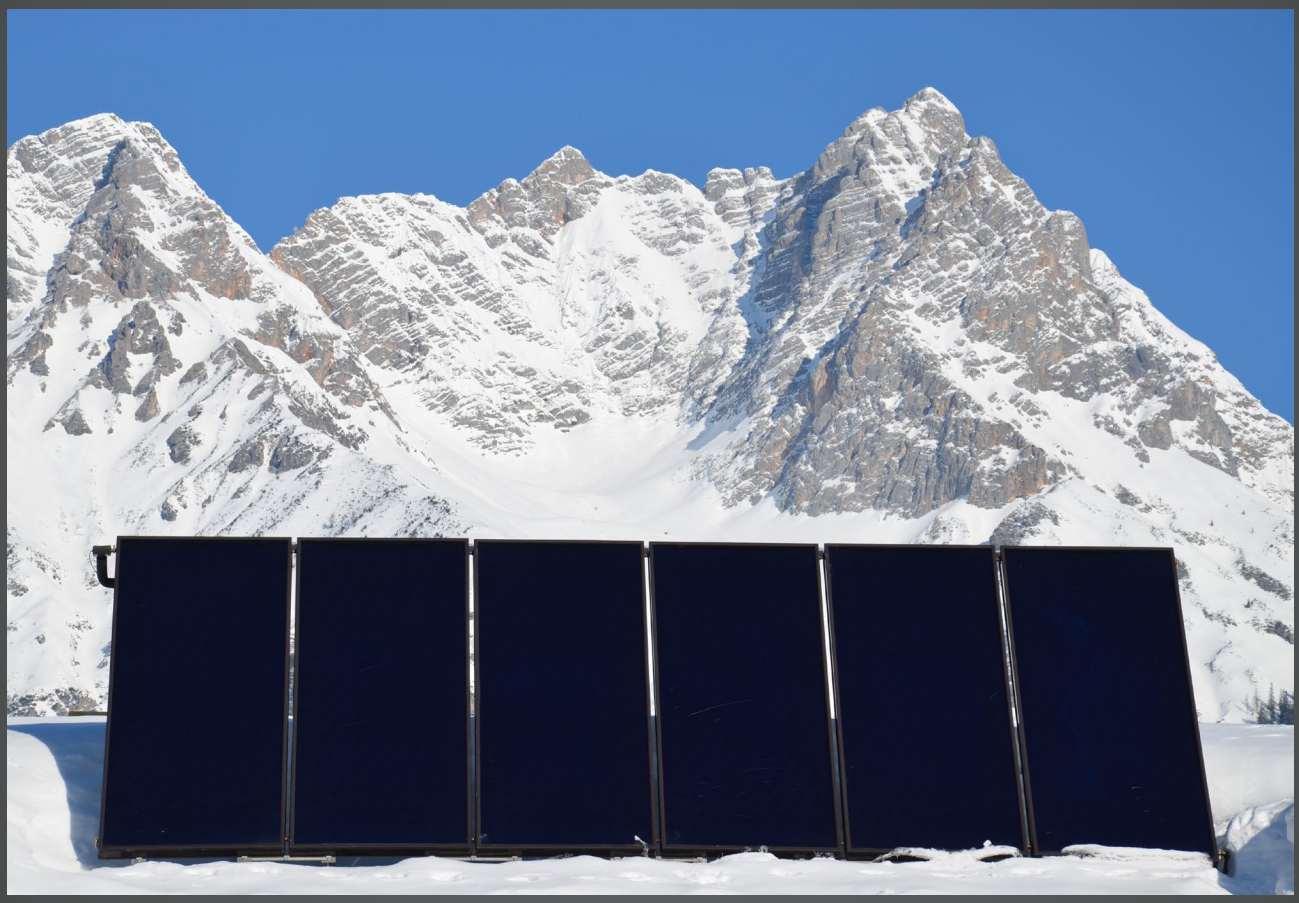

Original operating instructions

Flat-plate collector RA ST253-4

Status 2025-07

ratiotherm
Smart Energy Systems

INFORMATION

These operating instructions are part of the technical documentation for the device in accordance with:

- Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits
- Directive 2014/68/EU of the European Parliament and of the Council of 15 May 2014 on the harmonisation of the laws of Member States relating to the making available on the market of pressure equipment

These operating instructions are intended for the operator and must be handed over to personnel who come into contact with the device. The operator must ensure that the information contained in the operating instructions and the accompanying documents is read and understood.

NOTE

If in any doubt, consult the operating instructions, which must be kept in a known and easily accessible place.
The manufacturer accepts no liability for damage to persons, animals, objects or the device itself caused by:

- improper use,
- non-compliance,
- insufficient attention

the safety criteria contained herein or by:

- modification of the device,
- use of unsuitable spare parts.

ratiotherm
Smart Energy Systems
ratiotherm GmbH & Co. KG
Wellheimer Straße 34
91795 Dollnstein Germany

For better readability, the generic masculine form is used in this original operating manual. The personal designations used refer to all genders.

As of: 7 October 2024

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1. INFORMATION ABOUT THE DOCUMENT

The following information serves as a guide to the complete documentation. Other documents are also valid in conjunction with these operating instructions. These operating instructions for specialist tradesmen are part of the RA ST253-4 flat-plate collectors. The collectors must not be installed or used without this document.
The operating instructions must be made available to the operator and the specialist installer for information at all times. If the collectors are sold, the instructions must also be supplied. ratiotherm GmbH & Co. KG accepts no liability for damage caused by failure to observe these instructions.

1.1 SAFETY AND WARNING NOTICES

Signal words and colours

The following signal words are based on DIN ISO 3864-2 and are used in this documentation. The safety colours have been adopted from the DIN ISO 3864-1 standard. The design complies with DIN EN 82079-1 and ANSI Z 535.4.

Signal word	Explanation
DANGER	Indicates a dangerous situation which, if ignored, will result in death or serious injury.
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor injury or property damage.
NOTE	Indicates operating instructions and cross-references. A note excludes the risk of property damage or injury.

1.2 SAFETY SIGNS

1.2.1 OTHER SIGNS IN ACCORDANCE WITH DIN EN ISO 7010

Some of the following special safety signs in accordance with DIN EN ISO 7010 and DIN ISO 3864 are used in the relevant sections of this operating manual and, depending on the combination of signal word and graphic symbol, require special attention. Please note the distinction between:

- Mandatory signs ⇨ prescribe an action (e.g. use eye protection).
- Warning signs ⇨ depict a source of danger and supplement a warning notice.
- Prohibition signs ⇨ prohibit certain actions.

Symbol	Explanation	Symbol	Explanation
	General warning sign		Warning of flammable substances
	Warning of electrical voltage		General prohibition sign
	Warning of hot surfaces		No entry
	Follow instructions		General mandatory sign
	Disconnect before maintenance or repair		Use hand protection

1.2.2 OTHER SYMBOLS ACCORDING TO DIN ISO 7000

Symbol	Explanation	Symbol	Explanation
	Observe the operating manual (instructions for use)		Service indicator, Refer to the operating manual (instructions for use)
	Instructions for use/operating instructions (operating manual)		

1.2.3 OTHER SYMBOLS

Symbol	Explanation	Symbol	Explanation
	Recycling		Dispose of packaging material in accordance with regulations

2. IDENTIFICATION AND NOTES

2.1 PRODUCT DATA

Device designation:	Flat-plate
collector Type:	RA ST253-4
Year of manufacture:	See type plate
Country of origin:	Germany

2.2 INTENDED USE

The flat-plate collectors capture solar radiation and convert it into thermal energy to provide direct heating support and hot water preparation. Any other or extended use of the device is considered improper and therefore inappropriate. In this case, the safety and protective functions of the device may be impaired. ratiotherm GmbH & Co. KG is not liable for any damage resulting from this. Intended use also includes:

- observing all instructions in this operating manual,
- observing all warnings and
- compliance with the inspection and maintenance conditions.

The collectors are state of the art and built in accordance with recognised safety regulations. The device is intended exclusively for domestic and/or commercial use.
Improper or unintended use may result in danger to the life and limb of the user or third parties. In addition, damage to the device and other property may occur. The collectors are not intended for use by persons (including children) with limited physical, sensory or mental abilities, or by persons with insufficient experience and/or knowledge. The risk is borne solely by the operator and user.

2.3 TARGET GROUPS

For safety reasons, the design of the device does not allow it to be used by persons with disabilities (e.g. visual impairments). DANGER Only perform tasks for which you are authorised.

2.3.1 TARGET GROUP MATRIX

Tasks	Operators and users	Specialist personnel
Transport/storage		X
Assembly/installation		X
Commissioning/adjustment		X
Automatic operation (control)	X	X
Set-up/conversion/technical modification		X
Maintenance/inspections/repairs		X
Cleaning	X	X
Troubleshooting/fault rectification		X
Decommissioning/dismantling/disposal		X

2.3.2 TARGET GROUP DEFINITION

Operators and users

A person who has purchased the device for use in an existing system for direct heating support and hot water preparation. The person must have knowledge of the necessary protective devices and protective measures.

Qualification of operators and users:

- Of legal age and physically/mentally capable of working on the device
- Knowledge of how to operate the product, imparted by specialist personnel a

Specialist personnel

A person employed by a qualified specialist company for heating systems and hot water supply. The specialist personnel must have acquired special knowledge and experience through professional training. The person must have knowledge of relevant standards, be able to assess the work assigned to them (e.g. instruction of personnel, switching on, programmes and switching off) and identify potential hazardous situations.

Qualifications of specialist personnel:

- Of legal age and physically/mentally capable of working on the device
- Knowledge and several years of experience in working on heating and hot water systems

2.4 MISUSE

2.4.1 REASONABLY FORESEEABLE MISUSES

Reasonably foreseeable misuse that poses a risk to personnel, third parties or the device applies to all operating modes:

- Using the device contrary to its intended use
- Feeding in components that are not certified by the manufacturer
- Operating the device outside its physical operating limits
- Modifying the control software without prior consultation with ratiotherm GmbH & Co. KG
- Making changes to the device or adding or modifying components without prior consultation with ratiotherm GmbH & Co. KG
- Operating the device contrary to the provisions of the risk assessment
- Bypassing or decommissioning protective and safety devices
- Operating the device with obvious faults
- Operation of the device by persons with limited physical, sensory or mental abilities or by children

DANGER

Unauthorised modifications to the device

Unauthorised modifications pose a risk of death or injury.

Do not make any unauthorised modifications to the device without the prior consent of ratiotherm GmbH & Co. KG.

2.4.2 UNFORESEEABLE E MISUSE/ABUSE

Unforeseeable misuse may occur due to:

- disasters,
- the impact of foreign objects and/or
- force majeure.

2.5 WARRANTY, LIABILITY, GUIDELINES, STANDARDS AND LAWS

The "General Terms and Conditions of Sale and Delivery" of ratiotherm GmbH & Co. KG apply in principle. The "General Terms and Conditions of Sale and Delivery" are available to the operator at the latest upon conclusion of the contract. Warranty and liability claims for personal injury and property damage are excluded if the damage is attributable to one or more of the following causes:

- Improper use of the device
- Improper handling of the device
- Operating the device with defective protective devices
- Failure to observe the safety and warning instructions in the operating manual
- Unauthorised structural modifications to the device
- Inadequate implementation of the specified maintenance measures
- Disasters involving foreign objects or force majeure

The operating instructions must be read before handling the device. The operating instructions familiarise personnel with the handling of the device and provide information on all phases of the device's life cycle.
The operating instructions must be accessible to personnel at all times. The safety and warning notices in the operating instructions and on the device must be observed and complied with. If you have any further questions that go beyond the scope of these operating instructions, please contact ratiotherm GmbH & Co. KG.

The following guidelines, standards and laws must be observed when using the device in Germany:

- VDE and EVU regulations and provisions (in particular VDE 0100)
- Regulations and provisions of local utility companies
- DVGW worksheet W 382 "Installation and operation of pressure reducers in drinking water consumption systems"
- DIN 1988 – TRWI Technical rules for drinking water installations
- DIN 4753 – Water heating systems for drinking and service water
- DIN 8947 – Ready-to-connect heat pumps for water heating with electrically driven compressors
- Accident prevention regulations VGB 20 Accident prevention regulations "Refrigeration systems" with implementation instructions
- Energy Saving Ordinance EnEV – Ordinance on energy-saving thermal insulation and energy-saving plant technology in buildings from 2009

NOTE

Guidelines, standards and laws

Additional local guidelines, standards and laws, e.g. building regulations, may apply. As a general rule, the legal guidelines, standards and laws applicable in the respective country must be observed.

3. SAFETY INSTRUCTIONS

DANGER

Read and observe the operating instructions before starting work on and with the device.
Despite all precautions taken, there may still be some residual risks that are not immediately apparent. You can reduce the existing residual risks by observing and complying with the general safety instructions and warnings as well as the intended use.

3.1 GENERAL SAFETY INSTRUCTIONS

Observe the following general safety instructions:

- The volume of water increases during the heating process. Therefore, never close the blow-off line of the safety valve.
- Hot water may escape from the blow-off pipe.
- If leaks occur in the vicinity of the appliance, switch off the appliance and isolate it from the rest of the heating system. The leaks must then be repaired immediately.
- Do not use the following products to prevent corrosion on the device: sprays, solvents, chlorine-based cleaning agents, paints, adhesives, etc.
- Components that have not been tested with the device may cause damage to the device or impair its functions. Only use original spare parts and original wear parts.
- Only allow qualified personnel to carry out the assembly/installation/commissioning/adjustment of the device.
- Observe the existing regulations, rules and guidelines as well as the local installation requirements.
- To prevent injuries of any kind, the general accident prevention regulations must be observed under all circumstances and appropriate personal protective equipment must be used.
- Technical modifications to the system are not permitted. This also applies to the retrofitting of safety devices and welding on load-bearing parts. Safety devices must not be taken out of operation. Only original spare parts and original accessories from the manufacturer may be used.

3.2 ADDITIONAL INFORMATION

Local accident prevention regulations apply to all work on the device. The following must also be observed:

- applicable binding regulations for accident prevention
- Recognised technical rules for safe and professional working practices
- existing environmental protection regulations
- Other applicable regulations

The outlet temperature at the hot water taps can be up to 60 °C. Carefully check the water temperature at the hot water taps before placing your hands completely under the water jet.

Do not make any changes to the following components:

- Collectors and pipes for water and electricity
- Safety valve;
- structural conditions that may affect the operational safety of the appliance;
- structural conditions in the vicinity of the appliance, insofar as these may affect the operational safety of the appliance.

3.3 RESTRICTED RISK

WARNING

Measures/work carried out by unauthorised/unqualified personnel

Measures/work carried out on the device and/or its components and connections by unauthorised/unqualified personnel pose a serious risk of injury.

In the event of malfunctions, only allow qualified personnel to carry out measures/work on the device and/or its components and connections.

WARNING

Damaged insulation

Damaged insulation poses a serious risk of burns on hot and/or cold surfaces.

Protect yourself with suitable PPE (e.g. heat- and cold-resistant protective gloves). Allow hot or cold surfaces to cool down or warm up before working on them. Replace damaged insulation.

3.4 SAFETY INSTRUCTIONS FOR COLLECTORS

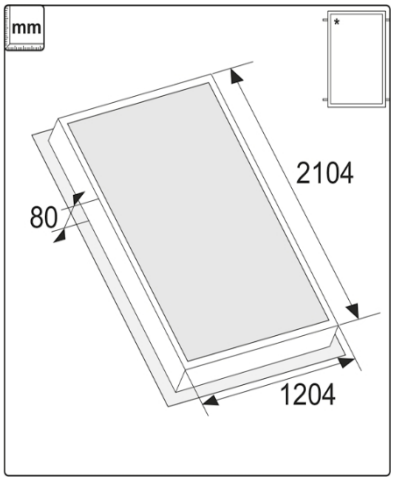
NOTE

- The accident prevention regulations for working on roofs in accordance with UVV must be observed.
- If necessary, erect barriers to protect against falling objects.
- For work on the roof, a safety harness for persons or protective scaffolding must be used in accordance with the UVV (Accident Prevention Regulations).
- Suitable measures must be taken to prevent collectors from slipping during installation.
- Do not fill the system when the sun is strong. There is a risk of scalding from escaping steam.
- If necessary, cover the collectors or wait until they are in the shade.
- If there is a risk of frost, do not fill the system with water and pressurise it under any circumstances.
- Heat radiation against the cold night sky can cause frost damage even at air temperatures of 5 °C!
- In order to comply with accident prevention regulations, the use of safety systems (belts, scaffolding, fall arrest devices, etc.) may be necessary.
- These safety systems are not included in the scope of delivery.

4. STRUCTURE AND FUNCTION

4.1 TECHNICAL DATA

Type Gross collector	RA ST253-4
area Aperture area	2.53 m²
Dimensions Weight	2.34 m²
Collector frame	2104 x 1204 x 80 mm (HxWxD)
Glass	43 kg
Connections Energy	Anodised aluminium
yield	Highly transparent solar safety glass 4 mm 4
Minimum volume flow V_{min}	connection pieces, 4 x Cu 18 mm
Nominal heat output	Over 525 kWh/m² a
Pressure loss (at V_{min})	2.5 l/min
Permissible operating	1.9 kW
overpressure	47 mbar
Standstill temperature Test	10 bar
	207 °C
	according to DIN EN 12975



Overview table for volume flows:
depending on the size of the collector field

RA ST253-4 in a solar system with a bivalent storage tank			
Number of collectors	4	5	6
Flow rate [l/min]	2.6	3.3	4

4.2 REQUIRED AIDS AND TOOLS

At least the following materials and tools are required for installing the collectors:

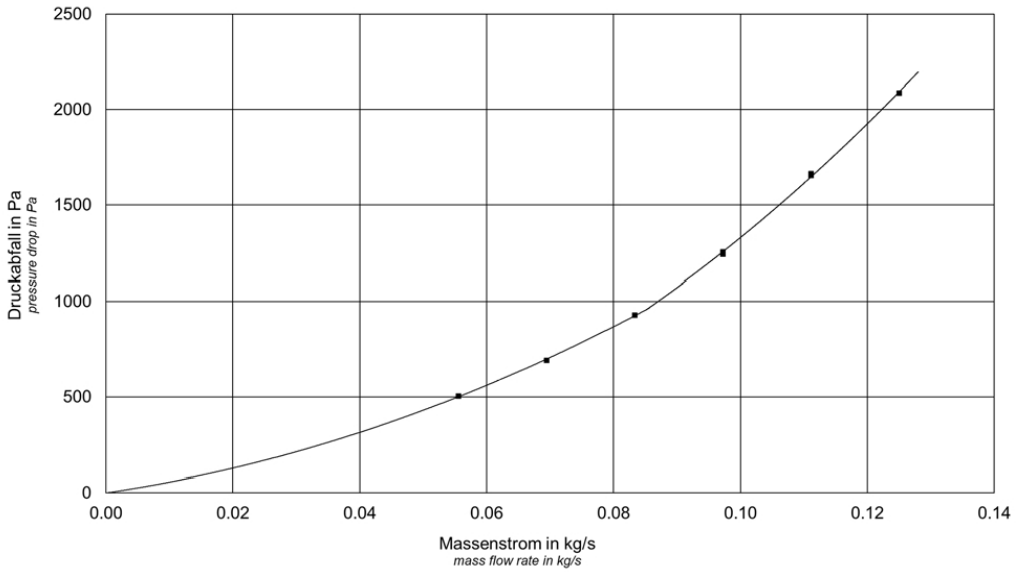
- Chalk, chalk line
- 2 ladders
- Rope, approx. 8-10 m long, at least ø 6.5 mm; tension straps
- Spirit level
- Drill with drill bit set
- Drill bit (Z2 bit) for Spax screws
- Drill bit (Torx T25) for Torx screws
- Socket wrench with ratchet, socket and extension (SW 17 mm)
- Open-end spanner (SW 17 mm)
- Adjustable open-end spanner (up to approx. SW 30 mm)
- Set of screwdrivers (sizes 3 - 4)
- Angle grinder with cutting disc for stone
- Jigsaw with wood and metal blades
- Hex key 6 mm

Type:	**Flat plate collector**	m [kg]:	**43**
No°:	**600 047**	T_{day} [°C]:	**207**
A [m²]:	**2.53**	P_{max} [bar]:	**10**
D [mm]:	**2104 x 1204 x 80**	V [l]:	**0.8**

Made in Germany in accordance with EN 12975
Keymark Reg. No. xxx-xxxxx x

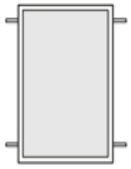
CE 0036

4.3 PRESSURE LOSS



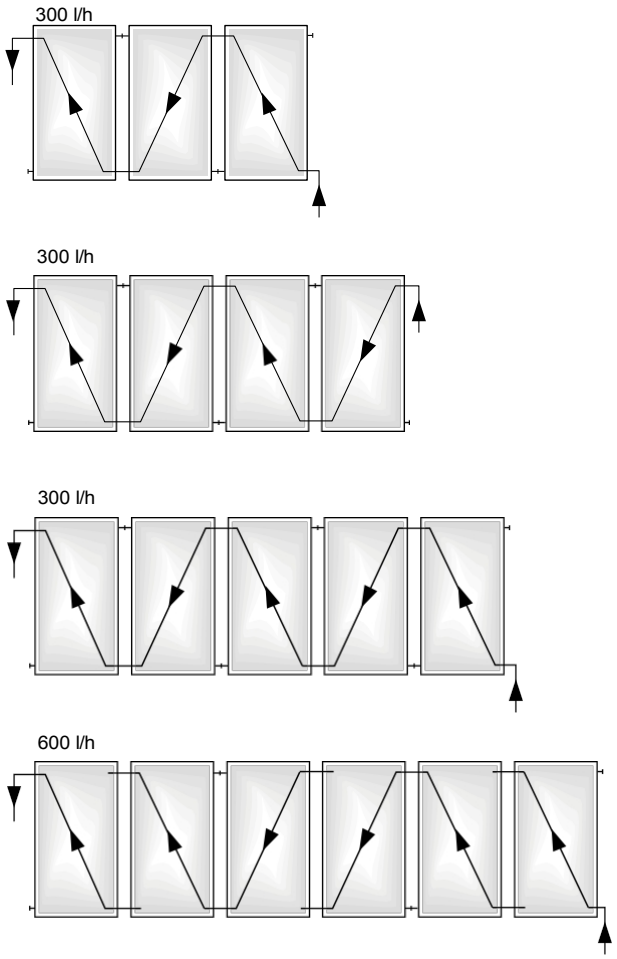
4.4 PIPE DIMENSIONING

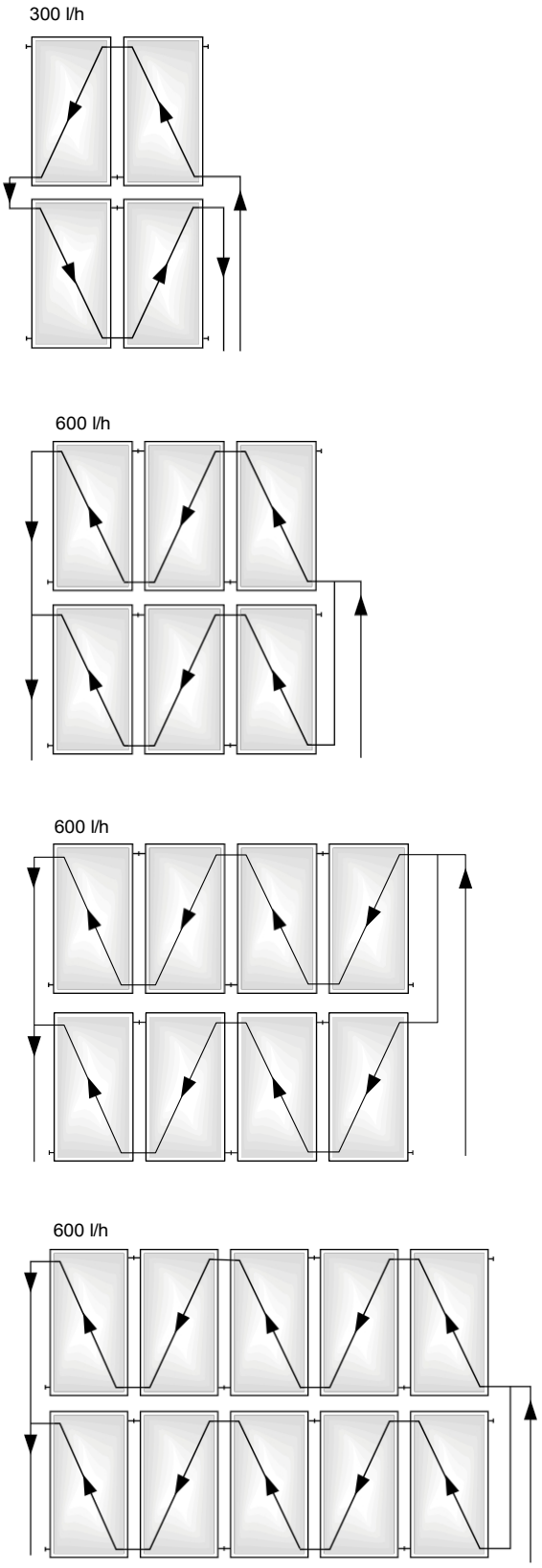
Dimensions of pipe connections for collector fields up to 20 m² :



1 2 .. n	1 to 4	5 to 6
Ømm	1x Cu Ø 18	1x Cu Ø 22
l/min	4.4 l/min	8.3 l/min

4.5 COMBINATION OPTIONS





A maximum of 6 collectors can be connected in series. Several groups must be connected in parallel according to Tichelmann. If groups of different sizes are connected together, a temperature-resistant (up to at least 150 °C) control valve is required to compensate for the pressure loss.

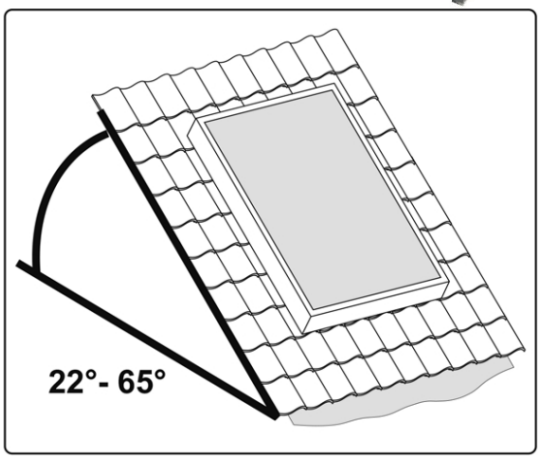
4.6 PRODUCT

Efficiently convert solar energy into heat

Heating costs account for the largest share of energy costs. Over 80 percent of domestic energy consumption is attributable to space heating and hot water production. By incorporating solar energy, this cost block can be significantly reduced. With its 2.53 m^2surface area and variable connections, the flat-plate collector is suitable for almost any task. The collector is designed as a harp collector and therefore has a very wide range of applications. Whether you have a flat, pent or gable roof, we can supply the appropriate mounting materials. It can also be installed as a high-quality and attractive façade element.

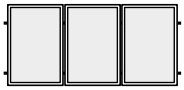
ADVANTAGES

- Maximum solar yields thanks to blue, highly selective Tinox vacuum coating
- Durable thanks to hail-resistant safety glass, double-walled aluminium frames and permanently sealed cutting ring connections
- Optimal use of space thanks to horizontal and vertical installation
- Minimal solar radiation can be utilised when combined with the Oskar° stratified storage tank and/or a heat pump
- With other ratiotherm components, a completely coordinated system



The collectors and the associated mounting kits are designed for roofs with a pitch of 22° to 65°. Installation on flat roofs requires a special mounting kit with triangular supports, which can also be ordered from ratiotherm.

4.7 SCOPE OF DELIVERY

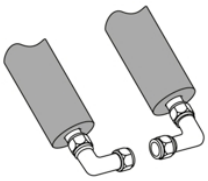
de Lieferumfang en Scope of delivery es Volumen de suministro fr Etendue de la livraison it La fornitura include pt Material fornecido nl Omvang van de levering/benodigde artikelen			
 de Basisprofil en Mounting rail es Perfil básico fr profilé principal it Profilo di base pt Perfil de base nl Basisprofiel	2	2	2
 de Montagehaken en Mounting hook es Gancho de montaje fr Crochets de montage it Gancio di montaggio pt Gancho de montagem nl Montagehaak	2	4	6
 de Klemmhalter en Retaining clip es Grapa fr Clip de fixation it Staffe di bloccaggio con vite pt Braçadeira de fixação nl Klem	4	8	12
 de Zylinderschrauben en Hexagon socket head screw es Tornillos cilíndricos fr Vis à tête cylindrique à trou six pans it Viti cilindriche pt Parafusos cilíndricos nl Cilinderkopschroeven	4	8	12
 de Nutstein en Anchor block es Tuerca de ranura fr Coulisseau de rainure it Contropiastra pt Porca com ranhura nl Borgplaatje	4	8	12
 de Montageanleitung en installation instruction es Instrucciones de montaje fr instructions de montage it Consiglio dell'Assemblea pt Instruções de montagem nl Montage-instructies	1	1	1
	2/1	3/1	4/1

4.8 ADDITIONALLY REQUIRED

de Dachanker
en Roof anchor
es Anclajes de tejado
fr Ancre de toit
it Ancoraggio per copertura
pt Gancho de fixação
nl Dakhaak

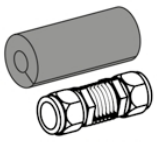
de Lüftungspfanne (individuelle Dacheindeckung beachten)
en Ventilation roofing tile, (individual roofing consider)
es Azulejo del material para techos de la ventilación, (el material para techos individual considera)
fr Tuile de toiture de ventilation, (la toiture individuelle considèrent)
it Mattonelle del tetto di ventilazione, (il tetto specifico considera)
pt Telha de ventilação (ter em atenção a cobertura específica do telhado)
nl Ventilatiepan (individuele dakbedekking in acht nemen)

de Absturzsicherung
en antifall guard
es Juego de seguridad contra caídas
fr Sécurité anti-chute
it Dispositivo anticaduta
pt Dispositivo anti-queda
nl Valbeveiliging



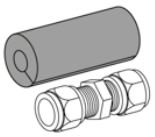
Ø = 12/18mm

de Kollektorfeld-Anschlussset, gebogen
en Collector connection kit, bent
es Juego de conexión para batería de colectores
fr Kit de connection pour capteur, courdé
it Set di allacciamento del collettore
pt Jogo de ligação do colector, curvo
nl Aansluitset collectorveld, gebogen



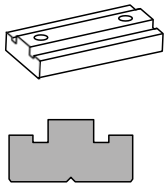
Ø = 18mm

de Kollektorverbinder, gerade
en Collector connector, straight
es Conector de colectores, recto
fr attache de capteur droit
it Raccordo del collettore, diritto
pt Conector de colectores, recto
nl Collectorverbinder, recht



Ø = 12/18mm

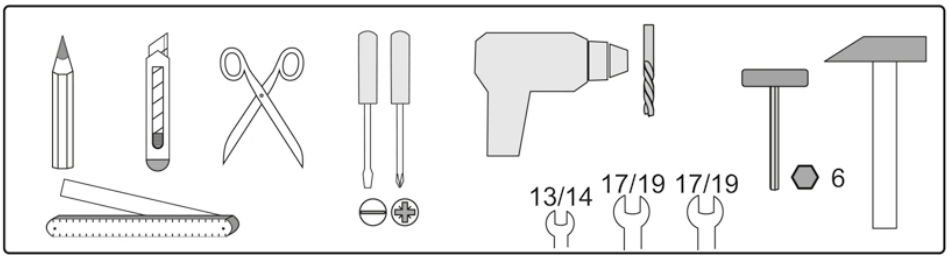
de Kollektorverbinder, gerade
en Collector connector, straight
es Conector de colectores, recto
fr attache de capteur droit
it Raccordo del collettore, diritto
pt Conector de colectores, recto
nl Collectorverbinder, recht



de Coupling set
Coupling kit (including fixing)
(incl. fixings)
fr Jeu de pièces d'accouplement
(pièces de fixation comprises)
it Set di accoppiamento
pt Kit de acoplamento
nl Coupling piece

---

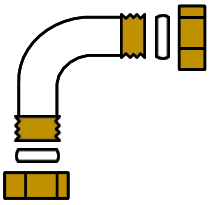
de Erforderliche Werkzeuge:
en Tools required:
es Herramientas necesarias:
fr Outillages nécessaires:
it Attrezzi necessari:
pt Ferramentas necessárias:
nl Vereist gereedschap:



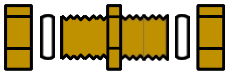
4.9 SPARE PARTS

Corrugated hose ra/12862

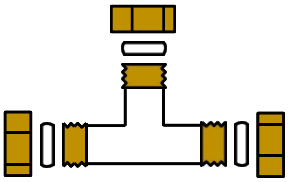
Cutting ring fitting, elbow ra/11650



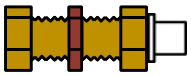
Connecting piece, upright ra/11645



Cutting ring fitting, T-piece ra/11670

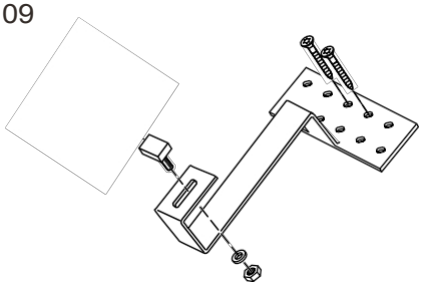


Connector with shut-off device, upright ra/12564

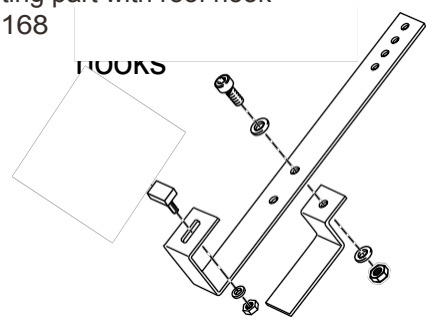


Cutting ring fitting with end cap ra/11677

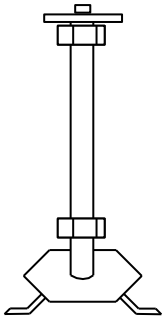
Mounting part with rafter anchor ra/13109



Mounting part with roof hook ra/14168



Anchor for lawn grid stones ra/13111



5. ASSEMBLY

5.1 GENERAL INFORMATION ON ROOF FASTENING

Storage:

- If temporary storage is necessary before installation, the collectors must be stored in a dry place and protected from the sun.

Transport

- When transporting vertically, the collector must be secured against slipping out of the packaging.

Installation:

- The condition of the existing roof structure must be checked (possibly building permit and structural analysis).
- The installation system is designed in accordance with DIN 1055 T5 for snow load zone II up to 400 m above sea level.
- For snow loads exceeding 0.75 kN/m^2 or wind loads exceeding 0.5 kN/m^2, we recommend increasing the number of roof hooks or using metal roof panels instead of roof tiles.

NOTE

Installation work on concrete roof tiles is only possible with caution within the usual curing time of approx. 6 months.

- When installing collectors more than 1 m below the ridge, a snow guard must be installed directly above the collector field.
- Collectors should be aligned to the south if possible.
- The minimum angle of inclination for collector installation is 20°, the maximum angle of inclination is 90°.
- Our collectors have holes on all sides at the level of the glazing below the protective edge for venting the collectors. If the collector is raised so high that the protective edge no longer covers the holes, we recommend installing an appropriate rain protection device to protect against rainwater ingress in unfavourable weather conditions.

CAUTION

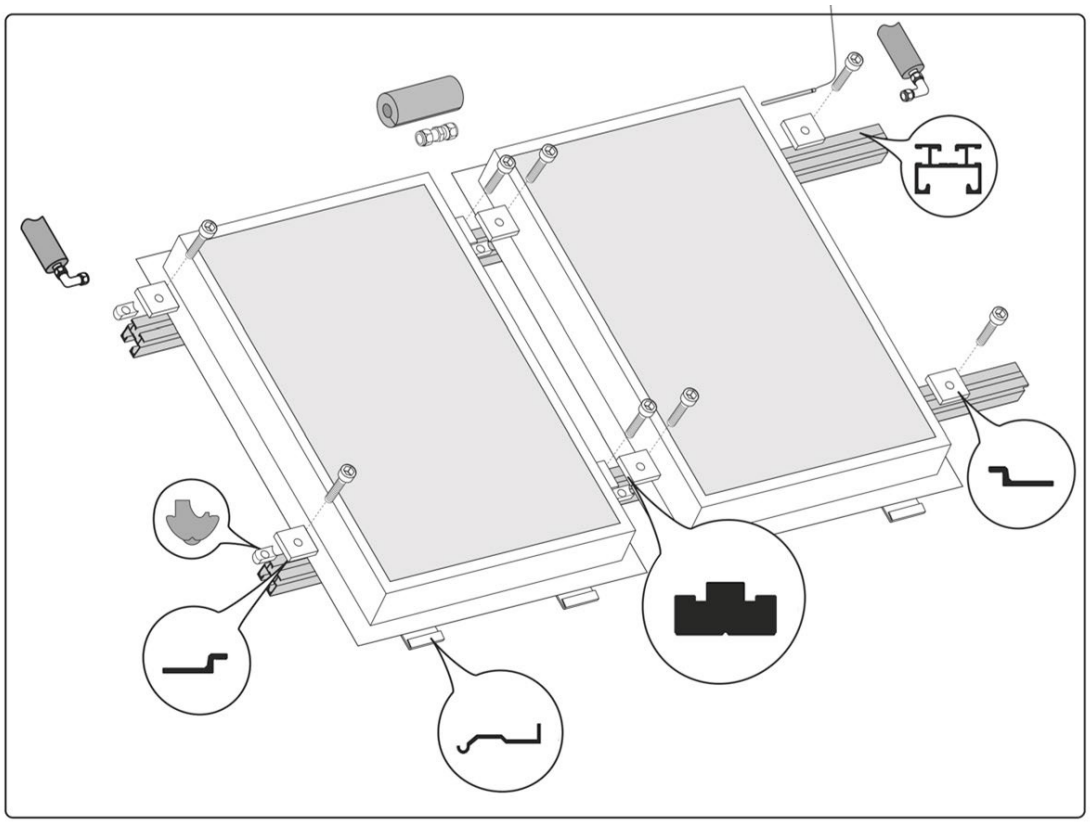
Wind loads

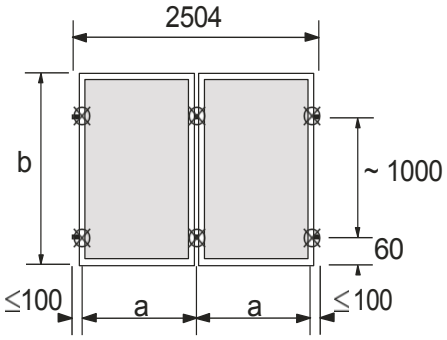
If the collectors are not fixed to the building on flat roofs, they must be weighted down (on site) with weights.

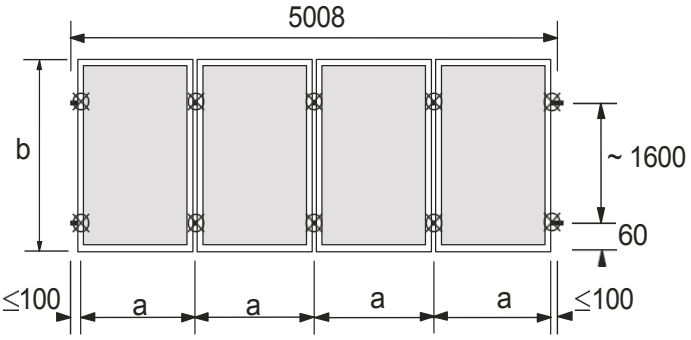
Installation height up to 8 m: Required weight per m^2 Gross collector area = 75 kg
Installation height up to 20 m: Required weight per m^2 Gross collector area = 128 kg

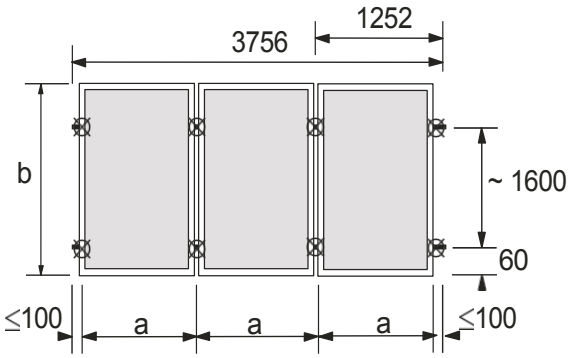
The distance between the collector and the edge of the building should not be less than 2 m.

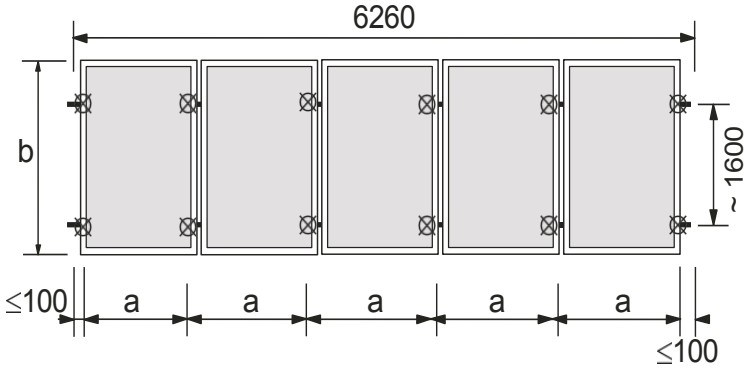
5.2 HORIZONTAL MOUNTING KIT









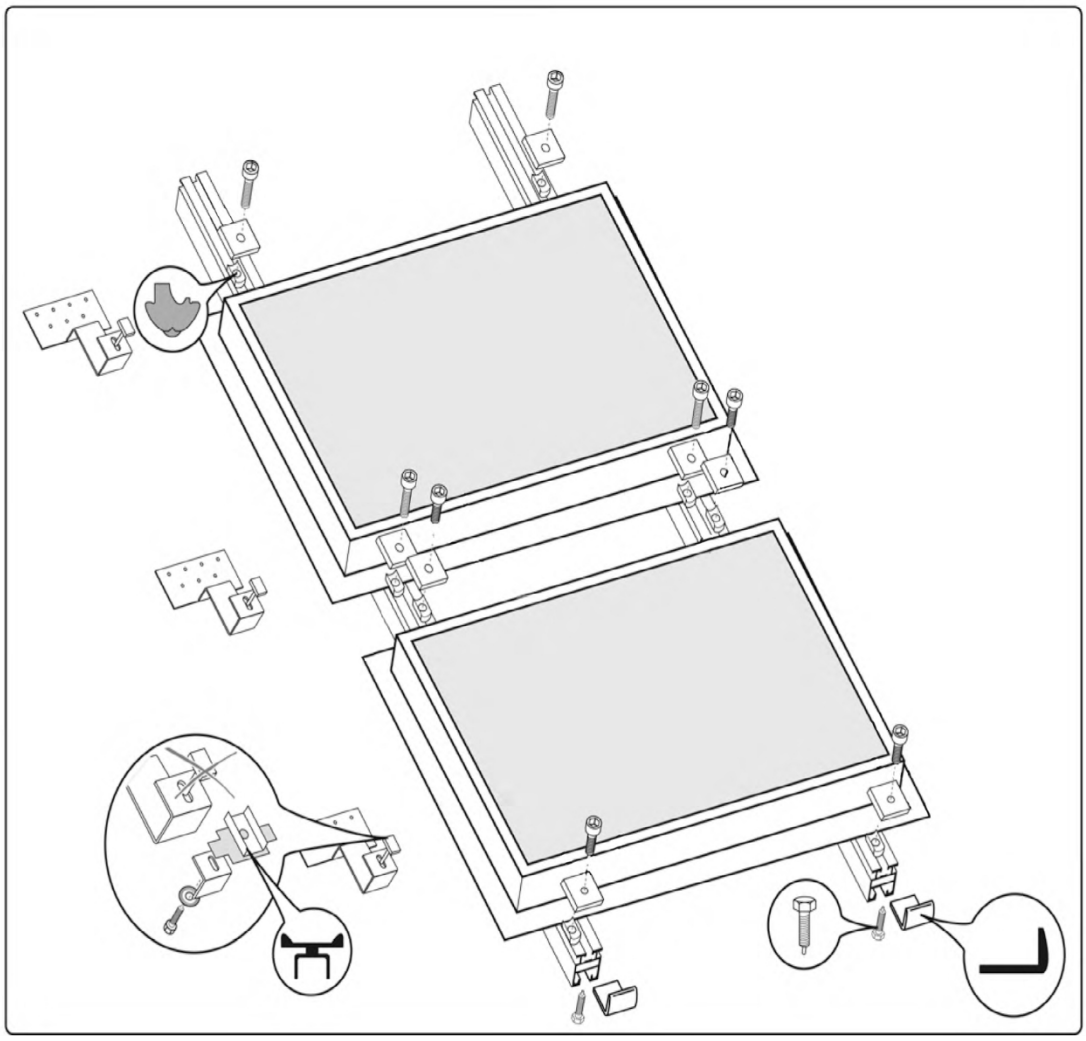


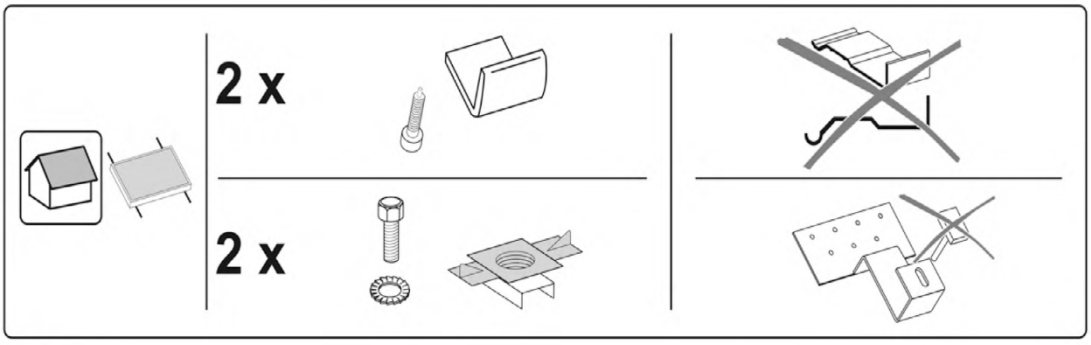
All dimensions in millimetres

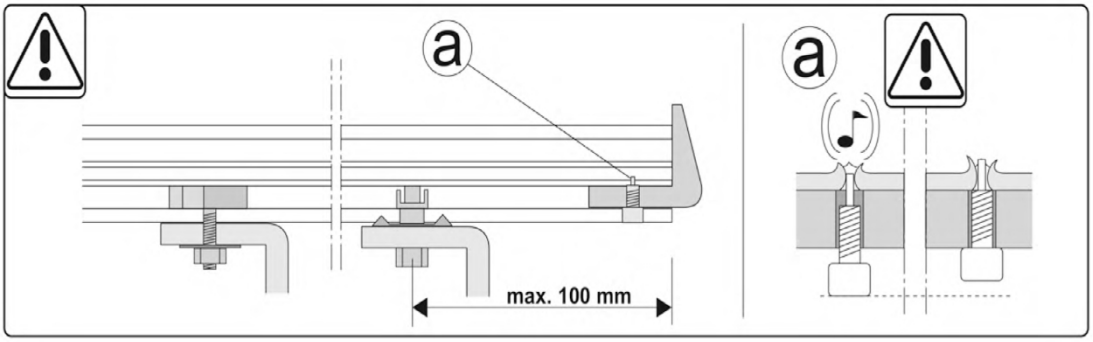
a = 1204 ± 100
b = 2104

Mounting points

5.3 VERTICAL MOUNTING KIT

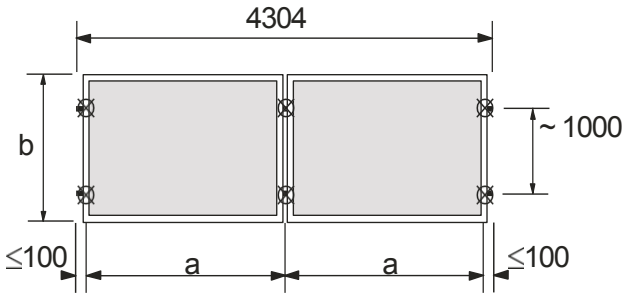


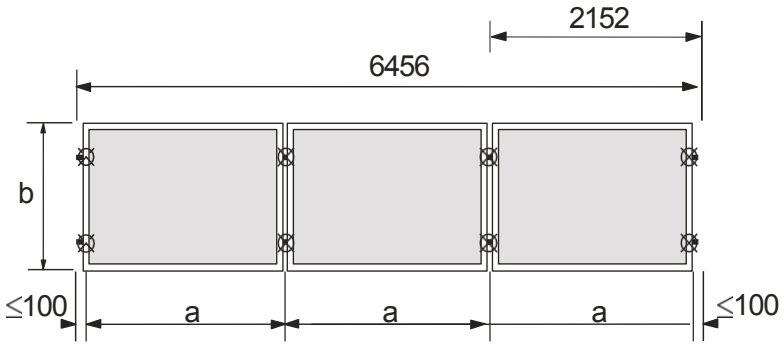


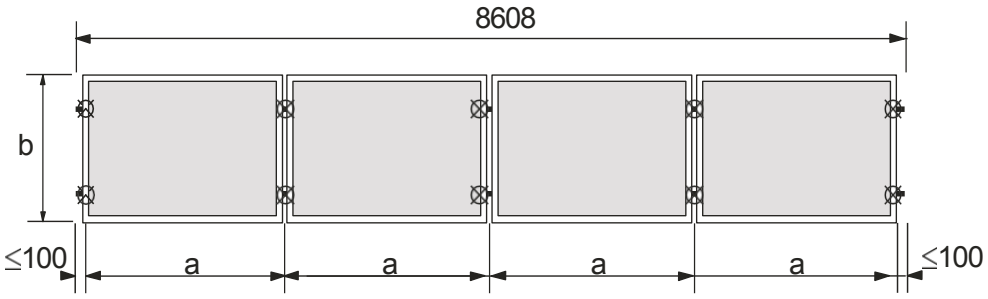


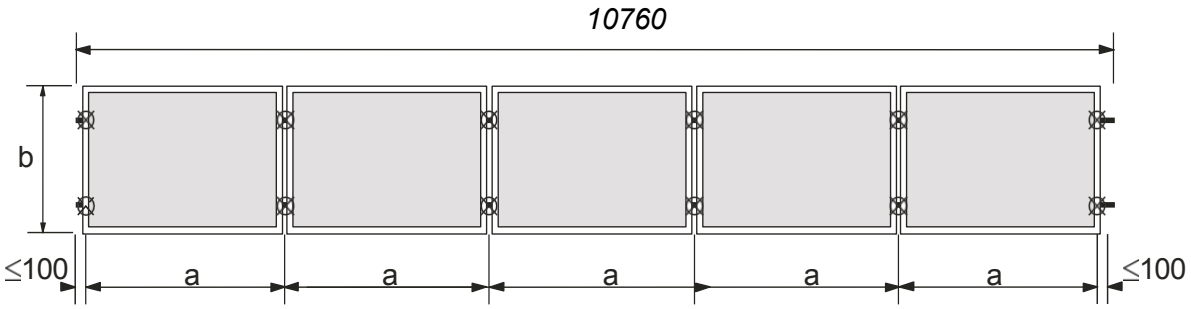
5.3 VERTICAL MOUNTING KIT

All dimensions in millimetres







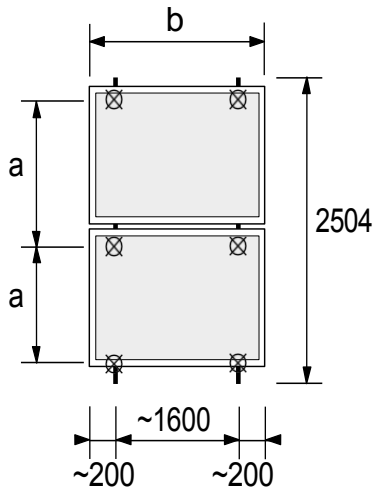


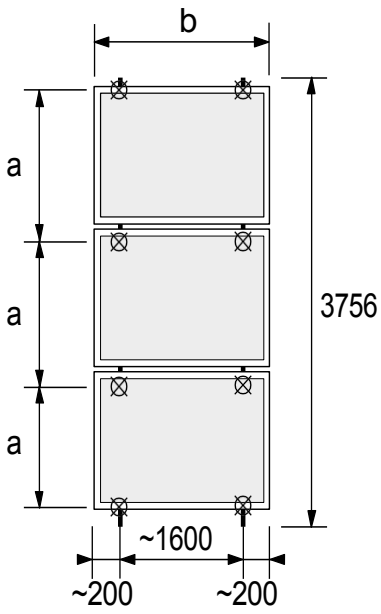
a = 1204 ± 100
b = 2104

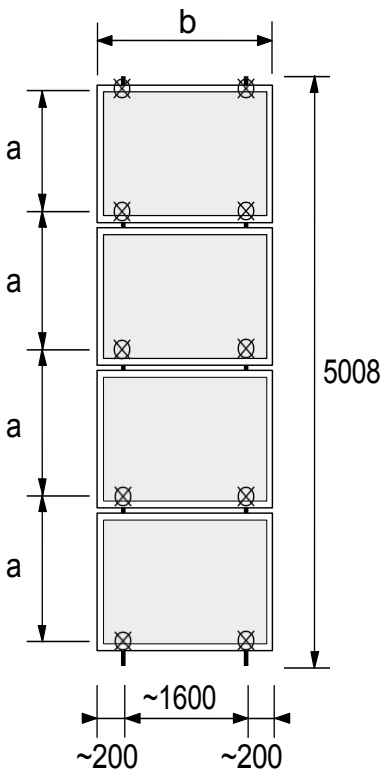
Fastening points

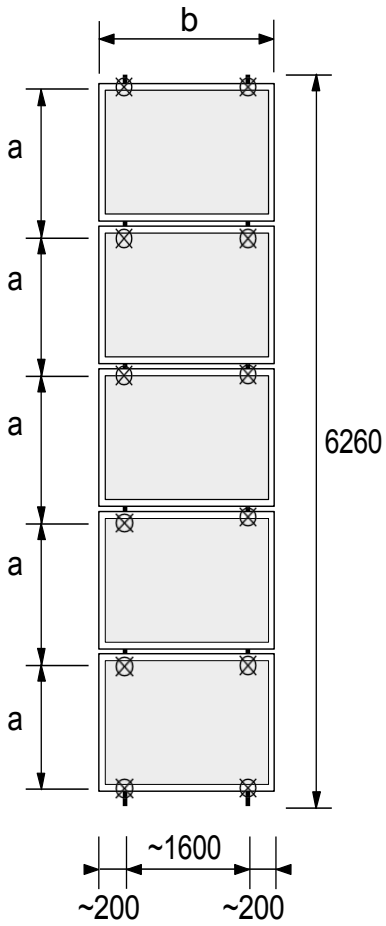
5.3 VERTICAL MOUNTING KIT

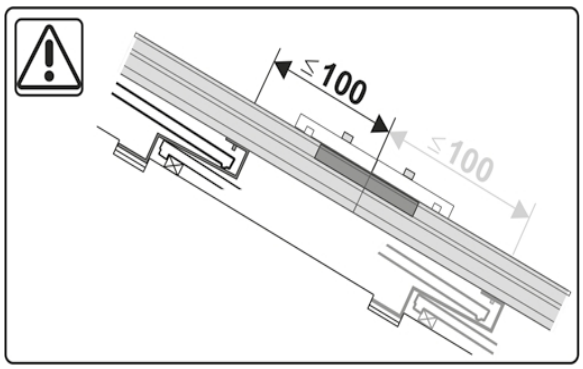
All dimensions in millimetres







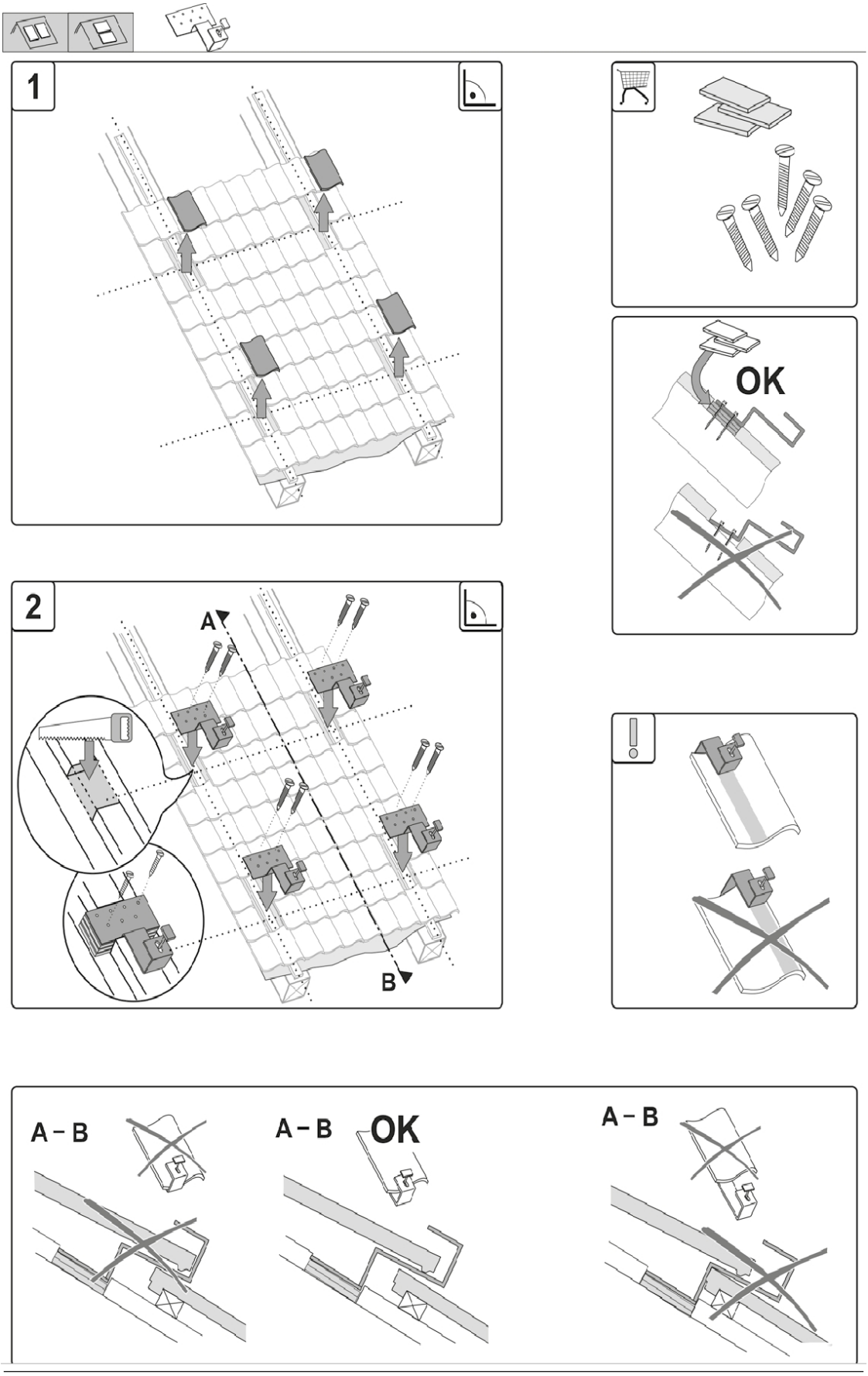




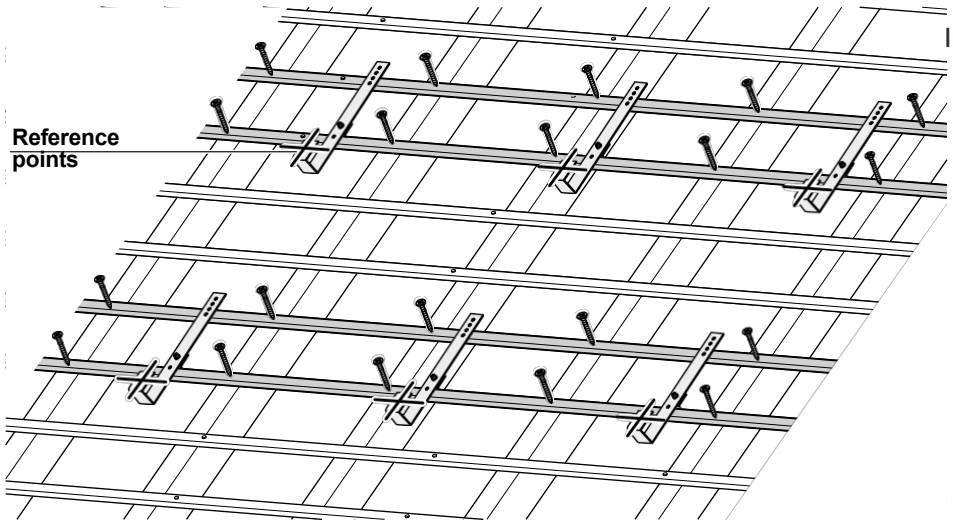
a = 1204 ± 100
b = 2104

Fixing points

5.4 INSTALLATION OF FASTENING POINTS, RAFTER-DEPENDENT

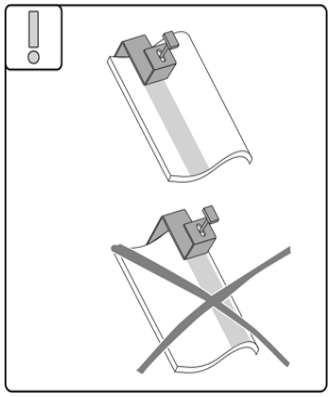


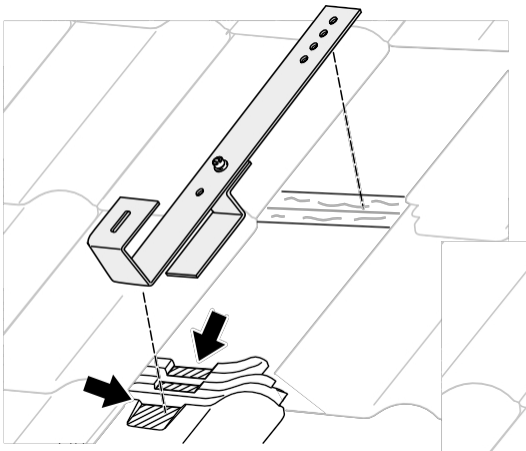
5.5 INSTALLATION OF FASTENING POINTS, RIDGE-INDEPENDENT



Installation with roof hooks:

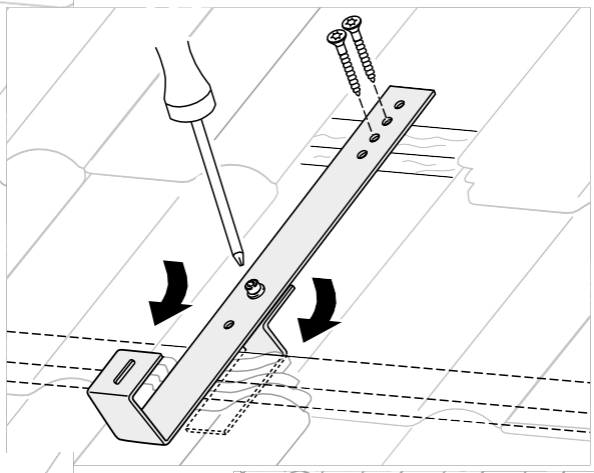
- Check existing roof battens for load-bearing capacity
- Additional fastening of roof battens up to 50 x 30 mm with Spax screws with internal star (Torx) 5 x 60 (provided by customer).



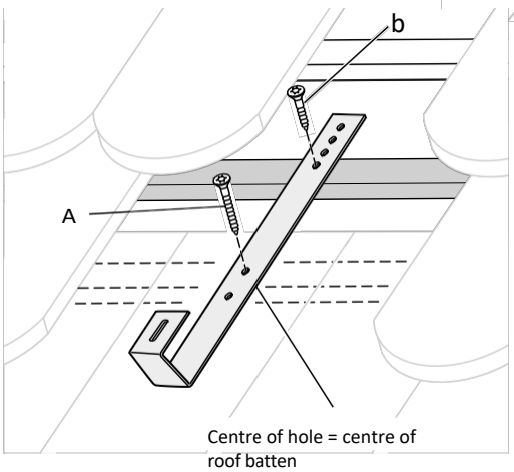


If necessary, sand down the roof tiles to ensure that the roof hooks are flat.

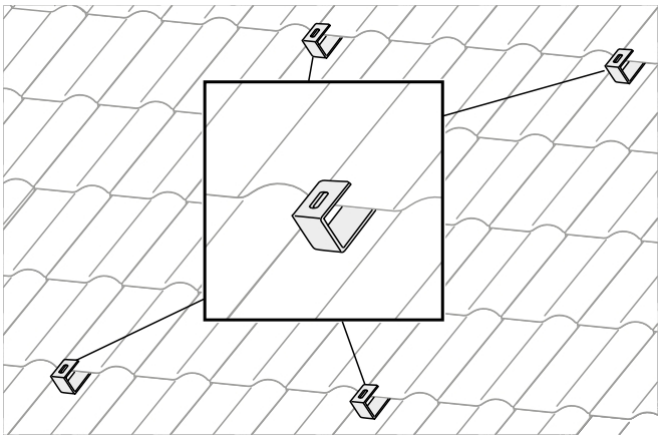
to ensure they are flush with the roof hooks.



Hook in the roof hooks and screw them tight.

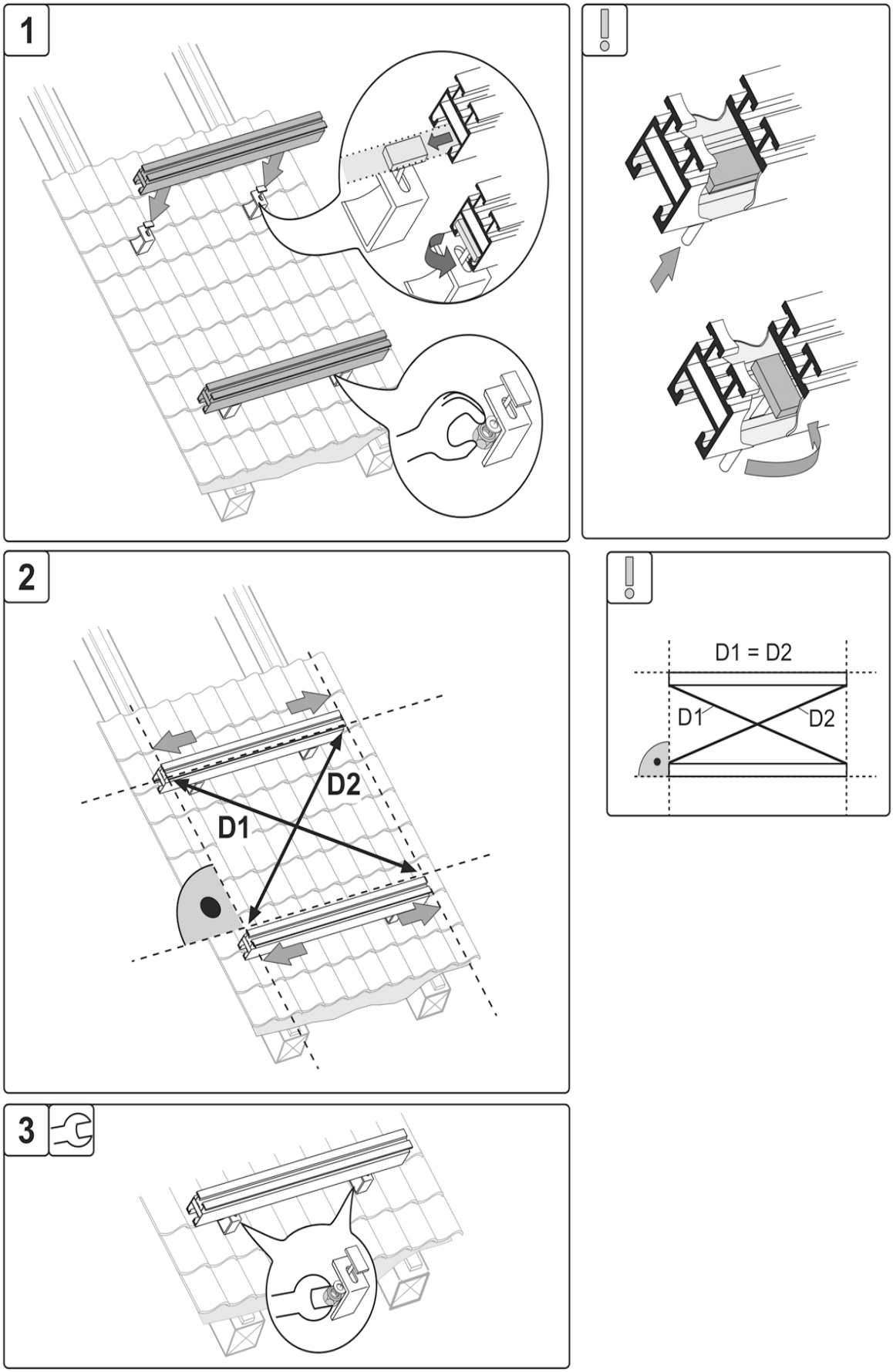


For plain tiles, screw the roof hooks tight.

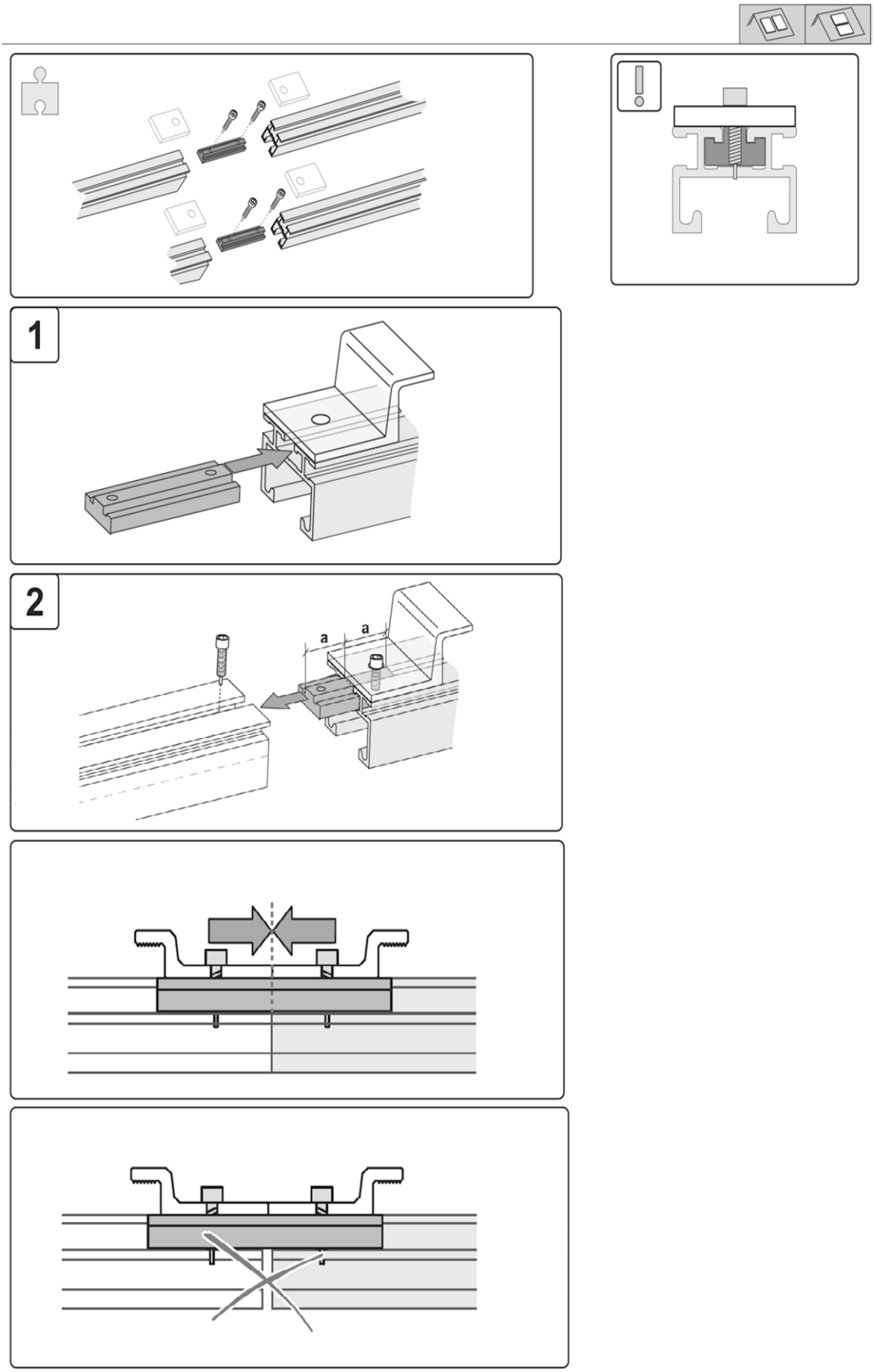


Re-cover the roof completely.

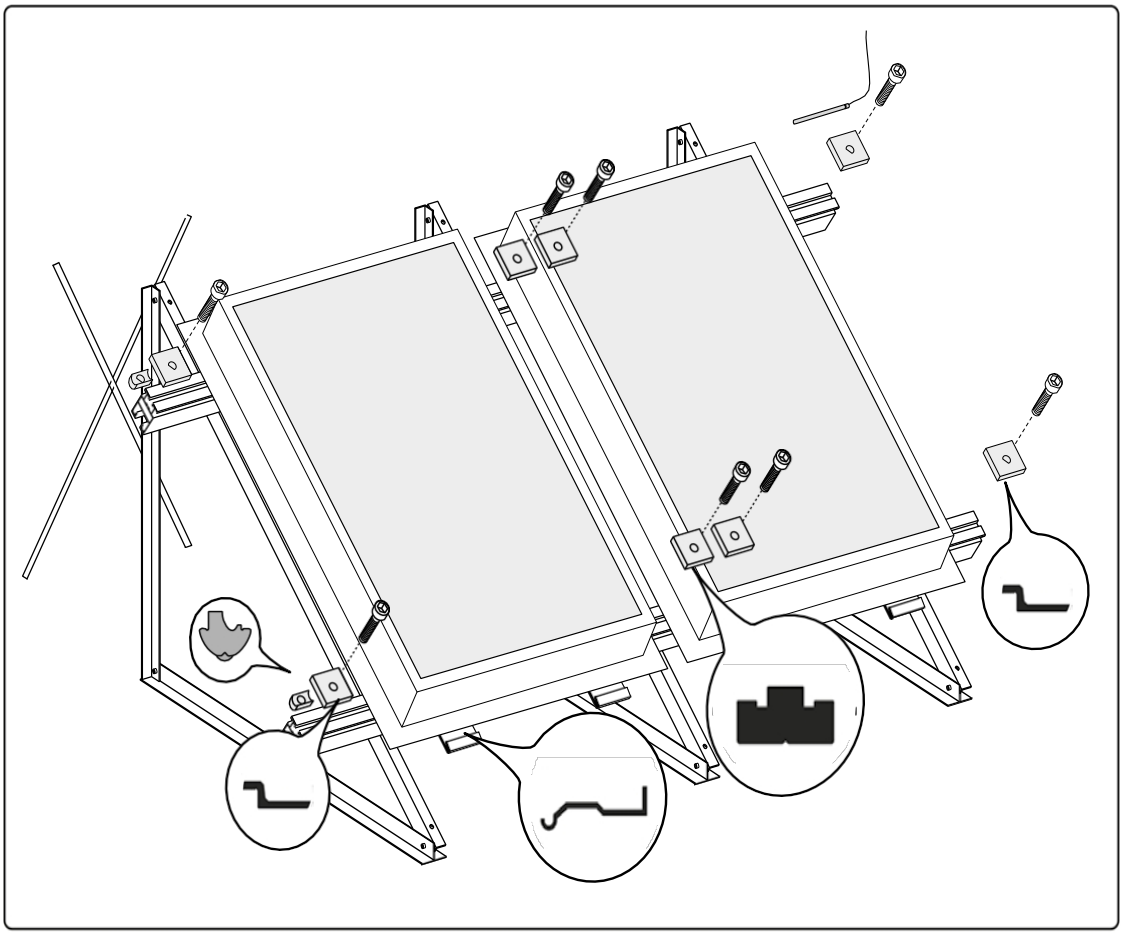
5.6 BASIC PROFILE INSTALLATION, HORIZONTAL

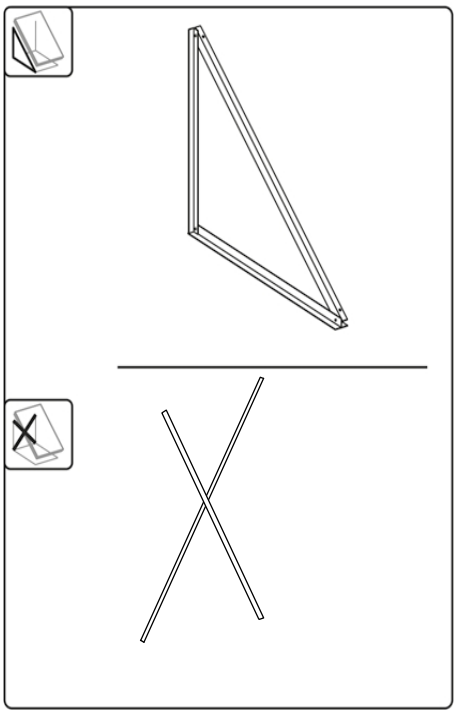


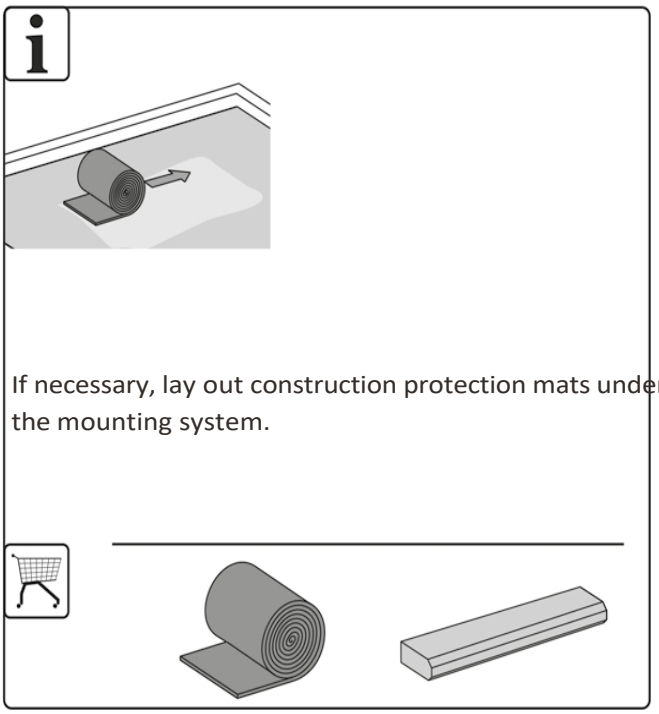
5.7 NOTE: EXTENSION SET



5.8 FLAT ROOF MOUNTING SYSTEM

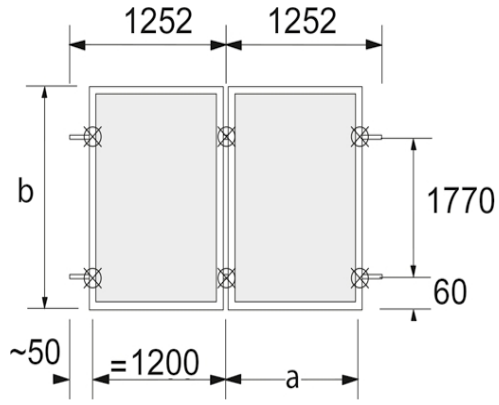


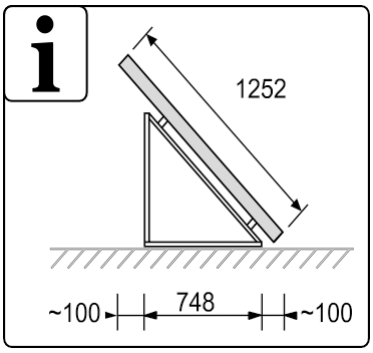


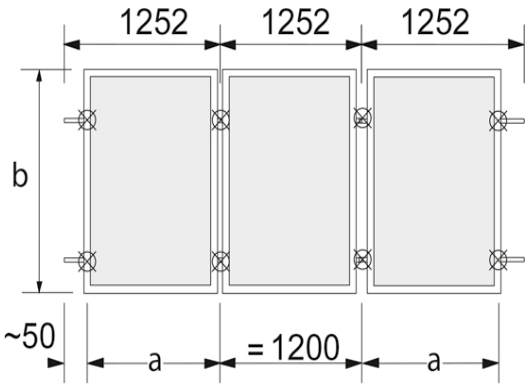


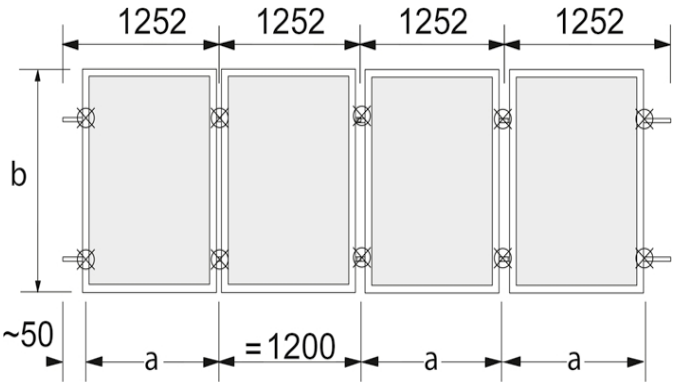
If necessary, lay out construction protection mats under the mounting system.

5.8.1 FLAT ROOF MOUNTING SYSTEM, VERTICAL

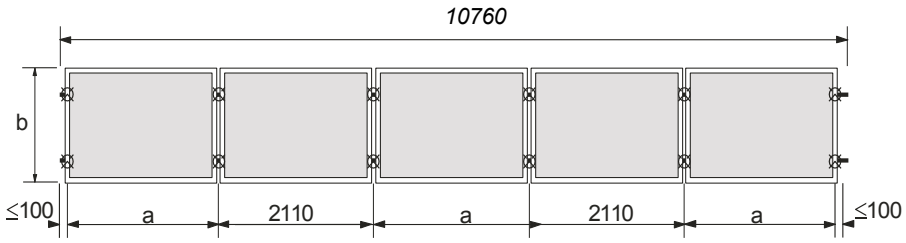


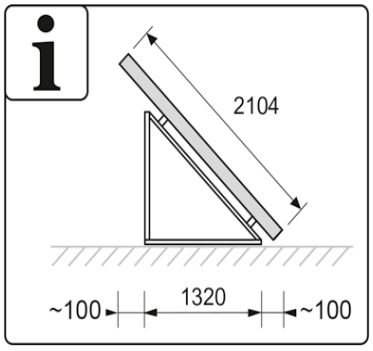


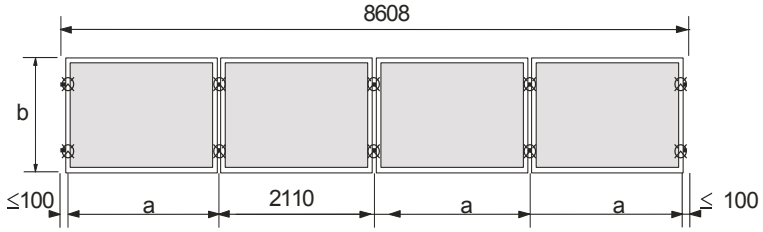


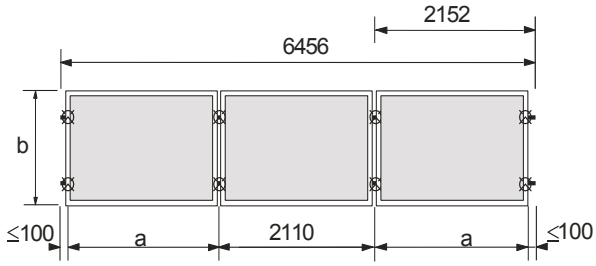


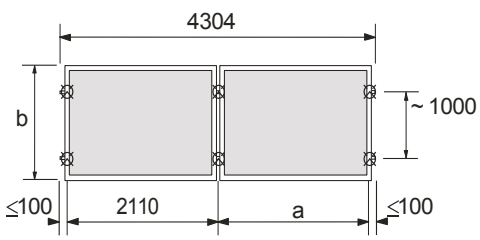
5.8.2 FLAT ROOF MOUNTING SYSTEM, HORIZONTAL



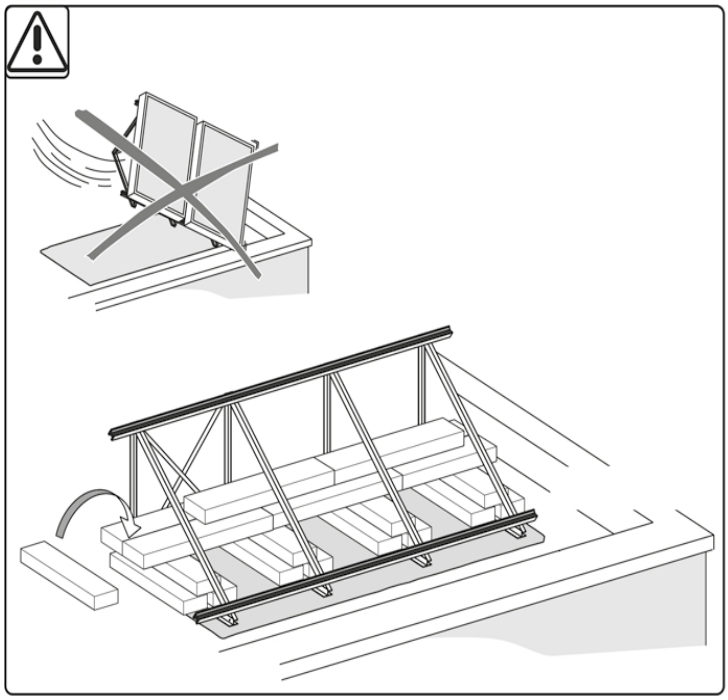


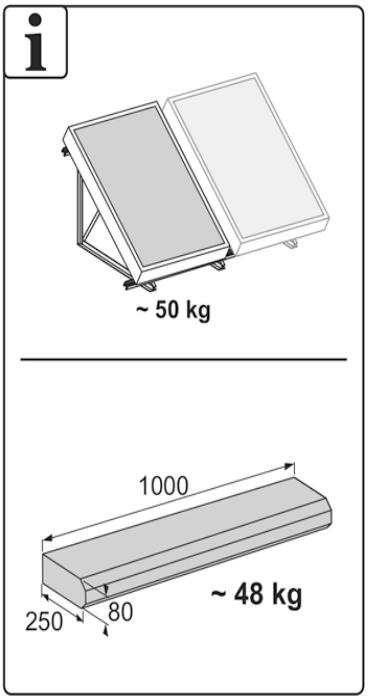


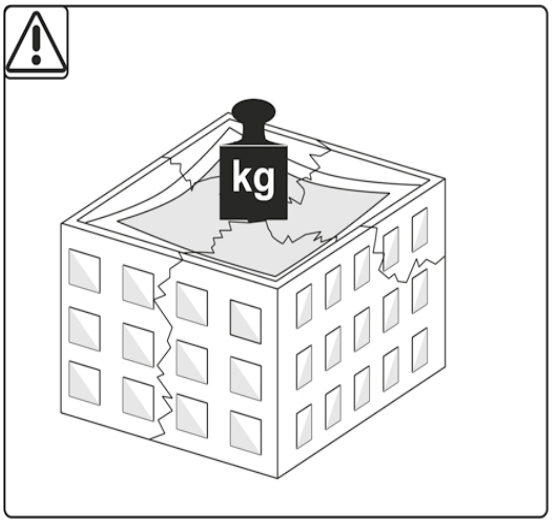


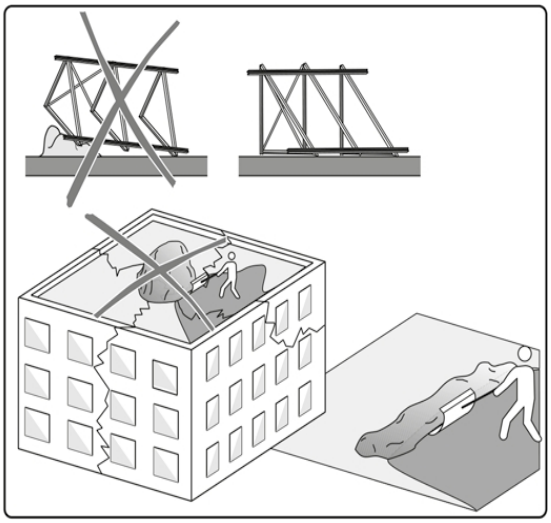


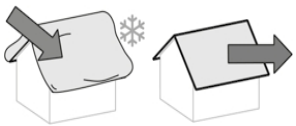
5.8.3 FLAT ROOF MOUNTING SYSTEM: NOTES





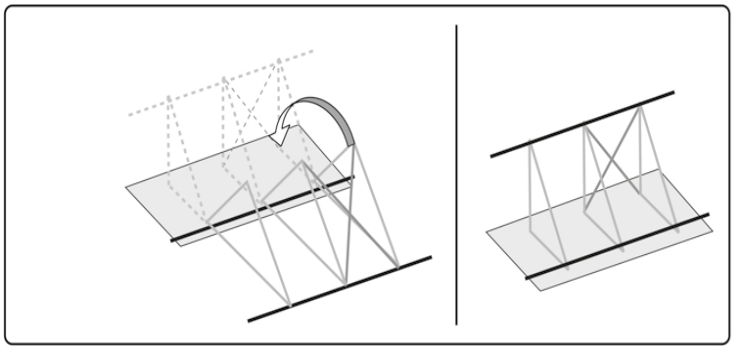


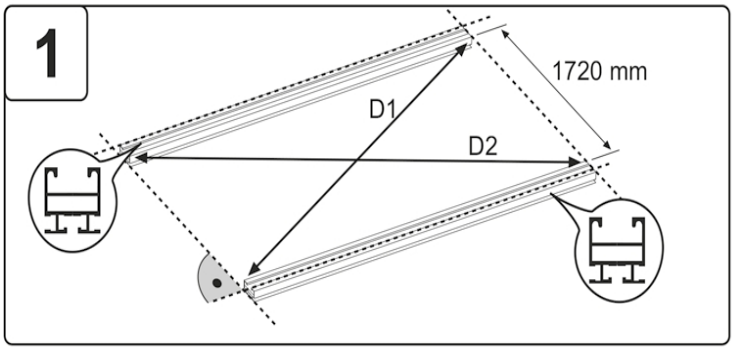


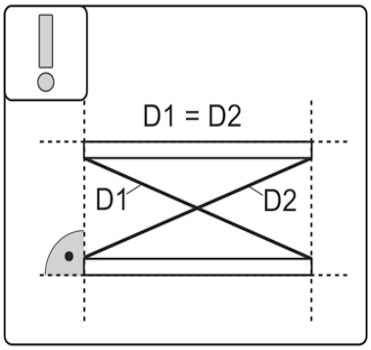


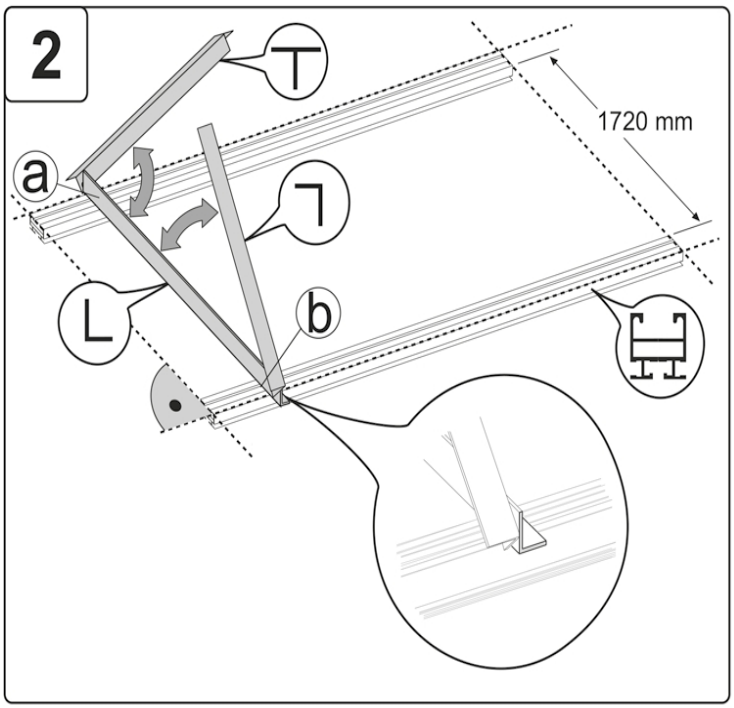
Weights, wind and snow loads must be determined on a case-by-case basis. A case-specific structural analysis may be required for the installation of the substructure.

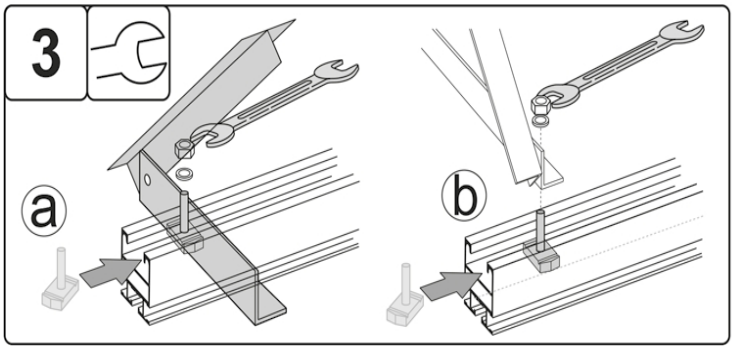
5.8.4 FLAT ROOF MOUNTING SYSTEM: FLAT ROOF FRAME

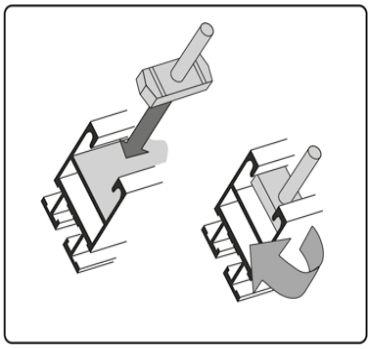




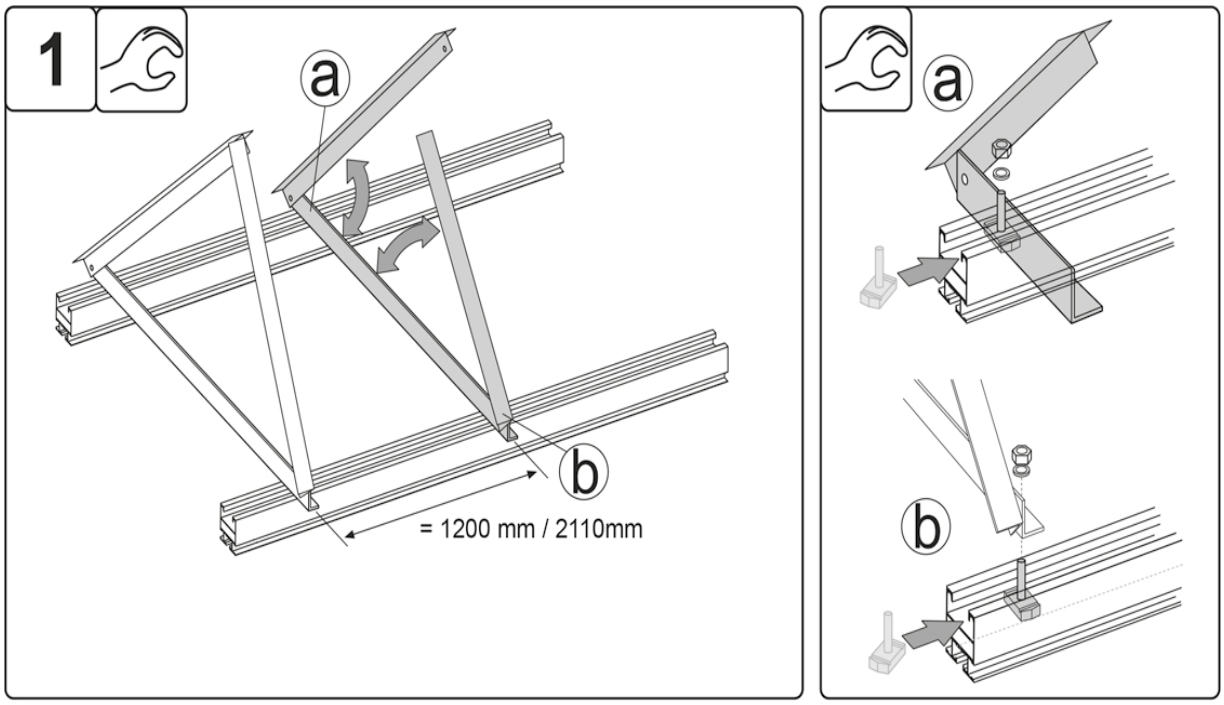


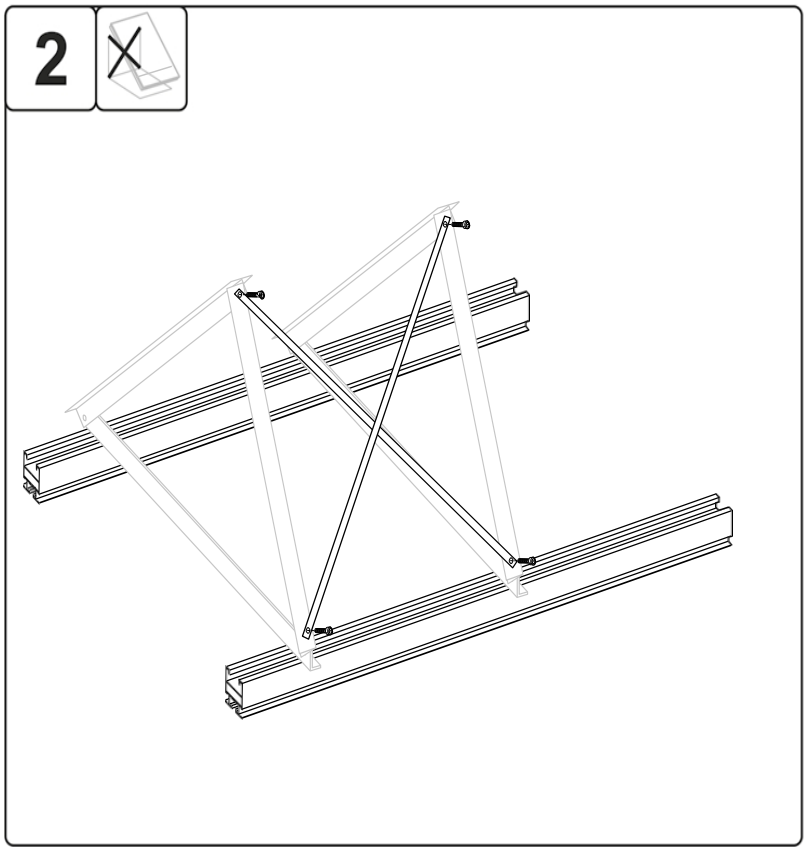




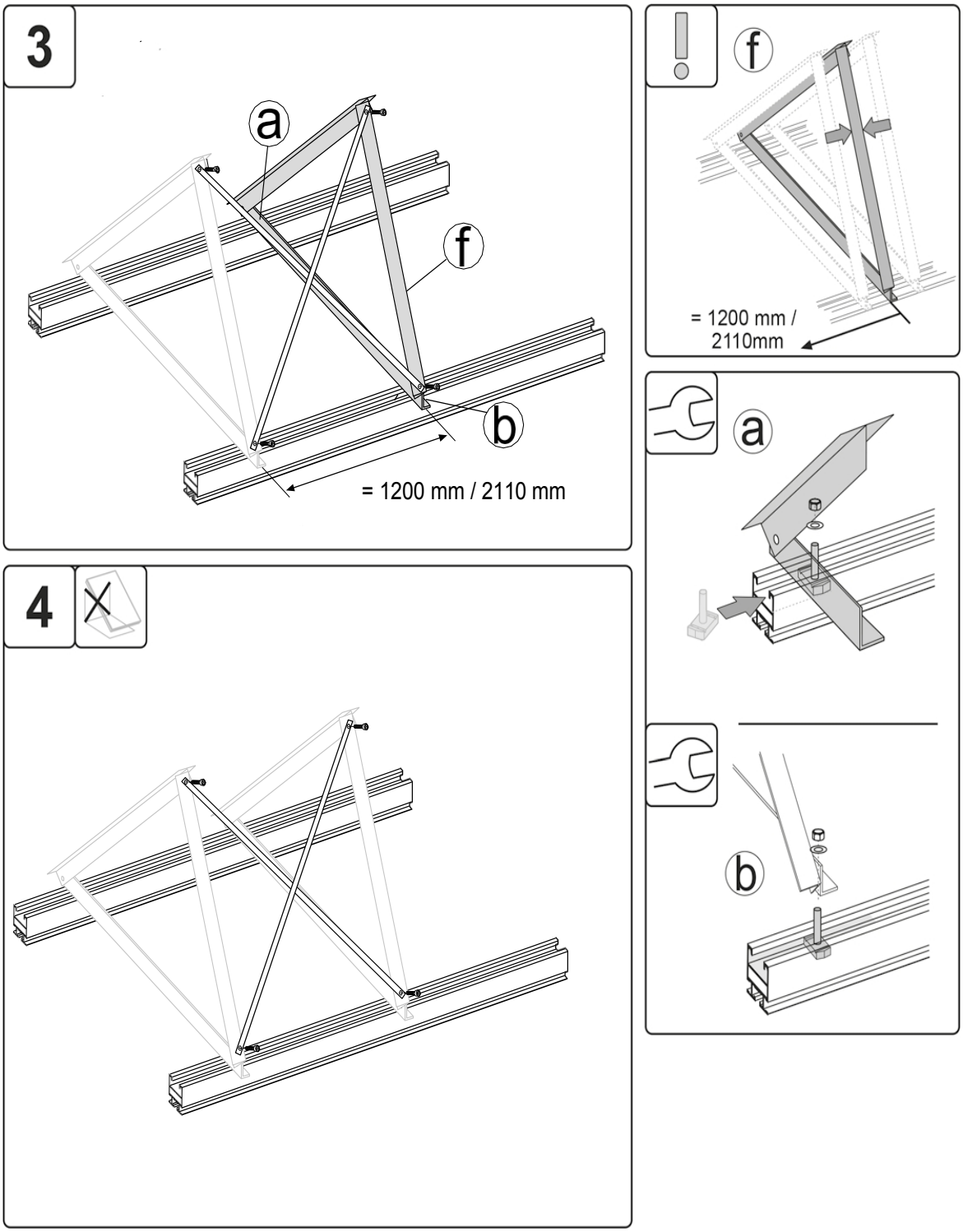


5.8.4 FLAT ROOF MOUNTING SYSTEM: FLAT ROOF FRAME





5.8.4 FLAT ROOF MOUNTING SYSTEM: FLAT ROOF FRAME



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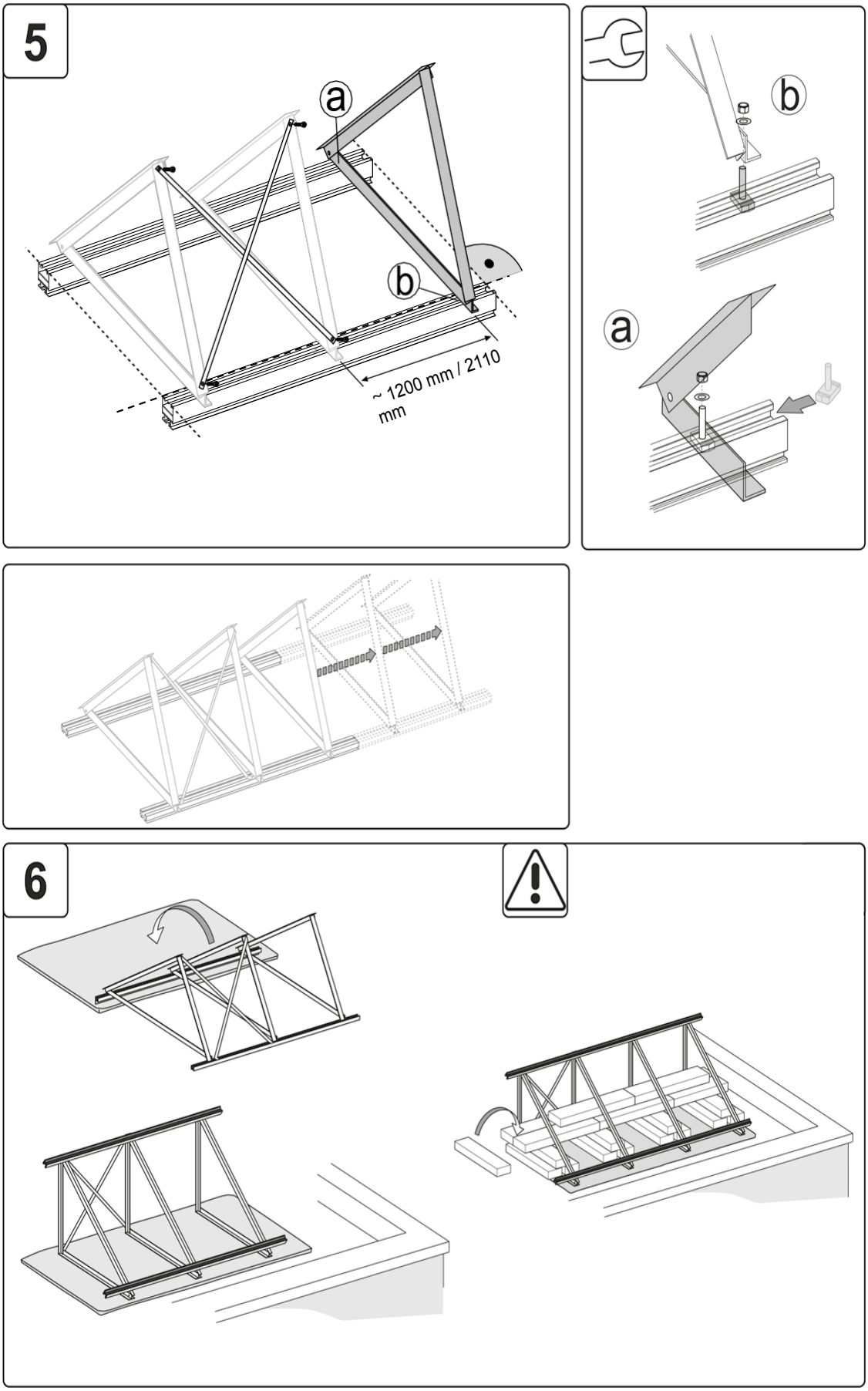
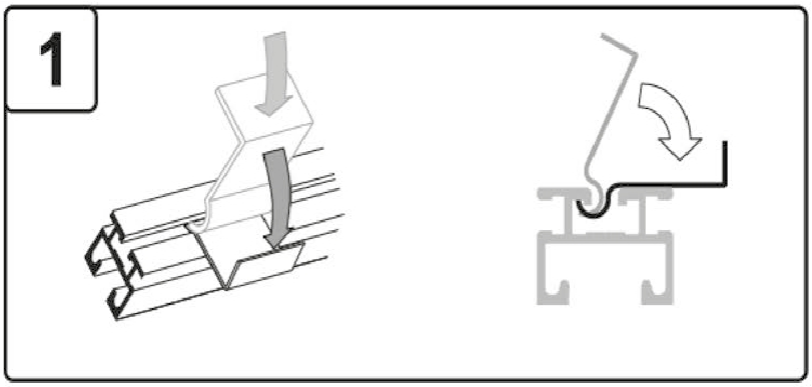
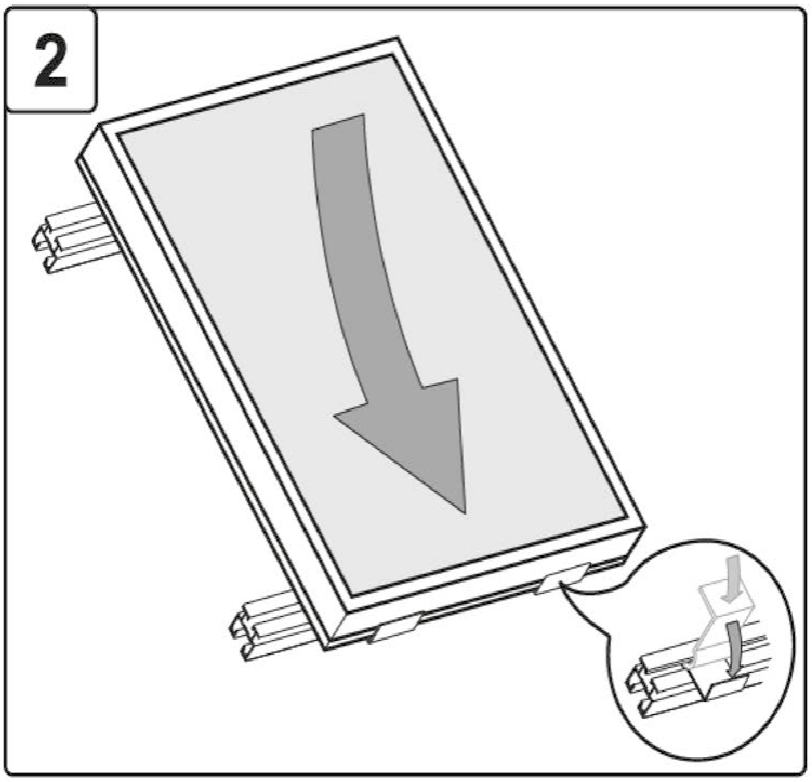
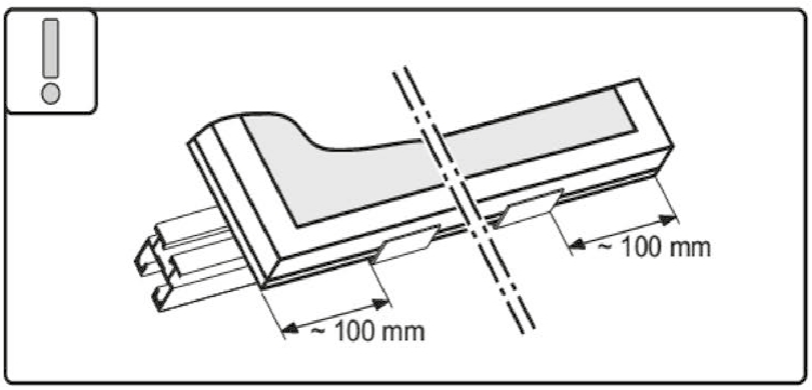


5.9 COLLECTOR MOUNTING ON HORIZONTAL BASE PROFILES

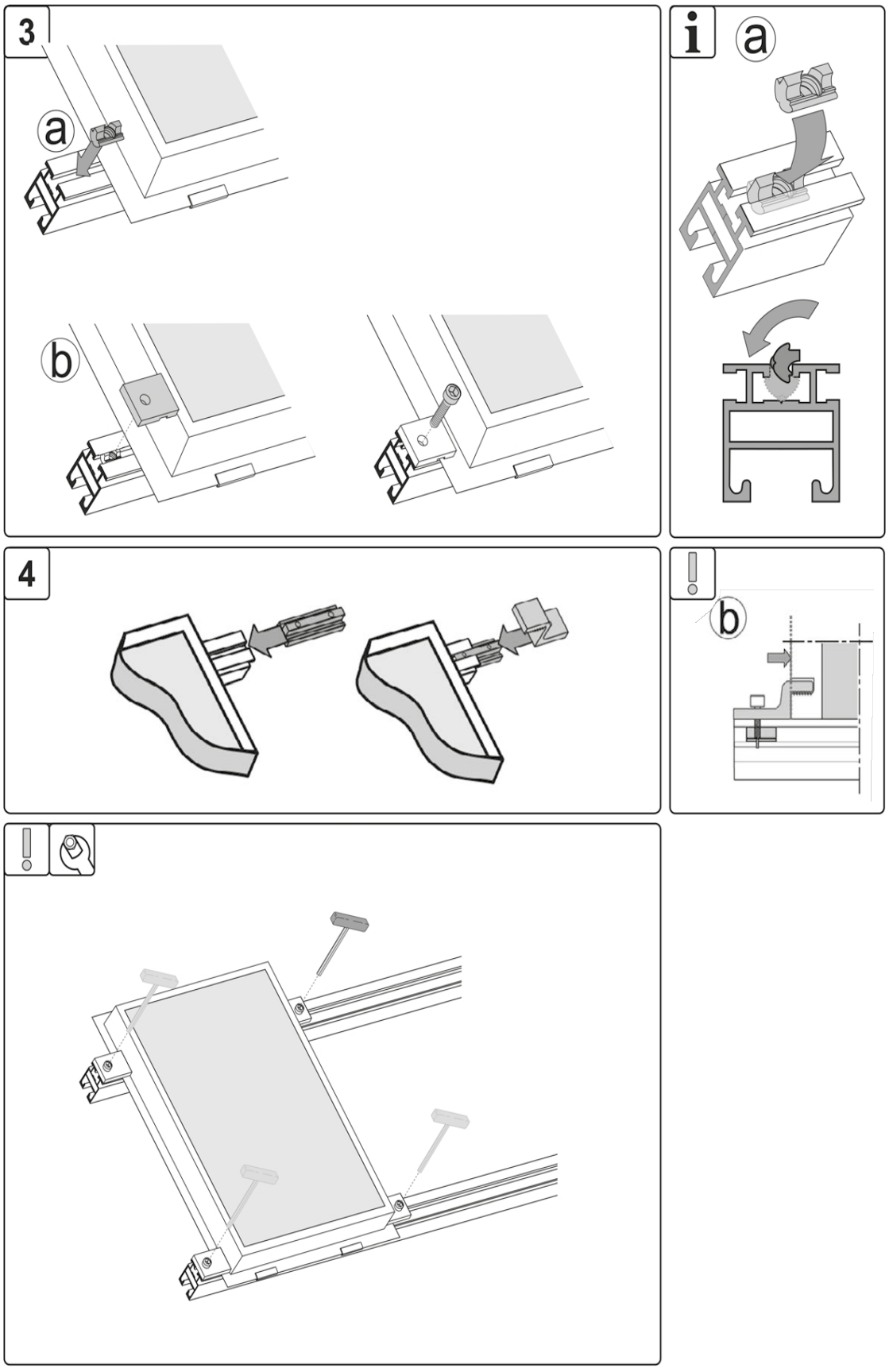
Fastening of the first collector in the row





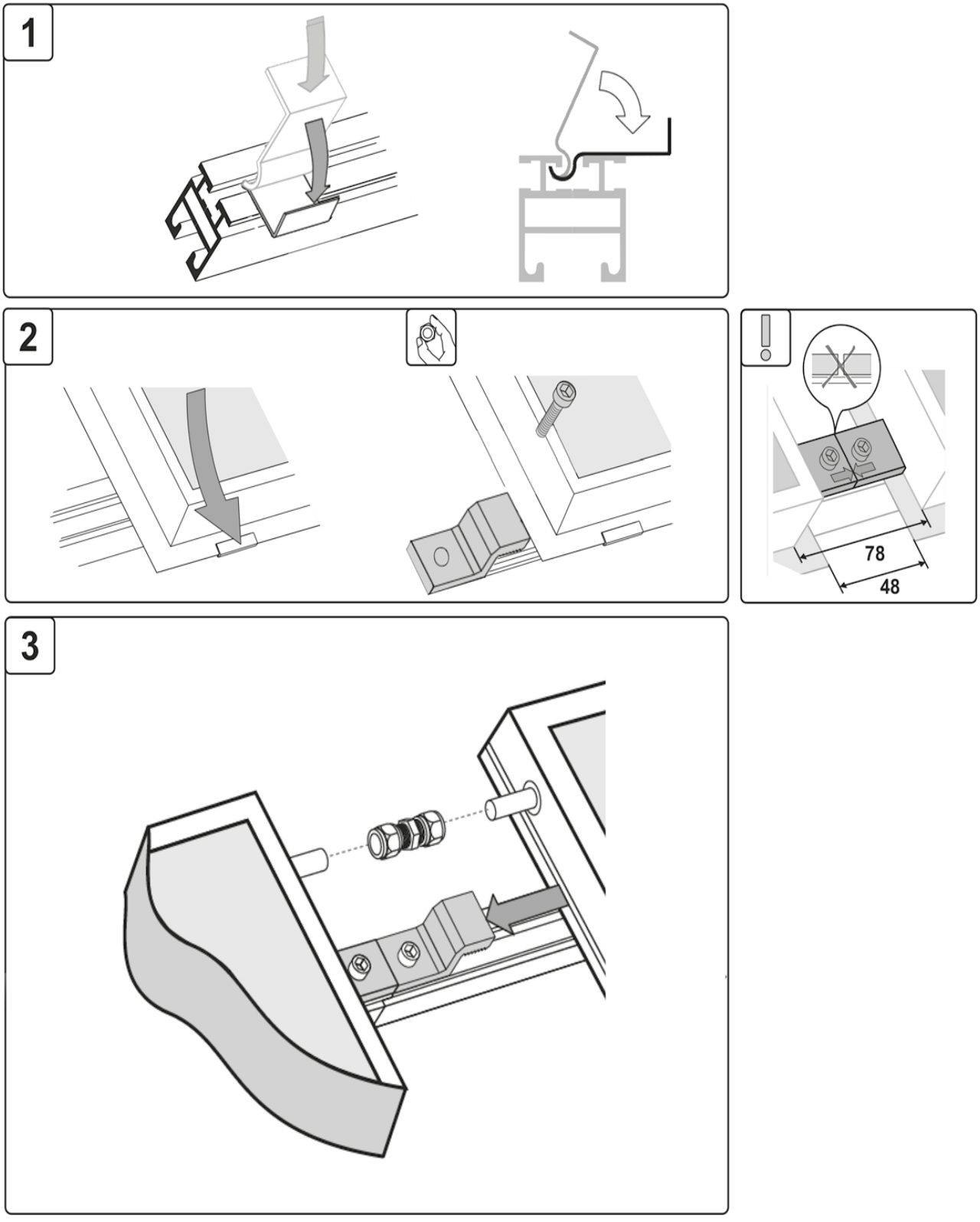


5.9 COLLECTOR MOUNTING ON HORIZONTAL BASE PROFILES

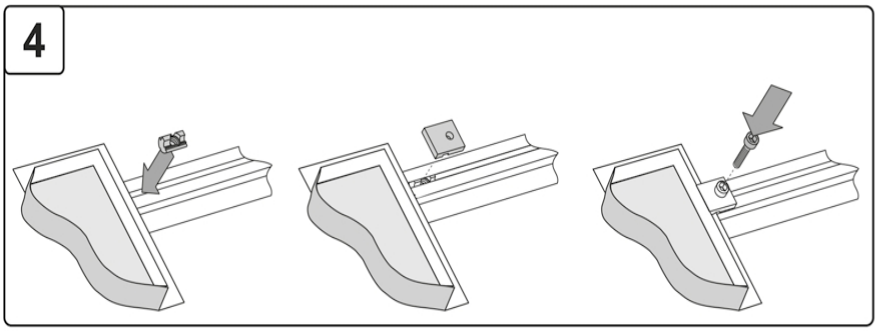


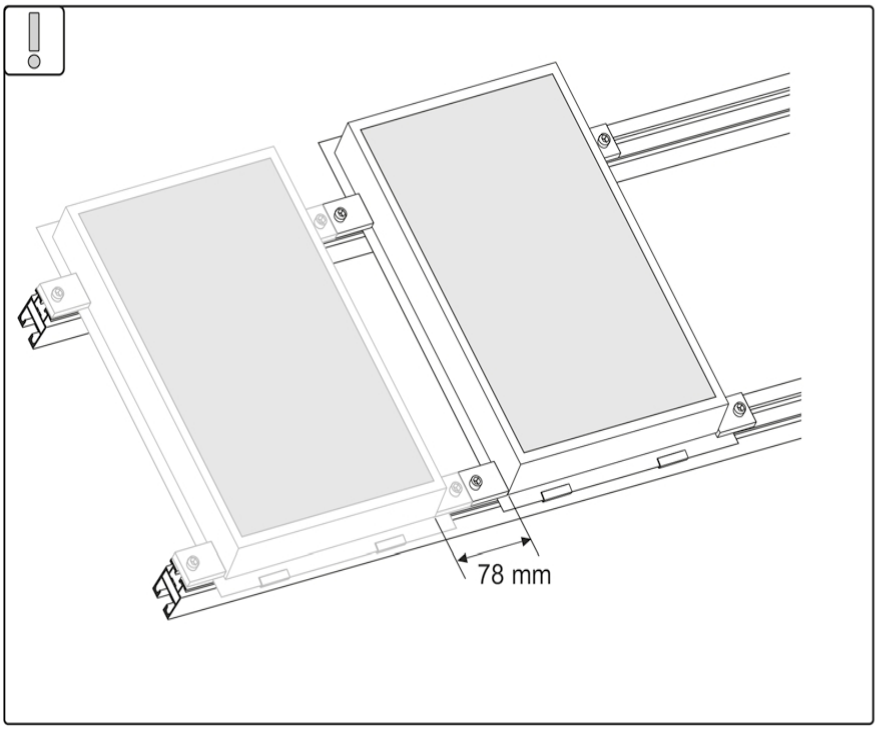
5.10 MOUNTING OF ADDITIONAL COLLECTORS, HORIZONTAL

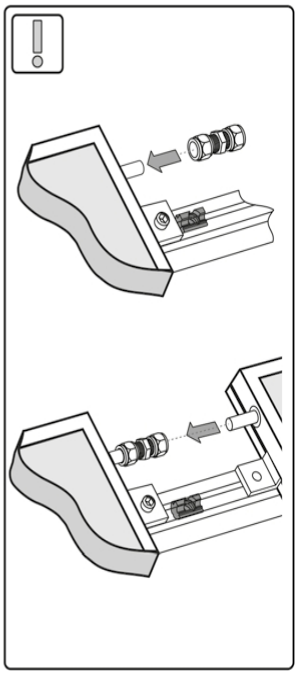
Fastening subsequent collectors

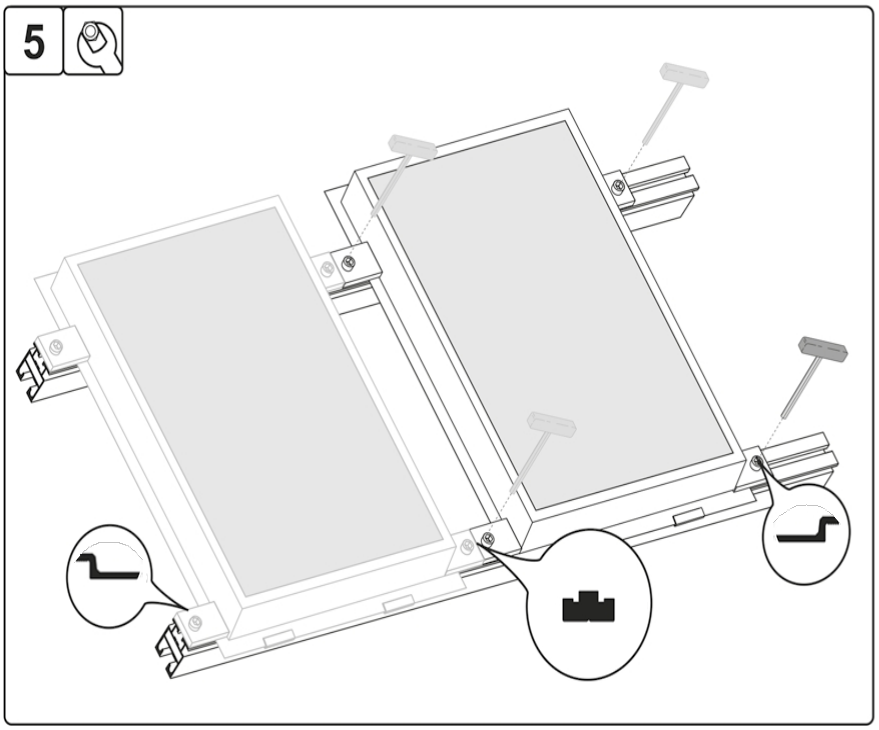


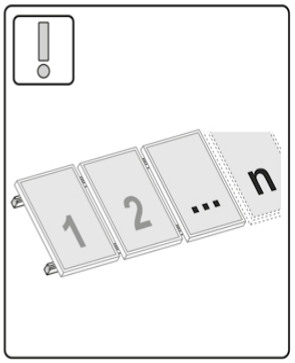
5.10 INSTALLATION OF ADDITIONAL COLLECTORS, HORIZONTAL



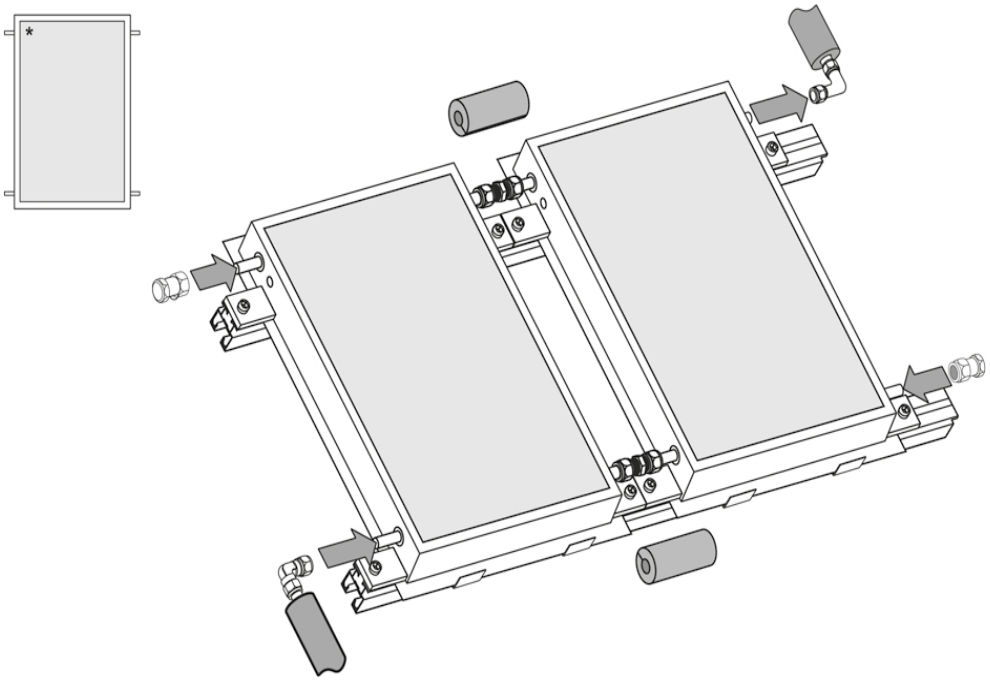


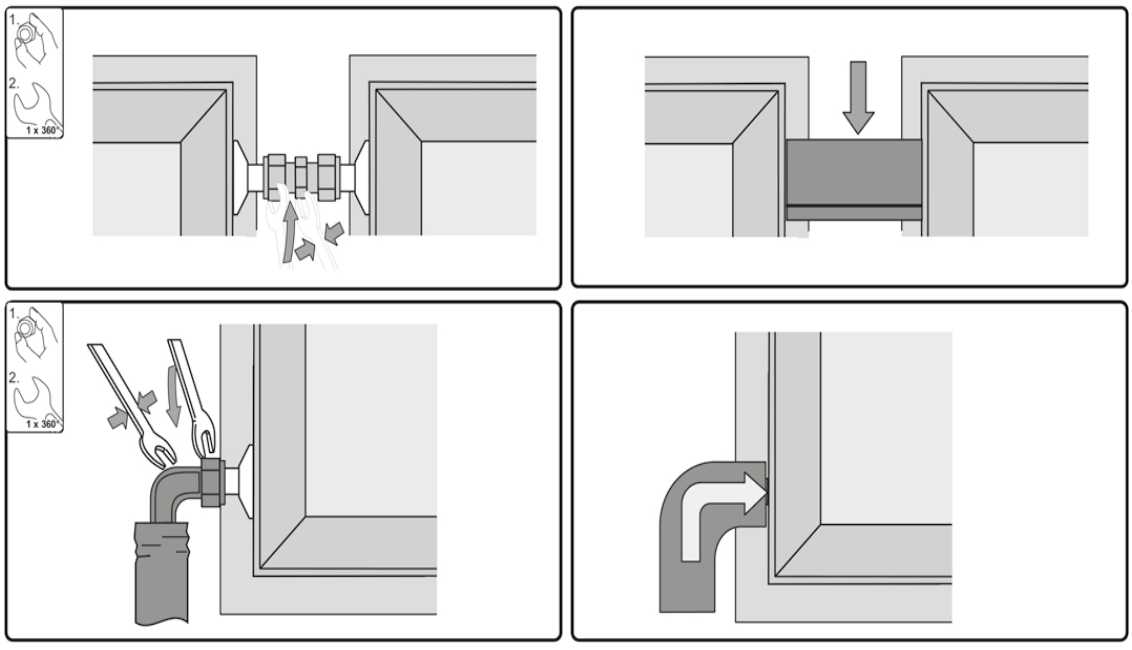


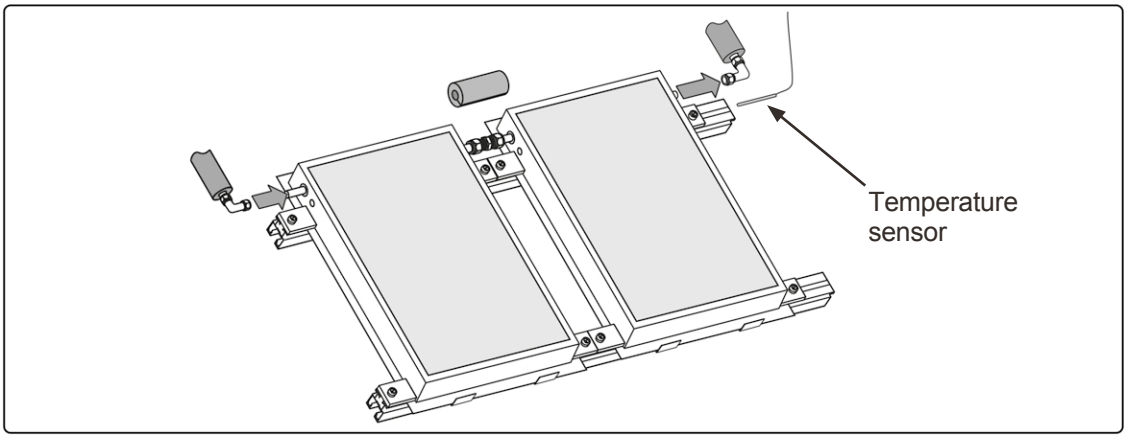




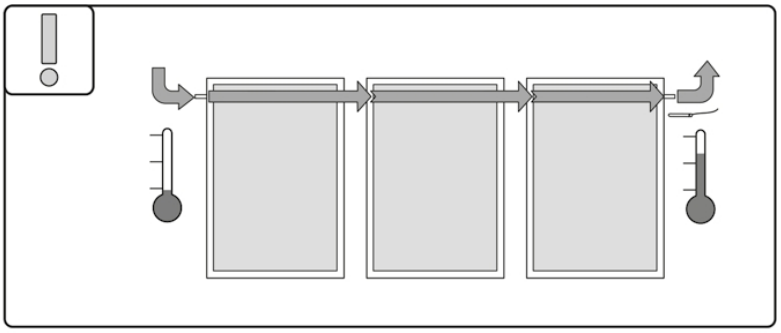
5.11 CONNECTING HYDRAULIC CONNECTIONS

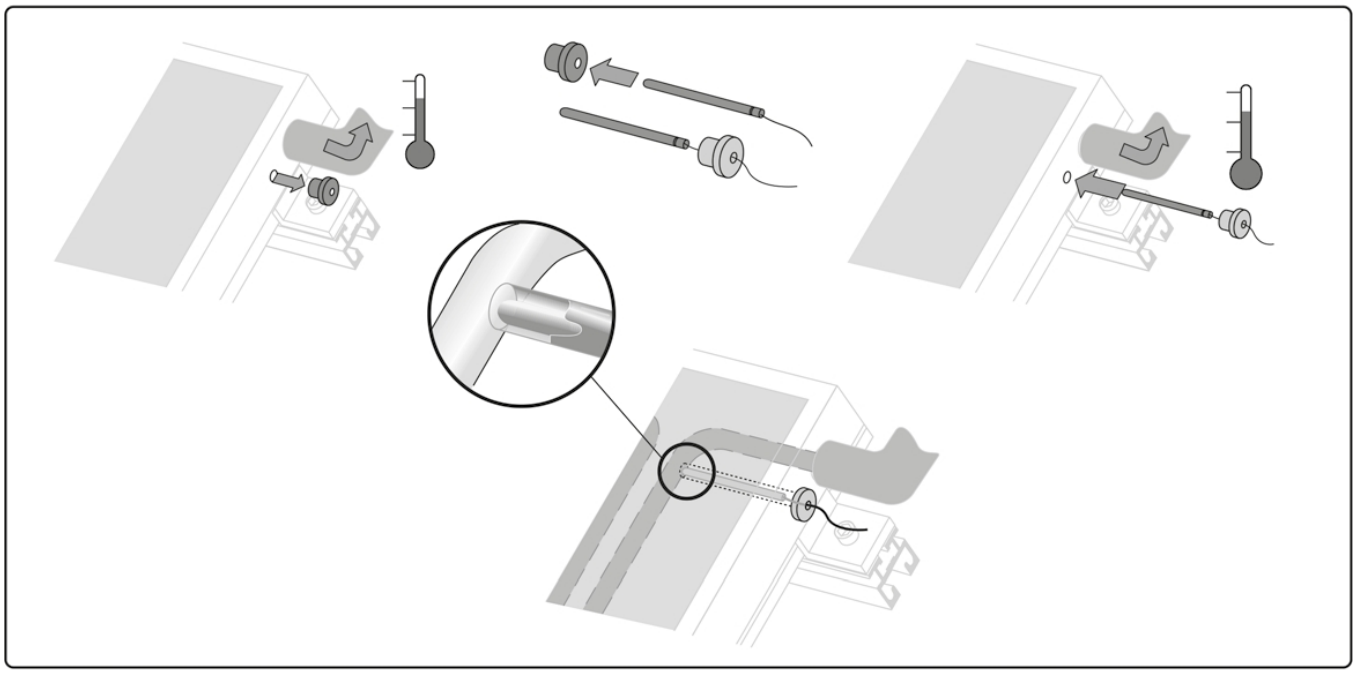


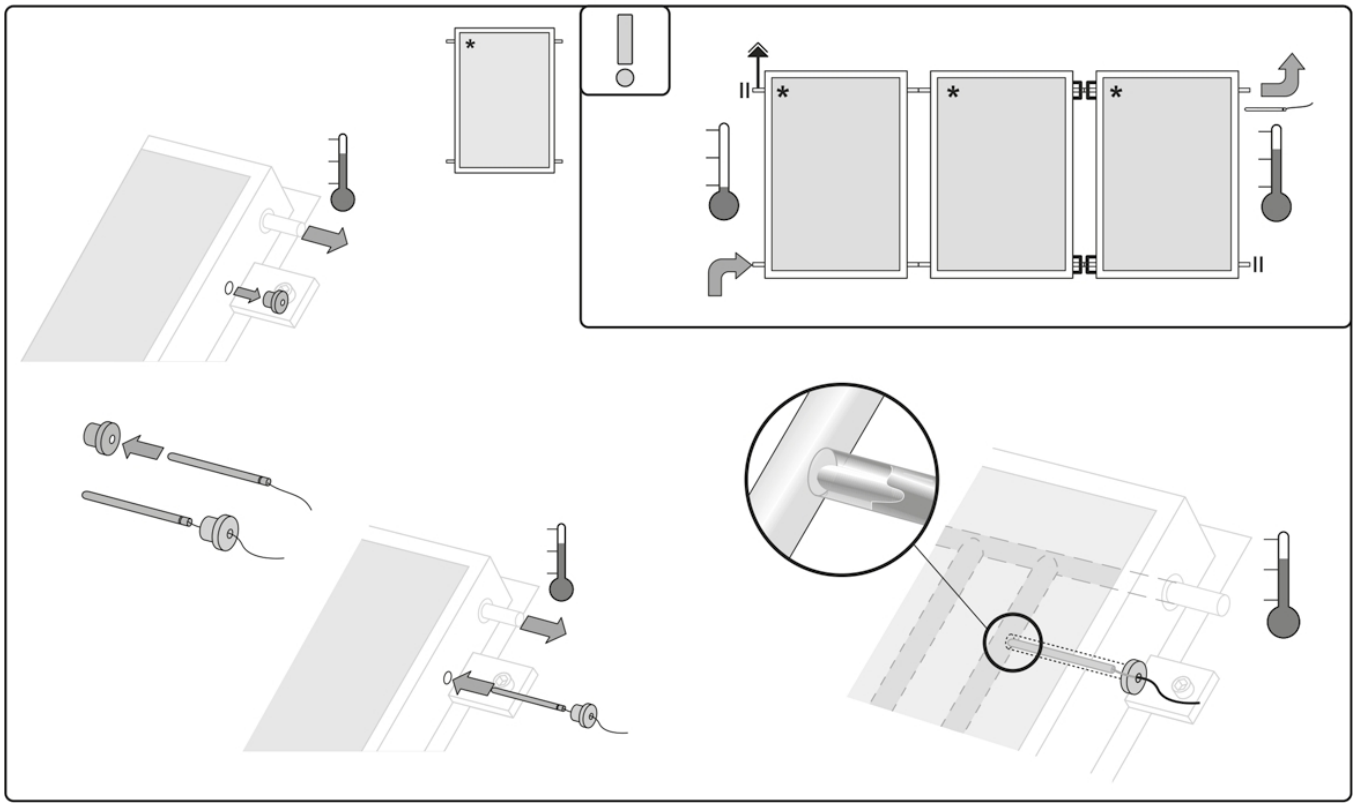




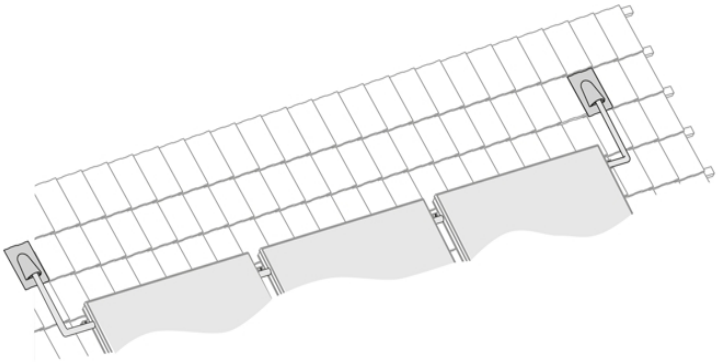
5.12 INSTALLING THE COLLECTOR SENSOR

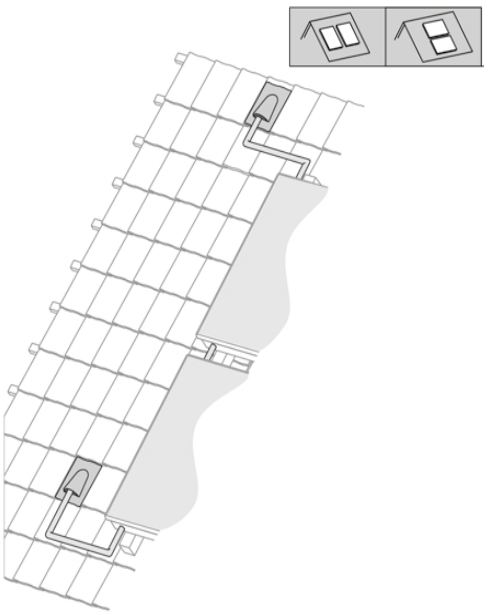


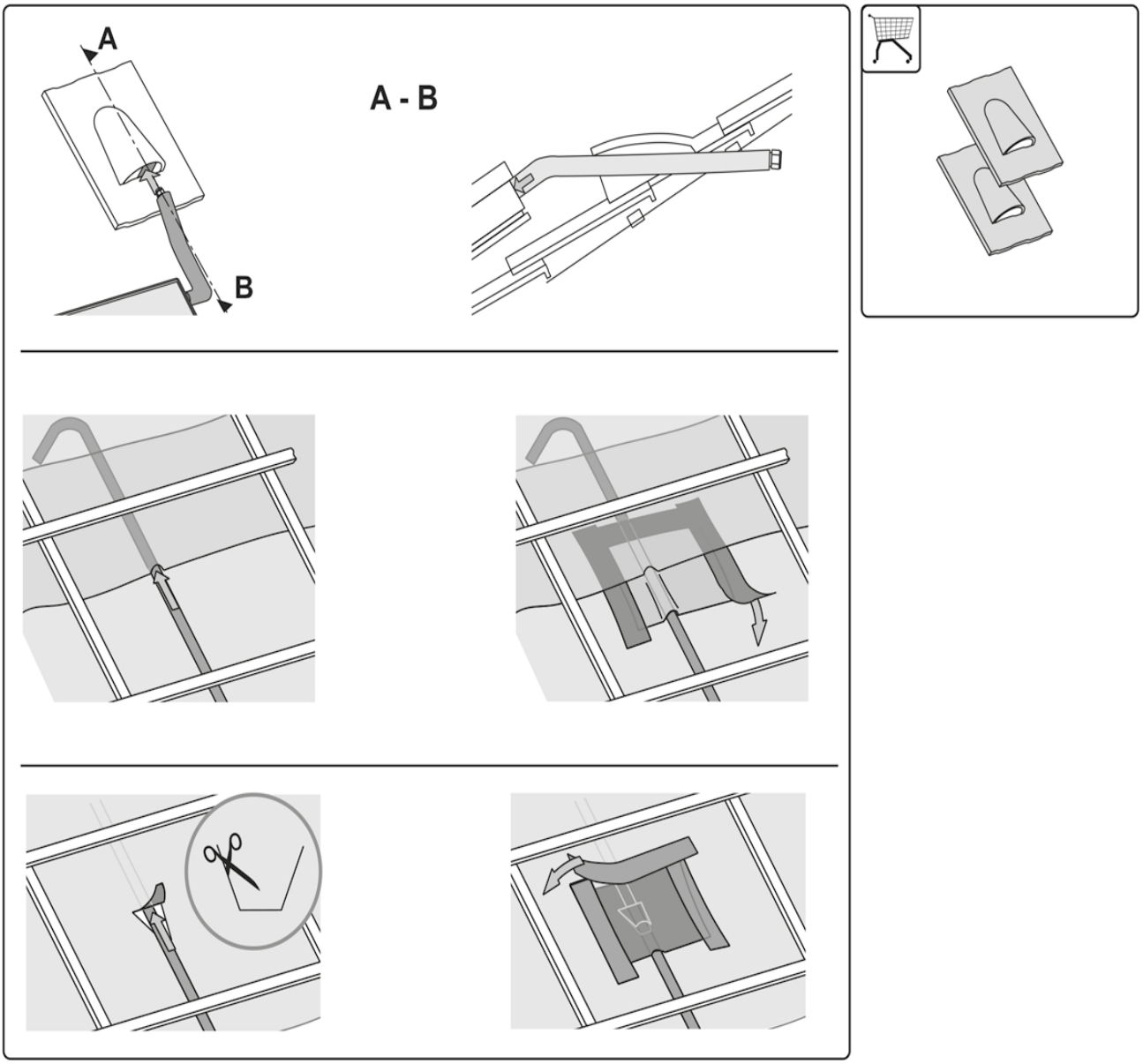


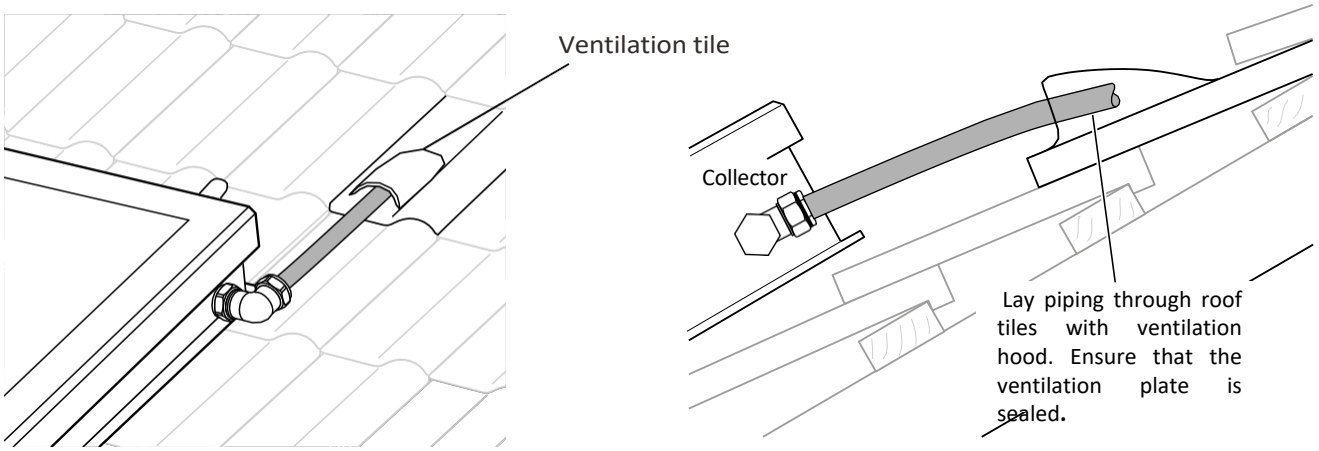


5.13 CREATING A ROOF PENETRATION









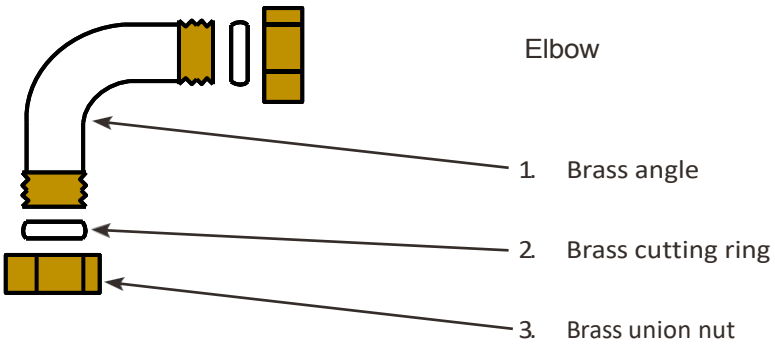
5.14 CONNECTION AND JOINTING SET WITH CUTTING RING

The cutting ring fittings are suitable for copper pipes in accordance with DIN EN 1057 or DIN 1754 with a wall thickness of 1 mm.

To ensure a quick and secure connection, observe the following rules:

1. Cut the pipe at right angles to its axis to the desired length using a rotating pipe cutter. The pipe end must be round, cleanly deburred and free of scratches during installation.
2. Loosen the union nut (3) and check that the cutting ring (1) is correctly seated in the fitting (2).
3. Now push the pipe into the fitting as far as it will go. The pipe axis of the pipe to be connected must be aligned with that of the fitting to be connected without any tension.
4. Now tighten the union nut (3) by hand and turn it one more turn with a suitable open-end spanner.
5. Now carry out the leak test in accordance with the recognised rules of technology.

Note: Only original ratiotherm spare parts may be used for replacement, otherwise any warranty claims will be void.



5.15 NOTES ON HYDRAULIC INSTALLATION

All installation work must be carried out by a certified specialist. The supply and return pipes must be made of copper (in accordance with DIN 1786) or approved systems. Copper pipes must be hard soldered in accordance with the Pressure Vessel Ordinance. Only use manual or automatic metal air vents that are shut off during operation. The fittings must be suitable for a pressure rating of PN10.

For flow reasons, only groups of up to 6 collectors can be connected in series. Multiple groups must be connected in parallel according to Tichelmann or balanced using control valves. The pressure loss of pipes, pumps and other pipe fittings must be calculated according to the system design.

The thermal insulation materials must be able to withstand operating temperatures of up to 200 °C. Mineral fibre or glass fibre shells with aluminium lamination or other suitable materials are recommended. A sheet metal casing made of aluminium or galvanised sheet steel, with silicone-sealed longitudinal and transverse seams, protects the thermal insulation from moisture outdoors.

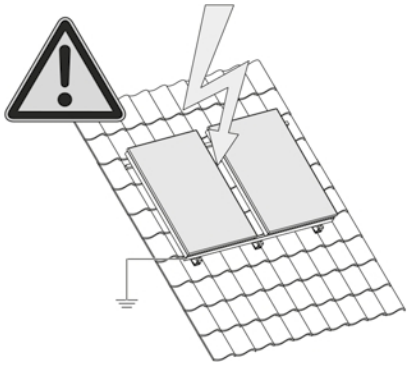
The insulation thickness is based on the Heating Systems Ordinance (3/3-ENEG), i.e. all pipes must be 100% insulated. Suitability and processing are based on the specifications of the insulation material manufacturer.

Caution: Uninsulated pipes result in enormous heat loss.

5.16 POTENTIAL EQUALISATION AND LIGHTNING PROTECTION

Lightning protection:

In buildings where lightning protection is necessary, the collector field must be included in the lightning protection system.



Electrical contact protection:

The solar piping (flow and return) must be connected to the building's equipotential bonding system via the shortest possible route. If the building already has lightning protection, large metal parts must be connected to it.

6. COMMISSIONING AND NOTES

Commissioning

Once the collectors have been installed and the hydraulics connected, the system can be pressure tested and filled. Both the thermal conditions and the specific features of the system must be taken into account.
Flushing and filling must not be carried out with heated collectors, as this can lead to scalding due to evaporating heat transfer fluid! For this reason, the filling, installation and maintenance of the system may only be carried out by an appropriately authorised specialist. To prevent damage to the system, only the heat transfer fluid that will later be used should be used for pressure testing.

Heat transfer fluid

To prevent frost and corrosion damage, the solar system may only be filled with a high-quality heat transfer medium (propylene glycol-water mixture). When using the recommended ready-made mixture, sufficient frost protection is provided down to approx. -24 °C.

Instruction of the operator

The commissioning engineer must instruct the system operator on the function, handling and appropriate maintenance intervals of the system. The installation and operating instructions must be handed over to the system operator for safekeeping.

Operating instructions

- Collector overheating (e.g. during standstill operation) can cause solar fluid to escape via the pressure relief valve, depending on the system. This fluid must not be allowed to enter the sewage system, but must be collected and returned to the system. To do this, a pressure pump must be used, which is mounted on the filling tap and the drain tap with the hose connection piece. Open the valve, do not pump in air!
- The safety valve, expansion tank and heat transfer fluid must be checked regularly in accordance with the manufacturer's instructions!
- After filling and at regular intervals, the heat transfer fluid must be checked for frost resistance down to -27 °C ± 3 K using a special SOL frost protection tester and documented.
- The hot water temperature in the pipe network must be limited to a maximum of 60 °C by means of automatically operating devices (domestic water mixer at the storage tank outlet) or other measures, as otherwise scalding may occur at the hot water outlet.

Maintenance instructions

- Frost protection must be checked annually.
- The corrosion protection must be checked every 2 years.
- The pH value must be greater than 7.
- If the heat transfer medium becomes brown, cloudy or odorous, it must be replaced.

Further information

- No liability can be accepted for any frost damage.
- If the solar system is not put into operation immediately, the collectors must be covered. This protects the sealing material used and the heat transfer fluid already filled in from overheating. Damage due to overheating is not covered by the manufacturer's warranty.
- Oversizing and system downtime during periods of high solar radiation can lead to overheating and steam formation in the system.

Information on returns

- After use, the collectors can be returned to ratiotherm.
- The costs for dismantling and transport will not be covered.
- All collector materials are recyclable and will be disposed of properly by ratiotherm.

6.1 MOST COMMON SOURCES OF FAULTS IN SOLAR SYSTEMS

- Solar systems lack air vents in places where air pockets can form.
- Automatic air vents can be destroyed by steam escaping. Remedy: Close the shut-off valve in front of the air vent or do not use automatic air vents, but install Spirovent instead.
- The pipe insulation in the solar area is not heat and UV resistant.
- There is no collection tank under the outlet pipe of the solar safety valve.
- The potential equalisation (earthing) of the solar circuit is missing.
- Only tighten screw connections when cold.
- The collector sensor has been installed in the wrong place or the sensor has been wired incorrectly.
- Assignment of flow and return.
- Plastic or galvanised parts should be avoided throughout the solar circuit.
- Incorrect size of the expansion vessel.
- The system has not been completely vented.
- The pipes were not flushed.
- Occurrence of self-circulation due to manual activation of the gravity brake.
- Control system incorrectly set or connected.
- The primary pump is undersized, causing steam pockets to form in the collectors.
- Hydraulic balancing has not been carried out on the primary and secondary sides.

7. EC DECLARATION OF CONFORMITY

In accordance with the Pressure Equipment Directive (2014/68/EU), Annex IV, we hereby declare under our sole responsibility that the device:

Manufacturer		
ratiotherm GmbH & Co. KG	Email	info@ratiotherm.de
Wellheimer Straße 34	Telephone:	+49 (0) 8422/9977-0
91795 Dollnstein	Website	www.ratiotherm.de

Device name:	**RA ST253-4 flat-plate collector**
Year of manufacture:	See type plate
Intended use:	The flat-plate collector converts solar energy into usable thermal energy for direct heating support and hot water production.

The version supplied complies with the directives

- Directive 2014/68/EU of the European Parliament and of the Council of 15 May 2014 on the harmonisation of the laws of Member States relating to the making available on the market of pressure equipment

Applied standards and technical specifications: DIN EN ISO 9806; DIN EN 12975

Technical documentation is available. Name and address of the person authorised to compile the technical documentation:

Name:	Julian Kruck, Head of Heat Pump Technology
Address:	ratiotherm GmbH & Co. KG, Wellheimer Straße 34, 91795 Dollnstein

We hereby certify that the certification procedure has been carried out in accordance with the Pressure Equipment Directive (2014/68/EU) and that the provisions of the standard DIN EN ISO/IEC 17050-1 "Conformity assessment – Declaration of conformity by suppliers – Part 1: General requirements" have been observed in issuing this declaration of conformity. This declaration shall cease to be valid in the event of any modification to the equipment that has not been agreed with us. Any unauthorised modification in this sense shall exclude any liability on our part.

Dollnstein, _____ Signature of authorised representative: _____ Details of the person authorised to issue this declaration on behalf of the manufacturer or its authorised representative:

Name: _____ Position: _____

Address: ratiotherm GmbH & Co. KG, Wellheimer Straße 34, 91795 Dollnstein

8. NOTES

You can find us here

ratiotherm
Smart Energy Systems

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91795 Dollnstein

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