



# Planning and installation instructions



DAIKIN DrainBack solar system

**EKSV21P  
EKSV26P  
EKSH26P  
Solar assembly packages**

Planning and installation instructions  
DAIKIN DrainBack solar system

**English**

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## 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 initial 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 Solar EKS RPS4A: Operating and installation instructions
- DAIKIN hot water storage tank (EKHWP or Altherma EHS(X/H)): 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 Safety

#### 2.1 Warning signs and explanation of symbols

##### 2.1.1 Meaning of the warnings

Warnings in this manual are classified according to 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 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 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 against being switched on inadvertently 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 responsible energy supply company (EVU).
- In accordance with IEC 60335-1, connect the mains 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  $\leq 0.2$  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 being switched on again inadvertently.
- 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)), 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 you hand 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 1055-4: 2005 / EN 1991-1-4 Wind actions
- DIN 1055-5: 2005 / EN 1991-1-3 Snow loads
- DIN 18338 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.

## 3 Product description

## 3 Product description

### 3.1 Construction and components of the Solar system (unpressurised system)

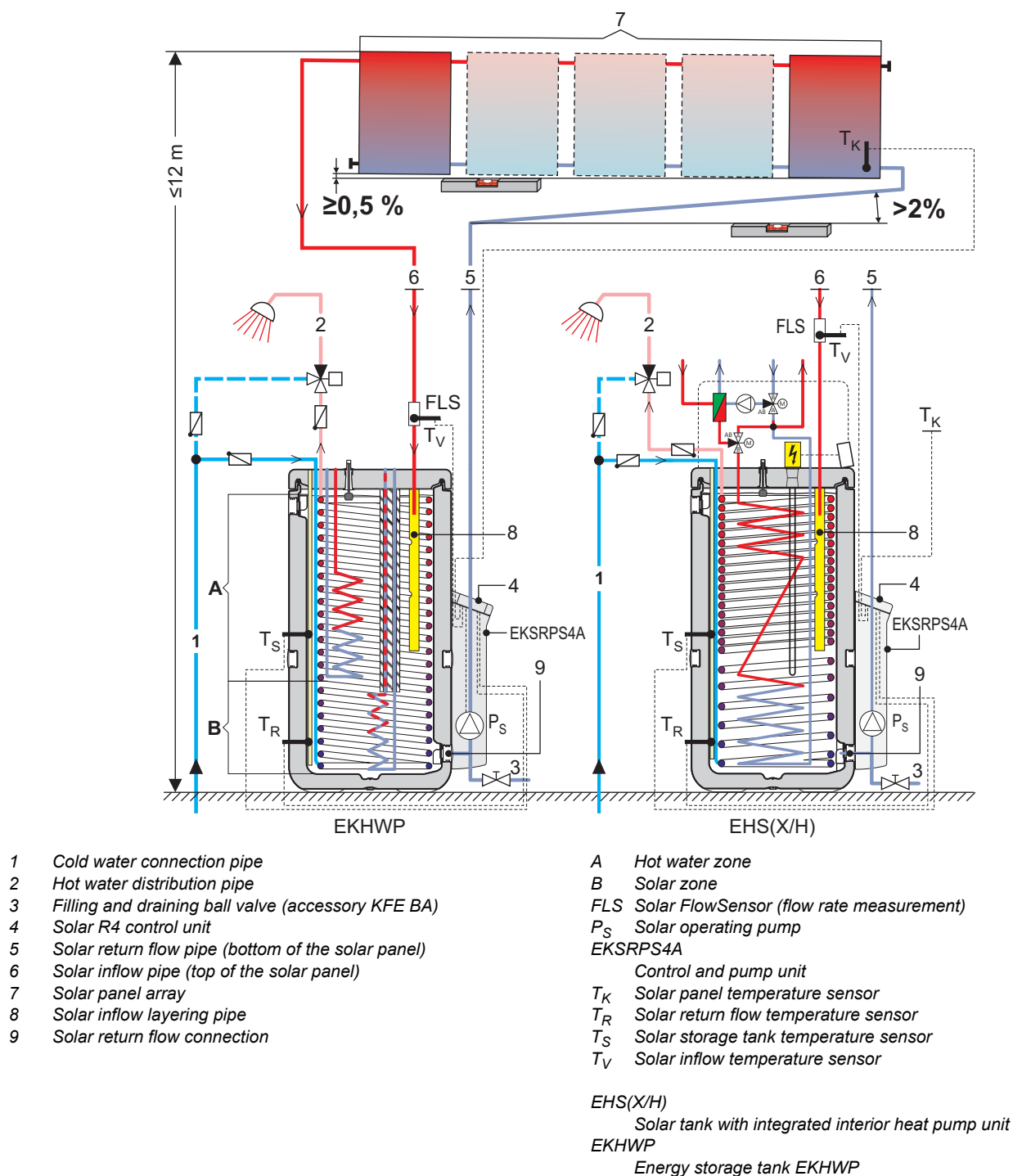


Fig. 3-1 Standard design of a DAIKIN Solar system (DAIKIN recommends a two-way connection)

## 3.2 Brief description

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



The pressure-less system (DrainBack) must only be used with the EKS RPS4A control and pump unit.

Prerequisite for fault-free operation in the DrainBack system is that the connecting pipes are laid with a consistent gradient (at least 2 %) and, with two-way connection, the bottom edges of the solar panel with constant gradient to the return flow connection or with equilateral connection, mounted horizontally.

### Operating mode

The Solar EKS V21P, EKS V26P and EKSH26P high-performance flat solar panels convert solar radiation into heat with a high degree of efficiency. The heat carrying medium is water with which the storage tanks are filled in accordance with the associated installation instructions.

As soon as the solar panels have reached a useful temperature level, the buffer water in the storage tank (which is not under pressure) is pumped directly through the panels. With insufficient panel temperature, the circulation pump is switched off and the system is drained automatically. This operating mode has several advantages:

- High operating safety as there are no components (such as expansion vessel, safety valve, vent valves) sensitive to damage or interference
- Excellent heat transfer and heat storage capacity (system works without antifreeze agents)
- Minimum maintenance requirements
- Frostproof
- No additional solar heat exchanger required
- No stagnation problems

### 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: Highly thermally insulated, unpressurised solar stratified tank (with possibility to connect to a DAIKIN air/water heating pump).
- Daikin Altherma integrated solar unit: 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 fully electronic DAIKIN Solar R4 control unit ensures optimum utilisation of the solar heat (hot water heating, heating support) and the observance of all safety-relevant aspects. All parameters needed for trouble-free operation have been preset at the factory.

## 3.3 System components for pressure-less systems

### 3.3.1 System components for all systems

#### High-performance flat solar panels

##### EKS V21P

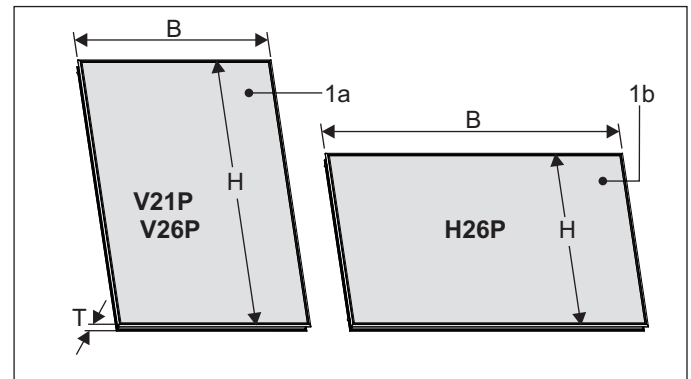
H x W x D: 2000 x 1006 x 85 mm, weight: approx. 35 kg

##### EKS V26P

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 EKS V21P / EKS V26P flat solar panel

1b High-performance EKSH26P flat solar panel

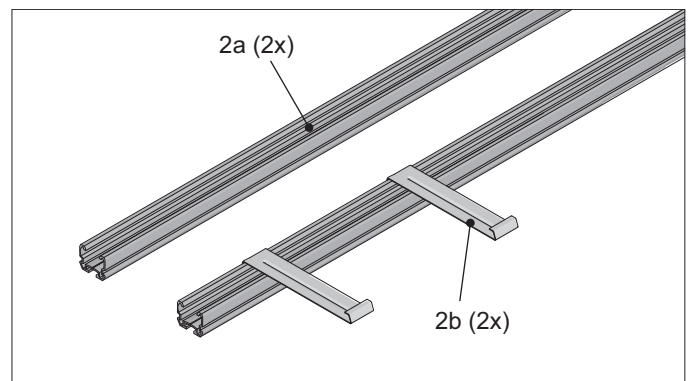
Fig. 3-2 Flat solar panel

#### FIX MP solar panel mounting rails

**FIX MP100** for one EKS V21P flat solar panel

**FIX MP130** for one EKS V26P flat solar panel

**FIX MP200** for one EKSH26P flat solar panel



2a Mounting profile rail

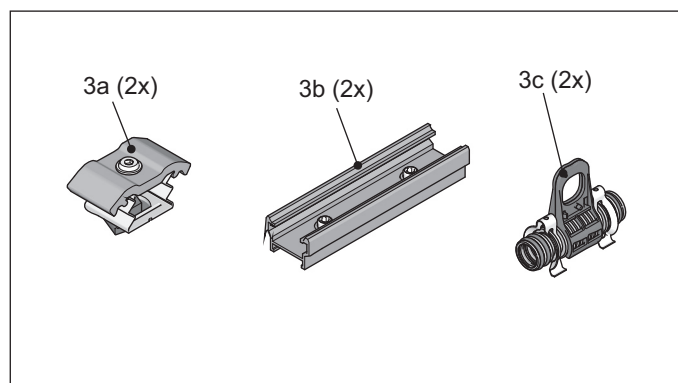
2b Solar panel securing clips

Fig. 3-3 FIX MP



### 3 Product description

#### 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 and CON 20 connection pipes

CON 15, L=15 m

and

CON 20, L=20 m

Connecting pipes between solar panel array and EKS RPS4A (heat-insulated inflow pipe and return flow pipe (Al-PEX compound pipe) with integrated sensor cable).

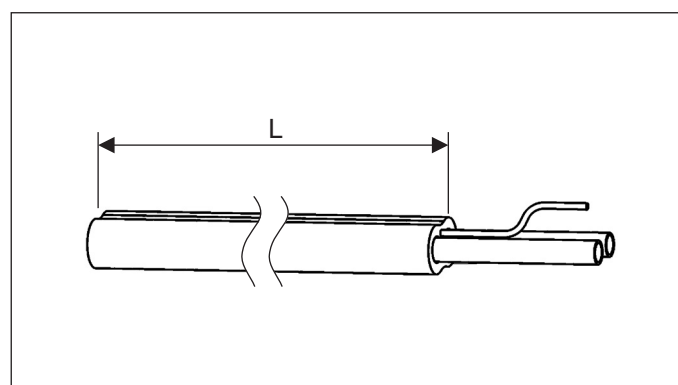


Fig. 3-5 CON 15 / CON 20

#### Extension kits for CON X connection pipe

CON X25, L=2.5 m

CON X50, L=5 m

CON X100, L=10 m

Heat insulated feed and return line with integrated sensor cable, pipe clamps and connecting fittings.

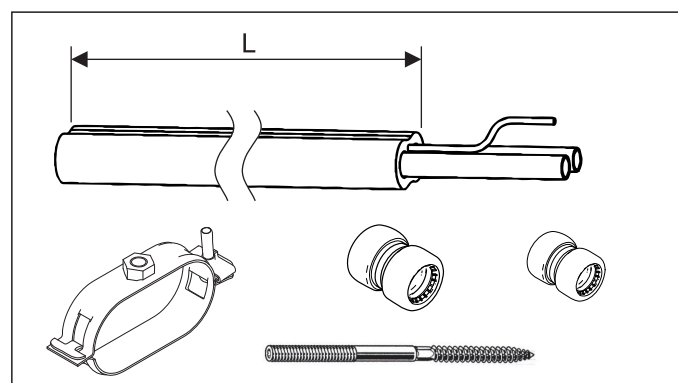


Fig. 3-6 CON X (optional)

#### Extension kit for CON XV feed line

CON XV80, L=8 m

UV-resistant thermally insulated feed line with integrated sensor cable, pipe clamps, cable connection fitting and connecting fitting.

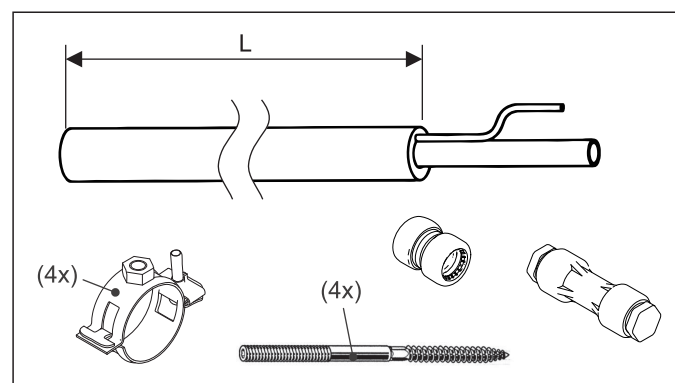
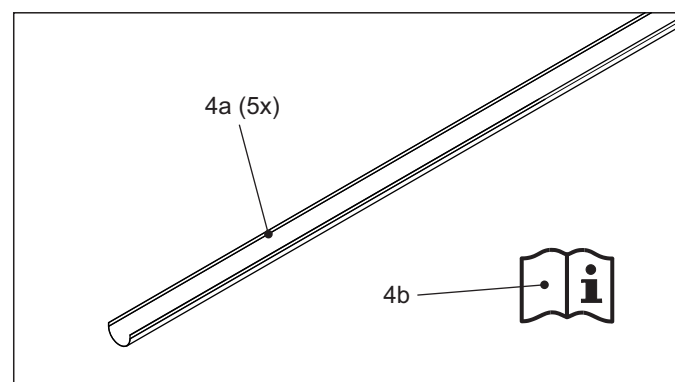


Fig. 3-7 CON XV (optional)

#### Vessel holder set (TS) for CON 15 and CON 20 connecting pipes

TS, L=1.30 m

Vessel holders for supporting CON 15 and CON 20 connecting pipes (avoidance of water sacks).



4a Vessel holders  
4b Quick instructions  
Fig. 3-8 TS (optional)

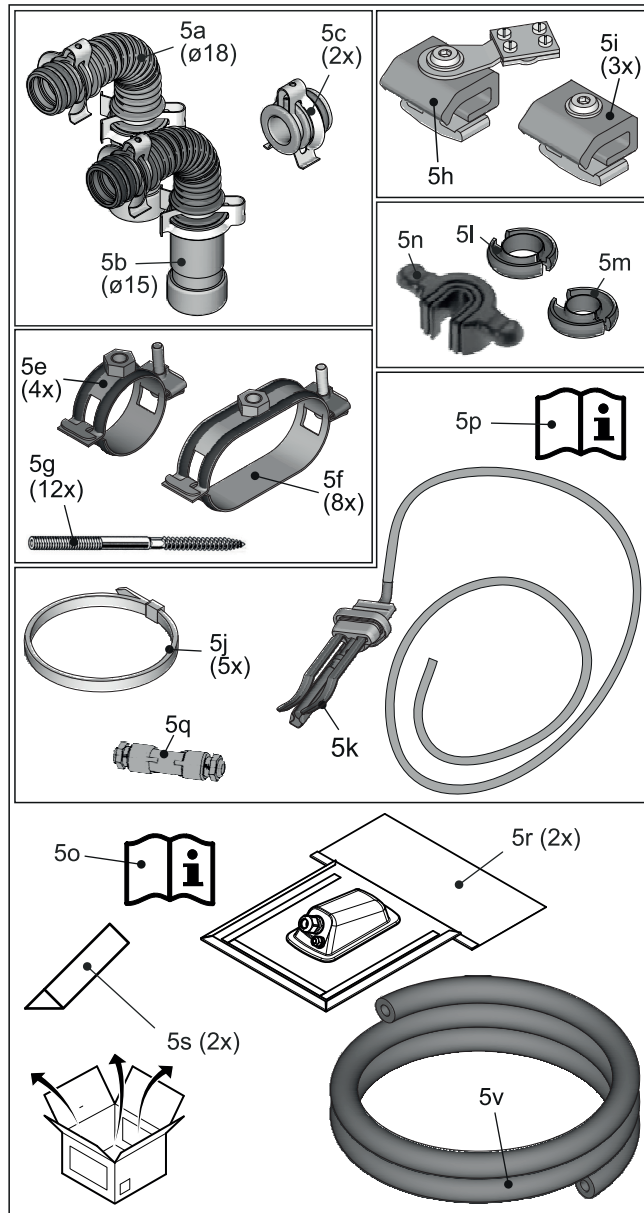


## 3.3.2 System components for roof-mounted systems (ADM)

### Roof penetration packs, roof-mounted

**EKSRCAP** (anthracite)

**EKSRCRP** (brick-red)



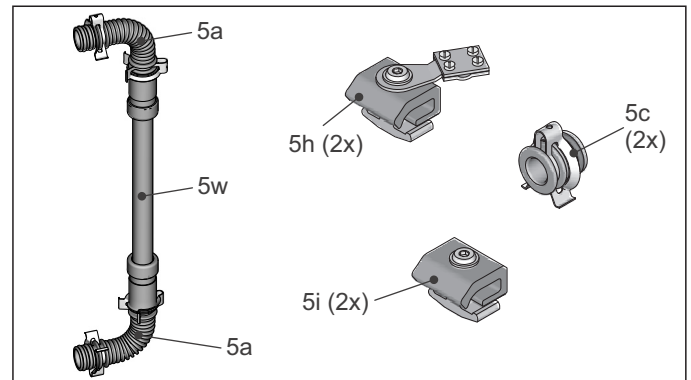
- 5a Solar panel connecting elbow, return flow
- 5b Solar panel connecting elbow, inflow
- 5c Sealing plugs
- 5e-g Pipe clamps with hangar bolts
- 5h Single terminal block with equipotential bonding terminal
- 5i Single terminal block
- 5j Cable tie
- 5k Solar panel temperature sensor
- 5l-n Extraction tool with inserts for Ø 15 mm and Ø 18 mm
- 5o Planning and installation instructions
- 5p Quick instructions
- 5q Cable connection fitting
- 5r Roof penetration
- 5s Foam wedge
- 5v HT-Armaflex ø22x13 UV-resistant (2 m)

Fig. 3-9 EKSRCAP, EKSRCRP

### Solar panel row connector

**CON RVP**

For connecting two solar panel rows one above the other.

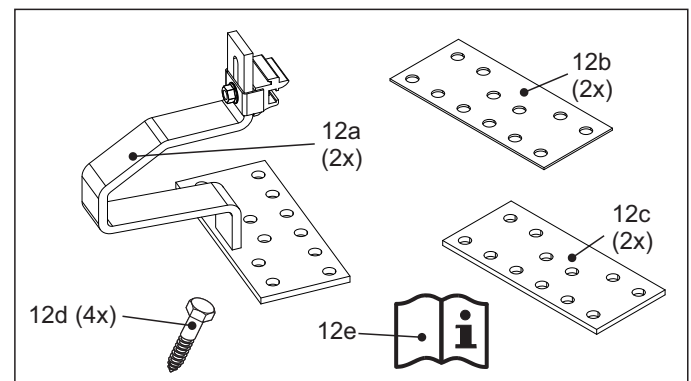


- 5i Single terminal block
- 5h Single terminal block with equipotential bonding terminal
- 5c Sealing plugs
- 5a Solar panel connecting elbow
- 5w 1 m heat-insulated Al-PEX compound pipe

Fig. 3-10 CON RVP

### On-roof mounting packs

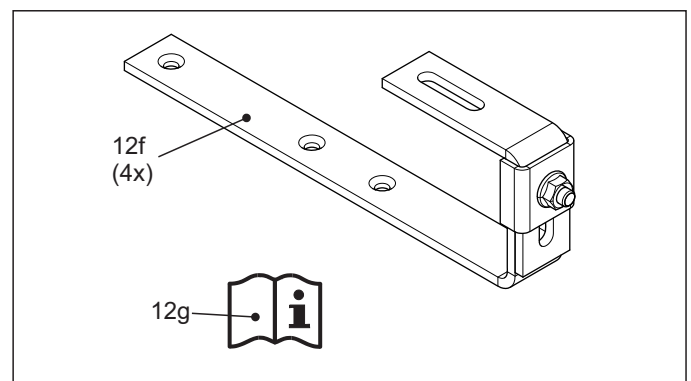
**FIX ADDP** for roof tiles/shingles



- 12a Roof mounting hook
- 12b Packing plate 2 mm
- 12c Packing plate 5 mm
- 12d Hexagon wood screws M8 x100
- 12e Quick instructions

Fig. 3-11 FIX ADDP

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

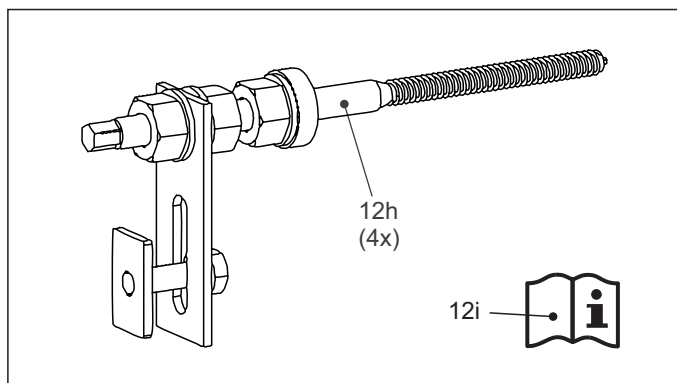


- 12f Roof mounting hook
- 12g Quick instructions

Fig. 3-12 FIX ADS

### 3 Product description

#### FIX WD for corrugated roofing

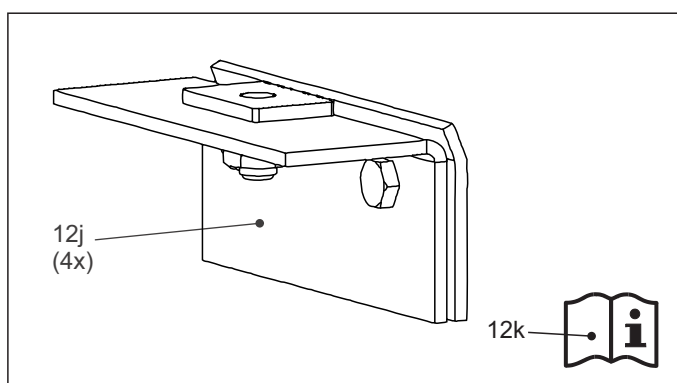


12h Mounting profile beam

12i Quick instructions

Fig. 3-13 FIX WD

#### FIX BD for folded sheet metal roofing



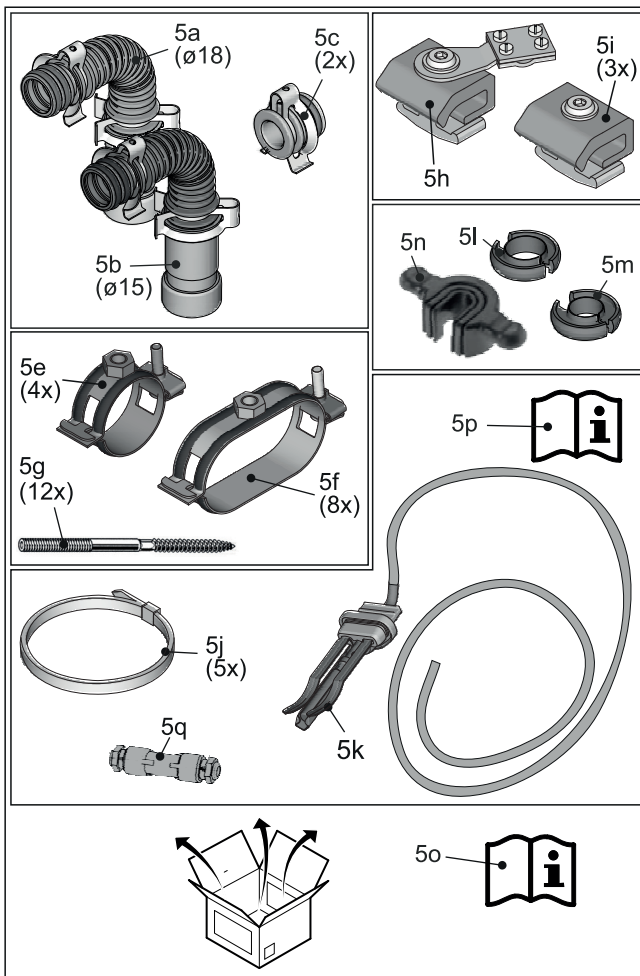
12j Mounting profile beam

12k Quick instructions

Fig. 3-14 FIX BD

## 3.3.3 System components for in-roof systems (IDM)

### Solar panel connection set RCIP

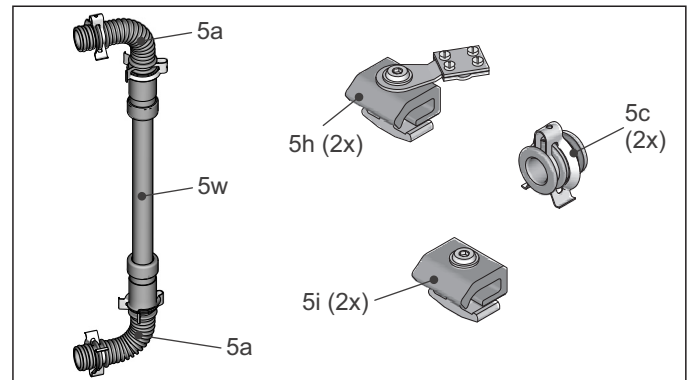


- 5a Solar panel connecting elbow, return flow
- 5b Solar panel connecting elbow, inflow
- 5c Sealing plugs
- 5e-g Pipe clamps with hangar bolts
- 5h Single terminal block with equipotential bonding terminal
- 5i Single terminal block
- 5j Cable tie
- 5k Solar panel temperature sensor
- 5l-n Extraction tool with inserts for Ø 15 mm and Ø 18 mm
- 5o Planning and installation instructions
- 5p Quick instructions
- 5q Cable connection fitting

Fig. 3-15 RCIP

### Solar panel row connector CON RVP

For connecting two solar panel rows one above the other.



- 5i Single terminal block
- 5h Single terminal block with equipotential bonding terminal
- 5c Sealing plugs
- 5a Solar panel connecting elbow
- 5w 1 m heat-insulated Al-PEX compound pipe

Fig. 3-16 CON RVP

### 3 Product description

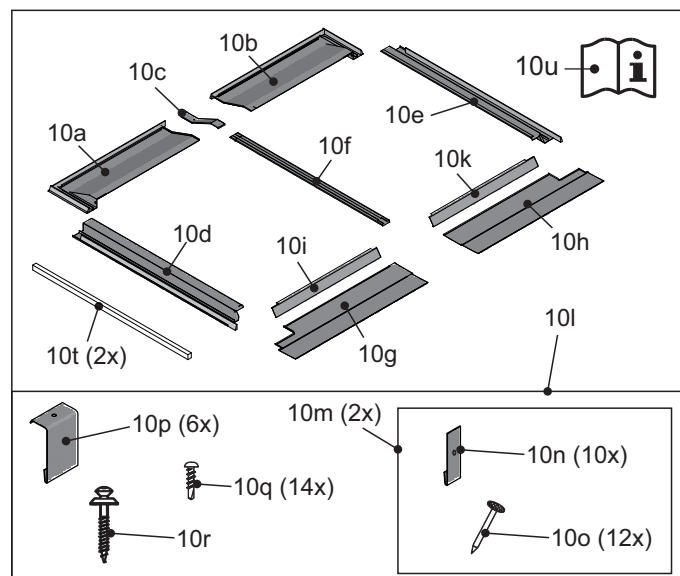
#### In-roof mounting packs

##### Basic package IB V21P

for two EKS21P flat solar panels

##### Basic package IB V26P

for two EKS26P 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

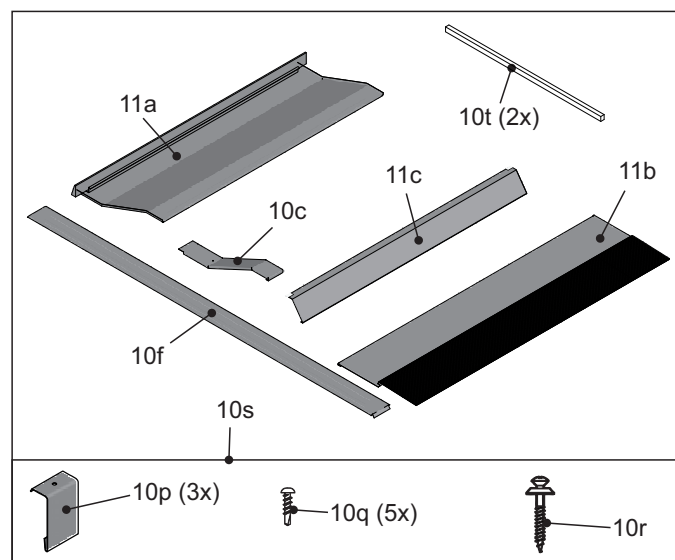
Fig. 3-17 IB V21P / IB V26P

##### Expansion package IE V21P

for each further EKS21P flat solar panel (3 to 5)

##### Expansion package IE V26P

for each further EKS26P 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. 3-18 IE V21P / IE V26P

##### Expansion package FIX IES

for flat roofing (e.g. slate) and two flat solar panels

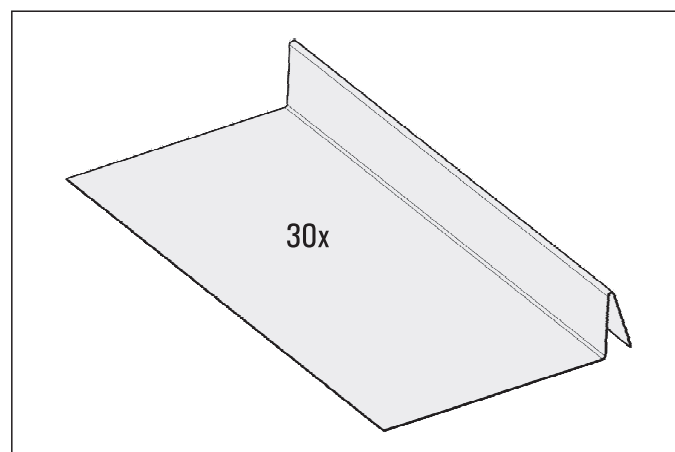
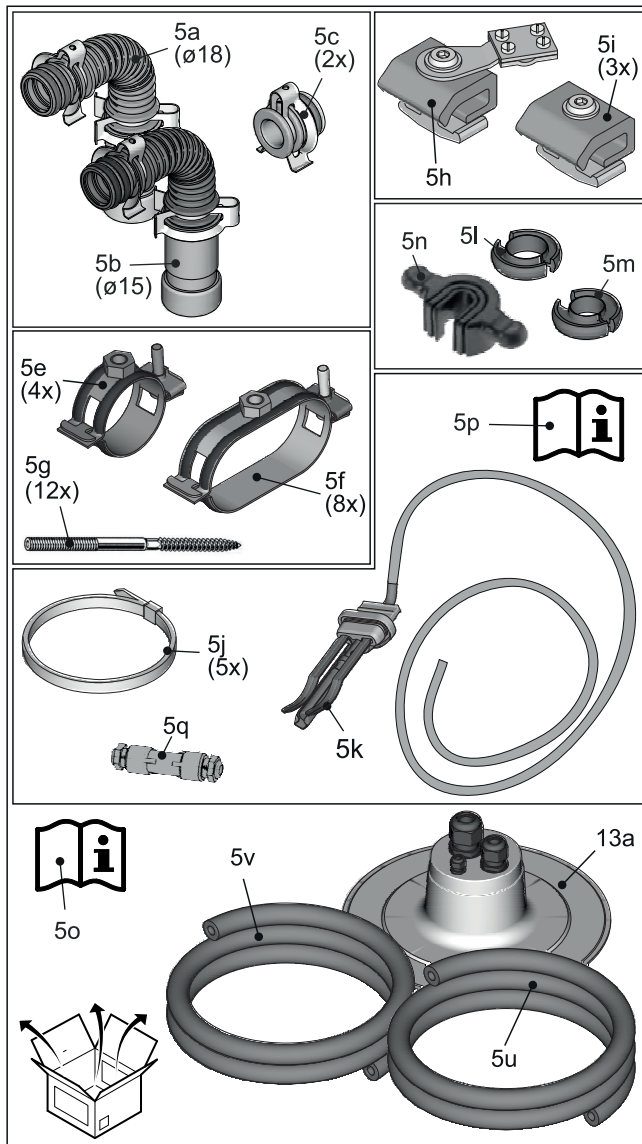


Fig. 3-19 FIX IES

### 3.3.4 System components for flat roof systems (FDM)

### Solar panel connection kit and roof penetration for two-way connection of 2 solar panels

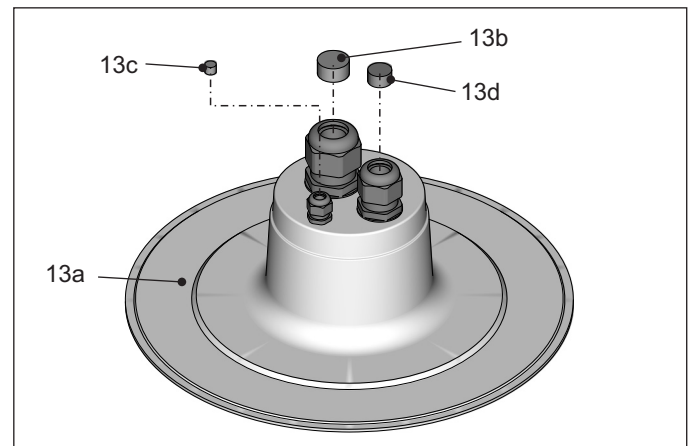


- 5a Solar panel connecting elbow, return flow
- 5b Solar panel connecting elbow, inflow
- 5c Sealing plugs
- 5e-g Pipe clamps with hangar bolts
- 5h Single terminal block with equipotential bonding terminal
- 5i Single terminal block
- 5j Cable tie
- 5k Solar panel temperature sensor
- 5l-n Extraction tool with inserts for Ø 15 mm and Ø 18 mm
- 5o Planning and installation instructions
- 5p Quick instructions
- 5q Cable connection fitting
- 13a CON F roof penetration box
- 5u HT-Armaflex ø18x13 UV-resistant (6.5 m)
- 5v HT-Armaflex ø22x13 UV-resistant (2 m)

*Fig. 3-20 RCFP*

### CON FE roof penetration

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

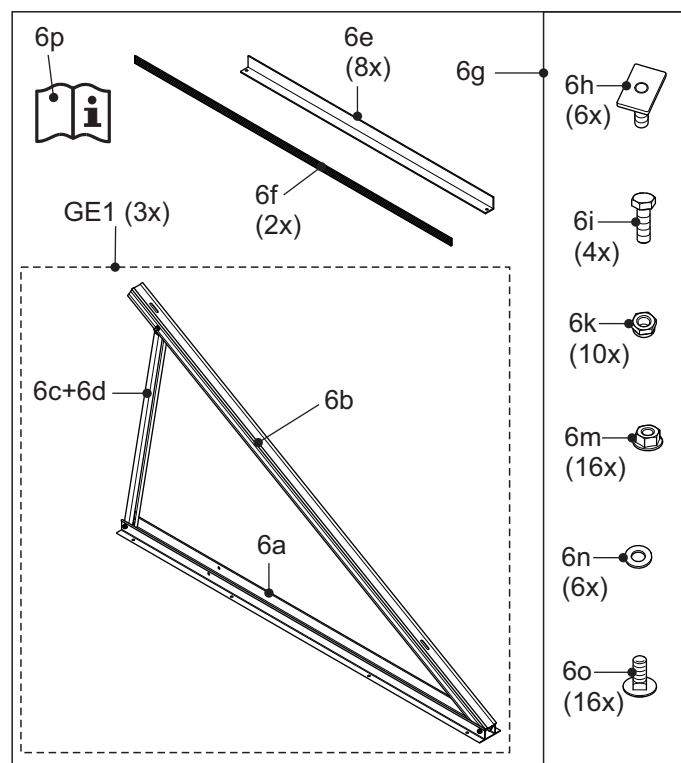
Fig. 3-21 CON FE

### 3 Product description

#### Flat roof mounting packs

##### Basic package FB V26P

for two EKS26P flat solar panels



GE1 Pre-mounted basic element

6a Basic rail EKS26P

6b Bearing rail EKS26P

6c Telescopic rail, outer EKS26P

6d Telescope rail, inner EKS26P

6e Cross brace EKS26P

6f Diagonal brace EKS26P

6g Accessory bag EKS26P

6h Terminal M8

6i Hexagon screw M8

6k Hexagon nut M8

6m Hexagon nut M8 with locking serration

6n Washer

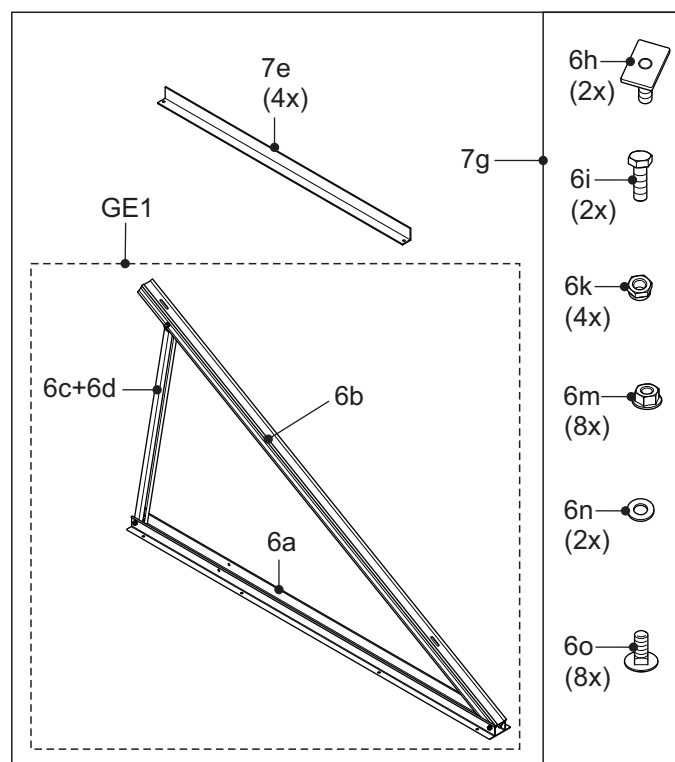
6o Round head screw M8

6p Quick instructions

Fig. 3-22 Flat roof frame, basic package FB V26P

##### Expansion package FE V26P

for each further EKS26P flat solar panel (3 to 5)



GE1 Pre-mounted basic element

6a Basic rail EKS26P

6b Bearing rail EKS26P

6c Telescopic rail, outer EKS26P

6d Telescope rail, inner EKS26P

7e Cross brace EKS26P extension

7g Accessory bag EKS26P

6h Terminal M8

6i Hexagon screw M8

6k Hexagon nut M8

6m Hexagon nut M8 with locking serration

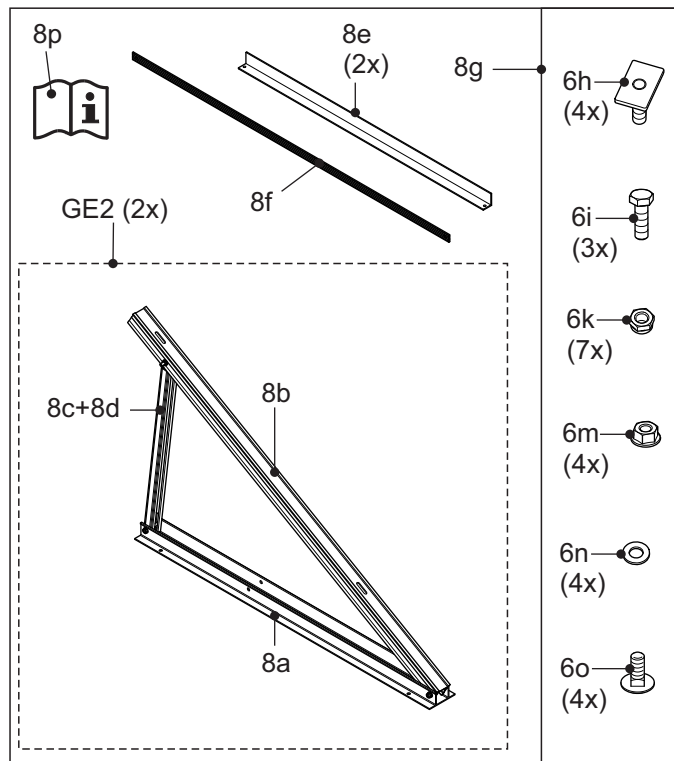
6n Washer

6o Round head screw M8

Fig. 3-23 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

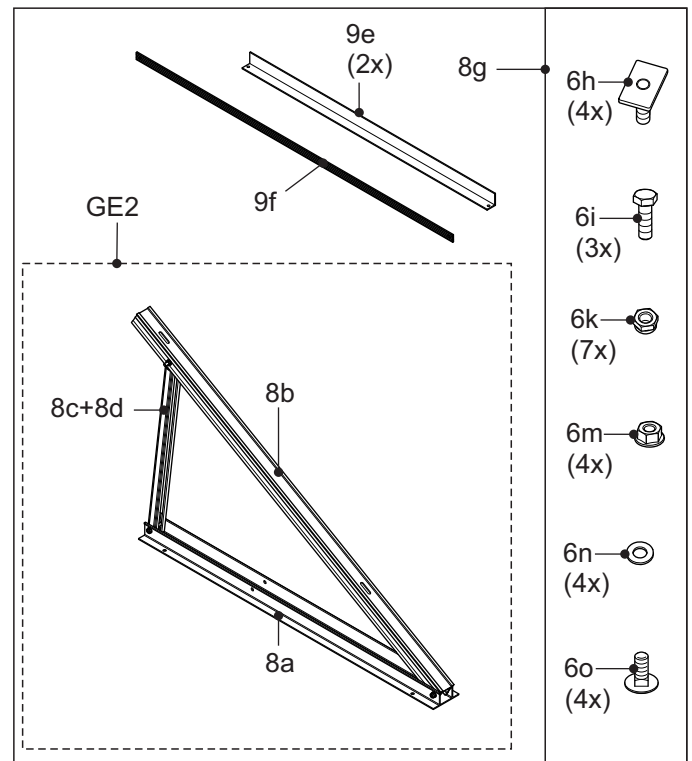
6o Round head screw M8

6p Quick instructions

Fig. 3-24 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. 3-25 Flat roof frame, expansion package FE H26P



## 4 Installation

### 4 Installation

These instructions describe the solar panel fastening and the hydraulic connection of the pressure-less 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.

**i** 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 gradient of the solar panel array must always be aligned to the bottom connection. With same-side connection, the solar panel array (bottom edge) must be aligned exactly horizontal.

### 4.1 Transport and storage

#### 4.1.1 Transport



#### CAUTION!

The DAIKIN Solar flat solar panels are imperious 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 them. 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 inadvertent restarting.
- 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

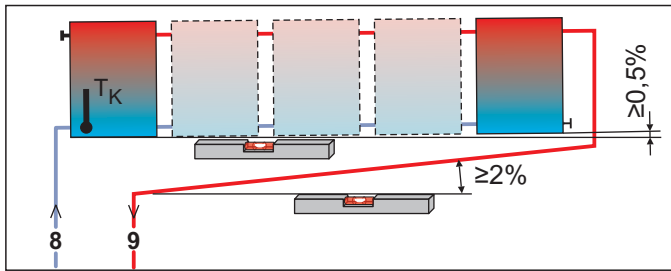


Fig. 4-1 Two-way connected solar panel array (recommended)

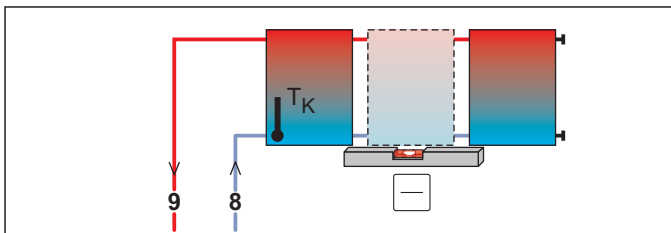


Fig. 4-2 Same-side connected solar panel array  
(max. 3 solar panels)

### 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).

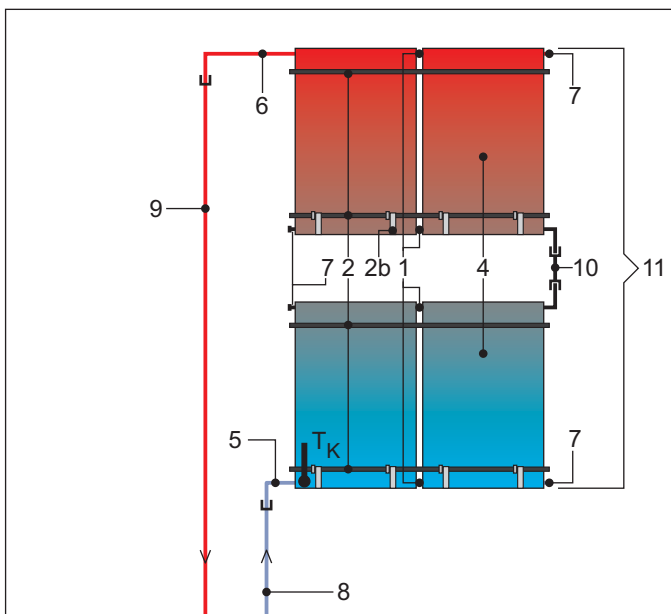


Fig. 4-3 Alternative solar panel arrangement

- 1 Solar panel 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)
- TK Solar solar panel temperature sensor

Tab. 4-1 Legend for fig. 4-1 to fig. 4-3 and fig. 4-8



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 they have 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 Installation

### 4.3 Laying the connecting pipe



#### CAUTION!

No siphon action may be allowed to occur anywhere in the pipe run between the storage tank and the flat solar panel. This could lead to functional faults and even material damage.

In the case of longer pipe runs with only a minimum gradient, it is also possible for water pockets with a siphoning effect to develop due to thermal expansion of the plastic pipes between the mounting points.

- Always make sure that pipe runs have a continuous gradient of at least 2 %.
  - For longer horizontal pipe runs, DAIKIN generally recommends the use of the vessel holder set (**TS**) or a rigid supporting construction (e.g. profile rails, pipe, etc.).
- 
- 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 with control system and EKS RPS4A pump unit.
    - Make sure there is adequate length for connection to the hot water storage tank and the flat solar panels.
    - Ensure a constant gradient of the connecting pipes (min. 2 %).
    - The maximum permissible overall pipe length must not be exceeded (see tab. 4-2).If the CON 15 or CON 20 connection pipes do not reach, DAIKIN recommends using the CON X25, CON X50, CON X100 or CON XV80 connection pipes.



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

Contact DAIKIN Service.

- The inflow connecting pipe (VA15 Solar) must be connected to the top and the return flow connecting pipe (VA18 Solar) to the bottom of the solar panel (see fig. 4-1 to fig. 4-3 and fig. 4-8).

Number of solar panels	Max. possible total length of pipe
2	45 m
3	30 m
4	17 m
5	15 m

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

#### Additional notes about connecting pipes

If on-site conditions make it impossible or very difficult to install the connecting pipes in the manner described above, slight deviations from the specified installation are permitted. Hereby, the inflow pipe may not be larger than 18 x 1 mm.

- If vertical copper pipes are already installed in the house, they can be used if a continuous connection pipe gradient can be guaranteed.
- If a uniform gradient from the second roof penetration to all pipe sections cannot be guaranteed when the solar panels are connected at opposite ends, then for roof penetration purposes, the inflow pipe can be connected to the top of (e.g. through a ventilating tile) if:
  - the highest point of the inflow pipe is not more than 12 m above the storage tank mounting floor level.
  - the internal diameter of the inflow pipe is not more than 16 mm.
  - a continuous rise of the inflow pipe to the highest point, as well as a continuous gradient to the warm water storage cylinder is ensured.
- For pipe runs in which only a limited gradient can be achieved, copper pipe should be used on site. This avoids the need for a rigid supporting structure and prevents the formation of water pockets due to expansion of the plastic 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.



#### CAUTION!

If plastic pipes are damaged, there is a risk that they will break.

- When cutting through the thermal insulation, never damage the outer surface of the VA Solar-connecting pipes.

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. Special roof penetrations for on-roof mounting and flat roof mounting are available as system components (see chap. 3.3).

2. Lay the connection pipes up to the roof penetration and fix in position (e.g. with clamps).

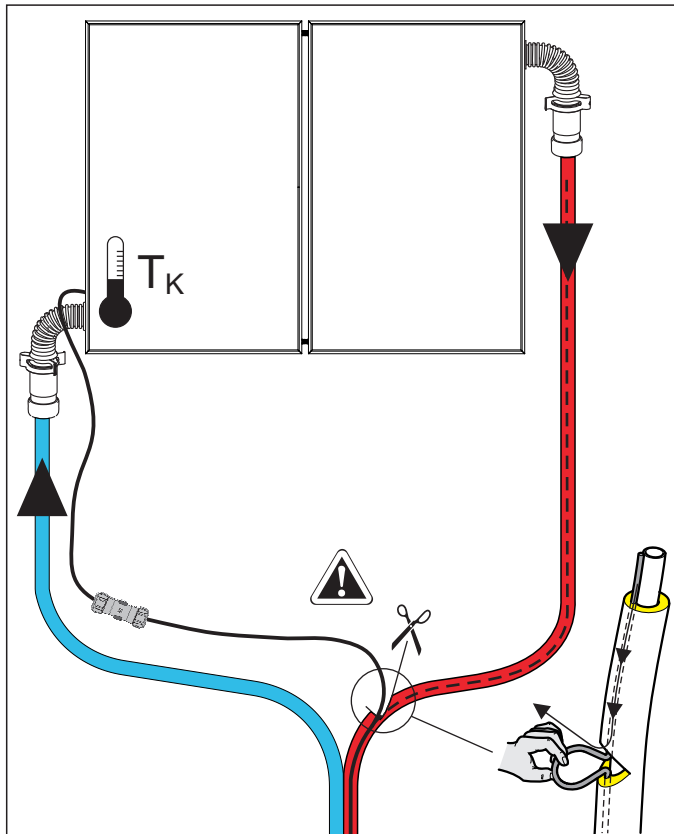


Fig. 4-4 Step 2



The connecting cable for the solar panel temperature sensor is drawn into the heat insulation hose together with the inflow connecting pipe. At the joint of the inflow and return flow connecting pipes, the connecting cable must be pulled out of the CON... pre-fabricated connecting pipe and routed along the return flow connecting pipe to the bottom panel connection.



**For flat roof mounting:**

In order to keep the pipe laying as short as possible in the frost-endangered area (outdoors), DAIKIN recommends installing two separate flat roof penetrations for two-way connection of the solar panel array for the roof penetration of the inflow and return flow pipes.

With 3 and more solar panels, the two-way solar panel array must be connected with 2 flat roof penetration boxes. The CON FE roof penetration required for this is equipped with seals for the cable screw fittings. They must be converted to match the connection type.

3. Carefully cut open or cut off the thermal roof insulation under the roof penetration so the return flow pipe (VA18 Solar) can be pulled out and laid with sufficient gradient to the roof penetration.
4. Run the connecting pipes through the roof at the points provided. To ensure uninterrupted thermal insulation (also within the roof structure), the insulation must be resealed at the penetration points (e.g. with adhesive tape).

5. Cut off the thermal insulating hoses of the connecting pipes so that the pipes can be passed through the individual roof penetrations.

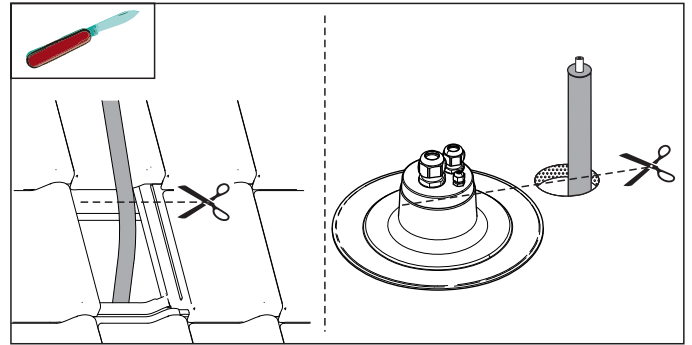


Fig. 4-5 Step 5

6. Pull the inflow pipe (top on the flat solar panel / VA15 Solar) as well as the return flow pipe (bottom on the flat solar panel / VA18 Solar) through the M32 screw fitting of the respective roof penetration. Next, push the equipotential bonding cable and the solar panel temperature sensor cable through the respective M16 glands from inside.

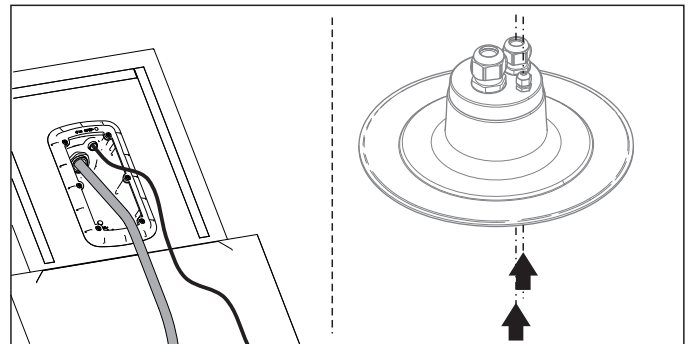


Fig. 4-6 Step 6

## 7. For on-roof mounting:

Cover the roof penetrations.

- The roof tiles at the side and above must overlap the roof penetration.
- The corrugated flashing must overlap the roof tile underneath and be shaped to match the roof tile.

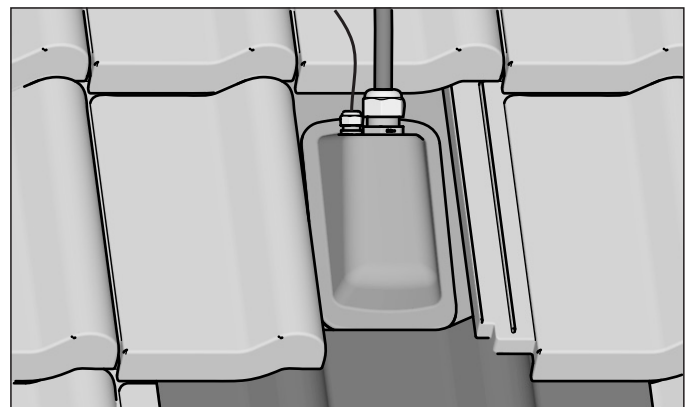


Fig. 4-7 Step 7

## 4 Installation



### CAUTION!

With special roof coverings, such as roof tiles with very pronounced undulations (large differences in height), sealing problems can occur with the universal roof penetration.

- In such cases, and also with plane tiles or slate roofing, a professional roofer should be consulted.

#### With flat roof mounting:

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.

8. 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.

Carry out the following steps:

1. Hook the solar panel securing clips in the guide groove of the lower mounting profile and tilt downwards. After they have been hooked on, the solar panel securing clips can be moved sideways (see fig. 4-8 and tab. 4-3).

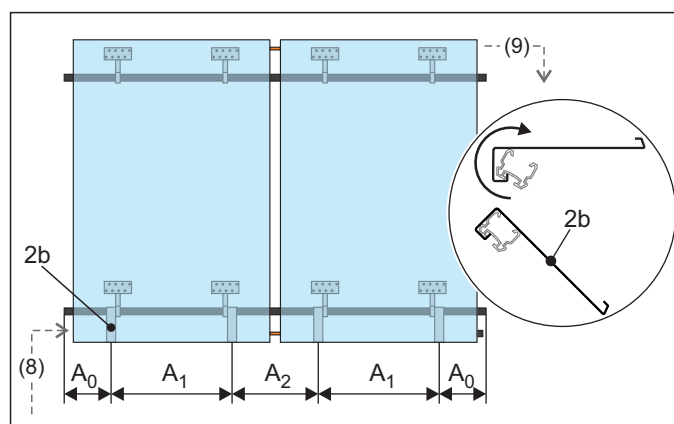


Fig. 4-8 Step 1: Alignment of the securing clips  
(Legend, see tab. 4-1, Dimensions, see tab. 4-3)

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

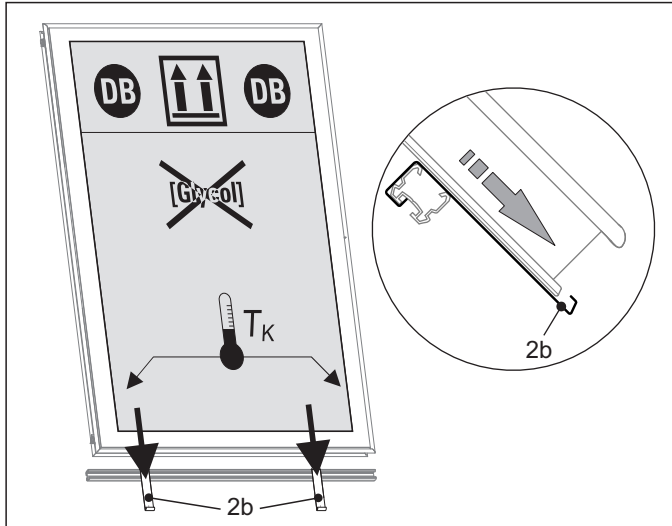
Tab. 4-3 Clearance dimensions of the securing clips

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 (DB) 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. 4-9 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!

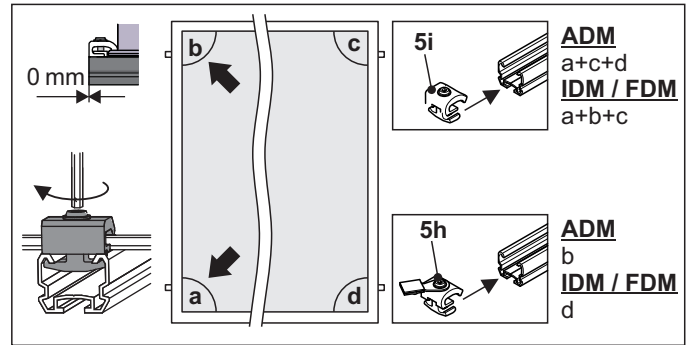
In order to prevent torsional stresses and fixing difficulties when mounting the solar panels,

- slightly tighten the self-locking nuts of the slide blocks,
- align both mounting profiles exactly level and parallel to one another. If needed, underlay the mounting profiles 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), 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. 4-10).

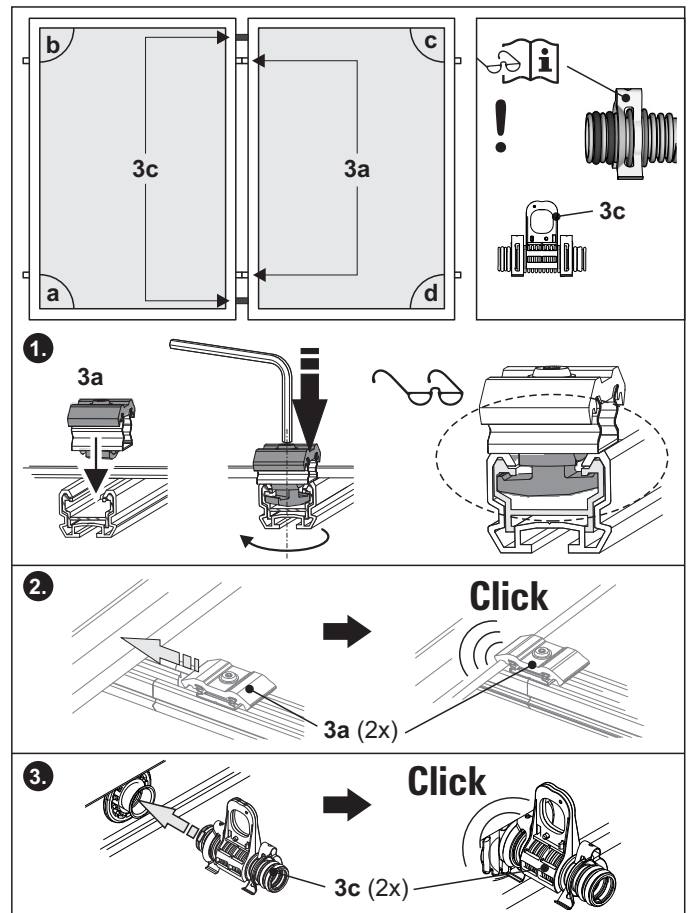


5h Single terminal block with equipotential bonding terminal

5i Single terminal block

Fig. 4-10 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. 4-11 Step 5 for 2 and more panels



## 4 Installation

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).

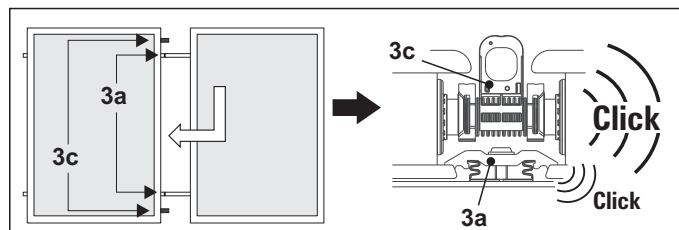


Fig. 4-12 Step 6 for 2 and more panels

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

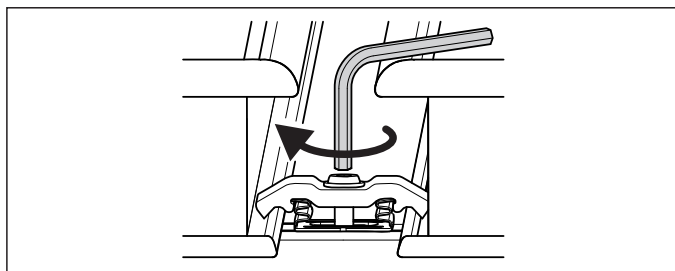
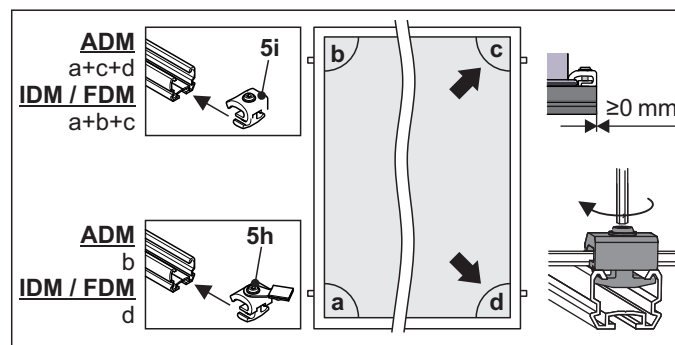


Fig. 4-13 Step 7

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. 4-14 Step 8

9. Pull the mounting supports off the compensators.

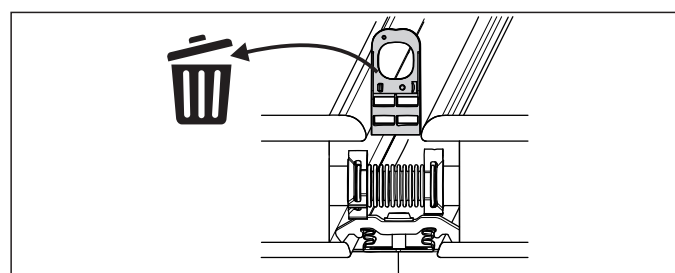


Fig. 4-15 Step 9



## 4.5 Connecting the pressure-less Solar system hydraulically



These instructions only describe the pipe laying for alternate end connection with two roof penetrations.

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

- In this case, always make sure that the inflow pipe is 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.

1. Mark and cut off the required length of inflow pipe (top / VA15 Solar) and return flow pipe (bottom / VA18 Solar). Then deburr the pipe ends.

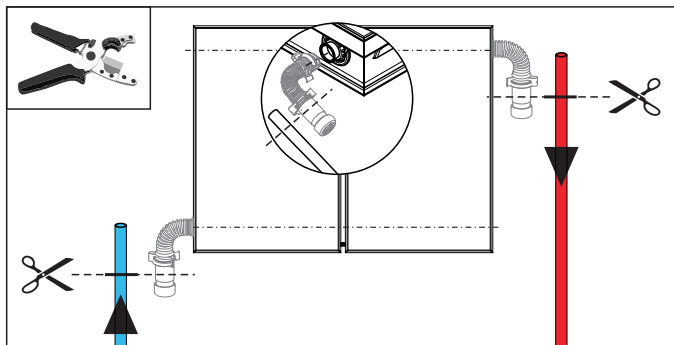


Fig. 4-16 Step 1

2. Slide the heat insulation hoses onto the connection pipes and cut to the required length.

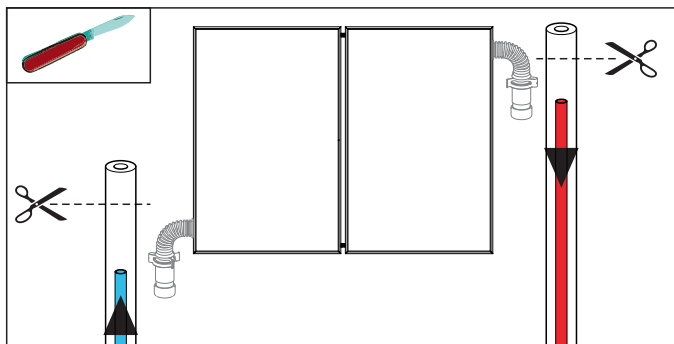


Fig. 4-17 Step 2

3. Compress the heat insulation hoses and plug the solar panel connecting elbows onto the matching connecting pipe.

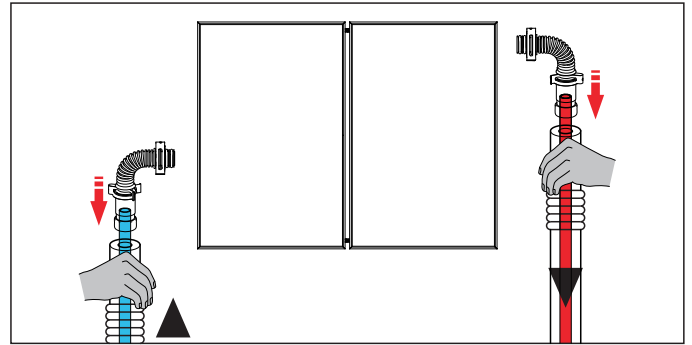


Fig. 4-18 Step 3

4. Insert the solar panel connecting elbows into the solar panel connecting pipes until the retaining clip audibly engages.

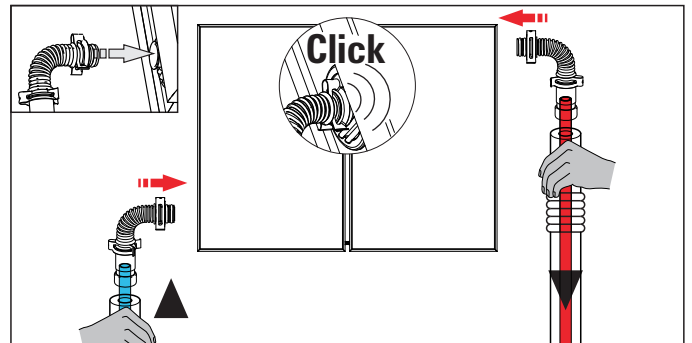


Fig. 4-19 Step 4

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

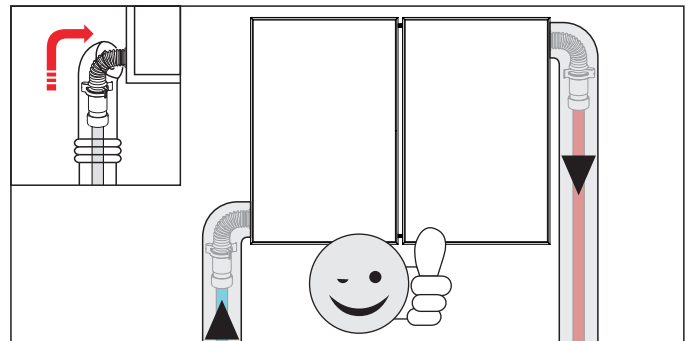


Fig. 4-20 Step 5

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

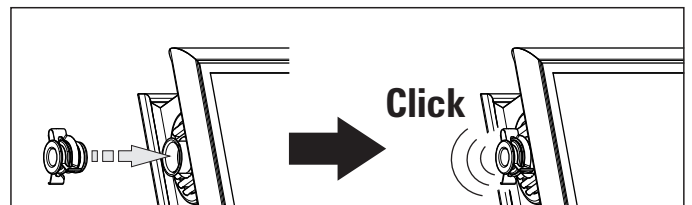


Fig. 4-21 Step 6

## 4 Installation

### 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), 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.

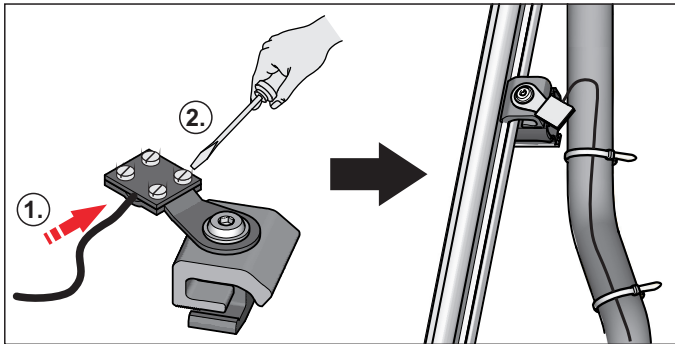


Fig. 4-22 Steps 1+2



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

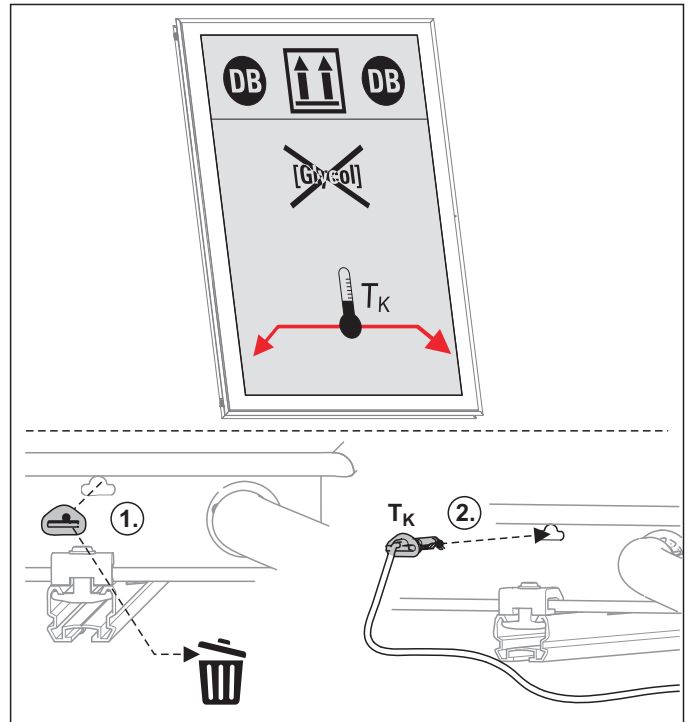
### 4.7 Installing the solar panel temperature sensor



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 on the return flow connection side (see fig. 4-10 and fig. 4-11, pos. a) at the bottom 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. 4-23 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. 4-24).

3. Run the silicone-covered cable of the solar panel temperature sensor with drip-off elbow to the roof penetration and secure to the mounting rail or connecting pipe using cable ties. 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.

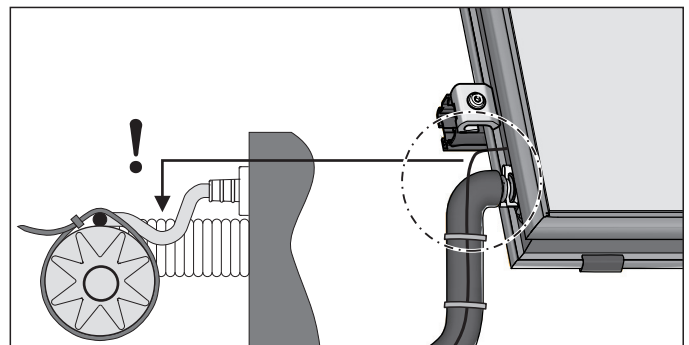


Fig. 4-24 Step 3

## 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 maintenance instructions of the control and pump unit (EKSRS4A).



#### **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 be conducted by DAIKIN-authorized and trained heating experts.

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



#### **CAUTION!**

Starting up in frosty conditions can result in damage to the entire system.

- Start-up at outside temperatures below 0 °C only when a water temperature of at least 5 °C is guaranteed in the solar circuit (e.g. prior heating of the hot water storage tank). DAIKIN recommends not operating the installation in extremely frosty conditions.

### 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 heating system that is shut down if there is danger of frost.



#### **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.

By switching off the Solar R4 control unit at the main switch or disconnecting the mains plug from the power supply, the DAIKIN solar system can be shut down temporarily.

If there is a danger of frost:

- put the DAIKIN solar system back into operation or
- suitable antifreeze measures must be applied 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.
- Dismantle the DAIKIN solar system in accordance with the assembly instructions (chapter 4 "Installation") in reverse order.
- Dispose of the DAIKIN solar system properly.

#### 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.

## 5 Start-up and taking out of operation

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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.

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## 6 Technical data

### 6.1 Product fiche

Energy labelling regulation: (EU) 811/2013

Ecodesign regulation: (EU) 813/2013

Solar devices, pumps + controls	/ Model names		EKS RPS4A			
Auxiliary	Solpump	[W]	37.3			
	Solstandby	[W]	2			
Annual auxiliary electricity consumption Qaux		[kWh/a]	92			
Details and precautions on installation, maintenance and assembly can be found in the installation and or operation manuals. Energy labels and product fiches for additional combinations, packages and other products can be found at <a href="http://www.rotex-heating.com">www.rotex-heating.com</a> .						
Sound power in heating mode, measured according to EN12102 under conditions of EN14825.						
This data is for comparison of energy efficiencies according to energy label directive 2010/30/EC. 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 <sup>2</sup>	2.01	2.60	
Aperture surface area	m <sup>2</sup>	1.80	2.36	
Absorber surface area	m <sup>2</sup>	1.80	2.36	
Heat insulation				
Material	–	Mineral wool		
Thermal conductivity	W/(m K)	0,037		
Thickness [mm]	mm	50		

## 6 Technical data

	Unit	Solar flat solar panel		
		EKSV21P	EKSV26P	EKSH26P
Performance characteristics				
Conversion factor with (T <sub>m</sub> -T <sub>a</sub> =0)		0,781	0,784	
Linear solar panel efficiency factor a1	W/m <sup>2</sup> K	4.24	4.25	
Quadratic solar panel efficiency factor a2	W/m <sup>2</sup> K	0,006	0,007	
Radiation angle correction factor K(50°)		0.94		
Effective thermal capacity c <sub>eff</sub> *	kJ/m <sup>2</sup> K	4.98	5.04	
Max. pressure drop at 100 l/h	mbar	3.5	3.0	0.5
Limit data for operation				
Max. operating pressure	bar	6		
Stagnation temperature	°C	192		
Installation method				
		On-roof In-roof	On-roof Flat roof In-roof	On-roof Flat roof

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

Minimum collector yield above 525 kWh/m<sup>2</sup> per year with 40 % cloud coverage (location Würzburg)

\*) with regard to the gross surface area of the solar panel / solar panel filled with fluid

Tab. 6-2 Technical data, flat solar panel

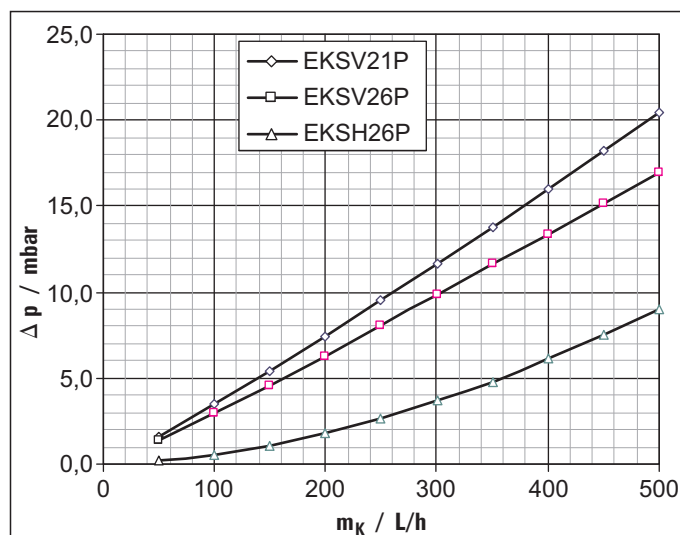


Fig. 6-1 Hydraulic resistance, flat solar panels

### 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 <sup>2</sup> 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 <sup>2</sup> 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 <sup>2</sup>	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  $1.3 \text{ kN/m}^2$
- Only for snow loads up to  $1.1 \text{ kN/m}^2$
- 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 <sup>2</sup> ]													
	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 <sup>2</sup> ]						
	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 Technical data

### 6.5 Flat roof system – Shading

Latitude	EKSV26P					EKSH26P				
	Distance z [m] depending on gradient angle $\alpha$					Distance z [m] depending on gradient angle $\alpha$				
	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	2.91	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

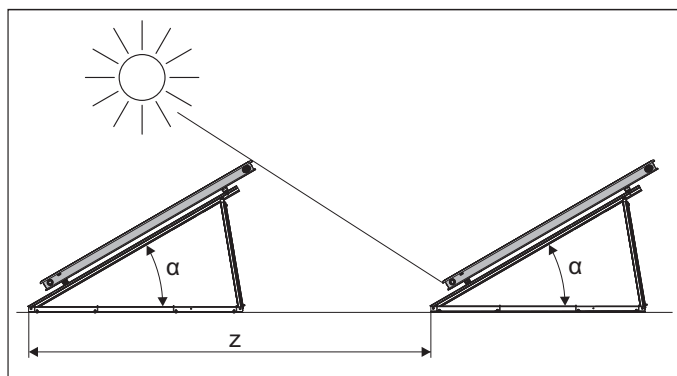


Fig. 6-2 Shading

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