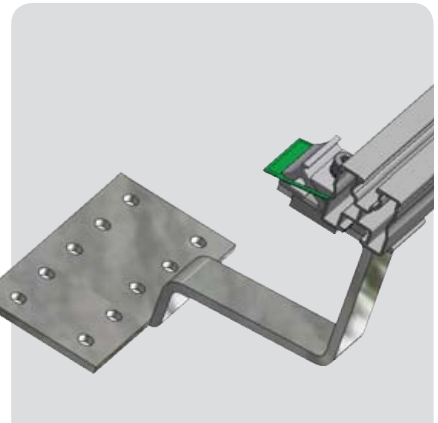
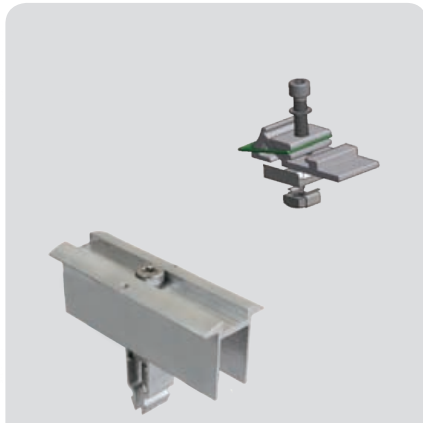
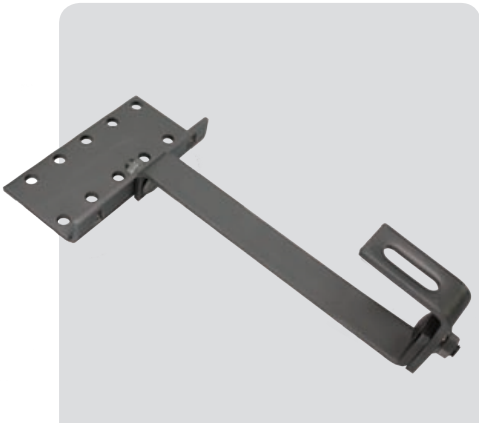




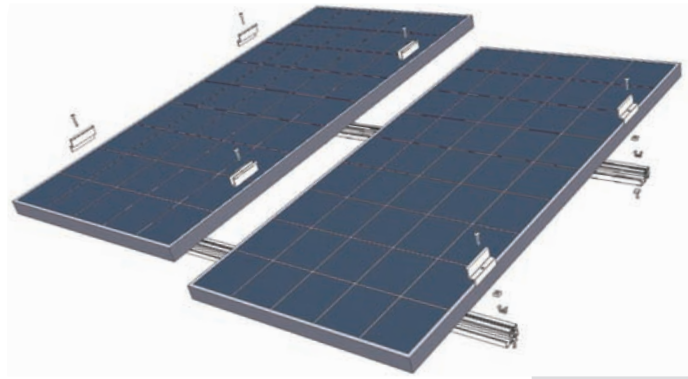
*Flush Mount  
Mounting Systems for Pitched Roofs*



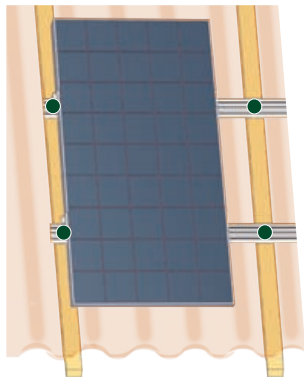
## Schletter Standard

### Standard System for Pitched Roofs

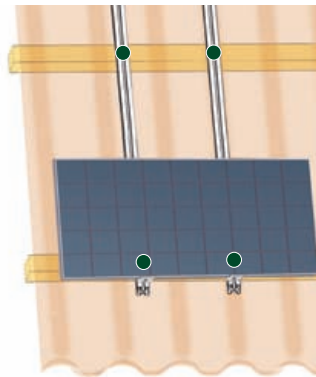
- Can be combined with all Schletter roof attachments
- Simple mounting
- Economically priced



Generally, two horizontal cross beams carry one module row. The cross beams are connected to the substructure respectively to the roof cladding by means of roof hooks or special fixation elements.



Vertical to the substructure - rafter



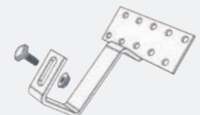
Vertical to the substructure - purlin

The modules are fixed to the cross beams by means of middle and end clamps. Usually, the modules are mounted vertically.

Regardless of the roof type and attachment method used, once the attachment mechanism is installed (i.e. roof hook, trapezoidal sheet metal clamp, etc.) the same process for installation of the cross beams, modules, and clamps is essentially the same. The following will review installation methods for commonly used attachment components for the Standard Flushmount System on pitched roofs.

Roof Hooks	3
Corrugated Roof Attachments	5
Standing Seam Clamps	5
Fix T	6
Fix2000	7
Standing Seam	8
Rails	9
Clamps and Components	10

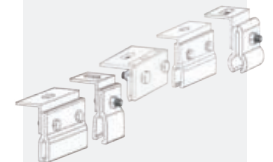
### Connectors



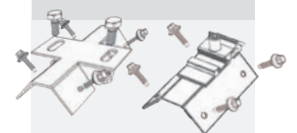
Roof hook also with KlickTop



Corrugated roof set



Standing seam clamps



Trapezoidal sheet metal clamp  
Fix2000 / Fix2000 KlickTop



Special fixation on sheet metal roofs  
FixPlan

## Roof Hooks, Asphalt Shingle

Step 1: Identify the structural joist system support for the roof decking system above. Typical joist spacing is 2 feet on center on wood 2x joists or truss joists (structural). Locate the wood rafter or joist below the roof deck. Location can be found either through a stud finder from above or from under deck access (attic in most cases of a 4:12 sloped roof). Blocking is not required if the center of the wood joist is located.



Step 2: Lift the shingle above, if this is an existing roof. Place the hook along the center of the joist below. Align the bottom hole closest to the "bent hook" at the asphalt self-adhesive line, as shown. Drill holes with a 7 mm bit for M8x80 or 5/16"x3-1/8" screws. Remove hook.



Step 3: Fill holes with Silicone or other approved water proof sealant, per Schletter recommended specifications. This will seal the penetration holes. Place the roof hook back in place with the holes aligning.



Step 4: Place a screw by hand in each hole to ensure the drilled and hook holes align. Begin partially screwing each screw to prevent twisting and misalignment.



Step 5: After securing all screws, tighten to the Torque as stated on the drawings. Next, cut a piece of self-adhesive asphalt waterproof membrane about 6.5" long x 4" wide (enough to extend over all edges of hook that is under the above shingle.) Per Schletter recommended specifications.



Step 6: Press the membrane all around every edge to adhere securely with no gaps, bulges, or folds. Replace the shingle above. Note: adjacent photo on right shows the pre-assembled KlickTop component assembly mounted on the Roof Hook. This is the standard method of connecting the roof hook to the rails / purlins. It generally arrives slightly tightened on the Roof Hook. You will need to tighten it later for rail installation.



See section on cross beam installation to continue.



## Tiled Roofs

Stainless steel roof hooks are used to attach to asphalt shingle or concrete tile roofs. A variety of hook profiles are available to match nearly any type of tile, including flat tiles, scalloped tiles, and S-tiles.

### **i** Tools:

**Ratchet wrench with 13 mm socket wrench and a drill with 6 mm pilot bit. If using impact driver, use caution not to over tighten. Refer to Tool List.**

#### ❶ Determination of the rail position

The rails should be positioned approximately one-fourth of the module height away from the lower and upper module edge (see module manufacturer's documentation for more information). The position of the support rails for module rows above each other must be aligned to the tile rows. Rails must be installed parallel to tile configuration (perpendicular to the rafters).

#### ❷ Choice and arrangement of roof hooks

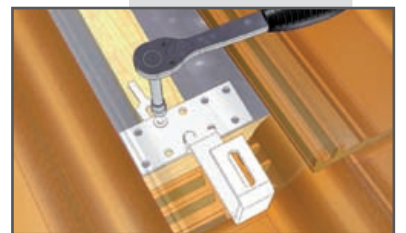
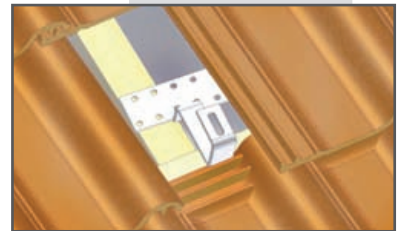
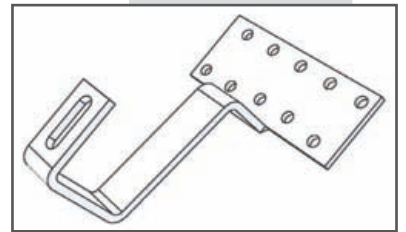
Roof hooks are arranged vertically according to the intended cross beam positions and north-south directions. Adjustable roof hooks are available for height adjustment in case of uneven roofs. If the substructure does not give any suitable attachment locations for support rails, often a cross rail system is recommended. Reference image on page 2 for examples, or see information on the GridNorm System in the Mounting and Project Planning Guide for further details.

#### ❸ Attachment of roof hooks

The covering tile is lifted and set aside. The attachment plate of the roof hook aligns over a rafter. A distance of 0.08 – 0.20" (3–5 mm) must be maintained between roof hook and tile. This distance can be achieved by using plywood or a Schletter metal distance piece. (See item #400 893 in accessories)

The roof hook is fastened to the rafter with at least two lag bolts, 5/16" (8 mm). At least two-thirds of the screw length must be pre-drilled. Ensure that at least 2.75" (70 mm) of the lag bolts have a grip in the rafter. Reference design documentation for further information on bolt embedment. Screw lengths of 3" (80 mm) for non-decked roofs and screw lengths of 4.75" (120 mm) for decked roofs are typical. Only use bolts allowed by system design specifications.

#### ❹ Replace covering tile.



## Corrugated and Trapezoidal Sheet Metal Roofs

Mounting to corrugated or trapezoidal (u-shaped) sheet metal roofs, can be accomplished through a variety of products offered by Schletter. The first, are Hanger Bolt attachments, sold with or without Gator Clamp attachments. Each hanger bolt comes with EPDM sealing and a mounting plate. Usually, a fastening set with a hanger bolt M12 x 300 mm (11.8"), M12 x 200 mm (7.9") is recommended. For special types of attachments with reduced horizontal distances, M10 x 200 mm (7.9") is available.

**i Note: M10 or M12 bolts must be used for this system but the largest bolt that can be drilled into 2x4 construction is M8. Therefore, this system can only be used on 4x4, rough cut, or reinforced construction.**

### **i Tools, Drill Diameter**

Hanger bolts M10: combination wrench with wrench size 15, power screwdriver with 7 mm (0.28") insert. Wood is pre-drilled with a diameter of 0.25" (7 mm); the roof is pre-drilled with a diameter of 0.5" (15 mm).

Hanger bolts M12: combination wrench with wrench size 18, power screwdriver with insert 9 mm (0.35"). Wood is pre-drilled with a diameter of 0.3" (8.5 mm); the roof is pre-drilled with a diameter of 0.6" (16 mm).

### **1 Fastening of mounting sets**

The roof cladding is drilled through at the appropriate locations, making sure that drill points are not situated in the water-bearing valleys of the sheet metal, but rather on the top areas of the plate profile. By pre-drilling, the fastener bolt penetrates the rafter or the purlin. Screw the hanger bolt in such a manner that only the metric thread stands out of the roof cladding (and, if possible, a bit of the shaft) to act as a seating for the gasket. Greasing the screw makes the process easier.

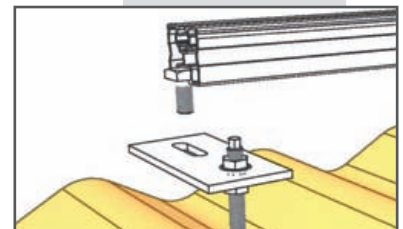
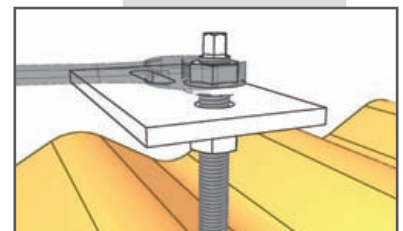
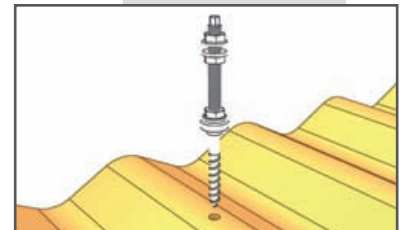
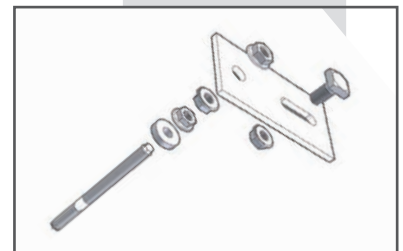
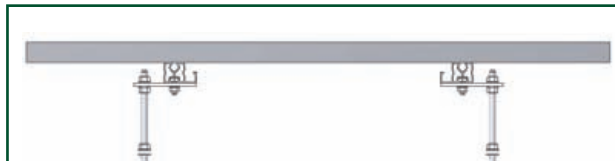
### **2 Creation and check of the sealing**

For sealing, the rubber gasket is pushed down as far as possible and slightly pressed onto the roof cladding with the flange nut.

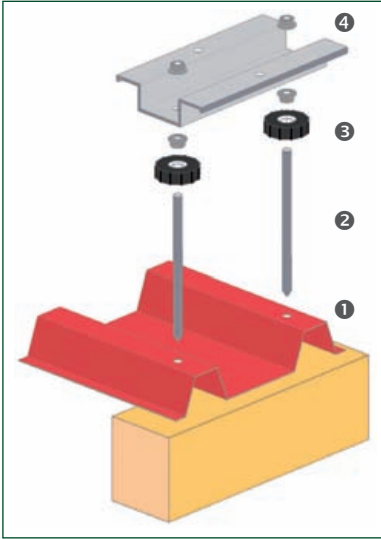
### **3 Alignment of mounting plates**

In the case of cross rails, an upwards arrangement of the plates is recommended. In the case of vertical rails, the plates should be arranged according to the symmetrical load distribution and screwed with flange nuts.

**NOTE:** If the rafters run north/south under the roofs (as is the case with most standard shingled roofs), it is best to run rails east/west and mount the panels in portrait. If the supporting roof members are purlins running east/west (as is the case with many metal roofs), it is best to run the modules rails north/south and mount the panels in landscape. In some cases, the combination of roof structure and necessary panel layout may require the use of two layers of rails (called a GridNorm™ System).



## Fix T, Trapezoidal and Corrugated Sheet Metal Attachment



FixT on wooden purlins

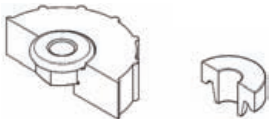
### 1 Pre-drill attachment locations

<b>Top of corrugation</b>	<b>wooden purlins</b>
with hanger bolts M12 12mm	8.5mm / 0.33"
with hanger bolts M10 10mm	7.0mm / 0.28"
with hanger bolts M8 8mm	5.6mm / 0.22"

### 2 Insert hanger bolts

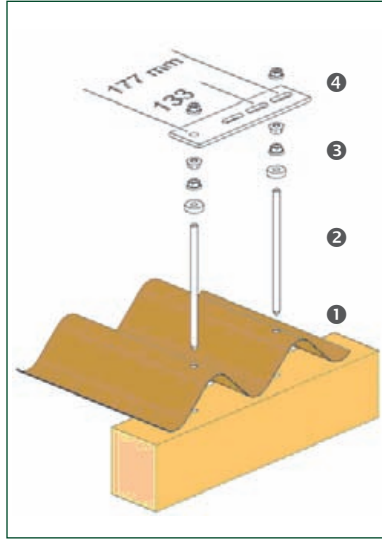
### 3 Fasten by hand tightening the sealing gaskets with integrated flange nut.

Besides the usual FixT-sealing attachment which is used for corrugation top widths starting from 20mm, an EPDM – sealing rubber for corrugation tops up to 20 mm is available.



FixT-sealing attachment from about 20 mm (3/4")  
EPDM-sealing 20 mm or less

### 4 Place Fix T and screw upper flange nut



Double corrugated roof set on wooden purlins

### 1 Pre-drill attachment locations

<b>Top of corrugation</b>	<b>wooden purlins</b>
with hanger bolts M12 14mm	8.5mm / 0.33"
with hanger bolts M10 13mm	7.0mm / 0.28"
with hanger bolts M8 8mm	5.6mm / 0.22"

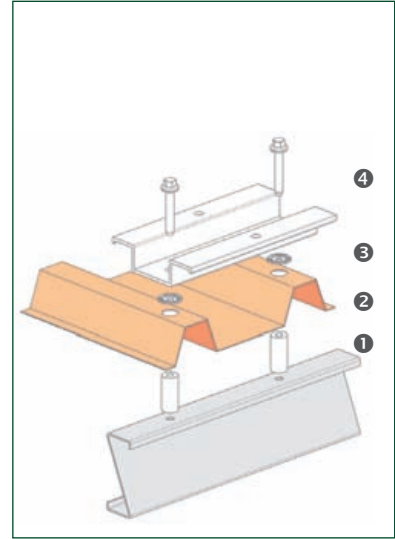
### 2 Insert hanger bolts

### 3 Tighten sealing gasket with flange nut. Sealing rubber must be lightly pressed.



EPDM-sealing

### 4 Apply mounting plate according to the corrugation top distance and screw it with the flange nuts



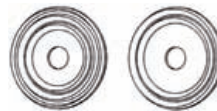
FixT on steel purlins

### 1 Pre-drill attachment locations

<b>Top of corrugation</b>	<b>steel purlins</b>
Size of distance tube	up to 4mm 6.8mm / 0.26"
(20 or 16 mm customize)	up to 11mm 7.0mm / 0.27"
	from about 11mm 7.2mm / 0.28"

### 2 Insert distance tube

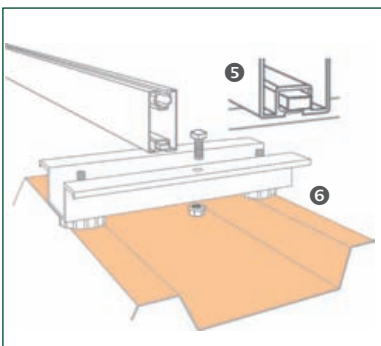
### 3 Place distance-tube-sized sealing gaskets onto the trapezoidal sheet – view from above:



20 mm 16 mm

### 4 Apply hat section and fix it using M8 screws.

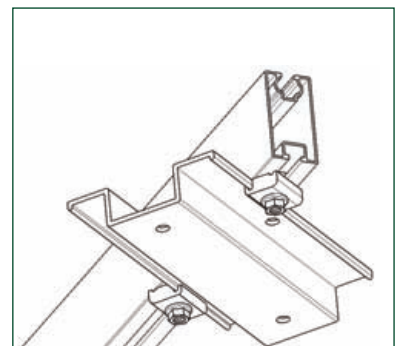
**Screw up to the stop.**  
Sealing washer has to be slightly pressed.



### 5 Insert square head screw M10x25 in the provided groove of the bearing rail and arrange it according to the holes of the cap profile

### 6 Arrange the rails, if necessary lengthen them with connectors and screw them with flange nut M10

Besides the direct screwing at the holes of the cap profile, the bearing profiles can also be clamped (440157-40) in a variable manner at the sides. This makes an optimum alignment and maximum yields possible.



## Fix2000 Trapezoidal (U-shaped) Sheet Metal Roofs

When the roof substructure provides unsuitable connection locations, the Fix2000 allows for such connections to occur.

### Calculations

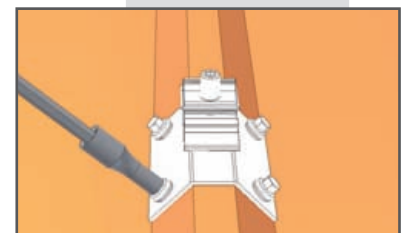
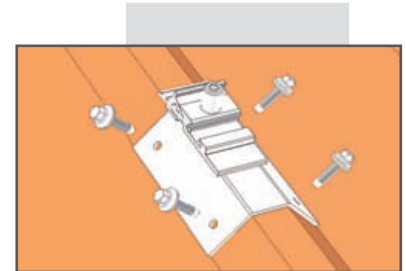
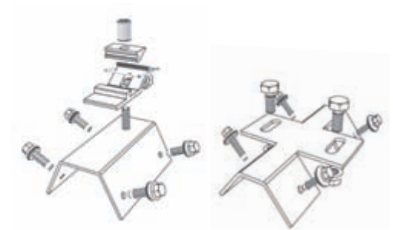
The Fix2000 fastening elements must be able to transfer the exact load forces to ensure reliable system calculations. For Fix2000 calculations, the wind load is more relevant than the snow load. The snow load is transferred into the roof by all the ribs of the sheet metal; due to a slight elastic deformation, the ribs between the clamps are also loaded. The cross rails should be arranged vertically to the ribs.

It is essential for the wind load to transfer and the trapezoidal sheet metal be sufficiently attached to the substructure. These two conditions must be met for mounting of the Fix2000 to take place. Only by using an adequate amount of Fix2000 elements will the adhesive force of the clamps to the sheet metal take place. Individual verifications for the load transfer into the sheet metal are required. Usually, a horizontal distance of 47–55" (1.2–1.4 m) between the clamps is sufficient for this to occur; more clamps should be placed at the edges. Tilted systems on Fix2000 are only recommended when the adhesive force of the sheet metal can be definitively verified.

Step 1: A minimum thickness of 19.7 mil (0.5 mm) steel sheet metal and 31.5 mil (0.8 mm) aluminum sheet metal is required for use with the Fix2000.

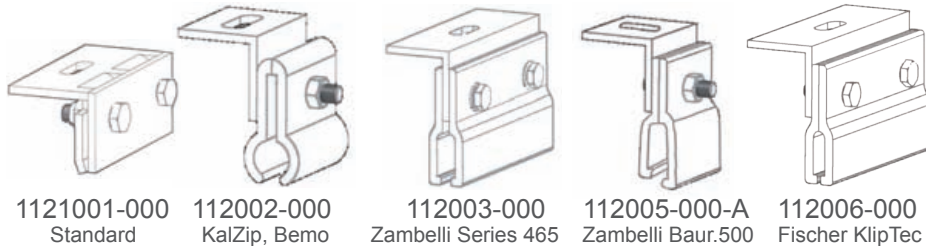
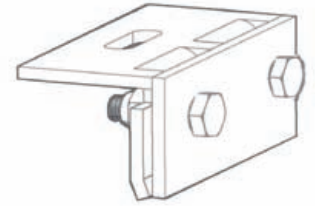
Step 2: As with all roof attachments, find proper connection locations. Refer to supplied drawings if necessary.

Step 3: Place Fix2000 in appropriate attachment locations and screw in with supplied hardware. The screws must not spin free of grip during the mounting process (use a depth-stop).



## Standing Seam Roof, Sheet Metal Roofs

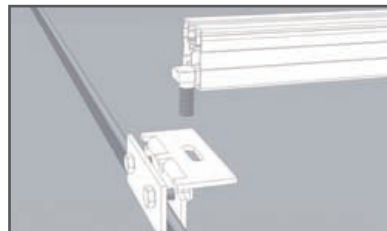
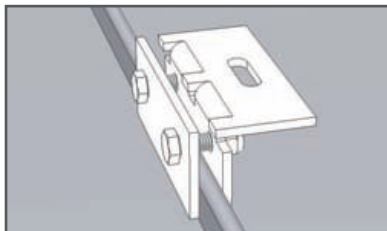
For fastening, the cross rail profile is screwed onto special standing seam clamps. Various designs are available for different types of roof systems. An alternative to the standard clamps is the **FixPlan™** for direct attachment to the substructure.



Alternative.: FixPlan

### **i** Tools:

Ratchet wrench 13 plus insert 13, torque wrench (if necessary, power screwdriver with torque setting)  
Alternative: FixPlan, tools as needed for corrugated roof kit mounting (see above)



### **1** Positioning of standing seam clamps

Arrange the clamps vertically according to the required cross rail positions. For horizontal applications: One clamp should be positioned on each standing seam and the cross beam should not bear more than a maximum of 15.75" (0.4 m) to the left and right.

### **2** Fastening of standing seam clamps

Put the clamp on the seam and loosely tighten. Alignment is completed when the cross rails are fastened. The clamp must be shifted onto the seam as far as possible.

### **i** Please Note:

Torque for standing seam clamp screws should be 11 lbs/ft (15 Nm).

Rule of thumb: Fasten tightly with a short ratchet. When fastening onto sheet metal roofs, the roof cladding must be able to absorb the wind load. Careful review should be performed by the installer on the installation site to ensure the roof has proper support.

**ATTENTION:** With system roofs (e.g., Kalzip), the standing seams must not be altered in shape when the clamps are tightened to make sure that the roof sheeting is not blocked in case of thermal expansion.

## Cross Beam Profiles

The cross beam profiles Eco05, Solo05 and Profi05 are the standard components of the different fixation systems.

A variety of other profile forms complete the system to a complete unit assembly system for almost all cases of application. For example, the standard profiles are completed by the ProfiPlus profile and the wide spanning profile series GP1 to GP3.

Profiles from DN0 to DN2.5 are suitable as continuous beams for substructures and load distribution beams. Dimensioning programs for each profile design help picking the right profiles and apply them professionally.

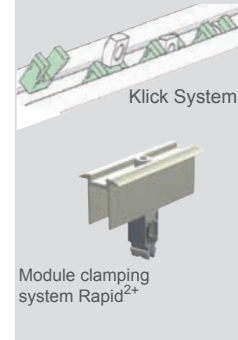


## The Klick System and Rapid<sup>2+</sup> Clamp

The Klick system for attaching modules onto the cross beam rails allows for optimum security and short mounting times at the same time and therefore is integrated both in standard and special bearing profiles.

- Quick and convenient mounting
- Secure fixation with quality steel thread
- Application of standard components

The module clamping system Rapid<sup>2+</sup> serves for the mounting in the cross beam, with pre-packaged clamps. For more information on the Klick System, see section on System Mounting.



## Module Clamping Systems

Middle and end clamps made of aluminium for framed modules are available for virtually all framed module types. Please refer to the Components Overview for a complete listing of all module clamps available including the ETL Certified Rapid Grounding Middle Clamp.

For laminated modules, the design series LaminatEco is applicable for determined module thicknesses, the design series LaminatProfi is universally applicable for different module thicknesses. With vertical mouning, VA quality steel safety hooks are recommended as an anti-sliding device.

The design series LaminatGS has been optimized especially for scaled mounting.



## Technical data

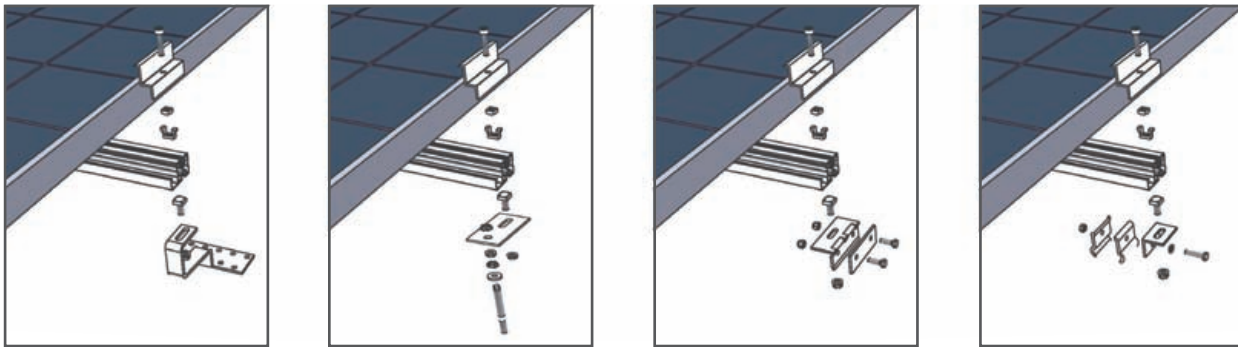
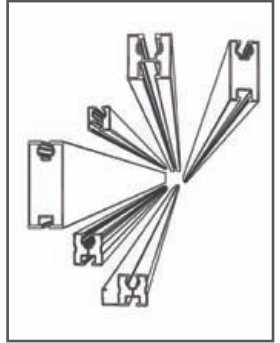
<b>Material</b>	Roof hooks and screws: quality steel 1.4301 Profiles, module clamps, KlickTop: Aluminium
<b>Structural analysis</b>	Structural analysis according to the current national standards (IBC 2006/2009).  Attachments regarding the dimensioning of the number of required fixation spots based on structural analysis. For this purpose, we put our charts and dimensioning programs at your disposal.

## System Mounting

After the fastening elements are mounted, the next step is to apply the cross beams and/or rails.

### Pitched Roof Mounting: Cross Beam Mounting

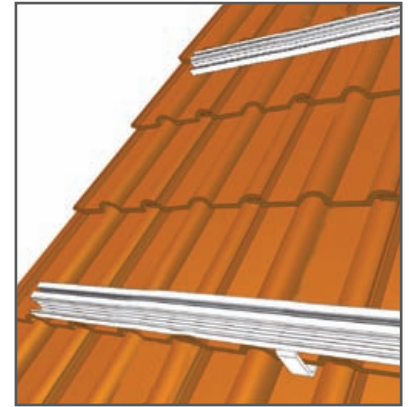
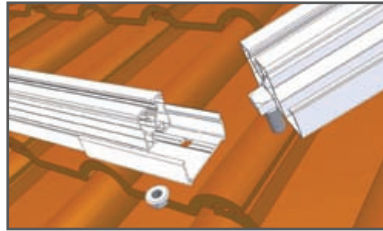
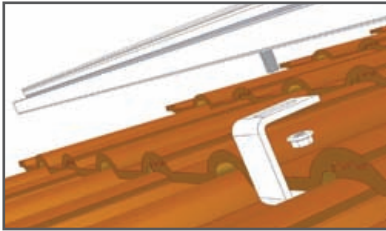
With classic pitched roof fastening, two rows of roof hooks and/or other roof fastening elements are attached to the supporting roof substructure. The cross beam profile is mounted onto these profiles. Two cross beam profiles bear one module row, which is aligned and fastened to the cross beams by means of end and middle clamps. Usually, the modules are mounted vertically (portrait).



#### IMPORTANT!

Due to thermal expansion, ensure that the rows are not too long. Long, continuous rows should be subdivided. On tiled roofs, a maximum length of about 66 ft (20 m); on sheet metal roofs without the possibility of thermal equalization, a maximum length of about 33 ft (10 m) is common.

**Tools:** Combination 15 mm wrench with 6 mm (0.24").



### ❶ Secure and align the cross beams on the fixation spots

Insert the bolts (usually M10 x 25 mm (0.98 inches) hexagon head or square head) into the groove of the cross beam rails and arrange them at approximate distances. Then insert the first piece of the cross beam (starting with the first screw) in the attachment row (roof hooks, corrugated roof fasteners, standing seam clamps). The most effective method is securing the first bolt with a nut at the roof attachment and then lifting the rail at a slight diagonal, inserting more bolts and securing each of them with a nut (**DO NOT TIGHTEN** at this point).

If necessary, extend the cross beam rail with a connector plate.

#### How to even out different heights on roofs

a) **For tiled and pan tiled roofs:** Use height adjustable hooks or use underlayments with fasteners

b) **For corrugated or trapezoidal (U-shaped) sheet metal roofs:** Adjust the mounting plate at the hanger bolt by adjusting the fastening nuts

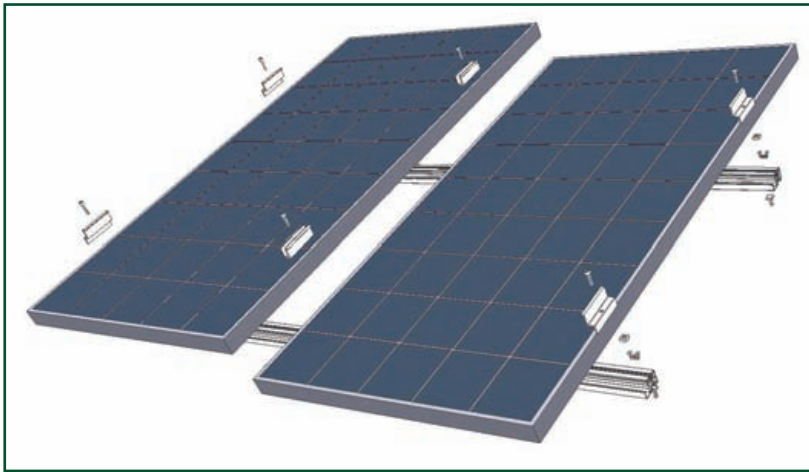
c) **For standing seam roofs:** When necessary, use underlayments and appropriate bolts.

Next, the lowest rail should be aligned straight. After fastening the lower row of rails, and with the other rails still attached, ensure that the rails at the sides are aligned to the roof covering. (**Important:** Make sure that the side rails are aligned at a 90° angle. If this does not occur, the rails in the complete module field cannot be aligned in one direction!) Number triples can be used to achieve the 90° angle. For example: 23.6", 31.5" (60, 80 cm) result in a diagonal of 39.4" (100 cm).

After aligning all cross beam rails, secure all connection bolts tightly. Use only special nuts with locking teeth. If the installation is supposed to be integrated in the lightning protection of the building, pay special attention to ensure the side rails are aligned at a 90° angle.

### ❷ All bolts of the substructure have to be fastened tightly and double checked.

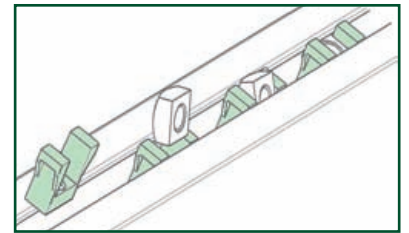
## Module Mounting Suggestions



### Framed Modules

#### 1 Module mounting preparation

Cabling to the module rows must be prepared. Keep the necessary steps for lightning protection in mind as the cabling is prepared. For module cabling, at the end of a string of cables, suitable plugs/sockets for the individual module types must be mounted. Connect the first module (as specified by the manufacturer) followed by the other modules.



Click the square nuts into the upper groove of the cross beam rail in approximate distances using the click-in component (item #430024). Loosely place the first two end clamps at the end of the cross beam rail. Then apply the first module and fit them loosely with the end clamps (the end clamps should be positioned 2 mm or more away from the edges of the cross beams). Now align the first module to the cross beam (use a cord or auxiliary device, available as an accessory).

#### 2 Mounting of the module rows

After aligning the first modules, one middle clamp per cross beam rail is loosely fixed to the corresponding cross beam. Then the next module is loosely clamped, shifted under the module clamp, and fastened. The next middle clamp is attached accordingly. The cables can be placed in the cable duct of the rail, securing them to the cross beam by means of UV resistant cable straps.

#### 3 Tighten all module attachment screws and check each one a second time

#### 4 End cap: If desired, the cross beam rails can be finished with an end cap (for Solo™ and Profi™).



