Planning and installation instructions

DAIKIN Pressurised solar system

EKSV21P
EKSV26P
EKSH26P
Solar assembly packages

Table of contents

1 General information

1.1 Refer to the manual

These instructions are a >> ***translation of the original version*** << in your language.

All procedures required for installation, start-up, operation and adjustment of the system are described in this instruction manual and associated documents. Detailed information on the connected components of your heating system is given in the relevant manuals.

- Work on the DAIKIN Solar system (such as hydraulic and electrical connection and initial start-up) is only to be carried out by persons who are authorised and who have successfully completed qualifying technical or vocational training in the respective activity and who have taken part in professional advanced training courses recognised by the competent authority. This especially includes heating specialists who have experience in the proper installation and maintenance of heating and solar systems due to their technical training and specialist knowledge.
- Please read this manual carefully and thoroughly before proceeding with the installation and start-up or modification of the system.
- Comply strictly with warning instructions.

Relevant documents

Documents listed below are part of the technical documentation of the DAIKIN solar system and therefore must be observed. The documents are part of the scope of delivery of the respective components.

– DAIKIN EKSRDS2A solar pressure station: Operating instructions
– Pressurised solar control unit DSR1: Installation and operating instructions
– DAIKIN hot water storage tank (EKHWP or Altherma EHS(X/H)B): Operating and installation instructions
– Quick instructions for solar panel assembly and the requisite assembly materials which accompany the respective construction kits for roof-mounted, in-roof and flat roof mounting

When connecting to an external heat generator or storage tank which is not included in the scope of delivery, the individual associated operating and installation instructions apply.

2 Safety

2.1 Warning signs and explanation of symbols

2.1.1 Meaning of the warnings

Warnings in this manual are classified according into their severity and probability of occurrence.

DANGER!

Draws attention to imminent danger.

Disregarding this warning can lead to serious injury or death.

WARNING!

Indicates a potentially dangerous situation.

Disregarding this warning may result in serious physical injury or death.

CAUTION!

Indicates a situation which may cause possible damage.

Disregarding this warning may cause damage to property and the environment.

This symbol identifies user tips and particularly useful information, but not warnings or hazards.

Special warning signs
Some types of danger are represented by special warning symbols.

Electric current

Risk of burning or scalding

Danger of falling

Danger of falling parts

2.1.2 Handling instructions

- Handling instructions are shown as a list. Actions for which the sequential order must be maintained are numbered.
  ➔ Results of actions are identified with an arrow.

2.2 Avoiding danger

DAIKIN solar installations are state of the art and are built to meet all recognised technical requirements. However, improper use may result in serious physical injuries or death, as well as property damage. To prevent such risks, install and operate the DAIKIN solar installations only:
– as stipulated and in perfect condition,
– with an awareness of safety and the hazards involved.
This assumes knowledge and use of the contents of this manual, of the relevant accident prevention regulations as well as the recognised safety-related and occupational health rules.

2.3 Use as intended

The DAIKIN solar system may only be used for the solar-supported heating of hot water systems. The DAIKIN solar system must be installed, connected and operated only according to the instructions in this manual.

Any other use outside the intended use is considered as improper. The operator alone shall bear responsibility for any resulting damage.

Intended use also includes compliance with the maintenance and service conditions. Replacement parts must at least satisfy the technical requirements defined by the manufacturer. This is the case, for example, with original spare parts.

2.4 Instructions for operating safety

2.4.1 Working on the roof

- Installation work on the roof may only be carried out by authorised and trained persons (heating technicians, roofers, etc.) in compliance with the relevant Accident Prevention Regulations.
- Material and tools must be secured against falling.
- Barriers must be erected to prevent persons from entering the area below the roof where the work is being carried out.

2.4.2 Before working on the heating system

- All work on the heating system (such as installation, connection and initial start-up) may only be carried out by authorised and trained heating technicians.
- Switch off the main switch and secure it against unintended switching on when carrying out any work on the heating system.

2.4.3 Electrical installation

- Electrical installations must only be carried out by electrical engineers and in compliance with valid electrical guidelines as well as the specifications of the energy supply company (EVU).
- Connect the mains in accordance with IEC 60335-1 via a separator device which exhibits contact separation in all poles with a contact opening distance that provides full disconnection in accordance with the conditions of overvoltage category III and a residual current circuit breaker (RCD) with a reaction time ≤ 0.2 s.
- Compare the mains voltage (230 V, 50 Hz) indicated on the nameplate with the supply voltage before connecting to the mains.
- Before beginning work on live parts, disconnect them from the power supply (switch off main switch, remove fuse) and secure against unintentional restart.
- Equipment covers and service panels must be replaced as soon as the work is completed.

2.4.4 Installation room, water quality, heating and sanitary connection

The requirements on installing the hot water tank (EKHWP or Altherma EHS(X/H)B), on the water quality, as well as the heating and sanitary connection are described in detail in the instructions for the hot water tank. It is essential they are complied with.

2.4.5 Instruct the owner

- Before handing over the heating system, explain to the user/owner how to operate and check the heating system.
- Document the handover by filling out the installation and instruction forms together with the owner and sign them.

2.4.6 Relevant national regulations

- DIN EN 1991-1-4 Wind actions
- DIN EN 1991-1-3 Snow loads
- DIN 18338/ DIN 18336 Roofing work
- DIN 18451 Scaffolding work
- DGUV Information 208-016
- DGUV Information 201-054
- DGUV Regulation 112-198

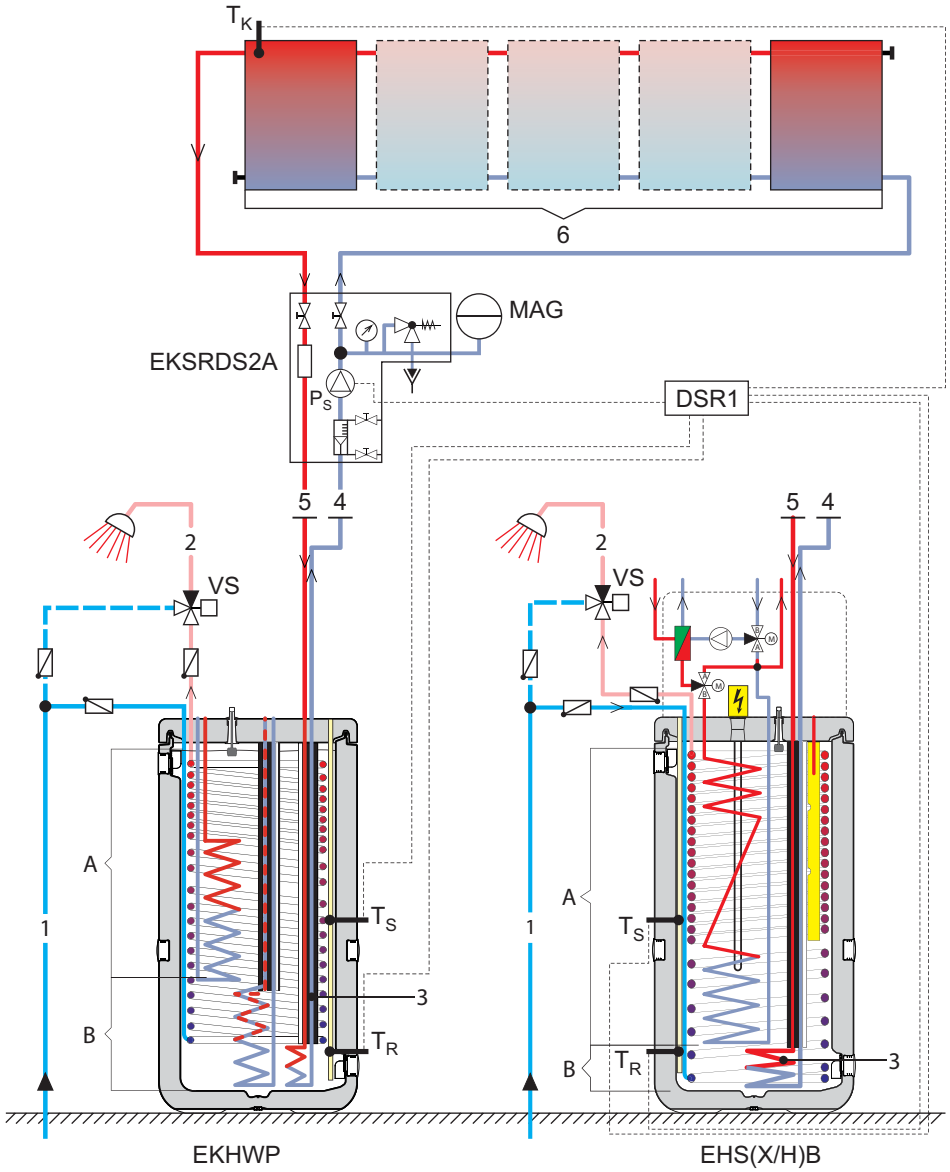
The accident prevention regulations must be heeded when working on the roof.

2.4.7 Thermal insulation

The national regulations for thermal insulation must be observed.

3 Product description

3.1 Construction and components of the Solar system (Pressurised solar system)



1 Cold water connection pipe
2 Hot water distribution pipe
3 Heat exchangers (stainless steel) for pressurised solar system storage charging
4 Solar return flow pipe
5 Solar inflow pipe
6 Solar panel array

A Hot water zone
B Solar zone
DSR1
Solar differential temperature control unit
MAG Diaphragm expansion vessel
P_S Solar operating pump
EKSRDS2A
Solar pressure station
T_K Solar panel temperature sensor
T_R Solar return flow temperature sensor
T_S Solar storage tank temperature sensor
VS Scalding protection

EHS(X/H)B
Solar tank with integrated interior heat pump unit
EKHWP
Energy storage tank EKHWP…PB

Fig. 3-1 Standard design of a DAIKIN Solar system (DAIKIN recommends a two-way connection)

3.2 Brief description

The DAIKIN solar system is a thermal solar system for supplying hot water for consumption and solar support.

The pressurised solar system must only be used with the DSR1 control unit and the EKSRDS2A pressure station.

Operating mode

The Solar EKSV21P, EKSV26P and EKSH26P high-performance, flat solar panels convert solar radiation into heat with a high degree of efficiency. The heat carrying medium is a glycol/water mix.

As soon as the solar panels have reached a usable temperature level, the glycol/water in the solar circuit is pumped through the solar panels. Otherwise, the circulation pump switches off and the mix remains in the solar system circuit. This operating mode has several advantages:

– Minimum maintenance requirements.
– Frostproof.
– Complete flexibility in arrangement and installation
– High efficiency due to integrated solar heat exchanger

Modular design

The system consists of several pre-assembled modules. Plug-in technology and a high degree of pre-assembly ensure fast and simple system installation.

Storage tank

The following storage tanks can be used for the DAIKIN solar system:

– DAIKIN EKHWP[1)]: Highly thermally insulated, unpressurised solar stratified tank (with possibility of connecting to a DAIKIN air/water heating pump).
– Daikin Altherma integrated solar unit [2)]: Solar stratified tank with integrated indoor unit of an air/water heating pump.

Design, functionality, start-up and operation of the storage tanks and other Solar components not mentioned in chap. 3.3 are not described in these instructions. Detailed information on these components can be found in the associated operating and installation instructions.

The handling instructions and descriptions mentioned in these instructions basically apply to all DAIKIN storage tanks that can be used in this solar system, even if only one type is described for illustrative purposes. If there are variances to other storage tanks, special reference is made.

Electronic control

The DSR1 fully electronic pressurised solar control unit ensures optimum utilisation of the solar heat (hot water heating, heating support) and the observance of all safety-relevant aspects. The parameters required for ease of operation are preset at the factory for selectable hydraulic variants (see accompanying installation and operating instructions).

3.3 System components for pressurised solar systems

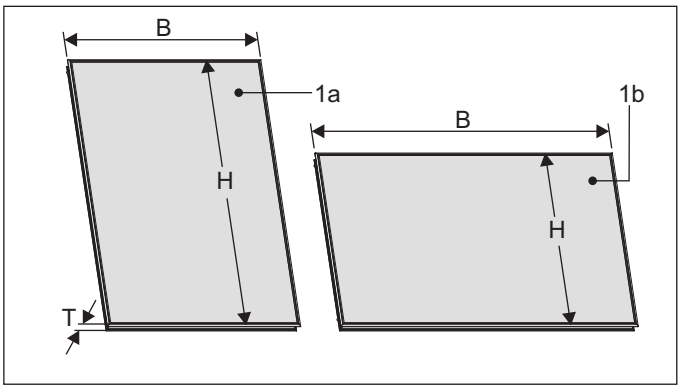
3.3.1 System components for all systems

High-performance flat solar panels

EKSV21P
H x W x D: 2000 x 1006 x 85 mm, weight: approx. 35 kg

EKSV26P
H x W x D: 2000 x 1300 x 85 mm, weight: approx. 42 kg

EKSH26P
H x W x D: 1300 x 2000 x 85 mm, weight: approx. 42 kg



1a High-performance EKSV21P / EKSV26P flat solar panel
1b High-performance EKSH26P flat solar panel

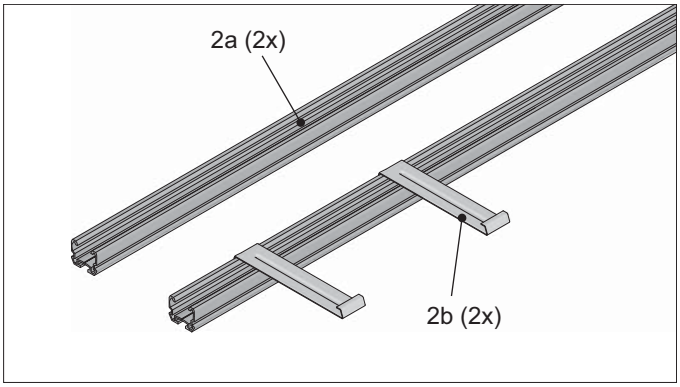
Fig. 3-2 Flat solar panel

FIX MP solar panel mounting rails

FIX MP100 for one EKSV21P flat solar panel

FIX MP130 for one EKSV26P flat solar panel

FIX MP200 for one EKSH26P flat solar panel



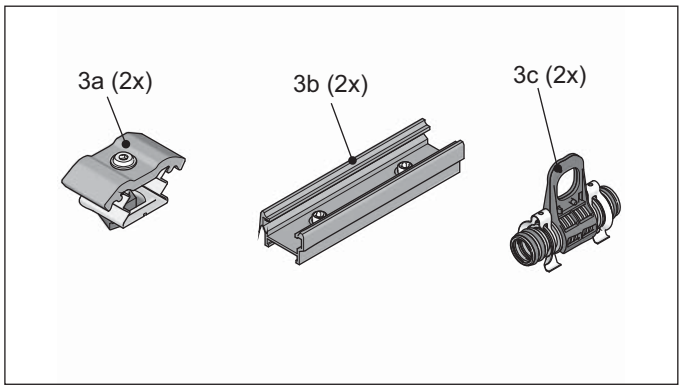
2a Mounting profile rail
2b Solar panel securing clips

Fig. 3-3 FIX MP

1) The device variants suitable for the pressurised solar system are identified by the extension "P" added to the type designation.
2) The device variants suitable for the pressurised solar system are identified by the extension "B" added to the type designation.

Solar panel connection Solar

FIX VBP



3a Double terminal block for solar panel fastening
3b Mounting profile connector
3c Compensator for solar panel connection with mounting support

Fig. 3-4 FIX VBP

CON 15 pressurised solar pipes

Thermal-insulated stainless steel pipeline for solar pressure systems with drawn-in sensor line.

CON 15P16, nominal size DN 16, L=15 m

For systems with up to 3 solar panels and a pipe length of up to 25 m.

CON 15P20, nominal size DN 20, L=15 m

For systems with up to 5 flat solar panels and a pipe length of up to 25 m.

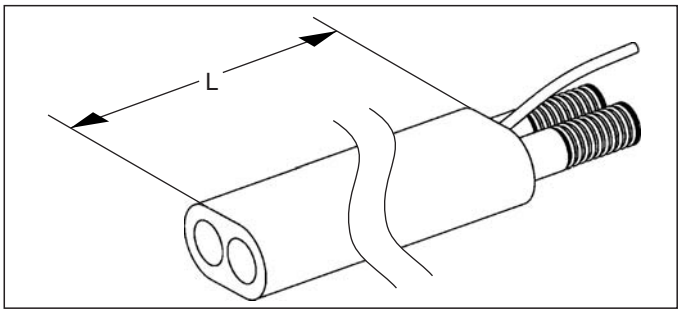


Fig. 3-5 CON 15P16 / CON 15P20

CON CP pressurised solar connection set

CON CP16

For connecting the CON 15P16 pressurised solar pipe

CON CP20

For connecting the CON 15P20 pressurised solar pipe

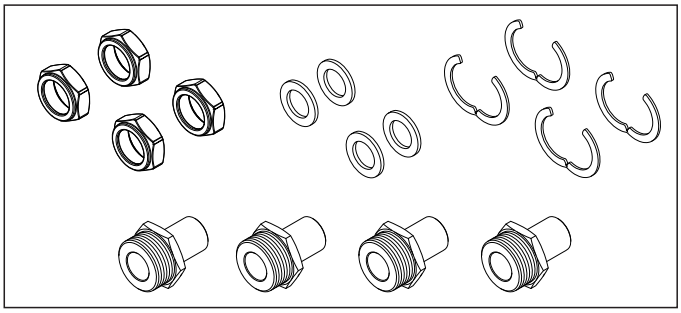


Fig. 3-6 CON CP16 / CON CP20

CON XP pressurised solar pipe connector

CON XP16

For the connection of two pressurised solar system pipes (nominal size DN 16).

CON XP20

For the connection of two pressurised solar system pipes (nominal size DN 20).

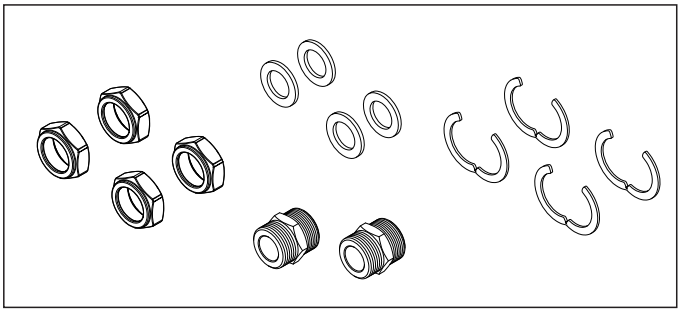
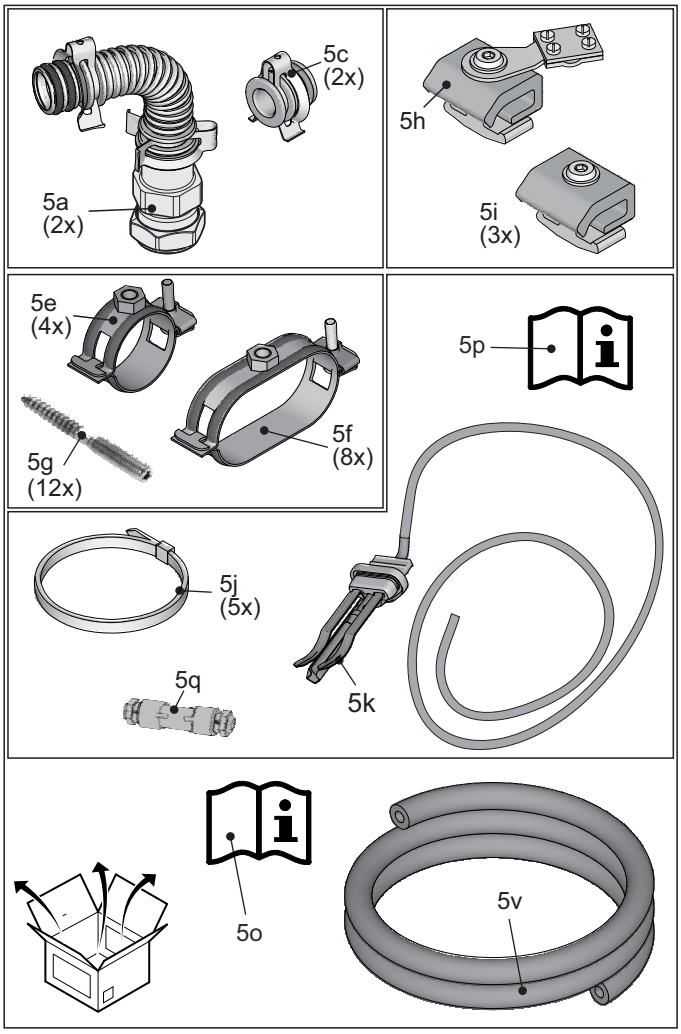


Fig. 3-7 CON XP16 / CON XP20 (optional)

Solar panel connection set

EKSRCP



5a Solar panel connecting elbow, pressure
5c Sealing plugs
5e-g Pipe clamps with hangar bolts
5h Single terminal block with equipotential bonding terminal
5i Single terminal block
5j Cable tie
5k Solar panel temperature sensor
5o Planning and installation instructions
5p Quick instructions
5q Cable connection fitting
5v HT-Armaflex Ø 22 x 13 UV-resistant (2 m)

Fig. 3-8 EKSRCP

CORACON solar system fluid

CORACON SOL 5F

20 litres of ready-mix with frost protection up to -28 °C.

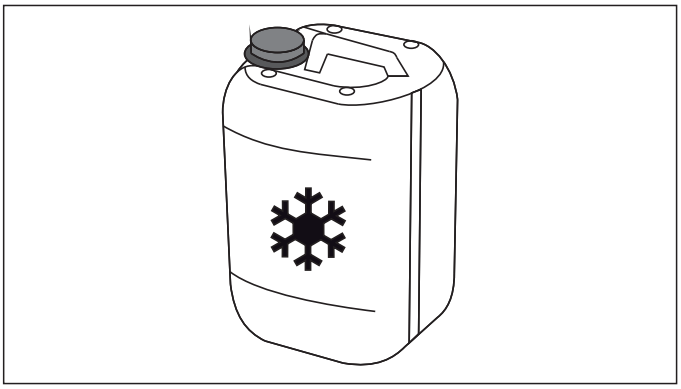


Fig. 3-9 CORACON SOL 5F

Diaphragm expansion vessel

MAG S12

for pressurised solar systems up to maximum 2x EKSV21P / EKSV26P solar panels

MAG S25

for pressurised solar systems up to maximum 3 solar panels

MAG S35

for pressurised solar systems up to maximum 5 solar panels

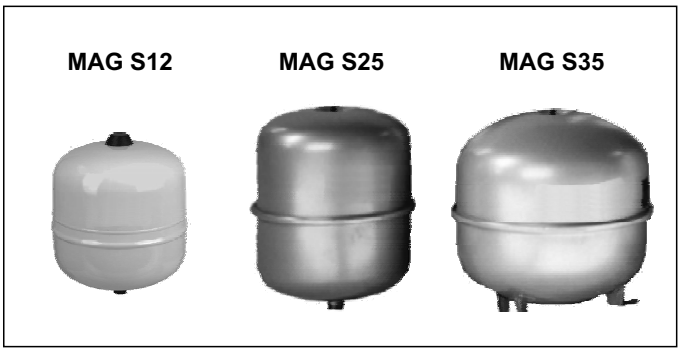
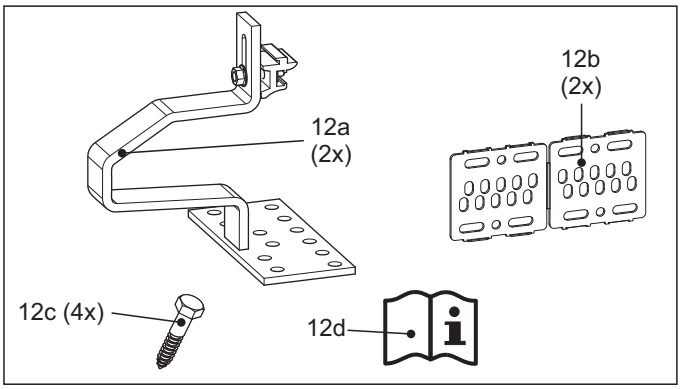


Fig. 3-10 MAG Sxx

3.3.2 System components for roof-mounted systems (ADM)

On-roof mounting packs

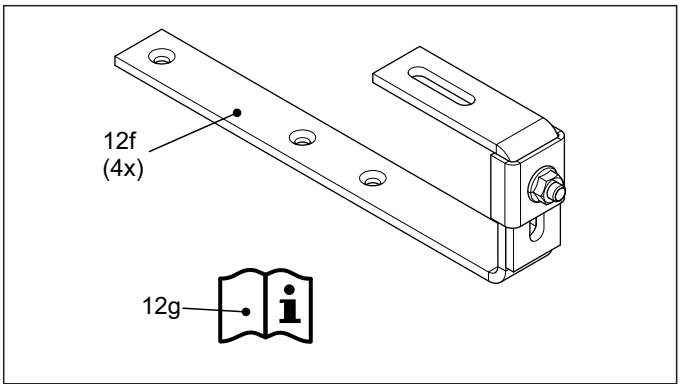
FIX ADDP for roof tiles/shingles



12a Roof mounting hook
12b Packing plate
12c Hexagon wood screws M8 x100
12d Quick instructions

Fig. 3-11 FIX ADDP

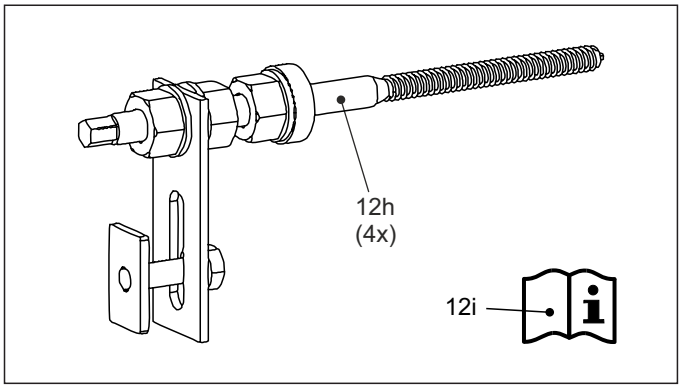
FIX ADS for flat roofing (e.g. slate)



12f Roof mounting hook
12g Quick instructions

Fig. 3-12 FIX ADS

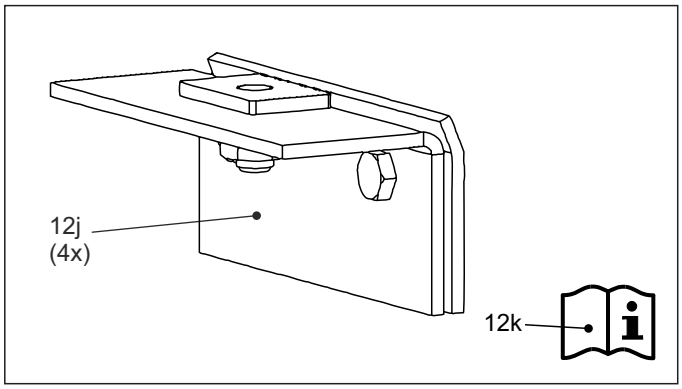
FIX WD for corrugated roofing



12h Mounting profile beam
12i Quick instructions

Fig. 3-13 FIX WD

FIX BD for folded sheet metal roofing



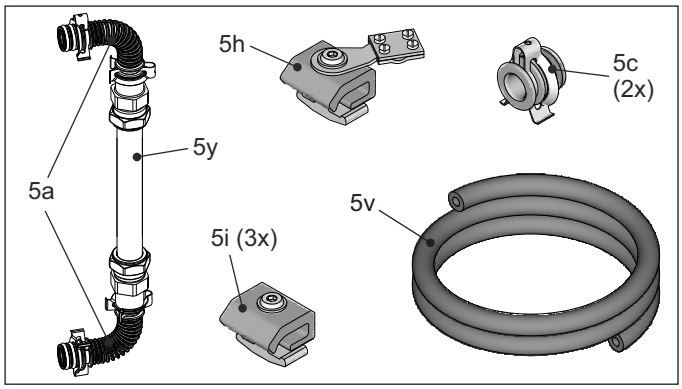
12j Mounting profile beam
12k Quick instructions

Fig. 3-14 FIX BD

Solar panel row connector

CON LCP

For connecting two solar panel rows one above the other.



5a Solar panel connecting elbow, pressure
5c Sealing plugs
5h Single terminal block with equipotential bonding terminal
5i Single terminal block
5v HT-Armaflex Ø 22 x 13 UV-resistant (1 m)
5y Connecting pipe Cu Ø 22 mm (1 m)

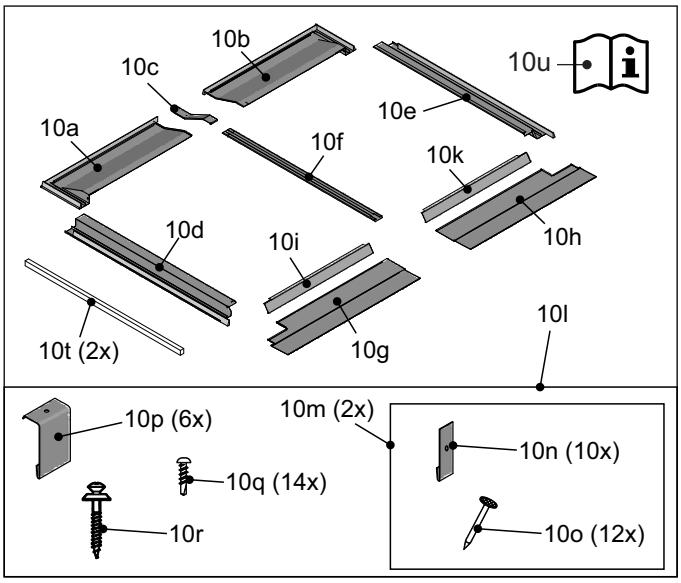
Fig. 3-15 CON LCP

3.3.3 System components for in-roof systems (IDM)

In-roof mounting packs
Please note the information in chapter 6.6.

Basic package IB V21P
for two EKSV21P flat solar panels

Basic package IB V26P
for two EKSV26P flat solar panels

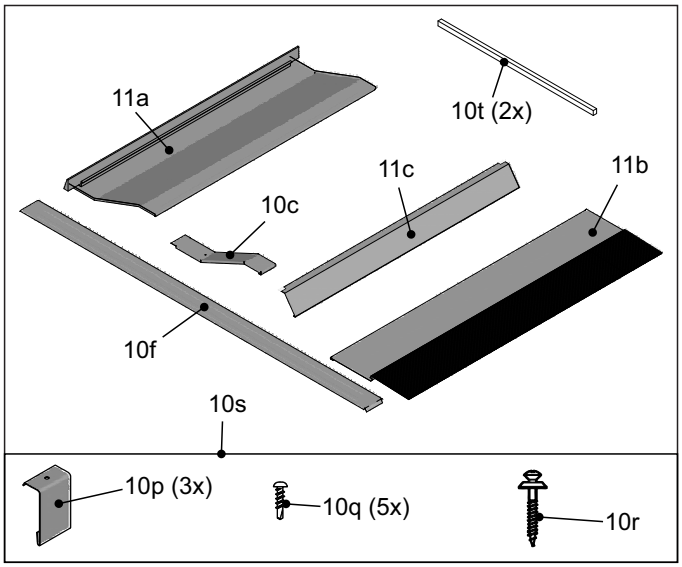


10a Upper left cover plate
10b Upper right cover plate
10c Upper cover strip
10d Left side part
10e Right side part
10f Plug-in strip
10g Bottom left drip-off sheet
10h Bottom right drip-off sheet
10i Bottom left sight guard plate
10k Bottom right sight guard plate
10l Accessory bag
10m Accessory bag
10n Locking plate
10o Nail
10p Holder for drip-off sheets
10q Tapping screw
10r Metal screw
10t Foam adhesive strips
10u Quick instructions

Fig. 3-16 IB V21P / IB V26P

Expansion package IE V21P
for each further EKSV21P flat solar panel (3 to 5)

Expansion package IE V26P
for each further EKSV26P flat solar panel (3 to 5)



11a Upper middle cover plate
10c Upper cover strip
10f Plug-in strip
11b Bottom middle drip-off sheet
11c Bottom middle sight guard plate
10p Holder for drip-off sheets
10q Tapping screw
10r Metal screw
10s Accessory bag
10t Foam adhesive strips

Fig. 3-17 IE V21P / IE V26P

Expansion package FIX IES
for flat roofing (e.g. slate) and two flat solar panels

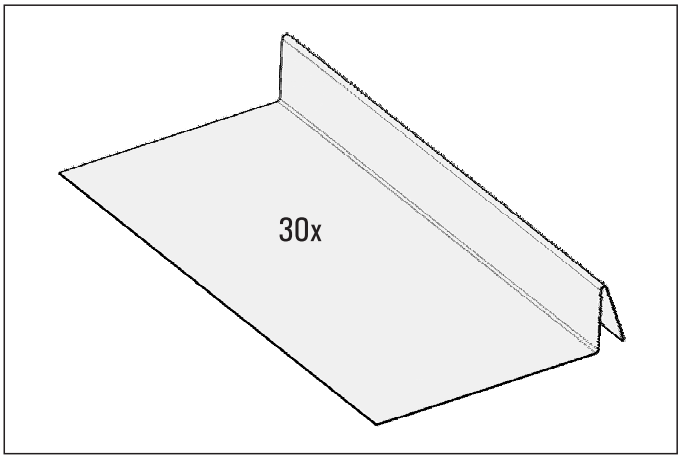


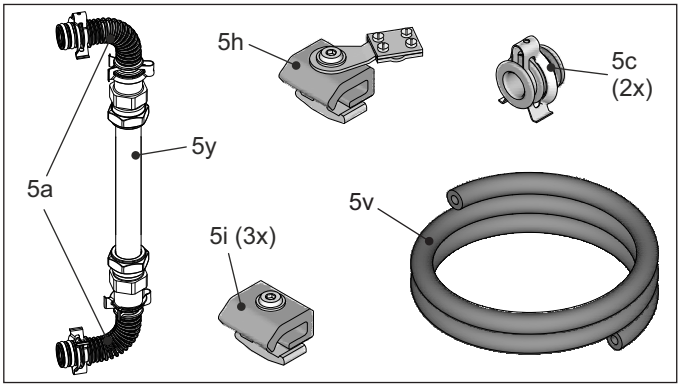
Fig. 3-18 FIX IES

3 Product description

Solar panel row connector

CON LCP

For connecting two solar panel rows one above the other.



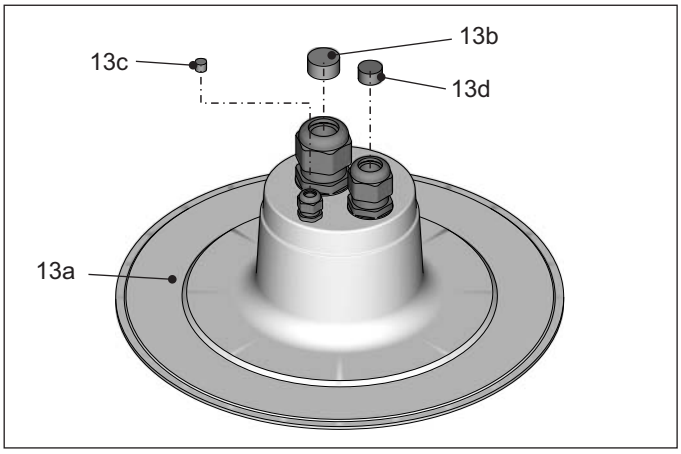
5a Solar panel connecting elbow, pressure
5c Sealing plugs
5h Single terminal block with equipotential bonding terminal
5i Single terminal block
5v HT-Armaflex Ø 22 x 13 UV-resistant (1 m)
5y Connecting pipe Cu Ø 22 mm (1 m)

Fig. 3-19 CON LCP

3.3.4 System components for flat roof systems (FDM)

Roof penetration

CON FE
CON FE is required twice for two-way connection (essential from 3 panels upwards)

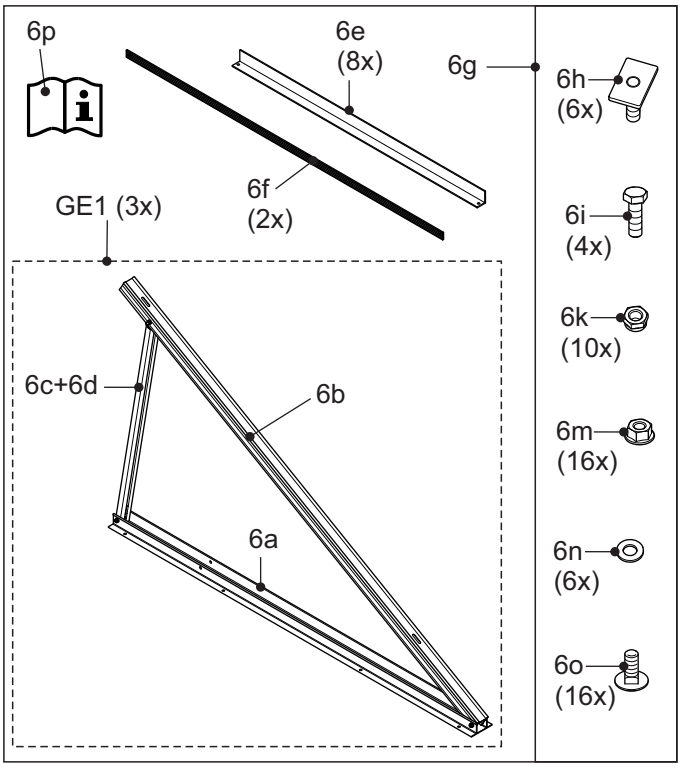


13a CON F roof penetration box
13b Sealing unit for screwed cable fitting M40
13c Sealing unit for screwed cable fitting M16
13d Sealing unit for screwed cable fitting M32

Fig. 3-20 CON FE

Flat roof mounting packs

Basic package FB V26P
for two EKSV26P flat solar panels



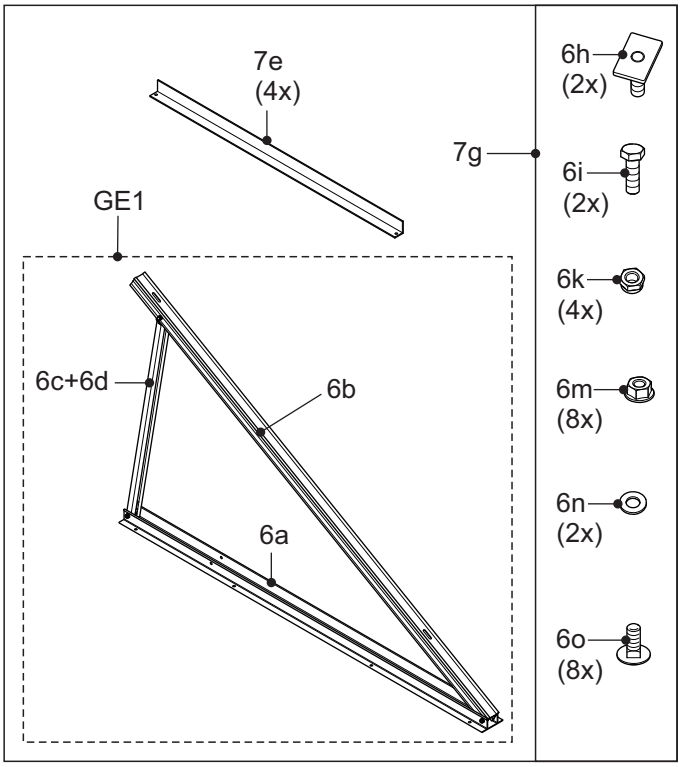
GE1 Pre-mounted basic element
6a Basic rail EKSV26P
6b Bearing rail EKSV26P
6c Telescopic rail, outer EKSV26P
6d Telescope rail, inner EKSV26P

6e Cross brace EKSV26P
6f Diagonal brace EKSV26P
6g Accessory bag EKSV26P
6h Terminal M8
6i Hexagon screw M8
6k Hexagon nut M8
6m Hexagon nut M8 with locking serration
6n Washer
6o Round head screw M8
6p Quick instructions

Fig. 3-21 Flat roof frame, basic package FB V26P

3 Product description

Expansion package FE V26P
for each further EKSV26P flat solar panel (3 to 5)

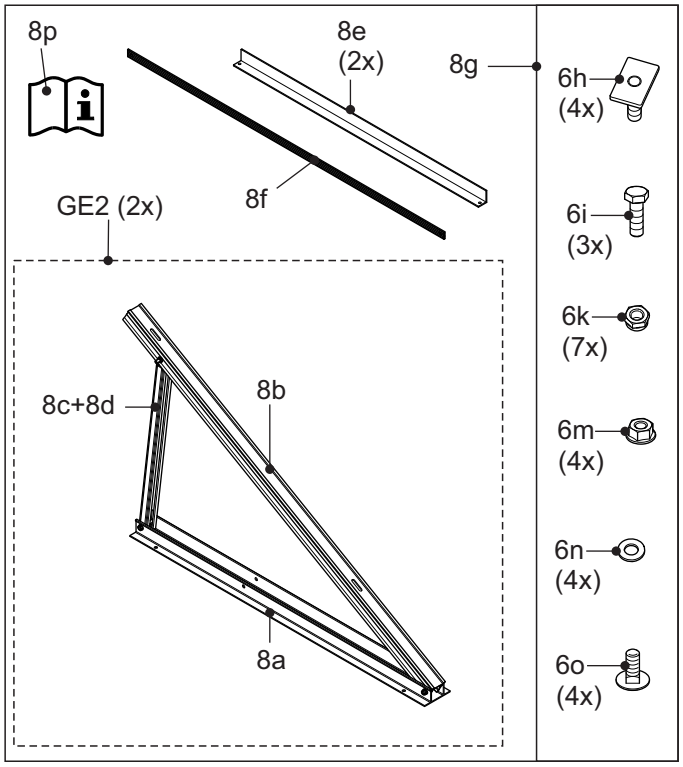


GE1 Pre-mounted basic element
6a Basic rail EKSV26P
6b Bearing rail EKSV26P
6c Telescopic rail, outer EKSV26P
6d Telescope rail, inner EKSV26P

7e Cross brace EKSV26P extension
7g Accessory bag EKSV26P
6h Terminal M8
6i Hexagon screw M8
6k Hexagon nut M8
6m Hexagon nut M8 with locking serration
6n Washer
6o Round head screw M8

Fig. 3-22 Flat roof frame, expansion package FE V26P

Basic package FB H26P
for one EKSH26P flat solar panel

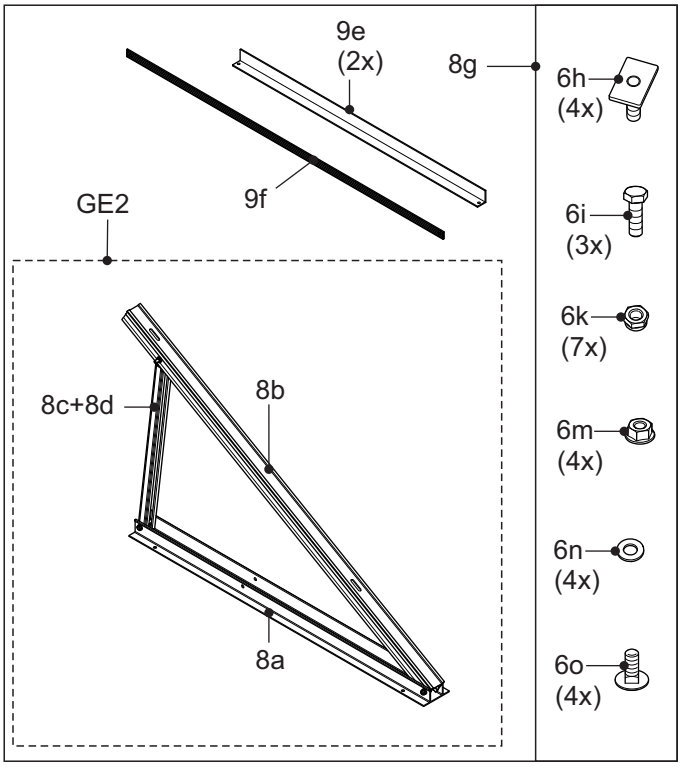


GE2 Pre-mounted basic element
8a Basic rail EKSH26P
8b Bearing rail EKSH26P
8c Telescopic rail, outer EKSH26P
8d Telescope rail, inner EKSH26P

8e Cross brace EKSH26P
8f Diagonal brace EKSH26P
8g Accessory bag EKSH26P
6h Terminal M8
6i Hexagon screw M8
6k Hexagon nut M8
6m Hexagon nut M8 with locking serration
6n Washer
6o Round head screw M8
6p Quick instructions

Fig. 3-23 Flat roof frame, basic package FB H26P

Expansion package FE H26P
for each further EKSH26P flat solar panel (2 to 5)



GE2 Pre-mounted basic element
8a Basic rail EKSH26P
8b Bearing rail EKSH26P
8c Telescopic rail, outer EKSH26P
8d Telescope rail, inner EKSH26P

9e Cross brace EKSH26P extension
9f Diagonal brace EKSH26P
8g Accessory bag EKSH26P
6h Terminal M8
6i Hexagon screw M8
6k Hexagon nut M8
6m Hexagon nut M8 with locking serration
6n Washer
6o Round head screw M8

Fig. 3-24 Flat roof frame, expansion package FE H26P

4 Installation

These instructions describe the solar panel fastening and the hydraulic connection of the pressurised solar system as well as the associated electrotechnical measures.

All assembly information for the sub-construction or the roof integration of the DAIKIN Solar flat solar panels are given in the respective quick instructions which accompany the

- roof-mounted assembly packages
- in-roof assembly packages
- flat roof assembly packages.

All steps in these instructions are described using an example of a single row solar panel array with double-sided connection (solar return flow at bottom left, solar inflow at top right). For double-sided connection with reverse hydraulic connection (solar return flow at bottom left, solar inflow at top left), the steps must be carried out in a similar way.

The solar panel array (bottom edge) should be aligned exactly horizontal or with a slight gradient to the bottom connection.

4.1 Transport and storage

4.1.1 Transport

CAUTION!

The DAIKIN Solar flat solar panels are impervious to slight mechanical loading. However, impact, shock and walking on them should be avoided.

- DAIKIN Solar flat solar panels should be transported and stored with care in their original packaging only and this packaging should not be removed until shortly before installation.
- DAIKIN Solar flat solar panels should be stored and transported flat on even and dry supports.
  - Transport with forklift trucks or cranes is only allowed on pallets.
  - Up to 10 flat solar panels can be stacked and transported on top of each other.

The DAIKIN Solar flat solar panels are delivered on a pallet, wrapped in film. All industrial trucks, such as lifting trucks and forklift trucks, are suitable for transporting it. Other DAIKIN Solar components are delivered packaged separately.

4.1.2 Storage

The following should be taken into account when storing DAIKIN Solar system components:

- All components should be stored in dry and frost-protected rooms only.
- Dismantled hydraulic components must be completely drained before being stored.
- Components must not be stored until they have cooled down.
- Current-carrying components must be permanently isolated from the power supply before storage (switch off fuses and main switches, remove cables) and must be secured against being restarted inadvertently.
- The components must be stored in such a way that persons are not endangered by them.

The regulations in the respective documentation for other heating components apply for transport and storage of these products.

4.2 System layouts

DAIKIN solar systems are usually built according to one of the following system concepts.

4.2.1 Parallel connection

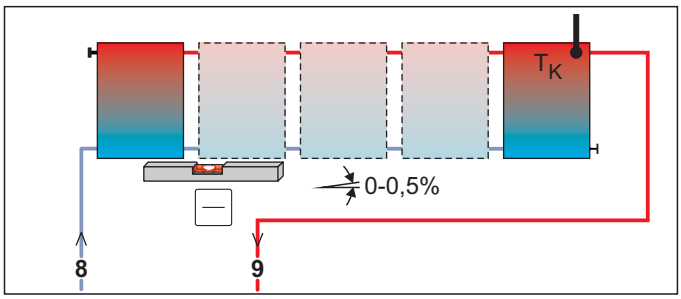


Fig. 4-1 Two-way connected solar panel array (recommended)

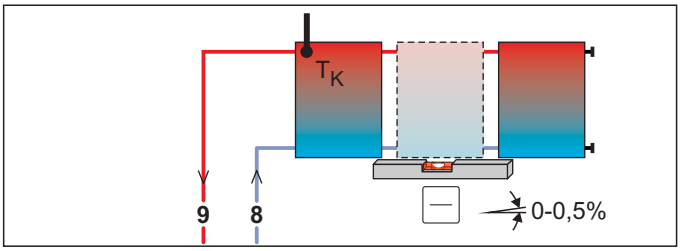


Fig. 4-2 Same-side connected solar panel array (max. 3 solar panels)

4.2.2 Series connection

As an alternative to the parallel circuits of the solar panels described in these instructions, a maximum of three rows of solar panels can also be installed above one another if required. Solar panels or solar panel arrays installed in this way must be connected in series (fig. 4-3).

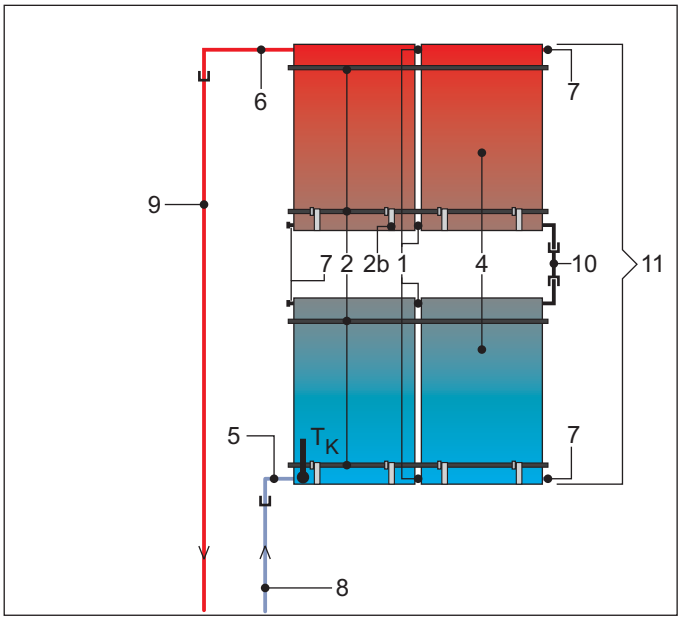


Fig. 4-3 Alternative solar panel arrangement

1 *Collector connector*
2 *Mounting rail*
2b *Solar panel securing clips*
4 *Solar panel*
5 *Solar panel connecting elbow return flow*
6 *Solar panel connecting elbow inflow*
7 *Sealing plug*
8 *Solar return flow pipe*
9 *Solar inflow pipe*
10 *Solar panel row connector*
11 *Solar panel array (2x 2 solar panels)*
T_K *Solar solar panel temperature sensor*

Tab. 4-1 Legend for fig. 4-1 to fig. 4-3 and fig. 4-5

The EKSV21P, EKSV26P and EKSH26P flat solar panels can be installed on roofs with an incline from 15° to 80° (roof-mounted mounting).

The EKSV21P and EKSV26P flat solar panels can be integrated in the roof area if it has an incline from 15° to 80° (in-roof mounting).

The EKSV26P and EKSH26P flat solar panels can be installed on flat roofs with an incline of less than 5° (flat roof mounting).

For detailed information on the alignment of the solar panel array and on attaching it onto the roof area or for integration in the roof covering, refer to the quick instructions that accompany the respective assembly packages.

4.3 Laying the connecting pipe

The connection pipe between the solar panel array and the hot water storage tank must be made of pressure-resistant metal pipes (CON 15P16 / CON 15P20 or Cu Ø 22 mm). The use of plastic piping is not allowed.

- Lay and affix prefabricated connection pipes (inflow and return flow) with integrated sensor cable (see chap. 3) between the planned installation location and the solar panel array in the inner roof and the site of the hot water storage tank.
  - Make sure there is adequate length for connection to the hot water storage tank and the flat solar panels.
  - The maximum permissible overall pipe length must not be exceeded (see tab. 4-2).
    If the CON 15P16 or CON 15P20 connection pipes do not reach, DAIKIN recommends using the extending the connection pipes with the CON XP pressurised solar system connectors (see chap. 3.3.1).

If longer distances need to be covered, calculations need to be made for the dimensioning of the connecting pipes.

Contact DAIKIN Service.

  - The inlet connection pipe must be connected to the solar panel at the top and the return flow connection pipe at the bottom (see fig. 4-1 to fig. 4-3 and fig. 4-5).

Number of solar panels	Maximum possible total pipe length with CON 15…	
	P16	P20
2	25 m	25 m
3	25 m	25 m
4	–	25 m
5	–	25 m

Tab. 4-2 Maximum lengths of the DAIKIN connecting pipes

Notes on the roof penetration of the connecting pipe

CAUTION!

Leaking vapour barriers can lead to building damage.

- Reseal the vapour barrier from the inside at the penetration points of the connecting pipes and cable.

Carry out the following steps:

1. Make the roof penetration points as close as possible under the panel connecting points. Make sure that effective sealing of the outer roof area can be ensured.
2. Lay the connection pipes up to the roof penetration and fix in position (e.g. with clamps).

The connecting cable for the solar panel temperature sensor is drawn into the heat insulation hose together with the inflow connecting pipe.

For flat roof mounting:

For two-way connection of the solar panel array for the roof penetration of the inlet and return flow pipes, DAIKIN recommends installing two separate flat roof penetrations.

With 3 and more solar panels, the solar panel array must be two-way connected. The CON FE roof penetration required for this is equipped with seals for the cable screw fittings. They must be removed to match the connection type.

3. Cut off or cut open the heat insulation of the roof underneath the roof penetration in such a way that the connecting pipe can be laid to the roof penetration.
4. Run the connecting pipes through the roof at the points provided. For the required continuous heat insulation (also inside the roof), seal the insulation at the joints (e.g. with adhesive tape).
5. **For on-roof mounting:**
   For roof penetration in roof-mounted systems, DAIKIN recommends laying the connection pipe through a ventilating tile into the inside of the roof.
   Guide the connection pipe through the ventilating tile. Ensure that the heat insulation hoses are not damaged.
   If no suitable ventilating elements are available for the existing roof covering, consult a roofer to ensure a permanently sealed roof penetration for the connection pipe.

   With flat roof mounting:
   a) Cut off the thermal insulating hoses of the connecting pipes so that the pipes can be passed through the individual roof penetrations.

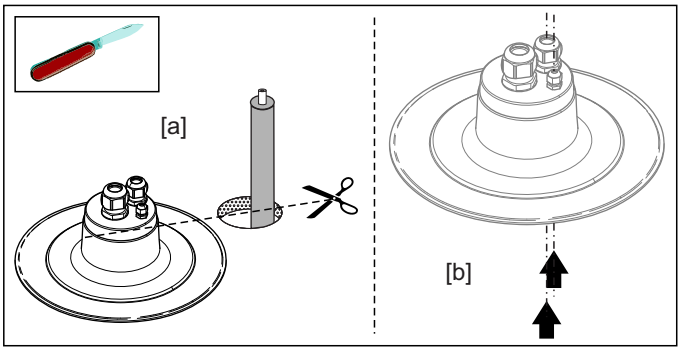


Fig. 4-4 Steps 5a and 5b

   b) Pull the inflow pipe (top on the flat solar panel) as well as the return flow pipe (bottom on the flat solar panel) through the matching screw fitting of the respective roof penetration. Following this, push the equipotential bonding terminal/collector temperature sensor cable from the inside through the relevant M16 screw connection.
   c) The flat roof penetration must be professionally sealed in the roof (e.g. by means of bitumen sheeting). Involve a roofer if necessary.
   Depending on the type of connection, seal off the unused cable screw fittings in the flat roof penetrations with the matching seal screw fittings.
   d) Tighten the cable screw fittings in the roof penetrations (for connection pipes and cables).

4.4 Mounting the flat solar panels

The solar panel mounting and the hydraulic connection is only carried out after installation of the requisite sub-construction. All assembly information for the sub-construction or the roof integration of the DAIKIN Solar flat solar panels are given in the respective quick instructions which accompany the

- roof-mounted assembly packages
- in-roof assembly packages
- flat roof assembly packages.

- Fix the upper mounting profile in place in such a way that the lateral alignment can still be corrected.
- When mounting, ensure that the requirement for free air flow is always maintained. (Do not install any insulation or anything else that would impair the free flow of air.)

Carry out the following steps:

1. Hook the solar panel securing clips in the guide groove of the lower mounting profile and tilt downwards.
   When fitted, the securing clips can be easily pushed sideways.

In the pressurised solar system, the installation openings of the solar panel temperature sensor must be in the upper area of the flat solar panel.

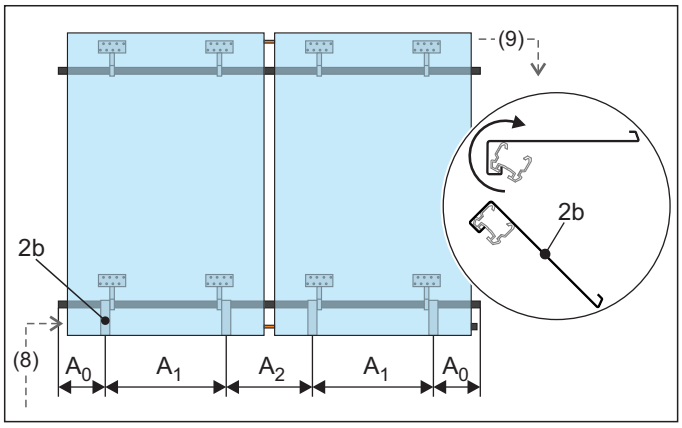


Fig. 4-5 Step 1: Alignment of the securing clips
(Legend, see tab. 4-1; Dimensions, see tab. 4-3)

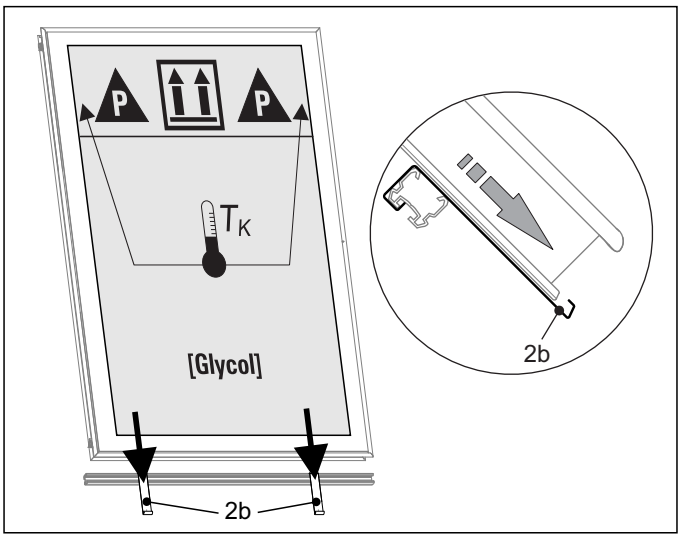
	EKSV21P	EKSV26P	EKSH26P
A0	100 – 250		
A1	650 – 850	800 – 1100	1600 – 1800
A2	240 – 440		

Tab. 4-3 Clearance dimensions of the securing clips

2. Lift the flat solar panel onto the roof area using a crane. If no crane is available, the solar panel can be hoisted onto the roof with a rope, using a ladder leaning against the roof edge. Depending on the installation requirements, unpack the solar panel before or after the transport to the roof and remove the collection pipe protective plugs.

The flat solar panel must be lifted onto the roof in the correct orientation for mounting (prevents faults during connection or difficult manoeuvring operations). The top side of the solar panel (P) is marked on the protective cover of the solar panel glazing. The plugs for the solar panel temperature sensor and the round solar panel connection seals must at the bottom when aligning the flat solar panel.

3. Lift the covered solar panel above the mounting profile, set down and carefully hook into the securing clips. Always begin with the left outer solar panel.



2b Solar panel securing clips
Fig. 4-6 Step 3

4. Move the flat solar panel sideways until the left-hand outer ends of the two mounting rails project approx. 25 mm beyond the solar panel's edge.
   If necessary, correct the alignment of the upper mounting profile and finally screw tight.

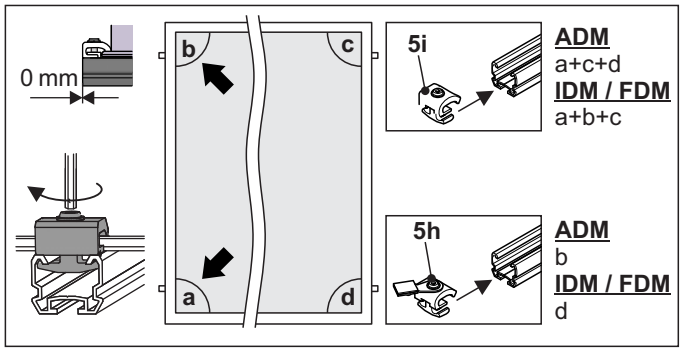
CAUTION!

In order to prevent torsional stresses and fixing difficulties when mounting the solar panels,

- slightly tighten the self-locking nuts of the slide blocks,
- align both mounting profiles exactly level and parallel to one another. If needed, the mounting profiles inserted in suitable way.

For the roof-mounted system (ADM), the equipotential bonding terminal is attached close to the inflow connection (top); in contrast, for the in-roof system (IDM) and flat roof system (FDM), it is attached close to the return flow connection (bottom).

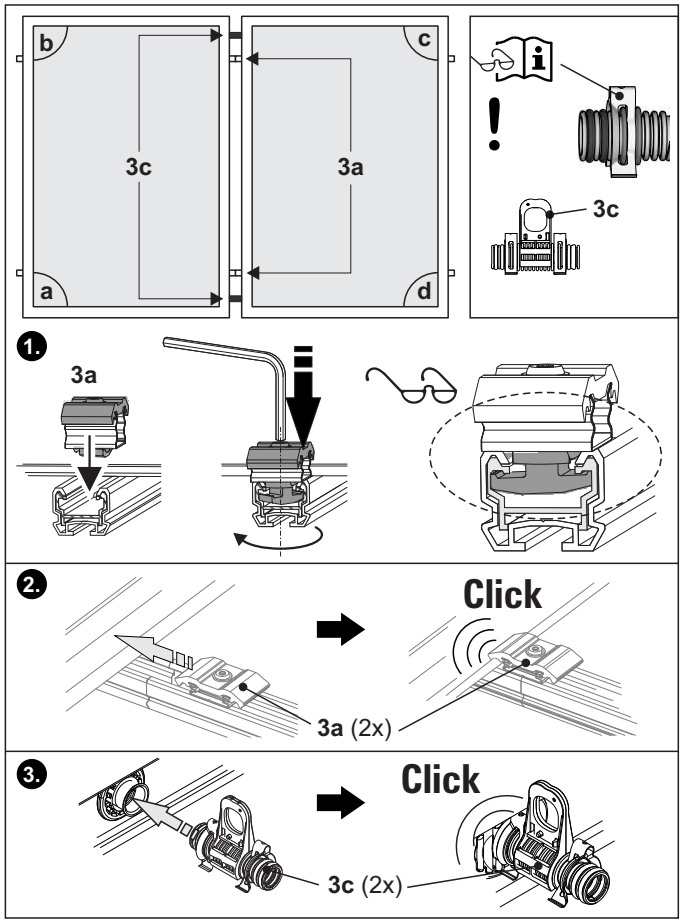
Push the single terminal blocks from the left side into the mounting profiles (flush closure) and screw tight (fig. 4-7).



5h Single terminal block with equipotential bonding terminal
5i Single terminal block

Fig. 4-7 Work step 4

5. If there are 2 and more solar panels, install double terminal blocks and compensators.



3a Double terminal block for solar panel fastening
3c Compensator for solar panel connection with mounting supports

Fig. 4-8 Step 5 for 2 or more panels

6. Raise further covered solar panels above the mounting profile, set down and carefully hook into the securing clips and push together.

CAUTION!

If the connections on the flat solar panel (FIX VBP, pos. 3c) are not fitted with extreme caution, the seal ring can become damaged. This causes leaks in the system.

- Always fit the expansion joints to the flat solar panels with extreme caution.
- Bring the next flat solar panel into alignment with the connection pipes of the previous flat solar panel when pushing together.

CAUTION!

If the retaining clamps do not click in place audibly, the DAIKIN Solar system can develop leaks and thus restrict operational safety.

Reasons for the retaining clamps not engaging:

- Flat solar panels not completely pushed together.
- Absorber position moved (push the absorber into the connections on the opposite side in the correct position, wearing protective gloves).

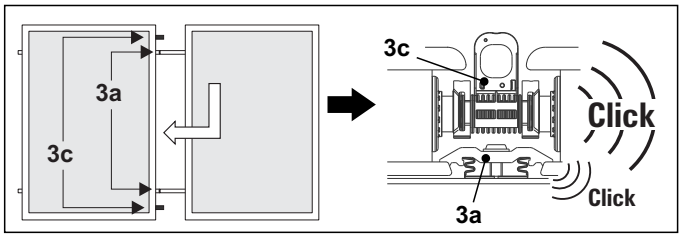


Fig. 4-9 Step 6 for 2 or more panels

7. Screw the double terminal blocks tight between the flat solar panels.

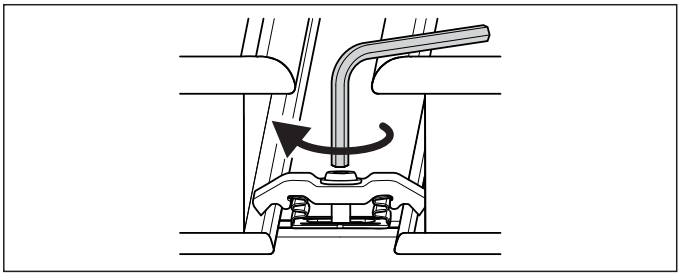
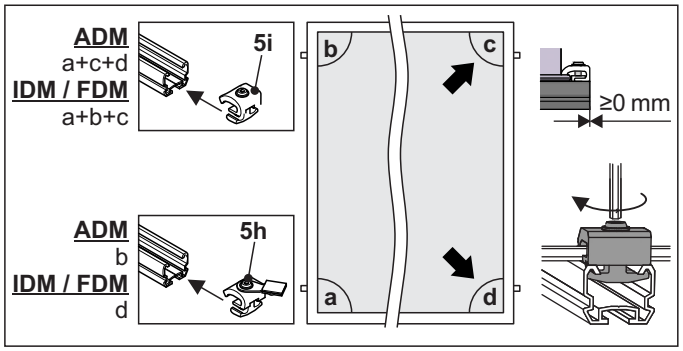


Fig. 4-10 Step 7

8. After fitting the last solar panel of a parallel connected solar panel array, push the single terminal blocks into the mounting profiles from the right side and screw tight.



5h Single terminal block with equipotential bonding terminal
5i Single terminal block

Fig. 4-11 Step 8

9. Pull the mounting supports off the compensators.

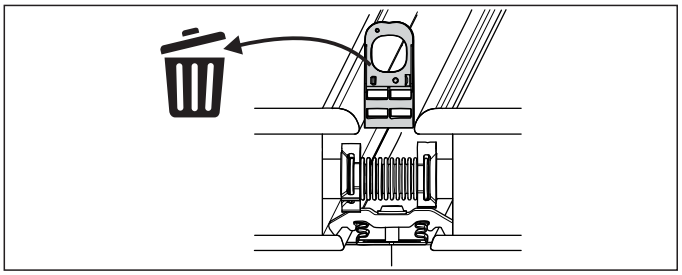


Fig. 4-12 Step 9

4.5 Connecting the pressurised solar system hydraulically

These instructions only describe the pipe laying for two-way connection with two roof penetrations.

In principle, there is a possibility of having an alternative connection with a single roof penetration.

- In this case, it is essential to make sure that the inflow pipe is always installed with the necessary gradient behind the solar panel surface in order to then lay this also on the side of the return flow pipe through the roof penetration.

WARNING!

Danger of burns from hot solar panel couplings and hot solar panel frame.

- Do not remove the cover of the solar panel until hydraulic connection work has been completed.
- Do not touch hot parts.
- Wear protective gloves.

CAUTION!

Danger of scalding if incorrect connection pipes are used.

- Only use connection pipes made of pressure-resistant metal piping (CON XP16 / CON XP20 or Cu Ø 22 mm) between the Solar panel array and EKSRDS2A.
- The use of plastic piping is not allowed.

Carry out the following steps:

1. Before installing the plug connections, check the proper seating of the holding clamps and inspect the O-rings for damage.

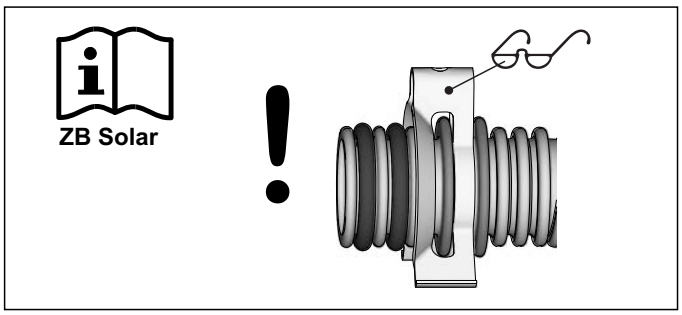


Fig. 4-13 Step 1

2. Insert the solar panel connecting elbows into the solar panel connecting pipe until the retaining clips audibly engage. Install the return flow connection at the bottom and the two-way inflow connection at the top if possible.

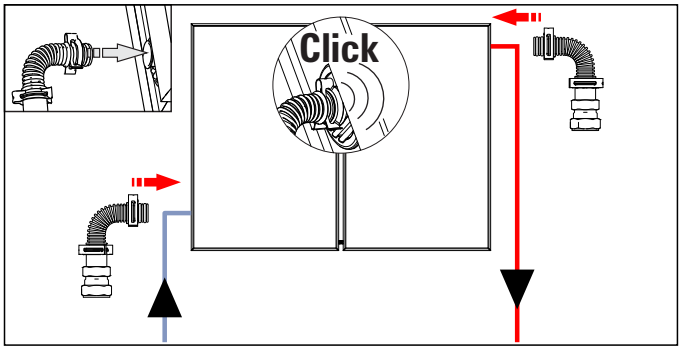


Fig. 4-14 Work step 2

3. Insert the sealing plugs into the open solar panel connection pipes until the retaining clamps click in place.

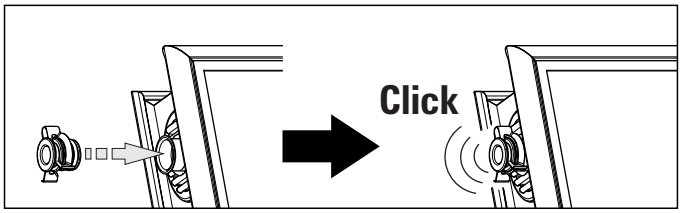


Fig. 4-15 Work step 3

4. Mark and cut off the required length of the inflow (top) and return flow pipes (bottom). Then deburr the pipe ends.

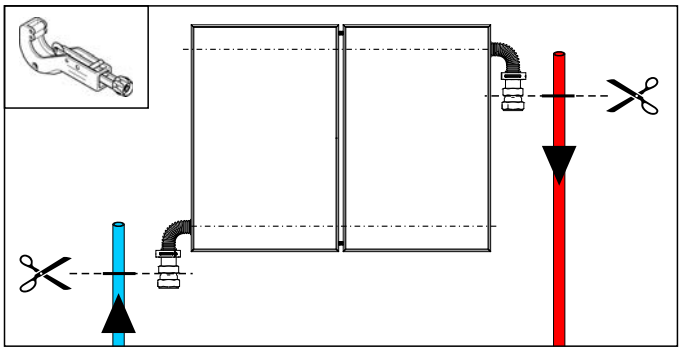


Fig. 4-16 Step 4

5. Slide the heat insulation hoses onto the connection pipes or solar panel connecting elbows and cut to the required length.

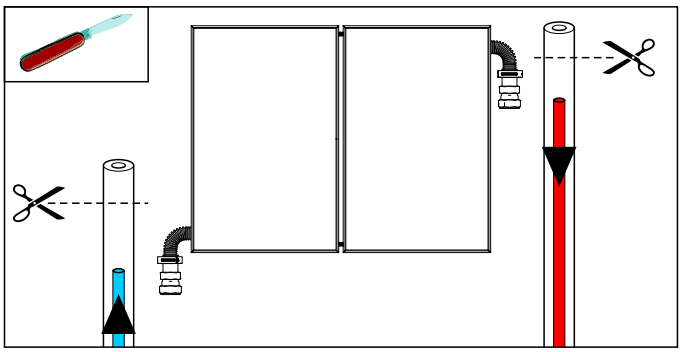
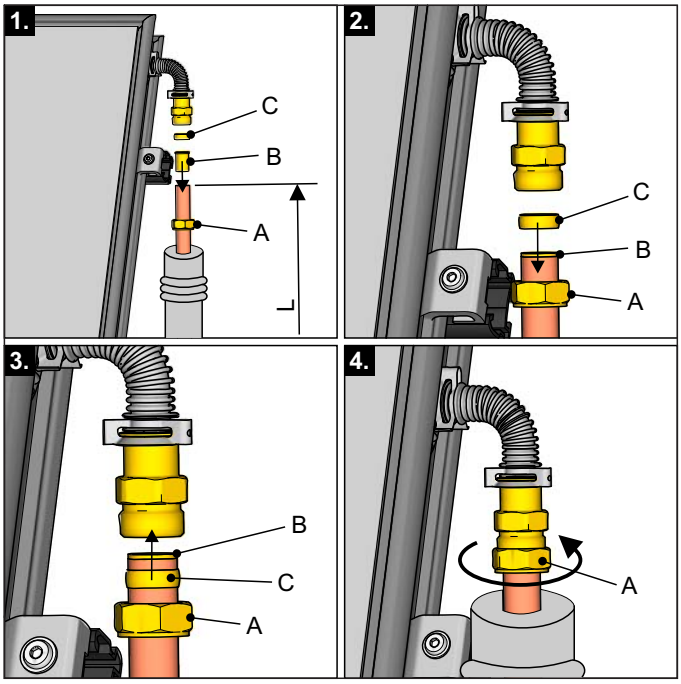


Fig. 4-17 Step 5

6. Connect the inflow and return flow pipes to the cutting ring screw fittings of the solar panel connecting elbows and the connection set.



A Union nut
B Support sleeve
C Cutting ring
D Fitting

Fig. 4-18 Step 6

7. Slide the compressed heat insulation hose over the solar panel connecting elbow.

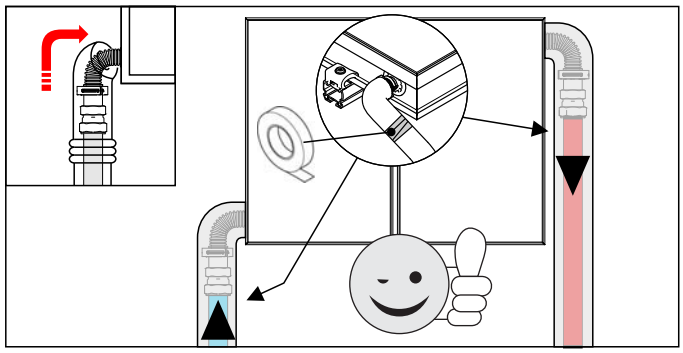


Fig. 4-19 Step 7

4.6 Installing the equipotential bonding terminal

WARNING!

The equipotential bonding does not replace a lightning conductor. It is only provided for protecting the solar panel temperature sensor and the control unit. Local lightning strike regulations must also be observed.

For the roof-mounted system (ADM), the equipotential bonding terminal is attached close to the inflow connection (top); in contrast, for the in-roof system (IDM) and flat roof system (FDM), it is attached close to the return flow connection (bottom).

1. Loosen the slotted screws on the installed equipotential bonding terminal and connect the equipotential bonding cable (not included in the scope of delivery) to the terminal. Then retighten the screws.
2. Lay the equipotential bonding cable up to the equipotential bonding rail (building side) and connect it there.
   Fix the equipotential bonding cable in place to the inflow pipe or return flow pipe with cable ties.

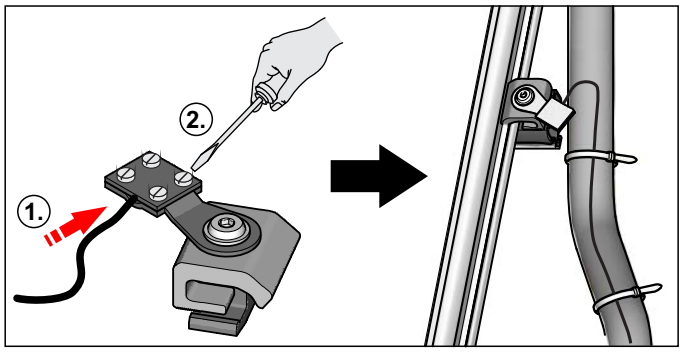


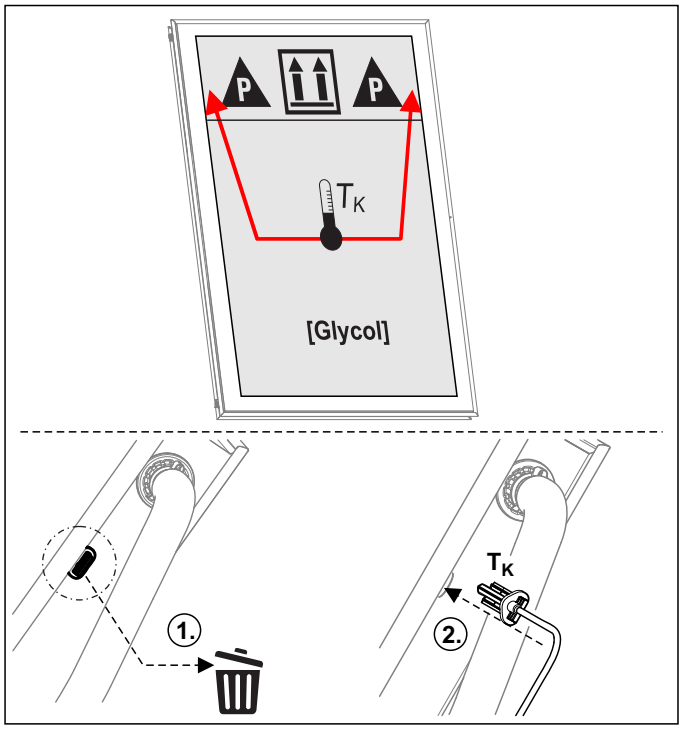
Fig. 4-20 Steps 1+2

If two or more solar panels rows are installed, they must be connected by means of an equipotential bonding. Equipotential bonding terminals are included in the CON LCP kit.

4.7 Installing the solar panel temperature sensor

The installation openings for the solar panel temperature sensor are located at the left and right of the side solar panel frame and closed with plugs when delivered.

1. Remove the sensor plugs at the top edge of the solar panel.
2. Slide the solar panel temperature sensor into the installation opening of the flat solar panel up to the end stop.
   The sensor of the probe must be clamped to the absorber plate.



T_K Solar panel temperature sensor
Fig. 4-21 Steps 1+2

CAUTION!

Moisture can damage the temperature sensor.

- When securing the cable, make sure that no rainwater can run down the cable to the sensor well (installing with drip-off elbow, see fig. 4-22).

3. Run the silicone-covered sensor cable to the roof penetration (with drip-off elbow) and secure it to the inflow connection line.
   Then connect the silicone-covered cable inside the roof to the connection cable of the solar panel temperature sensor of the control and pump units.

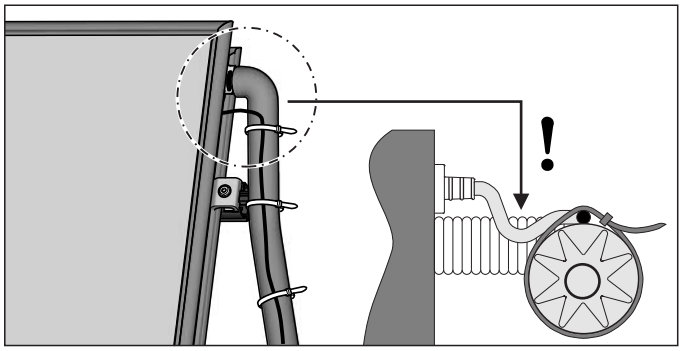


Fig. 4-22 Work step 3

5 Start-up and taking out of operation

5.1 Start-up

Instructions for integration in the hydraulic system, start-up, operation of the control systems and the rectification of faults and malfunctions are contained in the installation and operating instructions of the storage tanks, the DSR1 pressurised solar control unit and the EKSRDS2A pressure station.

WARNING!

The solar system cannot be started until all hydraulic and electrical connections have been completed.

An incorrect start-up will adversely affect the function and may damage the complete system. Installation and start-up must therefore must conducted by DAIKIN-authorised and trained heating experts.

Before start-up, the protective conductor resistance and proper connection must be checked.

The following points must be carried out during the initial start-up after all components have been installed:

1. Determining, checking and setting the required inlet pressure for the diaphragm expansion vessel in the depressurised condition (see Tab. 5-1 Inlet pressure MAG)
2. Fill the system with CORACON solar system fluid according to the operating instructions of the DAIKIN EKSRDS2A solar pressure station. The pressure at the initial filling must be 5 bar to ensure that all connections are properly mounted. The maximum system pressure p_e must not be exceeded (see Tab. 5-1 Maximum system pressure).
3. Venting the system (operating instructions of the DAIKIN EKSRDS2A solar pressure station).
4. Check all connection points and joints of the solar system circuit for leaks.
5. Then determine and set the system pressure in accordance with Tab. 5-1.

Inlet pressure MAG	System pressure	Maximum system pressure	System fill pressure
$p_v = 0.1 \times h_{stat} + 0.5$ bar	$p_0 = p_v + 0.3$ bar	$p_e \leq 0.9 \times p_{sv}$ (5.4 bar)	5 bar

p_e *Maximum permitted system pressure (warm) in bar*
p_{sv} *Operating pressure of safety valve = 6 bar*
p_v *Inlet pressure MAG in bar (at least 1.2 bar)*
p_0 *System filling pressure (cold) in bar*
h_{stat} *Static height in m between the centre of MAG and the highest point of the system*

Tab. 5-1 Calculating pressures for start-up

WARNING!

Danger of scalding from hot solar system fluid and escaping steam.

- Only fill the solar panel circuit with the solar panels covered.

5.2 Taking out of operation

5.2.1 Temporary shutdown

CAUTION!

A heating system which is shut down can freeze in the event of frost and may suffer damage.

- Drain the shut-down heating system if there is a danger of frost (does not apply to the frost-protected solar system circuit).

CAUTION!

Pumps switched off for a lengthy period can seize.
For temporarily shut-down solar systems, the protective function against seizing pumps (pump kick function) is also deactivated.

- When restarting, check the pump is working correctly. In most cases, seized pumps can be freed again manually.

The DAIKIN solar system can be temporarily shut down by disconnecting the mains plug from the power supply.

If there is a danger of frost:
- put the DAIKIN solar system back into operation
  or
- apply suitable antifreeze measures to the connected heating system and hot water storage tank (e.g. draining).

If there is a risk of frost for a few days only, the excellent heat insulation of the DAIKIN hot water tank means that it need not be drained as long as the storage tank temperature is observed regularly and not permitted to fall below +3 °C. This does not, however, provide any protection against frost for the connected heat distribution system.

5.2.2 Final shutdown

- Take the DAIKIN solar system out of operation (see chapter 5.2.1 "Temporary shutdown").
- Disconnect the DAIKIN solar system from all electrical and water connections.

- Drain the DAIKIN solar system (collect the solar system fluid and dispose of it properly) and dismantle in reverse order according to the installation manual (chapter 4 "Installation").
- Properly dispose of the DAIKIN solar system.

Recommendations for disposal

Thanks to the environmentally friendly design of the solar system, DAIKIN has complied with requirements for environmentally sound disposal. During the disposal process, the only waste created is that which can be used for material or thermal recycling.
The materials used that are suitable for recycling can be sorted into individual types.

The designation of the product means that electrical and electronic products may not be disposed of together with unsorted domestic waste.

Proper disposal in compliance with the respective national regulations of the country of use is the responsibility of the user/owner.

- Disassembly of the system, handling of coolant, oil and other parts may only be carried out by a qualified fitter.
- Disposal may only be carried out by a facility that specialises in reuse, recycling and recovery.

Further information is available from the installation company or the responsible local authorities.

6 Technical data

6.1 Product fiche

Energy labelling regulation: (EU) 811/2013

Ecodesign regulation: (EU) 813/2013

Solar devices, pumps + controls	/ Model names		EKSRDS2A			
Auxiliary	Solpump	[W]	22.5			
	Solstandby	[W]	5			
Annual auxiliary electricity consumption Qaux		[kWh/a]	89			
Details and precautions on installation, maintenance and assembly can be found in the installation and or operation manuals. Energy labels and product fiches for addition combinations, packages and other products can be found on www.energylabel.daikin.eu. This data is for comparison of Energy efficiencies according to Energy label directive (EU) 2017/1369, for correct selection of products for your application, contact your dealer. Depending on your application and the product selected an additional supplementary heater may have to be installed.						

Tab. 6-1 Characteristic data for determining the values for energy efficiency identification

6.2 General technical information

	Unit	Solar flat solar panel		
		EKSV21P	EKSV26P	EKSH26P
General				
Dimensions L x W x H	mm	2000 x 1006 x 85	2000 x 1300 x 85	1300 x 2000 x 85
Frame material	–	Aluminium		
Solar panel weight	kg	35	42	42
Solar panel content	l	1.3	1.7	2.1
Inclination angle	°	15-80		
Absorber				
Material	–	Aluminium		
Thickness	mm	0.4		
Coating	–	MIRO-THERM		
Connection to pipe register	–	Laser-welded		
Pipe register material	–	Copper		
Pipe register shape	–	Harp		
Glass				
Material	–	Single-pane safety glass		
Thickness	mm	3.2		
Min. hail resistance	–	HW 3		
Reference area				
Gross surface area	m^2	2.01	2.60	
Aperture surface area	m^2	1.80	2.36	
Absorber surface area	m^2	1.80	2.36	
Heat insulation				
Material	–	Mineral wool		
Thermal conductivity	W/(m K)	0.037		
Thickness	mm	50		

	Unit	Solar flat solar panel		
		EKSV21P	EKSV26P	EKSH26P
Performance characteristics [1]				
Conversion factor with (T_m-T_a=0)		0.71		
Linear solar panel efficiency factor a1	W/m²K	4.3		
Quadratic solar panel efficiency factor a2	W/m²K	0.006		
Radiation angle correction factor K(50°)		0.96		
Max. pressure drop at 100 l/h	mbar	3.5	3.0	0.5
Limit data for operation				
Max. operating pressure	bar	6		
Max. operating temperature	°C	95		
Stagnation temperature [2]	°C	192		
Installation method				
		On-roof In-roof	On-roof Flat roof In-roof	On-roof Flat roof

Test conditions: Collector testing is carried out in accordance with the European standards EN 12975:2022 and ISO 9806:2017
1) Test condition: Climate class A
2) Test condition: Stagnation temperature at 1000 W/m² and 30°C

The Solar flat solar panel is permanently standstill proof and thermo-shock tested.

Minimum collector yield above 525 kWh/m² per year with 40 % cloud coverage (location Würzburg)

Tab. 6-2 Technical data, flat solar panel

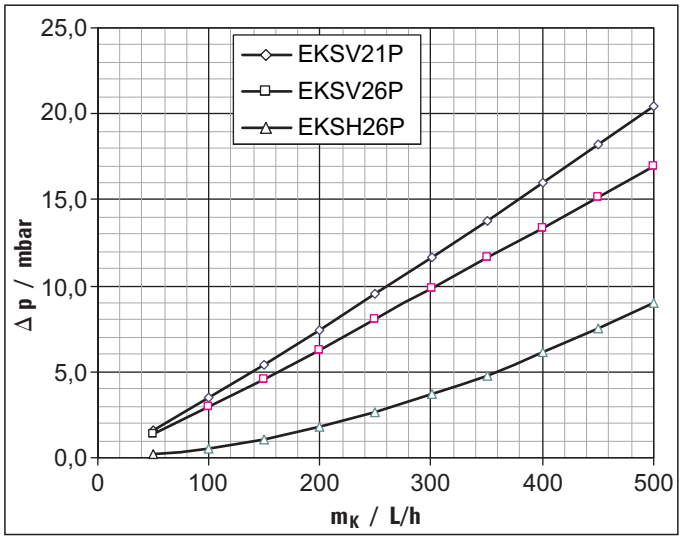


Fig. 6-1 Hydraulic resistance, flat solar panels

6 Technical data

6.3 Roof-mounted system – Max. permissible snow load (roof-mounted) as per EN 1991-1-3

Snow load s_k	Min. number of roof hooks	
< 1.6 kN/m^2 1)	1 solar panel	4
	2 solar panels	6
	3 solar panels	8
	4 solar panels	12
	5 solar panels	14
< 2.6 kN/m^2 2)	1 solar panel	4
	2 solar panels	6
	3 solar panels	8
	4 solar panels	12
	5 solar panels	14
> 2.6 kN/m^2	Additional mounting rail required 3)	

*1) With a rafter spacing of 1000 mm, a roof gradient of 30° and a building height < 10 m **
*2) At a rafter spacing of 650 mm, a roof gradient of 30° and a building height < 10 m **
3) For detailed execution information, contact DAIKIN Service
**) does not apply to exempted regions stated in EN 1991-1-3*

Tab. 6-3 Required number of roof hooks

6.4 Flat roof system – Required ballast weights (flat roof mounting) as per EN 1991-1-4

WARNING!

There is a danger of collapse if the load on the roof area is too high.

- Check the permissible roof load before installing the flat roof system.
- If the permissible roof load has been exceeded by the ballast weight, secure the solar panel array using a suitable steel rope construction.

- Only for wind actions up to 1.3 kN/m^2
- Only for snow loads up to 1.1 kN/m^2
- Height of the installation location above intended site up to 25 m

For higher wind actions or snow loads or building heights, contact DAIKIN Service for detailed execution information.

EKSV26P flat solar panel

Working angle	Wind action [kN/m^2]													
	0.5		0.65		0.8		0.95		1.1		1.2		1.3	
	Ballast weight in kg/solar panel													
	front	rear	front	rear	front	rear	front	rear	front	rear	front	rear	front	rear
30°	65	170	80	200	100	265	120	315	140	365	150	400	165	435
40°	40	170	45	200	60	265	70	315	80	365	90	400	95	435
50°	10	170	10	200	10	265	10	315	10	365	10	400	10	435
55°	15	170	15	200	25	265	25	315	30	365	35	400	35	435
60°	90	225	110	270	145	360	175	425	200	490	220	540	235	580

EKSH26P flat solar panel

Working angle	Wind action [kN/m^2]						
	0.5	0.65	0.8	0.95	1.1	1.2	1.3
	Ballast weight in kg/solar panel						
30°	250	320	395	470	545	595	640
40°	215	280	345	410	475	515	560
50°	180	235	290	345	400	435	470
55°	160	205	255	300	345	375	410
60°	150	195	235	280	325	355	385

Tab. 6-4 Ballast weights

6.5 Flat roof system – Shading

	EKSV26P					EKSH26P				
	Distance z [m] depending on gradient angle α					Distance z [m] depending on gradient angle α				
Latitude	30°	40°	50°	55°	60°	30°	40°	50°	55°	60°
56	7.13	8.47	9.55	9.99	10.35	4.63	5.50	6.21	6.49	6.72
54	6.24	7.33	8.20	8.54	8.81	4.06	4.77	5.33	5.55	5.73
52	5.60	6.50	7.21	7.48	7.70	3.64	4.23	4.69	4.86	5.00
50	5.11	5.87	6.46	6.68	6.85	3.32	3.82	4.20	4.34	4.45
48	4.72	5.37	5.86	6.04	6.18	3.07	3.49	3.81	3.93	4.01
46	4.41	4.97	5.38	5.53	5.63	2.86	3.23	3.50	3.59	3.66
44	4.15	4.64	4.98	5.10	5.18	2.70	2.01	3.24	3.32	3.37
42	3.93	4.35	4.65	4.74	4.80	2.55	2.83	3.02	3.08	3.12
40	3.74	4.11	4.36	4.43	4.47	2.43	2.67	2.83	2.88	2.91
38	3.57	3.90	4.11	4.16	4.19	2.32	2.53	2.67	2.71	2.72
36	3.43	3.71	3.89	3.93	3.94	2.23	2.41	2.53	2.55	2.56

Tab. 6-5 Measurement z with shading

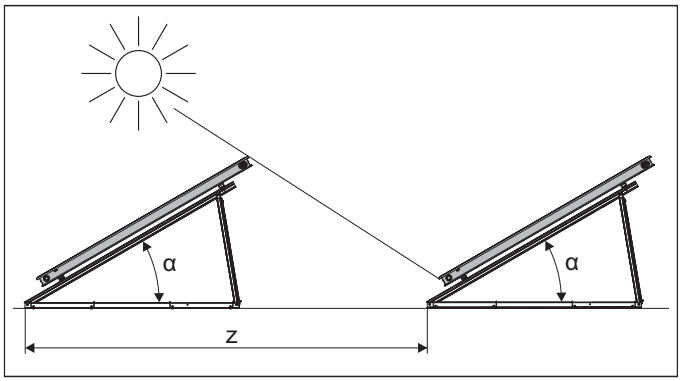


Fig. 6-2 Shading

6.6 In-roof system

CAUTION!

- It is important to avoid permanent stagnation over long periods of time.
- The stagnation period between installation and commissioning of the system must be less than a month.
- Ensure that the ventilation behind the collector housing is sufficient and complies with national regulations and building regulations.
- Do not add any additional insulation to the back of the collector.
- Lay and insulate the pipes near the collector so that they do not come into contact with wood or other combustible materials.
- Preventive measures must be taken to prevent any leaky connection from causing heat transfer fluid to penetrate into the collector.

7 Notes

8 List of keywords

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