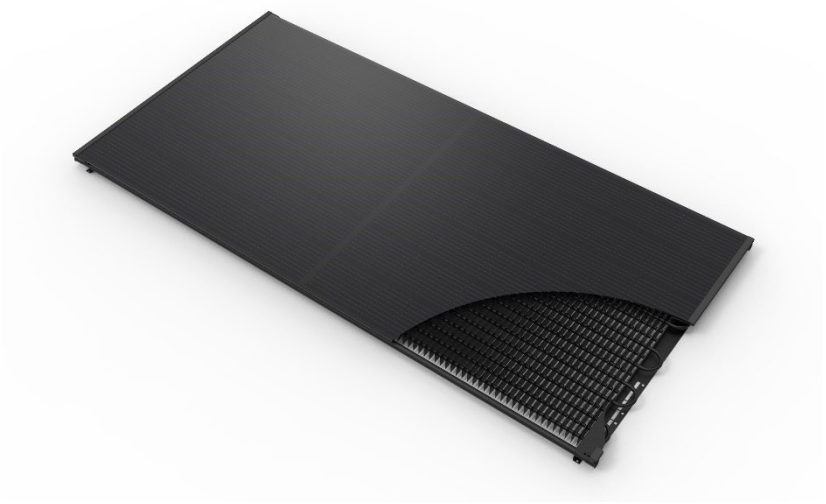
UK Installer manual

PV-T Collector System - UK



PV-T_M3-IHB

000002

Important information

Safety information

This manual describes installation and service procedures for implementation by specialists.

The manual must be left with the customer.

This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.

This is an original manual. It may not be translated without the approval of NIBE.

Rights to make any design or technical modifications are reserved.

SYMBOLS

NOTE
This symbol indicates danger to person or machine.

Caution
This symbol indicates important information about what you should consider when installing or servicing the installation.

TIP
This symbol indicates tips on how to facilitate using the product.

MARKING

Explanation of symbols that may be present on the product's label(s).

General

RECOVERY

Leave the disposal of the packaging to the installer who installed the product or to special waste stations.

Do not dispose of used products with normal household waste. It must be disposed of at a special waste station or dealer who provides this type of service.

Improper disposal of the product by the user results in administrative penalties in accordance with current legislation.

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COUNTRY SPECIFIC INFORMATION

United Kingdom

Warranty and insurance information

Thank you for installing PV-T panels from NIBE in your home.

The PV-T collector system is manufactured to the very highest standard, so we are pleased to offer our customers a comprehensive guarantee.

For the PV-T panels the product warranty is 10 years from the date of manufacture and includes supplied system components. This is a product only warranty, excluding labour.

Claims made against PV-T will require photographic evidence, a picture of the PV-T panel type plate and the PV-T panel serial number.

The PV aperture has a 25-year performance guarantee of >85% of the initial performance.

Start-up protocol for solar panel system

Start-up protocol, which is filled in by the installer.

Installer	
Company:	
Installer:	
Telephone:	
E-mail	

Product	
Make:	
Model:	
Inverter's serial number:	
Start-up date:	
Connected to compatible NIBE product:	
Inverter's position:	

Measurement values	
☐ Inverter test-run/started	The inverter is powered by the solar panels and will, for this reason, not start under all conditions. Measuring the values below ensures that the installation has been performed correctly.
☐ Checked polarity from the solar panels	
Current conditions (time, weather)	
Voltage AC:	
Voltage DC - String 1:	
Voltage DC - String 2:	
Voltage DC - String 3:	
Voltage DC - String 4:	

Notes / Other

Signature	
Place and date:	
Signature:	
Clarification	

Installation inspection, solar panels

Current regulations require the installation to undergo an installation inspection before it is commissioned. The inspection must be carried out by a suitably qualified person.

The installation inspection, and commissioning, checklists contained within the main NIBE heat pump installation handbook should also be followed.

√	Description	Notes	Signature	Date
Mounting				
	All work is carried out in accordance with the installation instructions, regulations and procedures regarding health, safety and the environment.			
	In the event of any deviations from the specifications, changes must be performed in dialogue with, and according to the guidance of, the supplier.			
	Roof surface checked and measured prior to start of installation.			
	Roof structure and condition of mounting points checked.			
	Projecting rails cut outside of outer clamps.			
	All roof brackets have been installed in accordance with the instructions and measures have been implemented to prevent damage caused by water, moisture or other environmental factors.			
	No holes have been made unnecessarily in the roof, and penetrations that have been created unintentionally or by mistake have been sealed.			
	Any damage to the product(s) has been reported to the supplier and rectified in the agreed manner.			
Electrical installation				
	Notification submitted to the power supplier, inverter data enclosed.			
	The property's main fuse checked against power from solar panels.			
	Cables are installed in accordance with applicable rules and regulations.			
	All MC4 connectors/connections have been double-checked to ensure they are correctly connected.			
	All cables are correctly routed and executed with suitable pipes, ducts or protection indoors and outdoors.			
	All roof and wall lead-throughs are protected against water, moisture and other environmental factors, and are executed in accordance with applicable rules and regulations.			
	DC cables are clearly marked.			
	All voltages on the DC side have been measured and noted in the start-up protocol.			
	The PV system is connected to the AC network and the installation has been functionally tested in accordance with the start-up protocol.			
	Make sure that the connections are tamper-proof, if the inverter is located where it can be accessed by unauthorised parties.			
	Warning signs installed.			
	Notification of completion submitted to the power supplier.			
	Handover to the property owner completed.			
Heat pump, where applicable				
	EME 20 / TCP Modbus Solar connection between inverter and heat pump.			
	EME 20 / TCP Modbus Solar communication checked in heat pump.			

Delivery, handling, and maintenance

Delivery

Together with the driver check, check the delivery immediately for the following:

- Visible Damage (compressed packaging etc)
- That the correct number of packages have been delivered
- That the PV-T panels are undamaged

Handling

Always store the PV-T panels in a dry place and do not expose them to the weather or moisture.

If the heat pump panels are stored, the sealing caps must remain on the pipe openings to prevent dirt from entering the pipes

The heat pump panels may only be supported via the profiles on the short side. The header pipes and heat exchanger must not be used for this purpose. Lifting equipment such as hoisting belts must not be attached to the pipes.

Caution

Avoid knocks and mechanical damage to the PVT panel. Do not lift the solar panels by the connections. Do not place the solar panels on objects that can damage them, nor pull or drag them over anything that can damage them.

Maintenance

Service

The Solar panels must be regularly inspected

Check that the glass in the panels and the aluminium frames are not damaged

Check that electrical wiring and connections are intact and not damaged.

Mechanical cleaning is not usual required and is not recommend.

Supplied components

PV-T Panel

Art No.	Description
101150	PVT M3-450XL heat pump panel landscpae 450Wp 2.21m^2
101250	PVT M3-375L heat pump panel landscpae 375Wp 1.87m^2

Mounting Rails

2 pieces of mounting rail per PV-T panel with pre-mounted panel clamps and connectors. Mounting rail supplied will depend on the PV-T array size and configuration.

Art No.	Description
325010	Mounting Rail 2209mm for first panel in row, M3-450XL, pre-mounted clamps
325020	Mounting Rail 2169mm for supplementary panel in row, M3-450XL, pre-mounted clamps
325030	Mounting Rail 1869mm for first panel in row, M3-375L, pre-mounted clamps
325040	Mounting Rail 1829mm for supplementary panel in row, M3-375L, pre-mounted clamps

Hydraulic Packages

Pitched-roof mounting

Art No.	Description
012013	PV-T Basic Kit 1-s, First Panel Press Fit
Contents :	
311120	Locking Pin x 2
424010	Ribbed hose plug/press 20-40mm. DN20, with 22mm SS press fit.
424015	Ribbed hose plug/press 110-210mm. DN20, with 22mm SS press fit.
410200	End plug with air vent x 2
410500	Locking Clip x 4
615000	PV cable clamp

Flat roof / Ground mounting

Art No.	Description
012013**L**	PV-T Basic Kit 1-s, First Panel Press Fit **Long**
Contents :	
311120	Locking Pin x 2
424010	Ribbed hose plug/press 110-210mm. DN20, with 22mm SS press fit.
424015	Ribbed hose plug/press 250-350mm. DN20, with 22mm SS press fit.
410200	End plug with air vent x 2
410500	Locking Clip x 4
615000	PV cable clamp

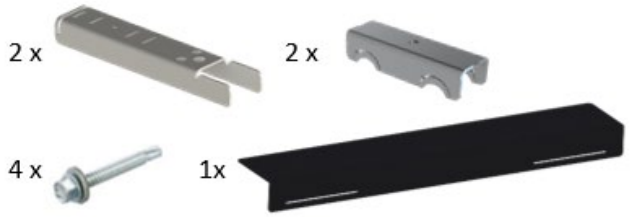
Art No.	Description
012023	PV-T Basic Kit 3, Supplementary Panel
Contents :	
311120	Locking Pin x 2
411000	Intermediate hose x 2
615000	PV cable clamp x 1

Roof penetration kits

Art No.	Description
014011	Sloped roof gland, including flexible piping (SS press) and insulation. Antracite
014021	Sloped roof gland, including flexible piping (SS press) and insulation. Natural Red
Contents:	
890020 890010	Roof Pentration Kit (Antracite or natural red)
890005	Sealing Collar (EPS, diam. 42-55mm x 2
425080	Ribbed hose SS press. DN25, 1000-2000mm x 2
430252	Pipe insulation vapour tight 2m length, (19x28mm) x 2

Cover Plate

For pitched roof insulations a mounting cover plate accessory can be installed to conceal the header pipework connections.



Art No.	Description
013022	Sloped roof mountign cover plate, per PV-T row.

Art No.	Description
330251	Mounting Cross Connector

Installation

General

The installation must only be carried out by competent personnel.

The enclosed materials are those required for the installations described. In special cases, these may need to be supplemented. If in doubt, contact your supplier. Information on the applicable standards and regulations must be obtained prior to installation and commissioning. The electrical installation, as well as the notification to the network operator, must be carried out by a qualified electrician. Please note that commissioning the installation before the network operator has given its approval is not permitted.

> **NOTE**
>
> Installation of a solar panel is an extensive intervention on an existing roof. The roof covering, particularly on converted and inhabited loft spaces or where the roof's minimum angle is undersized (relative to the covering), may require further measures against moisture because of wind pressure and drifting snow, this must be evaluated by the installer on a case to case basis. The roof design must be able to handle the wind and snow loading that can occur in the region.

STATIC LOAD

The installation is only permitted to be performed on roof surfaces or support structures with sufficient carrying capacity and strength. If necessary, the static load capacity of the roof and roof structure must be investigated before the solar panels are installed. Great importance should be placed on the condition of wooden roof structures and the possibilities for screwing the mounting devices for the PVT panels to the structure. The roof structure must be reinforced if necessary. Inspection of the whole PVT panel installation in accordance with DIN 1055 part 4 and 5, or in accordance with country-specific regulations, is required, in particular in areas that experience snowfall and strong winds. The characteristics of the installation's location (prevailing wind direction, whirlwinds, etc.) must also be included in the calculation/estimate if these could involve increased loads. The solar panels must be installed so that snowdrifts resulting from snow guards or due to special conditions in the installation location cannot occur in the vicinity of the solar panels.

The distance from the outer edges of the roof must be at least 0.35 m at the sides of roofs and 0.2 m at ridges and eaves, in order to reduce the risk of the wind ripping the solar panels off.

The installation system according to DIN 1055 part 5 for snow zone II is intended for use up to 400 m above sea level. If the installation is made on a tiled roof, it is recommended that the snow is cleared if it reaches a depth of more than 30 cm on the solar panels (NOTE! If the snow has melted, been packed down and then more snow has fallen and so the density has increased, the snow may need to be cleared - even though it is not 30 cm deep.)

If there is a risk that the snow will slide down onto the panels and in particular behind the rear of raised panels, snow guards must be installed to prevent this.

Also ensure that the material under roofs with roof tiles is sufficiently stable to support the roof mounting points. Otherwise the roof must be reinforced. The installer must evaluate this and make a decision. If in doubt, a structural engineer needs to be consulted. We also recommend that the roof tiles should be ground down so there are no point loads between the roof and the roof brackets. The minimum distance between roof tiles at overlap points and the underside of the brackets is 3 mm, in order to allow for any movements in the mounting system due to the loads that can arise.

SAFETY INSTRUCTIONS

- Safety regulations for working on roofs and similar structures must be followed.
- Protection against falling parts must be installed. This is particularly important in locations where people pass below the roof/building.
- Personal safety equipment and/or scaffolding must be used when working on roofs, according to applicable regulations.
- Suitable measures must be taken during installation to ensure that the solar panel does not come loose and fall.
- Observe the safety distance to live conductors.

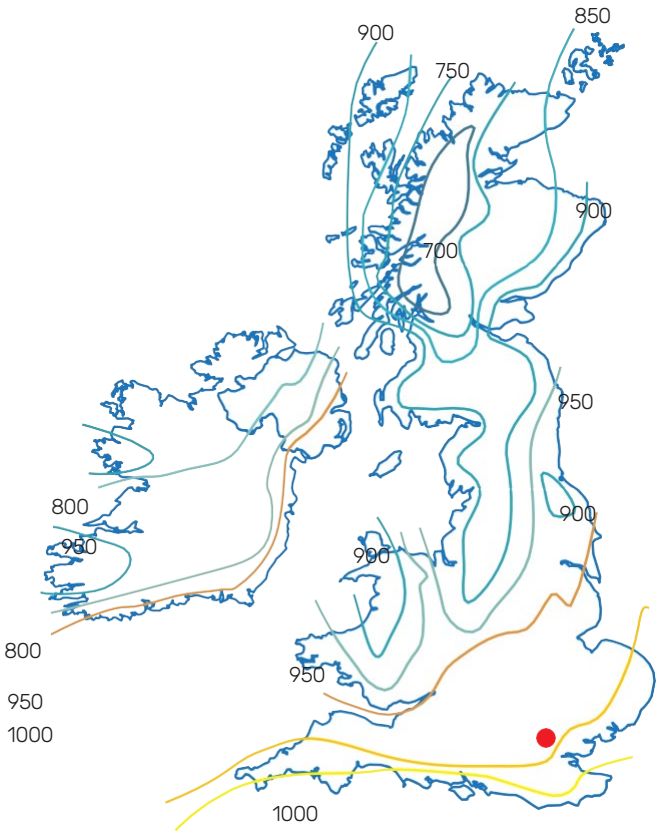
Installation and positioning

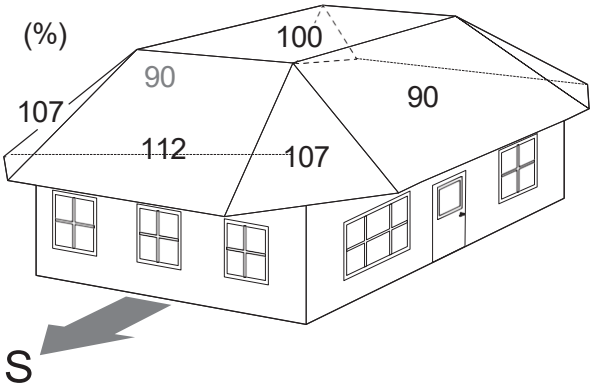
Using the map and the diagram, it is possible to estimate the annual value of the insolation on the surface where the solar panels are placed.

100% is the insolation at a horizontal surface. The angle of inclined surfaces is 45°.

The diagram shows insolation as a percentage of global radiation in relation to surfaces at various orientations and angles.

The map shows lines with the same global radiant flux, i.e. the insolation measured at horizontal surfaces.





1. Calculate the annual solar radiation using the map. The specific solar radiation for the installation is obtained as a percentage, based on the location of the solar panel according to the diagram.
2. Multiply the results by the installation's peak output (e.g. 4 / 8 kW).
3. Multiply the result 2 by a constant 0.9 to calculate the energy production in kWh/year (with a reservation for shade, dirt and snow coverage).

   Example: London, 8 kW, 45°, installation south (112 %).

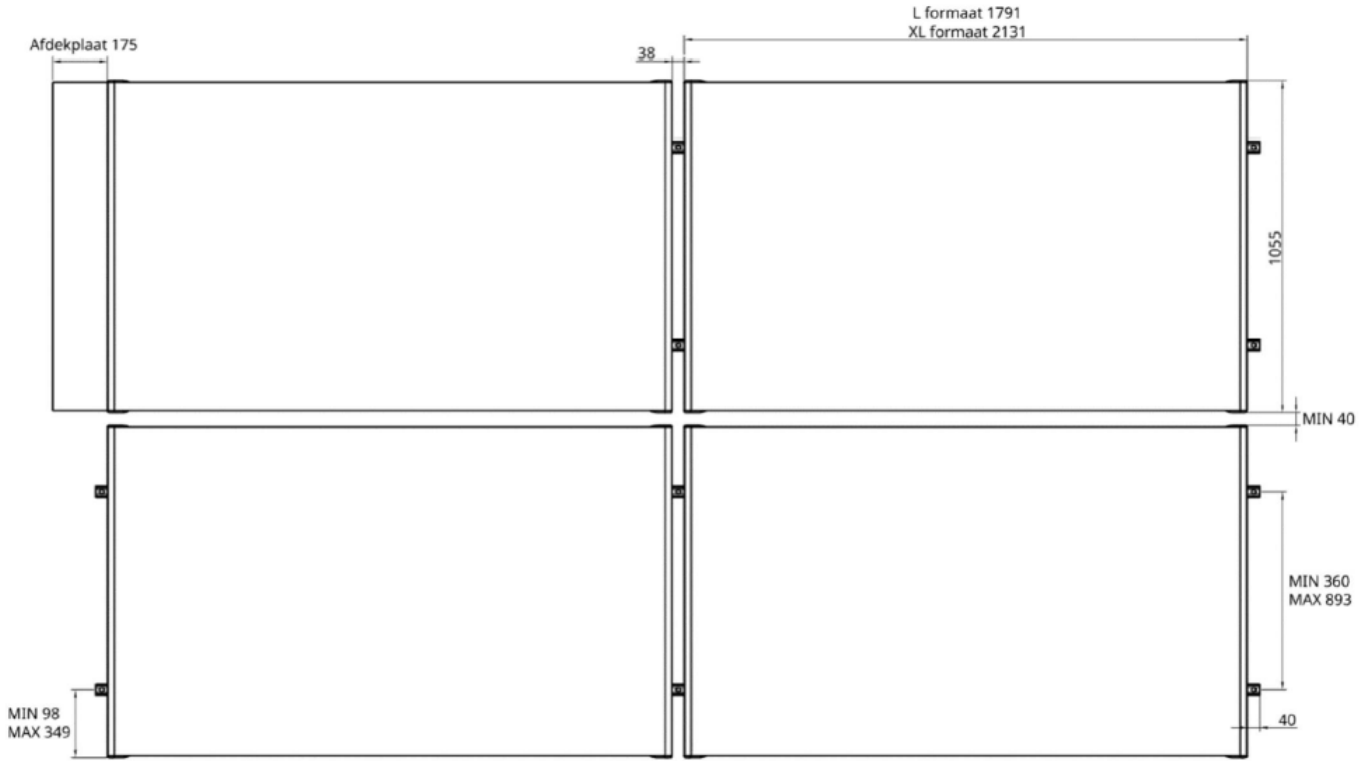
   1020 x (112/100) x 8 x 0.9 = 8225 kWh/year

Mounting Rails

OVERVIEW, ASSEMBLY PARTS

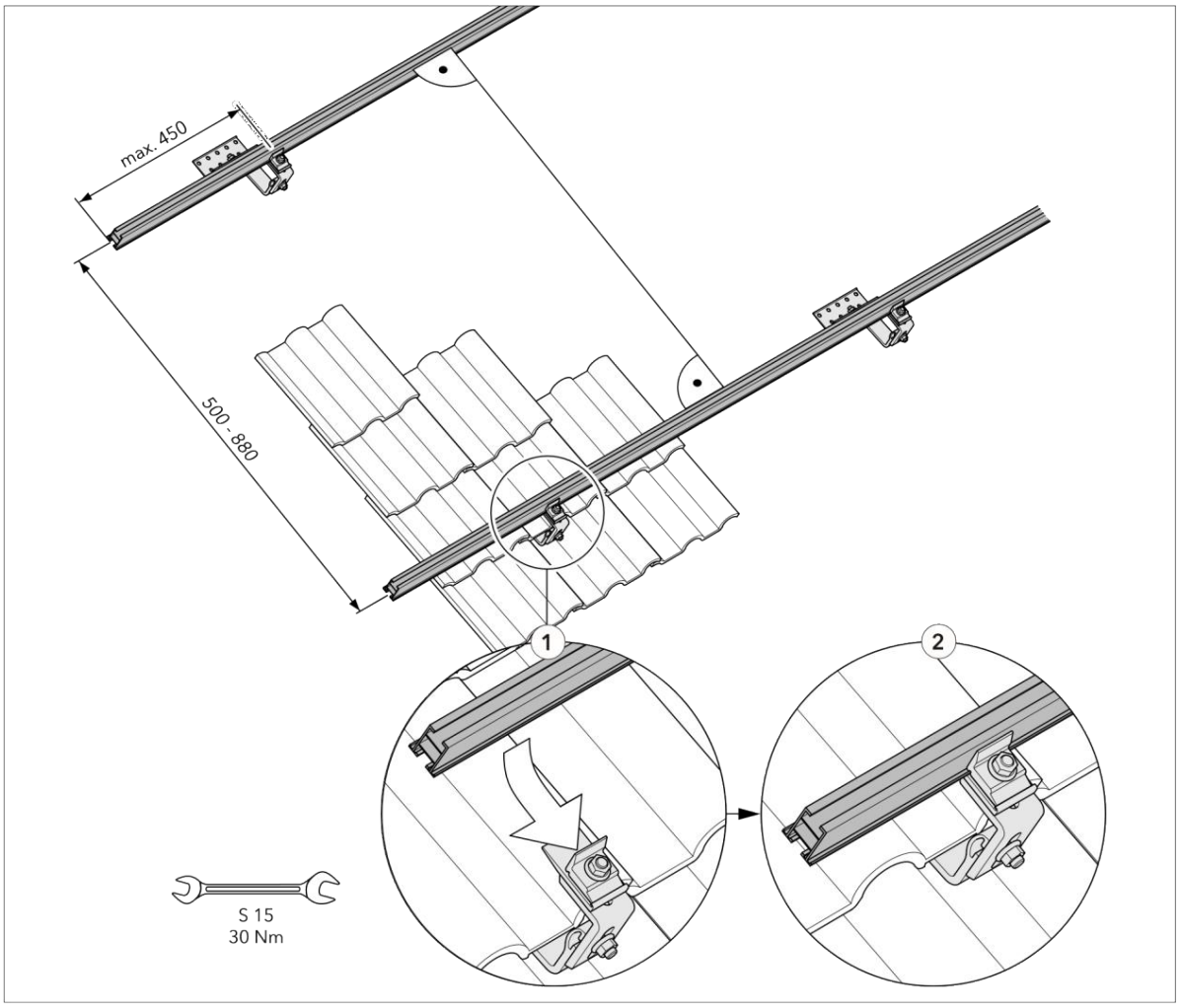
> **NOTE**
> Ensure that the strength and load-bearing capacity of the roof structure is sufficient.

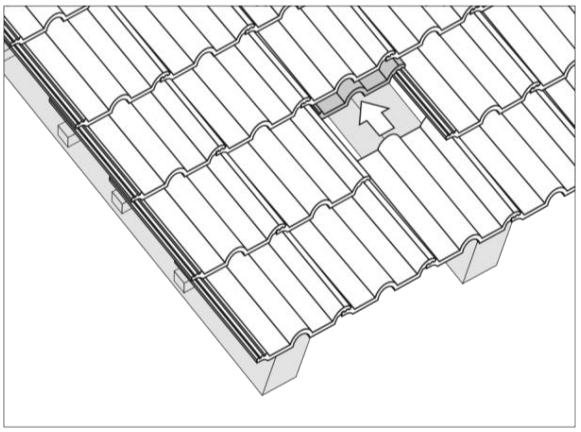
- Each PV-T panel is supported by two horizontal mounting rails.
- There are two types of mounting rail per panel size, for if a rail is for the first panel in a row or the next panel in the row.
- The supplied mounting rails are supplied with pre-assembled clamps.
- Mounting rails are identical for pitched roof, flat roof, and ground mounted systems.
- NIBE recommend a minimum distance of 500mm is maintained between the panel field and the edge of the roof.
- There should be a minimum distance of 40mm between panel rows.
- A 38mm gap is required between panels for the installation of the intermediate hydraulic hoses.
- A spacing of 175mm is recommended for the primary pipework connections to the first panel in a row.

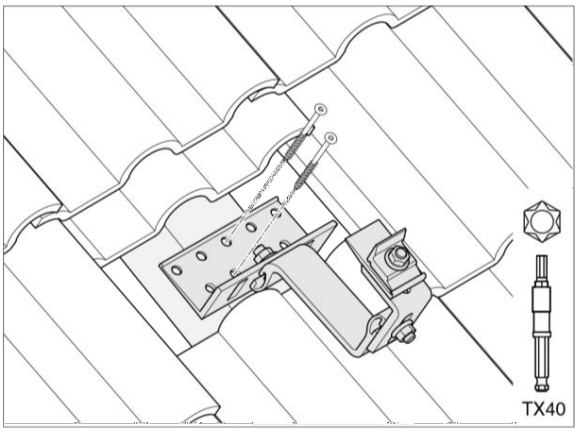


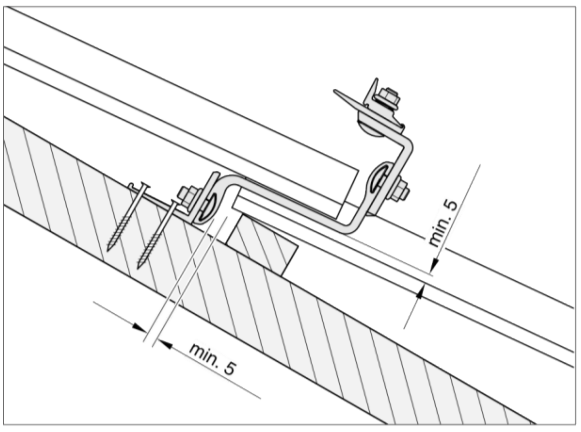
Pitched Roof Installation

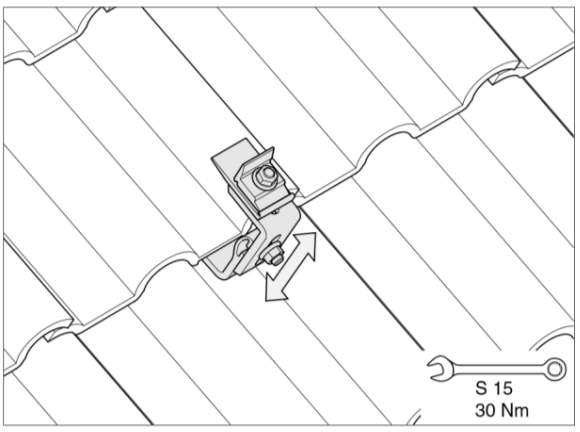
- For pitched roof installations each PV-T panel should be supported by a minimum of 4 roof hooks.

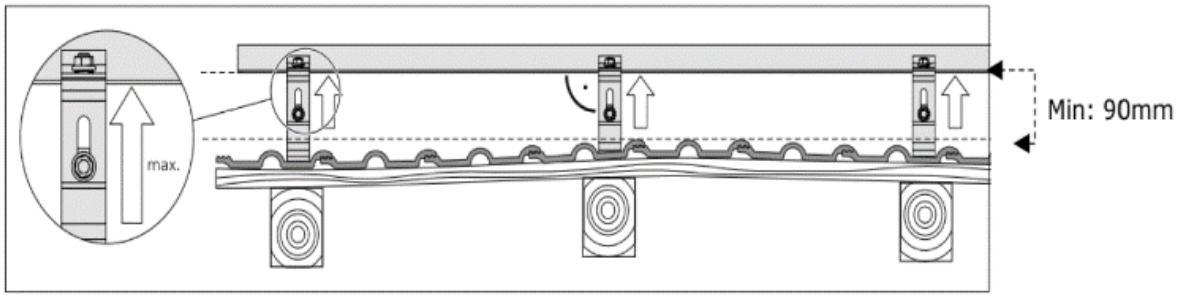








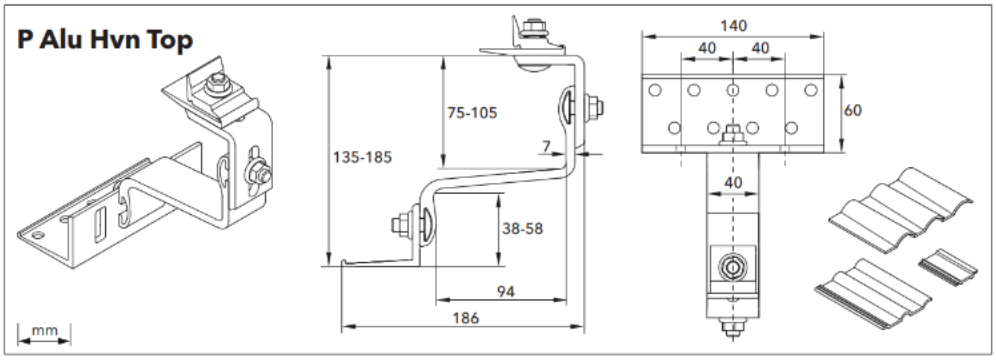




NOTE

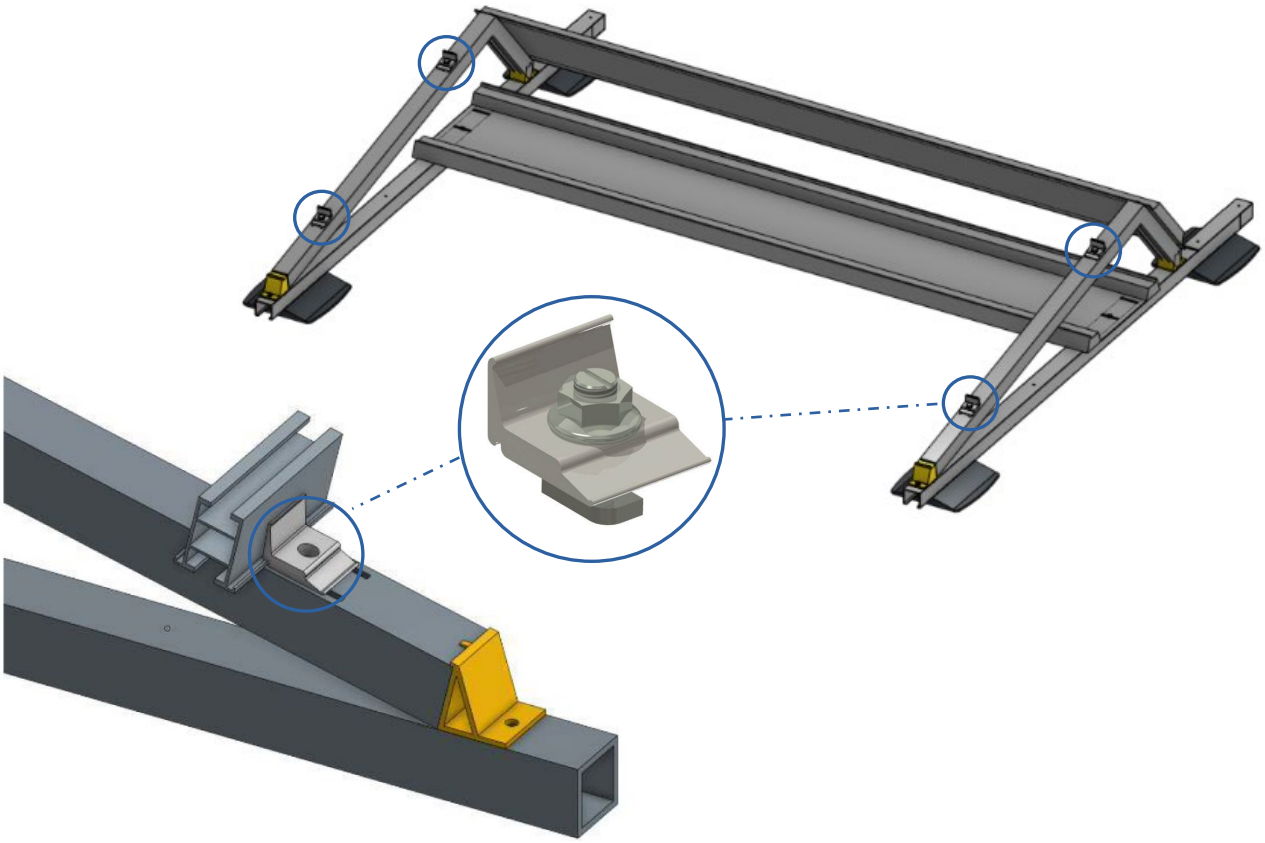
There is a minimum distance between the roof and the bottom of the heat pump panel of 90mm. The height of the roof anchors should be adjusted to meet this.

- Adjustable roof hooks, suitable for the roof structure, should be installed to ensure the minimum ventilation gap is achieved.



Flat Roof & Ground Mounted Systems

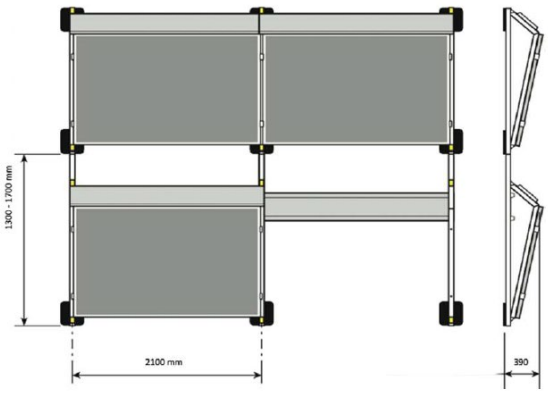
- The PV-T mounting rail system can be used in conjunction with flat roof and ground mounting systems.
- For flat roof and ground mounted systems the cross-rail connector accessory should be used to install the provided mounting rails securely.

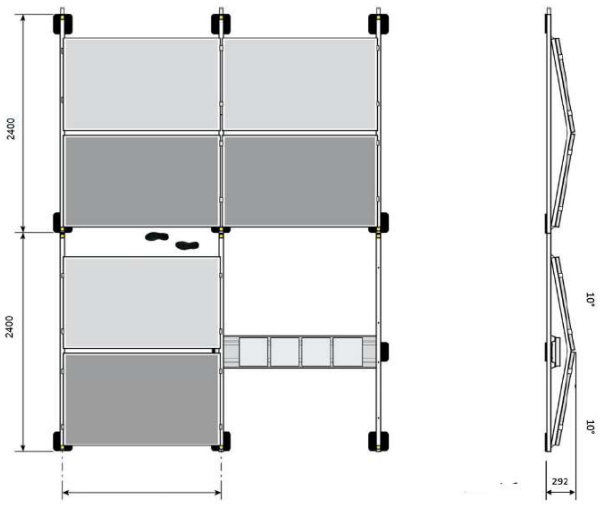


- For flat roof arrangements, the intermediate row distance of the panel rows must be taken into account to minimise the loss of PV generation yield.

Panel Angle	12 Degrees South Facing			
Row Distance	1300	1500	1700	mm
Shadow Angle	33	22	16	Degrees
Loss of Yield	6	2	0	%

Panel Angle	2 x 10 Degrees E-W Split	
Row Distance	2400	mm
Shadow Angle	9	Degrees
Loss of Yield	Not applicable	%

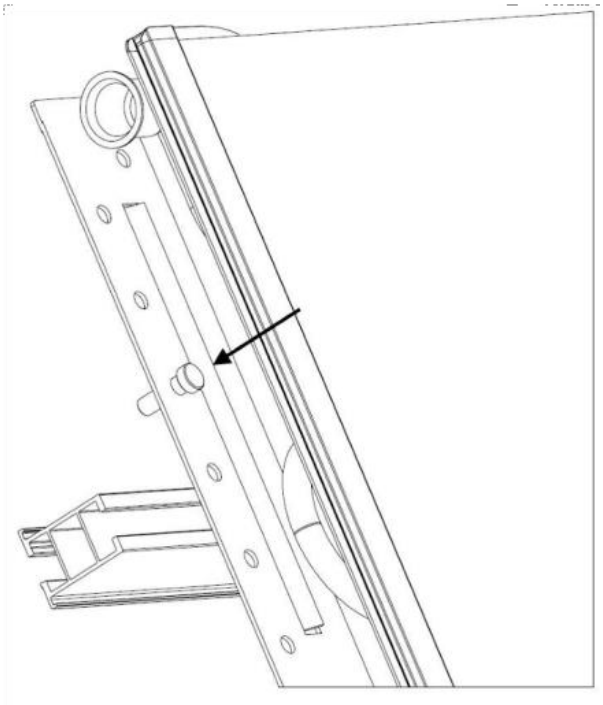




Panel Installation

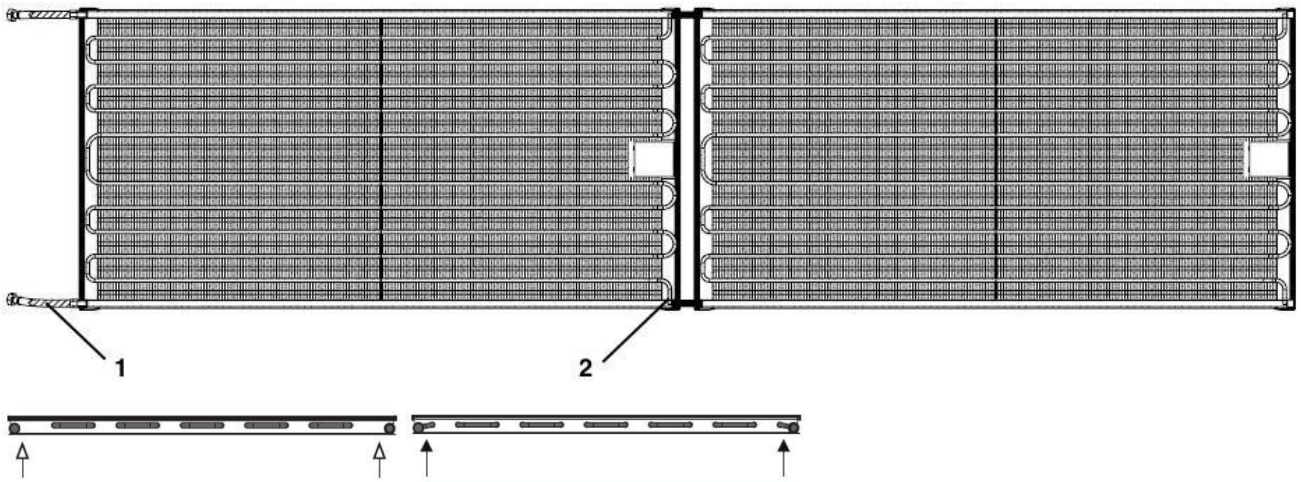
Prepare the panels

- Remove the dust caps from the end panel connections
- Place the provided locking pin into the PV-T mounting holes. The locking pin is used to support the weight of the panel on the mounting rail whilst the clamp connections are made.



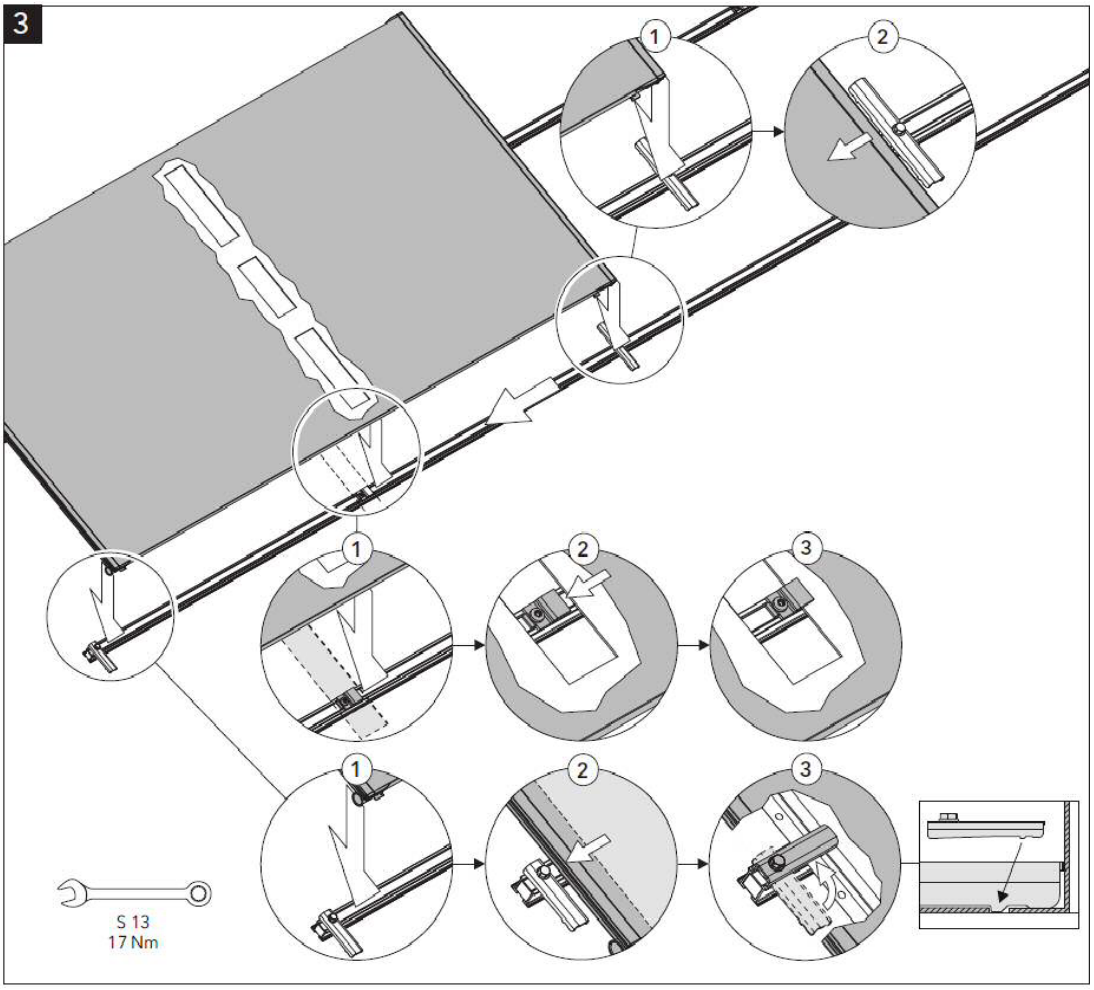
Panel Orientation

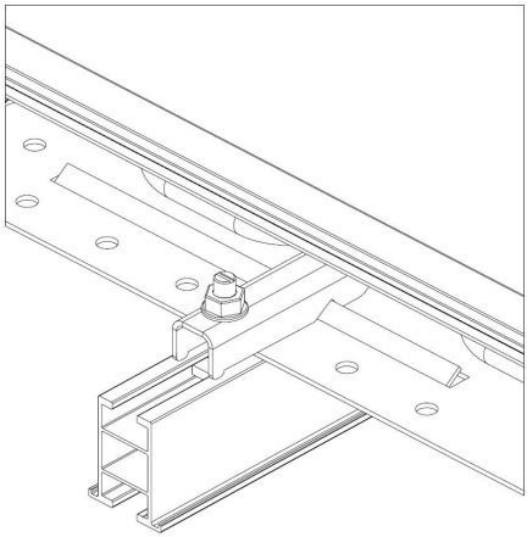
> **Caution**
> Pay attention to the orientation of the collector, to ensure the correct flow rates are being achieved. The correct orientation can be found by looking at the header pipework connections

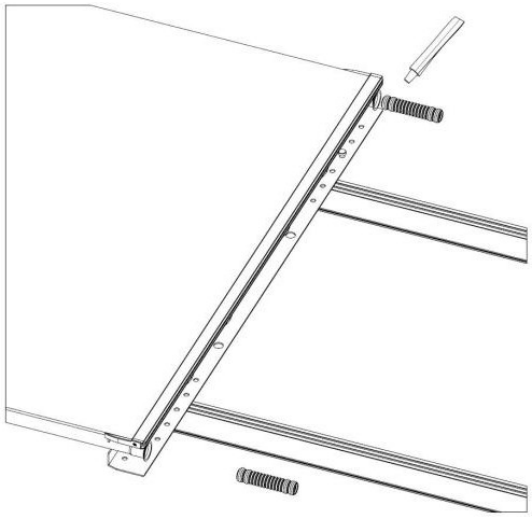


Securing the first panel

- Secure the mid-panel clamping mount, paying attention to the correct orientation as shown below.
- Secure the end panel mount.
- The middle clamping mount should not be secured until the next panel in the row, with the hydraulic connections, has been installed.

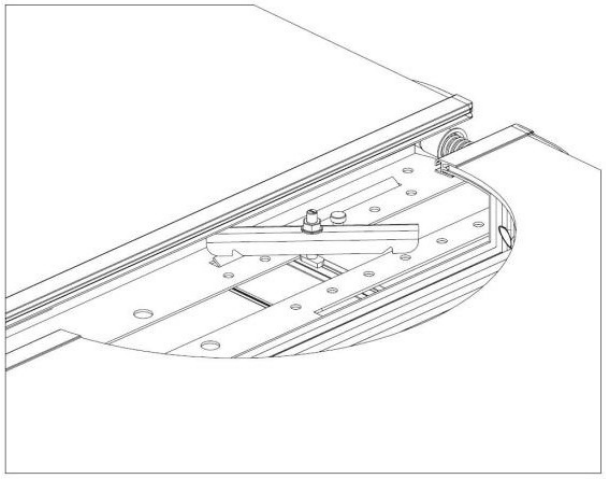


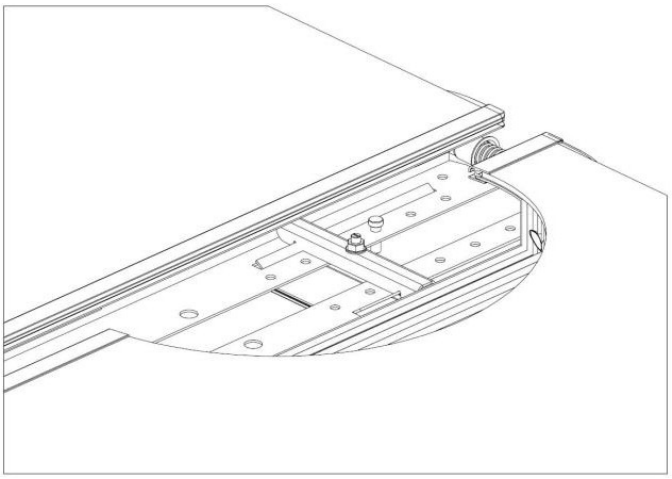


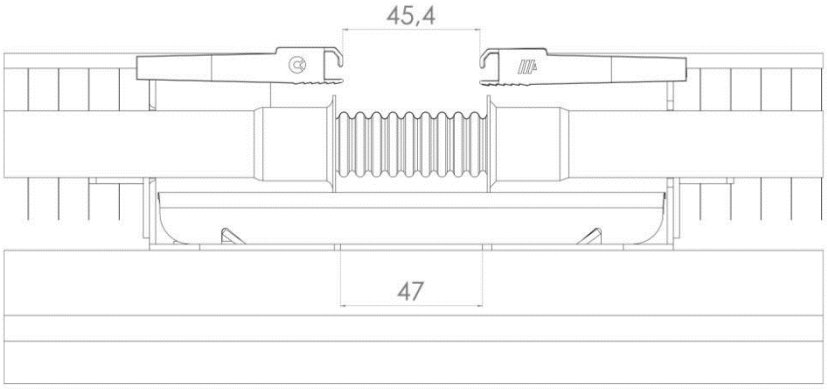


Securing supplementary panels

- Install the intermediate hydraulic hoses, applying lubricant, to the first panel.
- Position the next panel in the row using the locking pins and connect with the intermediate hoses.
- The middle clamp connectors can now be secured, first twisting them into place. Tightening the middle clamp will achieve a secure fit for the hoses.

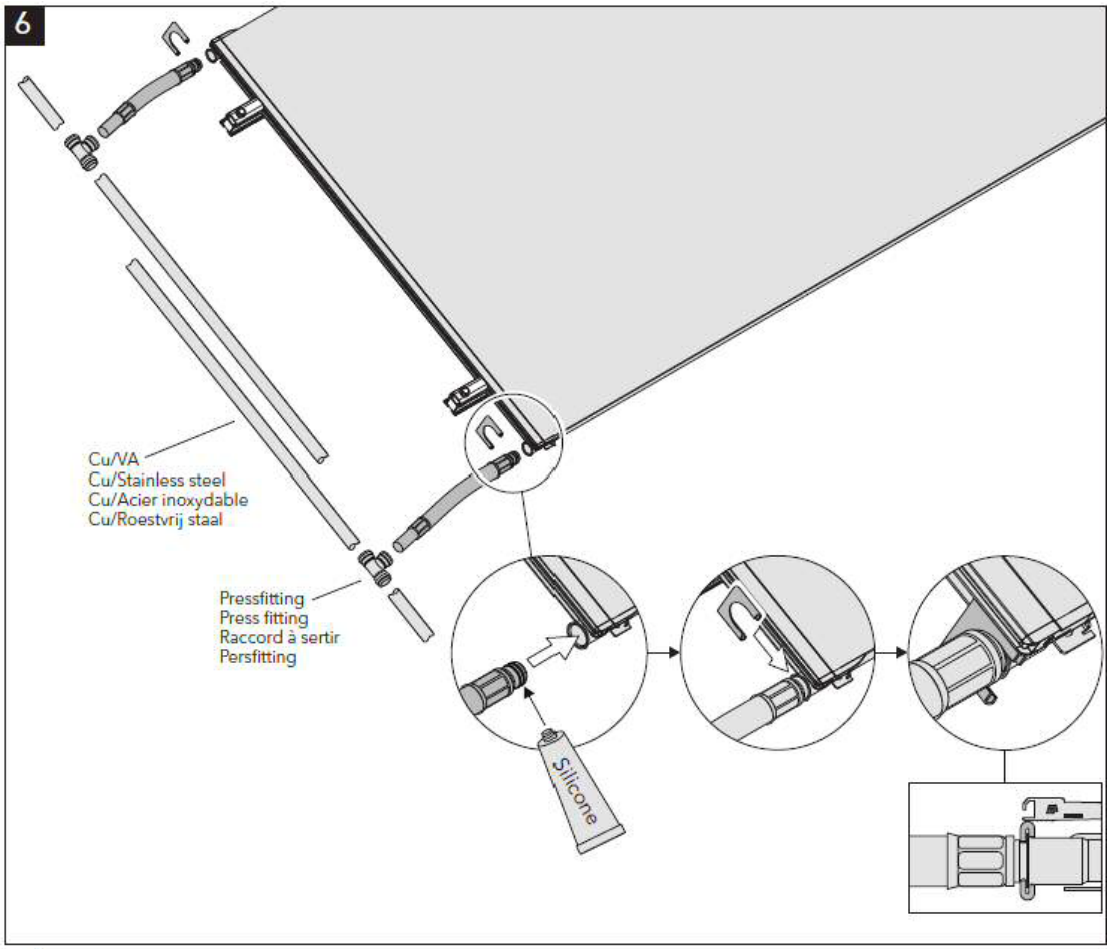


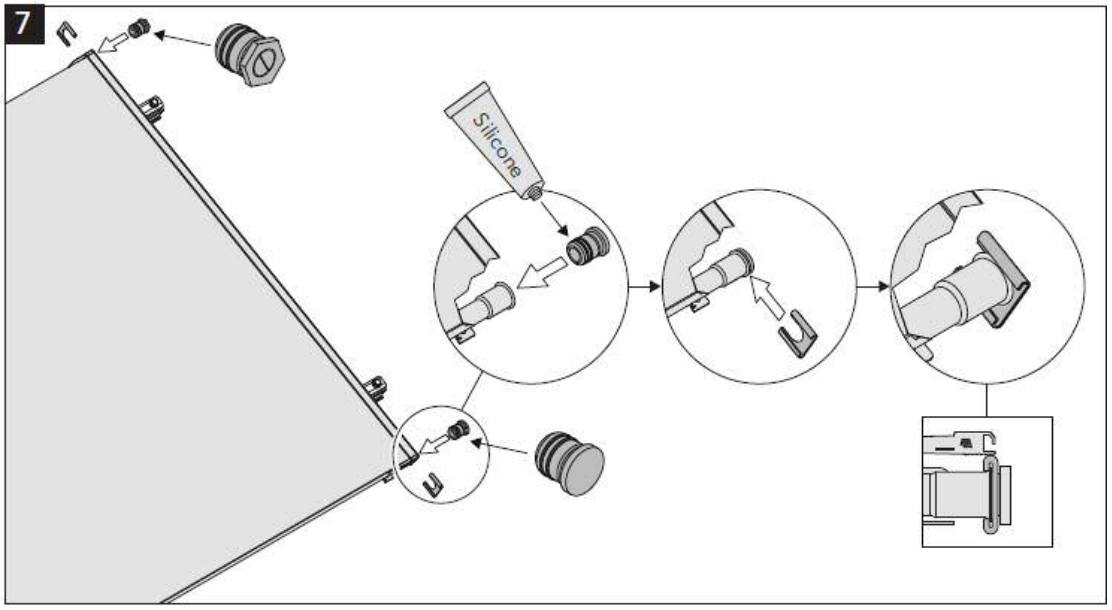




Hydraulic Connections

- Attach the ribbed hose connections to the primary PV-T panel connections. The supplied hoses come in different lengths to allow for adjustment.
- Inset the end plug with air vents to the last panel in each PV-T row.
- Secure all connections with the provided locking clips.





Pipe Connections

Caution

The required number of PV-T panels for an installation varies depending on the climate zone, climate system (radiators or underfloor heating) and the heating requirement of the building. Each installation must be sized individually.

Note

The main heat pump product installer handbook should be consulted for further installation instructions.

General

Consideration should be made to limit the pressure drop through the PV-T system, in accordance to the minimum pipework recommendations and flow rates provided opposite.

Do not install header pipework underneath the PV-T panels.

When connecting the heat pump to the heating circuit always use a bronze connecting piece between the copper pipes of the heat pump and the C-steel of the heating circuit

Various pipework specifications can be used for the connections between the PV-T panel array and the heat pump. Stainless Steel pipe, copper pipe, PEX, or plastic PP-R pipe can be used.

Plastic pipes that are exposed to the sun must always be protected against UV light by means of a UV-resistant sheath or UV-resistant paint. The plastic pipes must be suitable for the source fluid.

Any pipework from the roof flange, within the insulated envelope of the building, should be installed with vapor sealed insulation to prevent the risk of condensation.

Because the temperature of the brine system can fall below 0°C, it must be protected against freezing down to -15°C. Anti-freeze must be mixed according to manufacturer's instructions to ensure frost protection and should be checked using a refractometer.

NIBE Energy Systems Limited recommends water treatments (supplied by e.g Fernox) specifically designed for heat pumps.

Minimum Primary Pipework Specification

Heat Pump Capacity (kW)	Minimum Primary Pipework Specification (Ømm)
6 to 8 kW	28mm
8 to 15 kW	35mm
15 to 28 kW	42mm
29 to 50 kW	54mm

Collector Flow Rates

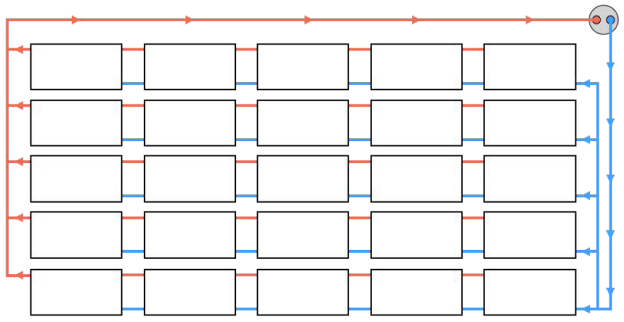
No. of Panels	Flow Rate per row (l/s)	Pressure Drop (kPa)
1	0.028	22.2
2	0.056	22.9
3	0.083	24.0
4	0.111	25.4
5	0.139	27.2
6	0.167	29.3
7	0.194	31.7

Pitched Roof Hydraulic Set-up

When connecting several PV-T panels in a row, consideration must be given to limiting the pressure drop. We recommend a connection set-up according to the reverse return Tichelmann principle.

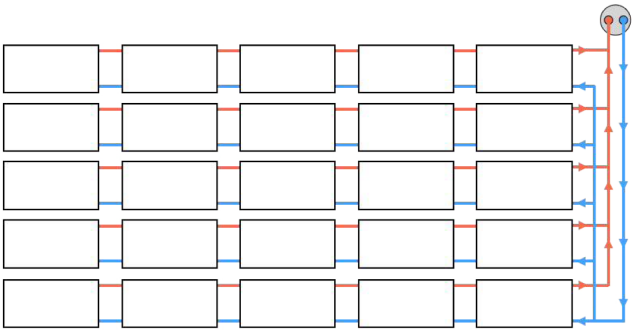
For pitched roof installations a reverse return pipework configuration is mandatory for system containing 4 or more panels in a row.

Double-sided Tichelmann connection



If a double sided Tichelmann connection is not an option, it is possible to do a single-sided Tichelmann connections. A double-sided connection will always have better flow characteristics.

Single-sided Tichelmann connection



Note

For either Tichelmann connection:

- The cold pipe is connected at the bottom of the panels
- The warm return line is connected at the top.
- Ensure that all system air vents are accessible

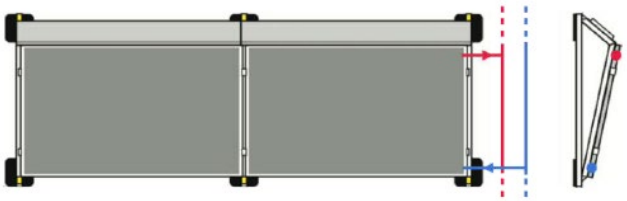
Note

Ensure that the cleaning agent has been removed from the entire system before the anti-freeze is added.

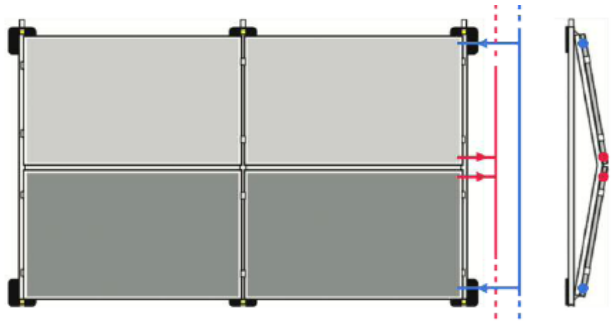
Flat Roof Hydraulic Setup

For flat roof installations, the return (warm) pipe should always be at the highest point of the panels.

Flat roof – Connection with South Elevation



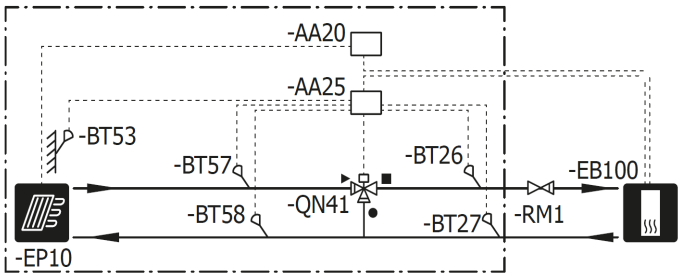
Flat roof – Connection with East/West split configuration



Shunt Controlled Brine AXC 50 / PV-T 40 Accessory

The PV-T accessory or AXC 50 accessory is required to connect the heat pump to the PV-T system, to activate the shunt-controlled brine function. Using a shunt valve (QN14) and brine sensor (BT26), the heat pump regulates the temperature of the incoming brine in the summer, limiting the incoming brine temperature to a maximum of 30°C.

The PV-T 40 manual or AXC 50 installer handbook should be consulted for full installation instructions. The PV-T 40 accessory is suitable for installations up to 40kW. Installations exceeding 40kW should use the NIBE AXC 50 accessory.



Connecting the Brine Side

- Insulate all indoor brine pipes against condensation
- The system must be fitted with an expansion vessel (CM3), pressure gauge (BP6) and safety valve (FL3).
- Install a shut off valve for outgoing brine as close to the heat pump as possible.
- Fit the enclosed filter ball on the incoming brine, before the QN41 shunt-valve.

Electrical connection

PV Connection

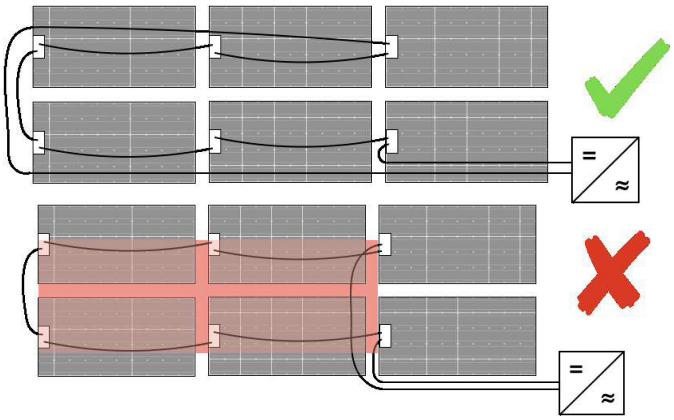
> **NOTE**
>
> Electrical installation and service must be carried out under the supervision of a qualified electrician, and in accordance with applicable electrical safety regulations.

Factory-fitted junction boxes prepared with cables for positive and negative connections can be found on the reverse of the solar panels. The cables are fitted with quick-release connectors.

The electrical cables between the panels and the inverter must be double insulated and UV/weather-resistant photovoltaic cables, 4 mm² up to 100 m length (not supplied).

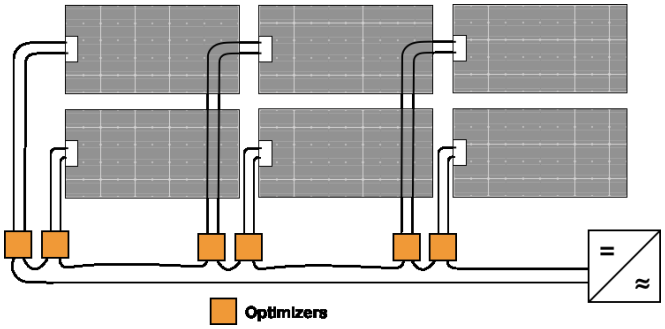
The instructions for the electrical connection of the PVT panels are identical to those for conventional PV panels.

Each row of mounting rail must be earthed separately When earthing the PV cables, avoid large induction loops. The electrical cables should run in parallel as much as possible, see the figure below.



If optimizers are used, it is advisable to mount them at a location in the panel field that is easily accessible. Use extension cables if necessary.

> **Caution**
>
> Optimizers usually have a shorter lifespan than PV panels.



LIGHTNING PROTECTION

There are occasions when lightning protection can affect how the installation is installed. See the applicable laws and regulations.

> **NOTE**
>
> In order to minimise the risk of induced voltages in the event of lightning, the return cable must be laid together with connection cables for the panels connected in series.

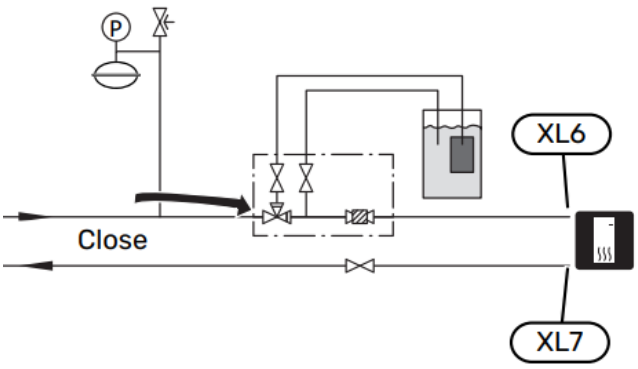
Commissioning and Adjusting

The main heat pump installer handbook should be consulted for full instructions.

Filling and Venting the Brine System

When filling the brine system, mix the water with the antifreeze in an open container. The mixture should be protected against freezing down to -15°C. The brine is topped up by connecting a filling pump.

1. Check the brine system for leakages. The installation should always be pressure tested with air to detect leaks before filling.
2. Connect the filling pump and return line on the brine system's filling connection (accessory) .
3. Close the reversing valve in the filling connection.
4. Open the valves on the filler connector.
5. Start the filling pump.
6. Fill until liquid enters the return pipe.
7. Close the valves on the filer connector.
8. Open the reversing valve in the filling connection.



Caution

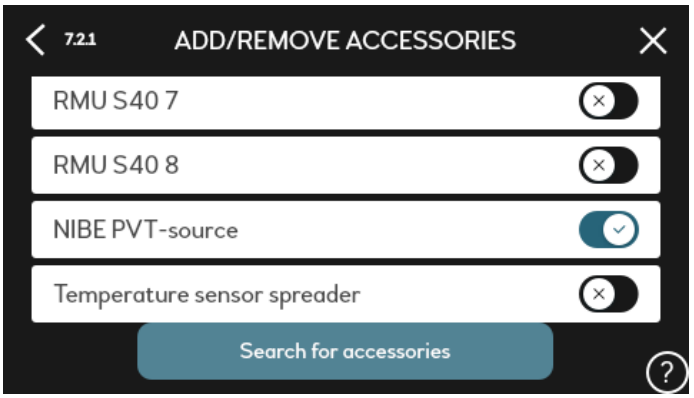
The system pressure on the roof will be 0.1 bar lower for every meter of elevation. The location of the PV-T array should be considered during pressurization.

NIBE PVT-source

For systems with a capacity lower than 40kW the PVT 40 accessory must be used to activate the shunt-controlled brine function and limit the maximum source temperature reaching the heat pump. For systems with a capacity greater than 40kW the NIBE AXC 50 accessory should be used.

Menu 7.2.1 – "Add/Remove Accessories"

Here the NIBE PVT-source accessory can be selected once the suitable product has been installed.



Menu 7.2.25 – "NIBE PVT-Source"

Max Brine in

The temperature at which the shunt valve is to start working to limit the maximum brine in temperature.

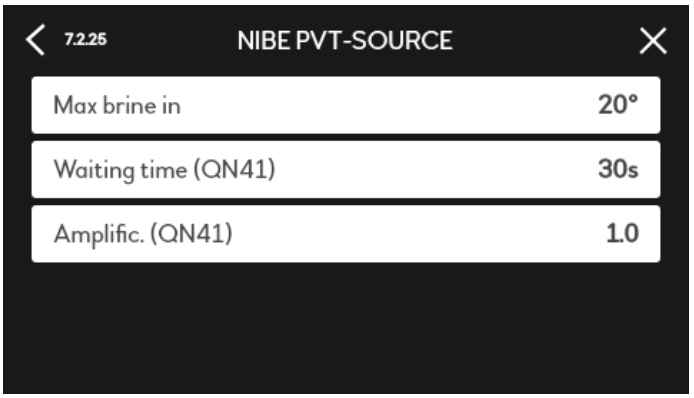
Default setting: 20°C
Setting Range: 0°C - 30°C

Shunt Amplification.

Default setting: 1.0

Shunt waiting time

Default setting: 30 seconds



Menu 7.1.2.8 – "Brine alarm, settings"

Here, you can set the lowest and highest temperatures for the incoming brine, as well as the highest temperature at which the system will initiate an alarm.

Caution

For optimum operation of PVT systems, the lowest brine temperature should be changed to -12°C.

Solar Communication

The NIBE heat pump product is capable of connecting and communicating to solar PV inverters, to optimise how generated electricity is being consumed.

NIBE EME 20

For NIBE F-series and S-series heat pumps the EME 20 accessory can be used to allow for solar communication. Successful connectivity requires the solar PV inverter to be registered on the Sunspec alliance database with Modbus RTU communication protocol, with an RS 485 connectivity type.

For full installation instructions on the EME 20 please consult the accessory installer handbook.

Modbus TCP Connectivity

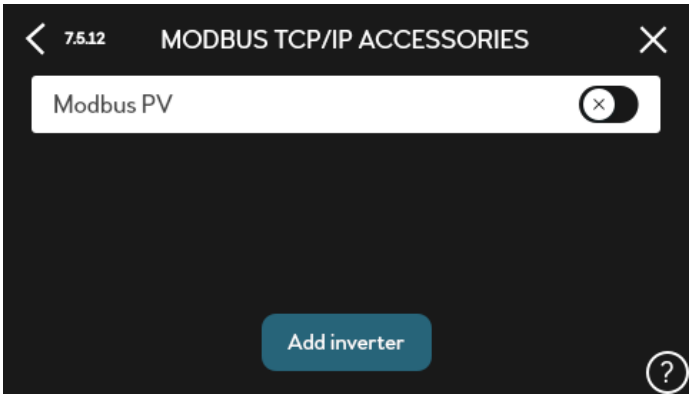
For NIBE S-series heat pumps it is possible to connect to the solar PV inverter using the heat pumps in-built Modbus TCP connectivity.

PV inverters must be compatible with the Modbus TCP communication protocol to be suitable for this style of connection.

> **Caution**
>
> Connectivity via Modbus TCP requires an active internet subscription.

Menu 7.5.12 – "Modbus TCP/IP Accessories"

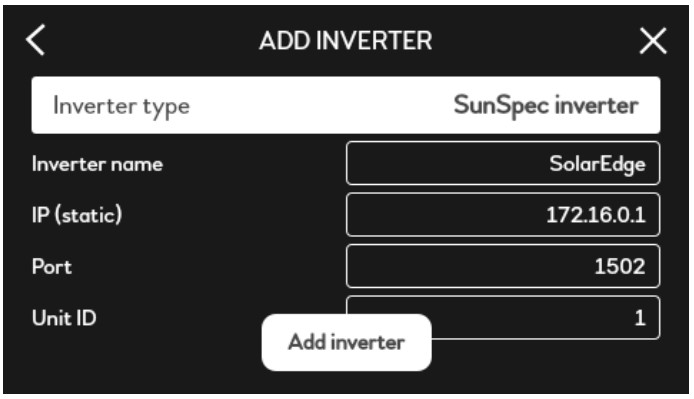
Here the Modbus PV accessory can be activated for allow for solar communication.



Menu 7.5.9 – "Add Inverter"

In this menu the Modbus TCP port settings should be adjusted to reflect the information displayed on the solar PV inverters display.

> **TIP**
>
> The port number can usually be found in the solar PV inverters communication menu.
>
> The IP address shall be automatically filled when the heat pump unit is connected to the internet via the in-built Wi-Fi or direct connection.



Menu 4.2.2 – "Solar Electricity"

This is where you set which part of your installation (room temperatrure, hot water temperature, pool temperature) is to benefit from the solar electricity surplus.

When the PVT panels are producing more electricity than the compatible product requires, the temperature in the propertyt is adjusted and/or the temperature of the hot water or the pool is increased.

In the compatible heat pump product, you can select whether you want domestic electricity to be priroties over room temperature and hot water, provided that this is equipped with an external energy meter.

Affect Room Temp Heating
Alternative: on/off

Affect Hot Water
Alternative: on/off

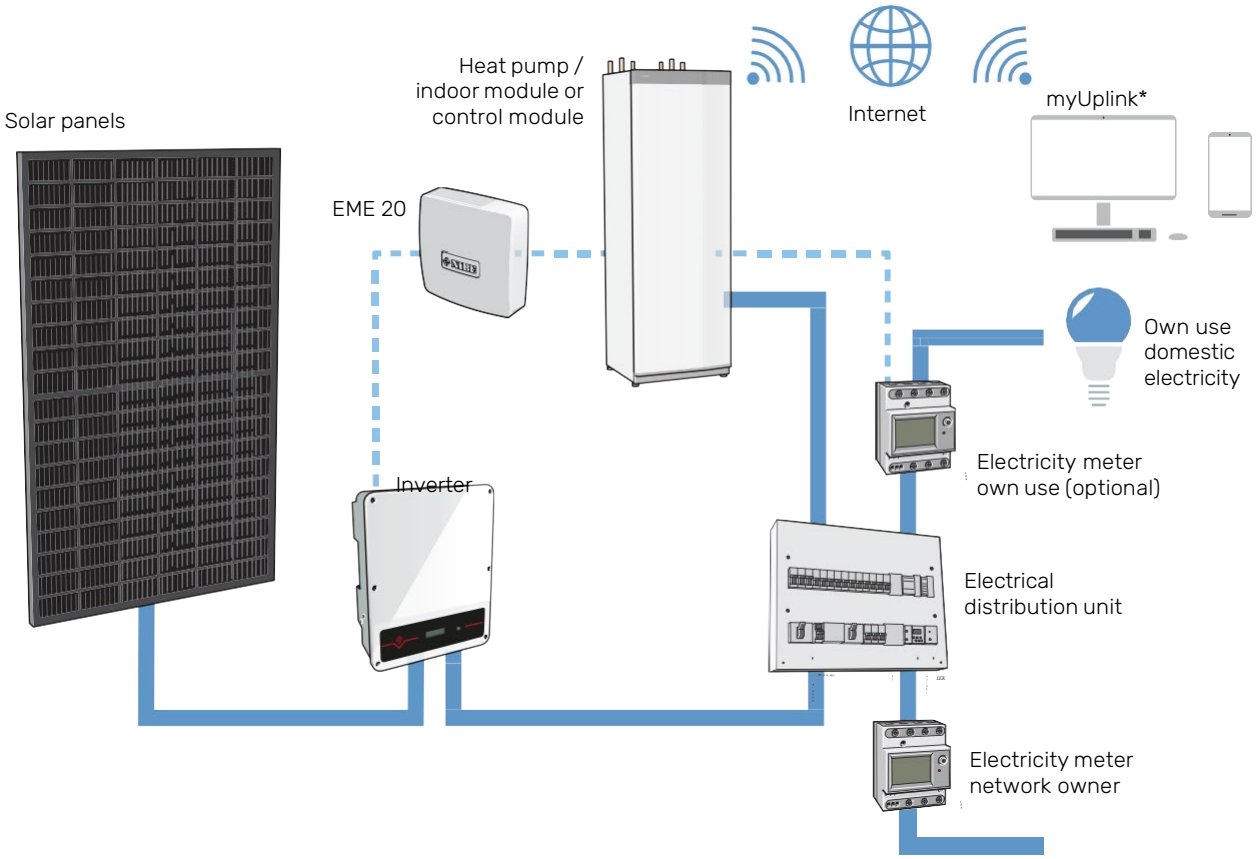
Affect Pool
Alternative: on/off

Energy Meter:
Alternative: BE6, BE7, BE8

Prioritise Domestic Electricity:
Alternative: on/off

Connection Diagram

Solar Communication



* myUplink for the S-series and NIBE Uplink for the F-series.

Technical specifications

PV-T Panels	Unit	M3-375L	M3-450XL
Overall Dimensions	mm	1791 x 1055 x 65	2131 x 1055 x 65
Aperture Dimensions	mm	1778 x 1043	2118 x 1043
Weight (excl glycol)	kg	33	39
Overall Surface	m^2	1.85	2.21
Materials			
PV Panel	-	Glass	
Heat Exchanger Tube	-	Copper	
Heat Exchanger Fin	-	Aluminum	
Surface Treatment	-	Black Power Coating	
PV Panel		**M3-375L**	**M3-450XL**
Type	-	Monocrystalline half cut cell duplex	
Nominal Power	W_p	375	450
Short Circuit Current	A	11.40	11.35
Short Circuit Voltage	V	41.9	50.2
MPP Current	A	10.75	10.75
MPP Voltage	V	34.9	41.9
Solar Cell Efficiency	%	21.7	21.6
Module Efficiency	%	20.2	20.3
Power Output Tolerance	W	0/+5W	
Maximum Reverse Current	A	20	
Max System Voltage	V	1500 (class A)	
Current Temperature Coefficient	%/K	0.06	
Voltage Temperature Coefficient	%/K	-0.27	
Power Temperature Coefficient	%/K	-0.35	
NOCT	°C	44	
Temperature Range	°C	-40 to +95	
Heat Exchanger		**M3-357L**	**M3-450XL**
Meander Tube	mm	12 x 0.3	
Header Tube	mm	22 x 1.0	
Volume Fluid	Litres	3.3	4.0
Heat Exchanger Tube	-	Copper	
Heat Exchanger Fin	-	Aluminum	
Surface Heat Exchanger	mm	0.18	
Surface Heat Exchanger	m^2	ca. 18	
Connectors	-	Plug in with double O-ring	
Length Compensation	-	Flexible Connectors	
Maximum Pressure	bar	6	
Pressure loss water-glycol mixture 40% [1)]	mbar	140	
Specific Flow	l/min	Ca. 2-4 per panel	
Heat exchange capacity Air to liquid, U value [2]		62 with parallel roof mounting	
Optical Efficiency [2)]	%	47	
Heat Capacity [2)]	kJ/(m^2K)	77	
Stagnation Temperature	°C	62°C at 1000W/m^2 irradiation with an ambient temperature of 30°C	

PV-T_M3-IHB-000001