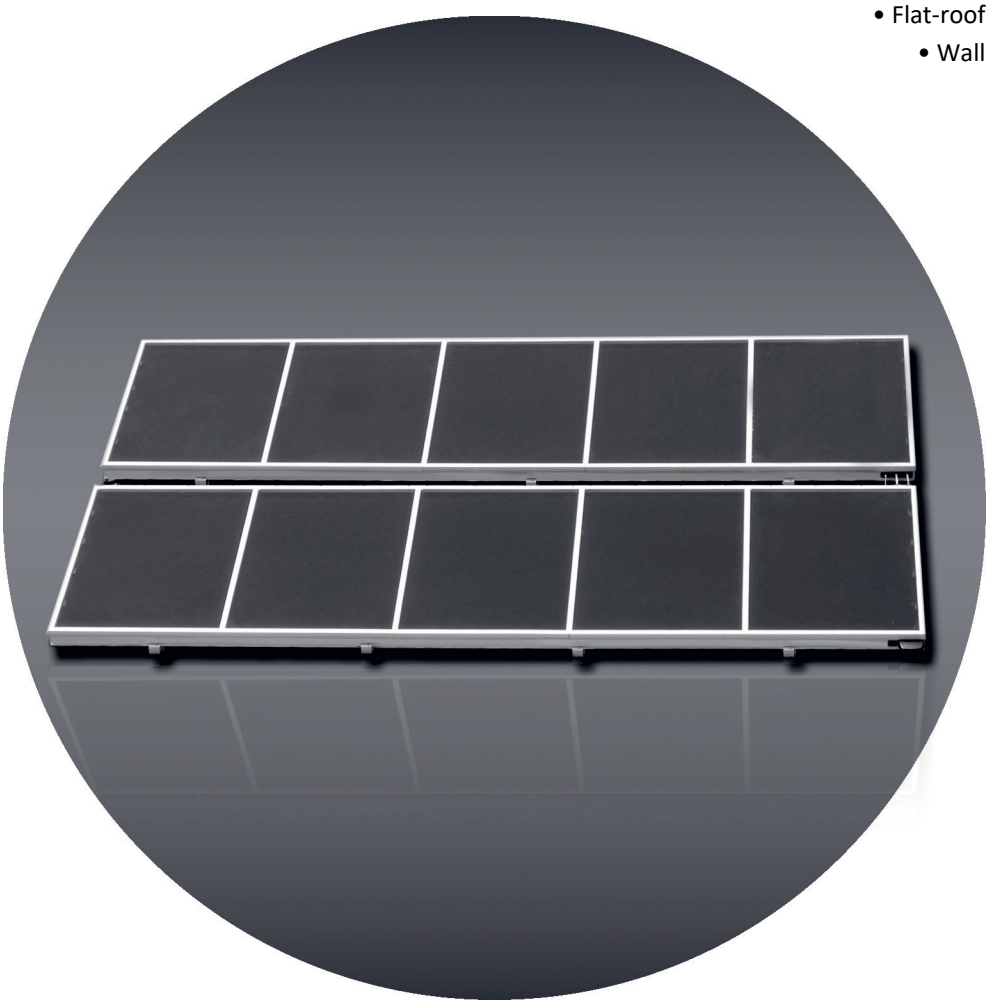
Installation

SolvisFera 3/4

Large-surface collector

For following installation types:

- Roof-mounted (sl.: 20° to 60°)
- Flat-roof (slope: 30° to 60°)
- Wall (slope: 45° to 90°)



Wärme. Leben. Zukunft.

1 Information About These Instructions

These instructions are intended for you as a technician from an installation company. You will find the specifications for installation, start-up and maintenance of the system here.

Please keep these instructions with the system so they can be referred to when necessary.

We recommend that you participate in a Solvis training course to ensure safe and proper installation.

As we are interested in improving our technical documentation, we appreciate feedback of any kind.

A list of our international representatives is provided at www.solvis.com.

Please understand that the telephone numbers are reserved for use by our installers.

Interested system operators should contact their installer.

Symbols used

DANGER

Immediate danger, with serious health consequences and even death.

WARNING

Danger, with potentially serious health consequences.

CAUTION

Possible risk of moderate or light injury.

CAUTION

Risk of damage to unit or system.

Useful information, notes and work tips.

Change of document, referring to another document.

Energy-saving tip with suggestions on how to save energy. This reduces costs and helps protect the environment.

Contents

2 Notes

2.1 Safety Notes

Observe the safety notes
This is primarily for your own safety.
- Make sure that you are familiar with the safety notes before beginning work.
- Observe and adhere to the applicable safety regulations and accident prevention regulations.

2.1.1 General Information

DANGER
Note the following in the vicinity of live overhead electric cables:
Touching the overhead cables or a flashover may cause burns or cardiac arrest.
- When working in the vicinity of overhead electric cables, observe the safety clearances.
- Refer to the Employers' Liability Insurance Association (German: “Berufsgenossenschaft”) guidelines for safety and health at work to find out the applicable safety clearances and further measures.

WARNUNG
Burn hazard when there is direct sunlight
Fluid that remains in the collector or steam released from the collector can cause scalding. Touching hot connections may cause burns.
- Perform work on the collectors only when the sun is not shining or when the collectors are covered.
- Remove the sun protection only after the (re-) commissioning of the solar plant.

CAUTION
Lower side of the collector is hot
This may damage the components below the collector.
- Materials that come into contact with the rear side of the collector must be able to withstand temperatures up to 120 °C.
- Otherwise, they must be spatially and thermally separated from the rear side of the collector.

CAUTION
Observe instructions
Solvis is not liable for any damage resulting from non-observance of these instructions.
- Read the instructions carefully before operating or installing the system.
- Contact our Technical Sales department if you have any questions.

CAUTION
Do not make any unauthorised modifications
Otherwise, there is no guarantee that the system will function correctly.
- You must not make any changes to the components of the unit.
- Only use original spare parts.

WARNING
Read before working on roof
Injury hazard
- Check the local conditions and construction requirements carefully before beginning the installation. Employ a structural engineer for advice if necessary.
- For roof-mounted installations, you must construct a collective non-personal fall prevention or fall arrest system in accordance with DIN 18338 (roofing and roof sealing work) and DIN 18451 (scaffolding work with safety nets).
- If, for technical reasons, a collective non-personal fall prevention system is not available, safety harnesses must be used.
- Use only tested and recommended safety harnesses: safety belts, lanyards or straps, shock absorbers, fall arresters. Attach safety harnesses only to load-bearing structures and/or fixing points.
- In addition to protecting those participating in the construction project, uninvolved third parties must also be protected from falling objects.
- The use of normal non-secured ladders can cause accidents if the ladder sinks in, slides or falls over. Do not use damaged ladders. Ensure that the ladder is at the correct angle; between 68 and 75°. Secure all ladders.
- Wear safety gloves, a helmet and safety boots during installation. Also wear protective goggles when drilling or grinding.
- Protect against moisture and dampness during electrical installation.

Work to be performed by qualified technicians
- Only trained specialist companies may install or maintain the system.
- Only qualified electricians may work on electrical equipment.

Intended use
The solar collectors are intended only for indirect heating of drinking water and for heating support and must be operated with appropriately sized heat exchangers between the closed solar circuit and heat consumer.
Operating these collectors for any other purpose is prohibited. Exceptions require express written approval or a statement from the manufacturer in advance.

The warranty is voided if:

- The components supplied are subject to improper use or modified without permission,
- The installation instructions are not properly observed during installation,
- The structural requirements regarding the snow and wind loads are not observed.

Disclaimer

The manufacturer accepts no liability for any damage that occurs as a result improper, incomplete or false information.

2.1.2 Regulations

Specifications, standards and guidelines must be applied as implemented in the country in question.

The following specifications and guidelines are to be observed:

Regulatory provisions

- Statutory specifications for preventing accidents
- Statutory specifications for environment protection
- Specifications of professional associations
- Federal German Energy Conservation Act for saving energy in buildings (EnEG)
- Federal German Renewable Energy Heat Act (EEWärmeG)

Standards and guidelines

- Safety regulations of the DIN, EN and VDE

Installation on roofs

- German Social Accident insurance (DGUV) 101-016 roofing work
- DIN 18338 Roofing work
- DIN 18339 Sheet metal roofing and wall covering work
- DIN 18451 Scaffolding works
- DIN EN 1995 Design of timber structures
- DIN EN 1991 Actions on structures

Connection of solar thermal systems

- EN 12975 Thermal solar systems and components – Solar collectors
- EN 12976 Thermal solar systems and components – Factory made systems
- EN 12977 Thermal solar systems and components – Custom built systems
- EN ISO 9488 Thermal solar systems and components – Terminology
- VDI 6002 Solar drinking water heating
- DIN EN 1044 Brazing

General Conditions for Water Supply, DVGW worksheet

- W551, W552 Technical Measures for Preventing Growth of Legionella

German Energy Conservation Regulations

- German Energy Conservation Regulations (EnEv)

Installation and Equipment of Water Heaters

- DIN 18380 Heating of water for domestic and heating purposes – Leak testing
- DIN 18381 Gas, water and waste water installation work
- DIN 18421 Insulation of service installations
- DIN 1988 Codes of practice for drinking water installations
- EN 1717 Protection against pollution of potable water installations
- DIN 4753/EN 12897 Water heaters, water heating installations for drinking and service water; requirements, labelling, equipment and inspection

Electrical connection

- VDE 0100 Selection and erection of electrical equipment – Earthing arrangements and protective conductors
- VDE 0185 General notes on erection of lightning protection systems
- DIN EN 62305 Lightning protection of physical structures – Part 1: General principles
- VDE 0100-540 Main potential equalisation of electrical systems

2.2 Piping

CAUTION

Avoid excessively high temperature loads.

Otherwise, the solar system may be subjected to vapour shock or damage.

- The collector field must be positioned above the solar station.
- The pipe lines must always run down from the collector connection points to the station.
- Do **not** run the pipe lines higher than the collector connection points.

- To allow for thermal expansion, use compensators, expansion bends, sliding clamps, and so on
- Give collector connections some flexibility (e.g. using the corrugated pipe connectors provided)
- For better ventilation, you should preferably use bare-pipe (copper, stainless steel, standard steel)
- Use corrugated pipes only in difficult installation conditions and then flush the system particularly thoroughly
- Insulate the pipe lines to ensure resistance to high temperatures in accordance with the German Energy Conservation regulations (EnEv).

2.3 Preventing Damage

CAUTION

Risk of corrosion

- Do not install the solar system on copper roofs or underneath copper components.

CAUTION

When filling the solar circuit:

- Fill only with original Tyfocor LS-rot ready-mixed heat transfer fluid and flush.
- Using other types of heat transfer fluid in this system is prohibited because it may damage the solar circuit components.
- Use only the Füll-Jet unit to flush and fill the system (please order separately).

CAUTION

Risk of deposits

- Once the collector has been previously filled with solar liquid, it may not be exposed it to sunlight when empty.

Transporting the collectors

The collector connections must not be subjected to load. Always use the Solvis collector installation grip to transport the collectors properly. Observe the instruction sheet for the installation grip.

When using a crane for installation, first insert the solar glass panes at ground level.

CAUTION

Note the following information for the SolvisFera

The SolvisFera, with and without glass, may be stored outdoors for a maximum of 14 days as follows:

- **Storing the collector**: If stored temporarily after delivery, the collector must be protected from moisture because cardboard does not offer sufficient protection against rain. Only store in covered spaces that are free from frost.
- **Storing the solar glass panes**: Solar glass panes should also be stored in dry conditions. Never place or lay the panes directly on top of each other. Otherwise, the panes may tarnish (no air circulation).

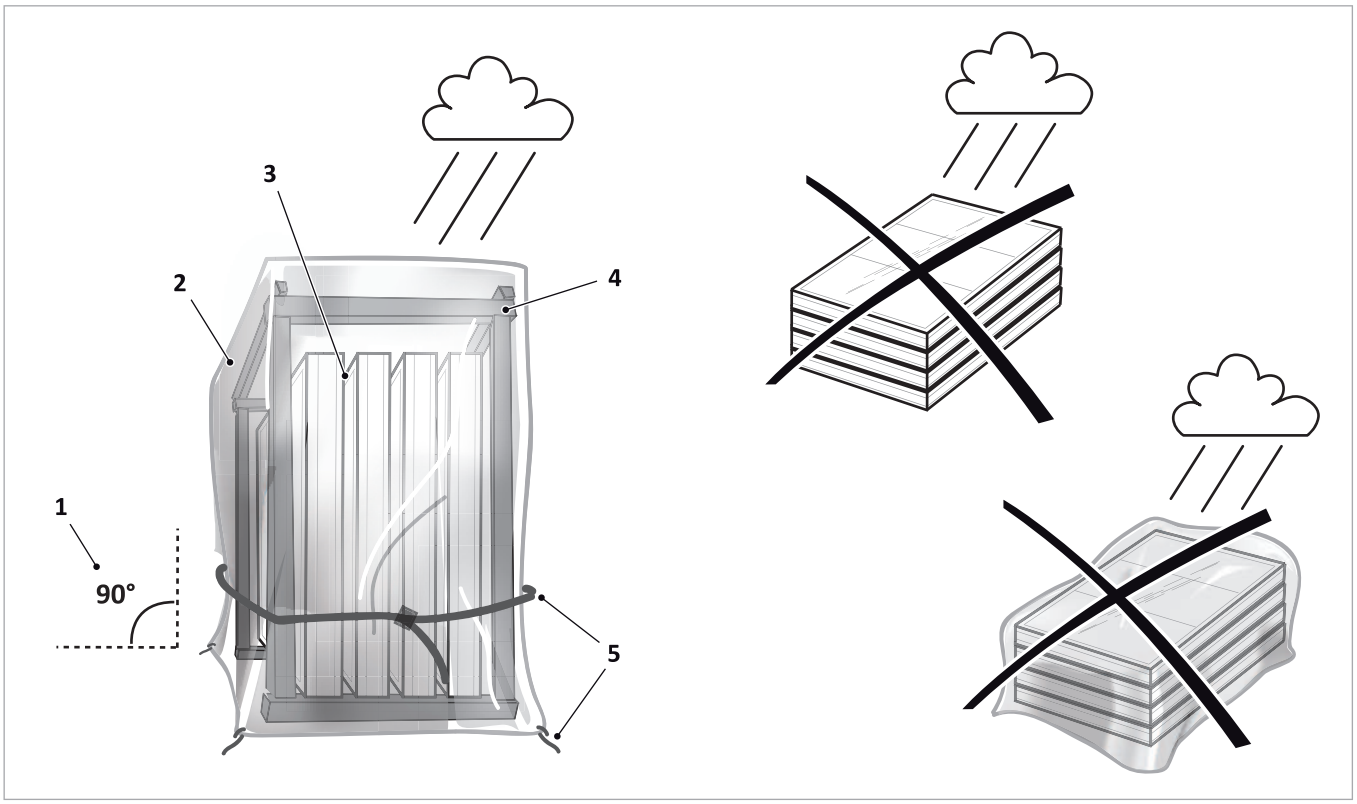


Fig. 1: Storage outdoors, max. 14 days

1 *Upright and secured from toppling over.*
2 *With stable tear-proof tarpaulin to protect it from the rain.*
3 *Maintain a distance of 5 to 10 cm between the collectors.*
4 *With spacers to the rear ventilation. The tarpaulin must not lie directly on the collectors.*
5 *The tarpaulin is securely lashed against the wind.*

2.4 Handling solar glass panes

CAUTION

Observe with regard to anti-reflective glass

Otherwise damage may result

- Handle with care Anti-reflective glass is treated with a special, delicate surface coating that increases its transparency.
- Leave minor soiling untreated. You have no influence on the effectiveness of the collector. Otherwise the pollutant may be ground into the surface or damage the surface coating.

The following instructions must be observed:

Notes on handling

- Avoid leaving fingerprints. Handle the sheets only with clean, soft (cotton) gloves (no leather gloves)
- Handle anti-reflective glass sheets only around the edges
- Do not set glass panes down on the sharp edge
- Do not expose the glass panes to uneven pressure
- Preferably use glass lifters
- Prevent soiling: keep clean all objects and surfaces that come in contact with the sheets (such as storage areas, glass lifters, tools)
- Avoid contact with substances such as silicone, oil and other lubricants as well as other mineral substances such as cement and mortar
- Avoid letting rain from façades (especially with mineral coatings) run off onto the collector
- Store sheets in a dry place protected from rain and from freezing

Notes on cleaning

- Clean anti-reflective glass sheets carefully and without pressing using only a microfibre cloth
- Use only glass cleaner or isopropyl alcohol for cleaning
- Do not use aggressive, scouring or chemical cleaning substances
- No mechanical cleaning: do not use abrasive sponges, steel wool, or scrapers

Installation information

For information about installing solar glass panes in the collector, see ➔ *chapter "Installing the Panes" on page 28*.

2.5 Crane installation

When performing the installation using the crane, note:

- Please allow sufficient time between the delivery of the collectors and the operational readiness of the crane. The collectors are supplied unglazed, but with the anti-reflection glass panes.
- Store collectors on the wooden transport guard provided or standing on squared timber with intermediate layers (see ➔ *fig. 1, page 7*).
- Do not place the collectors on the connections
- Keep a tarp or pavilion available to protect against rain
- Install the glass panes in the collectors in front of the crane; place the collectors on suitable pedestals to do so.
- Lift the fully glazed collector directly from the pedestals to the stands/rails on the roof by crane
- Fasten grips and tethers to the collector as shown in ➔ *fig. 2*
- Use a tether of a sufficient length to secure the collector against turning.

Using the crane

Attach the collector with the finished glass directly to the cross members using four grips each.

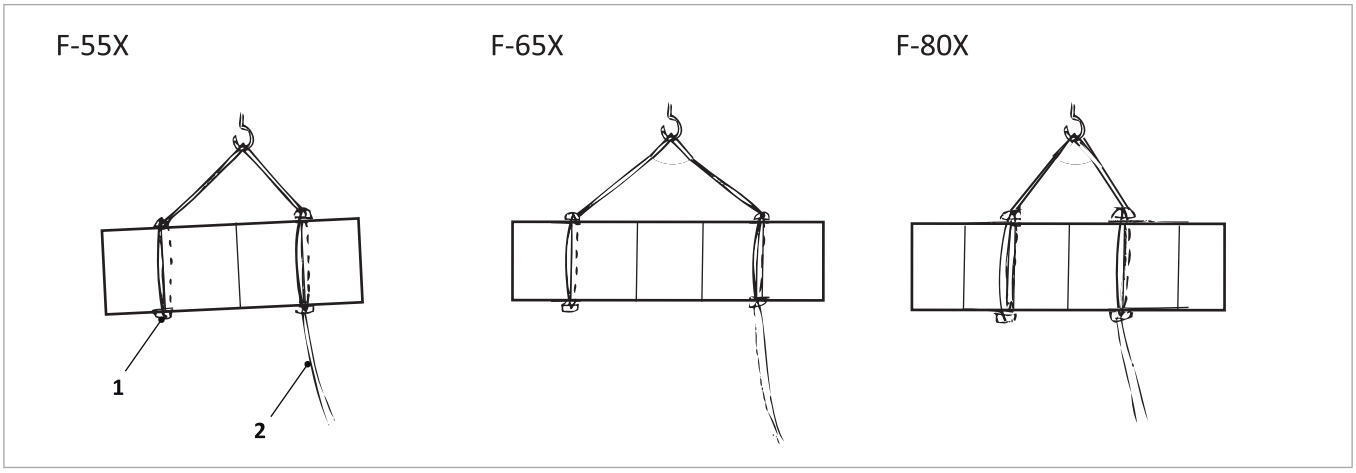


Fig. 2: SolvisFera – position of grips and tethers

1 *Grips* 2 *Tether*

2.6 Overvoltage Protection

Lightning protection

Clarify if a lightning arrester is required according to building legislation. In addition, the planner or insurance company may require that lightning protection be installed. Take this into account accordingly.

CAUTION

Observe the following for lightning protection devices

- The layout and installation of lightning protection devices should be carried out by suitably qualified technicians only, in accordance with the recognised technical regulations.
- Observe the general principles of the DIN EN 62305 lightning protection standard.

External lightning protection

External lightning protection comprises interception devices, conductors and ground electrodes.

If a lightning protection system is in place, the planner checks if and how (separation distance) the planned solar system can be positioned within the interception devices.

This applies in particular:

- If an external lightning protection system is required
- If additional lightning protection is required for solar systems which are elevated in an exposed location on public buildings (e.g. if the building becomes significantly taller as a result).

Internal lightning protection

The internal lightning protection comprises equipotential bonding and overvoltage protection for electrical devices.

There must always be a connection between the equipotential bonding of the house and the solar circuit piping (solar flow and solar return); the cross section of the connection must be a minimum of 6 mm².

Even if no lightning protection is needed, you should at least install a lightning protection box (as close to the sensor as possible) to protect the collector sensor against overvoltage.

CAUTION

Please note the following with regard to lightning protection

Note that even a lightning protection system that fulfils all standards cannot guarantee complete protection against damage caused by lightning.

2.7 Dimensions

The collector spacing must be observed when connecting the collector connectors. Measurements are performed on the base (foot) of the collector.

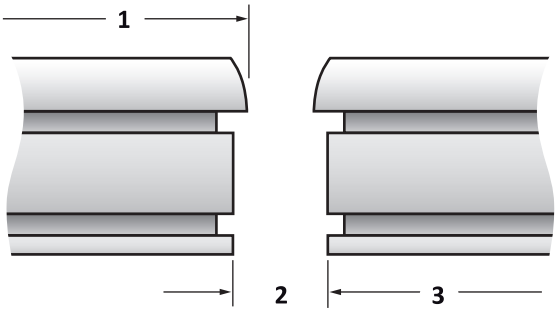


Fig. 3: The horizontal and vertical mounting clearance for collectors is measured at the base (foot) of the collector.

1 *Head measurement (length and width at the top)*
2 *Clearance (horizontal and vertical at the bottom)*
3 *Foot measurement (length and width at the bottom)*

Collector dimensions and clearances

Name	F-553, F-554	F-653, F-654	F-803, F804
Horizontal clearance	25 – 30		
Vertical clearance	180		
Length (head measurement)	3793	4735	5677
Width (head measurement)	1480		
Length (foot measurement)	3780	4722	5664
Width (foot measurement)	1467		

All dimensions in [mm]

2.8 Orientation

CAUTION

Avoid excessively high temperature loads.

Otherwise, there may be damage to the solar system.

- The lower edge of the collector field **must not** be below the upper edge of the SolvisMax!

A solar system generates a maximum yield when it is facing due south. The recommended slope angle α of the collector in relation to horizontal depends on the type of installation, and is between:

- **Roof-mounted** 20° to 60°
- **Flat-roof** 30° to 60°
- **Wall** 45° to 90° . With additional cover on-site when 60° or more. Only 3 m above ground level when 75° or more.

CAUTION

avoid slope angles smaller than 20° vermeiden

Otherwise losses in the solar yield or damage caused by condensation in the collector are possible.

- Slope angles should always be greater than 20° .
- For small slope angles (20° to 30°) , an increased amount of condensate in the collector must be expected

2.9 Effects of Shadowing on Flat-Roof or Wall-Mounted Installations

Shadowing

Any shadow on the collector surface area reduces the solar yield and should be avoided whenever possible.

Shadows may also be cast by tall buildings, chimneys, dormer windows, tall trees, etc.

With flat-roof installation, it is also important to maintain sufficient spacing to prevent the adjacent collectors from casting shadows on one another.

Using the figures and the tables, you can calculate the spacing between the flat roof holders when taking shadowing into account:

- You can find the latitude of your location using ➔ *Fig. 4*.
- The table shows the correct spacing given the latitude and the slope angle.

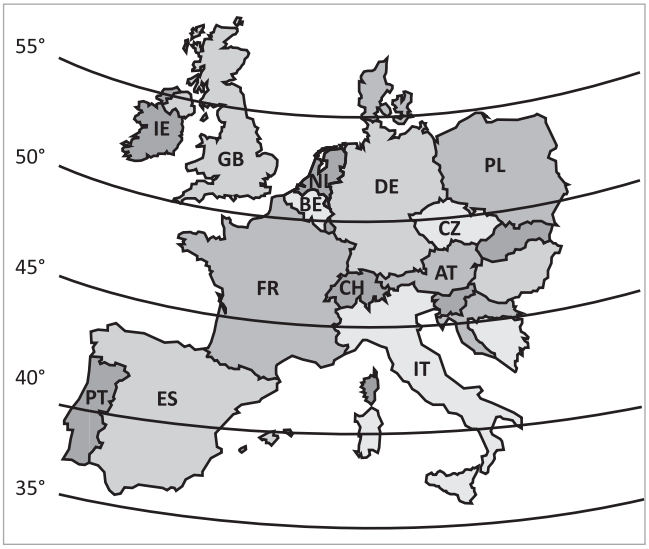


Fig. 4: Latitudes in Europe

Spacing depending on latitude

Latitude	Flat-roof mounted installation						Wall-mounted installation			
	Spacing in [m] for the slope angle						Spacing in [m] for the slope angle			
	30°		45°		60°		45°		60°	
	Measurement a	Measurement b	Measurement a	Measurement b	Measurement a	Measurement b	Measurement c	Measurement d	Measurement c	Measurement d
55	3.64	6.20	5.14	7.24	6.30	7.78	1.71	3.80	1.21	3.77
54	3.34	5.90	4.72	6.81	5.78	7.26	1.78	3.87	1.26	3.82
52	2.86	5.42	4.05	6.14	4.96	6.44	1.93	4.02	1.36	3.93
50	2.5	5.06	3.53	5.63	4.33	5.81	2.10	4.19	1.48	4.05
48	2.21	4.78	3.13	5.22	3.83	5.31	2.30	4.39	1.62	4.19
46	1.98	4.54	2.80	4.89	3.43	4.91	2.53	4.62	1.79	4.35
44	1.79	4.35	2.53	4.62	3.09	4.57	2.80	4.89	1.98	4.54
42	1.62	4.19	2.30	4.39	2.81	4.29	3.13	5.22	2.21	4.78
40	1.48	4.05	2.10	4.19	2.57	4.05	3.53	5.63	2.50	5.06
38	1.36	3.93	1.93	4.02	2.36	3.84	4.05	6.14	2.86	5.42
36	1.26	3.82	1.78	3.87	2.18	3.66	4.72	6.81	3.34	5.90

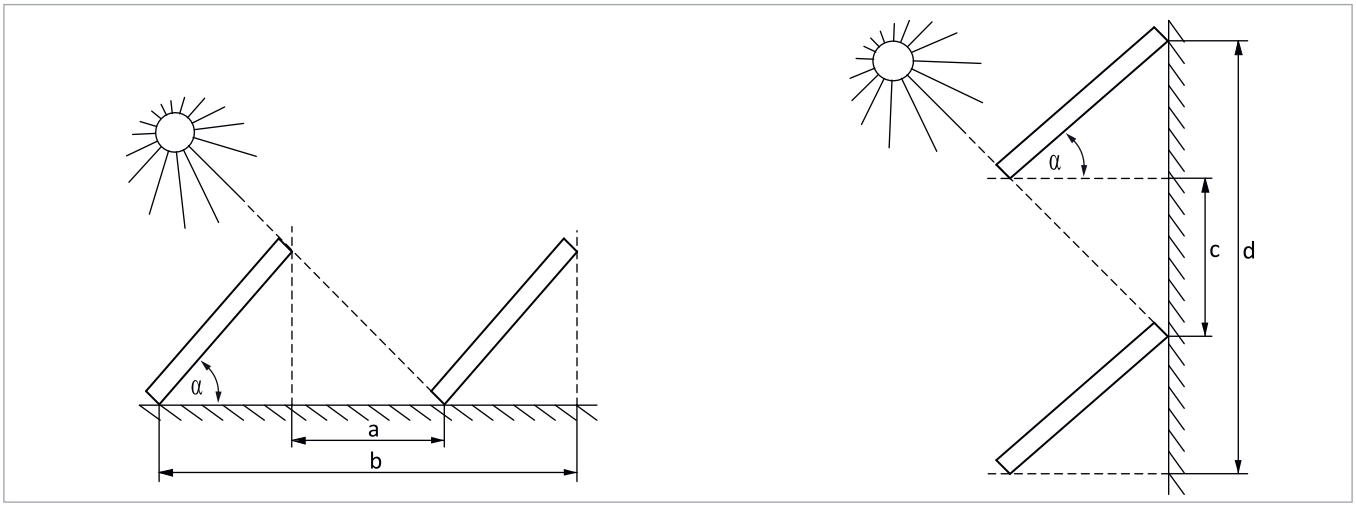


Fig. 5: Spacing and angles determined by shadowing

3 Hydraulic Versions

Please note: our Integral collectors are designed for use with specially designed storage tanks with patented stratified chargers. Do not use these collectors in any other manner.

Required pipe diameters

Pipe diameter at a maximum length of 25 m*			
Opening surface area [m²]	SolvisFera Integral	SolvisFera Diagonal	
	Low-flow operation	Low-flow operation	High-flow operation
< 13	SMR 12 x 0.8	–	–
< 21	SMR 15 x 0.8	–	–
< 40	–	DN 25 (28 x 1.5)	DN 40 (42 x 1)

* *Pipe diameters only apply for the specified pipe lengths and opening surface areas. Contact our Technical Sales department if you require pipe diameters for other system conditions.*

The collector sensor must be ordered separately and is mounted directly on the collector output at the flow.

SolvisFera is available in three hydraulic versions that differ in terms of their wiring and the absorber tube cross section. This allows optimum degrees of efficiency to be achieved for each system. The following versions are available:

- **SolvisFera Integral (I)**
  – Opening surface area up to 21 m²
  – Can only be mounted horizontally
  – Can be rotated by 180° (connections on right or left)
  – Recommended SolvisMax system

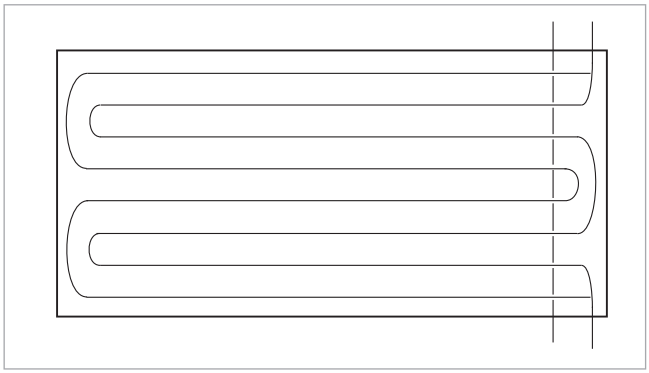


Fig. 6: Hydraulics of SolvisFera Integral (F-xx3-I-AR)

- **SolvisFera Diagonal (D)**
  – Can only be mounted horizontally
  – Suitable for long, horizontal rows
  – Two designs: “LR” and “RL”
  – Recommended for SolvisVital and SolvisDirekt systems.

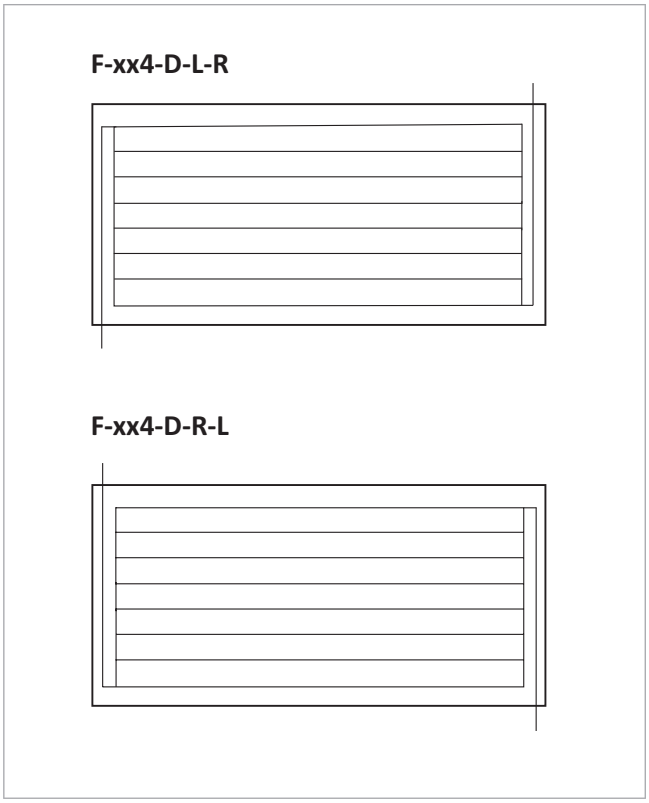


Fig. 7: Hydraulics of SolvisFera Diagonal (F-xx4-D)

When ordering Diagonal collectors, you must specify the number of RL and/or LR versions. They cannot be changed at the construction site.

3.1 SolvisFera Integral

Required components for one collector

- 1 x collector (F-553-I, F-653-I or F-803-I, including connection elbow) and installation kit depending on the installation type
- 1 x connection set ASS-SEN-12-C-F
- 1 x BLS-SEN lightning protection box
- 1 x flexible connection pipe set, e.g. ROS-12-FLX

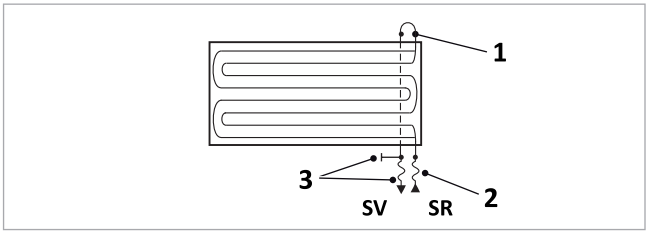


Fig. 8: SolvisFera Integral, connection cables at the bottom

SV *Solar flow* SR *Solar return*

1 *Flexible connection elbow (delivered with the collector)*
2 *Flexible connection pipe set (e.g. ROS-12-FLX)*
3 *ASS-SEN-12-C-F + BLS-SEN*

Required components for two horizontally mounted collectors

- 2 x collectors (F-553-I, F-653-I or F-802-I, incl. connection elbow) and installation kits, depending on the installation type
- 1 x connection set ASS-SEN-12-C-F
- 1 x BLS-SEN lightning protection box
- 1 x VB-F-I-PN-12 parallel connection kit
- 1 x flexible connection pipe set, e.g. ROS-12-FLX

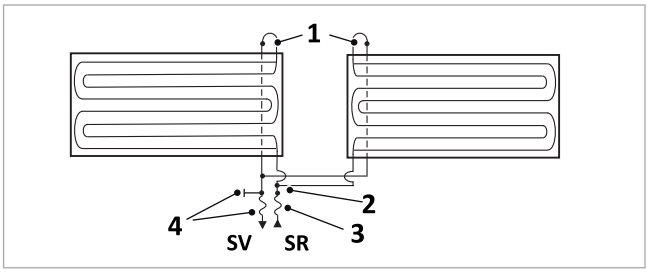


Fig. 9: SolvisFera Integral, parallel connection (horizontal)

SV *Solar flow* SR *Solar return*

1 *Flexible connection elbow (delivered with the collector)*
2 *VB-F-I-PN-12*
3 *Flexible connection pipe set (e.g. ROS-12-FLX)*
4 *ASS-SEN-12-C-F + BLS-SEN*

Required components for two vertically mounted collectors

- 2 x collectors (F-553-I, F-653-I or F-802-I, incl. connection elbow) and installation kits, depending on the installation type
- 1 x connection set ASS-SEN-12-C-F
- 1 x BLS-SEN lightning protection box
- 1 x VB-F-I-P-UE-12 parallel connection kit
- 1 x flexible connection pipe set, e.g. ROS-12-FLX

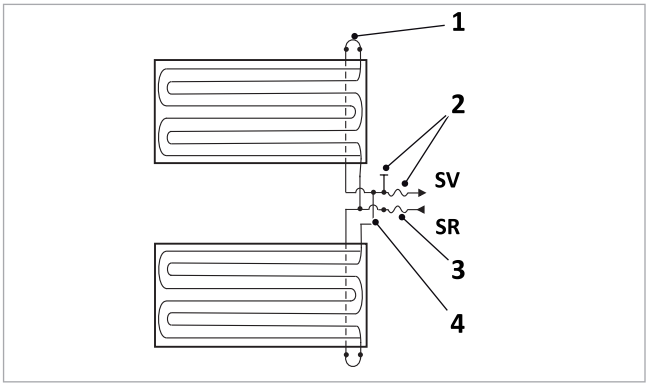


Fig. 10: SolvisFera Integral, parallel connection (vertical)

SV *Solar flow* SR *Solar return*

1 *Flexible connection elbow (delivered with the collector)*
2 *ASS-SEN-12-C-F + BLS-SEN*
3 *Flexible connection pipe set (e.g. ROS-12-FLX)*
4 *VB-F-I-P-UE-12*

3.2 SolvisFera Diagonal

Required components for series connection

Allowable for a specific flow of 12 - 15 l/m²h (Low-Flow operation):

9 pcs. F-554-D, 8 pcs. F-654-D, 7 pcs. F-804-D.

- 4 x collectors (F-554-D, F-654-D or F-804-D) and installation kits, depending on the installation type
- 1 x T-piece set for SolvisFera S/D and connection set ASS-SEN-18-F-S-D
- 1 x BLS-SEN lightning protection box
- 2 x VB-F-S-D-N-E collector connectors
- 1 x collector connector VB-F-S-D-N
- 1 x flexible connection pipe set, e.g. ROS-18-FLX

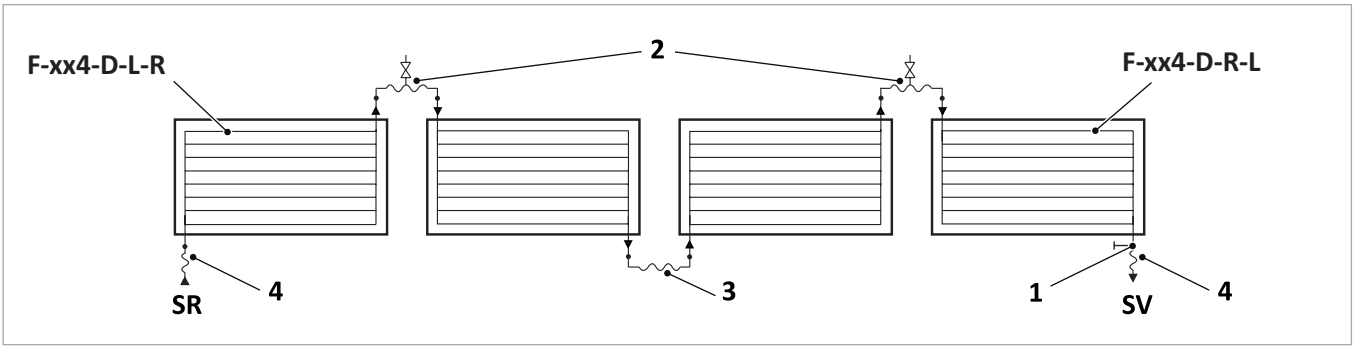


Fig. 11: SolvisFera Diagonal, series connection (horizontal)

1 *ASS-SEN-18-F-S-D + BLS-SEN*
2 *VB-F-S-D-N-E*
3 *VB-F-S-D-N*
4 *Connection pipe set (e.g. ROS-18-FLX)*
SR *Solar return*
SV *Solar flow*

4 Roof-Mounted Installation

4.1 Scope of Delivery

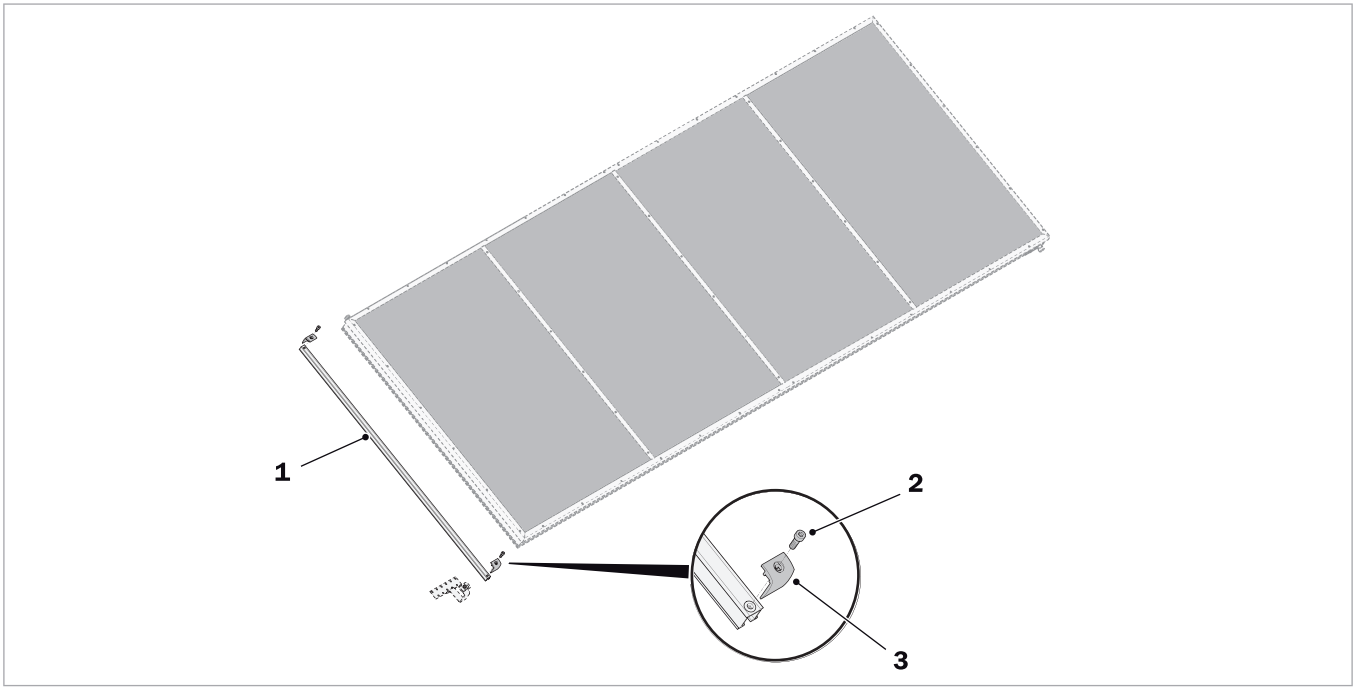


Fig. 12: Roof-mounted rail set for SolvisFera (collector and roof-mount frame are not included in the scope of delivery)

1 *Holding rail*
2 *Allen screw, M8 x 15*
3 *Collector edge clamp*

List of tools

- Allen key size 6, extended by at least 10 cm
- Ratchet with extension, 13 mm socket
- Wrenches: size 15, 17, 2 x 19, 22, 24 and 27
- Adjustable wrench, pipe wrench
- Pencil, felt tip pen or chalk
- Folding metre ruler, 10 m measuring tape
- Measuring cord, spirit level
- Rubber mallet, hammer
- Cable drum, protective goggles
- Cordless screwdriver and/or drill
- Size 25 and 40 Torx bits and size 5 and 6 hexagon socket bit
- Suction lifter for collector panes

4.2 Structural Requirements and Dimensions

4.2.1 Edge and Corner Areas

Increased static loads occur at the edge area of the roof.

CAUTION

Risk of overloading the brackets

- Due to increased static load, the solar system must not protrude out to the edge areas of the roof unless special measures are taken (DIN EN 1991).
- If the solar system extends into the edge area, suitable measures for stabilising the system should be taken on-site.

The side edge area (**e**) applies for installation without elevation with a slope greater than 20°.
For roofs with a slope less than 30°, maintain a lower and upper edge area as well (**e'**).

Side edge area (e):

e = b * 0,1
e = h * 0,2

Lower/upper edge area (e'), if necessary:

e' = l * 0,1
e' = h * 0,2

When calculating the edge areas, the **smaller value** is to be used as the minimum size of the edge area (e and possibly e').

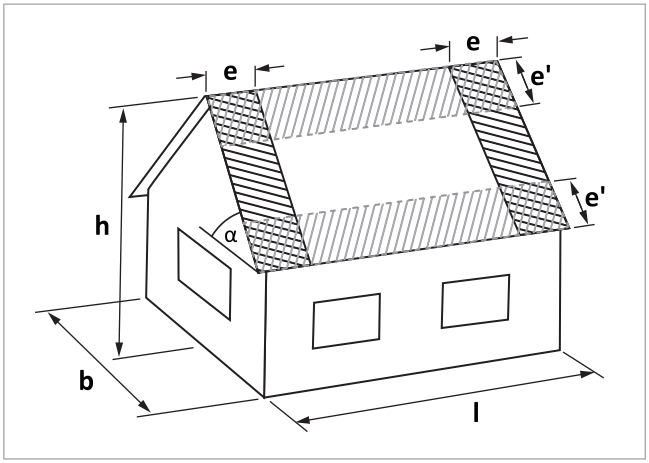


Fig. 13: Edge areas of the roof

α *Roof slope*
b *Building width*
h *Building height*
l *Building length*
e *Side edge area*
e' *Lower/upper edge area*

4.2.2 Structural Design

Maximum distances between rails

Collector type	Distance designation	Maximum distances in [mm] for load class				
		A	B	C	D	E
F-553 F-554	Rail spacing	1650	1200	1200	1000	850
	Edge spacing	700	700	600	600	440
F-653 F-654	Rail spacing	1650	1200	1200	1000	850
	Edge spacing	700	700	600	500	440
F-803 F-804	Rail spacing	1650	1200	1200	1000	850
	Edge spacing	700	700	600	500	440

Contact our Technical Sales department if you have any questions.

4.3 Installing Roof Brackets and Rails

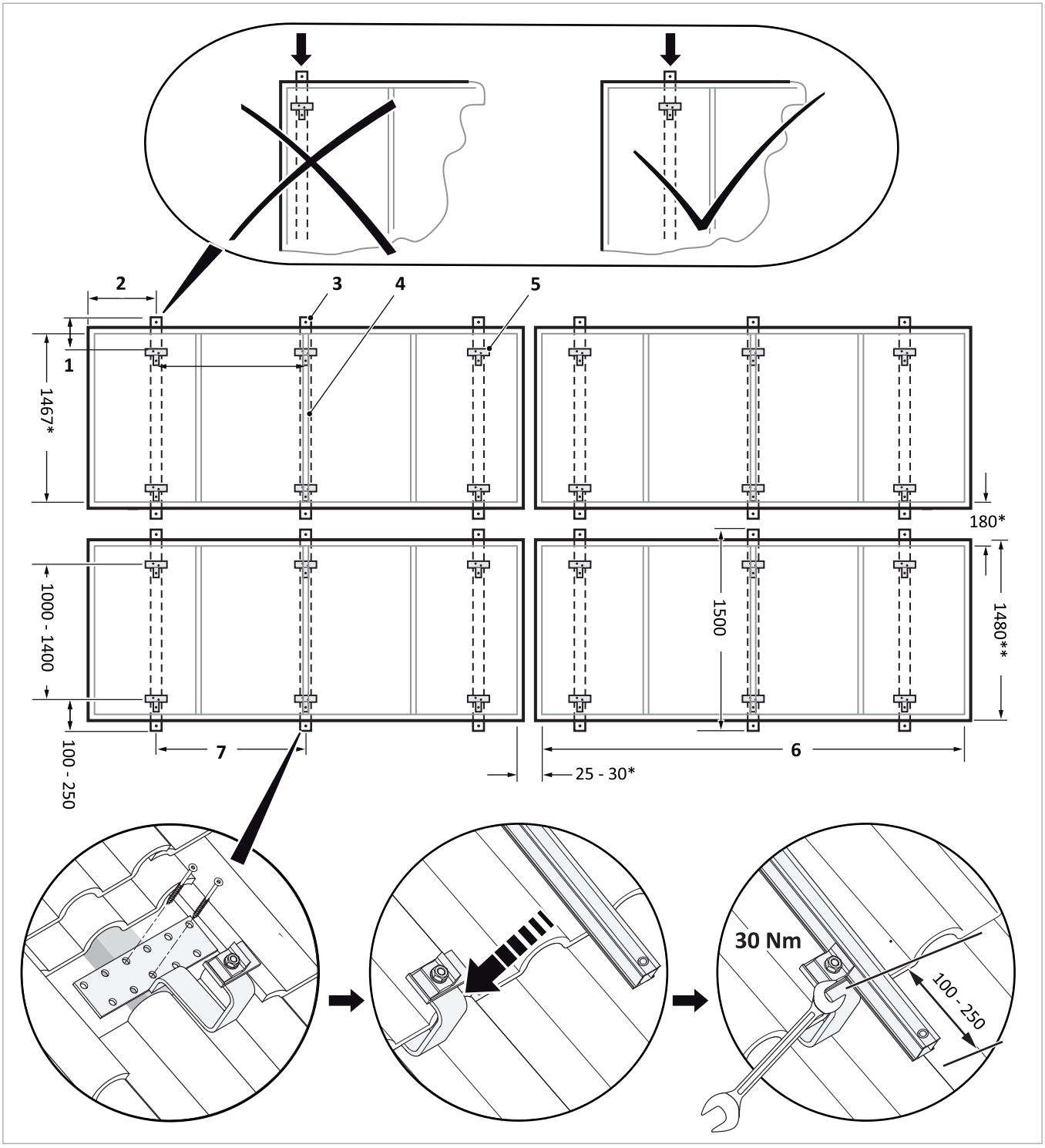


Fig. 14: Installation of roof brackets/holding rails. The type of roof bracket varies depending on the roofing. Follow the roof bracket installation instructions.

*	*foot measurement, ** head measurement*
1	*There is a resulting upper overhang*
2	*Edge spacing, min. 50 mm, max.* -> tab. “Maximum rail spacings”, p. 15
3	*Edge clamp*
4	*Holding rail*
5	*Roof-mount frame*
6	*Foot measurement* –> tab. “Collector dimensions and clearances”, p. 9
7	*Rail spacing*

For screw connections use screw paste, e.g. "OKS 250".

- Lower thread friction
- sufficient tightening torque
- good removability.

4.4 Collector Installation

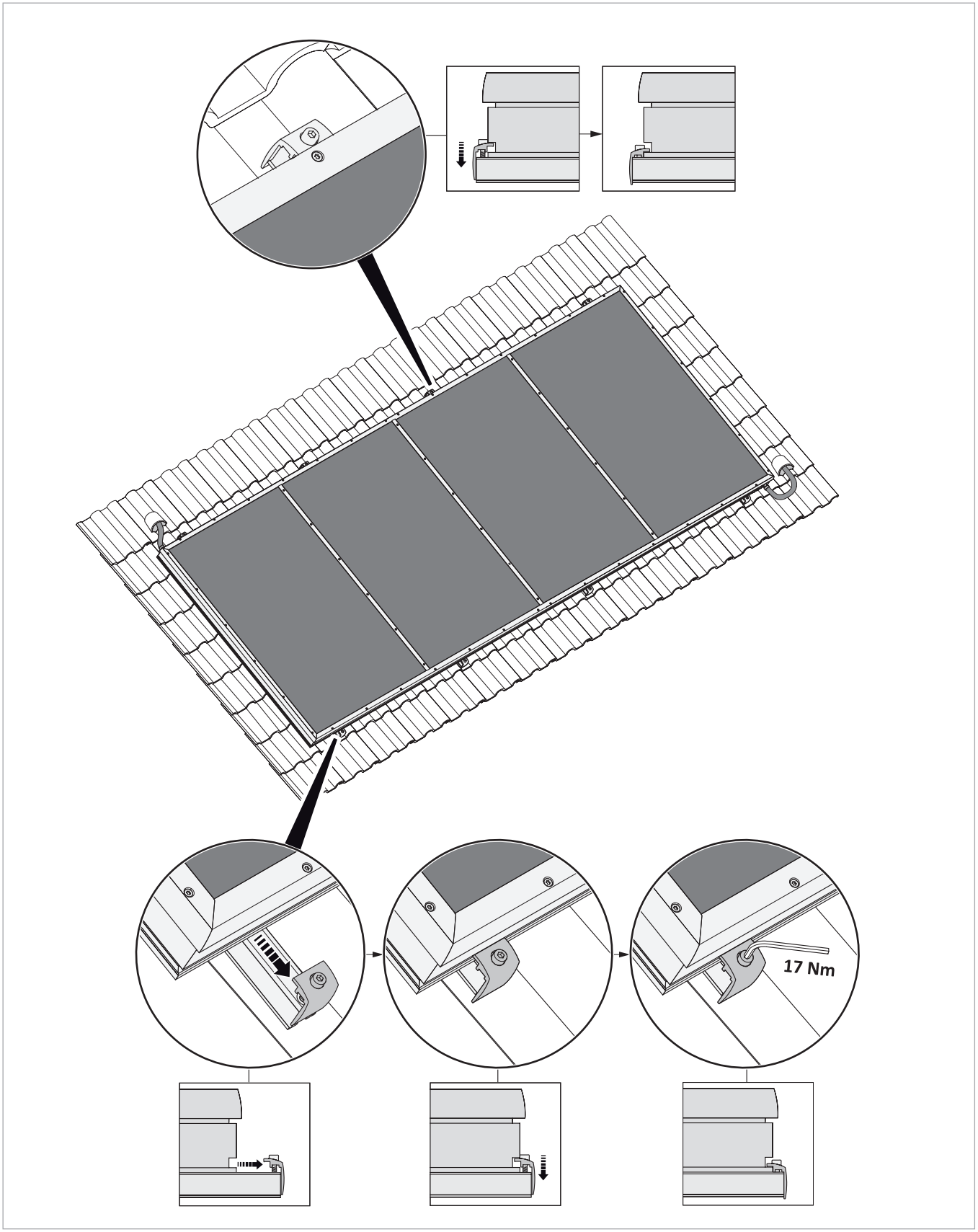


Fig. 15: Fastening a collector to the holding rails

5 Flat-Roof or Wall-Mounted Installation

5.1 Scope of Delivery

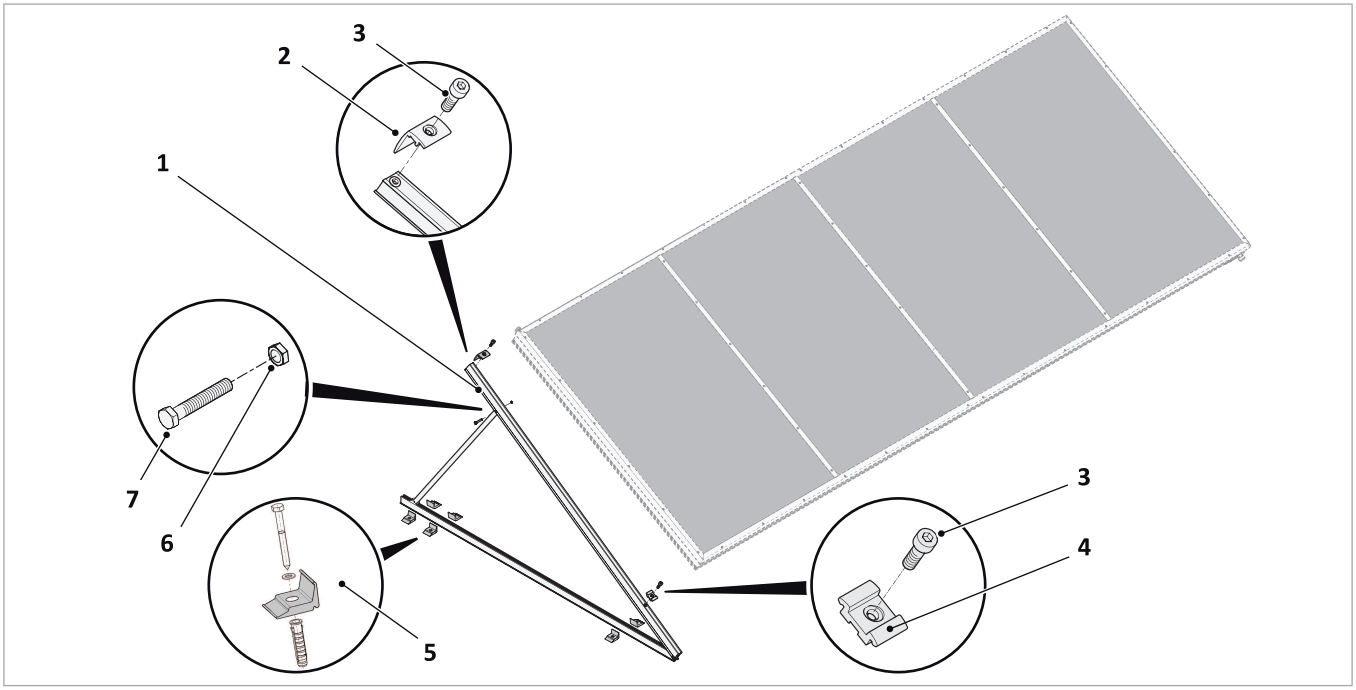


Fig. 16: Flat roof holder set for SolvisFera (collector not included in the scope of delivery)

1	*Flat roof holder*	5	*Clamping bracket (incl. concrete screw and wall plug)*
2	*Collector edge collector edge clamp (for top)*	6	*M8 nut with locking serration*
3	*Allen screw, M8 x 15 A2*	7	*Screw, M8 x 40 A2*
4	*Collector central clamp (for below)*		

List of tools

- Allen key size 6, extended by at least 10 cm
- Ratchet with extension, 13 mm socket
- Wrenches: size 13 (2x), 17, 19, 22, 24 and 27
- Adjustable wrench, pipe wrench, nipper pliers
- Pencil, felt tip pen or chalk
- Folding metre ruler, 10 m measuring tape
- Measuring cord, spirit level
- Rubber mallet, hammer
- Cable drum, protective goggles
- Cordless screwdriver and/or drill
- Size 25 Torx bits and size 6 hexagon socket bit
- Suction lifter for collector panes
- Depending on the flat roof holder installation on the base structure, additional drills and installation material may be required

5.2 Structural Requirements and Dimensions

5.2.1 Edge and Corner Areas

CAUTION

Observe the minimum edge spacing

- On flat roofs, all superstructures should maintain a minimum spacing of 1 m to the edge of the roof.

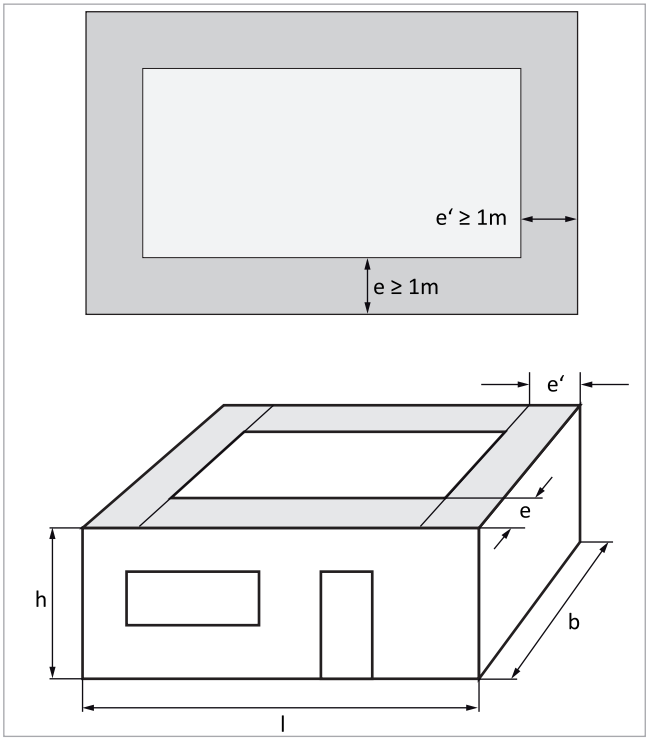


Fig. 17: Minimum spacing to edge of building

5.2.2 Structural Design

Contact our Technical Sales department if you have any questions.

5.3 Installation with Weights

Load distribution

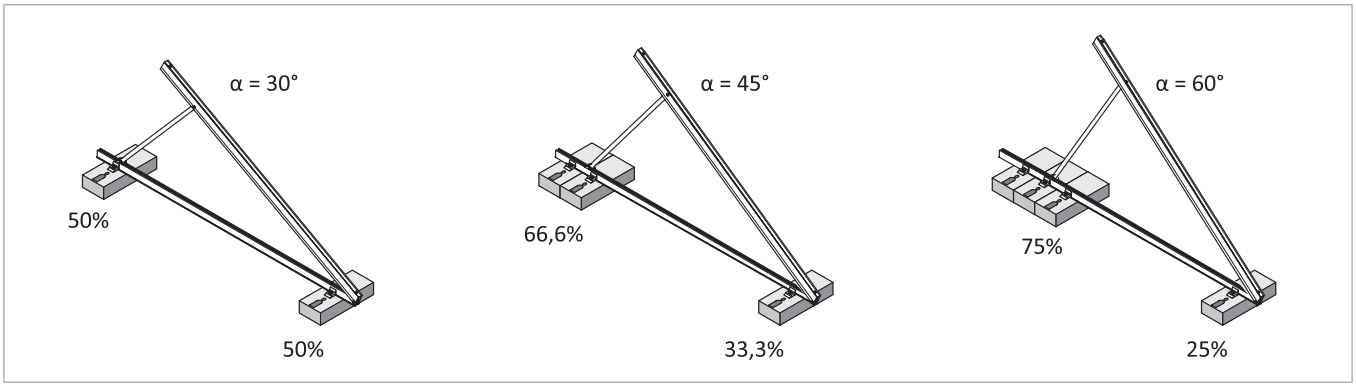


Fig. 18: Load distribution at slope angle α = 30°/ 45° / 60°

CAUTION

Hazard due to overloading the building

- As the system (solar module + holder + weights) has a significant weight load, always check the structural calculations for the building bearing the load before beginning installation.

Superimposed loads

The superimposed loads can be made from any material. It is important that they ensure long-lasting protection against wind loads for the service life of the collectors. Higher superimposed loads are required for gravel fills. For more information, please contact the application consultancy team (for the phone number, see ➔ *chapter "Information About These Instructions", page 2*).

Example for load distribution

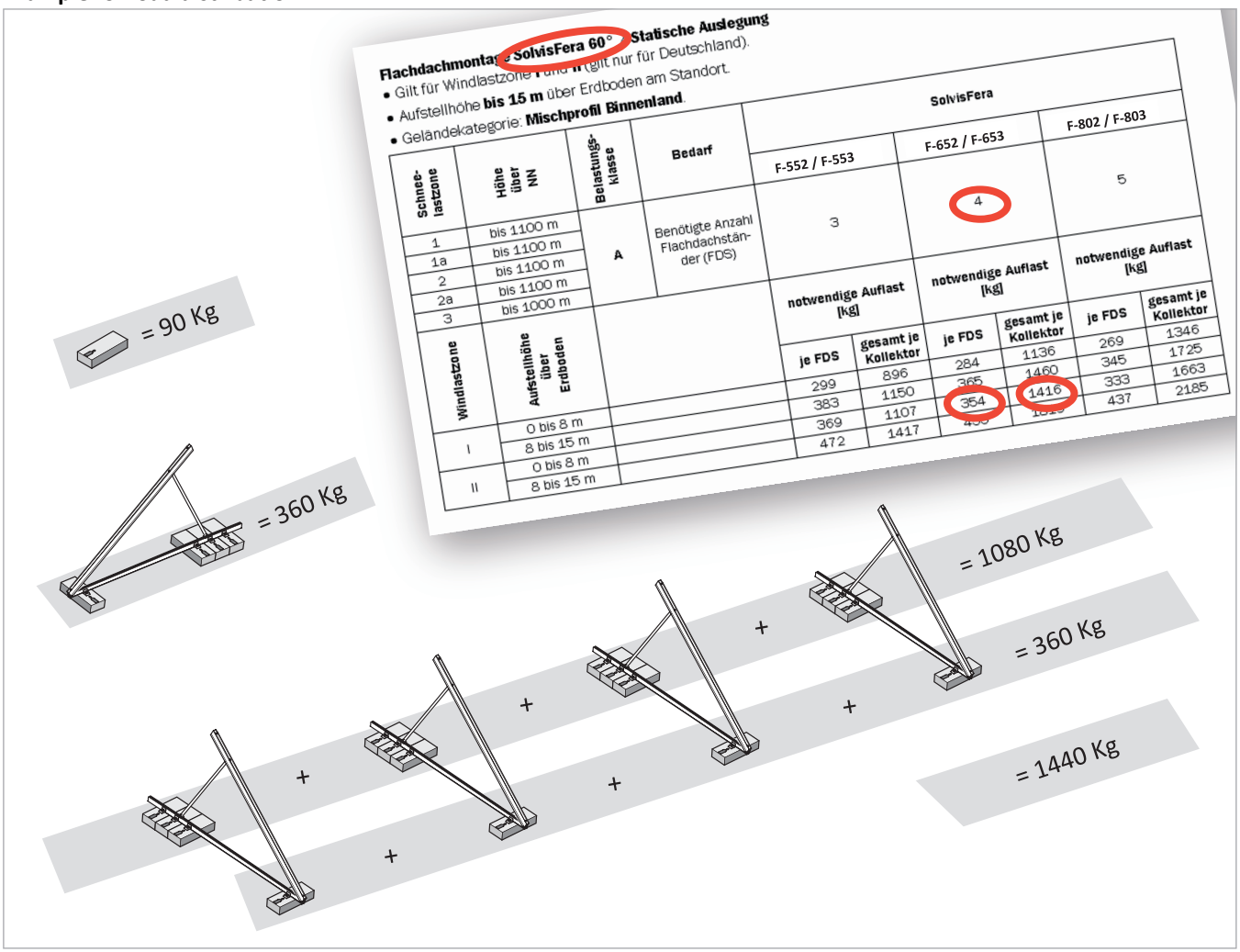


Fig. 19: Example for load distribution

5.4 Placement

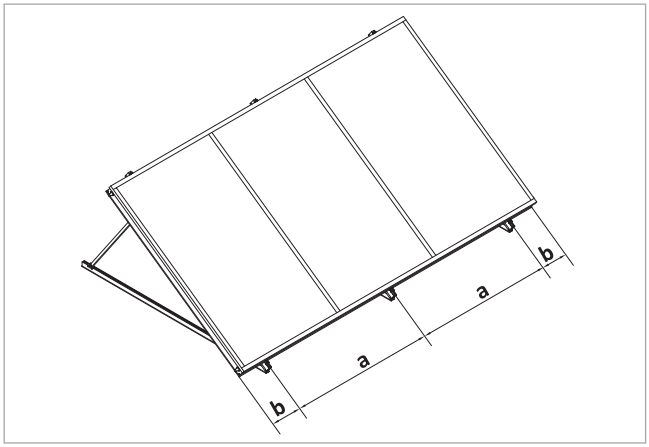


Fig. 20: Flat roof holder clearances

a *Distance of holders*
b *Collector overhang*
(a), (b) see ➔ *Tab. "Number of required flat roof holders and clearance", p. 21*

Number of required flat roof holders and clearance

Name	SolvisFera		
	F-553 F-554	F-653 F-654	F-803 F-804
Number of flat roof holders	3	4	5
Holder spacing (a) ± 100 [mm]	1240	1170	1120
Collector overhang (b) [mm]	620	580	560
Number of flat roof holders	4	5	6
Holder spacing (a) ± 80 [mm]	950	950	950
Collector overhang (b) [mm]	475	475	475
Number of flat roof holders	5	6	7
Holder spacing (a) ± 50 [mm]	740	780	800
Collector overhang (b) [mm]	370	390	400

Determining the installation angle

Installation angle (= slope angle) α in °	Installation angle setting	
	C in mm	Shortening size for S in mm [1)]
25	87	342
30	257	342
35	494	342
40	88	–
45	274	–
50	486	–
55	734	–
60	1071	–

[1)] At an installation angle smaller than 40°, it is necessary to shorten the support rail S by the measurement specified.

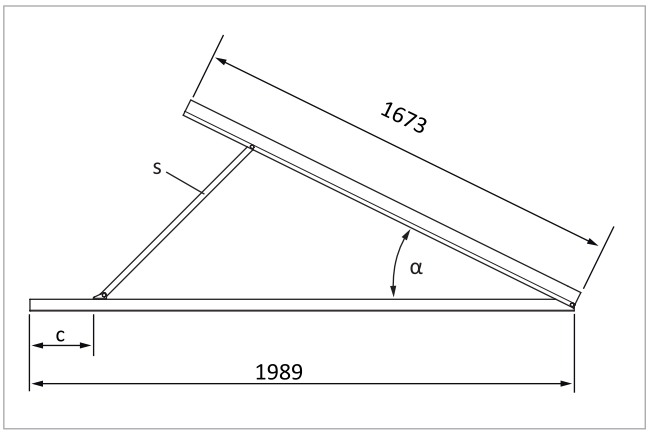


Fig. 21:Flat roof holder, dimensions and installation angle

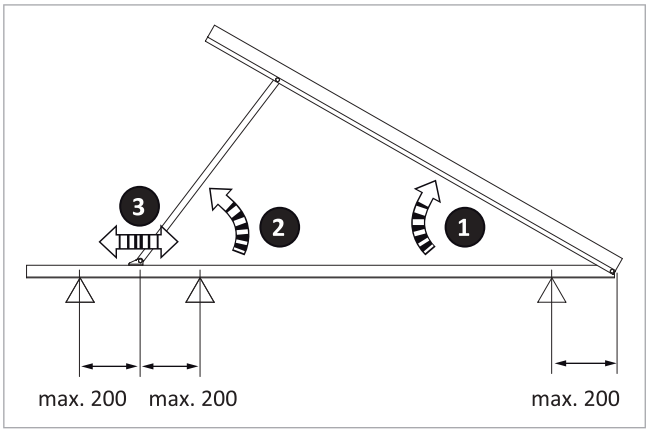


Fig. 22: Setting up the flat roof holder

5.4.1 Low Slope Surfaces

Low slope surfaces (10° – 40°) present special cases in terms of setting up flat roof holders.

The required number of roof-mount frames must be determined by our Technical Sales department with a static calculation.

If the collectors are to be installed on low slope surfaces (roof slope angle in relation to horizontal = γ) using flat roof holders, a flat roof holder installation angle (= β) of a maximum of 20° is permitted. The overall slope of the collector α in relation to horizontal may not exceed 60°.

Determining the installation angle - special case

Installation angle β in °	Installation angle setting	
	C in mm	Shortening size for S in mm [1)]
10	168	690
15	271	690
20	464	690

[1)] At an installation angle smaller than or equal to 20°°, it is necessary to shorten the support rail S by the measurement specified. After shortening the support rail, drill a 8 mm hole in the support rail (in the same position as the original hole).

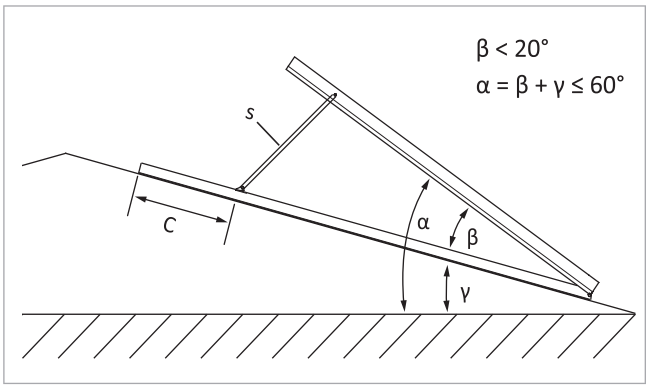
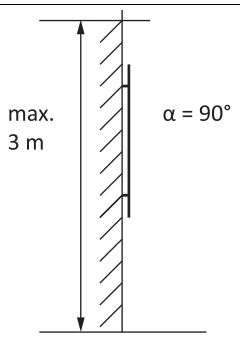
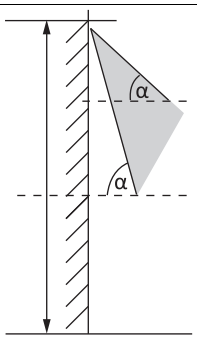


Fig. 23: Angle on low slope surfaces

5.5 Wall-Mounted Installation

Installation variants

Solvis collectors, wall-mounted	
Orientation: upright only	**Orientation: crosswise and upright**
for heights up to 3 m $\alpha = 90°$	**All heights** $75° > \alpha > 45°$
	

For wall-mounted installation up to a slope angle of 74°, flat roof holders are screwed on to customer-provided substructures or are fastened directly to the wall with wall plugs (provided the wall has sufficient load-bearing capacity). For this, holes are drilled in the centre of the bottom rail.

For thermally insulated façades, make sure that the foundation has sufficient compressive strength. Appropriate fixing materials can be purchased from producers of thermal insulation systems.

The fixing material you choose (wall plugs, etc.) must meet static requirements and be suitable for the on-site brickwork.

Minimum pull-out loads of the wall plugs

Applies for directly fastening the flat roof holders to the wall:

- 2 kN for buildings up to 8 m tall
- 3 kN for buildings between 8 and 20 m tall

If these values cannot by reached, then more attachment points must be sought. For example, a customer-provided substructure of horizontal rails to which the flat roof holders are screw-fastened.

The construction party is responsible for providing on-site support structures.

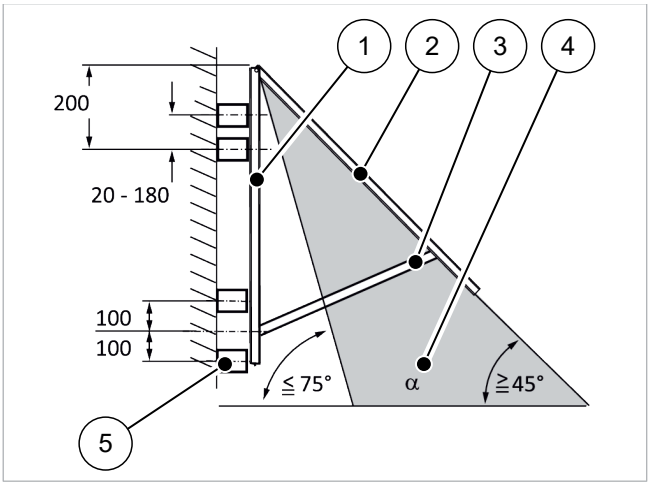


Fig. 24: Assembly of the holders on the wall

1 Bottom rail
2 Bearing rail
3 Support rail
4 Slope angle α (75° - 45°)
5 On-site connection according to construction and static specifications (installation example)

Where possible, install the collector at an angle to the wall. Use the holders described in the installation instructions for this.

For angles larger than 60° (e.g. vertical installation on the wall), fit the top of the collectors with a cover plate on site. During heavy rainfall, water could otherwise get into the collector via the ventilation holes. Metal flashing should also be secured against effects of the wind.

An additional cover plate is not necessary if the roof offers sufficient protection.

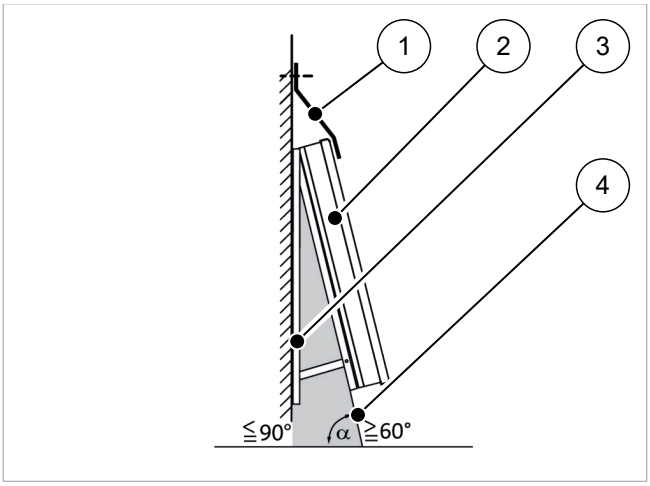


Fig. 25: Collector with cover plate

1 Cover plate (on-site)
2 Collector
3 Flat roof holder
4 Slope angle α (90° - 60°)

5.6 Flat Roof Holder Installation

5.6.1 Steel Girders

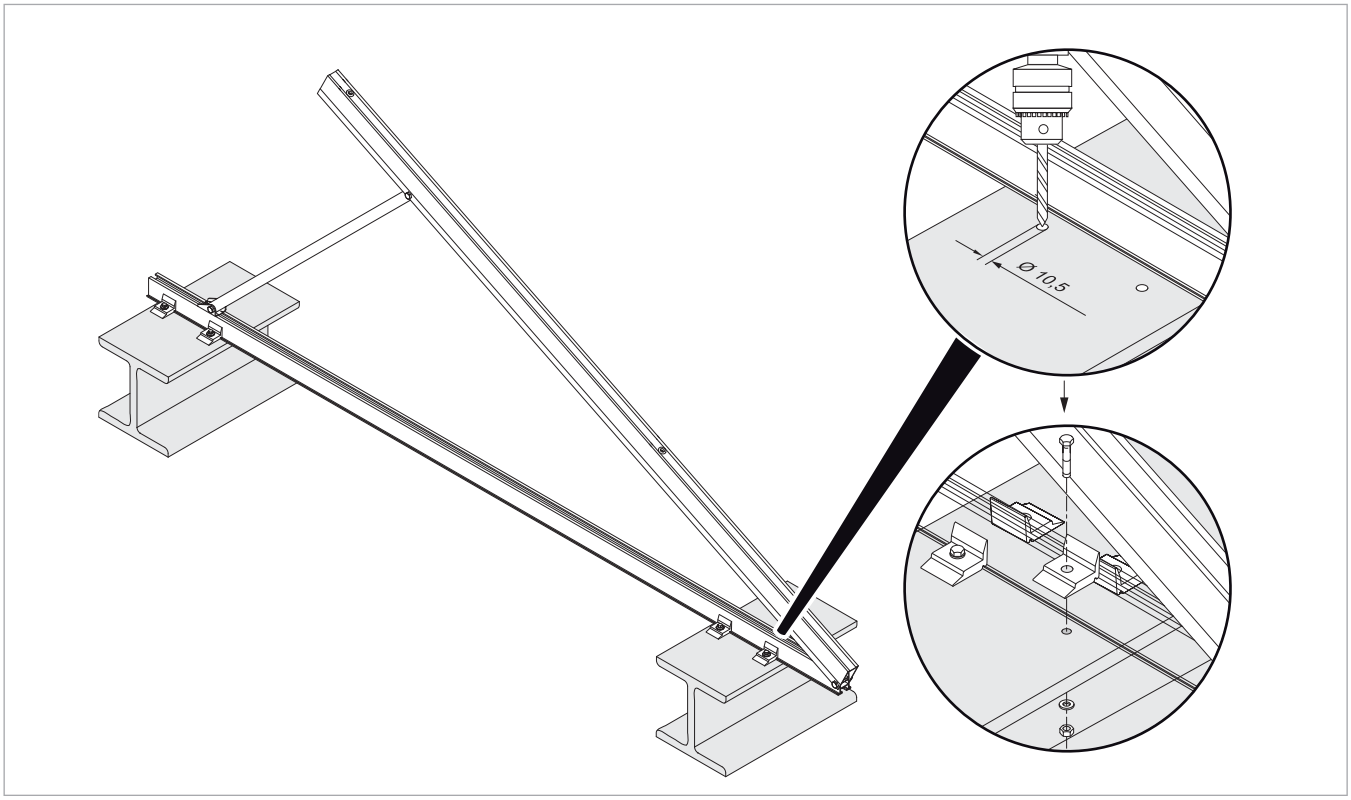
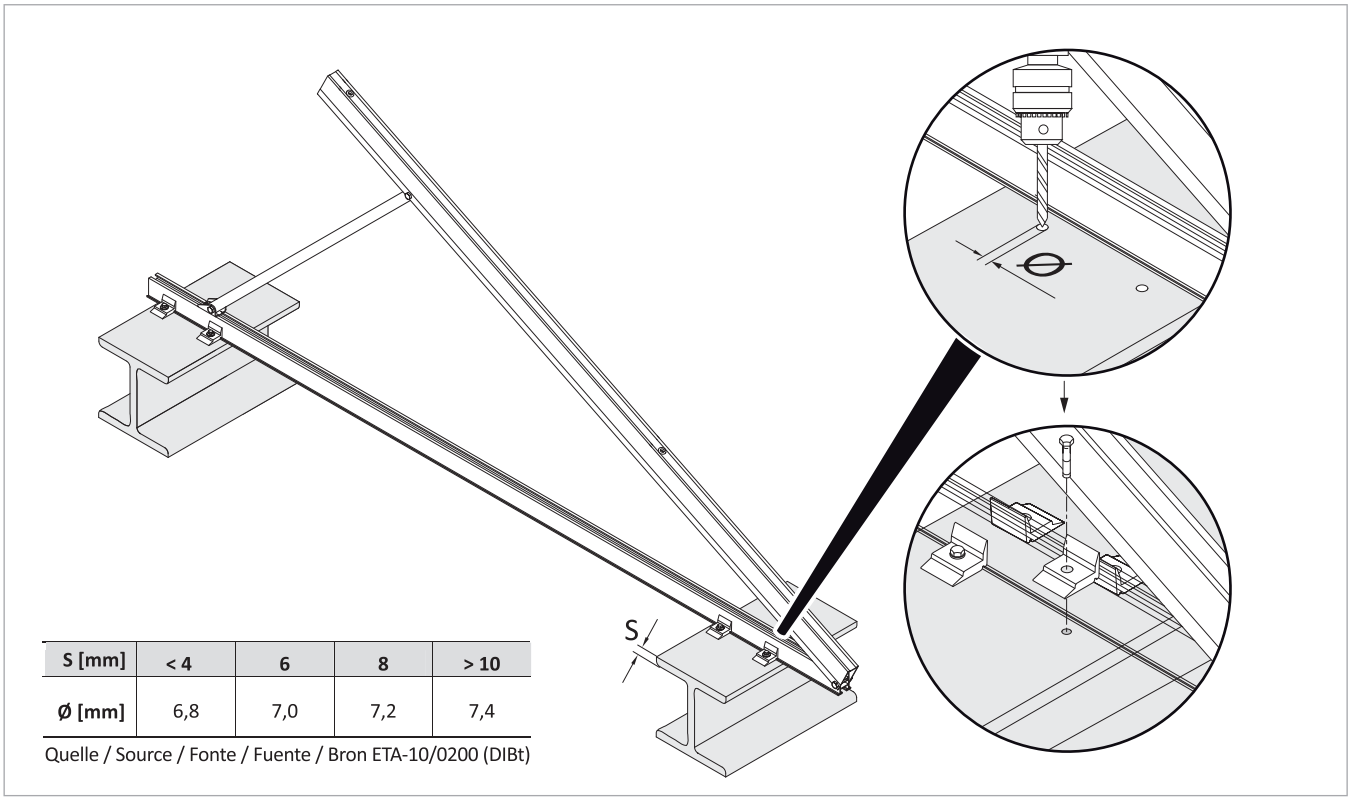


Fig. 26: Flat roof holder installation on steel girders

5.6.2 Steel girder (self-tapping)



S [mm]	< 4	6	8	> 10
Ø [mm]	6,8	7,0	7,2	7,4

Quelle / Source / Fonte / Fuente / Bron ETA-10/0200 (DIBt)

Fig. 27: Installation of the flat roof holder on a steel girder with self-tapping screws (flat roof holder set MUK)

5.6.3 Concrete Blocks

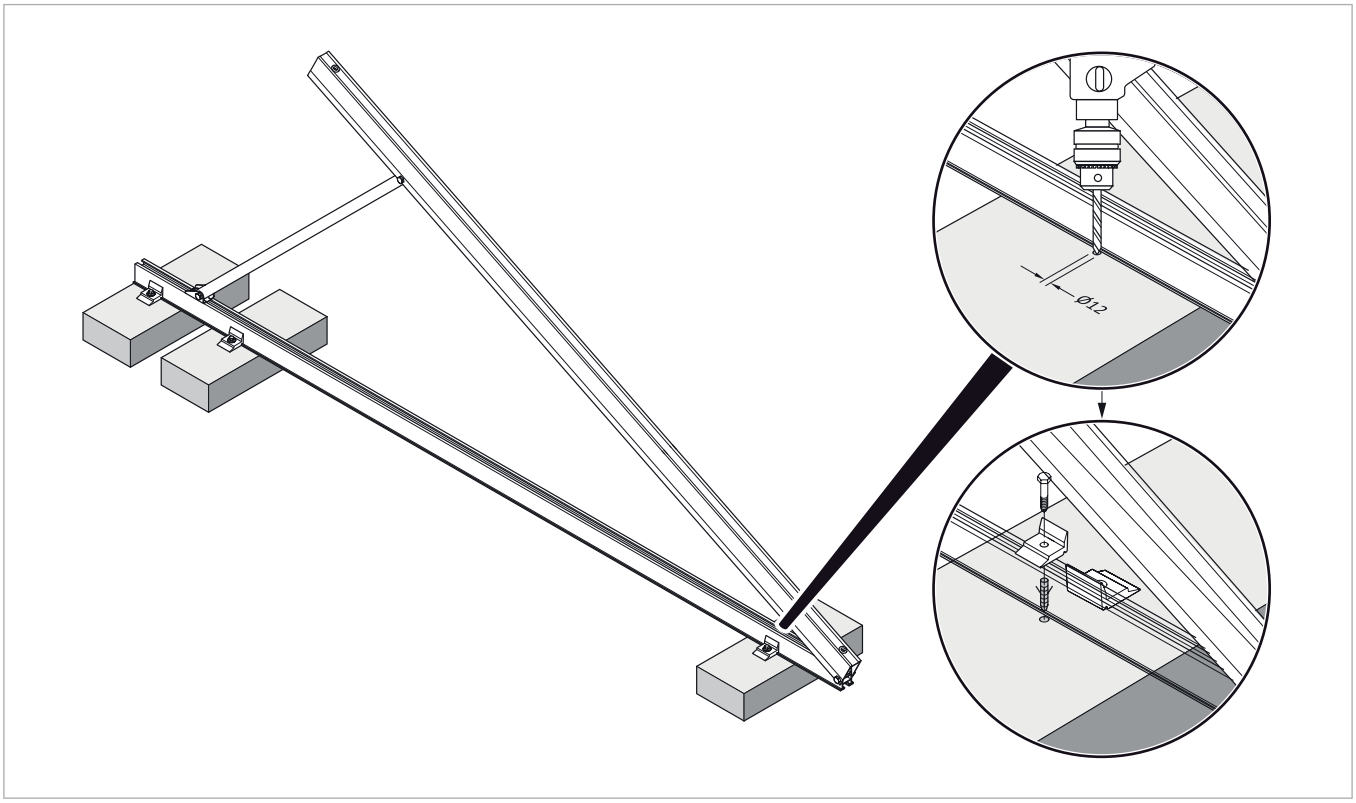


Fig. 28: Flat roof holder installation on concrete blocks

5.7 Roof-mount frame ADH-U

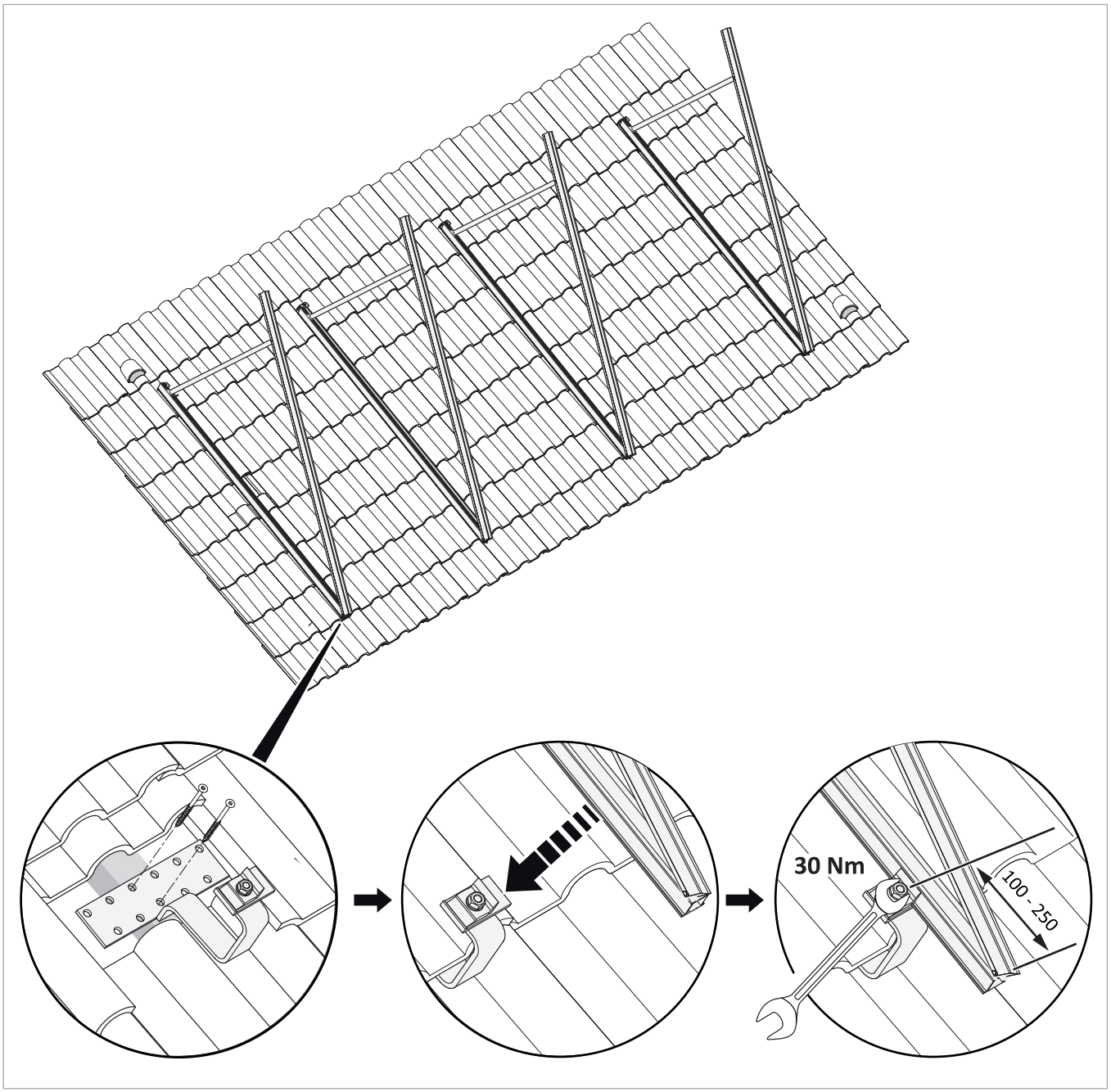


Fig. 29: Installation of the flat roof holder on a roof-mount frame ADH-U

5.8 Trapezoidal Sheet Metal

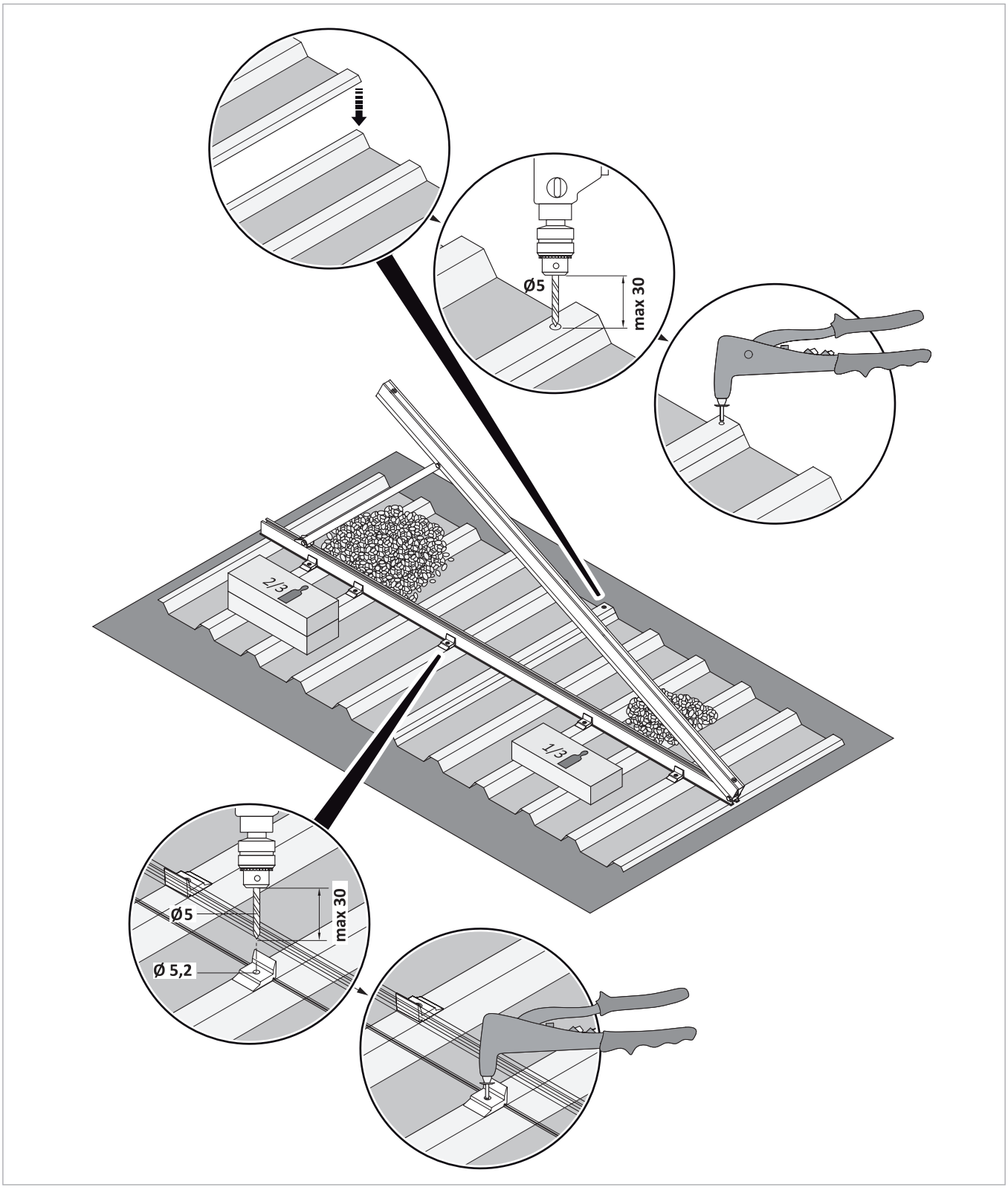


Fig. 30: Flat roof holder installation on trapezoidal sheet metal

CAUTION
Be careful when drilling the roofing
Possible building damage due to moisture
- Drill carefully
- Place a protective layer underneath

5.9 Collector Installation

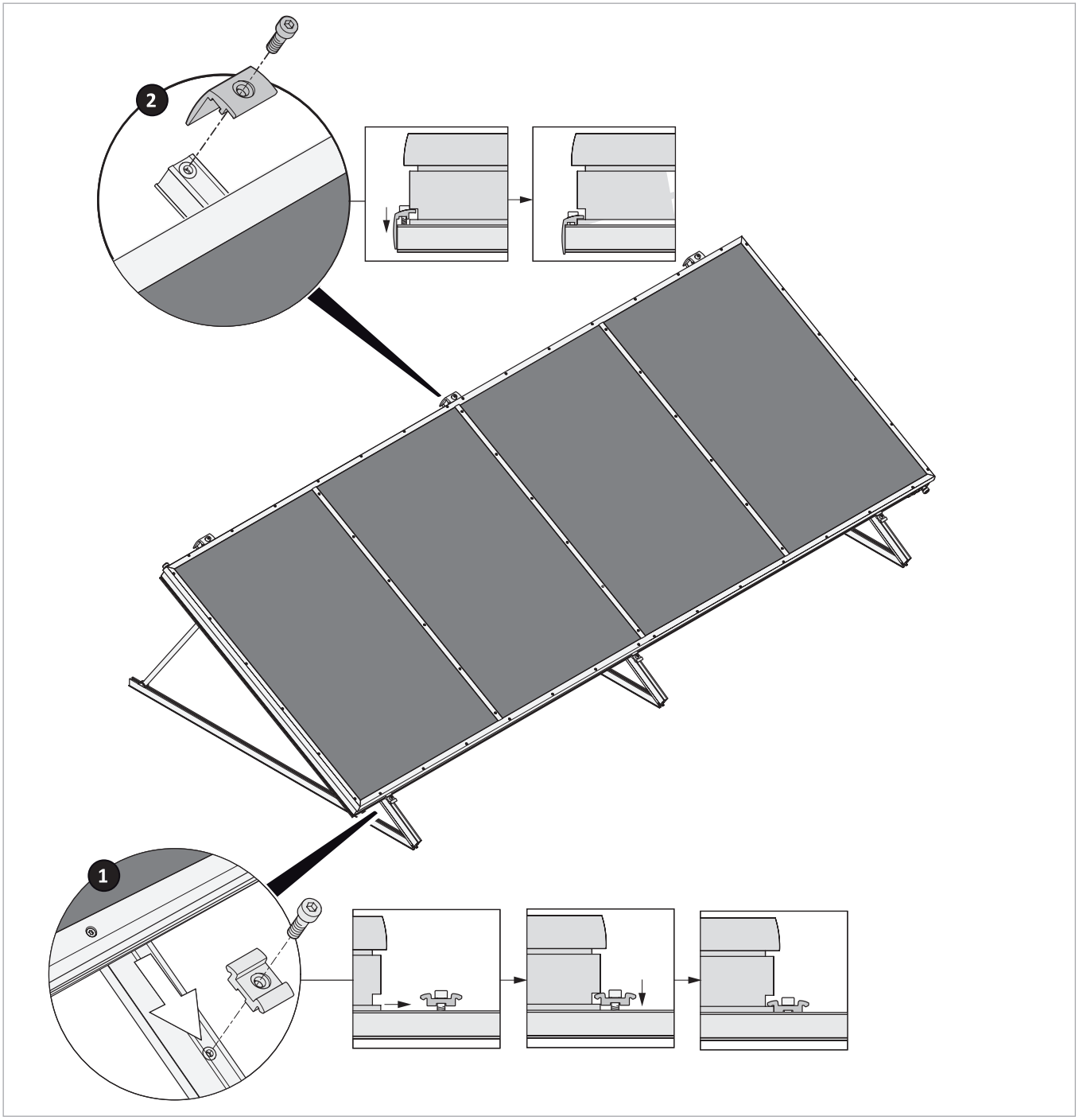


Fig. 31: Fastening a collector to flat roof holders

6 Installing the Panes

You must refer to the separate instructions for handling and installing anti-reflective glass; see ➔ *chapter "Handling solar glass panes" on page 8*.

When using a crane for installation, first insert the solar glass panes at ground level.

Removing the clip profiles and cardboard covers

1. Remove the screws from the clip profiles.
2. Loosen and lift the clip profiles off from the edges of the collector using a wrench or similar.
3. Remove the cardboard covers.

Fig. 32: Removing the clip profiles and cardboard covers

In windy conditions, remove the clip profiles one segment at a time, as the loosely applied pieces of card may otherwise be easily blown away.

Positioning the panes

1. First insert the pane in to the aluminium profile (glass holder).
2. Slowly lower the pane on to the profile. Check that the pane is positioned correctly.

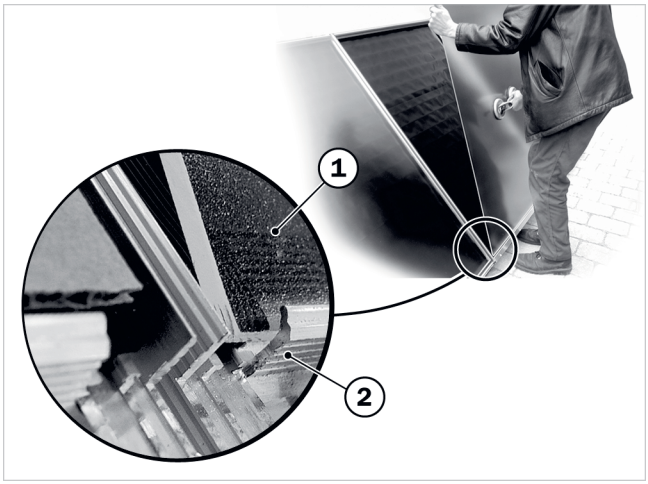


Fig. 33: Positioning the panes

1 *Pane*
2 *Lower aluminium profile*

Mounting the clip profiles

1. Starting at the front, insert the clip profiles one after the other all the way round(1., 2., etc.).
2. Align the profiles.

The clip profiles may only be screwed in place when they have all been aligned.

3. Fasten the clip profiles with Torx screws.

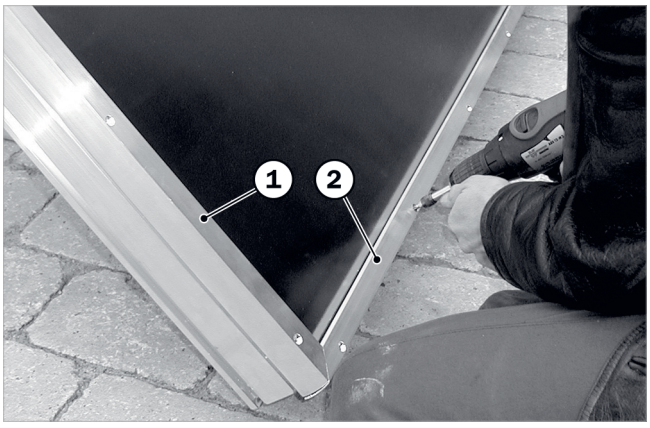


Fig. 34: Positioning, aligning and screwing on clip profiles

CAUTION

It is possible to over-tighten the screws

It is then no longer possible to guarantee a secure hold.

- Observe the maximum tightening torque of 3 Nm.
- If you use a cordless screwdriver, start installation using the smallest torque setting.

Using screw strips

1. Position the screw.
2. Pull the strip over the screw head.
3. Carefully screw the screw in as far as it will go.
4. Remove the cordless screwdriver and pull the strip off the bit.

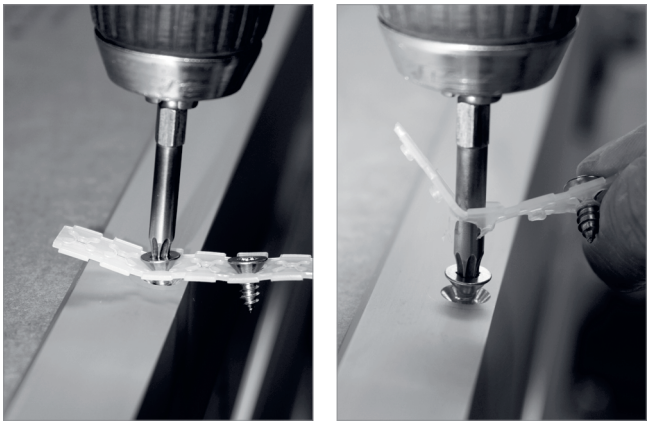


Fig. 35: Positioning a screw, pulling the strip off

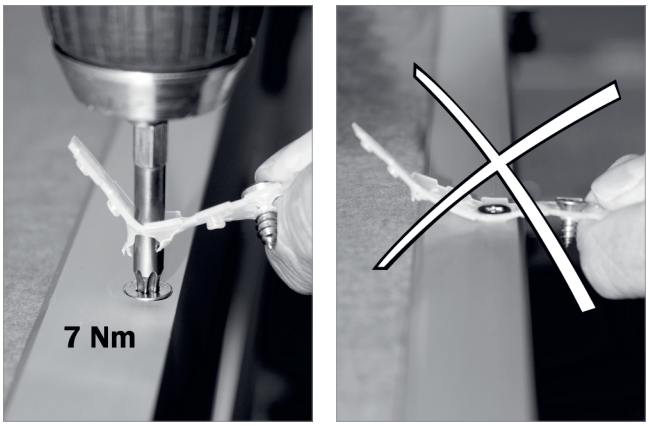


Fig. 36: Screwing in the screw (do not screw in the strip)

Installing crossmember cover strips

1. Position the crossmember cover strips and screw them in place.

Fig. 37: Installing crossmember cover strips

7 Hydraulic Connection

CAUTION

When installing the system:

- It is possible to over-tighten the clamp ring screw connections. Therefore, do not tighten by more than one revolution.
- The corrugated pipes will be damaged if they are twisted. When tightening the flexible connections, hold them in place on the flats!

7.1 Integral collectors F-xx3-I

Solvis Integral collectors are self-venting when used in conjunction with Solvis Low-Flow technology. A bleeder is therefore not necessary on the highest point of the solar line.

The integral collectors must be connected in such a way that the meander flows from the bottom up. This has a favourable effect on drainage during system downtime.

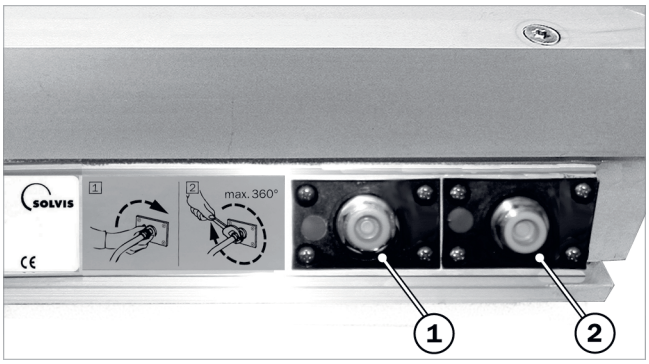


Fig. 38: View of collector, bottom connections (right side)

1 *Empty conduit* 2 *Meander*

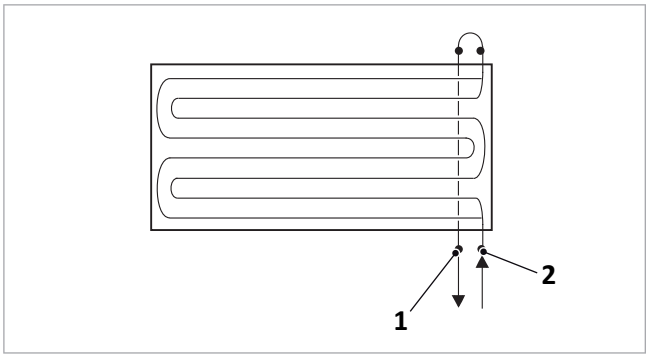


Fig. 39: Diagram of collector, bottom connection cables, right

1 *Solar flow* 2 *Solar return*

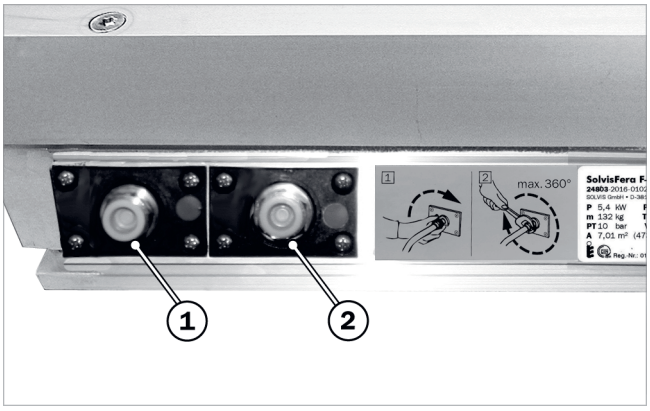


Fig. 40: View of collector, top connections (left side)

1 *Meander* 2 *Empty conduit*

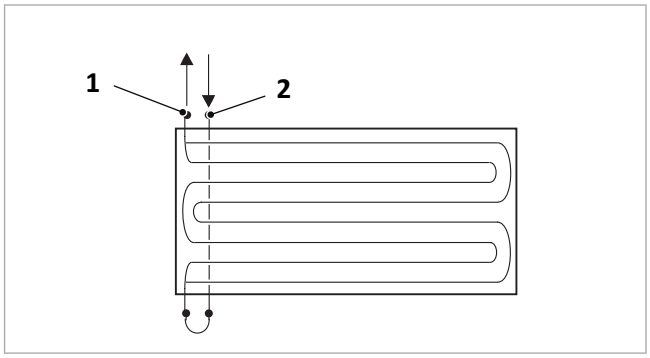


Fig. 41: Diagram of collector, top connection cables, left

1 *Solar flow* 2 *Solar return*

7.1.1 A Single Integral Collector

Bottom connection cables

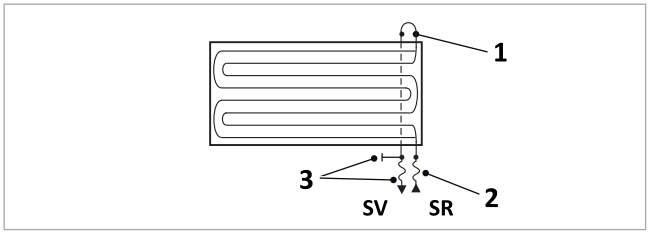


Fig. 42: SolvisFera Integral, connection cables at the bottom

SV *Solar flow* SR *Solar return*

1 *Flexible connection elbow (delivered with the collector)*
2 *Flexible connection pipe set (e.g. ROS-12-FLX)*
3 *ASS-SEN-12-C-F + BLS-SEN*

Connecting the collector to the solar circuit

1. Remove the protective caps.

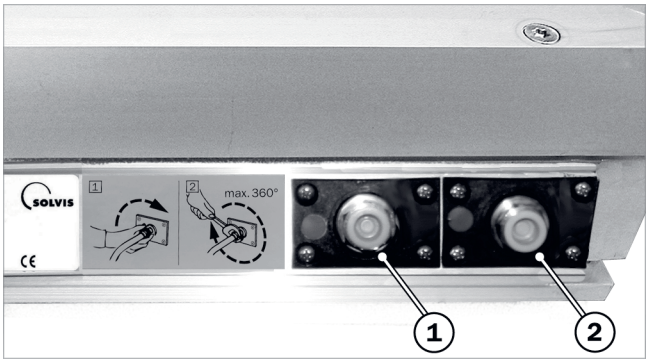


Fig. 43: External connection: Solar flow

1 *Solar flow* 2 *Solar return*

2. Fit the connection set (connection elbow for solar return, connection elbow with sensor for solar flow) directly to the collector connections. To do so, tighten the union nut (size 19) that was tightened by hand with an additional full turn (held in place at the connection elbow with size 22).

3. Connect the flexible connection cables (e.g. ROS-12-FLX) to the connection elbows. To do so, tighten the union nut (size 19) that was tightened by hand with an additional full turn. Always hold in place at the hexagon bolt of the corrugated pipe (size 17) when doing so.

4. Connect the flexible connection cables to the solar circuit (e.g. Solvis SMR quick-fit duct, with support sleeves). Always hold in place at the hexagon bolt of the corrugated pipe (size 17) when doing so.

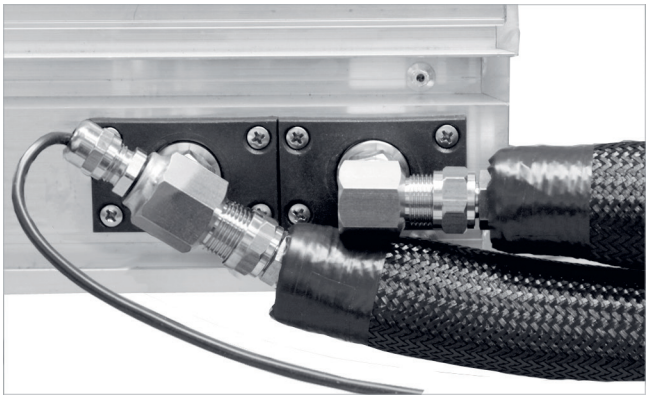


Fig. 44: Flexible connection with insulation

5. Then thermally insulate all the solar lines with high-temperature resistance in accordance with the German Energy Conservation regulations (EnEv).

Installing a connection elbow

1. Install a connection elbow on the free collector connections.

2. Use an open-end wrench (size 19) to tighten the clamp ring screw connection that was tightened by hand (maximum of one turn). Always hold in place at the hexagon bolt of the corrugated pipe (size 17) when doing so.

Fig. 45: Installed connection elbow

3. Insulate the connection elbow using a cap. Hold the side with the smaller tab so that it is facing downwards (**1**).

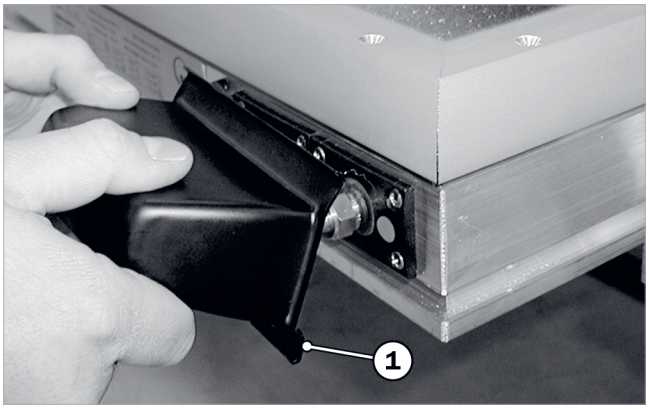


Fig. 46: Attaching the protective cover

Additional work

Before proceeding further with installation **Carry out a pressure test**, see ➔ *section "Starting up the solar circuit", in the installation instructions for the SolvisMax system*.

Then **install the collector sensor**, see ➔ *section "Installing the Sensor", p. 40*.

Top connection cables

Connect the solar flow to the meander (external connection) and the solar return to the conduit (internal connection); perform the same steps as in "Bottom connection cables" when doing so.

7.1.2 Two Horizontally Mounted Integral Collectors (F-553-I, F-653-I only)

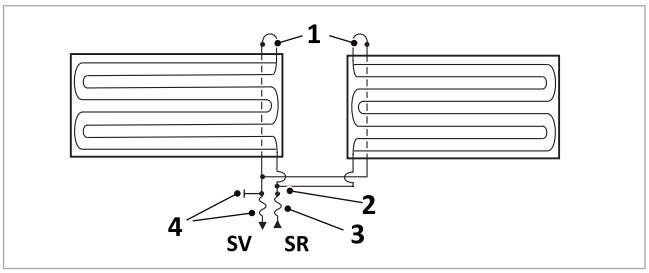


Fig. 47: SolvisFera Integral, parallel connection (horizontal)

SV *Solar flow* SR *Solar return*

1 *Flexible connection elbow (delivered with the collector)*
2 *VB-F-I-PN-12*
3 *Flexible connection pipe set (e.g. ROS-12-FLX)*
4 *ASS-SEN-12-C-F + BLS-SEN*

Connecting collectors to the solar circuit

1. Remove the protective caps.
2. Connect the parallel fittings to the collectors as shown in the diagram. Tighten the union nuts (size 19) that were tightened by hand with an additional full turn (hold in place at the hexagon bolt of the parallel fitting with size 17).

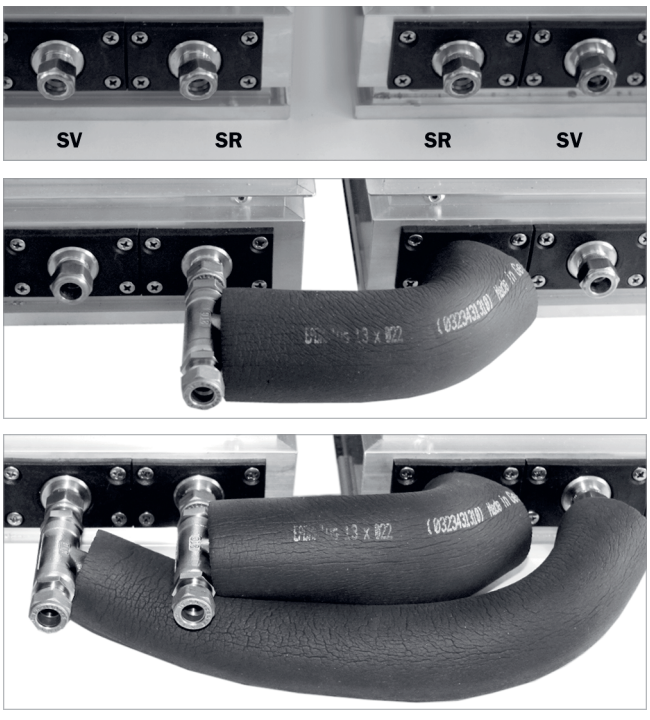


Fig. 48: Fitting the parallel fitting

3. Fit the connection set (connection elbow for solar return, connection elbow with sensor for solar flow) to the parallel fittings. To do so, tighten the union nut (size 19) that was tightened by hand with an additional full turn (hold in place).
4. Insulate the connections.
5. Connect the flexible connection cables (e.g. ROS-12-FLX) to the connection elbows. To do so, tighten the

union nut (size 19) that was tightened by hand with an additional full turn. Always hold in place at the hexagon bolt of the corrugated pipe (size 17) when doing so.

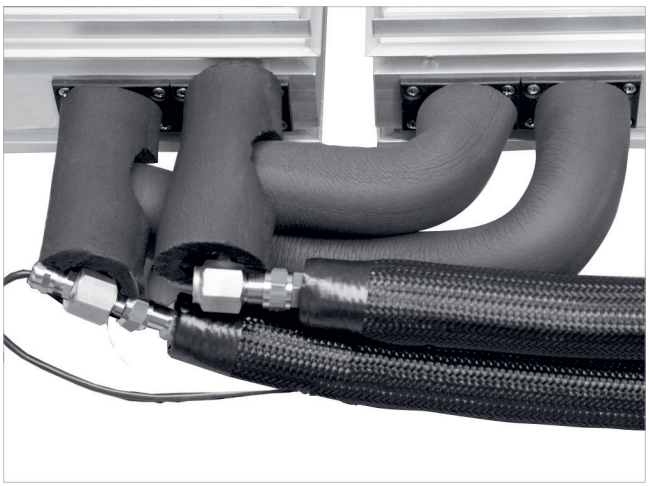


Fig. 49: SolvisFera Integral, horizontal installation, connected

6. Connect the flexible connection cables to the solar circuit (e.g. Solvis SMR quick-fit duct, with support sleeves). Always hold in place at the hexagon bolt of the corrugated pipe (size 17) when doing so.
7. Then thermally insulate all the solar lines with high-temperature resistance in accordance with the German Energy Conservation regulations (EnEv).

The figure *"SolvisFera Integral, horizontal installation, connected"* shows the connection with the solar lines underneath. If the connection cables are located above the collector, the solar flow and solar return must be swapped.

Installing connection elbows

1. Install connection elbows on the free collector connections.
2. Use an open-end wrench (size 19) to tighten the clamp ring screw connection that was tightened by hand (maximum of one turn). Always hold in place at the hexagon bolt of the corrugated pipe (size 17) when doing so.

Fig. 50: Installed connection elbow

3. Insulate the connection elbow using a cap. Hold the side with the smaller tab so that it is facing downwards (**1**).

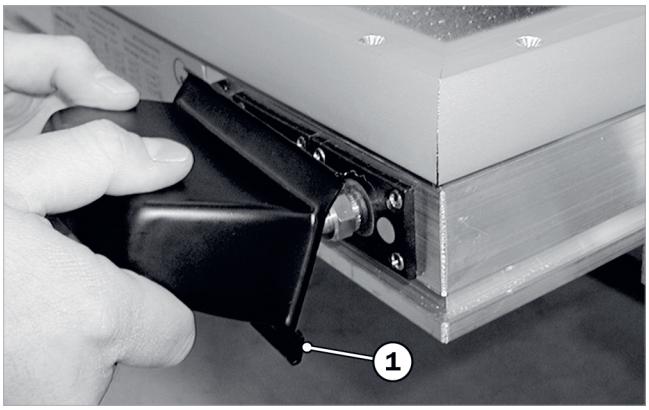


Fig. 51: Attaching the protective cover

Additional work

Before proceeding further with installation **Carry out a pressure test**, see ➔ *section "Starting up the solar circuit", in the installation instructions for the SolvisMax system*.

Then **install the collector sensor**, see ➔ *section "Installing the Sensor", p. 40*.

7.1.3 Two Vertically Mounted Integral Collectors (F-553-I, F-653-I only)

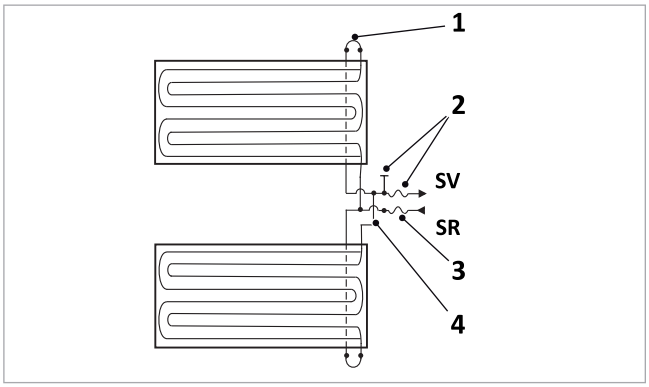


Fig. 52: SolvisFera Integral, parallel connection (vertical)

SV *Solar flow* SR *Solar return*

1 *Flexible connection elbow (delivered with the collector)*
2 *ASS-SEN-12-C-F + BLS-SEN*
3 *Flexible connection pipe set (e.g. ROS-12-FLX)*
4 *VB-F-I-P-UE-12*

Connecting collectors to the solar circuit

1. Remove the protective caps.
2. Connect the connections between the collectors using the corrugated pipe parallel fitting so that they are crossed.
3. Tighten the union nuts (size 19) that were tightened by hand with an additional full turn (always hold in place at the hexagon bolt of the parallel fitting with size 17 when doing so).
4. Fit the connection set (connection elbow for solar return, connection elbow with sensor for solar flow) to the parallel fittings. To do so, tighten the union nut (size 19) that was tightened by hand with an additional full turn (hold in place).

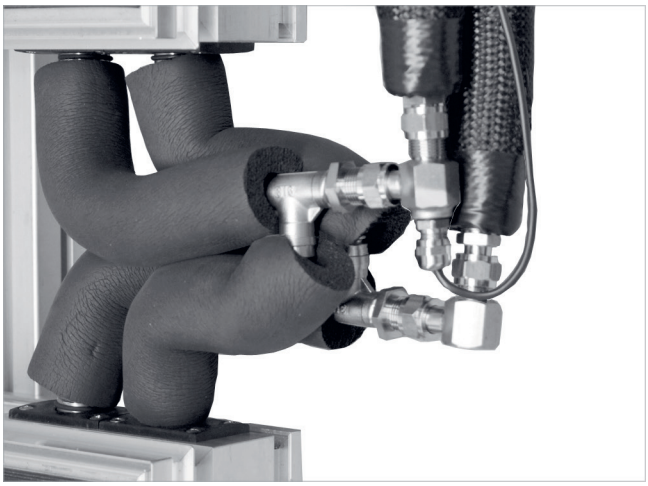


Fig. 53: Parallel fitting installed in a cross pattern.

5. Connect the flexible connection cables (e.g. ROS-12-FLX) to the connection elbows. To do so, tighten the union nut (size 19) that was tightened by hand with an additional full turn. Always hold in place at the hexagon bolt of the corrugated pipe (size 17) when doing so.
6. Connect the flexible connection cables to the solar circuit (e.g. Solvis SMR quick-fit duct, with support sleeves). Always hold in place at the hexagon bolt of the corrugated pipe (size 17) when doing so.
7. Then thermally insulate all the solar lines with high-temperature resistance in accordance with the German Energy Conservation regulations (EnEv).

Installing connection elbows

1. Install connection elbows on the free collector connections.
2. Use an open-end wrench (size 19) to tighten the clamp ring screw connection that was tightened by hand (maximum of one turn). Always hold in place at the hexagon bolt of the corrugated pipe (size 17) when doing so.

Fig. 54: Installed connection elbow

3. Insulate the connection elbow using a cap. Hold the side with the smaller tab so that it is facing downwards (**1**).

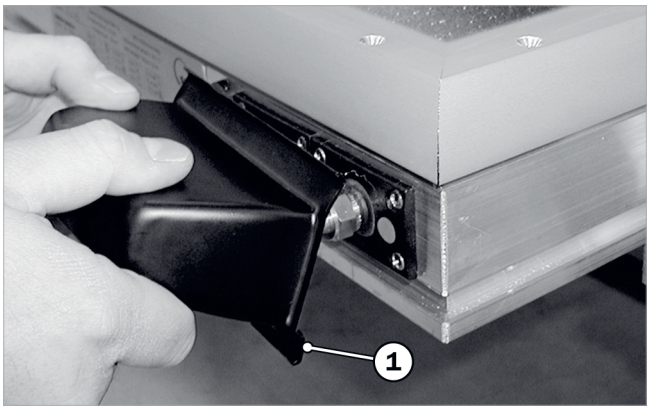


Fig. 55: Attaching the protective cover

Additional work

Before proceeding further with installation **Carry out a pressure test**, see ➔ *section "Starting up the solar circuit", in the installation instructions for the SolvisMax system*.

Then **install the collector sensor**, see ➔ *section "Installing the Sensor", p. 40*.

7.2 Diagonal collectors F-xx4-D

7.2.1 Several Vertically Mounted Diagonal Collectors

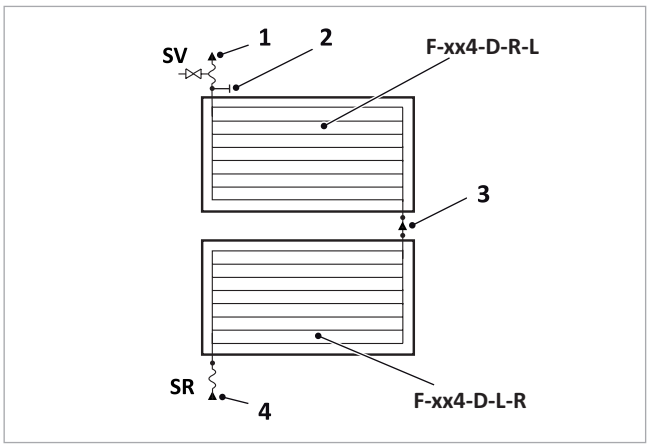


Fig. 56: Vertically mounted SolvisFera Diagonal

1 *VB-F-S-D-N-E*
2 *ASS-SEN-18-F-S-D + BLS-SEN*
3 *Collector connector (e.g. VB-F-S-D-UE)*
4 *Collector connector (e.g. VB-F-S-D-N)*
SR *Solar return*
SV *Solar flow*

Connecting collectors to the solar circuit

1. Fit the connection elbow with sensor to the top collector connection (flow). To do so, tighten the union nut on the collector by hand, align the connection angle and tighten with an additional full turn (size 27).
2. Fit a flexible connector with vent (e.g. VB-F-S-D-N-E) to the free end of the connection elbow. Tighten the union nut that was tightened by hand with an additional full turn (always hold in place on the flats of the corrugated pipe (size 24) when doing so).

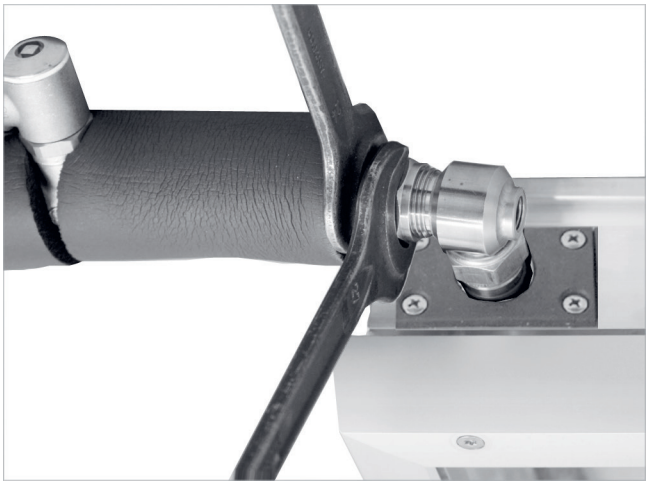


Fig. 57: Top connection: Solar flow

3. Fit the connection elbow without a sensor connection to the bottom collector connection (return). To do so, tighten the union nut on the collector by hand, align the connection angle and tighten with an additional full turn (size 27).
4. Fit a flexible connector (e.g. VB-F-S-D-N) to the free end of the connection elbow. Tighten the union nut that was tightened by hand (size 27) with an additional full turn (always hold in place on the flats of the corrugated pipe (size 22) when doing so).

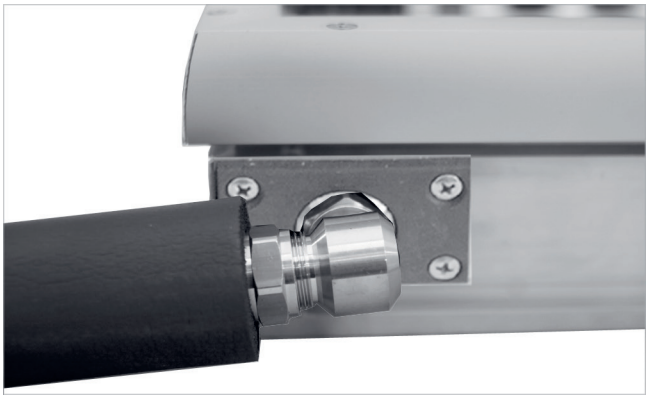


Fig. 58: Lower connection: Solar return

Connecting the collectors

1. Fit the collector connector VB-F-S-D-UE on the lower connection of the collector connections that are above one another.
2. Tighten the union nut that was tightened by hand with an additional full turn (size 27).

Fig. 59: VB-F-S-D-UE screwed onto the lower connection

3. Fit the collector connector VB-F-S-D-UE on the upper connection of the collector connections that are on top of each other.
4. Tighten the union nut that was tightened by hand (size 27) with an additional full turn (always hold in place on

the flats of the corrugated pipe (size 22) when doing so).

Fig. 60: Screwing VB-F-S-D-UE to the upper connection

5. Connect the flexible pipes for the solar flow and return to the solar circuit (always hold in place when doing so!)
6. Then thermally insulate all the solar lines with high-temperature resistance in accordance with the German Energy Conservation regulations (EnEv).

Additional work

Before proceeding further with the installation, **carry out a pressure test**; see ➔ *chapter "Start-up" in the installation instructions for the solar heat transfer station (MAL-SUES and MAL-SUES-HE)*.

Then **install the collector sensor**; see ➔ *section "Installing the Sensor" on page 40*.

7.2.2 Several Horizontally Mounted Diagonal Collectors

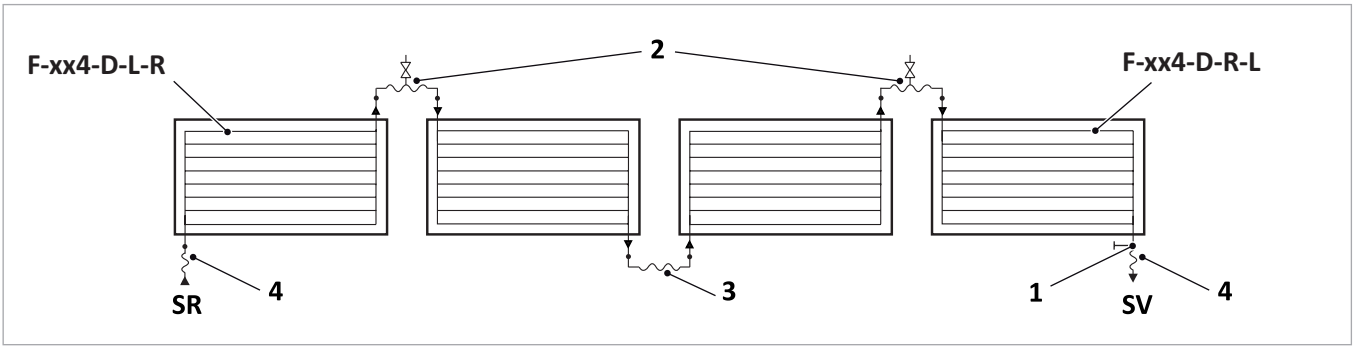


Fig. 61: SolvisFera Diagonal, series connection (horizontal)

1 *ASS-SEN-18-F-S-D + BLS-SEN*
2 *VB-F-S-D-N-E*
3 *VB-F-S-D-N*
4 *Connection pipe set (e.g. ROS-18-FLX)*
SR *Solar return*
SV *Solar flow*

Connecting collectors to the solar circuit

1. Fit the connection elbow with a sensor connection to the collector connection for the solar flow. To do so, tighten the union nut on the collector by hand, align the connection angle and tighten with an additional full turn (size 27).
2. Fit a flexible connector (e.g. ROS-18-FLX) to the free end of the connection elbow. Tighten the union nut that was tightened by hand (size 27) with an additional full turn (always hold in place on the flats of the corrugated pipe (size 24) when doing so).

Fig. 62: Lower connection: Solar flow

3. Fit the connection elbow without a sensor connection to the collector connection for the solar return. To do so, tighten the union nut on the collector by hand, align the connection angle and tighten with an additional full turn (size 27).
4. Fit a flexible connector (e.g. ROS-18-FLX) to the free end of the connection elbow. Tighten the union nut that was tightened by hand (size 27) with an additional full turn (always hold in place on the flats of the corrugated pipe (size 24) when doing so).

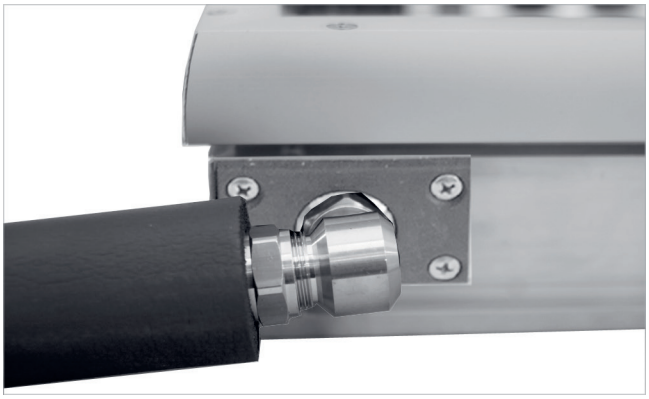


Fig. 63: Lower connection: Solar return

5. Connect the flexible pipes for the solar flow and return to the solar circuit (always hold in place when doing so!)

Connecting the collectors

1. Set the collector connectors with vent VB-F-S-D-N-E onto the top of the collector connections that are next to each other.
2. Tighten the union nut that was tightened by hand (size 27) with an additional full turn (always hold in place on the flats of the corrugated pipe (size 24) when doing so).

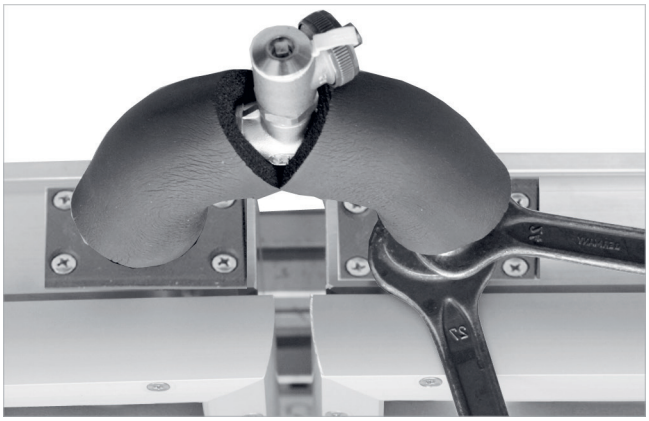


Fig. 64: Connection of horizontally mounted collectors

3. Set the collector connectors (e.g. VB-F-S-D-N) onto the bottom of the collector connections that are next to each other. Do not forget the support sleeves.
4. Tighten the union nut that was tightened by hand (size 27) with an additional full turn (always hold in place on the flats of the corrugated pipe (size 22) when doing so).
5. Then thermally insulate all the solar lines with high-temperature resistance in accordance with the German Energy Conservation regulations (EnEv).

Additional work

Before proceeding further with the installation, **carry out a pressure test**; see ➔ *chapter "Start-up" in the installation instructions for the solar heat transfer station (MAL-SUES and MAL-SUES-HE)*.

Then **install the collector sensor**; see ➔ *section "Installing the Sensor" on page 40*.

7.2.3 Several Diagonal Collectors Mounted in a Field

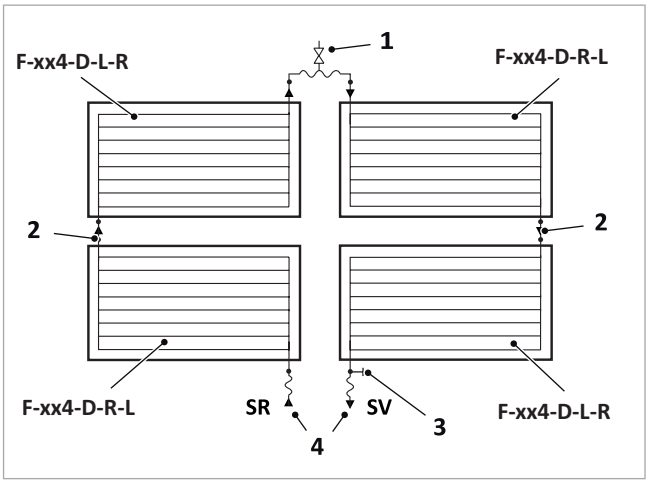


Fig. 65: Collector field with four diagonal collectors

1 *VB-F-S-D-N-E*
2 *Flexible connection (e.g. VB-F-S-D-UE)*
3 *ASS-SEN-18-F-S-D + BLS-SEN*
4 *ROS-18-FLX*
SR *Solar return*
SV *Solar flow*

Connecting collectors to the solar circuit

1. Connect the bottom collector connections to the connection elbow of the sensor (flow) or the connection elbow. To do so, tighten the union nut on the collector by hand, align the connection angle and tighten with an additional full turn (size 27).
2. Connect the flexible connection pipes (e.g. ROS-18-FLX) to the connection elbows. To do so, tighten the union nut that was tightened by hand with an additional full turn. Always hold in place on the flats of the corrugated pipe (size 24) when doing so.

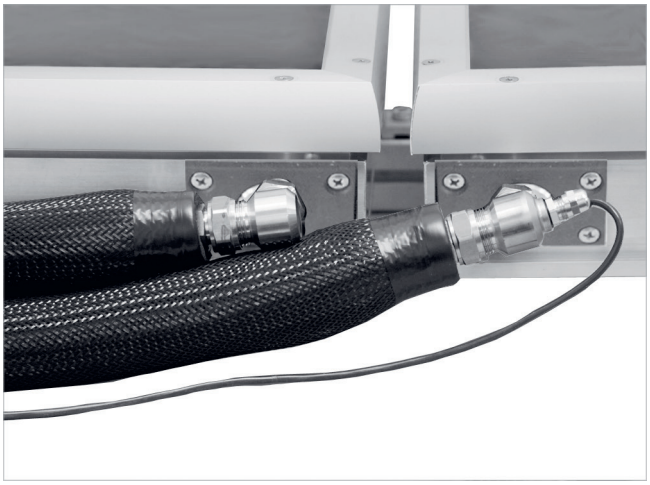


Fig. 66: Flexible connection pipe set with insulation

3. Connect the flexible connecting pipes to the solar circuit in the same way, applying counter-pressure while doing so.

Connecting the collectors

1. Set the collector connectors with vent VB-F-S-D-N-E onto the collector connections that are next to each other.
2. Tighten the union nut that was tightened by hand (size 27) with an additional full turn (always hold in place on the flats of the corrugated pipe (size 24) when doing so).

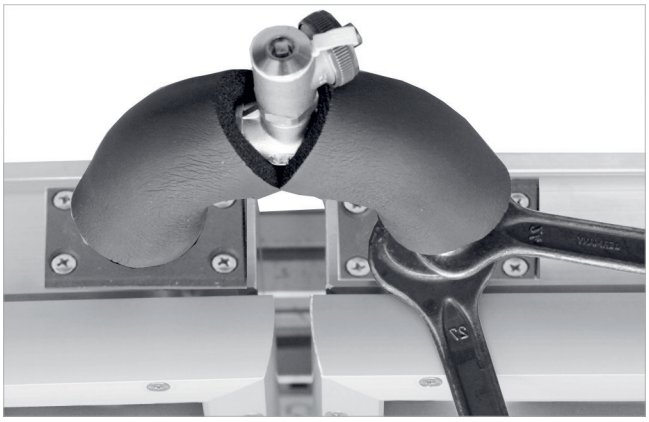


Fig. 67: Connection of horizontally mounted collectors

1. Fit the collector connector VB-F-S-D-UE on the lower connection of the collector connections that are above one another.
2. Tighten the union nut that was tightened by hand with an additional full turn (size 27).

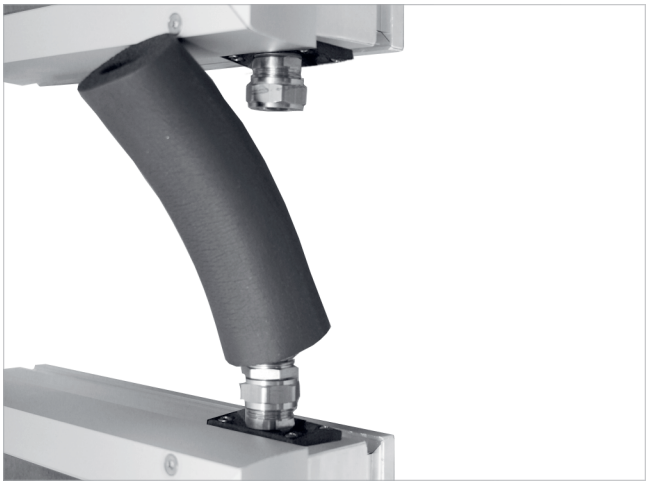


Fig. 68: VB-F-S-D-UE screwed onto the lower connection

3. Fit the collector connector VB-F-S-D-UE on the upper connection of the collector connections that are on top of each other.
4. Tighten the union nut that was tightened by hand (size 27) with an additional full turn (always hold in place on the flats of the corrugated pipe (size 22) when doing so).

Fig. 69: Screwing VB-F-S-D-UE to the upper connection

5. Then thermally insulate all the solar lines with high-temperature resistance in accordance with the German Energy Conservation regulations (EnEv).

Additional work

Before proceeding further with the installation, **carry out a pressure test**; see ➔ *chapter "Start-up" in the installation instructions for the solar heat transfer station (MAL-SUES and MAL-SUES-HE)*.

Then **install the collector sensor**; see ➔ *section "Installing the Sensor" on page 40*.

8 Installing the Sensor

In order for the system to function properly, it is important that the sensor is positioned correctly.

- Always attach the sensor on the side of the collector where the solar flow is located.

Preparing installation

1. Push the PG screw fitting parts onto the collector sensor.

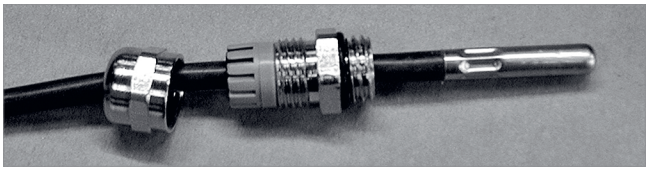


Fig. 70: Pushing the PG screw fitting onto the collector sensor

The collector sensor is always installed at the output of the solar flow.

Installing the Sensor

1. Push the sensor into the T-piece as far as it can go.
2. Screw in the front part of the PG screw fitting to the connection.
3. Tighten the union nut.

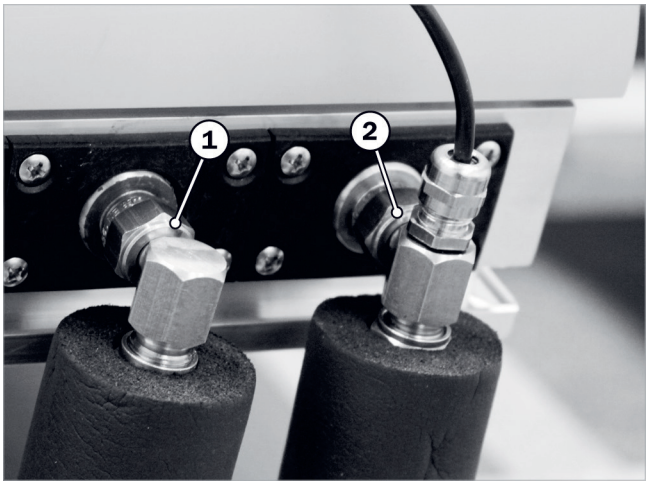


Fig. 71: Fitted collector sensor, SolvisFera Integral

1 *Solar return*
2 *Solar flow*

Fig. 72: Collector sensor on the solar flow, SolvisFera Diagonal

8.1 Final Tasks

The sensor must be activated by the control using the **collector start** function.

Installing the lightning protection box

1. To protect the control from overvoltage, place a lightning protection box as close as possible to the collector (beneath the roof, for example).
2. Then extend the sensor cable over the lightning protection box connection to the control.

CAUTION

Pay attention to the sensor line when extending.

- The line you use must at least meet the requirements for temperature and UV radiation in the installation location.
- Use only shielded lines.
- Use a protective conduit to prevent damage by animals or mechanical strain.
- For extension up to 50 m: (2-wire, 0.75 mm²)
- For extension over 50 m: (2-wire, 1.5 mm²)

CAUTION

Note the following for wall-mounted installation with slope angles greater than 60°

Possible reduction in solar yields or collector damage due to moisture.

- Fit the top of the collectors on-site with a suitable cover plate.
- See ➔ *section “Wall-Mounted Installation”, p. 22*.

9 Start-Up

WARNING

Risk of hot steam escaping when working on the solar system

Scalding of hands and face possible.

- Carry out work on the solar system only when there is no direct sunlight or when the collectors are covered.

CAUTION

When filling the solar circuit:

- Fill only with original Tyfocor LS-rot ready-mixed heat transfer fluid and flush.
- Using other types of heat transfer fluid in this system is prohibited because it may damage the solar circuit components.
- Use only the Füll-Jet unit to flush and fill the system (please order separately).

Setting the solar operating pressure

1. Set the solar operating pressure approx. 0.3 bar higher than the admission pressure of the solar expansion vessel (e.g. admission pressure 3.1 bar, solar operation pressure 3.4 bar).
2. When the solar operating pressure has been reached, close the flushing valve.

The collector can be operated with an operating pressure of up to 6 bar. The higher the pressure, the quicker damage can be done to the heat transfer fluid. It remains in liquid form at higher temperatures.

A calculation table sheet for the expansion vessel design (and a primary solar tank where applicable) and for determining the admission pressure and system filling pressure can be downloaded using the following link:

https://extranet.solvis.de/public/user_upload/MAG_Nachdruckhaltung_ab.xls

Fill, pressure test and start up system as per ➔ *'Start-Up' chapter of installation instructions for relevant system*.

10 Maintenance

You must perform an annual check of the pH value of the heat transfer fluid using suitable testing equipment.

Maintain the system according to ➔ *section "Maintenance and Care" in the installation instructions and the maintenance reports for the respective system*.

11 Decommissioning

The system must be drained if it is taken out of operation for long periods or if it is taken out of operation completely. Collect solar liquid and dispose of it correctly.
If taking out of service for extended periods and simultaneously draining the system, we recommend that you make sure, as far as is possible, that no solar liquid residue remains in the collectors.

Observe the safety notes when disassembling the system, see ➔ *section "Safety Notes", p. 5*.

WARNUNG

Burn hazard when there is direct sunlight

Fluid that remains in the collector or steam released from the collector can cause scalding. Touching hot connections may cause burns.

- Perform work on the collectors only when the sun is not shining or when the collectors are covered.
- Remove the sun protection only after the (re-) commissioning of the solar plant.

Environmentally-sound reuse

Old Solvis collectors may be returned to the factory free of charge and then recycled in an environmentallysound manner.

12 Technical Data

12.1 General Specifications

SolvisFera collector specifications

Name	Unit	F-553-I, F554-D	F-653-I, F-654-D	F-803-I, F-804-D
Dimension (gross surface area)	mm (m²)	3793 x 1480 x 105 (5.61)	4735 x 1480 x 105 (7.01)	5677 x 1480 x 105 (8.4)
Opening surface area*	m²	5.16	6.45	7.74
Absorber surface area	m²	5.25	6.58	7.91
Total weight	kg	109	132	154
Weight without panes	kg	69	82	94
CE marking	–	✓	✓	✓
Glass transmission	%	> 96		
Absorber type	–	Aluminium with mirotherm® coating (95% absorption, 5% emission)		
Solar Keymark registration no.	–	011-7S1750 F / 011-7S2482 F		
Solar Keymark certificate	–	see ➔ http://www.dincertco.com		

** Effective surface area according to EN 12975*

12.2 Connection Dimensions

Centre-to-centre distances for the connections

For information about the position of the connections, see
➔ *chapter "Hydraulic Versions" on page 11*.

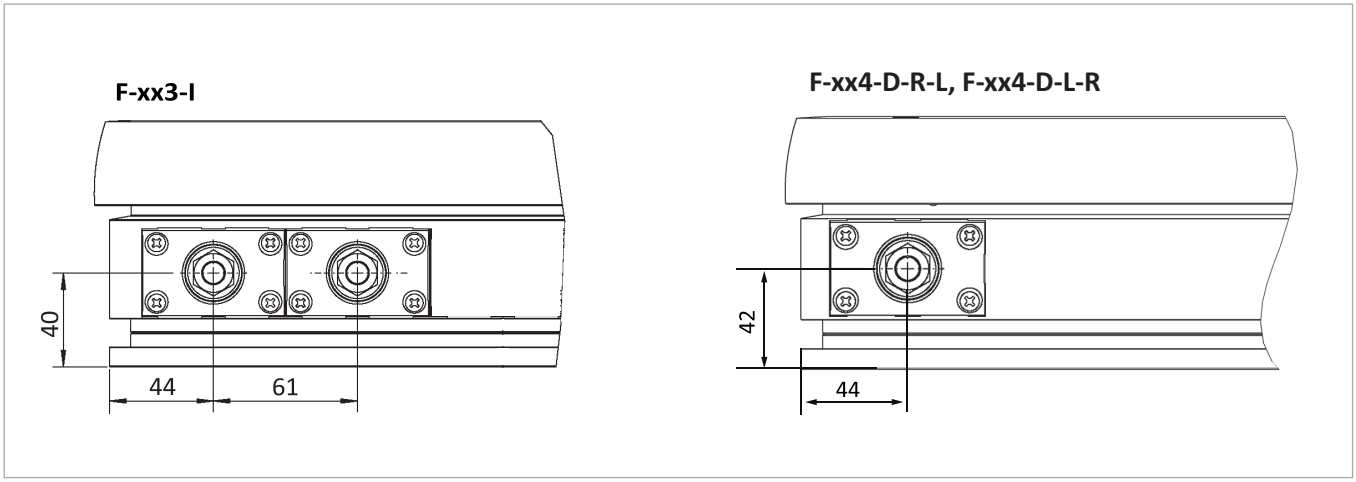


Fig. 73: Centre-to-centre distances for the connections

12.3 Hydraulic Specifications

Hydraulics of the SolvisFera

Name	Unit	Integral			Diagonal		
		F-553-I	F-653-I	F-803-I	F554-D	F-654-D	F-804-D
Heat transfer fluid content	l	2.60	3.21	3.82	3.64	4.33	5.02
Hydraulics	–	Two-meander parallel flowthrough			18 pipes parallel flowthrough		
Rated flow	l/hm²	10 – 20 matched flow			10 – 25 matched flow		
Connections (clamp ring)	mm	12			18		

12.4 Pressure Loss

Integral

- Two meander parallel flowthrough
- LS-rot solar liquid
- Average collector temperature 40 °C

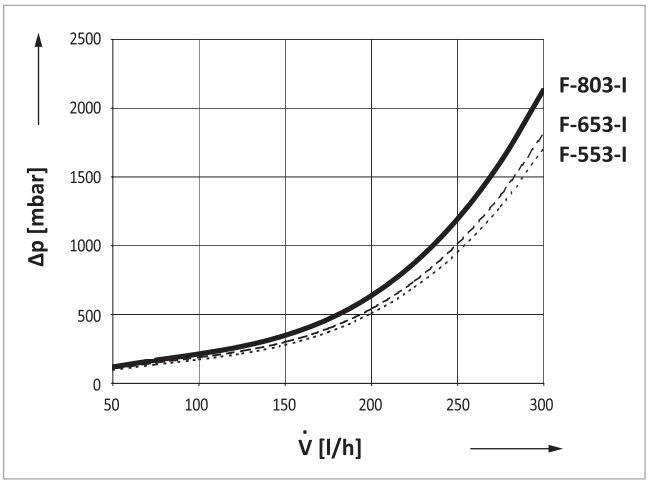


Fig. 74: SolvisFera Integral pressure loss curve

$\dot{V}$ *Volume flow [l/h]*

Δp *Pressure loss in [mbar]*

Diagonal

- 18 pipes parallel flowthrough
- Solar liquid LS-rot
- Average collector temperature 40 °C

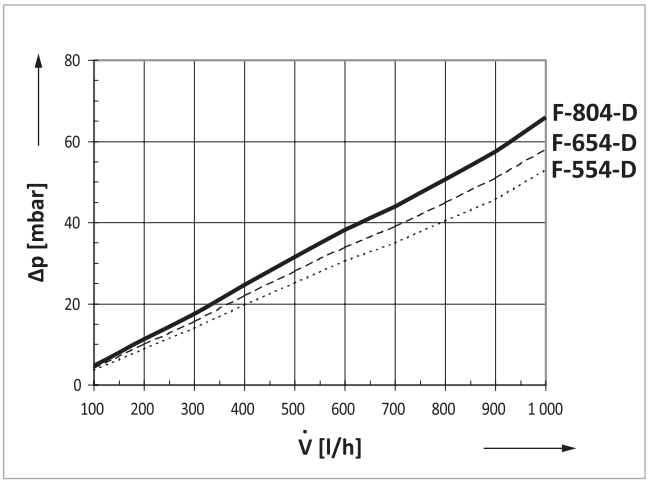


Fig. 75: SolvisFera Diagonal pressure loss curve

$\dot{V}$ *Volume flow [l/h]*

Δp *Pressure loss in [mbar]*

13 Appendix

13.1 Product Fiche

SOLVIS

Product fiche collector

Scheda di prodotto di / Ficha del producto de / Ficha de produto de / Fiche de produit de / Productkaart voor de collector

Solvis GmbH
Grotrian-Steinweg-Str. 12
38112 Braunschweig - Germany

Information according to regulation / Informazioni secondo la normativa / Información según reglamento / Informação de acordo com regulamento / Information conforme à la règlement / Informatie volgens verordening:

➔ installation instructions / istruzioni per il montaggio / instrucciones de montaje / instruções de montagem / instructions de montage / montage-instructies

1 Information in accordance with Annex IV

Informazioni in conformità all'Allegato IV / Información de acuerdo con el Anexo IV / Informações em conformidade com o anexo IV / Informations conformément à l'annexe IV / Informatie overeenkomstig bijlage IV

1	2		3								
			SolvisCala		SolvisLuna	SolvisFera					
			C-254-C	C-254-E	LU-304	F-553-D F-554-D	F-653-D F-654-D	F-803-D F-804-D	F-553-I-AR	F-653-I-AR	F-803-I-AR
4	$A_{sol(ap)}$ [m²]	A	2,39	2,39	2,57	5,16	6,45	7,74	5,16	6,45	7,74
	$A_{sol(g)}$ [m²]	B	2,56	2,53	2,87	5,61	7,10	8,40	5,61	7,01	8,40
5	η_{col} [%]	A	66	62	61	66	66	66	68	68	68
		B	60	58	54	60	60	60	63	63	63
6	η_o [%]	A	85,0	79,1	64,4	83,1	83,1	83,1	84,3	84,3	84,3
		B	79,0	74,8	57,7	75,6	75,6	75,6	77,6	77,6	77,6
7	a_1 [W/(m²K)]	A	4,15	3,46	0,75	3,52	3,52	3,52	3,32	3,32	3,32
		B	3,87	3,28	0,67	3,20	3,20	3,20	3,05	3,05	3,05
8	a_2 [W/(m²K²)]	A	0,019	0,023	0,005	0,017	0,017	0,017	0,016	0,016	0,016
		B	0,018	0,021	0,004	0,015	0,015	0,015	0,016	0,016	0,016
9	IAM [-]	A	0,92	0,94	1,00	0,93	0,93	0,93	0,94	0,94	0,94
		B	0,92	0,94	1,00	0,93	0,93	0,93	0,94	0,94	0,94

A *For collector aperture area / Per area di apertura del collettore / Para área de apertura del colector / Para área de abertura do coletor / Pour la surface d'entrée du capteur / Voor apertuuroppervlak van de collector*

B *For collector gross area / Per l'area lorda del collettore / Para área bruta del colector / Para área Bruta do Coletor / Pour la surface brute du collecteur / Voor collector bruto oppervlakte*

1 *Collector values / Valori da collezione / Valores de colector / Valores do coletor / Valeurs du collecteur / Collectorwaarden*

2 *Abbreviation / Abbreviazione / Abreviatura / Abreviatura / Abréviation / Afkorting*

3 *Solar collector / Collettore solare / Colector solar / Coletor solar / Capteur solaire / Zonnecollector*

4 *Reference surface / Superficie di riferimento / Superficie de referencia / Superfície de referência / Surface de référence / Referentieoppervlak $A_{sol(ap)}$, $A_{sol(g)}$ [m²]*

5 *Collector efficiency / Efficienza del collettore / Eficiência do coletor / Rendement du capteur / Collectorefficiëntie η_{col} [%]*

6 *Optical efficiency / Efficienza ottica / Eficiência óptica / Efficacité optique / Optische efficiëntie η_o [%]*

7 *Linear heat transfer coefficient / Coefficiente di trasmissione termica lineare / Coeficiente de transferencia de calor lineal / Coeficiente de transferência de calor linear / Coefficient de transfert de chaleur linéaire / Lineaire warmteoverdrachtscoëfficiënt a_1 [W/(m²K)]*

8 *Square heat transfer coefficient / Coefficiente di trasmissione termica quadrato / Coeficiente de transferencia de calor cuadrado / Coeficiente de transferência de calor quadrado / Coefficient de transfert de chaleur carré / vierkante warmteoverdrachtscoëfficiënt a_2 [W/(m²K²)]*

9 *Incident angle modifier / Modificatore dell'angolo di incidenza / Modificador ángulo de incidencia / Modificador de ângulo de incidência / Agent de modification de l'angle d'incidence / Invalshoek modifier IAM [-]*

Fig. 76: Product data sheet

13.2 Snow and Wind Load Zones

For the structural design of the support structure, it is necessary to know and observe the additional snow and wind load in your region. These loads can be can be determined using the information from snow and wind load zones.
This is the only way to ensure safe installation of the solar system.
The illustrated map provides an overview of the distribution of snow and wind load zones.

Contact the local authorities for the classifications of the standard snow load for the region.

Contact Solvis if the standard snow load at the installation location is greater than the specifications in EN 1991 according to the local authorities responsible.

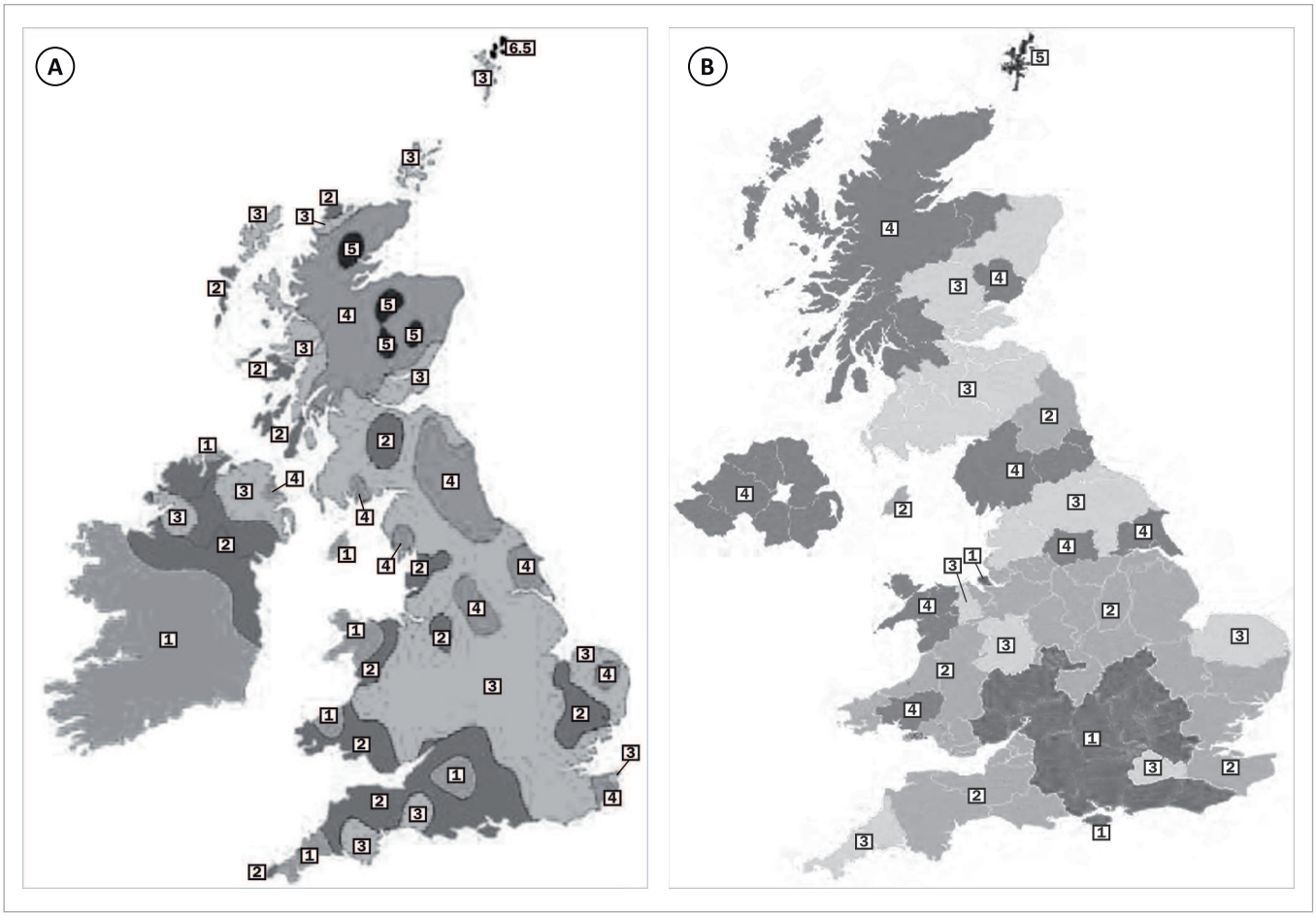


Fig. 77: Distribution of snow and wind load zones in Great Britain

A *Snow load zones* B *Wind load zones*

13.3 Accessories

All accessories are listed in the ➔ *Solvis price list*.

13.4 Nameplate

Each unit has a product-specific nameplate that indicates the most important parameters. The contents are explained using this example.

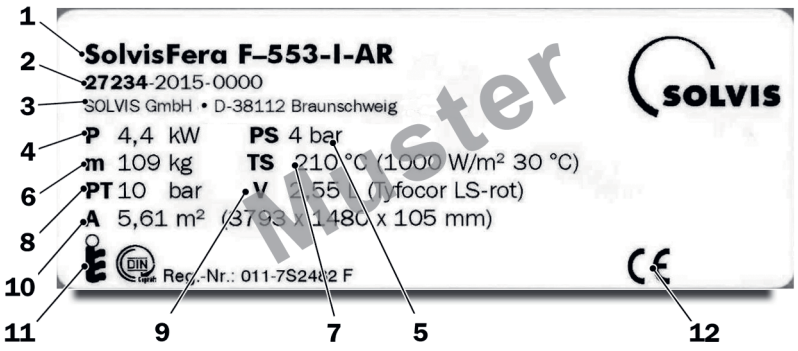


Fig. 78: SolvisFera sample nameplate

1	*Type designation*	5	*Permitted operating pressure*	9	*Heat transfer fluid volume*
2	*Item number, year of manufacture, serial number*	6	*Weight*	10	*Gross surface area and collector dimensions*
3	*Manufacturer and place of manufacture*	7	*Idle temperature*	11	*Keymark registration*
4	*Max. performance*	8	*Test pressure*	12	*Conformity marking*

14 Index

Notes

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