ Connection pipe (long)
- ⑭ Connection pipe (short)
- ⑮ Locking ring fitting (90° elbow), Ø 22 mm
- ⑯ Support sleeve
- ⑰ Special grease
- ⑱ Profile clip



Sensor well set

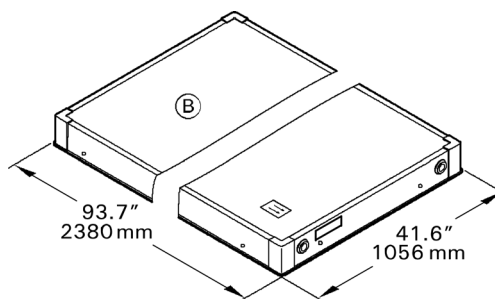
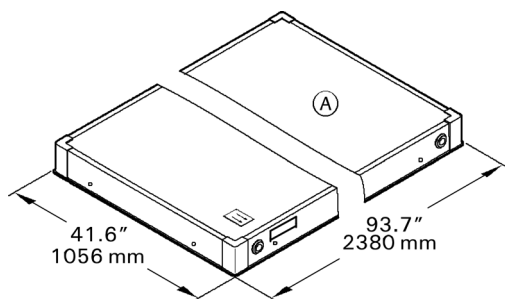
- ⑲ Support sleeve
- ⑳ Locking ring fitting (tee), Ø 22 mm
- ㉑ Sensor well
- ㉒ Strain relief fitting
- ㉓ Thermal insulation

Installation fittings kit (Adaptors)

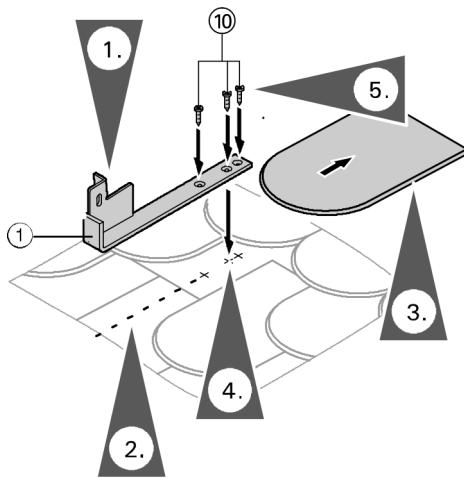
- ㉔ Copper Connector Ø 22mm x 2 ½ in. long
- ㉕ Copper Adaptor Ø 22mm to Ø ¾" x 4 in. long

Collectors

- Ⓐ Collector, Vitosol 200-FM, Model SV2F
- Ⓑ Collector, Vitosol 200-FM, Model SH2F

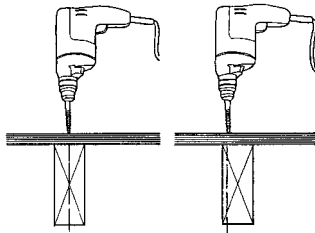


Installing the Mounting Frames



Drill within
0.2" (5 mm)
of center

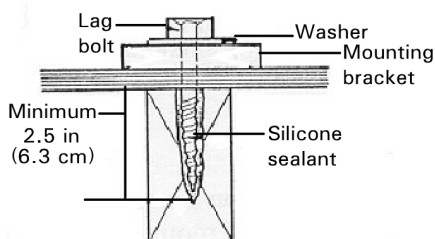
Too close
to edge



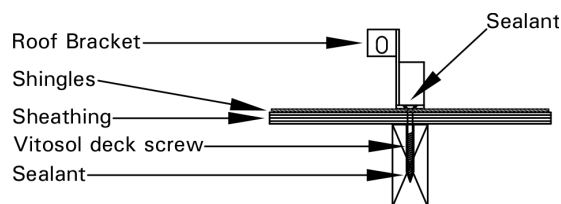
Correct

Incorrect

Source: CANSIA



Source: CANSIA



Install the panel array level or slightly inclined approximately $\frac{1}{2}$ in. (10 mm) towards the connection side to ensure complete venting. Always locate an air vent at the highest point in the piping.

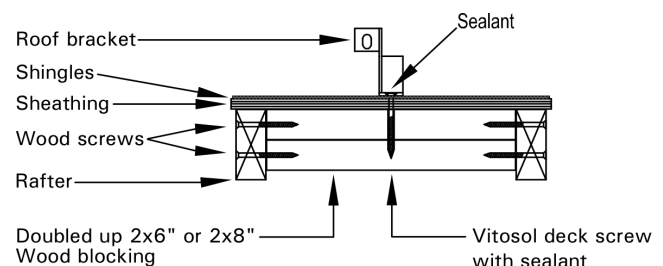
Attaching roof brackets on shingled roof

1. The roof brackets ① should be laid out as close as possible to the dimensions shown in the chart on page 11 for SV collectors, and page 12 for SH collectors.
2. Locate the roof joist by tapping along the roof to find its general location (stud finders do not work well through shingles and roof sheathing).
3. Pry up the shingles and drill small pilot holes to locate exact location of roof joist. If necessary, check where pilot hole is coming through roof from inside of attic.
4. Drill pilot holes into center of joist as shown. Fill the pilot holes and coat the bottom of roof bracket with silicone sealant.
5. Attach bracket to roof joist using the supplied 3.1 in. stainless steel screws ⑩. Screws should penetrate the roof joist at least $2\frac{1}{2}$ in. (64 mm). Use longer (field supplied) screws if required to achieve necessary penetration.
6. Re-apply shingles, if required, and ensure all roof penetrations are thoroughly sealed with silicone sealant.
7. Continue with mounting rail installation on page 15.

IMPORTANT

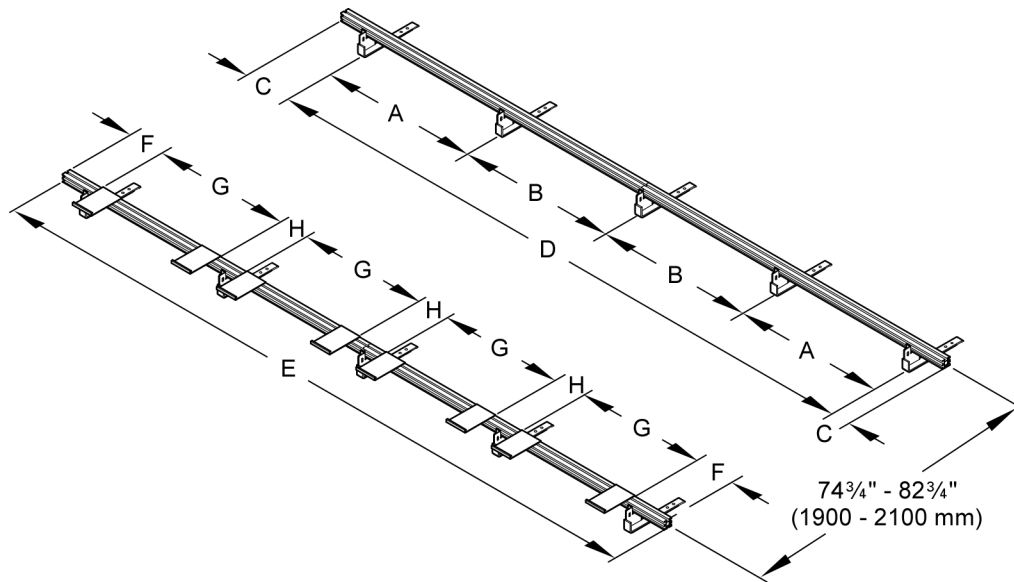
The roof bracket must be securely attached to the roof joist of the structure. Only use stainless steel attachment screws.

The 3.1 in. (80 mm) screws supplied with the mounting kit may not be sufficient length for some roof structures. The installer must ensure screws will penetrate roof joist sufficiently, and if not, must provide longer screws or lag bolts.



Installing the Mounting Frames *(continued)*

Installation dimensions for Vitosol 200-FM, Type SV (vertical collectors)



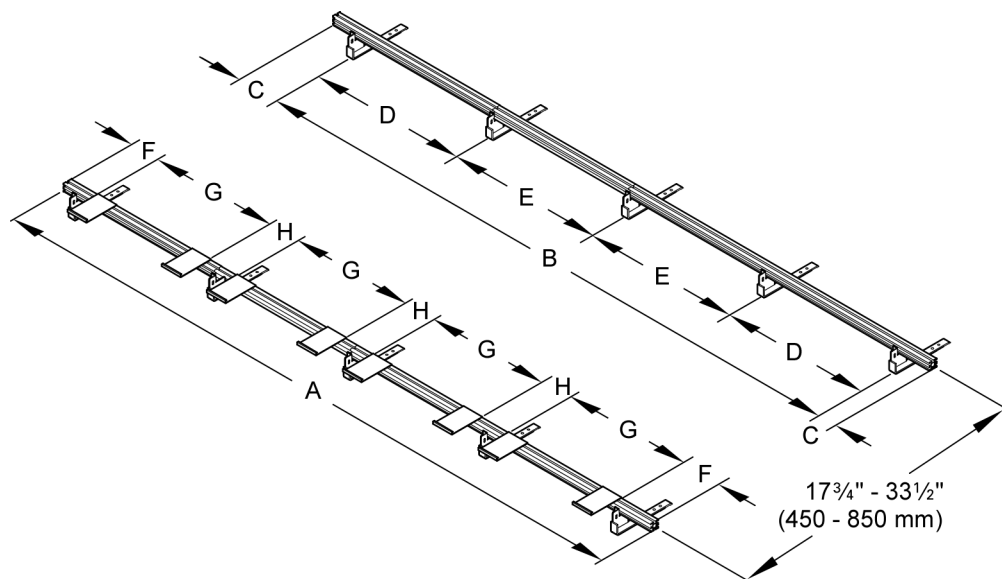
Dimensions for model SV collectors

Number of Collectors	Dimension A	Dimension B	Dimension C	Dimension D*1	Dimension E	Dimension F	Dimension G	Dimension H
	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)
1 Collector	40 (1019)	--	1½ (39.5)	40 (1019)	43¼ (1098)	3½ (87.5)	36¼ (923)	--
2 Collectors	40 (1019)	--	2¾ (68.5)	80¼ (2038)	85½ (2175)	3½ (87.5)	36¼ (923)	6 (154)
3 Collectors	40 (1019)	42½ (1077)	3 (79)	122½ (3115)	128¾ (3273)	4 (98)	36¼ (923)	6 (154)
4 Collectors	40 (1019)	42½ (1077)	3 (79)	165 (4192)	171¼ (4350)	4 (98)	36¼ (923)	6 (154)
5 Collectors	40 (1019)	42½ (1077)	3½ (89.5)	207½ (5269)	214½ (5448)	4¼ (108.5)	36¼ (923)	6 (154)
6 Collectors	40 (1019)	42½ (1077)	3½ (89.5)	249¾ (6346)	256¾ (6525)	4¼ (108.5)	36¼ (923)	6 (154)
7 Collectors	40 (1019)	42½ (1077)	4 (100)	292¼ (7423)	300¼ (7623)	4¾ (119)	36¼ (923)	6 (154)
8 Collectors	40 (1019)	42½ (1077)	4 (100)	334½ (8500)	342½ (8700)	4¾ (119)	36¼ (923)	6 (154)
9 Collectors	40 (1019)	42½ (1077)	4½ (110.5)	377 (9577)	385¾ (9798)	5 (129.5)	36¼ (923)	6 (154)
10 Collectors	40 (1019)	42½ (1077)	4½ (110.5)	419½ (10654)	428 (10875)	5 (129.5)	36¼ (923)	6 (154)
11 Collectors	40 (1019)	42½ (1077)	4¾ (121)	462 (11731)	471½ (11973)	5½ (140)	36¼ (923)	6 (154)
12 Collectors	40 (1019)	42½ (1077)	4¾ (121)	504¼ (12808)	513¾ (13050)	5½ (140)	36¼ (923)	6 (154)

* 1 For static reasons, maintain the stated sequence. Maintain the dimensions A and B as far as possible. Roof brackets may also be offset if you need to locate roof joist. However, always maintain the overall dimension.

Installing the Mounting Frames *(continued)*

Installation dimensions for Vitosol 200-FM, Type SH (horizontal collectors)



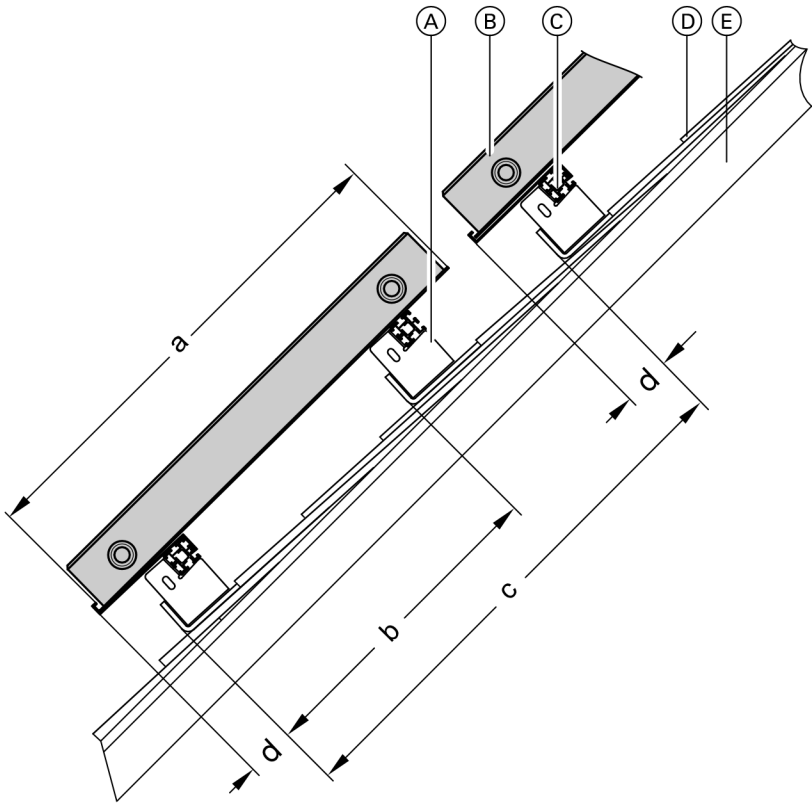
Dimensions for model SH collectors

Number of Collectors	Dimension A	Dimension B	Dimension C*1	Dimension D	Dimension E	Dimension F	Dimension G	Dimension H
	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)
1 Collector	95 $\frac{1}{4}$ (2422)	88 (2250)	3 $\frac{1}{2}$ (86)	88 $\frac{1}{2}$ (2250)	--	4 $\frac{1}{4}$ (111)	86 $\frac{1}{2}$ (2200)	--
2 Collectors	190 $\frac{3}{4}$ (4844)	177 (4500)	6 $\frac{3}{4}$ (172)	88 $\frac{1}{2}$ (2250)	--	4 $\frac{3}{4}$ (121.5)	86 $\frac{1}{2}$ (2200)	8 (201)
3 Collectors	286 (7266)	271 $\frac{3}{4}$ (6901)	7 $\frac{1}{4}$ (182.5)	88 $\frac{1}{2}$ (2250)	94 $\frac{1}{2}$ (2401)	5 $\frac{1}{4}$ (132)	86 $\frac{1}{2}$ (2200)	8 (201)
4 Collectors	381 $\frac{1}{2}$ (9688)	366 $\frac{1}{4}$ (9302)	7 $\frac{1}{2}$ (193)	88 $\frac{1}{2}$ (2250)	94 $\frac{1}{2}$ (2401)	5 $\frac{1}{2}$ (142.5)	86 $\frac{1}{2}$ (2200)	8 (201)
5 Collectors	476 $\frac{3}{4}$ (12110)	460 $\frac{3}{4}$ (11703)	8 (203)	88 $\frac{1}{2}$ (2250)	94 $\frac{1}{2}$ (2401)	6 (153)	86 $\frac{1}{2}$ (2200)	8 (201)
6 Collectors	572 (14532)	555 $\frac{1}{4}$ (14104)	8 $\frac{1}{2}$ (214)	88 $\frac{1}{2}$ (2250)	94 $\frac{1}{2}$ (2401)	6 $\frac{1}{2}$ (163.5)	86 $\frac{1}{2}$ (2200)	8 (201)
7 Collectors	667 $\frac{1}{2}$ (16954)	649 $\frac{3}{4}$ (16505)	8 $\frac{3}{4}$ (224.5)	88 $\frac{1}{2}$ (2250)	94 $\frac{1}{2}$ (2401)	6 $\frac{3}{4}$ (174)	86 $\frac{1}{2}$ (2200)	8 (201)
8 Collectors	763 (19376)	744 $\frac{1}{4}$ (18906)	9 $\frac{1}{4}$ (235)	88 $\frac{1}{2}$ (2250)	94 $\frac{1}{2}$ (2401)	7 $\frac{1}{4}$ (184.5)	86 $\frac{1}{2}$ (2200)	8 (201)
9 Collectors	858 $\frac{1}{4}$ (21798)	838 $\frac{3}{4}$ (21307)	9 $\frac{3}{4}$ (245.5)	88 $\frac{1}{2}$ (2250)	94 $\frac{1}{2}$ (2401)	7 $\frac{3}{4}$ (195)	86 $\frac{1}{2}$ (2200)	8 (201)
10 Collectors	953 $\frac{1}{2}$ (24220)	933 $\frac{1}{2}$ (23708)	10 (256)	88 $\frac{1}{2}$ (2250)	94 $\frac{1}{2}$ (2401)	8 (205.5)	86 $\frac{1}{2}$ (2200)	8 (201)
11 Collectors	1049 (26642)	1028 (26109)	10 $\frac{1}{2}$ (266.5)	88 $\frac{1}{2}$ (2250)	94 $\frac{1}{2}$ (2401)	8 $\frac{1}{2}$ (216)	86 $\frac{1}{2}$ (2200)	8 (201)
12 Collectors	1144 $\frac{1}{4}$ (29064)	1122 $\frac{1}{2}$ (28510)	11 (277)	88 $\frac{1}{2}$ (2250)	94 $\frac{1}{2}$ (2401)	9 (226.5)	86 $\frac{1}{2}$ (2200)	8 (201)

* 1 For static reasons, maintain the stated sequence. Maintain the dimensions D and E as far as possible. Roof brackets may also be offset if you need to locate roof joist. However, always maintain the overall dimension.

Installing the Mounting Frames *(continued)*

Secure mounting brackets (A) on site with factory supplied screws to the roof joist. For dimensions see 'Installing the mounting frames' from pages 11 and 12.



- Legend**
- (A) Mounting brackets
 - (B) Collector
 - (C) Mounting rail
 - (D) Shingles
 - (E) Roof joist

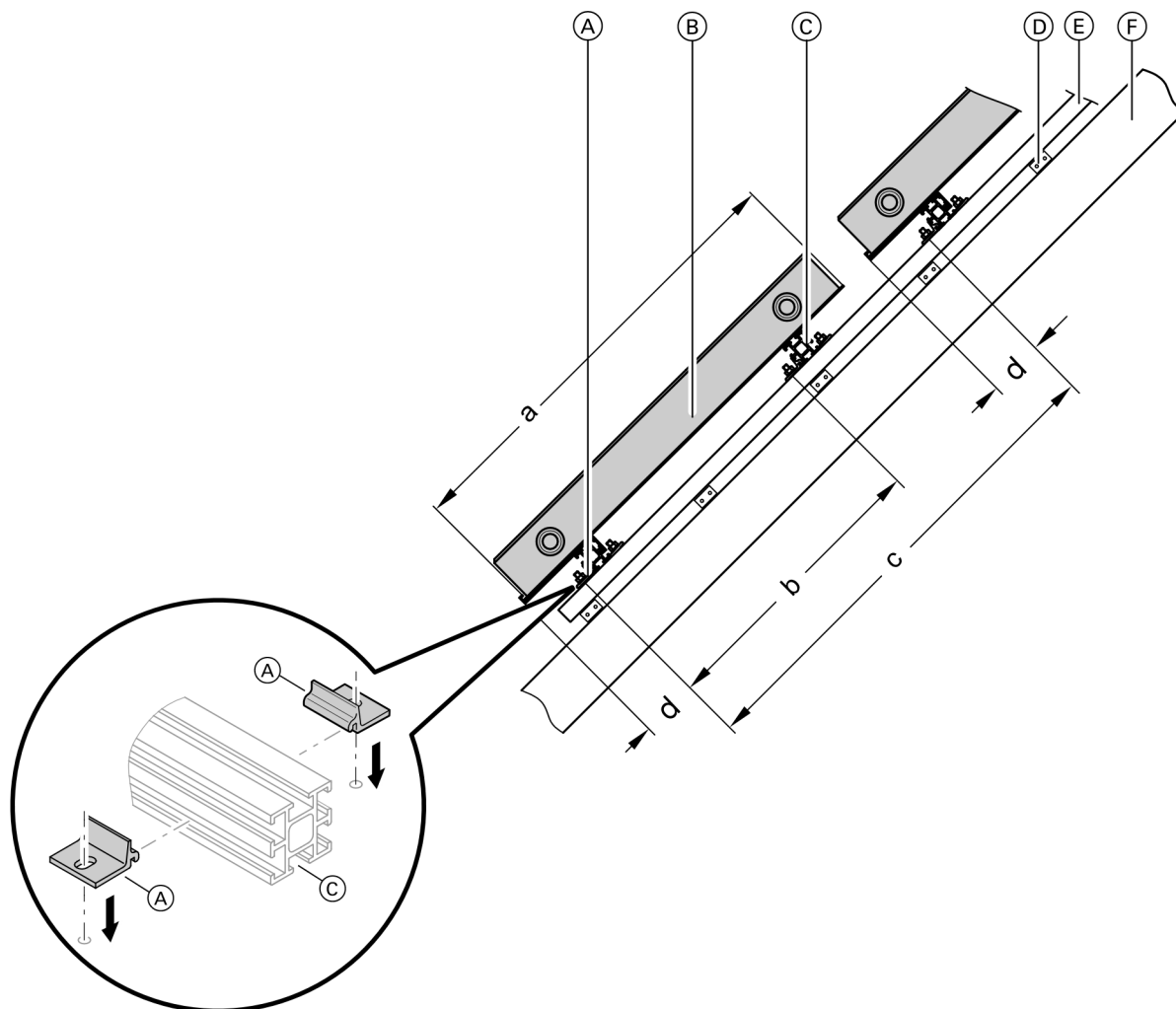
Dimensions for model SV and SH collectors

Type	a	in. (mm)	b	in. (mm)	c	in. (mm)	d	in. (mm)
SV		93¾ (2380)		74¾ - 82¾ (1900 - 2100)		≥ 94½ (≥ 2400)		2¾ (70)
SH		41¾ (1056)		17¾ - 33½ (450 - 850)		≥ 42½ (≥ 1077)		2¾ (70)

Installing the Mounting Frames *(continued)*

Overview - standing seam steel roof installation

Install clamping brackets (A) to mounting rail (C) and secure with field supplied fasteners to the field supplied support rail (E). For dimensions see 'Installing the mounting frames' on pages 11 and 12.



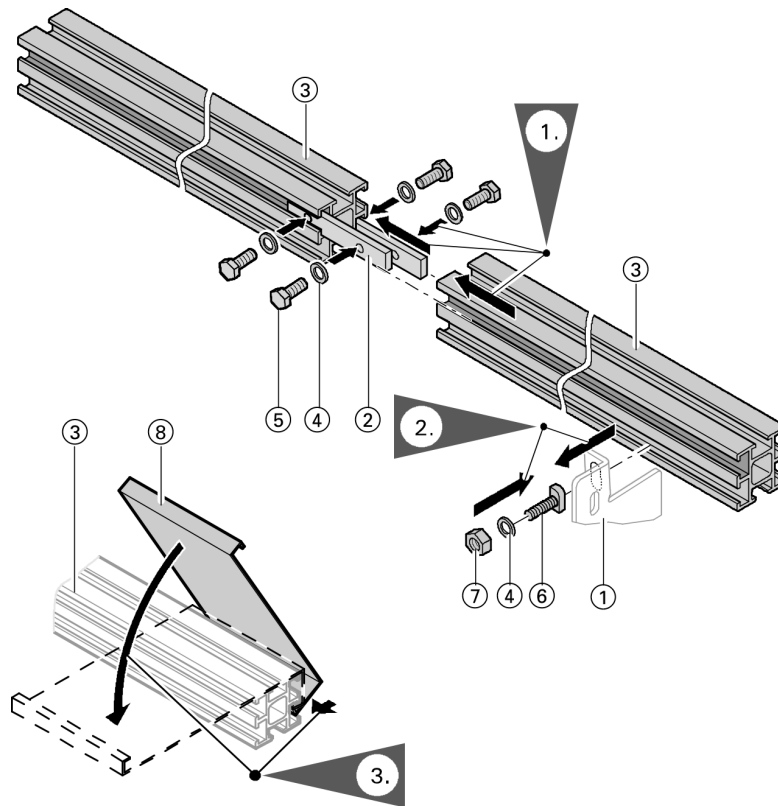
Legend

- (A) Clamping brackets with hole size Ø 5/16 in. (Ø 9 mm)
It is recommended that a minimum of 4x clamping brackets be installed per support rail (E) (clamping brackets are ordered separately from Viessmann)
- (B) Collector
- (C) Mounting rail
- (D) Standing seam profile clamps (field supplied)
- (E) Support rail (field supplied)
- (F) Standing seam steel roof

Dimensions for model SV and SH collectors

Type	a	in. (mm)	b	in. (mm)	c	in. (mm)	d	in. (mm)
SV		93¾ (2380)		74¾ - 82¾ (1900 - 2100)		≥ 94½ (≥ 2400)		4 (103)
SH		41¾ (1056)		17¾ - 33½ (450 - 850)		≥ 42½ (≥ 1077)		4 (103)

Installing the Mounting Frames *(continued)*



Installing the mounting rails

IMPORTANT

Make sure the mounting rail profile is as shown. The single slot in the rail must face upwards. Failure to install the mounting rail correctly will not allow proper mounting plate connection.

1. If more than two collectors are being installed, rails must be joined together. Secure the joining elements (2) into the mounting rails (3) with bolt (5) and washer (4).

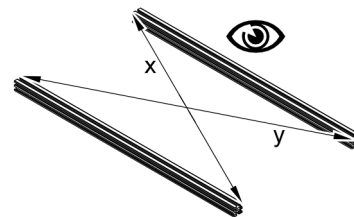
IMPORTANT

Turn the T-slot bolts 90° for all installation steps.

2. Secure the mounting rails (3) to the roof bracket (1) with bolt (6), nut (7) and washer (4). The locking bolt must be turned 90°.

IMPORTANT

Ensure the upper and lower mounting rails are square before tightening the locking bolts. Measure from opposite corners of the top and bottom rails to ensure that array is square. The length of "x" must be equal to the length of "y".

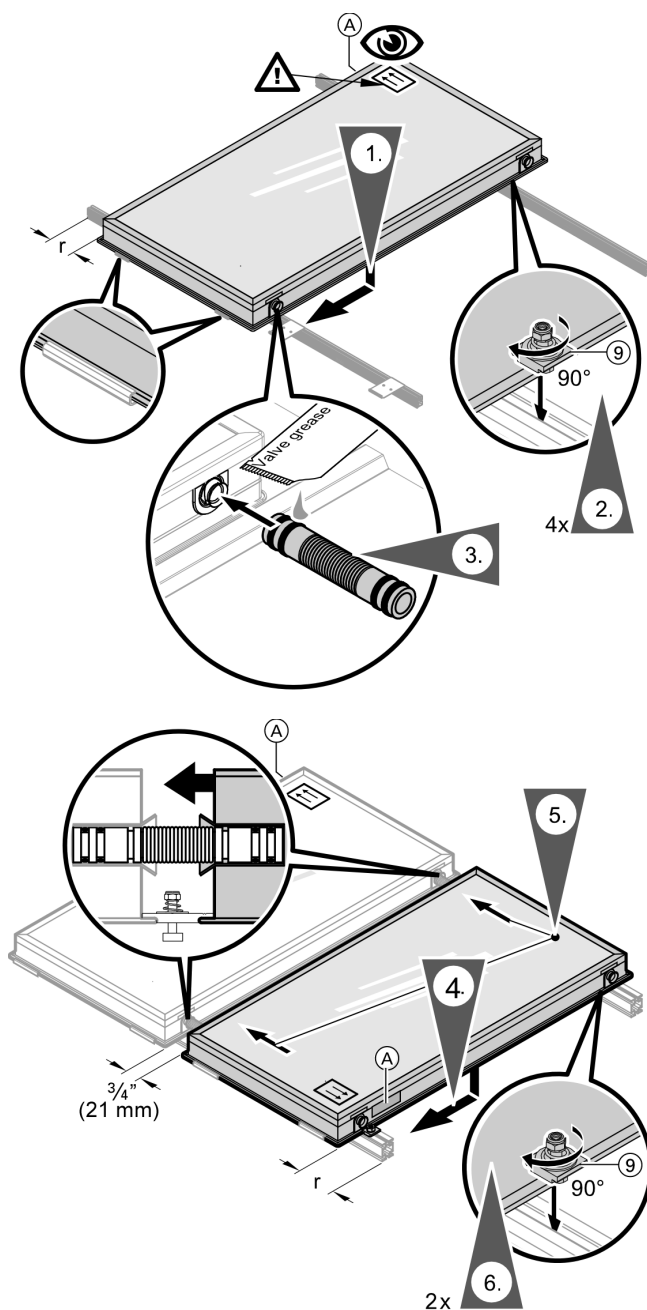


3. Hook the mounting plates (8) into lower mounting rails (3) according to the dimensions shown in the illustrations on pages 11 and 12.

IMPORTANT

Make sure the mounting plate is installed with the short bent edge connecting onto the bottom of the collector.

Installing the Solar Collectors



Legend

- (A) Rating plate (must be on the outside of the outer collectors)

Note: See page 9 for numbered component description

CAUTION

Never step, lean or place objects on the collectors.

IMPORTANT

Interconnecting pipes must be free from damage and contamination. Lubricate all plug-in joints (O-ring seals) on the collectors. Use only the special grease supplied with the connection set.

IMPORTANT

On the first and last collector, the side to which the rating plate (A) is attached must be on the outside. Ensure that dimension "r" is maintained for first and last collector.

1. Hook the collector into its mounting plates (8) and lay down onto the mounting rails (3).
2. Secure the collector with four clamping brackets (9) onto the mounting rails. Tighten the two outer clamping bolts only. Turn the T-slot bolt 90°.
3. Before inserting connecting pipe (11) mark the middle of the connecting pipe with a marker or a piece of tape for reference. Insert the connecting pipe into the collector until the brass section is no longer visible.

IMPORTANT

Ensure interconnection pipe is centered between collectors.

4. Position the second collector as in step 1.
5. Carefully push the second collector against the first and insert the connecting pipes (11) until they are centered between the collectors. Distance between the two installed collectors should be 3/4 in. (21 mm).
6. Install all additional collectors.
7. Tighten all clamping brackets (9).

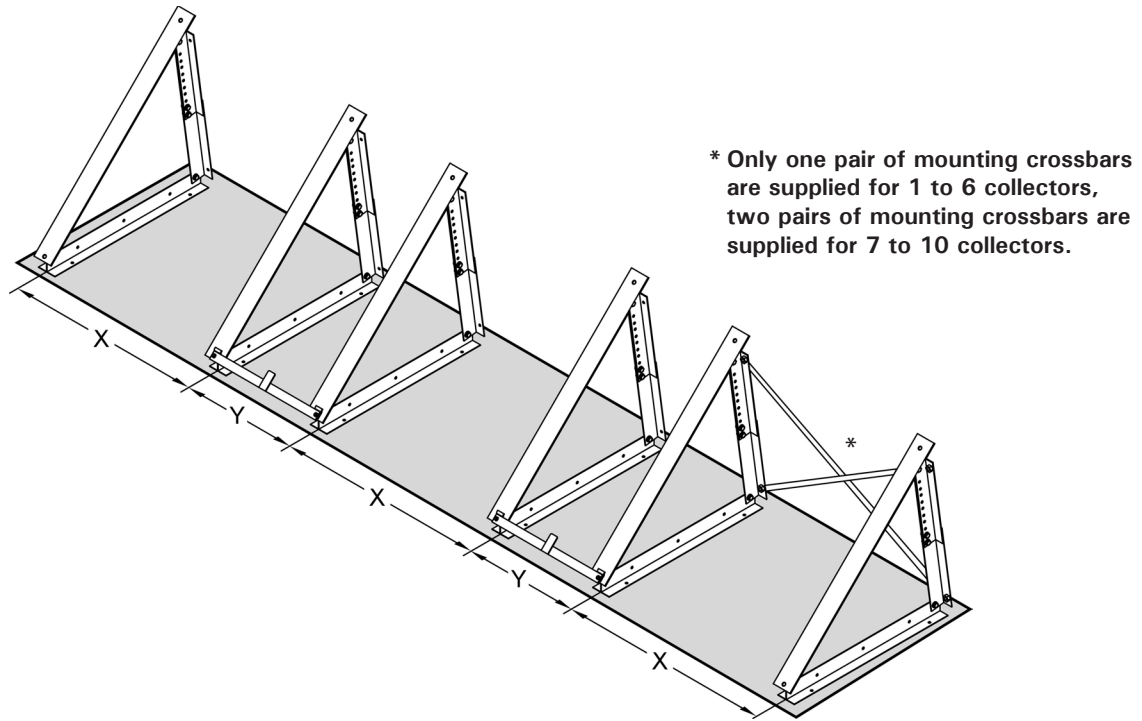
IMPORTANT

Remove all labels and foil cover from glass only after the system is fully operational.

Number of collectors		1	2	3	4	5	6	8	10
Dimension r SV collector	in.	0.8	0.8	1.2	1.2	1.7	1.7	2.1	2.5
	(mm)	(21)	(21)	(31.5)	(31.5)	(42)	(42)	(52.5)	(63)
Dimension r SH collector	in.	0.8	1.2	1.7	2.1	2.5	2.9	3.7	4.5
	(mm)	(21)	(31.5)	(42)	(52.5)	(63)	(73.5)	(94.5)	(115.5)

Required Installation Area (Flat Roofs) - Vitosol 200-FM, Type SV

For vertical collectors installed between 25° - 60° degrees from the horizontal plane (ground)

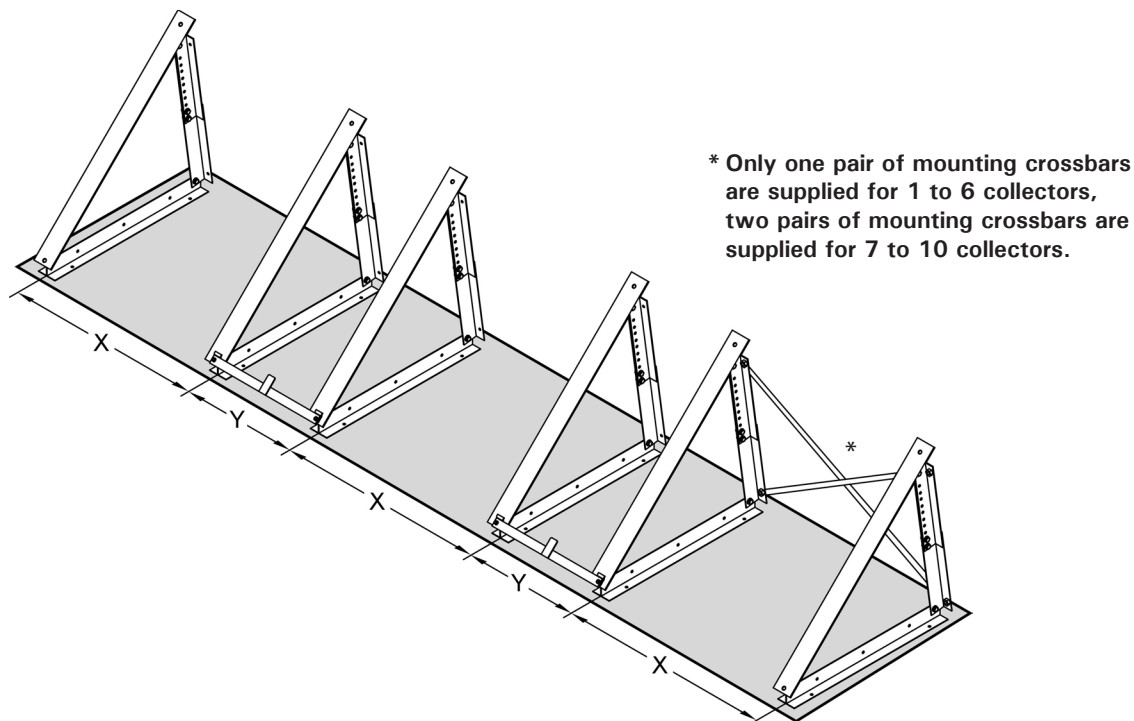


Number of Collectors	Vitosol 200-FM SV2F Array Dimensions		Flat Roof Installation Collector Array Weight (Collectors, racking, fittings & fluid)	
	Mounting Frame Spacing Dimensions	Overall Length of Array When Collectors Installed		
	"X" = 23½ in (595 mm) "Y" = 187/8 in (481 mm)	in. (mm)	lb. (kg)	
1 Collector	1x "X"	42¼ (1071)	142 (65)	
2 Collectors	2x "X" + 1x "Y"	84½ (2148)	278 (126)	
3 Collectors	3x "X" + 2x "Y"	127 (3225)	414 (188)	
4 Collectors	4x "X" + 3x "Y"	169¼ (4301)	549 (249)	
5 Collectors	5x "X" + 4x "Y"	211¾ (5378)	685 (311)	
6 Collectors	6x "X" + 5x "Y"	254¼ (6455)	820 (372)	
7 Collectors	7x "X" + 6x "Y"	296½ (7532)	958 (435)	
8 Collectors	8x "X" + 7x "Y"	339 (8609)	1094 (496)	
9 Collectors	9x "X" + 8x "Y"	381¼ (9685)	1229 (558)	
10 Collectors	10x "X" + 9x "Y"	423¾ (10762)	1365 (619)	
11 Collectors	11x "X" + 10x "Y"	466 (11839)	1500 (681)	
12 Collectors	12x "X" + 11x "Y"	508½ (12916)	1636 (742)	

Note: It is recommended that a minimum service clearance of 12 in. (305 mm) should be added to each end of the collector array. This allows for ease of installation and servicing of the solar supply and return connections.

Required Installation Area (Flat Roofs) - Vitosol 200-FM, Type SH

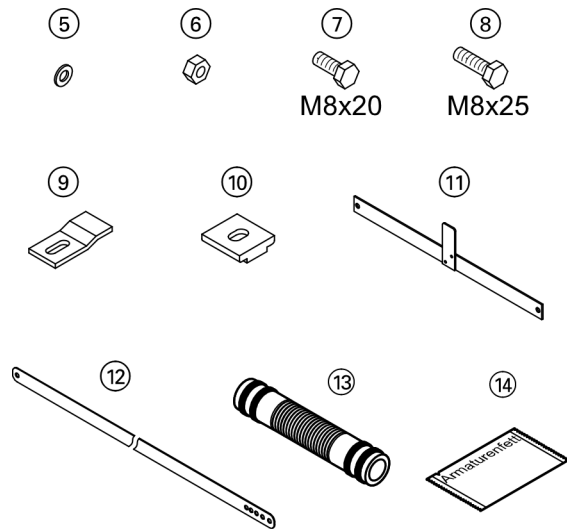
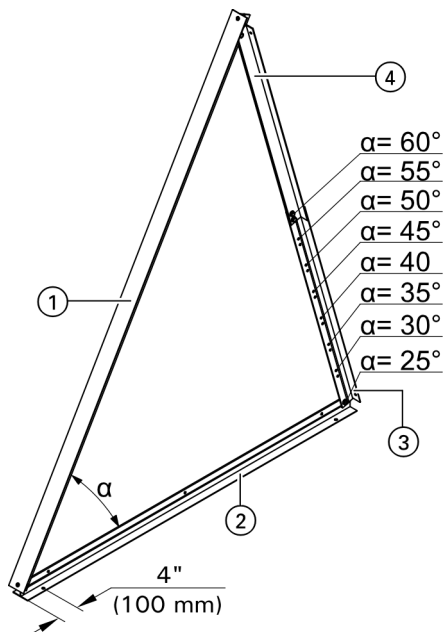
For horizontal collectors installed between 25° - 80° degrees from the horizontal plane (ground)



Number of Collectors	Vitosol 200-FM SH2F Array Dimensions		Flat Roof Installation Collector Array Weight (Collectors, racking, fittings & fluid)	
	Mounting Frame Spacing Dimensions	Overall Length of Array When Collectors Installed		
	"X" = 75 ⁵ / ₈ in (1920 mm) "Y" = 18 ⁷ / ₈ in (481 mm))	in. (mm)	lb. (kg)	
1 Collector	1x "X"	94 ¹ / ₄ (2395)	125 (57)	
2 Collectors	2x "X" + 1x "Y"	188 ³ / ₄ (4796)	243 (110)	
3 Collectors	3x "X" + 2x "Y"	283 ¹ / ₄ (7197)	361 (164)	
4 Collectors	4x "X" + 3x "Y"	377 ³ / ₄ (9597)	479 (218)	
5 Collectors	5x "X" + 4x "Y"	472 ¹ / ₄ (11998)	597 (271)	
6 Collectors	6x "X" + 5x "Y"	567 (14399)	715 (325)	
7 Collectors	7x "X" + 6x "Y"	661 ¹ / ₂ (16800)	836 (379)	
8 Collectors	8x "X" + 7x "Y"	756 (19201)	954 (433)	
9 Collectors	9x "X" + 8x "Y"	850 ¹ / ₂ (21601)	1072 (486)	
10 Collectors	10x "X" + 9x "Y"	945 (24002)	1190 (540)	
11 Collectors	11x "X" + 10x "Y"	1039 ¹ / ₂ (26403)	1308 (594)	
12 Collectors	12x "X" + 11x "Y"	1134 (28804)	1426 (647)	

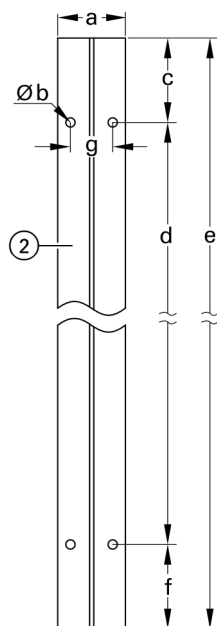
Note: It is recommended that a minimum service clearance of 12 in. (305 mm) should be added to each end of the collector array. This allows for ease of installation and servicing of the solar supply and return connections.

Overview of System Components (Model SV)



Legend

- ① Collector support for angle of inclination α 25° to 60°
- ② Base rail
- ③ Adjustable support, lower part
- ④ Adjustable support, upper part (2-part)
- ⑤ Washer $\varnothing 8.4$ mm
- ⑥ Hexagon nut M8
- ⑦ Hexagon bolt M8 x 20
- ⑧ Hexagon bolt M8 x 25
- ⑨ Retaining bracket
- ⑩ Clamping bracket
- ⑪ Support brace
- ⑫ Mounting crossbars
- ⑬ Interconnection pipe
- ⑭ Special valve grease

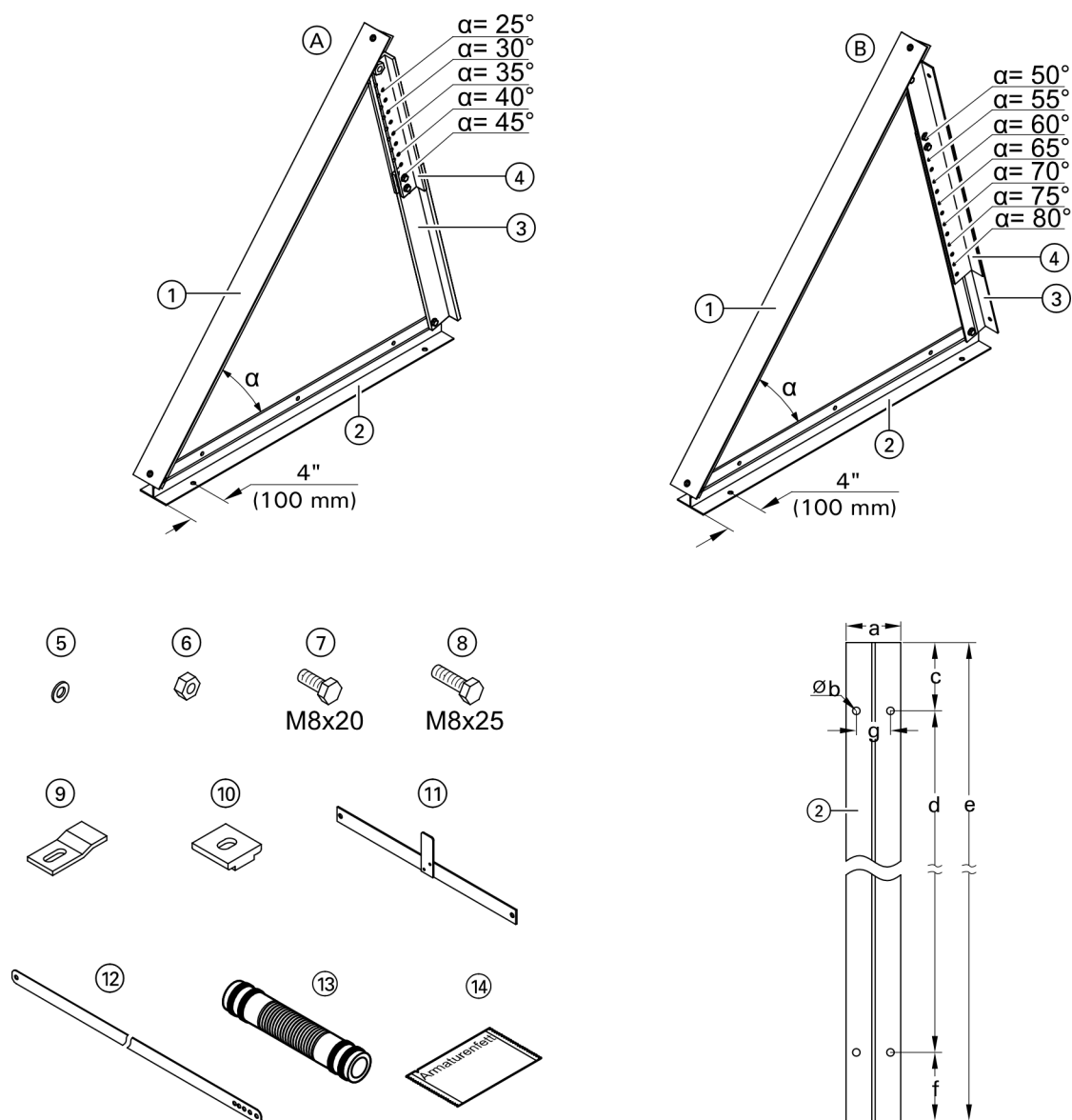


Dimensions:

- a 3 in. (80 mm)
- b $\varnothing 0.4$ in. (11 mm)
- c 4 in. (100 mm)
- d 63 in. (1600 mm)
- e 71 in. (1800 mm)
- f 4 in. (100 mm)
- g 2 in. (50 mm)

Note: Imperial dimensions are rounded to the nearest $\frac{1}{4}$ in.

Overview of System Components (Model SH)



Legend

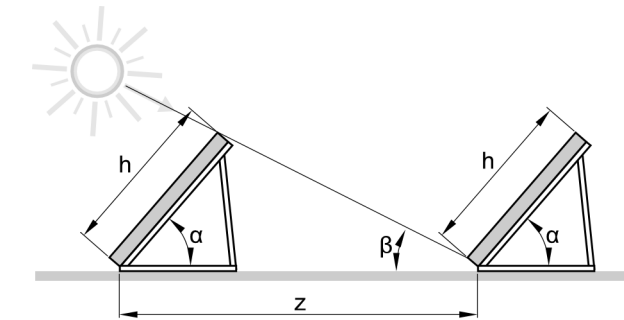
- (A) Collector support for angle of inclination $\alpha = 25^\circ$ to 45°
- (B) Collector support for angle of inclination $\alpha = 50^\circ$ to 80°
- (1) Collector support
- (2) Base rail
- (3) Adjustable support, lower part
- (4) Adjustable support, upper part (2-part)
- (5) Washer $\varnothing 8.4$ mm
- (6) Hexagon nut M8
- (7) Hexagon bolt M8 x 20
- (8) Hexagon bolt M8 x 25
- (9) Retaining bracket
- (10) Clamping bracket
- (11) Support brace
- (12) Mounting crossbars
- (13) Interconnection pipe
- (14) Special valve grease

Dimensions:

- a 3 in. (80 mm)
- b $\varnothing 0.4$ in. (11 mm)
- c 3 in. (75 mm)
- d 28½ in. (722 mm)
- e 35¼ in. (897 mm)
- f 4 in. (100 mm)
- g 2 in. (50 mm)

Note: Imperial dimensions are rounded to the nearest ¼ in.

Determining the Collector Row Distance "z"



$$z = \frac{h \cdot \sin (180^\circ - (\alpha + \beta))}{\sin \beta}$$

Legend:

z = Collector row distance

h = Collector height

200-FM model SV = 93¾ in. (2380 mm)

200-FM model SH = 41¾ in. (1056 mm)

α = Collector angle of inclination

200-FM model SV = 25° - 60°

200-FM model SH = 25° - 80°

β = Solar angle

$\beta = (90^\circ - 23.5^\circ) - \text{Latitude}$

IMPORTANT

When installing several collectors in series, maintain a distance of "z".

Example:

Vitosol 200-FM, Type SV (Vertical Collector)

Toronto is located at approximately 43° latitude.

1. Determine the angle of the sun β . This should be chosen so that the midday sun December 21 falls on the second row of collectors without being obstructed by shadows.

Solar angle β :

$\beta = (90^\circ - 23.5^\circ) - \text{latitude}$

(23.5° should be accepted as constant value for northern latitudes)

$$\beta = (90^\circ - 23.5^\circ) - 43^\circ = 23.5^\circ$$

2. Calculating dimension "z":

$h = 2380 \text{ mm}$

$\alpha = 45^\circ$

$\beta = 23.5^\circ$

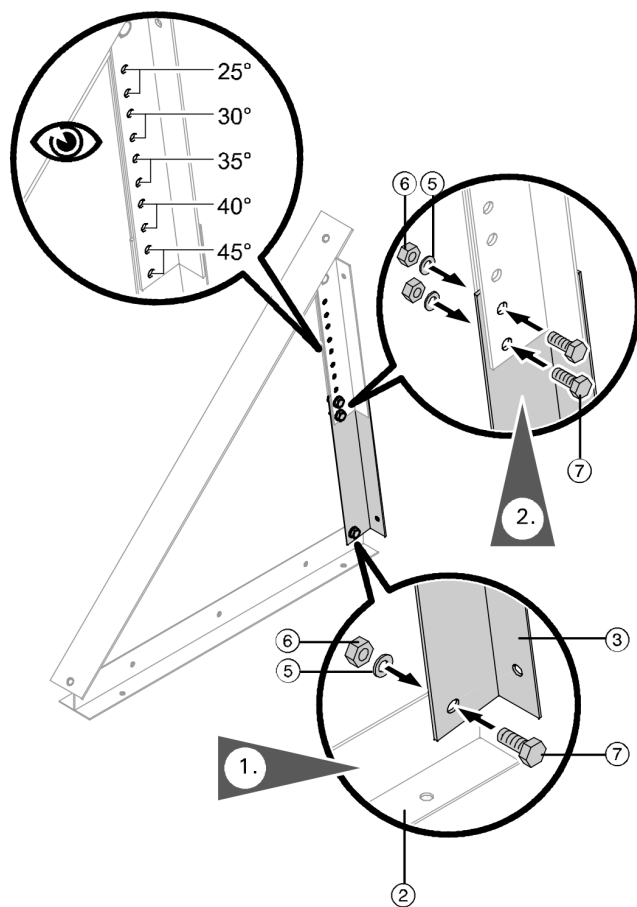
$$z = \frac{2380 \text{ mm} \cdot \sin (180^\circ - (45^\circ + 23.5^\circ))}{\sin 23.5^\circ}$$

$$z = \frac{2380 \text{ mm} \cdot \sin 111.5^\circ}{\sin 23.5^\circ}$$

$$z = 218.6 \text{ in. (5553 mm)}$$

Note: Contact Viessmann Solar Tech Support for assistance with calculating distance "z".

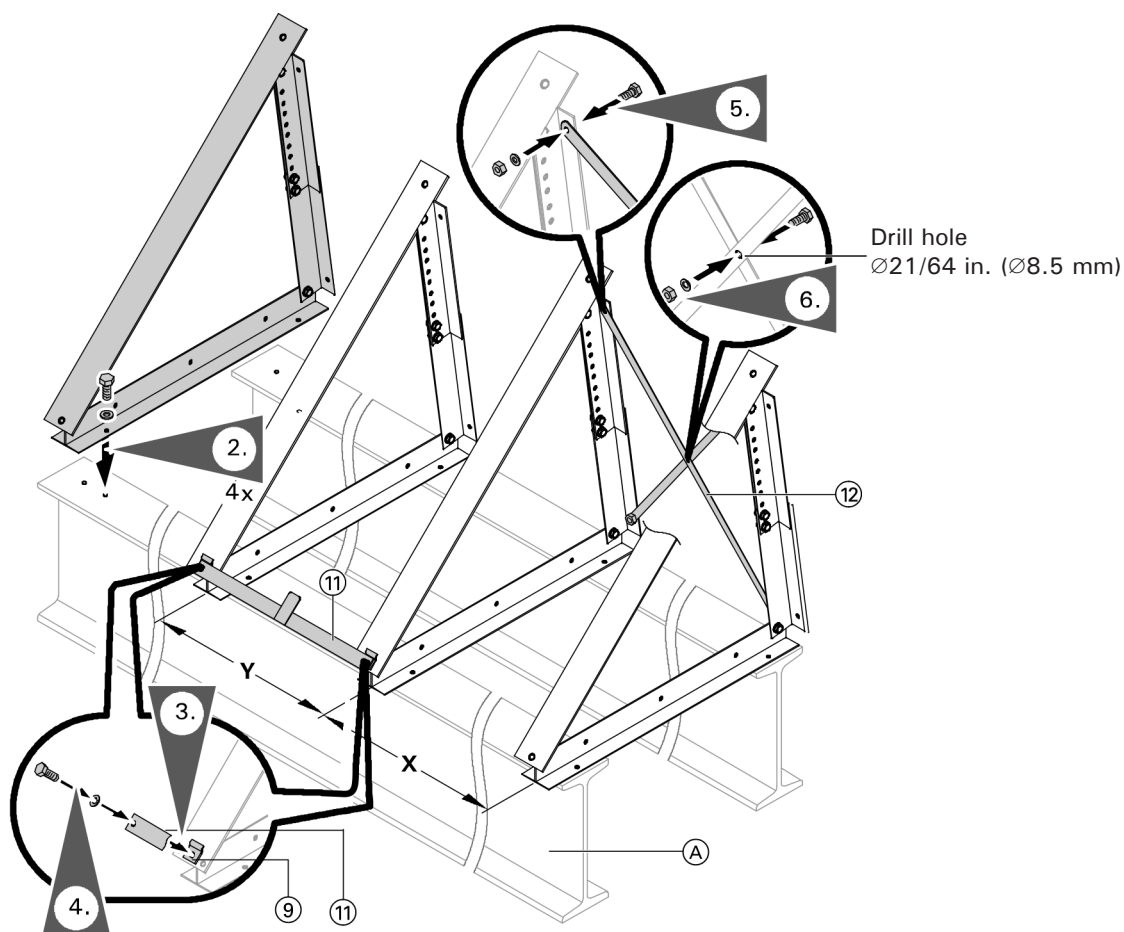
Installing the Collector Supports and Adjustment Angle of Inclination α



1. Secure the adjustable support (lower) (3) to the bottom base rail (2) with bolt (7), nut (6) and washer (5).
2. Secure the upper and lower adjustable supports together with bolts (7), nuts (6) and washers (5), in accordance with the required angle of inclination.

Note: See page 19 or 20 (depending on model) for numbered component description.

Installing Freestanding Installation on Substructures



Legend

(A) Substructure rails (field supplied)

Note: See page 19 or 20 (depending on model) for numbered component description.

		X	Y
Collector model SV	in. (mm)	23½ (595)	18⅞ (481)
Collector model SH	in. (mm)	75⅝ (1920)	18⅞ (481)

1. Mount the substructure (to be provided on site), e.g. structural wide flange beam, at right angles to and level with the installation orientation of the collectors according to the dimensions shown in the drawing.
2. Position and align the collector support frames according to the dimensions X and Y shown in the drawing and secure them to the substructure (A) using stainless steel bolts (supplied by others). Use the base rail as templates for drilling holes.
3. Secure retaining bracket (9) to the bottom of all collector supports; do not tighten bolts yet.



CAUTION

Any welds or connections to the existing substructure must be supervised by a professional structural engineer.

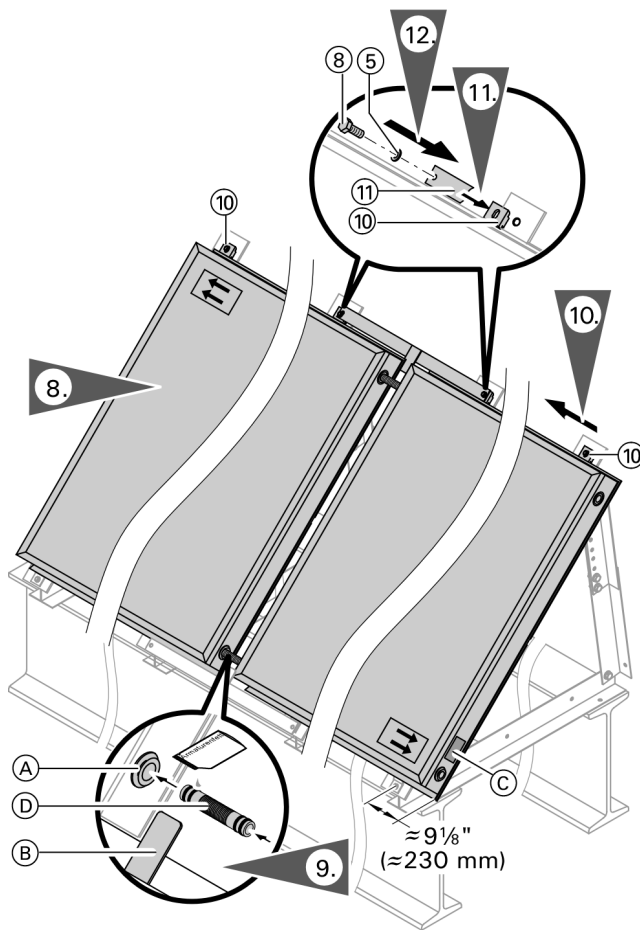
4. Secure support braces (11) on the top of the retaining brackets between the second and third, the fourth and fifth supports etc. Tighten all bolts.
5. Secure two mounting crossbars (12) diagonally side by side to the adjustable supports, respectively for between one and six collectors.

IMPORTANT

Only one pair of mounting crossbars are supplied for 1 to 6 collectors, two pairs of mounting crossbars are supplied for 7 to 10 collectors.

6. For added stability, attach connecting ties to each other where they intersect, using M8 or 5/16" (field supplied) nut and bolt.
7. Position the first collector into the retaining bracket (9) and push right up to the spacer lip of the support brace (11).

Installing Freestanding Installation on Substructures *(continued)*



Legend

- (A) Collector connection
- (B) Spacer lip of the support brace (11)
- (C) Rating plate
- (D) Interconnection pipe (13)

Note: See page 19 or 20 (depending on model) for numbered component description.

IMPORTANT

Install the collector panel so that the rating plate (C) side of the first and last collector is on the outside (note sticker)! If only one collector is to be installed, connect the piping opposite the rating plate (C) side. See page 34 for more information.

8. Before inserting interconnection pipe (D) mark the middle of the connecting pipe with a marker or a piece of tape for reference. Insert the interconnection pipe (D) into the collector until the brass section is no longer visible.

IMPORTANT

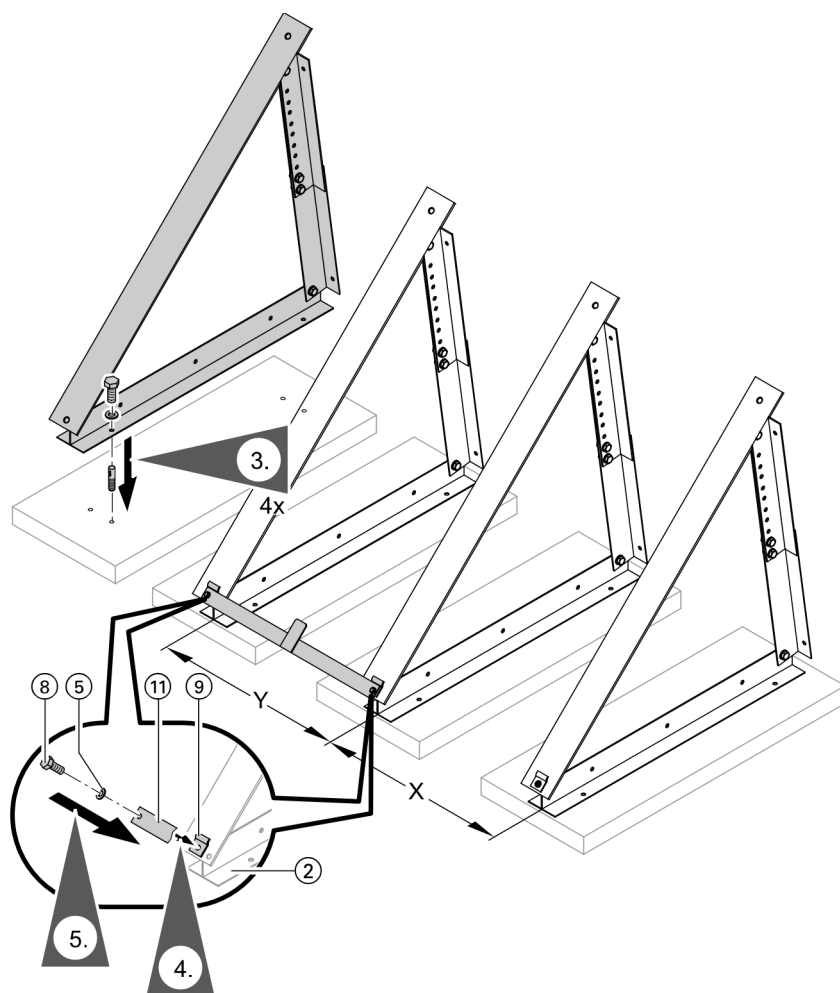
Interconnecting pipes must be free from damage and contamination. Lubricate all plug-in joints (O-ring seals) on the collectors. Use only the special grease supplied with the connection set.

9. Carefully push the next collector up to the collector that was just installed. Insert the supply and return interconnection pipes (D) (top and bottom) into the collector headers. Carefully push the collector up to the spacer lip (B) of the support brace (11). Visually inspect the interconnection pipes (D) to ensure that they are centered between the two collectors.

IMPORTANT

Ensure interconnection pipe is centered between collectors.

10. Click clamping brackets (10) into the collector edge at the top of all supports.
11. Secure the support brace (11) to the next collector support (1) using the clamping brackets (10) between the second and third, the fourth and fifth supports, etc.
12. The distance between collectors should be no greater than the width of the spacer lip (B) on the support brace which is 1 1/4 in. (32.8 mm).
13. Tighten all bolts.

Installing Freestanding Installation (with ballast - for Type SH only)

Note: Use the base rails as a drilling template.

		X	Y
Collector model SH	in.	75 $\frac{5}{8}$	18 $\frac{7}{8}$
	(mm)	(1920)	(481)

Note: See page 20 for numbered component description.

**WARNING**

Patio stones or pavers are **NOT** recommended for use as ballast material. Precast or custom formed concrete blocks are the preferred option for ballasting systems.

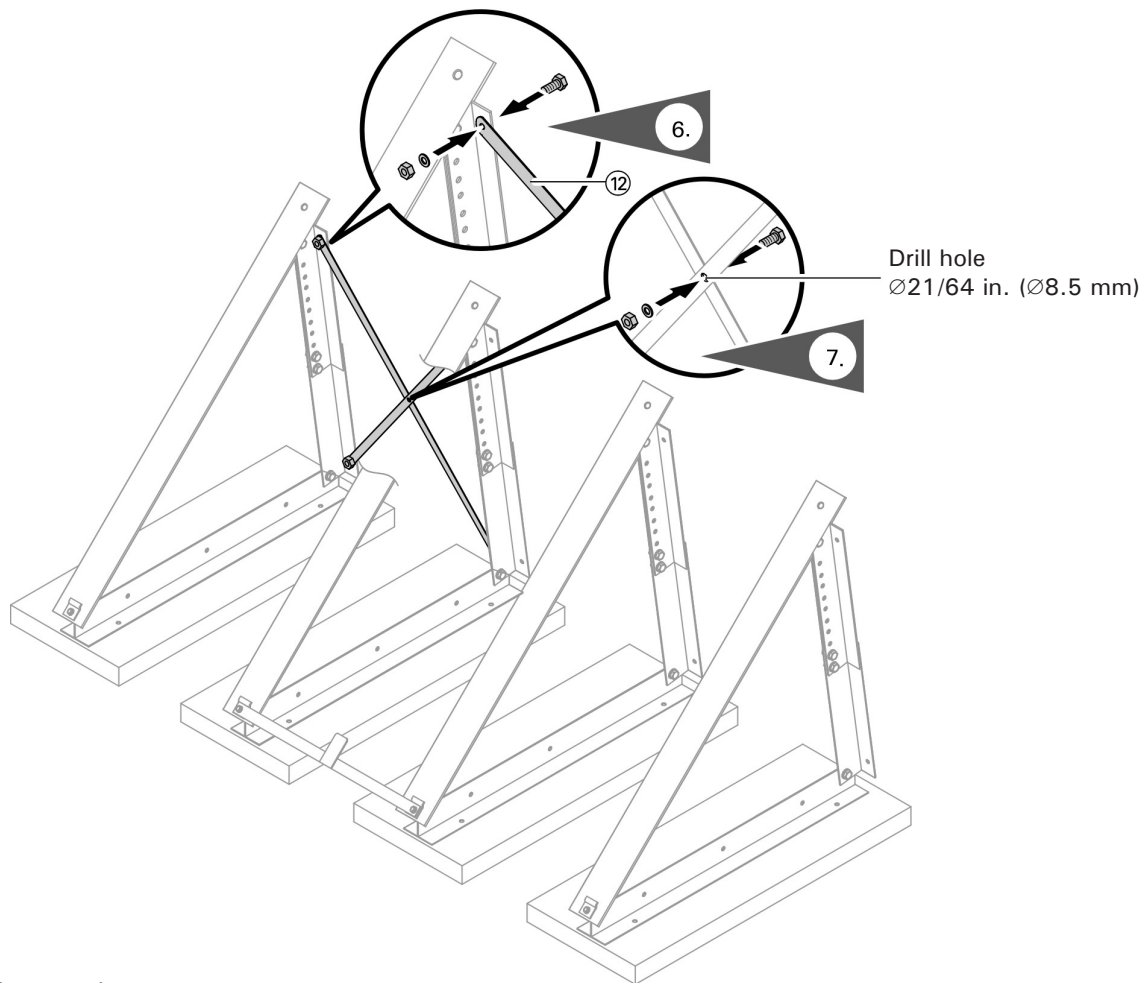
1. Observe the max. load and distance from the edge of the roof for on-site substructure.

**CAUTION**

A structural engineer must be consulted to ensure that the existing roof structure is capable of carrying the additional weight of the collectors, insert weights and support slabs.

2. Remove any gravel etc. from the installation area, cover the surface with protective building mats or foam insulation and position concrete slabs on top of the mats or insulation.
3. Secure the support base rail (2) (use as drilling template) onto the concrete slabs (bolts supplied by others).
4. Secure retaining bracket (9) to the bottom of all collector supports; do not yet tighten screws.
5. Secure support braces (11) onto the retaining plates between the second and third, the fourth and fifth supports etc. Tighten all bolts.

Installing Freestanding Installation (with ballast - for Type SH only) *(continued)*



Legend

⑫ Mounting crossbars

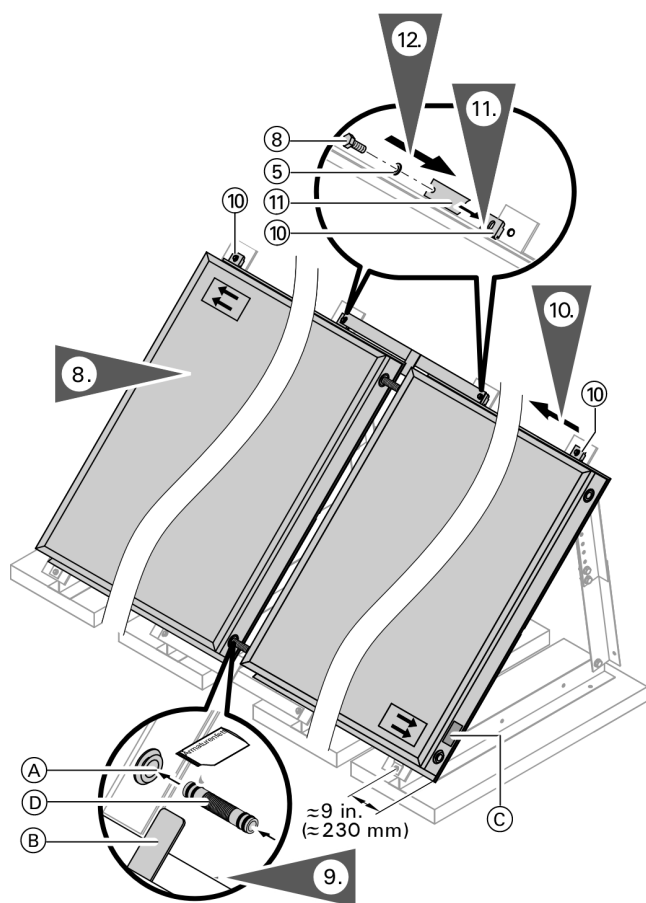
Note: See page 20 for numbered component description.

6. Secure two mounting crossbars ⑫ diagonally side by side to the adjustable supports, respectively for between one and six collectors.

IMPORTANT

Only one pair of mounting crossbars are supplied for 1 to 6 collectors, two pairs of mounting crossbars are supplied for 7 to 10 collectors.

7. For added stability, attach connecting ties to each other where they intersect, using M8 or 5/16" (field supplied) nut and bolt.

Installing Freestanding Installation (with ballast - for Type SH only) (continued)**Legend**

- (A) Collector connection
- (B) Spacer lip of the support brace (11)
- (C) Rating plate
- (D) Interconnection pipe (13)

Note: See page 20 for numbered component description.

8. Position the first collector into the retaining bracket (9) and push right up to the spacer lip of the connecting brace. Center the distance when fitting only a single collector.

IMPORTANT

Install the collector panel so that the rating plate (C) side of the first and last collector is on the outside (note sticker)! If only one collector is to be installed, connect the piping opposite the rating plate (C) side. See page 34 for more information.

9. Before inserting interconnection pipe (D), mark the middle of the connecting pipe with a marker or a piece of tape for reference. Insert the interconnection pipe (D) into the collector until the brass section is no longer visible.

IMPORTANT

Interconnection pipes must be free from damage and contamination. Lubricate all plug-in joints (O-ring seals) on the collectors. Use only the special grease supplied with the connection set.

10. Carefully push the next collector up to the collector that was just installed. Insert the supply and return interconnection pipes (D) (top and bottom) into the collector headers. Carefully push the collector up to the spacer lip (B) of the support brace (11). Visually inspect the interconnection pipes (D) to ensure that they are centered between the two collectors.

IMPORTANT

Ensure interconnection pipe is centered between collectors.

11. Click clamping brackets (10) into the collector edge at the top of all supports.
12. Secure the support brace (11) to the next collector support (1) using the clamping brackets (10) between the second and third, the fourth and fifth supports, etc.
13. The distance between collectors should be no greater than the width of the spacer lip (B) on the support brace which is 1 1/4 in. (32.8 mm).
14. Tighten all bolts.

Installing Freestanding Installation (with ballast - for Type SH only) *(continued)*

Model SH		Secure against slipping and lifting *1			Secure against lifting only *2		
Installation height above ground level	ft. (m)	< 26 (< 8)	26-66 (8-20)	66-328 (20-100)	< 26 (< 8)	26-66 (8-20)	66-328 (20-100)
Required weight at 25° *3	lbs (kg)	712 (323)	1237 (561)	1764 (800)	342 (155)	695 (315)	1049 (476)
Required weight at 45° *3	lbs (kg)	1085 (492)	1863 (845)	2641 (1198)	291 (132)	560 (254)	827 (375)

- *1 Securing against slipping and lifting requires no additional attachment to roof as the weight indicated above is enough to prevent both lifting and slipping.
- *2 Securing against lifting requires additional attachment to the roof as the weight indicated above is only enough to prevent lifting. Steel cables can be used to prevent the collector array from slipping or sliding across the roof deck.
- *3 Weights listed are the total weights of the support slabs, per individual collector.

IMPORTANT

The ballast weight requirements shown above are typical project recommendations only. Weight requirements for specific projects must be verified by a structural engineer and take into account local jurisdiction.

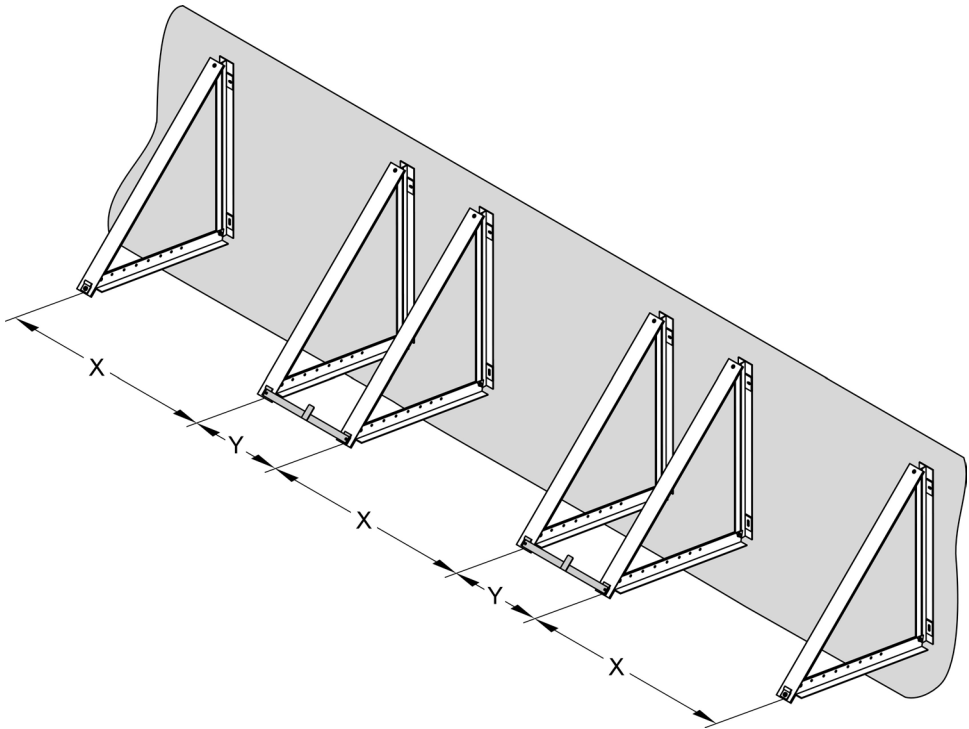


WARNING

Patio stones or pavers are **NOT** recommended for use as ballast material. Precast concrete blocks are the preferred option for ballasting systems.

Required Installation Area (Walls) - Vitosol 200-FM, Type SH

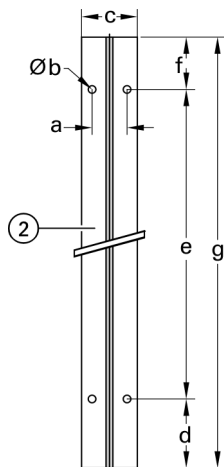
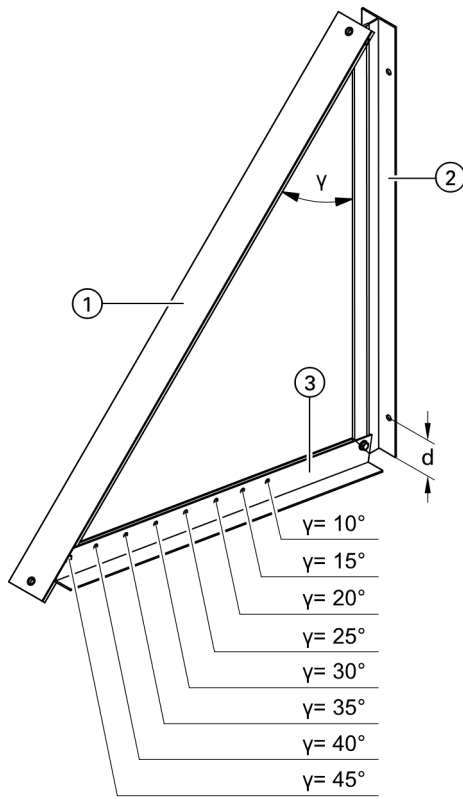
For horizontal collectors installed between 45° - 80° degrees from the horizontal plane (ground)



	Vitosol 200-FM SH2F Array Dimensions		Collector Array Weight (Collectors, racking, fittings & fluid)		
Number of Collectors	Mounting Frame Spacing Dimensions	Overall Length of Array When Collectors Installed			
	"X" = 75 ⁵ / ₈ in (1920 mm) "Y" = 18 ⁷ / ₈ in (481 mm)	in.	(mm)	lb.	(kg)
1 Collector	1x "X"	94 ¼	(2395)	120	(55)
2 Collectors	2x "X" + 1x "Y"	188 ¾	(4796)	236	(107)
3 Collectors	3x "X" + 2x "Y"	283 ¼	(7197)	352	(160)
4 Collectors	4x "X" + 3x "Y"	377 ¾	(9597)	467	(212)
5 Collectors	5x "X" + 4x "Y"	472 ¼	(11998)	583	(265)
6 Collectors	6x "X" + 5x "Y"	567	(14399)	699	(317)
7 Collectors	7x "X" + 6x "Y"	661 ½	(16800)	814	(370)
8 Collectors	8x "X" + 7x "Y"	756	(19201)	930	(422)
9 Collectors	9x "X" + 8x "Y"	850 ½	(21601)	1046	(475)
10 Collectors	10x "X" + 9x "Y"	945	(24002)	1161	(527)
11 Collectors	11x "X" + 10x "Y"	1039 ½	(26403)	1277	(579)
12 Collectors	12x "X" + 11x "Y"	1134	(28804)	1393	(632)

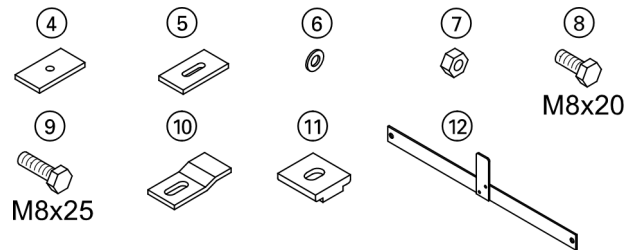
Note: It is recommended that a minimum service clearance of 12 in. (305 mm) should be added to each end of the collector array. This allows for ease of installation and servicing of the solar supply and return connections.

Overview of System Components (Type SH)



Dimensions:

- a 2 in. (50 mm)
- b Ø 0.4 in. (11 mm)
- c 3.1 in. (80 mm)
- d 4 in. (100 mm)
- e 28.4 in. (722 mm)
- f 3 in. (75 mm)
- g 35.3 in. (897 mm)

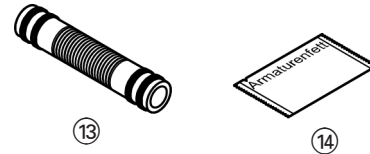


Legend

- ① Collector support
- ② Base rail
- ③ Adjustable support
- ④ Gusset plate with circular hole
- ⑤ Gusset plate with slot
- ⑥ Washer, Ø 8.4 mm
- ⑦ Hexagon nut M8
- ⑧ Hexagon bolt M8 x 20
- ⑨ Hex bolt M8 x 25
- ⑩ Retaining bracket
- ⑪ Clamping bracket
- ⑫ Support brace

Connection pipe

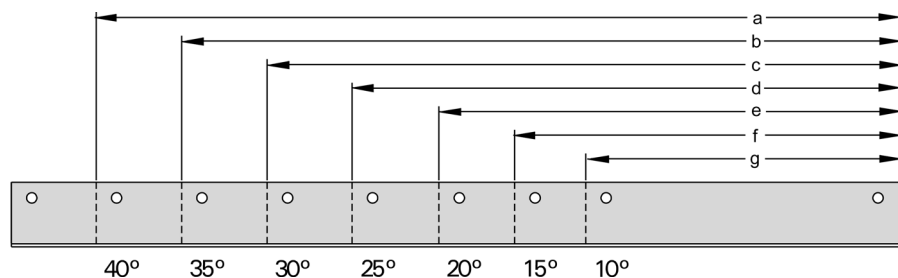
- ⑬ Interconnection pipe
- ⑭ Special valve grease



CAUTION

Wall mounting hardware is only supplied for SH series collectors. Wall mounting is not recommended for SV series collectors.

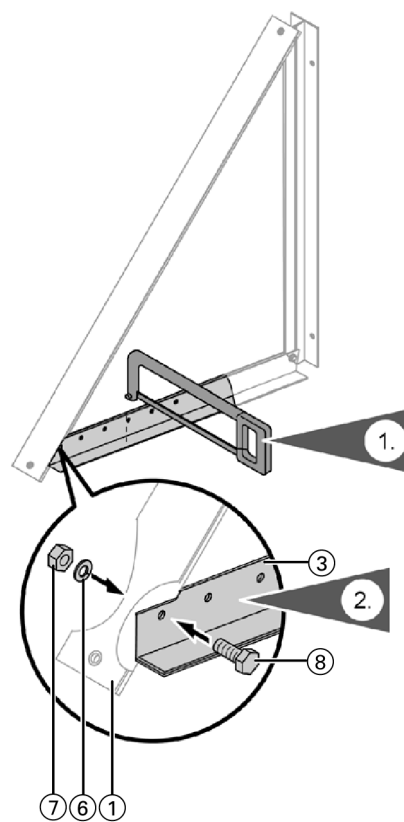
Installing the Collector Supports and Adjustment Angle of Inclination α



Cutting dimensions:

- a 10 3/4 in. (272 mm) = 40°
- b 13 1/8 in. (334 mm) = 35°
- c 15 3/4 in. (399 mm) = 30°
- d 18 5/8 in. (474 mm) = 25°
- e 21 1/2 in. (547 mm) = 20°
- f 24 1/2 in. (621 mm) = 15°
- g 27 3/8 in. (695 mm) = 10°

Note: An uncut adjustable support = 45°



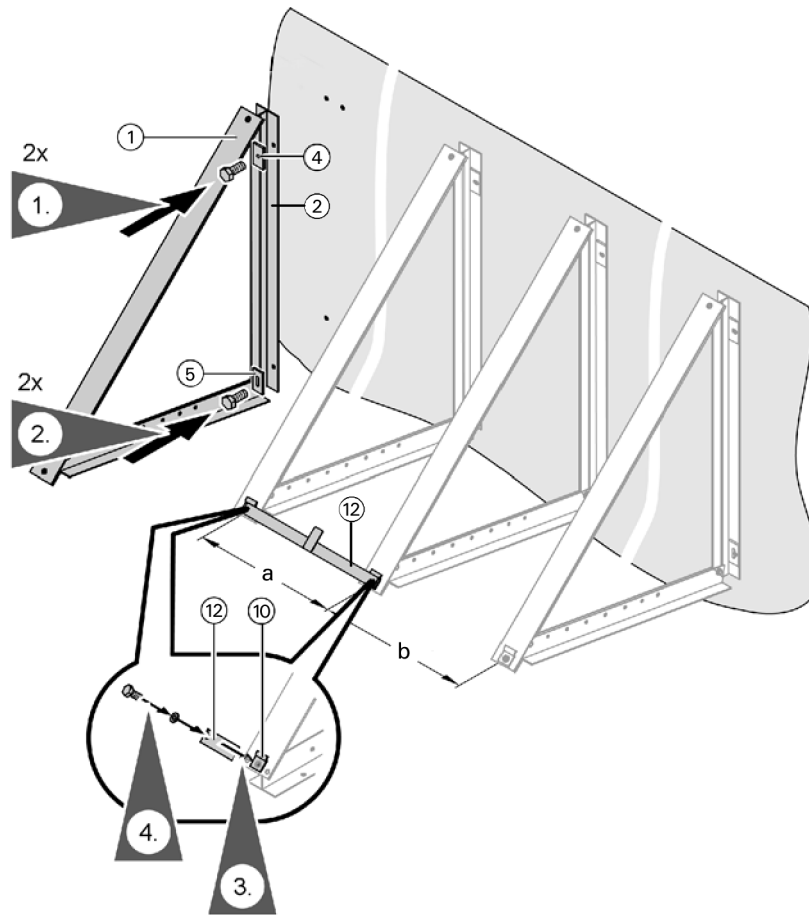
1. Trim adjustable supports (3) in accordance with the required angle of inclination.
2. Secure the adjustable support (3) to the collector support (1) with bolts (8), nuts (7) and washers (6).



CAUTION

Be sure to cut the adjustable supports such that approximately 11/16" (17.5 mm) of material is left on the end.

Installing the Solar Collectors



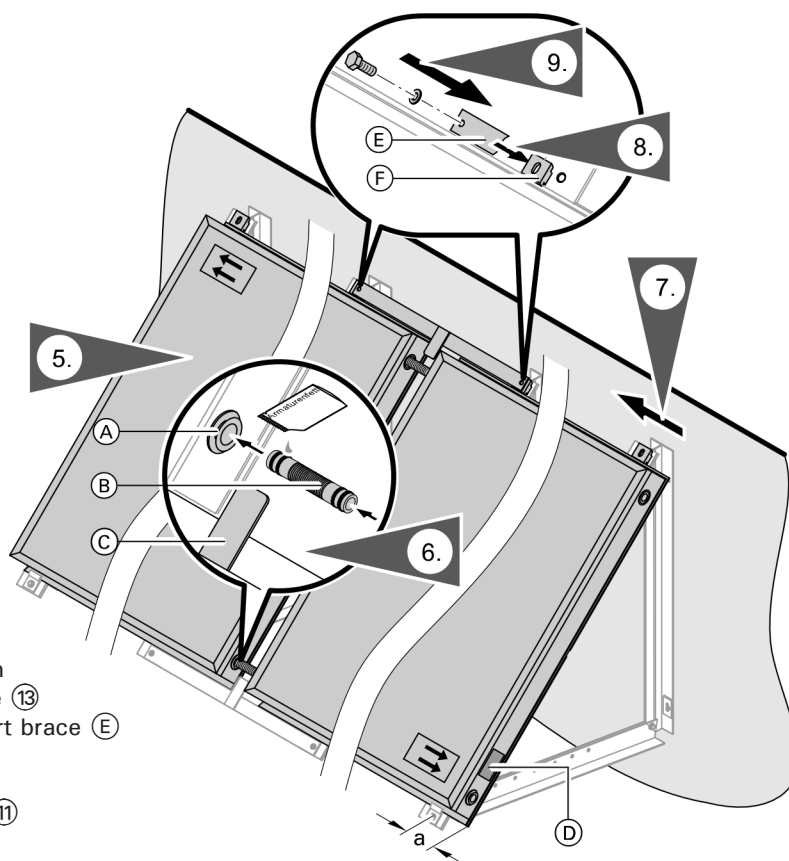
Dimensions

- a $18\frac{7}{8}$ in. (481 mm)
b $75\frac{5}{8}$ in. (1920 mm)

1. Use the base rails ② as a drilling template. Secure the base rails using the gusset plate having a circular hole ④ at the top of the wall.
2. Secure the base rails with slotted gusset plate ⑤ at the bottom of the wall.
3. Secure retaining bracket ⑩ to the bottom of all collector supports ①; do not tighten the screws.
4. Secure the support brace ⑫ onto the retaining plates between the second and third, the fourth and fifth collector supports ① etc. Tighten all bolts.

Note: Use base rails ② as a drilling template for the wall.

Installing the Solar Collectors *(continued)*



Legend

- (A) Collector connection
- (B) Interconnection pipe (13)
- (C) Spacer lip on support brace (E)
- (D) Rating plate
- (E) Support brace (12)
- (F) Clamping brackets (11)

a = 9 in. (230 mm)

IMPORTANT

The top support brace (E) may be omitted on larger collector arrays to ensure that the collectors stay aligned vertically.

5. Position the first collector into the retaining bracket (10) and push right up to the spacer lip of the support brace. Center the distance when fitting only a single collector.

IMPORTANT

Install the collector panel so that the rating plate side of the first and last collector is on the outside (note sticker)! If only one collector is to be installed, connect the piping opposite the nameplate side. See page 34 for more information.

6. Before inserting interconnection pipe (B) mark the middle of the interconnection pipe with a marker or a piece of tape for reference. Insert the interconnecting pipe (B) into the collector until the brass section is no longer visible.
7. Secure the support brace (12) to the next collector support (1) using the clamping brackets (11) between the second and third, the fourth and fifth supports, etc.

IMPORTANT

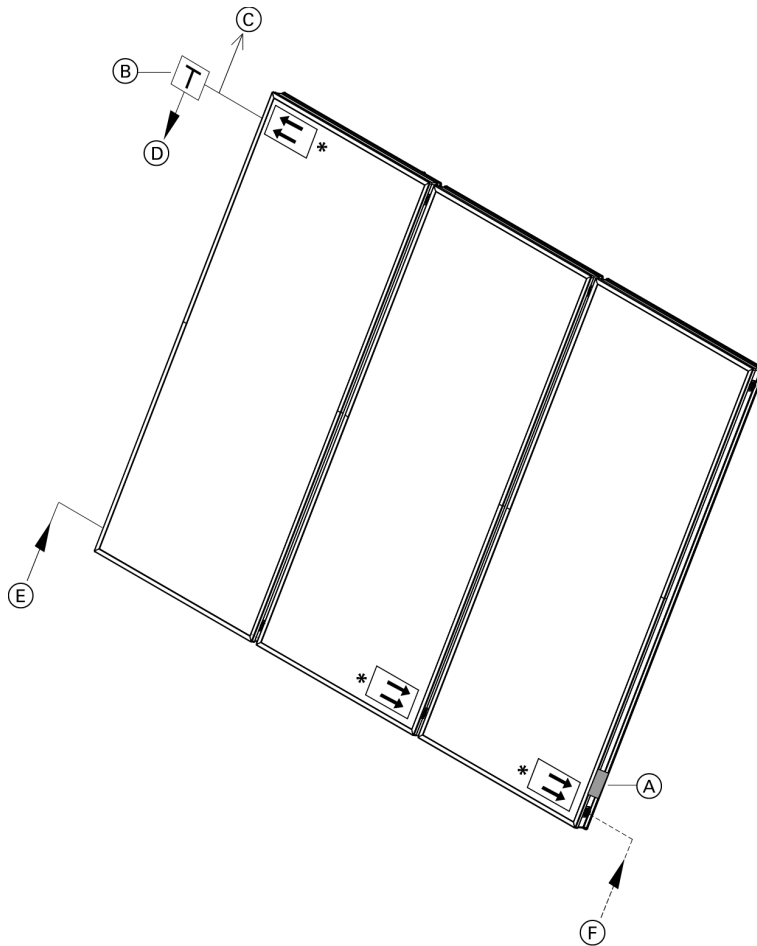
Interconnection pipes should not show any signs of damage.

Lubricate all plug-in connectors (O-rings) found on the collectors only with the special grease supplied with the connection set.

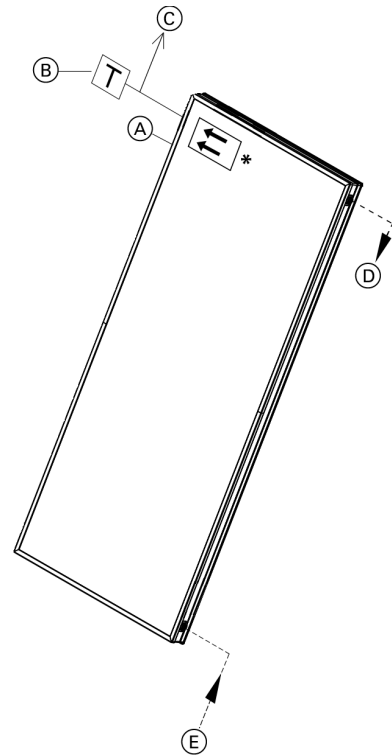
8. Click clamping brackets (F) into the collector edge at the top of all supports.
9. Carefully push the next collector up to the collector that was just installed. Insert the supply and return interconnection pipes (B) (top and bottom) into the collector headers. Carefully push the collector up to the spacer lip (C) of the support brace (12). Visually inspect the interconnection pipes (B) to ensure that they are centered between the two collectors.
10. The distance between collectors should be no greater than the width of the spacer lip (C) on the support brace which is 1 1/4 in. (32.8 mm).
11. Tighten all bolts.
12. Fit a snow guard on the roof above the collectors, as required.

Supply and Return Piping Configuration

Multiple collector array



Single collector array



Legend

- (A) Rating plate (must be on the outside of the outer collectors)
- (B) Collector temperature sensor location
- (C) Air vent location
- (D) Supply pipe from collector
- (E) Return pipe to collector
- (F) Alternate location for return pipe to collector



CAUTION

Arrows on the first and last collector in a series must point towards the outside.

Note: This piping configuration requires 1x short connecting pipe ⑭ on page 9. *This item must be ordered separately from Viessmann.

Arrow directions are to ensure balanced flow throughout the collectors.

If the collectors are not connected as shown above, it could also result in:

- Collector temperature sensor not sensing the hottest collector temperature.
- The fluid flow through the collector array may be imbalanced.
- A decrease in the efficiency of the collectors.



CAUTION

Viessmann strongly recommends not removing the cover foil from the collectors until after initial start-up in order to prevent overheating.

Flow Rate in the Collector Array

All Vitosol collectors have a minimum required flow rate (low flow) and maximum flow rate (high flow). The collectors must operate within this range and the system designer must choose a flow rate based on the specific parameters of the system. At the same collector output, a higher flow rate means a lower Δt or temperature spread across the collector array. Inversely a lower flow rate will have a higher Δt or temperature spread across the collector array. When the Δt or temperature spread across the collector array becomes too large, the efficiency of the collectors will also decrease.

For larger solar installations, high flow is usually not recommended as this results in bigger pumps and larger pipe sizes. Typically low flow would be used as the decreased flow requirements result in smaller pumps which would use less energy, and small pipe sizes, reducing the overall installation and operating cost for the system.

Operating modes:

Low flow operation

Operation with flow rates between:

0.010 - 0.012 USG/min/ft² (25 - 30 L/h/m²)

High flow operation

Operation with flow rates between:

0.012 - 0.025 USG/min/ft² (30 - 60 L/h/m²)

Specific Flow Rate

	Low Flow		High Flow					
USG/min/ft ²	0.0102	0.0123	0.0143	0.0164	0.0184	0.0205	0.0225	0.0245
(L/h/m ²)	(25)	(30)	(35)	(40)	(45)	(50)	(55)	(60)
USG/min	0.26	0.31	0.36	0.41	0.46	0.51	0.56	0.62
(L/min)	(1.0)	(1.2)	(1.4)	(1.6)	(1.7)	(1.9)	(2.1)	(2.3)

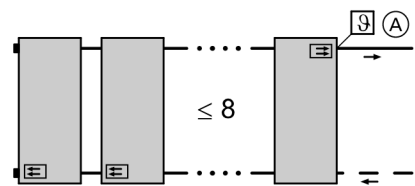
Recommended flow rate for the number of collectors per individual array

Number of Collectors	USG/min (L/min)							
1 Collector	0.26 (1.0)	0.31 (1.2)	0.36 (1.4)	0.41 (1.6)	0.46 (1.7)	0.51 (1.9)	0.56 (2.1)	0.62 (2.3)
2 Collectors	0.51 (1.9)	0.62 (2.3)	0.72 (2.7)	0.82 (3.1)	0.92 (3.5)	1.03 (3.9)	1.13 (4.3)	1.23 (4.7)
3 Collectors	0.77 (2.9)	0.92 (3.5)	1.08 (4.1)	1.23 (4.7)	1.39 (5.2)	1.54 (5.8)	1.69 (6.4)	1.85 (7.0)
4 Collectors	1.03 (3.9)	1.23 (4.7)	1.44 (5.4)	1.64 (6.2)	1.85 (7.0)	2.05 (7.8)	2.26 (8.5)	2.46 (9.3)
5 Collectors	1.28 (4.9)	1.54 (5.8)	1.80 (6.8)	2.05 (7.8)	2.31 (8.7)	2.56 (9.7)	2.82 (10.7)	3.08 (11.7)
6 Collectors	1.54 (5.8)	1.85 (7.0)	2.15 (8.2)	2.46 (9.3)	2.77 (10.5)	3.08 (11.7)	3.39 (12.8)	3.69 (14.0)
7 Collectors	1.80 (6.8)	2.15 (8.2)	2.51 (9.5)	2.87 (10.9)	3.23 (12.2)	3.59 (13.6)	3.95 (15.0)	4.31 (16.3)
8 Collectors	2.05 (7.8)	2.46 (9.3)	2.87 (10.9)	3.28 (12.4)	3.69 (14.0)	4.10 (15.5)	4.51 (17.1)	4.92 (18.6)
9 Collectors	2.31 (8.7)	2.77 (10.5)	3.23 (12.2)	3.69 (14.0)	4.16 (15.7)	4.62 (17.5)	5.08 (19.2)	5.54 (21.0)
10 Collectors	2.56 (9.7)	3.08 (11.7)	3.59 (13.6)	4.10 (15.5)	4.62 (17.5)	5.13 (19.4)	5.64 (21.4)	6.16 (23.3)
11 Collectors	2.82 (10.7)	3.39 (12.8)	3.95 (15.0)	4.51 (17.1)	5.08 (19.2)	5.64 (21.4)	6.21 (23.5)	6.77 (25.6)
12 Collectors	3.08 (11.7)	3.69 (14.0)	4.31 (16.3)	4.92 (18.6)	5.54 (21.0)	6.16 (23.3)	6.77 (25.6)	7.39 (28.0)

Note: Maximum of 10x Vitosol 200-FM can be connected in one array, having single-sided connections.

Maximum of 12x Vitosol 200-FM can be connected in one array, having alternate side connections (reverse return).

Vitosol 200-FM, Type SV and SH Low Flow Operation (single-sided connection)

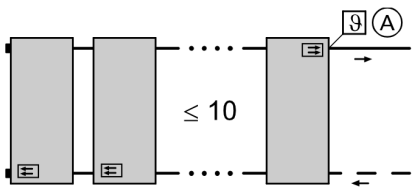


Single array less than or equal to (\leq) 8x flat plate collectors

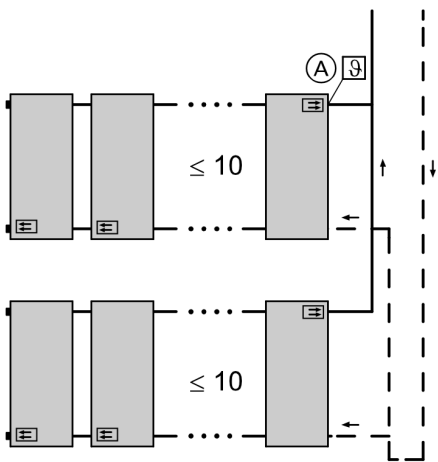
Legend

(A) Collector temperature sensor (field installed)

Vitosol 200-FM, Type SV and SH High Flow Operation (single-sided connection)



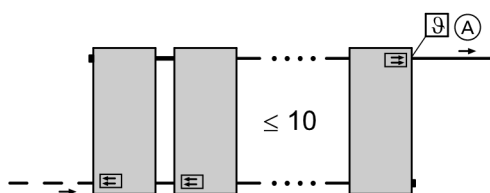
Single array less than or equal to (\leq) 10x flat plate collectors



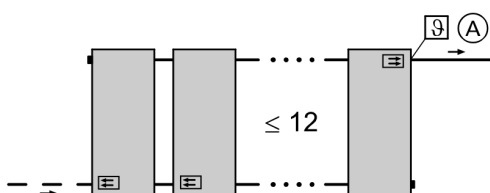
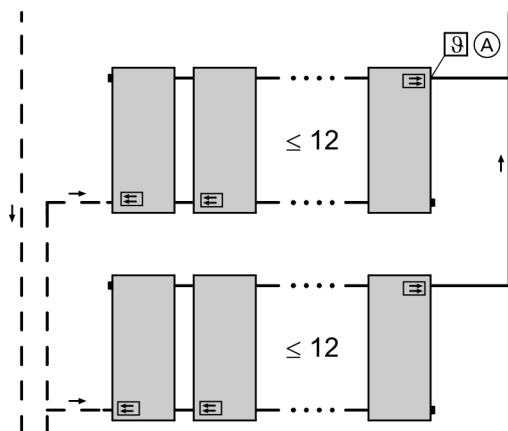
Multiple arrays less than or equal to (\leq) 10x flat plate collectors per individual array

Legend

(A) Collector temperature sensor (field installed)

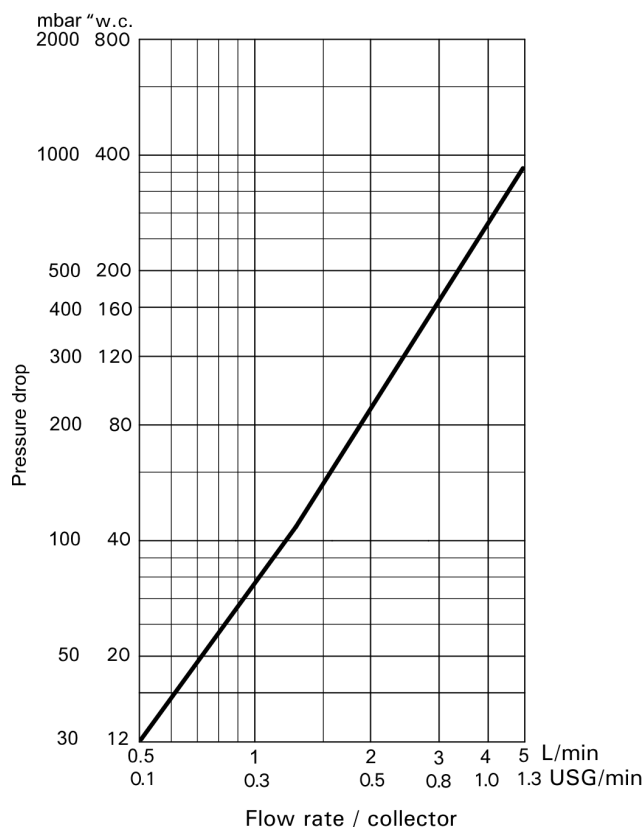
Vitosol 200-FM, Type SV and SH Low Flow Operation (connection on alternate sides)Single array less than or equal to (\leq) 10x flat plate collectors**Legend**

(A) Collector temperature sensor (field installed)

Vitosol 200-FM, Type SV and SH High Flow Operation (connection on alternate sides)Single array less than or equal to (\leq) 12x flat plate collectorsMultiple arrays less than or equal to (\leq) 12x flat plate collectors per individual array**Legend**

(A) Collector temperature sensor (field installed)

Collector Pressure Drop for Vitosol 200-FM, Type SV and SH



Relative to water, corresponds to Tyfocor HTL at approximately 140°C (60°C).

Note: For multiple Vitosol 200-FM collector arrays, use the flow rate per individual collector to calculate the pressure drop.

Flow Rate per Collector in an Array

	Low Flow		High Flow					
USG/min	0.26	0.31	0.36	0.41	0.46	0.51	0.56	0.62
(L/min)	(1.0)	(1.2)	(1.4)	(1.6)	(1.7)	(1.9)	(2.1)	(2.3)

Resulting Pressure Drop for Vitosol FM, Type SV and SH for collector arrays of up to 12 collectors

"w.c.	29	39	49	60	72	86	100	116
ft/hd	2.4	3.2	4.1	5.0	6.0	7.1	8.3	9.6
(mbar)	(73)	(96)	(121)	(149)	(180)	(213)	(249)	(288)
(kPa)	(7)	(10)	(12)	(15)	(18)	(21)	(25)	(29)

Note: Maximum of 10x Vitosol 200-FM can be connected in one array, having single-sided connections.
Maximum of 12x Vitosol 200-FM can be connected in one array, having alternate side connections (reverse return).

Equivalent Length for Fitting and Valves

		Fitting Pressure Drop ft. (m)								
		90° Elbow Standard Radius	90° Elbow Long Radius	45° Elbow standard Radius	Tee Side Port Flow	Tee Through Flow	Gate Valve	Globe Valve	90° Angle Valve	Swing Check Valve
Pipe Size	½ In.	1.6(0.5)	1.0(0.3)	0.8(0.2)	3.0(0.9)	1.6(0.5)	0.7(0.2)	17.0(5.2)	7.0(2.1)	6.0(1.8)
	¾ In.	2.0(0.6)	1.4(0.4)	0.9(0.3)	4.0(1.2)	2.0(0.6)	0.9(0.3)	22.0(6.7)	9.0(2.7)	8.0(2.4)
	1 In.	2.6(0.8)	1.7(0.5)	1.3(0.4)	5.0(1.5)	2.6(0.8)	1.0(0.3)	27.0(8.2)	12.0(3.7)	10.0(3.0)
	1-¼ In.	3.3(1.0)	2.3(0.7)	1.7(0.5)	7.0(2.1)	3.3(1.0)	1.5(0.5)	36.0(11.0)	15.0(4.6)	14.0(4.3)
	1-½ In.	4.3(1.3)	2.7(0.8)	2.2(0.7)	9.0(2.7)	4.3(1.3)	1.8(0.5)	43.0(13.1)	18.0(5.5)	16.0(4.9)

Flow Velocity

To minimize the pressure drop through the solar thermal system pipe work, the flow velocity in the pipe should not exceed 3.3 ft/s (1 m/s). We recommend flow velocities between 1.3 and 2.3 ft/s (0.4 and 0.7 m/s). At these flow velocities, an approximate pressure drop as indicated below can result:

0.12 and 0.3 "w.c. per foot of pipe length
(1 and 2.5 mbar per meter of pipe length)

For the installation of collectors, we recommend sizing the solar supply and return pipes as for a normal heating system according to flow rate and velocity.

Note: A higher flow velocity results in a higher pressure drop and potentially could erode the walls of the pipe work. If the flow velocity is too low, the system will not capture or move the air trapped in the system.

Any residual air that has collected at the collector must be routed downwards through the solar return line to the air vent in the Solar-Divicon. This will have to be manually vented.

Collector Supply and Return Piping

- For the piping connecting the collectors to the Solar Divicon pumping station, Viessmann recommends the use of commercially available copper pipe and bronze fittings, or non-galvanized steel pipe. (PEX or other plastic pipes are not suitable for solar collector supply and return piping).
- Use only high temperature solder or brazing material when connecting the copper piping to the collector connections. The melting temperature should be above 450°F (232°C).
- When laying out the collector array, ensure that air can be properly vented.



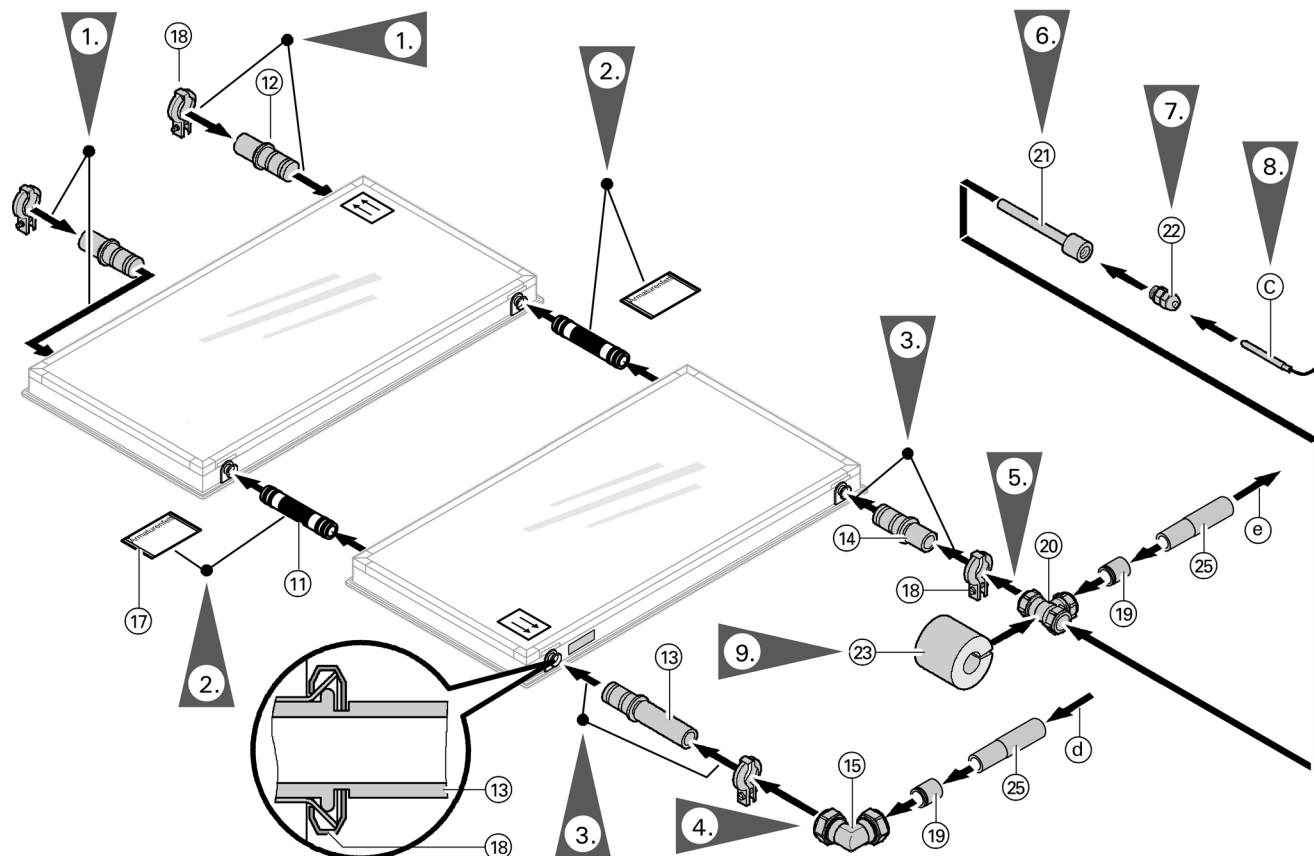
CAUTION

Do not use galvanized pipes, galvanized fittings or graphitized gaskets or any type of plastic pipes or fittings.



Refer to the Solar System Design Guide for required flow rates and pipe sizing parameters for Vitosol 200-FM collectors.

Installing the General Connection Set and Collector Temperature Sensor



Legend

- (C) Collector temperature sensor
- (D) Solar fluid return to collector
- (E) Solar fluid supply from collector



CAUTION

The collectors may be damaged if the solar heating system is not filled with heat transfer medium immediately after installation. Therefore protect the collectors against insolation by covering them up.



Refer to page 52 for information on venting the solar heating system.

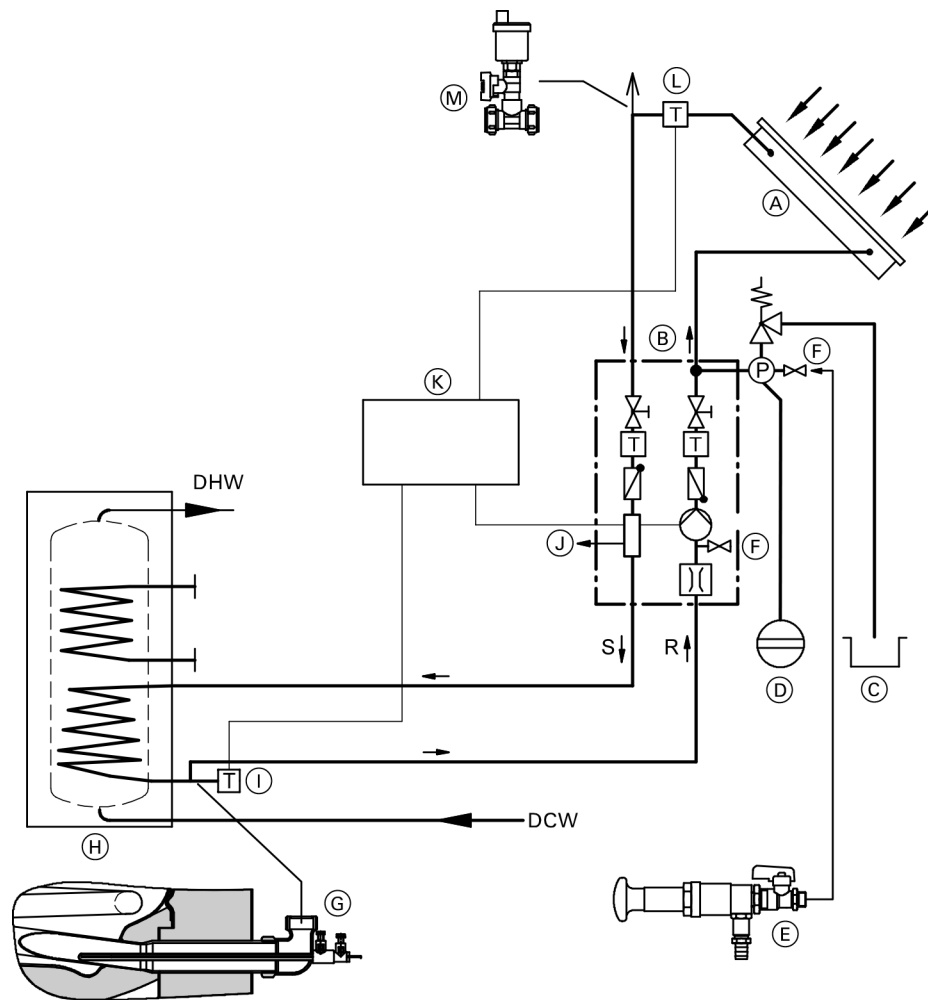
When assembling the 22 mm metric compression fittings (15), (20) and (25), observe the following:

- All pipe ends must be square and deburred.
- Push the union nut and the compression ring onto the pipe adaptor and lightly lubricate the threads with special grease supplied.
- Push the pipe into the compression fitting as far as it will go, then pull the pipe back $\frac{1}{16}$ in. (1.5 mm).
- Initially, turn the union nut by hand, then tighten with an open ended spanner by another $\frac{3}{4}$ turn.

Note: Connection pipes, interconnection pipes and plugs must not display any damage. Lubricate O-ring seals only with the special grease supplied. Never fit annealed (soft copper) pipe onto the 90° elbow (15) or tee (20).

1. Insert the plugs (12) until they bottom out, and secure to collector with profile clips (18).
2. For installations having multiple collectors, lubricate the o-rings of the interconnection pipes (11) using the supplied grease (17) and insert them halfway inside the collector (centered).
3. Insert the supply and return connection pipes (13) & (14) until they bottom out and secure them to the collector with profile clips (18).
4. Fit the 90° elbow (15) onto the return connector at the bottom of the collector.
5. Fit the tee (20) onto the supply connector at the top of the collector.
6. Insert the sensor well (21) into the tee (20). Hold the tee tightly.
7. Insert the strain relief fitting (22) into the sensor well.
8. Insert the collector temperature sensor (C) (supplied with solar controller) until it bottoms out inside the sensor well (21) and secure with strain relief fitting (22).
9. Insert the 4 in. long, 3 in. Ø to 22 mm Ø adaptor (25) into the compression fittings of 90° elbow (15) and tee (20) and make the connection between the panel array and the supply and return piping.
10. Install the insulation (23) and secure with adhesive (field supplied) on its cut faces.

Sample System Layout



Legend

- (A) Solar collector
- (B) Solar-Divicon (pumping station)
- (C) Overflow container
- (D) Expansion tank
- (E) Solar manual filling pump (optional)
- (F) System fill manifold valve
- (G) Solar brass elbow, comes with sensor well
- (H) Solar storage tank
- (I) Tank temperature sensor (field installed)
- (J) Air separator (Solar-Divicon)
- (K) Solar control unit
- (L) Collector temperature sensor (field installed)
- (M) Fast air vent, c/w shutoff valve *1
- (P) System pressure gauge
- R Return to collector
- S Supply from collector

*1 Install at least one air vent valve at the highest point of the system.



WARNING

The domestic hot water temperature to the building must be limited to 140°F (60°C) by installing a mixing device, e.g. a thermostatic anti-scald mixing valve.



Refer to the Solar System Design Guide for more information on other installation examples and system types

System Installation

- The supply and return lines must be pressure and temperature-resistant (observe the max. shutdown temperature of the collector).
- To guarantee the satisfactory operation of the solar heating system, install the pipes so that complete air venting is assured.



CAUTION

Use only red bronze fittings, brass fittings and copper piping. Do not use galvanized pipes, galvanized fittings, graphitized gaskets or any type of plastic pipe.



CAUTION

Do not carry out any soldering work at or near the collector.



CAUTION

Never step, lean or place objects on the collectors.

- At least one fast-acting air vent with shut-off valve must be installed at the highest point of the system. Install an air separator in the flow of the solar circuit, upstream of the inlet to the indirect coil of the domestic hot water tank. The Solar-Divicon comes with an air separator (factory installed) in the flow line going to the tank.
- Use only high temperature solder or brazing material when connecting copper lines in the solar circuit or join with high temperature rated press fittings.

Some soft solders can be weakened, particularly near the collectors, due to the high temperatures that occur there. Metal seal connections, locking ring fittings or Viessmann push-fit connections with double O-rings are the most suitable.

Should alternative seals be used, such as flat gaskets, their manufacturer must give an assurance of their adequate resistance to glycol, pressure and temperature.
- Make all connections pressure and temperature resistant (observe the maximum stagnation temperature of the collector).

Never use:

- Teflon (inadequate glycol resistance)
- Hemp connections (insufficiently gas-tight)

- The system must be equipped with an expansion tank, safety valve and circulation pump.
- The Solar-Divicon is equipped with a pressure relief valve designed for max. 87 psig (6 bar).

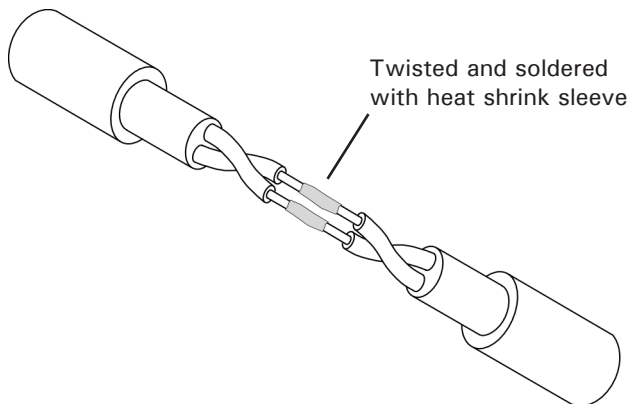
- Use only a diaphragm expansion tank that is suitable for the application as a solar expansion tank.
- The expansion tank must be approved for use in a solar heating system and must be connected via non-insulated piping.
- The diaphragms and seals of the expansion tank and safety valve must be suitable for the heat transfer medium.
- For operation without a Solar-Divicon, use only safety valves that meet the following conditions:
 - Designed for 248°F (120°C) and up to 87 psi (6 bar)
 - Letter ID "S" (solar) in the component identification
- Before filling system with solar heat transfer fluid, thoroughly flush and clean piping system to remove all dirt, oils, flux and solder residue.
- Fill the solar heating system with Viessmann heat transfer medium "Tyfocor-HTL" or suitable fluid as described on page 6. The "Tyfocor-HTL" is supplied as a premixed glycol/water solution and must not be mixed. The PRV discharge pipe must be run to an open container capable of accommodating the total fluid capacity of the collectors.



CAUTION

Components used must be resistant to the heat transfer medium. Insulation of external piping must be resistant to temperature, UV radiation and to destruction by birds (e.g. through the use of metal sheathing).

- Prior to installing pipe insulation, run a stranded twisted pair (shielded) 18/2 AWG low voltage sensor wire from the solar controller to the collector sensor well. Ensure all wire connections are soldered and sealed with heat shrink sleeve connectors (see illustration below). Cover all wire and connections with insulation and protective jacketing.



System Fluid Calculator

Solar Components	Quantity	Liquid Content				Total Liquid Content	
		USG	(L)	=	USG	(L)	
Miscellaneous fluid content	1	x	0.80	(3.00)	=	0.80	(3.00)
Vitosol 200-FM, SV2F		x	0.48	(1.83)	=		
Vitosol 200-FM, SH2F		x	0.66	(2.48)	=		
Solar-Divicon, DN20B		x	0.11	(0.40)	=		
Solar-Divicon, DN25B		x	0.20	(0.75)	=		
Vitocell 300-W, EVIB - 42 USG (160 L)		x	1.96	(7.40)	=		
Vitocell 300-V, EVIB - 53 USG (200 L)		x	1.96	(7.40)	=		
Vitocell 300-V, EVIB - 79 USG (300 L)		x	2.91	(11.00)	=		
Vitocell 300-V, EVIB - 119 USG (450 L)		x	3.43	(13.00)	=		
Vitocell 300-B, EVBB - 79 USG (300 L)		x	2.91	(11.00)	=		
Vitocell 300-B, EVBB - 119 USG (450 L)		x	3.43	(13.00)	=		
Vitocell 300-H, EHA - 92 USG (350 L)		x	3.43	(13.00)	=		
Vitocell 300-H, EHA - 119 USG (450 L)		x	4.23	(16.00)	=		
Other:		x			=		
Other:		x			=		
Other:		x			=		
Other:		x			=		
Solar Piping (select the following pipe size or combination of sizes)	Total Length ft (m)	Liquid Content USG/ft (L/m)				Total Liquid Content USG (L)	
½" Copper, Type-L (5/8" O.D.)		x	0.012	(0.15)	=		
¾" Copper, Type-L (7/8" O.D.)		x	0.025	(0.31)	=		
1" Copper, Type-L (1-1/8" O.D.)		x	0.044	(0.55)	=		
1¼" Copper, Type-L (1-3/8" O.D.)		x	0.066	(0.81)	=		
1½" Copper, Type-L (1-5/8" O.D.)		x	0.093	(1.15)	=		
½" Stainless Steel Insulated Lineset *		x	0.020	(0.25)	=		
1/2" Sch-40 Steel Pipe		x	0.016	(0.20)	=		
3/4" Sch-40 Steel Pipe		x	0.028	(0.34)	=		
1" Sch-40 Steel Pipe		x	0.045	(0.56)	=		
1-1/4" Sch-40 Steel Pipe		x	0.077	(0.96)	=		
1-1/2" Sch-40 Steel Pipe		x	0.106	(1.32)	=		
Total Liquid Content of System (Solar Components + Solar Piping)							

Note: Use this table to calculate the required amount of liquid content required for the solar thermal system.

- 1) Input the quantities for each listed item and the length of piping (in feet or meters) used in the system. Then multiply each item by the liquid content listed for each item and input each item total in the Total Liquid Content column.
- 2) Add all of the individual liquid content totals to determine the total liquid content of the system.

* This lineset comes in 20 ft., 40 ft. and 50 ft. lengths (it combines two pipes for supply and return wrapped in foam insulation). Example: A 20 ft. piping kit contains 20 ft. of supply and 20 ft. of return having a total length of 40 ft.

Expansion Tank Sizing Formula

For layout of the expansion tank, see “sample system layout” on page 41.

The expansion tank can be calculated once the steam spread has been determined and any heat sinks that may be used have been taken into consideration.

The required volume is determined by the following factors:

- Expansion of the heat transfer medium in its liquid state
- Liquid seal
- Expected steam volume, taking account of the static head of the system
- Pre-charge pressure

$$V_{dev} = (V_{col} + V_{dpipe} + V_e + V_{fv}) \cdot D_f$$

V_{dev} Nominal volume of the expansion tank in USG (L)

V_{col} Liquid content of the collectors in USG (L)

V_{dpipe} Content of the pipework subject to steam loads in USG (L) (calculated from the steam spread and the pipework content per meter pipe length)

Note: V_{dpipe} is zero for Vitosol 200-FM collectors as there is no steam generation.

V_e Increase in the volume of the heat transfer medium in its liquid state in USG (L)

$$V_e = V_a \cdot \beta$$

V_a System volume (content of the collectors, the heat exchanger and the pipework, from page 43).

β Expansion factor
 $\beta = 0.13$ for “Tyfocor-HTL” heat transfer medium from -4 to 248°F (-20 to 120°C)

V_{fv} Liquid seal in the expansion tank [4% of the system volume, min. 0.8 USG (3 L)]

D_f Pressure factor ($p_e + 1$): ($p_e - p_o$)

p_e Max. system pressure at the safety valve in bar (90% of the safety valve response pressure)

$$p_e = 87 \text{ psi} \cdot 0.90 = 78 \text{ psig}$$

$$(6 \text{ bar} \cdot 0.90 = 5.4 \text{ bar})$$

p_o System pre-charge pressure
 $p_o = 44 \text{ psi} + 0.45 \text{ psi/ft static head}$
 (3 bar + 0.1 bar/m static head)

To determine the system and steam volume in the pipework, the content per foot (meter) of pipe must be taken into consideration.

For the liquid content of the following components see “System fluid calculator” on page 43.

- Solar piping
- Collectors
- Solar-Divicon and solar pump assembly
- DHW tank and heating water buffer tank

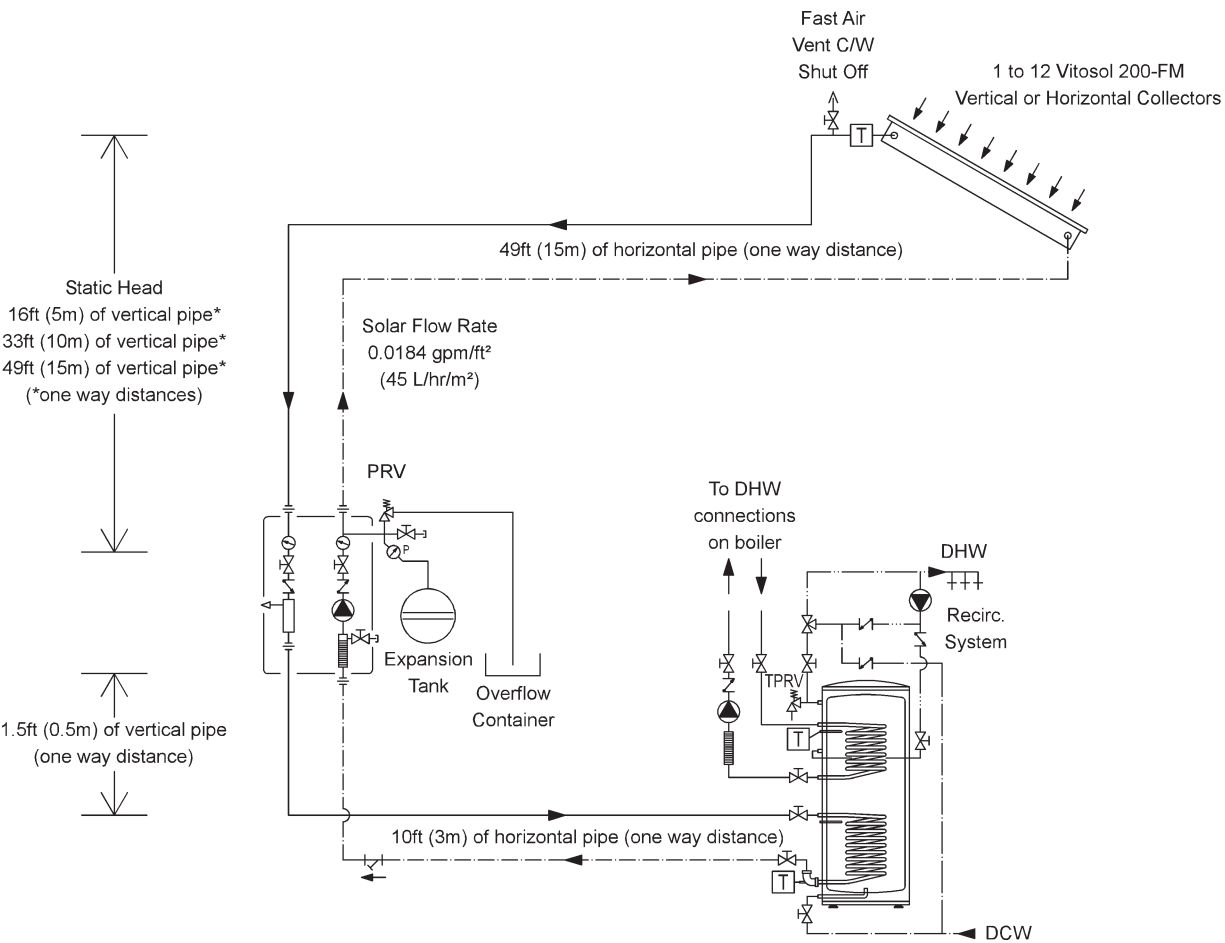
Selection of the expansion tank

The details in the following table are standard values. They allow quick estimates at the design and calculation stage. These values must be verified by appropriate calculations.

Note: Check the size of the expansion tank on site.

Note: Contact your local Viessmann sales representative for expansion tank sizing assistance.

Expansion Tank Quick Sizing Table for Vitosol 200-FM, Type SV & SH



Note: As a quick sizing example, use the image above and reference the information from the table on page 46, to select an applicable expansion tank. The values listed in the table are applicable for a single collector array consisting of 1 to 12 collectors.

Expansion Tank Quick Sizing Table for Vitosol 200-FM, Type SV & SH *(continued)*

Number of Collectors and Total Absorber Area	Static Head (vertical height)		Total Solar System Fluid Capacity		Recommended Capacity of the Expansion Tank	
	ft ²	(m ²)	USG	(L)	USG	(L)
1 Collector	16	(5)	7.2	(27)	4.8	(18)
	33	(10)	7.6	(29)	6.6	(25)
	49	(15)	8.0	(30)	10.6	(40)
2 Collectors	16	(5)	7.9	(30)	4.8	(18)
	33	(10)	8.3	(31)	6.6	(25)
	49	(15)	8.7	(33)	13.2	(50)
3 Collectors	16	(5)	8.5	(32)	6.6	(25)
	33	(10)	8.9	(34)	10.6	(40)
	49	(15)	9.3	(35)	13.2	(50)
4 Collectors	16	(5)	11.2	(42)	6.6	(25)
	33	(10)	12.0	(45)	10.6	(40)
	49	(15)	12.8	(49)	21.1	(80)
5 Collectors	16	(5)	11.8	(45)	6.6	(25)
	33	(10)	12.7	(48)	10.6	(40)
	49	(15)	13.5	(51)	21.1	(80)
6 Collectors	16	(5)	12.5	(47)	6.6	(25)
	33	(10)	13.3	(50)	10.6	(40)
	49	(15)	14.1	(54)	21.1	(80)
7 Collectors	16	(5)	15.8	(60)	10.6	(40)
	33	(10)	17.2	(65)	13.2	(50)
	49	(15)	18.6	(71)	21.1	(80)
8 Collectors	16	(5)	16.5	(62)	10.6	(40)
	33	(10)	17.9	(68)	13.2	(50)
	49	(15)	19.3	(73)	21.1	(80)
9 Collectors	16	(5)	17.1	(65)	10.6	(40)
	33	(10)	18.5	(70)	13.2	(50)
	49	(15)	19.9	(76)	21.1	(80)
10 Collectors	16	(5)	21.2	(80)	10.6	(40)
	33	(10)	23.4	(89)	21.1	(80)
	49	(15)	25.7	(97)	2x 13.2	(2x 50)
11 Collectors	16	(5)	21.9	(83)	10.6	(40)
	33	(10)	24.1	(91)	21.1	(80)
	49	(15)	26.3	(100)	2x 13.2	(2x 50)
12 Collectors	16	(5)	22.5	(85)	10.6	(40)
	33	(10)	24.8	(94)	21.1	(80)
	49	(15)	27.0	(102)	2x 13.2	(2x 50)

Note: The values listed in the table above are intended to be used for reference purposes only based on the installation image on page 45.

The system designer or engineer, must manually calculate the required expansion tank capacity, based on all the solar thermal system components which are to be installed.

System Fluid & Expansion Tank Pre-charge Pressure Calculator

CAUTION

The pressure relief valve must be piped to the overflow container or drain at all times, since excessively hot fluid can discharge from the system.

CAUTION

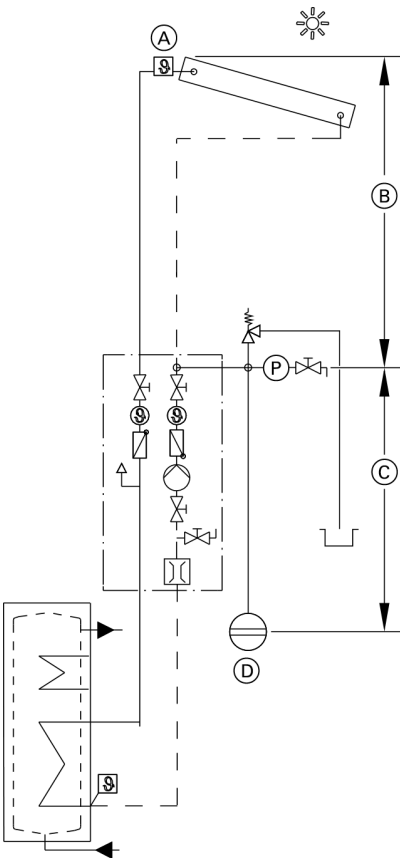
After de-aeration, the air vent c/w shut-off at top of system must be closed. To protect the solar system from overheating in the summer, e.g. during the holidays, do not shut off the power to the solar system.

The collector circuit must be protected during system stagnation (emergency shutdown) such that no heat transfer fluid can escape from the pressure relief valve or the air vent located at the collector.

This is achieved by the appropriate sizing of the expansion tank and matching of the system pressure.

IMPORTANT

Under cold fill conditions, a minimum static fluid pressure must be maintained. It can be calculated by completing the calculations in the table below:



System Cold Fill Fluid Pressure Calculator

① Required system pressure at highest point (A)	44 psig 3 bar
② Supplement for static head (B)	+ 0.45 psig/ft x <input type="text"/> ft = <input type="text"/> psig + 0.1 bar/m x <input type="text"/> m = <input type="text"/> bar
③ Required system fluid pressure at pressure gauge (P) Steps: ① + ② = ③	<input type="text"/> 44 + <input type="text"/> = <input type="text"/> psig <input type="text"/> 3 + <input type="text"/> = <input type="text"/> bar

Expansion Tank Cold Fill Gas Pressure Calculator

④ System cold fill fluid pressure at pressure gauge (P) *from Step: ③	<input type="text"/> psig <input type="text"/> bar
⑤ Pressure deduction for hydraulic seal in expansion tank (D)	-4.4 psig -0.3 bar
⑥ Supplement for height difference (C) between pressure gauge (P) and expansion tank (D)	+ 0.45 psig/ft x <input type="text"/> ft = <input type="text"/> psig + 0.1 bar/m x <input type="text"/> m = <input type="text"/> bar
⑦ Required pre-charge gas pressure in expansion tank (D) Steps: ④ + ⑤ + ⑥ = ⑦	<input type="text"/> + -4.4 + <input type="text"/> = <input type="text"/> psig <input type="text"/> + -0.3 + <input type="text"/> = <input type="text"/> bar

Recommended System Fluid & Expansion Tank Pressures

Static Head (vertical height)		Cold Fill Fluid Pressure		Cold Fill Gas Pressure	
ft	(m)	psig	(bar)	psig	(bar)
3	(1)	45.5	(3.1)	41.1	(2.8)
7	(2)	47.0	(3.2)	42.6	(2.9)
10	(3)	48.4	(3.3)	44.0	(3.0)
13	(4)	49.9	(3.4)	45.5	(3.1)
16	(5)	51.4	(3.5)	47.0	(3.2)
20	(6)	52.9	(3.6)	48.5	(3.3)
23	(7)	54.3	(3.7)	49.9	(3.4)
26	(8)	55.8	(3.8)	51.4	(3.5)
30	(9)	57.3	(3.9)	52.9	(3.6)
33	(10)	58.8	(4.0)	54.4	(3.7)
36	(11)	60.2	(4.1)	55.8	(3.8)
39	(12)	61.7	(4.2)	57.3	(3.9)
43	(13)	63.2	(4.3)	58.8	(4.0)
46	(14)	64.7	(4.4)	60.3	(4.1)
49	(15)	66.1	(4.5)	61.7	(4.2)

IMPORTANT

The solar expansion tank is factory precharged with Nitrogen to 44 psig (3 bar). The precharged gas pressure must be field adjusted prior to filling of the system with heat transfer fluid.

The cold fill fluid and gas pressures are to be verified when the collectors are not exposed to solar energy. Failure to do so will result in system pressures which are too low. It is recommended that this step be completed:

- First thing in the morning
- Late in the evening
- When collectors are covered

Pre-commissioning Checklist

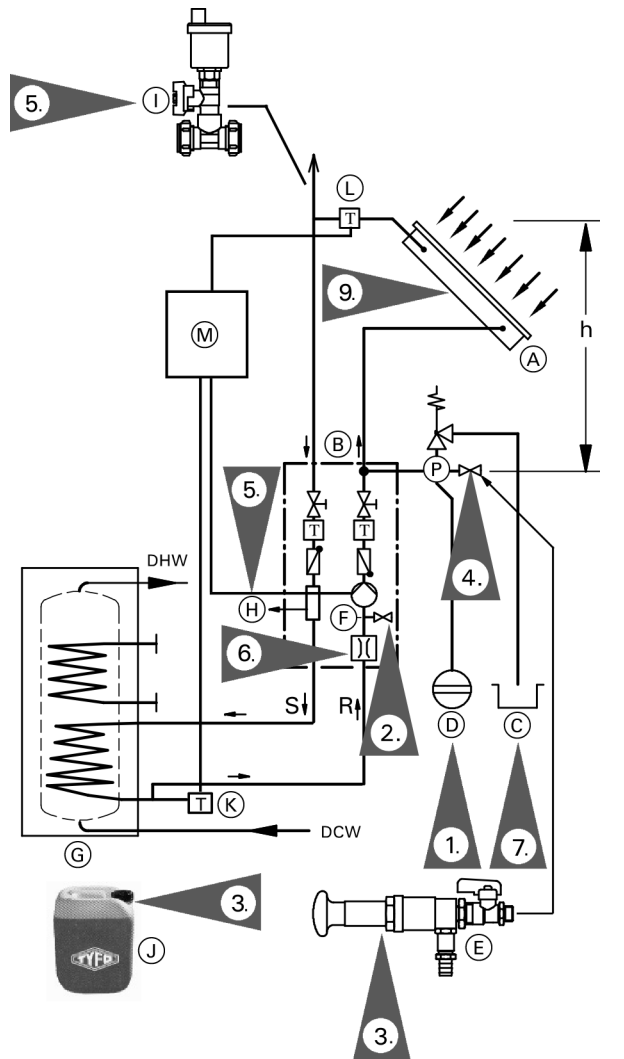
- | | |
|---|---|
| <ul style="list-style-type: none"> <input type="checkbox"/> Has the solar circuit been installed in accordance with the circuit diagram and all relevant standards? <input type="checkbox"/> Have the collectors been installed with a slight upward gradient towards the piping side? <input type="checkbox"/> Have the supply and return connections been carried out and pressure tested? <input type="checkbox"/> Have the electrical connections been carried out correctly? <input type="checkbox"/> Have the sensors been installed correctly? <input type="checkbox"/> Have air vent valves been installed at the highest points of the system and are they open? | <ul style="list-style-type: none"> <input type="checkbox"/> Have all bolts, threaded pipe connections and covers been securely tightened? <input type="checkbox"/> Has the solar hot water tank been filled with water? <input type="checkbox"/> Does the maximum capacity of the expansion tank correspond to the value calculated in the Expansion Tank Sizing Formula (see page 44). <input type="checkbox"/> Has the gas pressure of the expansion tank been adjusted to the system cold fill gas pressure? (see page 47) <input type="checkbox"/> Have connecting pipes been insulated and protected from the elements? |
|---|---|



CAUTION

It is absolutely essential to close the air vent valves again when the system has been started up and de-aerated.

Quick Start-up



Legend

- (A) Solar collector
- (B) Solar-Divicon (pumping station)
- (C) Overflow container
- (D) Expansion tank
- (E) Solar manual filling pump (optional)
- (F) System fill manifold valve
- (G) Solar storage tank
- (H) Air separator (Solar-Divicon)
- (I) Fast air vent c/w shutoff valve
- (J) Solar fluid
- (K) Tank temperature sensor (field installed)
- (L) Collector temperature sensor (field installed)
- (M) Solar control unit
- h Static head (used to calculate system pressure).
Highest point in system to expansion tank connection.
- R Return to collector
- S Supply from collector

Start-up steps

1. Check and adjust nitrogen cushion pressure in the diaphragm expansion tank (D). Calculate cushion pressure based on formula (see page 47) and charge cushion pressure as required.
2. Thoroughly flush system through the system fill manifold (F) to remove debris and flux residue (see page 51).
3. Fill system with solar fluid (J) through the system fill manifold (F) using charge pump or hand fill pump (E).



CAUTION

Never mix Tyfocor-HTL with alternative heat transfer media or with water.

4. Fill system to minimum fluid fill pressure (see page 47).
Typical values:
1-storey home: Static head = 10 ft. (3 m)
System fill pressure = 48.4 psig (3.3 bar)
2-storey home: Static head = 20 ft. (6 m)
System fill pressure = 52.9 psig (3.6 bar)
5. Purge all air from air vents (I) and (H) by running solar loop pump at maximum speed. After system is completely vented, shut off air vent valve in top of system.
6. Set system flow rate (see page 35).
7. Provide overflow container (C)
(minimum size should equal collector fluid volume).
8. Set control settings: Differentials, maximum tank temperature.
9. Remove protective film from flat plate collectors.



CAUTION

Remove protective film from flat plate collector ONLY after all above steps have been completed.



CAUTION

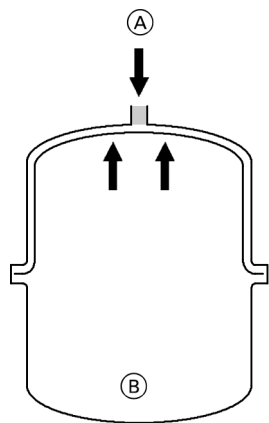
Never flush with water when it is freezing, if no heat transfer medium is used.



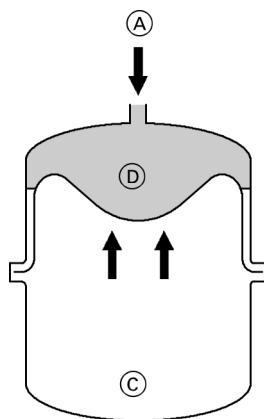
CAUTION

Never drain the system with a vacuum pump.

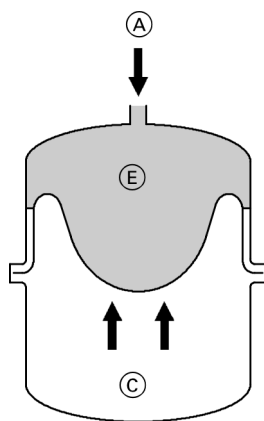
Set Expansion Tank Pre-charge Pressure



Factory set condition
[3 bar (44 psig) pressure]



Solar heating system
filled without heat effect



Under max. pressure at the
highest process medium temperature

1. Cover the collectors with an opaque tarpaulin (if necessary).
2. If the system has already been filled with heat transfer fluid, release fluid to ensure the system fluid pressure gauge indicates 0 psi (0 bar), or isolate the expansion tank from the system using the service valves and reduce the fluid pressure at the expansion tank connection. For new installations, set tank pressure prior to filling the system.
3. Calculate the air cushion charge pressure of the expansion tank using the formula on page 47.
4. In most cases the pre-charge pressure of the diaphragm expansion tank is factory set at 44 psig (3.0 bar) will be lower than the calculated charge pressure. Top up with sufficient amount of nitrogen through the air valve to raise the charge pressure to equal the calculated value.

IMPORTANT

Record the "pre-charge pressure level" on the expansion tank for future reference.

Legend

- (A) Heat transfer medium
- (B) Nitrogen filling
- (C) Nitrogen buffer
- (D) Safety water seal
- (E) Safety water seal under max. pressure

Fill, Flush and Leak Test the Solar Heating System



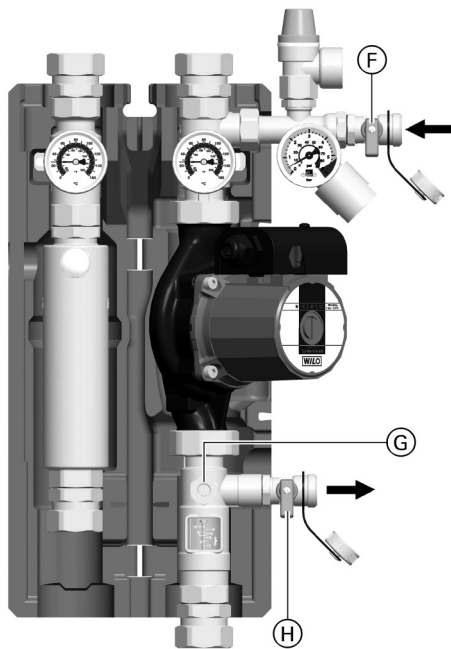
CAUTION

All work on the solar circuit or the components of the solar heating system may only be carried out if the sky is very cloudy, early in the morning, in the evening or with covered collectors.

We recommend the system is only flushed with the specified heat transfer medium to prevent a mixing with residual water inside the system. Mixing would alter the level of frost protection.

IMPORTANT

- Heat transfer media containing glycol can be damaged when subjected to temperatures above 338°F (170°C) for a prolonged period of time (stagnation). This can lead to the system suffering from sludge and hard deposits, particularly in conjunction with other contaminants and air.
- Ensure that the system is correctly flushed, filled and vented after installation. After filling the system with heat transfer medium, ensure the system is correctly vented and that heat is transferred inside the system, i.e. that longer periods of stagnation are avoided.
- The glycol PRV discharge pipe should terminate in an open container capable of holding the maximum possible collector fluid volume.
- The Viessmann compact mobile charging station is highly recommended for fast effective flushing, filling and air removal.



Solar-Divicon DN20B/DN25B pumping station

1. Do not remove cover foil from flat plate collectors before filling the system. Cover up collectors, if necessary.
2. Manually open any installed isolation valves.
3. Open the flow check valves on the Solar-Divicon supply and return lines by turning the combination thermometer/isolation valves clockwise 45°.
4. Close the shut-off valve (G) on the system fill manifold and open the drain valve (H).
5. The system is flushed via the return line to the collector. Fill and flush the system with heat transfer medium via the filling valve (F). Flush using a quick-running pump until you can be sure that all debris and air has been purged from the solar panel system. Proper start-up can only be guaranteed with a system that is completely free of air.
6. Close the drain valve (H) on the system fill manifold. Continue to charge system until desired final fill pressure is achieved (see page 47), then close (F). Open the shut-off valve (G) and check the system for leaks. Manually operate the Solar-Divicon pump at maximum speed for at least one hour to purge any remaining air. Observe the permissible operating pressure. The pressure should not drop over the space of at least one hour. Please refer to the Installation, Start-up and Service Instruction Manual for the Solar-Divicon for additional information.
7. Set the pump speed as required to obtain the flow rate shown in the chart on page 35.
8. For venting the solar heating system see page 52 for additional information.

Vent the Solar Heating System

1. The flow check valves on the Solar-Divicon can be bypassed by turning the combination thermometer and isolation valve 45°. Leave them in this position while starting up system. Open the air vent valve at the top of the system and bleed air from the air separator in the Solar-Divicon.
2. Adjust the circulation pump to its highest speed setting, and vent by starting and stopping several times (a vented pump will operate almost silently).

Note: Even after thorough ventilation, some dissolved air will still remain in the heat transfer medium. This will be released as the temperature rises, and will be discharged via the air separator in the Solar-Divicon.

3. Repeat the venting step until the float in the flow meter of Solar-Divicon holds a steady position when the pump is running (highest speed setting).

Note: If air is present bubbles will be visible in the flow meter (float moves).

4. Adjust the flow rate via the speed selector switch of the circulation pump. See page 35 for suggested flow settings for collector arrays having different quantities of collectors.
5. Repeat the venting steps after the system has been operating a few days.

IMPORTANT

Top up with heat transfer medium and repeat the venting process with the system in its cold state, if the system fluid pressure has dropped after venting.

6. Close the air vent valve at the top of the collectors after system venting is complete.
7. Periodically bleed air from manual air separator on the Solar-Divicon until no air remains.



CAUTION

Failure to close air vent at top of system can lead to steam escaping from air vent.

Check Switching Functions of the Solar Control Unit



Refer to the Installation Instructions of the solar control unit.

Check Electrical Connections

Check the tightness of electrical connections and cable grommets.

Check the cables for possible damage.

Check Solar Fluid Flow Rate

Check for proper flow rate based on the quantity of collectors installed. Refer to specific flow rate table on page 35 of this manual.

Maintenance, Inspection and Cleaning

The solar thermal system must be inspected regularly by the building owner to verify that the control is operational, and that the solar pump is running when the sun is shining and that the system fluid pressure is within range.



CAUTION

The building owner must notify a qualified heating contractor immediately if they notice any problems with the solar control or solar pump, or a system pressure drop. Failure to do so can result in system stagnation leading to excessively high temperatures and damage to the solar fluid and or system components.

Regular inspection and service (annually) by a qualified heating contractor is critical to the performance of the Viessmann Vitosol 200-FM.

Neglected maintenance, e.g. forgoing regular cleaning services, impacts on warranty and will result in decreased efficiency of the system. Regular cleaning and maintenance ensures clean, environmentally friendly and efficient operation. We recommend a maintenance contract with a qualified heating contractor.

Maintenance and Inspection Items:	Recommended Inspection Interval:
The glazing (glass) of the collectors is clean	1 year
The valve on the automatic air vent at the collectors is closed	1 year
There are no fluid leaks from solar collector, system piping, tanks, pumps, etc	1 year
Circulating pumps are operational without excess noise	1 year
Flow meter is functioning and moving freely	1 year
System flow rate meets requirements for the installed collector type	1 year
External heat exchangers are not leaking or showing signs of damage	1 year
Solar tank connections are not leaking or showing signs of damage	1 year
Solar controller is functional without any alarms or faults indicated	1 year
Solar control accessories and monitoring equipment is functioning correctly	1 year
Solar heat transfer fluid pH tested with test strips (normal 7.5-8.5)	1 year
Solar heat transfer fluid freeze point checked with refractometer	1 year
Solar heat transfer fluid is not thermally stressed or degraded (black or foul smelling)	1 year
Bleed air from the internal air separator on the Solar-Divicon	1 year
Solar fluid pressure has not dropped or changed since commissioning	1 year
Pressure Relief Valve (PRV) has not released or does not indicate signs of leakage	1 year
Overflow container does not contain glycol as a result of a discharge from the PRV	1 year
Interconnection pipes between collectors are centered and not damaged	2 years
System pipe insulation and protective jacketing is not damaged or missing	2 years
Roof or wall penetrations not leaking or showing signs damage	2 years
Solar control wires are secure without any visible damage	2 years
Thermostat gauges are operational and not showing signs of damage	2 years
Pressure gauges are operational and not showing signs of damage	2 years
Enamel steel tank sacrificial anode removed and inspected (replace if required)	2-5 years
Collector glass (glazing) seals are not cracked or broken	3-5 years
Collector absorber sheet not showing signs of degradation or flaking	3-5 years
Collector mounting hardware, racking or substructure components are secure	3-5 years
System pipe is supported properly with pipe hangers (not sagging)	3-5 years
System pipe markings or labels are present and legible	3-5 years
Solar tank internal heat exchanger inspected for leaks or signs of corrosion	3-5 years
External heat exchanger (brazed plate/shell & tube) inspected for leaks or signs of corrosion	3-5 years
Expansion tank gas pressure has not changed since commissioning	3-5 years
Solar heat transfer fluid replacement (complete flush and fill)	5-10 years

Check Safety Equipment

Check for proper operation of all safety equipment take into account local jurisdiction.

Shut Down Solar Heating System

IMPORTANT

Shut down of the solar system must always be avoided when the sun is shining on the collectors. If possible only shut down the system on cloudy days or in the morning or evening. If the sun is shining on the collectors, they must be covered before any work on the components of the solar heating system begins, in order to prevent equipment damage.

Isolate the main power supply of the system (e.g. by unplugging the control system or by means of a main power disconnect switch) and safeguard against unauthorized and/or accidental reactivation.

Clean Collectors

In areas experiencing frequent rain, collector cleaning is not usually required. In areas with very dry climates, urban areas or dusty areas, check and clean collectors periodically.

Use a glass cleaner or soap and water solution and rinse thoroughly with water.

Check Gaskets and Sealed Unions

Replace all worn/faulty parts.

Check the Thermal Pipe Work Insulation

Check the thermal insulation of the pipe work for damage and fit. No bare metal or fiberglass insulation should be exposed. Adjust if necessary. Replace all worn/faulty parts.

IMPORTANT

The thermal insulation of external pipe work must be resistant to temperature, water and UV radiation. It must be protected against destruction by small animals and birds (e.g. metal jacketing).

Check Pumps

Check for proper operation of circulation pumps

Check Frost Protection Temperature of Heat Transfer Medium

Tyfocor HTL should be between 45-50% propylene glycol. See below or for more details, refer to the product MSDS information on Tyfocor.



CAUTION

In areas with extremely cold climate conditions, where outdoor temperatures may drop below -31°F (-35°C), the use of Tyfocor-HTL is not recommended. Use a solar propylene glycol mixture with a higher concentration of glycol that provides the level of freeze protection required for the area of the collector installation.

Check the freezing point of Tyfocor HTL heat transfer medium with a Viessmann glycol hydrometer tester or approved alternate refractometer.



CAUTION

Never mix Tyfocor HTL with water or alternate heat transfer fluid.



CAUTION

Failure to test frost protection temperature of solar fluid can lead to freezing and damage to collector.

Check pH of Heat Transfer Medium

The Tyfocor heat transfer medium supplied is a liquid based on 1.2 - propylene glycol with a frost protection limit of -31°F (-35°C). Below this temperature the fluid is no longer pumpable.

The heat transfer fluid can be damaged if exposed to long periods of stagnation. The pH level of the fluid is the indicator of the fluids suitability for continued use. The pH value should be in the range of 7.5 - 8.5.

This must be tested annually.

If the pH value falls below 7.5, the heat transfer fluid must be drained, flushed and refilled with the new fluid.



CAUTION

Failure to test pH and replace solar fluid as required can lead to corrosion and fouling of collector circuit.

Maintenance Record

	Maintenance/Service	Maintenance/Service	Maintenance/Service	Maintenance/Service	Maintenance/Service
on:					
by:					

	Maintenance/Service	Maintenance/Service	Maintenance/Service	Maintenance/Service	Maintenance/Service
on:					
by:					

	Maintenance/Service	Maintenance/Service	Maintenance/Service	Maintenance/Service	Maintenance/Service
on:					
by:					

	Maintenance/Service	Maintenance/Service	Maintenance/Service	Maintenance/Service	Maintenance/Service
on:					
by:					

	Maintenance/Service	Maintenance/Service	Maintenance/Service	Maintenance/Service	Maintenance/Service
on:					
by:					

	Maintenance/Service	Maintenance/Service	Maintenance/Service	Maintenance/Service	Maintenance/Service
on:					
by:					

Parts List

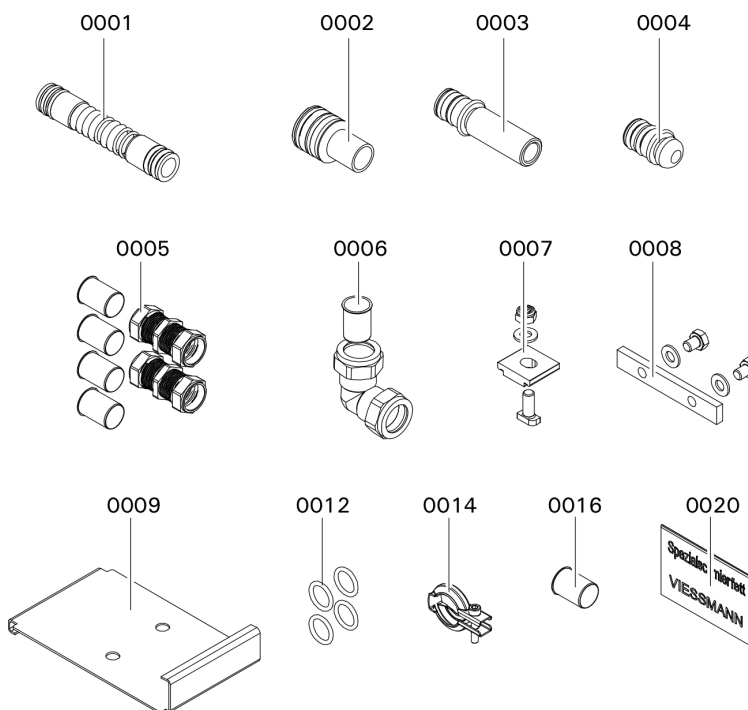
Model No.	Serial No.
Vitosol 200-FM	
SV2F	7571217□□□□□□□□
SH2F	7561684□□□□□□□□

Ordering Replacement Parts:

Please provide Model and Serial Number from rating plate when ordering replacement parts. Order replacement components from your Viessmann distributor.

Collector Assembly

- 0001 Interconnection pipe (each)
- 0002 Connection pipe (short), with no profile clamp
- 0003 Connection pipe (long), with no profile clamp
- 0004 Pipe plug
- 0005 Compression connector, straight
- 0006 Compression connector, elbow
- 0007 Clip for assembly kit, short
- 0008 Connection element
- 0009 Installation plate
- 0012 O-ring set (set of 4)
- 0014 Profile clamp
- 0016 Support sleeve, 22 x 1 mm (set of 2)
- 0020 Lubricant 6g



Other Parts (not illustrated)

- 0125 Installation Set
- 0126 Copper pipe adaptor, 3/4 in. x 4 in. (each)
- 0127 Copper pipe, Ø22 L = 60mm (each)
- 0128 Adaptor, G 3/4 in. F x NPT 3/4 in. M
- 0129 Gasket A 17.2 x 23.9 x 1.5
- 0130 Parts List for Installation Set
- 0150 Technical Literature Set
- 0153 Installation, Service, and Operating Instructions
- 0155 Handbook "Vitosol Connection Fittings"
- 0156 Certificate "SRCC"
- 0160 Warranty Sheet

Parts List *(continued)*

Installation Fittings,

7743295

for VITOSOL 200-FM solar collectors

Ordering Replacement Parts:

Please provide Model and Serial Number from rating plate when ordering replacement parts. Order replacement components from your Viessmann distributor.

Parts

001 Copper pipe adaptor, $\frac{3}{4}$ in. x 4 in.

002 Copper pipe, \varnothing 22 length = 60 mm

Other Parts (not illustrated)

0401 Technical literature set

0402 Parts List

Overview of Componentry

(outside of installation fittings)

- (A) Vitosol 200-FM Collector
see separate Parts List
- (B) Short connection pipe *1
For Vitosol 200-FM
- (C) Long connection pipe *1
For Vitosol 200-FM
- (D) Fast air vent *2
- (E) 90° compression elbow *1
- (F) Sensor well set *2
For Vitosol 200-FM
- (G) Solar Expansion Tank

*1 Included with general connection set

*2 Sold separately - see price list

Parts

003 Adaptor

$\frac{3}{4}$ in. G female - $\frac{3}{4}$ in. NPT male

004 Gasket,

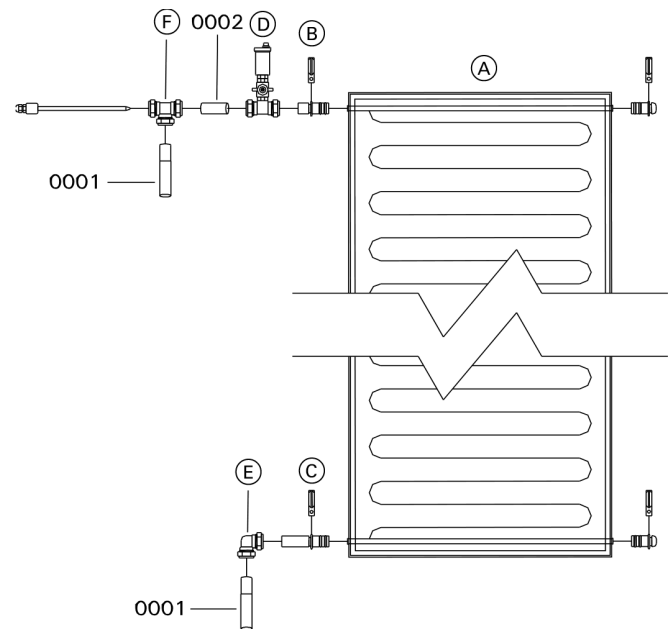
17.2 x 23.9 x 1.5

Other Parts (not illustrated)

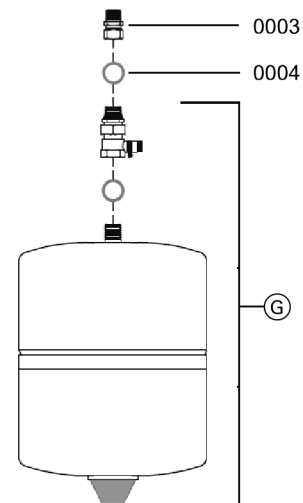
0401 Technical literature set

0402 Parts List

Vitosol 200-FM



Solar Expansion Tanks



18L, 25L, 40L and 50L Tank

Parts List (continued)

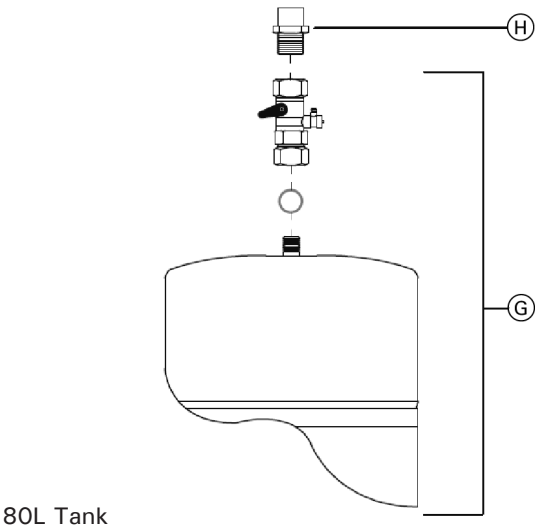
Installation Fittings,

7743295
for VITOSOL 200-FM solar collectors

Overview of Componentry
(outside of installation fittings)

- G Solar Expansion Tank
- H 1 in. NPT male to copper sweat adaptor (field supplied)

Solar Expansion Tanks



Printed on environmentally friendly
(recycled and recyclable) paper.

Technical information subject to change without notice.

Technical Data

Vitosol 200-FM

Model		SV2F	SH2F
Gross area	ft. ² (m ²)	27.0 (2.51)	27.0 (2.51)
Absorber area	ft. ² (m ²)	25.0 (2.32)	25.0 (2.32)
Aperture area	ft. ² (m ²)	25.1 (2.33)	25.1 (2.33)
Max. stagnation temperature	°F (°C)	293 (145)	293 (145)
Permiss. operating pressure	psig (bar)	87 (6)	87 (6)
Fluid capacity	USG (L)	0.48 (1.83)	0.63 (2.40)
Weight (dry)	lb (kg)	86 (39)	88 (40)



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