Installation instrutions Arres 3.2

English, Version 6/25

Contents

1. Safety instructions

FOR ARRES PHOTOVOLTAIC MODULES

Solarmarkt requires that the modules are only installed by technically certified installers.

The generally accepted rules of technology, national guidelines, standards and regulations always apply. Please also observe the currently valid accident prevention regulations.

A prerequisite for fault-free and safe operation is that the Arres photovoltaic modules are correctly transported and professionally stored, erected and installed.

When operating a photovoltaic system or individual modules, individual components will carry dangerous voltages when exposed to light, even if the modules are not yet connected. Where necessary, cover the modules with an opaque material.

FUNCTION DESCRIPTION AND USE OF THE MODULES

An Arres in-roof photovoltaic module consists of a glass laminate in a special aluminium frame.

Arres photovoltaic modules generate DC electricity as soon as they are exposed to light. The electrical contacts are then live.

The Arres in-roof system is designed for outdoor use and, depending on the design, can be mounted directly on the roof battens. Further installation information is provided in the installation instructions.

Any other use above or beyond this is regarded as inappropriate use. In addition, incorrect use can present a danger to life and limb of the user or third parties and can lead to failure or impairment of the system/PV modules.

SAFETY INSTRUCTIONS

- Do not drop the modules.
- Only carry the modules with cut-resistant gloves.
- Always carry the modules with both hands.
- Do not use the junction box as a handle.
- Do not lift the modules by the junction box or the connecting cables.
- Do not bend or twist the modules.
- Do not walk on the modules and do not place any objects on the modules.
- Keep the connector pins and sockets clean and dry.
- Only work in dry conditions.
- The modules may not be used under water.
- Do not install or store the modules near naked flames. Do not install or store the modules in a biologically or chemically aggressive environment.
- Observe the permissible temperature range: –40 °C to + 85 °C.
- A danger of corrosion exists in the case of contamination with salt or sulphur (observe the warranty conditions).
- The modules are designated as “non-explo-

sion-proof electrical equipment". They must therefore never be operated in the vicinity of rooms where ignitable gases can escape or accumulate.

- Do not use damaged modules. PV modules with broken glass no longer function correctly and must no longer be used (danger of injury from glass splinters).
- Do not interconnect modules with different construction, type or power classes.
- Do not dismantle the modules and do not remove applied type plates or other components.
- Take care to ensure that the tools used remain dry.
- Do not work on modules using sharp objects.
- Do not insert electrically conducting components into the plugs and sockets.
- Do not treat the modules with paint, adhesives, silicone or other sealants.
- Ensure that no impermissible forces can arise due to thermal expansion.
- Use insulated tools.
- Take care to ensure that the connectors are properly engaged.
- Do not use a mirror or lens to concentrate sunlight onto the modules.
- Do not disconnect the module from the inverter when it is still connected to the mains grid. Adhere to the delay specified by the manufacturer after switching off the inverter before commencing any further work.

INSTALLATION AND ELECTRICAL CONNECTION

- The modules should be aligned in the best possible position.
- A minimum inclination of 20° should be provided to ensure good self-cleaning through rainfall.
- The modules are equipped with an EVO 2 connector system.
- Observe the ratings of all devices and equipment in the system.
- Ensure that the cables are routed professionally.
- Only use cables and connectors that are verifiably suitable for extending the module connection cables.
- Only certified and authorised electricians are permitted to connect the system to the public mains grid or the central household electrical system.
- **Arcing can occur every time connections are separated while the system is in operation. Lethal arcing can occur when opening a closed string. You must therefore always cover the modules with an opaque cloth and disconnect the inverter from the mains grid!**

INSTALLATION

- Secure the modules so that they do not present

a danger to persons or property.

- Ensure that no mechanical stresses are transmitted to the module from the supporting structure.
- Do not install the modules as overhead glazing.
- Ensure that the substructure and PV system are suitably dimensioned to cope with the anticipated snow and wind loads and that the permissible loads for the module are not exceeded.
- Ensure adequate rear ventilation of the modules and the substructure.
- Connect the modules and mounting system to the site's equipotential bonding system. Adhere to the applicable regulations and standards when doing this.
- You may also need to connect overvoltage protection and lightning protection devices.
- In the case of buildings with a lightning protection system, the PV system must be integrated into the lightning protection concept by a specialist company.

TARGET GROUP AND IMPORTANT NOTES

These instructions assume a level of technical knowledge corresponding to professional training in at least one of the following areas, or equivalent:
– Solar technician
– Electrical installer
– Electronics engineer for energy and building technology
– Roofer

- It is also intended for persons who have been trained by Solarmarkt. We advise strictly against allowing photovoltaic systems to be installed by amateurs or persons without the necessary knowledge and qualifications!

1. Safety instructions

- Clarify individual details on site and always consult Solarmarkt if you have any questions (see address at the end of the assembly instructions).

- Observe the applicable national regulations during installation. Appropriate assistance is available at www.suissetec.ch (working on roofs) or at www.admin.ch/opc (Construction Regulations).

- Observe the applicable work health and safety regulations according to SUVA.

- Observe the applicable VDE regulations, DIN standards and VDS guidelines during installation and commissioning (this list does not claim to be complete):
  – NIN 2025 (especially 7.12)
  – SN EN 62305 and SNR 464022
  – Factory regulations
  – SIA 260
  – SIA 261

- Other standards and regulations:
  – SIA 232
  – Communal and regional building regulations
  – VKF guideline

- Additionally observe:
  – VDS 2010: risk-orientated lightning and overvoltage protection

- The roof substructure must be able to carry the additional loads on the roof joints presented by the photovoltaic system. If necessary contact a structural engineer.

- Only ESTI-certified electricians are permitted to connect PV systems to the public mains grid!

2. General notes

PRODUCT DESCRIPTION / AREA OF APPLICATION

Arres is an in-roof mounting system for photovoltaic systems. The PV modules with a special frame profile are approved by Solarmarkt and are attached directly to the roof to replace the roof tiles.

This mounting system can be used for roof pitches ranging from 20° to 60°.

Please refer to the respective data sheet for the maximum permissible suction and pressure loads.

Additional support battens must be used for loads greater than 2.4 kN/m^2.

Install the two additional support battens respectively one- and two-thirds along each module. Make sure that the support battens are not near the junction boxes.

Ensure compliance with the specifications, taking into account site-specific loads such as wind and snow. Check the suitability of the roof substructure with regard to its load-bearing capacity and condition.

The installed modules are not suitable as overhead glazing!

Module array connectors and other metal framing and structures on the roof can cause contact corrosion or deposits on the modules.
You should therefore only use aluminium flashing on the roof.

In particular, it is not recommended to use lead above the module array.
The substructure must be prepared for increased requirements. The sarking membrane used as underlay must have a fire protection rating equivalent to at least BKZ 4.1 (Swiss fire index) for solar arrays with surface areas ≤ 1,200 m^2 and a permanent heat resistance of at least +85°C. For larger installations, the corresponding provisions provided by the Vereinigung Kantonaler Feuerversicherungen (VKF – Association of Cantonal Fire Insurers) must also be taken into account. The substructure must always be drained into the roof gutter.

CABLE ROUTING

- Before installing the Arres modules, plan how the wiring is to be fixed to the substructure. The modules are usually equipped with plugs and sockets for rapid connection.
- It is advisable to route the cables in a cable duct.
- For each installation, check whether lightning or surge protection must be installed.

Improper connection/installation of electrical elements may cause material damage.

NOTES ON DISPOSAL

- Dispose of the packaging material for this photovoltaic system in the proper manner.
- Recycle as much material as possible.
- Information on the correct disposal of PV modules is available at:
  http://www.erecycling.ch/

2. General notes

3. Material & tool requirements

MATERIAL SYSTEM COMPONENTS

ITEM		ARTICLE NAME	DESCRIPTION
1		Base rail	4 m
2		Arres module	
3		Fastening screw	Torx 25
4		Equipotential bonding set Base rail connector	
5		Equipotential bonding set Base rail to module	
6		Equipotential bonding set Row connector	
7		Ridge flashing hook	

3. Material & tool requirements

MATERIAL – OPTIONAL COMPONENTS

ITEM		ARTICLE NAME	DESCRIPTION
8		Dummy module	
9		Snow guard components	
10		Skylight	
11		Upper apron flashing	
12		Upper left apron flashing	
13		Upper right apron flashing	
14		Left apron flashing	

3. Material & tool requirements

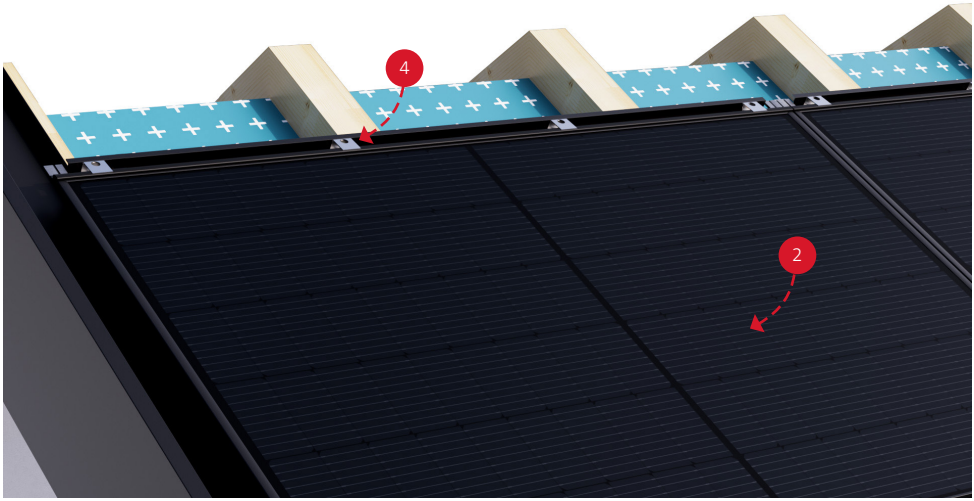
15		Right apron flashing	
16		Lower apron flashing	
17		Apron flashing fixing hook	
18		Foam wedge sealing strip	self-adhesive
19		Ice sheet holder	

3. Material & tool requirements

TOOL REQUIREMENTS

ITEM		ARTICLE NAME	DESCRIPTION
A		Electric screwdriver	On-site
B		Jigsaw or circular saw	On-site
C		Measuring tape	On-site
D		Carpenter's pencil	On-site

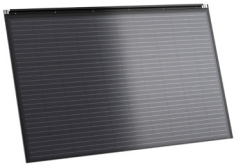
4. System overview



4. System overview

1 Base rail

2 ARRES module

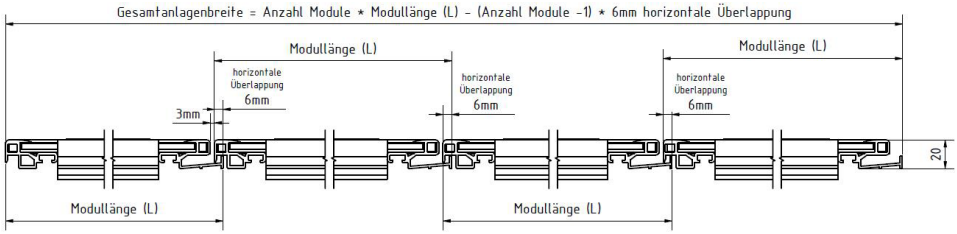


3 Fastening screw

4 Ridge flashing hook

5. Grid dimensions

Plan your roof substructure according to the following specifications. Refer to the respective data sheet specified in the table on the following page for the module dimensions.
The side grid dimension corresponds to the module length minus 6 mm for the module overlap.
To calculate the overall width of the PV system, multiply the module length by the number of adjacent modules in a row and then subtract an overlap of 6 mm for each butt joint.

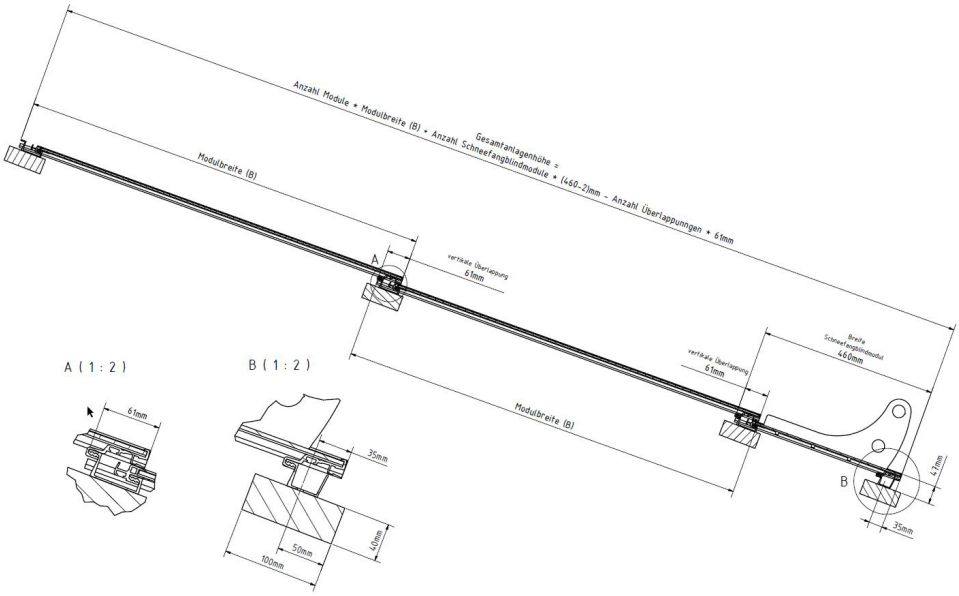


The vertical grid dimension (distance between cross battens) is derived in the same way from the module width minus an overlap of 61 mm from module row to module row.
Calculate the overall height of the PV system by multiplying the module width by the number of module rows above each other and then subtract 61 mm for each overlap.
If you wish to install a snow guard, add the width of the snow guard dummy module (460 mm), which is independent of the module type, and subtract an additional overlap and a correction value of 2 mm for the steeper angle of inclination of the snow guard dummy modules.
When planning the module battens, take into account that the base rail is not flush with the bottom edge of the lowest row of modules. It is mounted slightly offset below the module array to ensure that the PV system looks visually coherent.

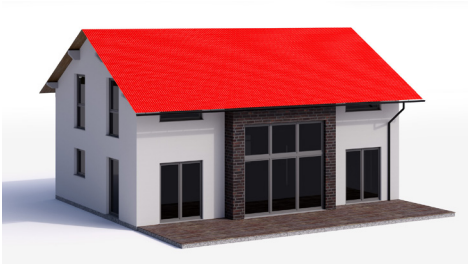
To enlarge the grid dimensions, scan the QR code

5. Grid dimensions

Module type designation	Module length	Module width	Grid dimension Cross battens
Arres 3.2 Premium L	1748 mm	1188 mm	1127 mm
Arres 3.2 snow guard dummy module Premium L	1748 mm	460 mm	397 mm



6. Installing ARRES 3.2



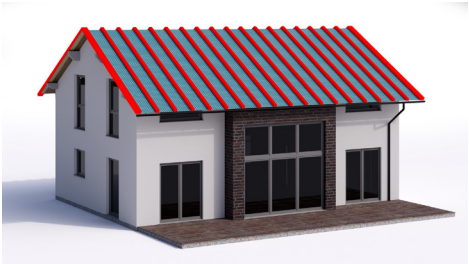
PREPARATORY WORK – NEW ROOF

A full-surface roof layout is described below. The connections are recommendations for an on-site solution.

The solar power system's own apron flashings can only be used for integration into tiled surfaces.

Lay a watertight sarking membrane over the rafters. Observe the applicable national standards. This prevents any condensate water or precipitation that penetrates during a storm from damaging the roof structure.

Ensure that the sarking membrane drains directly into the roof gutter. For example, allow the sarking membrane to run onto apron flashing that will allow the water to drain directly into the roof gutter.



Screw on the counter battens and gable flashings. Cover the counter battens with nail sealing tape to ensure that the substructure is perfectly sealed.

The counter battens should be at least 60 mm high to provide better rear ventilation of the system. They should have the same width as the rafters.

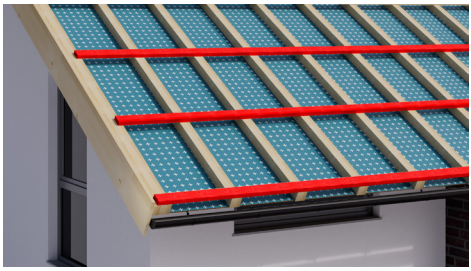
Double-up the counter battens along both gable ends of the roof. This makes it easier to install the flashing for draining water at the gable ends of the PV system at a later stage.

6. Installing Arres 3.2

Screw the module battens to the counter battens according to the PV system plan. If necessary, level the module battens. Straight module battens of the same height make the work easier and ensure that the PV system is watertight. The module battens should be 100 x 40 mm in size for the easiest installation. When integrating a solar array into an existing tiled roof, it may be beneficial to select smaller battens. These must be at least 80 x 24 mm in size

The maximum permissible suction and pressure loads for battens smaller than 100 x 40 mm are limited to -2.4 kN/m² and 5.4 kN/m² respectively

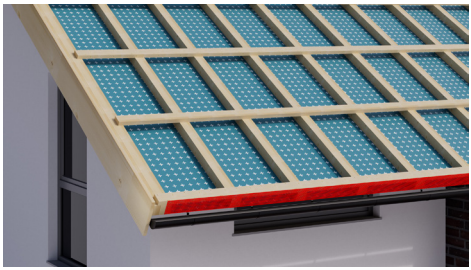
The lower edge of the module ends 35 mm further down towards the eaves than the screw axis for the base rail. Allow for this protrusion to ensure that the lower module batten can be accurately positioned.



Ensure that sufficient space is available for the apron flashing for draining water along the sides at the gable ends.

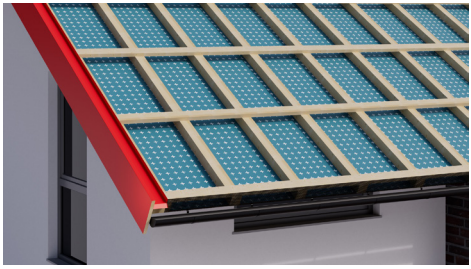
For this purpose, end the cross battens on both sides approximately in the centre of the inner, doubled counter battens.

6. Installing Arres 3.2



Use perforated flashing to close the gap between the cross battens and roof surface to prevent rodents or nesting birds from damaging the system or the roof.

Fit the perforated flashing flush with the cross battens at the side to avoid any impairment of the side water drain.



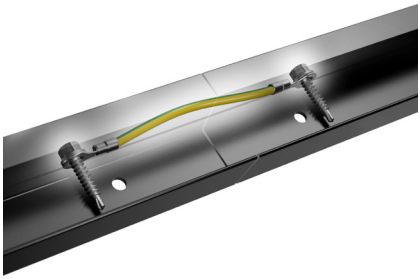
Now install the apron flashing for draining water along the sides next to the gable ends.

Ensure that the flashing adjacent to the PV system does not protrude higher than the cross battens.

Additional battens must be fitted under the middle of the modules (below or above the module junction box) for loads greater than 2.4 kN/m².

Note that these supporting battens must be somewhat higher than the other battens due to the overlapped layout of the PV modules.

Procedure for installing the support battens: Details for the Arres 3 support battens – scan QR code

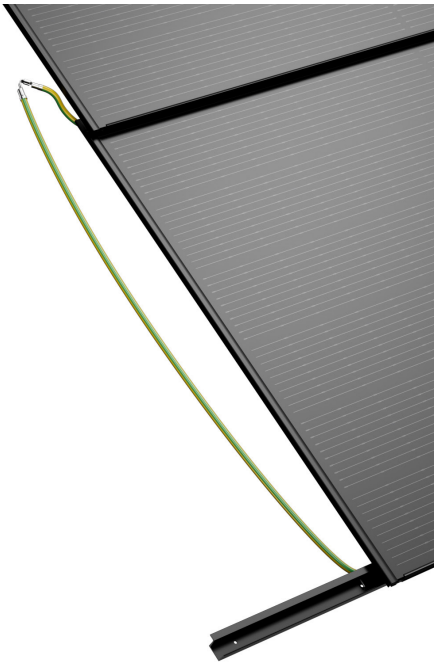


GROUNDING CONCEPT

First, connect the base rails to the building's equipotential bonding system in an electrically conductive manner.

Adhere to the specifications given in the current version of the NIN when doing this.

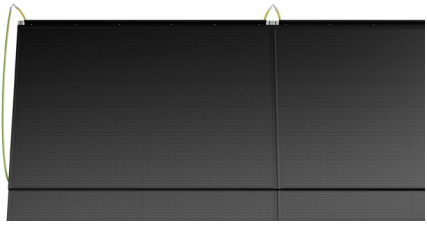
Connecting the base rails
Connect the base rails to one another using the "Equipotential bonding set – base rail connector". Use the self-drilling screw supplied for this purpose, which is inserted parallel to the roof in the drill groove in the ridge-side web.



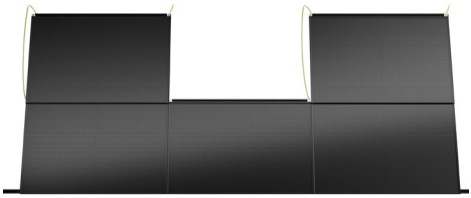
Connecting the base rail to the module
The base rail is now connected to the first module using the "Equipotential bonding set – base rail to module". The self-drilling screw is used again to connect to the base rail and is inserted into the ridge-side web. On the module side, the equipotential bonding set is connected to the pre-assembled module grounding.
This step only needs to be carried out once per PV system.

6. Installing Arres 3.2

Connecting from module to module
Within a row, the grounding cables integrated into the module frames are connected to each other. Two grounding cables are pre-assembled for each module.

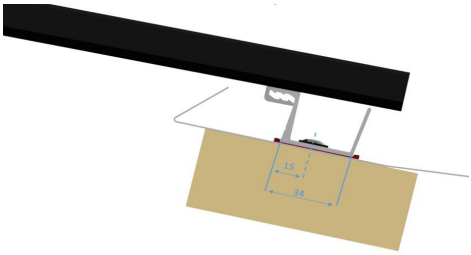


Connector from row to row
To connect two rows to each other, the “Equipotential bonding set – row connector” is attached to the grounding cable of the modules located one above the other. One equipotential bonding row connector is sufficient per row connection. Unused grounding cables can be removed if necessary.



ATTENTION: Several connectors are required if there is a break in the rows

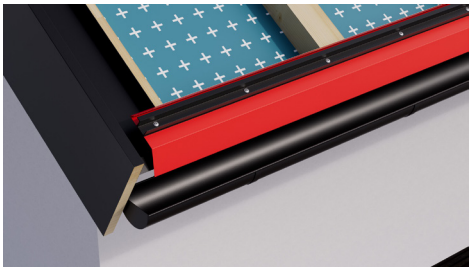
6. Installing Arres 3.2



INSTALLING THE ARRES 3.2 PV SYSTEM

Cover the base rail completely with nail sealing tape during the installation.

Ensure that the base rail rests fully on the cross batten and that the screws are screwed in the centre of the batten.



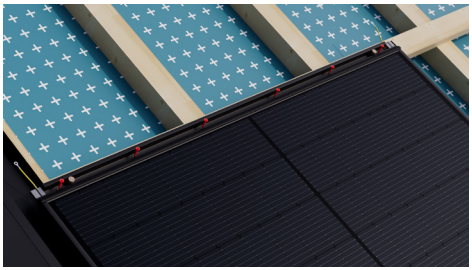
Now install the base rail together with the lower edge trim along the eaves.

Ensure that the base rail is aligned perfectly horizontally. Screw it through the flashing for the lower edge trim and fasten it to the lowest module batten using the supplied screws.

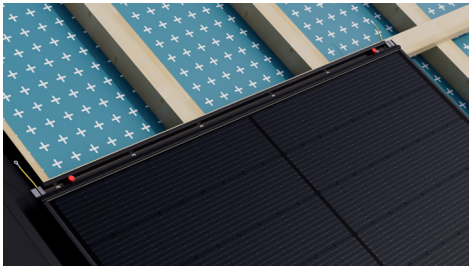
Mount the first module at the lower left.
To do this, slide the lower module profile into the slot in the base rail.

Make sure that the module is correctly positioned in the base rail!

Secure the module in the module rail using the fix-



ing screws. (6 screws per module)



During installation, always check that the perforated roof connection profile is correctly seated in the module frame. For this purpose, the profile is pushed upwards in the counterpart of the upper frame profile as far as it will go in the direction of the ridge.

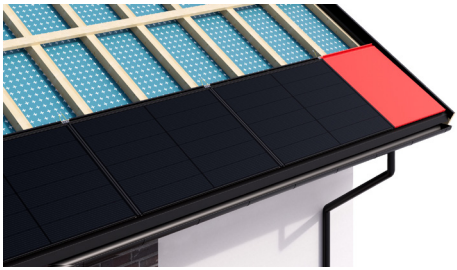
Then remove the spacers clamped between the two upper frame components.

Slide the second module into the right-hand profile of the first module and into the base rail mounted on the battens.

Make sure that a 3 mm gap remains between the sides of two modules.

Screw the module down in the same way as for the first one and remove the spacers. Mount the other modules in the first row in the same way.

Install the first dummy module
to complete the row. Shorten it on site according

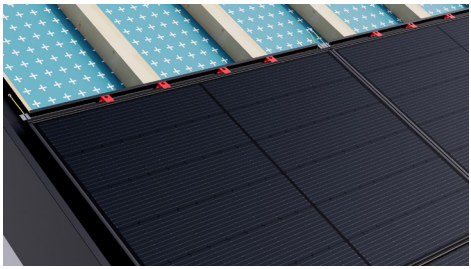


to the dimensions on the roof. The shortened dummy module must be fastened to the roof with at least 2 screws. If necessary, drill another hole (Ø 6.5 mm) in the connection profile if there is only one left after shortening.

Depending on the wind load and installation situation, additional on-site measures may be required to prevent shortened dummy modules and snow guard dummy modules from lifting out.

Start the installation of the second row from the left side again. Slide the module into the slot on the roof connection profile for the module below.

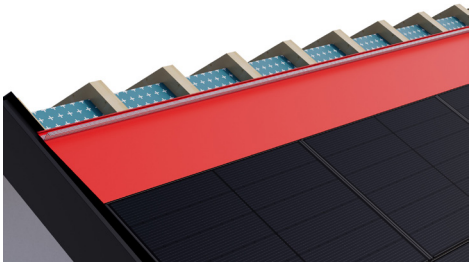
Install all modules and dummy modules one after another in the same manner until reaching the upper right edge of the PV system.



Use the fastening screws for the top row of modules to simultaneously mount 4 ridge flashing hooks per module.

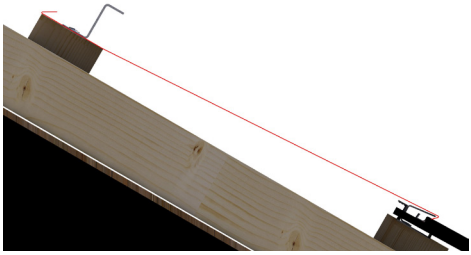
The fastening screws simultaneously serve to fix the hooks and the modules at the same time.

6. Installing Arres 3.2



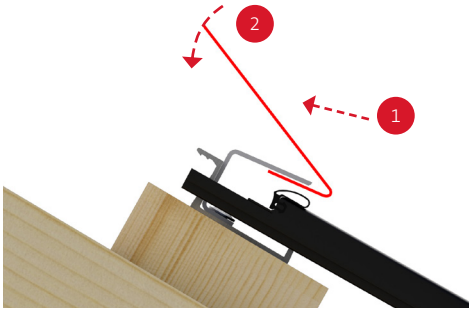
Install the upper apron flashing together with the upper perforated flashing. In order to achieve this, the uppermost cross batten must be positioned first in accordance with the geometry of the flashing.

Fasten the perforated flashing with screws spaced approximately 20 cm apart.



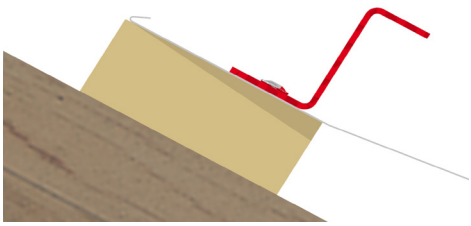
Dimension the upper apron flashing according to the roof characteristics so that the cleats can accommodate the ridge hooks and the perforated flashing.

Slot the apron flashing onto the ridge hooks and screw it together with the perforated flashing to the prepared cross battens.



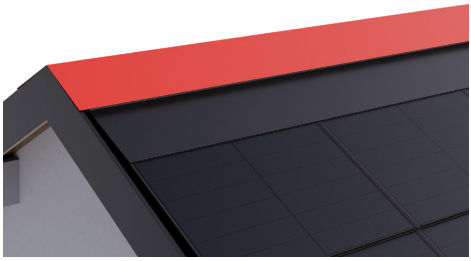
To ensure water tightness, the ridge flashing must be inserted between the ridge flashing hooks and the rubber seal without deforming it. To do this, insert the cleat for the flashing on the underside of the respective ridge flashing hook parallel to the top before laying the flashing on the roof. To ensure that the flashing presses sufficiently against the seal and seals the module array towards the top, the cleat should be bent at an angle of 25° and be 30 mm in length.

6. Installing Arres 3.2



Form the upper perforated flashing into a “Z shape” section as shown in the illustration. The upper flange for the perforated flashing should be flush with the roof height as the ridge flashing will be slotted onto this upper flange in a subsequent installation step.

Sufficiently dimension the perforated flashing according to the loads, the required depth of the perforated flashing’s vertical web and the perforation pattern. Always position the screws for fastening the perforated flashing as close as possible to its vertical web.



Install the ridge flashing as the final step.

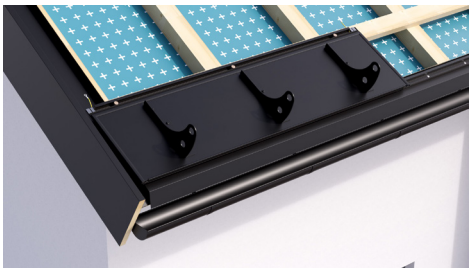
Slot the cleat of the ridge flashing onto the perforated flashing in the same way as you slotted the upper apron flashing on the ridge hooks in the previous step.

General note:
The principle of sheet metal cladding around the system is only a recommendation and can be adapted to suit the roof characteristics.
Alternatively, standard flashings from Solarmarkt GmbH can be used to provide flashing around the PV system, for example for tiled roofs. The installation is the same as for the existing Arres PV system and is described in the associated installation instructions.

7. Installing the Arres snow guard

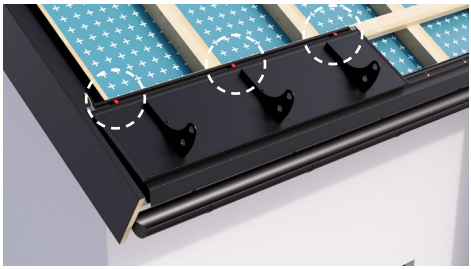
Before installing the snow guard dummy modules on the roof, attach three brackets to each pre-drilled snow guard dummy module.

Use the supplied nuts and bolts for this. Tighten these to a torque of approximately 25 –30 Nm.



Now slot the first snow guard dummy module on the bottom left edge of the PV system onto the base rail and fasten it using the fixing screws in the same way as the modules themselves (see Section 6)

Snow guard rows can only be installed across the entire width of a module array. It is not possible to transition from a snow guard dummy module to a module within a row.



Again, ensure that the roof mounting profile is correctly positioned in the frame and remove the spacers after installation.

Then install the other snow guard dummy modules in the snow guard row in the same way as the modules (see Section 6)

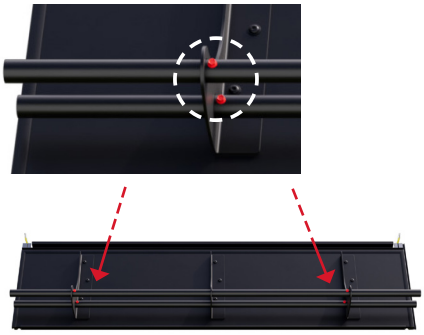
7. Installing the Arres snow guard

Install the snow guard pipes by sliding them sideways through the holes in the brackets.

Ensure a flush connection between the snow guard pipes and the snow guard dummy module.

To extend the snow guard pipes, connect them with the snow guard pipe connectors supplied. Ensure that the snow guard pipes are positioned without gaps between each other. Mount the connectors so that both pipe ends protrude the same distance into the connector wherever possible. This distance should, however, be no less than 12 cm.

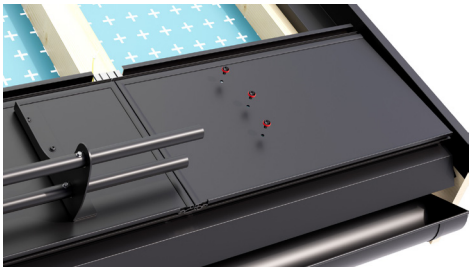
The pipe ends may be too short near the brackets. If necessary, trim the pipes so that they end approximately in the middle between adjacent brackets.



For snow guard pipes installed along short sections of the PV system without connectors, screw additional self-drilling screws that engage with the brackets to prevent the pipes from moving in both directions.

Always ensure that each pipe section (with and without connector) is always held by at least two snow guard brackets.

7. Installing the Arres snow guard



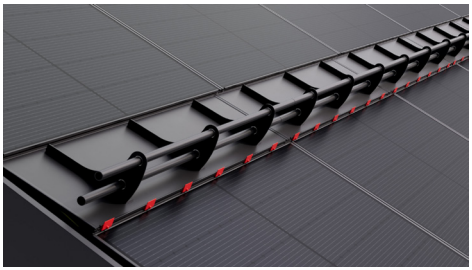
It may be necessary to shorten the snow guard dummy modules at the edge of the PV system. Snow guards cannot be fitted on these modules for structural loading reasons.
Seal the holes in the flashings using the EPDM compression seal set provided.

Depending on the wind load and installation situation, additional on-site measures may be required to prevent shortened dummy modules and snow guard dummy modules from lifting out. Ensure on site that the attachments for the snow guard and dummy modules can withstand the given conditions in accordance with SIA 261.

No Arres windows may be installed directly above the snow guard.

If very heavy snow loads require an additional snow guard in the middle of the module array, then further rows of snow guard dummy modules can be seamlessly integrated into the PV system.

7. Installing the Arres snow guard



ICE SHEET HOLDERS – SNOW STOP SYSTEM

Install the optional ice sheet holders where required. These prevent ice sheets from sliding down in the spring and slipping between the snow guard supports. For optimum protection, we recommend installing 6 ice sheet holders across the entire width of each module.

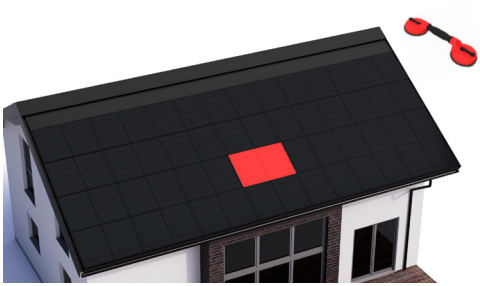
For easy installation, place the locking legs of the ice sheet holder at an angle on the lower frame profile and press the holder into the slot until it clicks into place. If necessary, you can use a rubber mallet to gently tap it into place.

Do not force the ice sheet holder into the slot and ensure that the legs that engage in the module are not bent.

Fasten the ice sheet holder to the frame profile using the appropriate self-tapping screw. Tighten the screw carefully, taking care not to overtighten it.

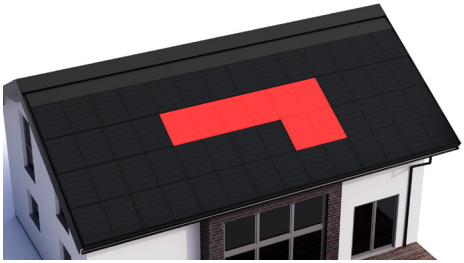
The ice sheet holder fits into the slot on each module and can therefore also be used as a snow stop system along the entire module surface.

8. Removing individual modules



You do not require any special tools to replace individual modules in the middle of the array. However, it might be recommended to use glass suction clamps in certain cases.

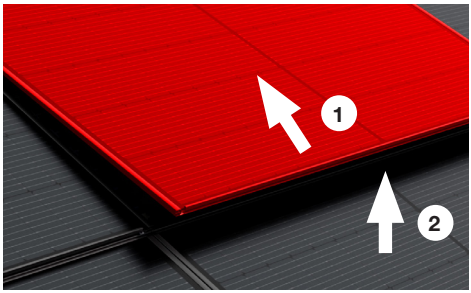
Make sure that you do not walk on the module surfaces. Use suitable walking surfaces that rest only on the module frames (e.g. timber planks).



To remove a module, first lift the adjacent module to the right as well as the three modules above to the left, centre and right of the module being replaced.

Start with the upper modules, working from right to left.

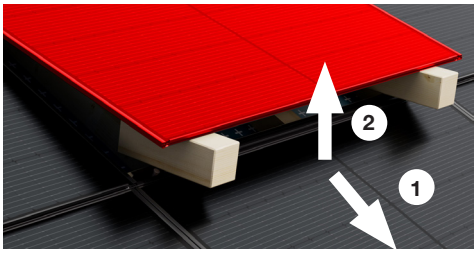
Then lift the adjacent module to the right of the module being replaced from its lower mounting.



First, slide the module being lifted upwards parallel to the module surface (1) until it can be released from the lower slot.

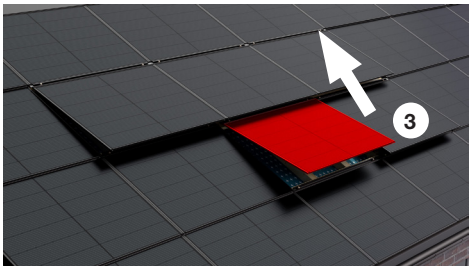
Now lift the lower end of the module just enough (2) so that you can pull it downwards over the module below.

8. Removing individual modules



Then pull the module downwards (1) and lift it far enough (2) so that you can support it against the roof, e.g. with wooden chocks.

Proceed in the same manner with the remaining modules around the module being replaced.



Now slide the module to be replaced upwards and lift it steeply (3) to disengage it from the upper slot. Remove the module.

To insert the new module, proceed in the reverse order.

Remove the supports from the lifted modules and slot the modules back into the modules below.

9. Maintenance Arres 3.2

ONGOING INSPECTIONS AND CARE

- The PV system must be serviced every year.
- Check the connecting cables and plug connections for corrosion and mechanical integrity during the annual inspection.
- Check the condition of the mounting system.
- Check the modules for soiling.
- Check the grounding resistance of the overall system in accordance with local regulations.
- Clean soiled modules with a soft sponge or cloth and plenty of clear water (rainwater or tap water). Do not use distilled water or cleaning agents of any kind.

Solarmarkt GmbH
Neumattstrasse 30
5000 Aarau
Switzerland
+41 62 200 62 00
info@arres.ch

arres.ch

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INDACH SOLARSYSTEM