Complete manual for STK support structures of natural circulation systems

This manual applies to the following solar kits					
Model	**Tank**	**Gross Collector area**	**Nr. Of collectors**	**Configuration**	**Support Code**
SUN 160/200	160lt	2.00m²	1x2.00	flat roof tilt 40°/inclined	XXSTKFI402024V4
SUN 160/237	160lt	2.37m²	1x2.37	flat roof tilt 40°/inclined	XXSTKFI402024V4
SUN 200/200	200lt	2.00m²	1x2.00	flat roof tilt 40°/inclined	XXSTKFI402024V4
SUN 200/237	200lt	2.37m²	1x2.37	flat roof tilt 40°/inclined	XXSTKFI402024V4
SUN 200/400	200lt	4.00m²	2x2.00	flat roof tilt 40°/inclined	XXSTKFI404048V4
SUN 250/400	250lt	4.00m²	2x2.00	flat roof tilt 40°/inclined	XXSTKFI404048V4
SUN 250/474	250lt	4.74m²	2x2.37	flat roof tilt 40°/inclined	XXSTKFI404048V4
SUN 300/400	300lt	4.00m²	2x2.00	flat roof tilt 40°/inclined	XXSTKFI404048V4
SUN 300/474	300lt	4.74m²	2x2.37	flat roof tilt 40°/inclined	XXSTKFI404048V4

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Contents

1. INTRODUCTION

1.1 Natural circulation main principals

Thermosiphonic circulation: It is a natural phenomenon that is the principle of function of a thermosiphonic solar system. When a liquid is absorbing thermal energy, molecular motion is created inside its mass. Hotter molecules being lighter and are moving to the upper layers of its mass. In the following lines, we will explain the application in the solar system.

The company is manufacturing 2 different families of thermosiphonic solar systems:

- Closed loop circuit thermosiphonic solar system
- Open loop circuit thermosiphonic solar system.

Operation of closed loop circuit: Thermosiphon solar water heaters for closed loop circuit operation (indirect system) include 2 different and separated circuits.

The first circuit is this, which is created by the water frame/s of the collector/s and a heat exchanger inside the boiler (our boilers include double jacket heat exchangers) of the system. This circuit contain the thermal liquid consisted of water and thermal fluid with anti-corrosion and antifreeze specifications for protection. This is circuit is called primary circuit.

The second circuit is the circuit of the sanitary water that is contained in the main tank of the boiler. The circulation of sanitary water is activated by the urban water network pressure when there is consumption of hot water from the boiler. This circuit is called secondary circuit.

IMPORTANT: There is no mixing of thermal fluid and sanitary water.

Function: The collector/s absorb solar energy that is transferred through the absorbing surface to the water frame and the thermal liquid contained in the collector/s. Hot thermal liquid being lighter rises inside the collector and transferred to the heat exchanger (jacket) of the boiler that is installed all around the main tank including the sanitary water.

As sanitary water has lower temperature than the thermal fluid the thermal energy carried from the thermal fluid is transferred to the sanitary water. Subsequently the thermal liquid cools back become heavier and returns back to the down part of the collector/s. The loop continues as the thermal liquid's temperature increase again in the collector/s and it is transferred to the jacket.

Indispensable condition for the continuous function of this circuit is the presence of solar radiation.

The sanitary hot water produced is stored in the insulated tank.

In this way the solar system function naturally without the use of pump and any other automation, producing hot water with most efficient, economic and ecologic way.

1.2 Important information

The company's solar water heating systems passed successfully durability and performance testing procedures in the accredited laboratory N.C.S.R DEMOKRITOS according to EN12976-2 Standard. According to the same standard, the installation of the mentioned solar systems is intended to be executed by properly licensed-authorized and experienced professional installers.

The company's solar water heater should not be installed in any area that has existing ambient air temperatures below -7°C (19.4°F) for a period of 18 hours'. In chapters 4.11 & 10 of this manual you can check the appropriate mixture of glycol based and distilled water to provide adequate freeze protection in your specific climate.

Extended periods with environmental temperatures above the specified limit may cause freezing in exposed parts of the system. It is the owner's responsibility to protect the system in accordance with the company's instructions if the ambient air temperature is close to the specified freeze limit (please check freezing protection instructions in chapter 4.12

Glycol-based heat transfer fluid must be used in this system as freeze protection agent. The use of any other unauthorized thermal fluid can result in a threat to health and safety and may cause the system piping to be damaged from freeze.

1.3 Important safety information

⚠	Water temperatures above 52°C (126°F) can cause severe burns or death from scalding. Be sure to read and follow the warnings outlined in chapter 4
⚠	Houses hosted small children, disabled, or elderly persons may require a 49°C (120°F) setting the thermostatic mixing valve (code number 005.304.4700457) to protect them and prevent contact with higher temperature water.

2. Packing, transport, storing and handling

The boilers could be packed in cardboard boxes or polystyrene and stretch film packing where they must remain during all transportations and storage. Handle with care during loading-unloading procedures.

Store the boilers packed in dry place.

Unpack paying attention when using sharp tools.

Collectors are packed in cardboard or with stretch film, carton on glass surface and hard polystyrene on the corners and must always be transported in vertical position.

Palletizing of collectors: Collectors are packed on special pallets in vertical position. Upon request special pallets for horizontal packaging are available.

- Handle with care during loading-unloading procedures.
- Store the collectors palletized or out of pallet in vertical position in dry place.
- Unpack paying attention when using sharp tools.
- During installation, keep the front cover in place until the closed circuit is filled with thermal fluid. This way will give a better protection to the glass against thermal and mechanical shocks.

Support structures' profiles are packed in cardboard boxes or in stretch film. Their accessories are packed in cardboard boxes separately. Store both parts in dry place and unpack them only before installation.

Connection's accessories are packed in cardboard boxes that must be transported and stored in vertical position according to the arrow direction on the box as they include the thermal fluid. They must be stored in dry places and put maximum 5 boxes in vertical position the one over the other when they are stored.

3. Instructions for the installer

This section explains how the present assembly and maintenance instructions are organized and recommends general safety precautions to assure safe and efficient use. The specific use and safety instructions are indicated in the assembly diagrams.

3.1 Before installation

⚠ Before the installation of the solar water heater, it is very important that customer and installer agree on all the details concerning the correct and safe installation of the appliance, such as location, placement point, static resistance and control of the surface on which the appliance will be placed, piping and wiring run etc.

- The position you will choose for the installation of the solar water heater, should not be shaded by any obstacles (trees, buildings ... etc.) during all the seasons of the year (details in section "SELECTION OF INSTALLATION AREA", chapter 3.3).
- The installation should be done according to local electric and plumbing regulations applicable.
- For optimum performance, the solar water heater must be installed at 40-45° inclination.
- The surface of the roof, where the installation will take place, must be normal and flat for the proper function and safe installation of the solar system.
- The static resistance of the roof must be appropriate to ensure the stability and safe installation of the solar system (take under consideration that the weight of a full solar system 300Lt is 550Kgs when it is full).
- The roof structure must be able to take the wind and snow loads (Note: 1m² powder snow ≈ 60kg / 1m² wet snow ≈ 200kg). It must be taken under consideration the local conditions regarding snow and wind loads. Please contact to the local dealer for more information.
- In order to avoid humidity problems or water ingress in the roof, the pipes which are entering the roof must be very well sealed. The entrance of piping into the building shall be finished through usual ventilation devices for roof. The building engineer should provide you the precise guidelines, depending in the kind of roof construction. Pay maximum attention to building penetrations in order not to impair enclosure functions. It is also very important not to allow vermin intrusion at the building.
- All interconnecting hot water piping and the final 1.5 meters (5.0 feet) of metallic cold water supply pipe leading to the system, or the length of piping which is accessible if less than 1.5 meters, shall be insulated with R-0.46 °K m²/W (R-2.6 °F-ft²-hr /Btu) or greater insulation. All exterior piping insulation shall be protected from ultraviolet radiation and moisture damage.

PERMISSIBLE POSITIVE PRESSURE ON THE COLLECTOR'S COVER
Our collectors are tested according to the standards EN 12975-2. According to mechanical load tests of EN 12975-2 standards, our collectors resisted to maximum pressure load 1000Pa.
PERMISSIBLE SNOW LOAD AND MEAN WIND VELOCITY
It is admitted that the company's collectors can resist without any failure to a snow load of up to 500 Pa. The company's systems may only be installed in locations with a value of possible snow load lower than 1000 Pa. According to the characteristics of their support frame and the standard ENV 1991, the solar systems may not be installed in locations where the maximum mean wind velocity exceeds 55 m/s (value for islands exposed to high winds).

3.2 Safety precautions for the installer

Read the safety instructions before beginning the assembly.

Failure to follow the safety instructions may cause serious damage and risk to persons of even a mortal nature as well as materials and environmental damage.

- The various assembly sets are to be used for the specific purposes for which they are intended.
- Incorrect use of the various components will not assure minimum safety requirements.
- In case of using ladders, check them in order not to be damaged, and place them on secure surfaces in inclination ≈70°. For maximum protection the installers should use safety belts.
- In case that the place of installation is near electrical wires, keep safety distance (minimum 5 meters) and pay maximum attention when handing long parts of the support structures or tools for the installation.

IMPORTANT SAFETY INSTRUCTIONS:

	Wear the right shoes to avoid slipping on the roof
	Pay attention to the electrical cables that are on the roof, unprotected and the cables of the electricity main that are close to the roof
	Use all the safety equipment and follow the regulations.
	Always wear a helmet.
	Wear protection gloves during the installation.
	Pay attention to the roof limits to avoid the risk of any falls. the installation place should be at least 1 m from walls or the end of the roof.
	Use anti-fall equipment.
	Always use protective glasses.

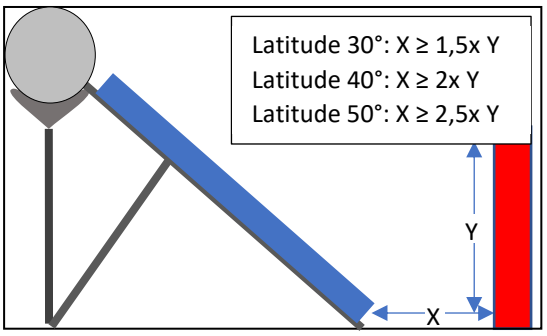
3.3 Selection of installation area and positioning of the solar water heater

Our solar systems can be installed on flat roofs or on the ground or on sloped roofs with defined orientation and slope.

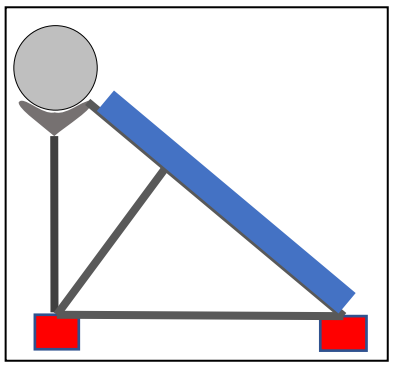
1. For optimum performance, the collectors must face the south, for counties located in the Northern hemisphere and north for counties located in the Southern hemisphere. In case that it is not totally possible for the collectors to face the equator, you can turn it towards East up to 30° if major hot water draw is before 2pm, or towards West up to 30° if major hot water draw is after 2 pm. In both cases, the losses of the total annual solar contribution, is no more than 6%.

To compensate energy losses there is the option to increase the number and surface of the collectors' that are going to be installed.

2. The following points must be considered when selecting the installation area:
   - The collectors must be oriented according to the above-mentioned conditions.
   - The position you will choose for the installation of the solar water heater, should not be shaded by any obstacles (wall, trees, buildings ... etc) all around the year.
3. The distance from an obstacle being at East, South or West must be:
   - At least 1,5 time the height of the obstacle for countries with latitude 30°.
   - At least 2 times the height of the obstacle for countries with latitude 40°.
   - At least 2,5 times the height of the obstacle for countries with latitude 50°.



4. For optimum performance the collectors must have inclination to the horizon of 45° (countries with latitude 40°). In general, the inclination of the collectors should be 5° higher than the latitude of the place. Any change of the above-mentioned condition causes a reduction to the average annual gain of usage that must be considered.
5. The distance between the solar water heater and the hot water consumption must be the shorter possible.



6. The area of collector's installation should have an easy and safe access for maintenance.
7. When installing our system on a flat roof, we propose not be screwed directly on the roof, to avoid any water penetration or roof insulation damage. It shall be screwed on concrete slabs. In case that it is not possible to use concrete slabs all the points that the support structure is fixed on the roof must be sealed perfectly using proper sealing materials (silicon, polyurethane sealants or other). In case of using concrete slabs, they must be laid down on the roof, below the support frame. The thickness of slabs should be at least 10cm.
   The whole weight of the full solar system with the slabs (in case that they exist) should be:
   - 290 kg per m² of collectors for an installation height up to 20m and a maximum mean wind velocity of 43 m/sec.
   - 490 kg per m² of collectors for an installation height up to 20m and a maximum mean wind velocity of 55 m/sec.

IMPORTANT NOTICE: According to the standard ENV 1991, these values are valid under the following conditions:

- ✓ The system must be installed on a roof covering a closed volume.
- ✓ The roof area must be at least 5m².
- ✓ The system must not be installed on the extreme sides of the roof.
- ✓ A static calculation of the roof must be carried out by a civil engineer to ensure that the roof can support the above-mentioned loads.

4. Proper function basics

In order to avoid any malfunction of the natural circulation, the following requirements are considered indispensable:

- The tank must be placed horizontally, with the hot inlet from the collector standing higher from the top of the collector, otherwise natural circulation will not be possible.
- The system's closed-circuit piping must be constantly sloped upwards, without causing any trappings of air.
- There must be no air inside the closed circuit.

4.1 System operation limits

- The pressure in the collector loop should be within 0.1 – 2.5 bar (1.5-36 psi).
- The pressure in the potable system should be within 2- 8.5 bar (29-123 psi).
- The temperature of the water in the solar tank should be within 10-99°C (50-210°F).

Upper limits are maximum working pressures and temperatures. Upper limits are not the recommended normal working pressures and temperatures.

4.2 Safe operation basics

Safety devices		
Code	**Image**	**Function**
001.102.01321000		The safety valve regulated to 2.5 bars (29 psi) protects the closed circuit against the risk of overpressure (due to overheating). This part is standard.
002.102.10000000		The safety valve of close loop circuit is combined with expansion vessel of 1Lt to prevent evaporation of thermal fluid. This part is optional.
003.304.01103069		The safety-non return valve regulated to 9 bars (130.5 psi) protects the sanitary water circuit against the risks of overpressure due to irregular overpressure in the urban water network or to overpressure created inside the tank due to high temperature. This part is standard.
005.304.4700457		The systems produce hot water with temperature higher than 55˚C (131°F). Especially during summer months the temperature can reach very high level (near 95˚C / 203°F) that can cause serious injuries or death in case of contact with human or animal body. For this reason, the use of thermostatic mixing valve is highly suggested.
007.304.12.1000		The combined temperature-pressure safety valve is set at 10 bar and 95 ° C as an additional safety factor for the protection of the domestic water circuit tank from overpressure or overheating.

4.3 Water contamination

The safety-non return valve regulated to 9 bars (130.5 psi) protects the sanitary water circuit against contamination due to reverse flow, by restricting the direction of the flow only from the cold city network to the tank and never vice versa.

4.4 Excessive temperature or pressure

The safety-non return valve regulated to 9 bars (130.5 psi) protects the sanitary water circuit against the risks of overpressure due to irregular overpressure in the urban water network or to overpressure created inside the tank due to high temperature.

Safety valves have a provision to drain an amount of drinking water as a protection against overheating. The hot water drain shall be constructed in such a way that no damage is done to the system or any other materials in the building, or to humans by the drained hot water.

The systems produce hot water with temperature higher than 55˚C (131°F). Especially during summer months, the temperature can reach very high level (near 95˚C / 203°F) that can cause serious injuries or death in case of contact with human or animal body. For this reason, the use of thermostatic mixing valve is absolutely necessary (please check also IMPORTANT SAFETY INFORMATION in chapter 1.3).

4.5 Blow-off lines

The system shall be equipped with blow off pipes to avoid danger for the user. Any pressure relief valves from which steam can escape during normal or stagnation conditions, shall be mounted in such a way that no injuries, harm or damage can be caused by the escape of steam. For this reason, a relief pipe has to be installed with continuous inclination on all exits of valves. It can maximally include 2 bends and have a length of 2 meters. When a length exceeding 2m is necessary, the pipe must be one size larger. Caution: more than 3 bends and a length exceeding 4 meters are not admissible. The outlet of the relief pipe must be free from obstruction, controllable and positioned in such a way that persons are not endangered by steam relief. When the relief pipe ends over a tundish, it is indispensable that its drain pipe has at least the double cross section of the valve inlet. Free access to the pressure relief valve must be provided. The blow-off shall be laid in such a way they cannot freeze up and that no water can accumulate in them. Thoroughly flush the relief pipes prior to installation.

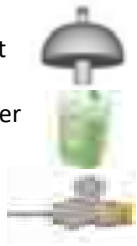
All fittings, copper and stainless-steel hoses used for the connections of open circuit of the solar systems have maximum working temperature 200°C (392°F) and maximum working pressure 15 bars (217.6 psi).

4.6 Overheating conditions

The required total solar radiation or the minimum solar lamp intensity at the plane of the collector for which overheating protection of the system has been tested (according to 5.2. of EN 12976-2:2006) is 1000W/m². We suggest that the system shall not be used in climate zones with higher irradiation values than this value.

4.7 Protection during stagnation conditions

The solar water heater is able to withstand prolonged periods of stagnation (high solar flux, no hot water demand) as it is protected as follow:



i. There is expansion vessel on the top of close loop circuit (highest position of jacket heat exchanger of boiler) preventing evaporation of thermal liquid. This is an optional part.
ii. Glycol based thermal liquid withstands temperatures up to 200°C (392°F) that is higher than the collector's stagnation temperature.
iii. Temperature and pressure valve used on the solar tank prevent temperature of water in the boiler to be over 95°C (203°F).

4.8 Pressure control in domestic hot water network

During the function of the solar water heating system the water is heated and expanded. It is recommended to install a potable water expansion tank to the piping between the solar tank and any check valves or backflow preventers (safety non-return valve) that are installed in the system. The potable water expansion tank shall be sized, charged and installed as required for the system pressure, the size of the solar tank and volume of water at the location.

It is advisable to determine the water pressure in the building using a pressure gage. The expansion tank's air chamber should be pre-charged to the same pressure as the building's water pressure. The city water supply network pressure must be between 2 and 5 bars (30 and 72.5 psi). If the water pressure in the building network is above 6 bars (87 psi), it is absolutely necessary to install a pressure reducing valve on the incoming water supply pipe of the building.

4.9 Anti-corrosion protection

The internal part of the tank is enamelled at 860°C according to the German standard DIN 4753. This treatment in combination with the magnesium anode rod protects the tank against corrosion. The enamelling is done in specialized industrial facilities that are certified according to international standards for enamelling treatment in water heating installations for drinking water. Each tank checked individually after enamelling procedure, assuring the top quality of the enamel.

4.10 Lightning protection

Use a copper wire 16 mm² to connect the collectors (metal parts) with lightning protection system if existing. Otherwise earth them to an earth rod using wire of the same size. The route of this wire should be always outdoors. All protection measures are according to standard EN 62305-3. For further information about this matter please address to a specialist.

4.11 Recommendations about the thermal fluid

The antifreeze liquid included is concentrated tri-ethylene glycol (except otherwise mentioned in the container can). In any case the concentrated antifreeze liquid contains a finely balanced combination of corrosion inhibitors (free of nitrites, amines, borates, phosphates, silicates and carcinogenic, mutagenic and reprotoxic substances) for a reliable protection against corrosion and ageing of various metallic materials. The recommended concentration with water is between 30 and 50% v/v, which corresponds to frost resistance from -9 to -26 °C (15.8 to -14.8° F). Mixtures with external products are not permitted. For very low environmental temperatures, the percentage of mixture should be according to the following table:

Temperature (°C)	-5°	-7°	-10°	-14°	-26°
Percentage in volume (%)	17	25	33	39	53

⚠ Keep the bottles of Thermal Fluid away from children, don't mix it with acids, and use gloves during the handling.

⚠ If Thermal Fluid comes in contact with eyes, rinse them with a lot of water.

⚠ If drank, drink plenty of water.

Please review Material Safety Data Sheet prior to handling, using, or disposing of Antifrozen Tri-Super. Used thermal fluid mixtures can be disposed in a special waste plant in accordance with local regulations. Packaging that cannot be cleaned should be disposed of as product waste.

Below you can find important information about the thermal fluid:

Tri -Super Solar Concentrated main properties	
Appearance	Green liquid
Service temperature range	-33 to +150 °C (-9.4 to 392 °F)
Kinematic Viscosity at 20 °C & 30% v/v(DIN 51562)	- mm^2/s
Kinematic Viscosity at 80 °C (DIN 51562)	- mm^2/s
Freezing Point at 30% v/v (ASTM D 1177)	-10 °C (about 14 °F)
Boiling point at 1013 mbar (ASTM D 1120)	about 106°C (about 223 °F)
Density at 20° C & 30% v/v (DIN51757)	1130 kg/m^3
Density at 80° C & 30% v/v (DIN51757)	- kg/m^3
Specific heat at 20 °C	- kJ/kg*K
Thermal conductivity at 20° C & 30% v/v	- W/m*K
Thermal conductivity at 80° C & 30% v/v	- W/m*K
Heat capacity at 20° C & 30% v/v	- kJ/kg*K
Heat capacity at 80° C & 30% v/v	- kJ/kg*K

First aid measures

- *Description of first aid measures*

1. General information: Remove soiled or soaked clothing immediately. Seek medical assistance if discomfort continues.
2. After inhalation: When inhaled remove to fresh air and seek medical aid.
3. After contact with skin: In case of contact with skin wash off immediately with soap and water
4. After contact with eyes: In case of contact with eyes rinse thoroughly with plenty of water and seek medical advice
5. After ingestion: Summon a doctor immediately.

- *Most important symptoms and effects, both acute and delayed*

Symptoms: No symptoms known currently.
Hazards: No hazards known at this time.

- *Indication of any immediate medical attention and special treatment needed*

Treatment: Treat symptomatically.

4.12 Freezing protection

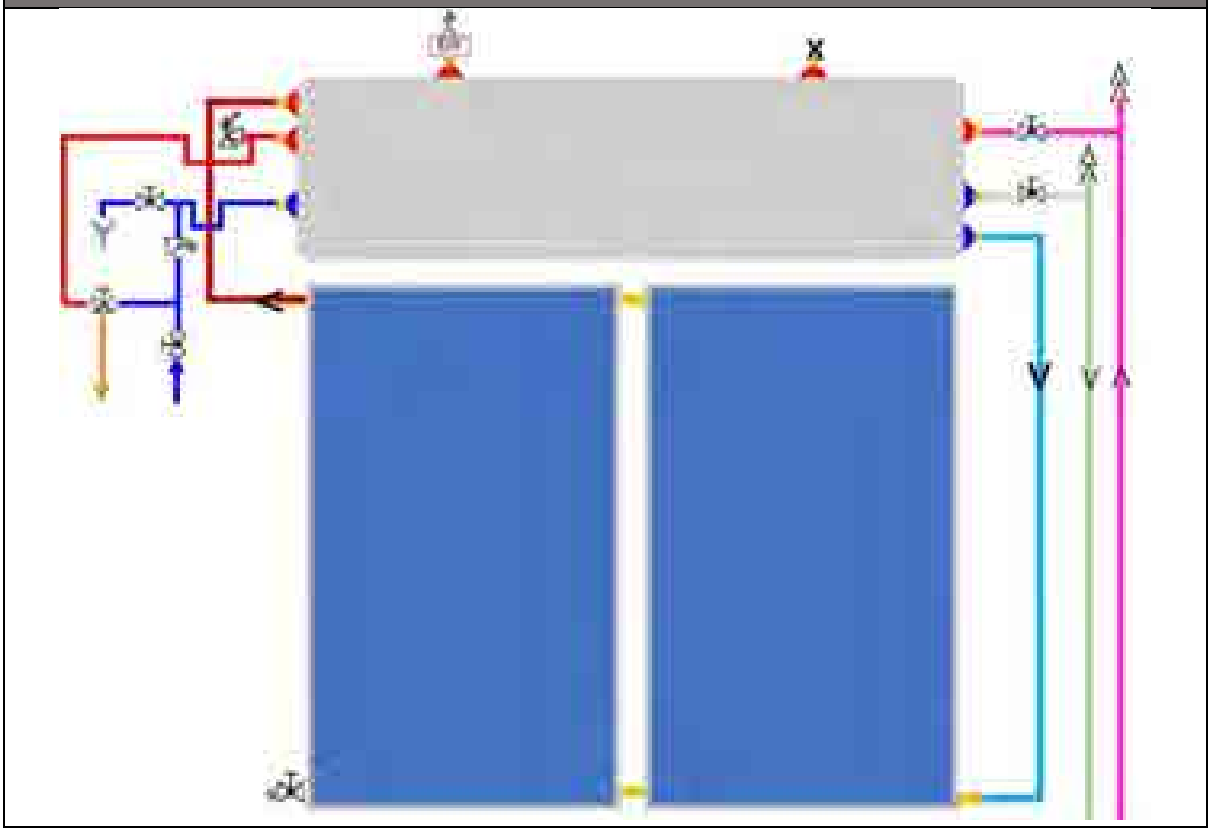
Close loop circuit: A 33% mixture of antifreezing liquid and distilled water can protect your solar system to temperatures as low as -10°C (14°F). Lower percentage of mixture will provide a lower level of freeze protection. The thermal fluid in the collector loop will not protect the potable water supply and return pipes to the solar storage tank from freezing as it is protecting only the close loop circuit of the solar system.

City Network supply and main solar tank circuit: The solar water heating system provides limited freeze protection at environmental temperatures down to -7°C (19.4°F) for a period of 18 hours. For colder or freezing conditions exceeding 18 hours the water must be manually drained from the solar water heater and piping exposed to this temperature levels.

Freeze tolerance limits are based upon an assumed set of environmental conditions.

4.13 Basic system layout

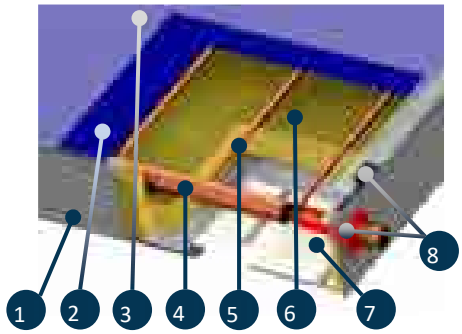
FULL DIAGRAM
Layout



Description		Use
	Ball valve	Optional part
	Thermostatic mixing valve	Optional part
	Safety non return valve	Standard part. Required
	Pressure relief valve	Standard part. Required
	Temperature - Pressure valve	Optional part. Protects from excessive temperature and overpressure .
EXP	Expansion vessel	Optional part. Prevents evaporation of thermal fluid.
	Drain off cock	Optional part.
x	End Plug	Standard part. Required
	Air vent	Not included. Installer's responsibility.

Description		Use
	Drain	Not included. Installer's responsibility.
	Blow off pipe	Not included. Installer's responsibility.
	Hot Outlet	Suggested to be plastic insulated. Not included.
	To the demand	Suggested to be plastic insulated. Not included.
	Cold inlet	Suggested to be plastic insulated. Not included
	Closed circuit collector outlet	Insulated Inox tube. Standard part.
	Closed circuit collector inlet	Insulated Inox tube. Standard part.
	External heater. Coil inlet	Not included. Installer's responsibility.
	External heater. Coil outlet	Not included. Installer's responsibility.

5. The collectors

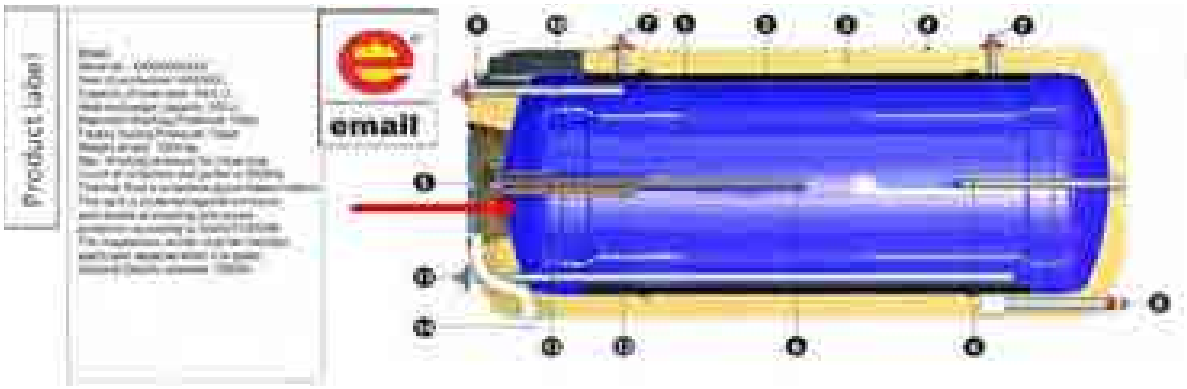


Description:

1. **Frame of the collector:** Aluminium profile powder coated for maximum protection in seaside areas.
2. **Absorbing surface:** Aluminum surface with blue titanium high selective treatment with high absorbance and low emission (α=95%, ε=4%), laser welded on the copper water frame.
3. **Transparent cover:** Security-Tempered prismatic solar glass for maximum protection against extreme weather conditions and temperature changes.
4. **Header of water frame:** Copper tubes Ø22, which is welded to the vertical tubes with hard silver solder. Each water frame is tested at the pressure of 15 bars. Headers are punched with upper expansion for perfect fitting with vertical tubes and minimum pressure drop in the collector.
5. **Vertical tubes:** Copper tubes in diameter Ø8mm.
6. **Thermal insulation:** 40mm thick layer of prepressed black mineral wool special for solar panels for minimum thermal loss. Rockwool insulation thermal conductivity: 0=0.035 W/m°K (EN 13162) and heat capacity 0.84 kJ/kgK.
7. **Back cover:** Aluzinc 0,4mm thick. Aluzinc stands for aluminum and zinc… fused in almost equal proportions, as a coating for the steel sheet that is coated with a silvery spangle composed of Aluminium (55%), Zinc (43,4%) and a touch of Silicon (1,6%). Great mechanical strength and 7 times more resisted to corrosion than common galvanized steel.
8. **Sealing materials:** For perfect waterproof finish and proper ventilation of collectors casing, all materials used (EPDM, polyurethane sealant) resist to extreme weather conditions and temperature changes.

COLLECTOR TECHNICAL DATA / SPECIFICATIONS										
Model	**1.50 V**	**1.50 H**	**1.82 V**	**1.82 H**	**2.00 V**	**2.00 H**	**2.37 V**	**2.37 H**	**2.72 V**	**2.72 H**
Gross area [m²]	1.50	1.50	1.82	1.82	2.00	2.00	2.37	2.37	2.72	2.72
Total Dimensions [mm]	L:1480 W:1010	L:1010 W:1480	L:1480 W:1230	L:1230 W:1480	L:1980 W:1010	L:1010 W:1980	L:1930 W:1230	L:1230 W:1930	L:2160 W:1260	L:1260 W:2160
Max. operating Pressure [bar]	10									
Collector front Cover-Thickness	LOW IRON TEMPERED GLASS 3.2mm									
Insulation	MINERAL WOOL									
Casing Material	ALUMINUM POWDER COATED									
Sealing Materials	POLYURETHANE - SILICON - EPDM									
Absorber Area [m²]	1.38	1.38	1.72	1.72	1.86	1.86	2.23	2.23	2.57	2.57
AbsorberMaterial-Treatment	ALUMINUM / PVD COATING / HIGH SELECTIVE – A=0.95±0.02 / e=0.05±0.02									
Absorber construction Type	LASER									
Heat transfer Medium	GLYCOL BASED + WATER MIXTURE									

6. Accumulator



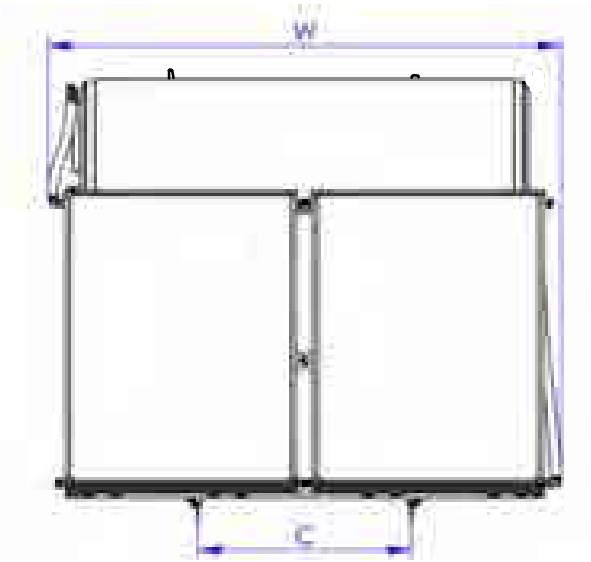
1. **Water storage tank**: Consists of hot rolled steel, with double internal layer of enamel, processed at 860° c, according to DIN 4753 Standard.
2. **Double jacket heat exchanger:** Consisting of cold rolled steel, for the function of the closed loop circuit. The jacket is properly formed for resistance to contractions and expansions, during the operation of the solar system.
3. **Thermal insulation:** Ecological, incombustible, high-density (>50kg/m³) expanded polyurethane surrounds the water storage tank and jacket for minimum heat loss, maintaining the hot water temperature, thickness 50mm.
4. **External casing:** Hot dip galvanized steel, powder coated RAL9006 / marine grade aluminum alloy.
5. **Side flange:** Wide opening for easy cleaning of minerals, inspection of the tank and maintenance. The flange is sealed with a silicon sealant with high heat resistance.
6. **Cathode protection:** 2 Magnesium anode rods for protection against corrosion and mineral deposits caused by electrolytic reactions.
7. 2-3 bar air relief valve connection point (left)/filling point: Inox 1/2" BSP male threaded pipe ends.
8. **Jacket outlet:** Inox 3/4" BSP male threaded pipe end.
9. **Jacket inlet:** Inox 3/4" BSP male threaded pipe end. A tee fitting is attached which also provides the filling point for the closed circuit, which must be plugged after filling is done.
10. **Hot Water (DHW) outlet:** Inox BSP male threaded pipe end (3/4" for 300lt tank and 1/2" for rest).
11. **Cold Water inlet:** Inox BSP male threaded pipe end (3/4" for 300 & 500lt tank and 1/2" for rest). At this connection a 9-bar safety non return valve must be placed for pressure relief.
12. **Heating element:** Rated according to the destination country's local regulations (optional, for the use of electricity as an auxiliary power source).
13. **Safety thermostat (optional-standard only in case that electric heating element is present):** With bipolar protection and auxiliary fuse. All electrical components carry a CE marking according to EN 60335-1 and EN 660335-2-21 standards.
14. **Cable gland and cable tube:** Water resistant passage for the electric element's electric connections.
15. **Heat exchanger coil:** Optional part

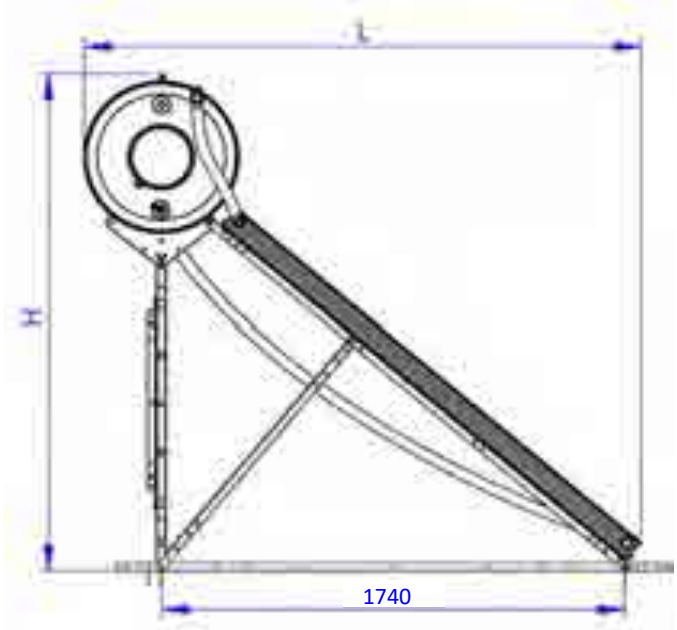
SUN boiler						
Model			**160**	**200**	**250**	**300**
Capacity	[lt]		150	192	248	293
Dimensions DxL	[mm]		580x1122	580x1394	580x1759	580x1966
Protection - treatment – of main tank		ENAMELED + MG ANODE ROD				
Insulation material - density	[kg/m³]	ENVIROMENTALLY FRIENDLY EXPANDED POLYURETHANE (50 kg/m³)				
Maximum operating Temperature	[°C]	99				
Maximum tested Pressure	[bars]	15				
Maximum working Pressure	[bars]	10				
Heat exchanger capacity (jacket)	[lt]		9.1	13.4	19.4	19.4
Heat exchanger surface (jacket)	[m²]		0.91	1.28	1.79	1.79

7. Support assembly

7.1 Frame assembly for flat roof configurations with 1-2 collectors 2.00 or 2.37m²

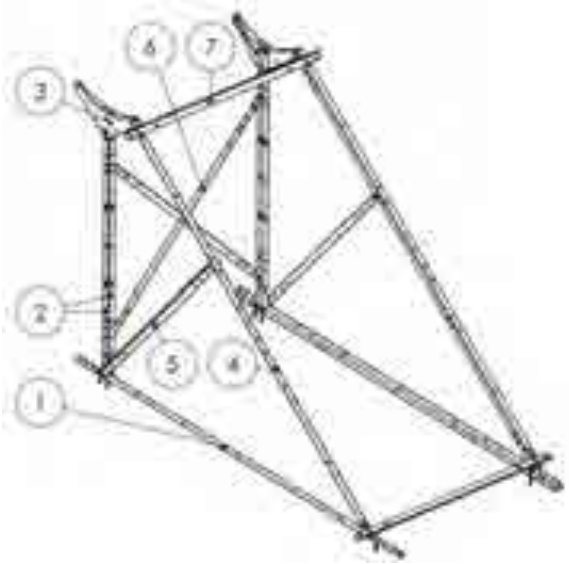
7.1.1 Dimensions

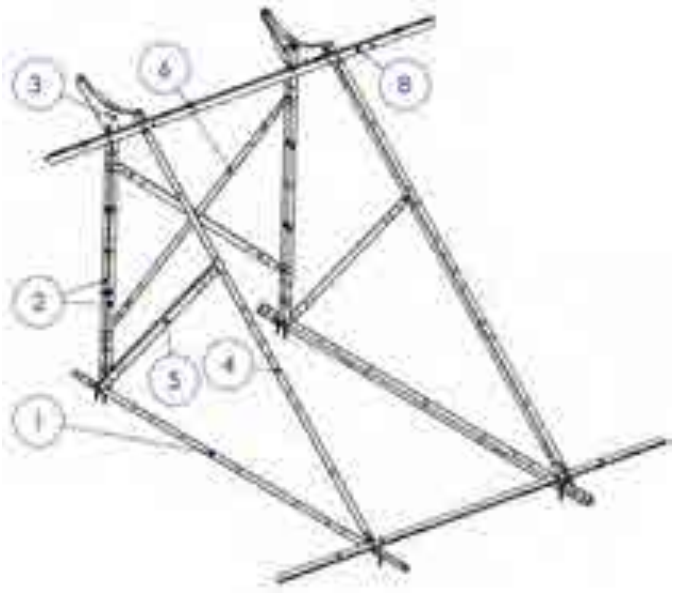
160lt/200lt	250-300lt
	



Model	C [mm]	W [mm]	H [mm]	L [mm]
160lt-2.00m²	841	1250	1895	2090
160lt-2.37m²	841	1310	1895	2090
200lt-2.00 m²	931	1450	1895	2090
200lt-2.37 m²	931	1450	1895	2090
200lt-2x2.00 m²	931	2180	1895	2090
250lt-2x2.00 m²	931	2180	1895	2090
250lt-2x2.37 m²	931	2600	1895	2090
300lt-2x2.00 m²	931	2180	1895	2090
300lt-2x2.37 m²	931	2600	1895	2090

7.1.2 Flat roof support composition

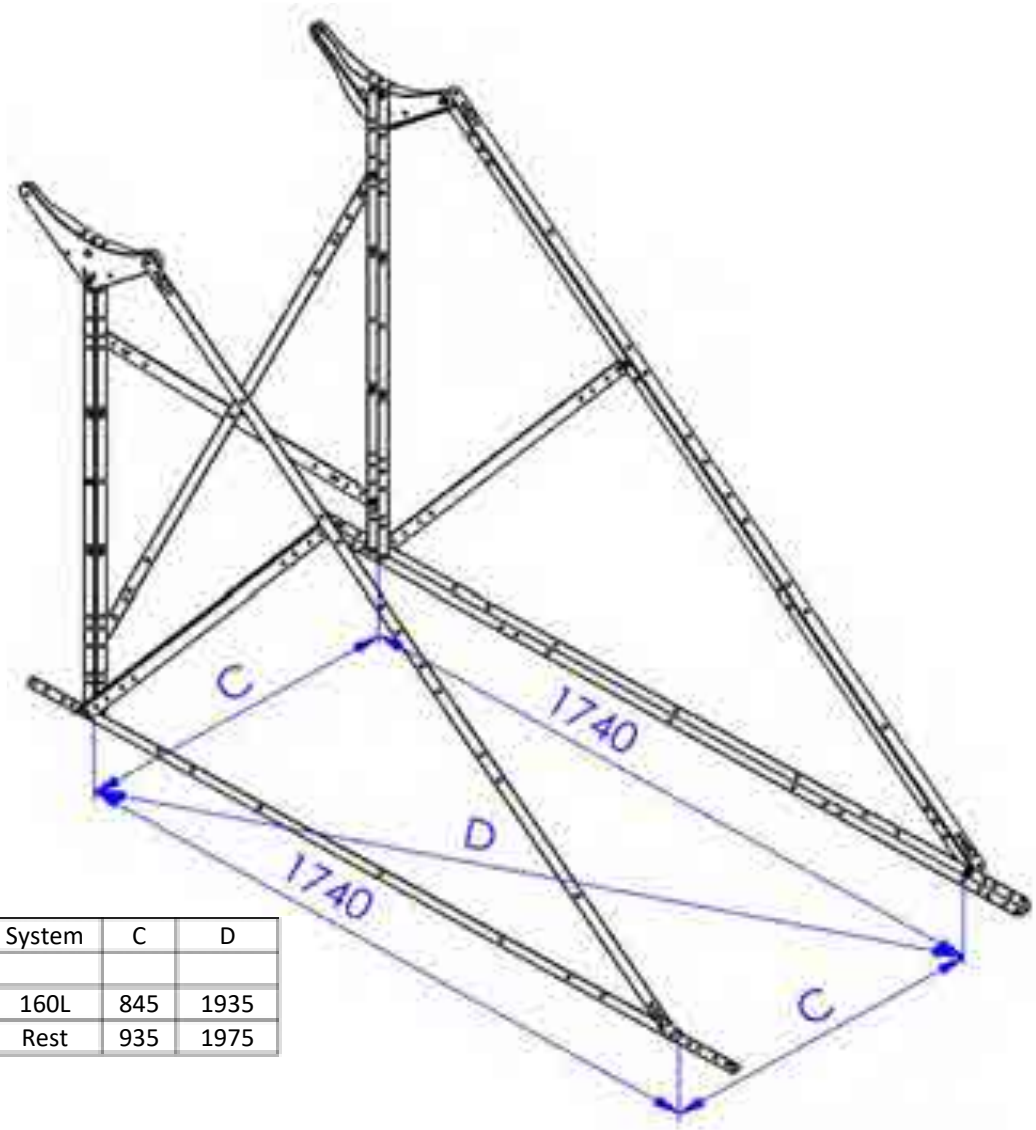




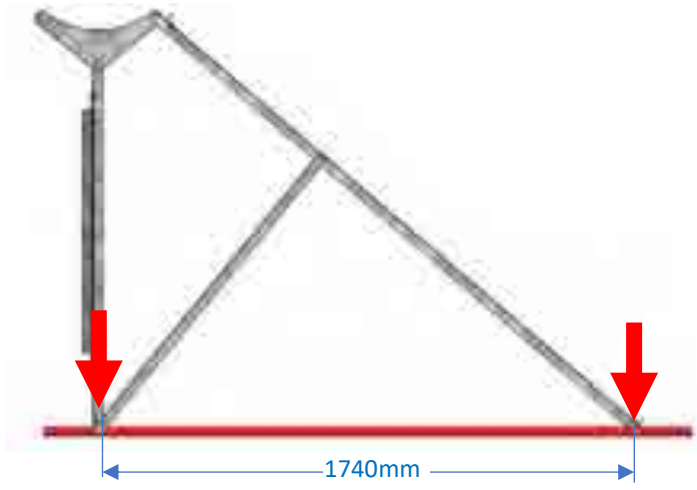
COMPONENTS		Configurations with 1x collector	Configurations with 2 collectors
1	Bar “L” 2094mm (209460200000U)	2	2
2	Bar “L” 1263 mm (126360202024S)	4	4
3	Accumulator support (BSUNISXK00001)	2	2
4	Bar “L” 2062mm (206260202024U)	2	2
5	Bar “L” 1143mm (114360202024S)	2	2
6	Bar “L” 1245 mm (124560202024U)	2	0
7	Bar “L” 1060 mm (10606020CO1NU)	2	0
8	Bar “L” 2000 mm (20006020CO2NU)	0	2
9	Bar “L” 95 mm (00956020CO2NU)	0	0
10	Bolts DIN933 M8X20	23	27
11	Bolts DIN933 M8X30 yellow Zinc	2	2
12	Square neck bolt DIN603 M8x16	4	4
13	Flanged nut DIN6923 M8	23	23
14	Washer DIN9021Ø8,5	12	16
15	Anchor bolt DIN571 M8x60	6	6
16	Nylon Plug 10x60	6	6

7.1.3 Support assembly

Flat roof support for 1 or 2 2.0 0 or 2. 37m² collettore. Fixing points



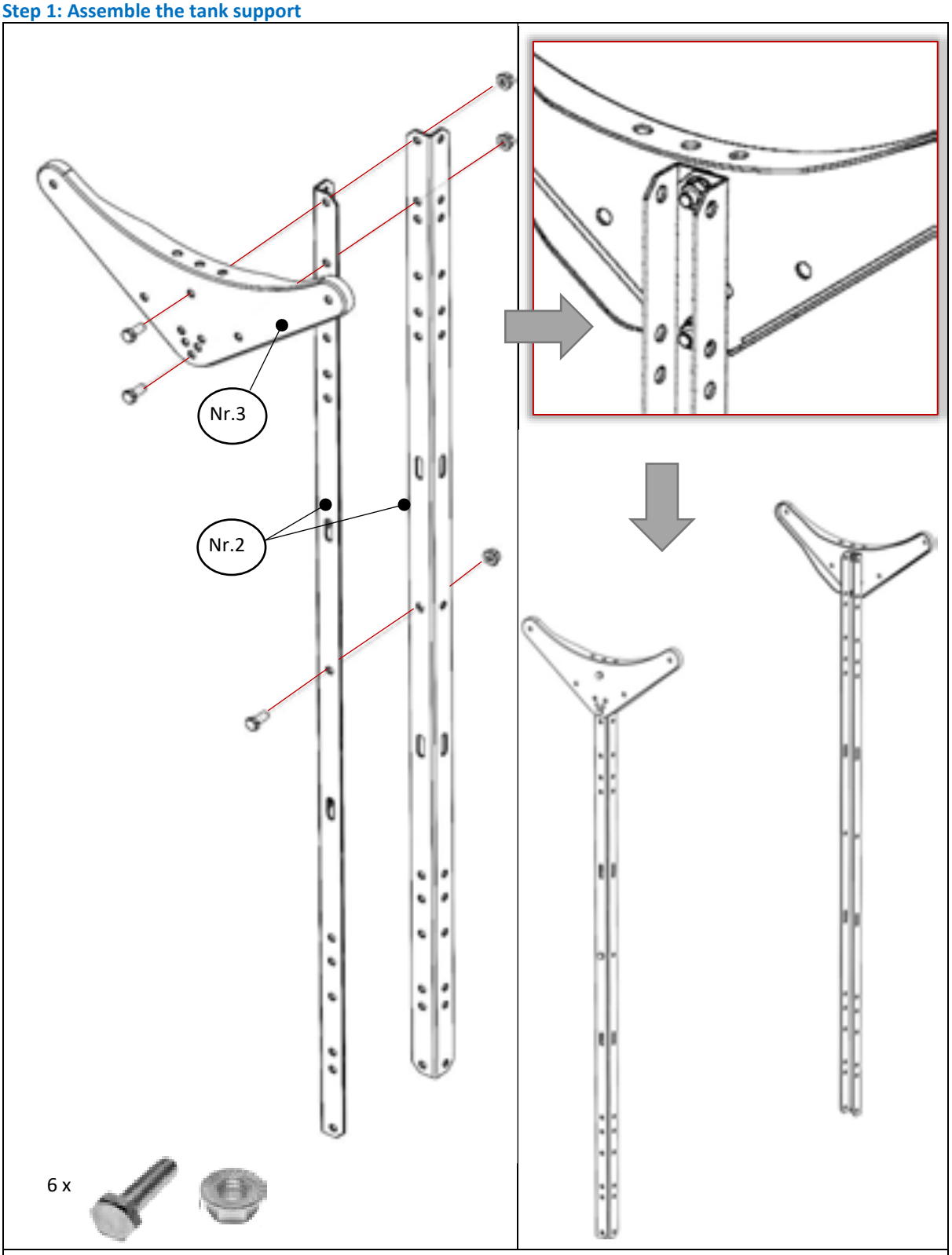
System	C	D
160L	845	1935
Rest	935	1975



Support beams No. 1 shall be fixed on a rigid surface, on blocks/plinths or on any other robust structure at least in the places indicated by red markings, capable of supporting the load of the solar system as well as any other load described in ENV1991.

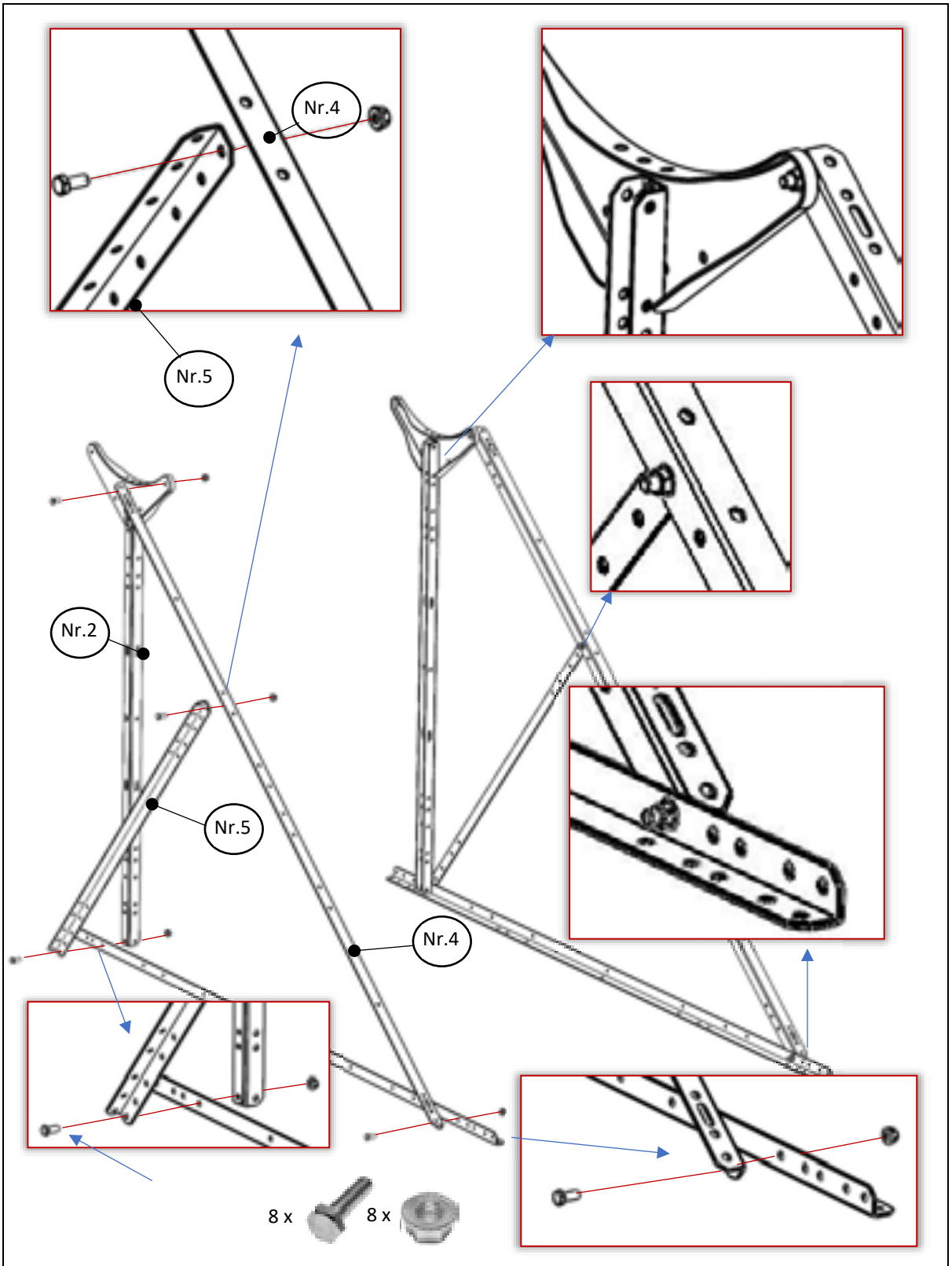
For fastening use anchor dowels 8x60, nylon dowels and washers. See spacing above. This step is necessary and must be performed for the support to be rigid.

Step 1: Assemble the tank support



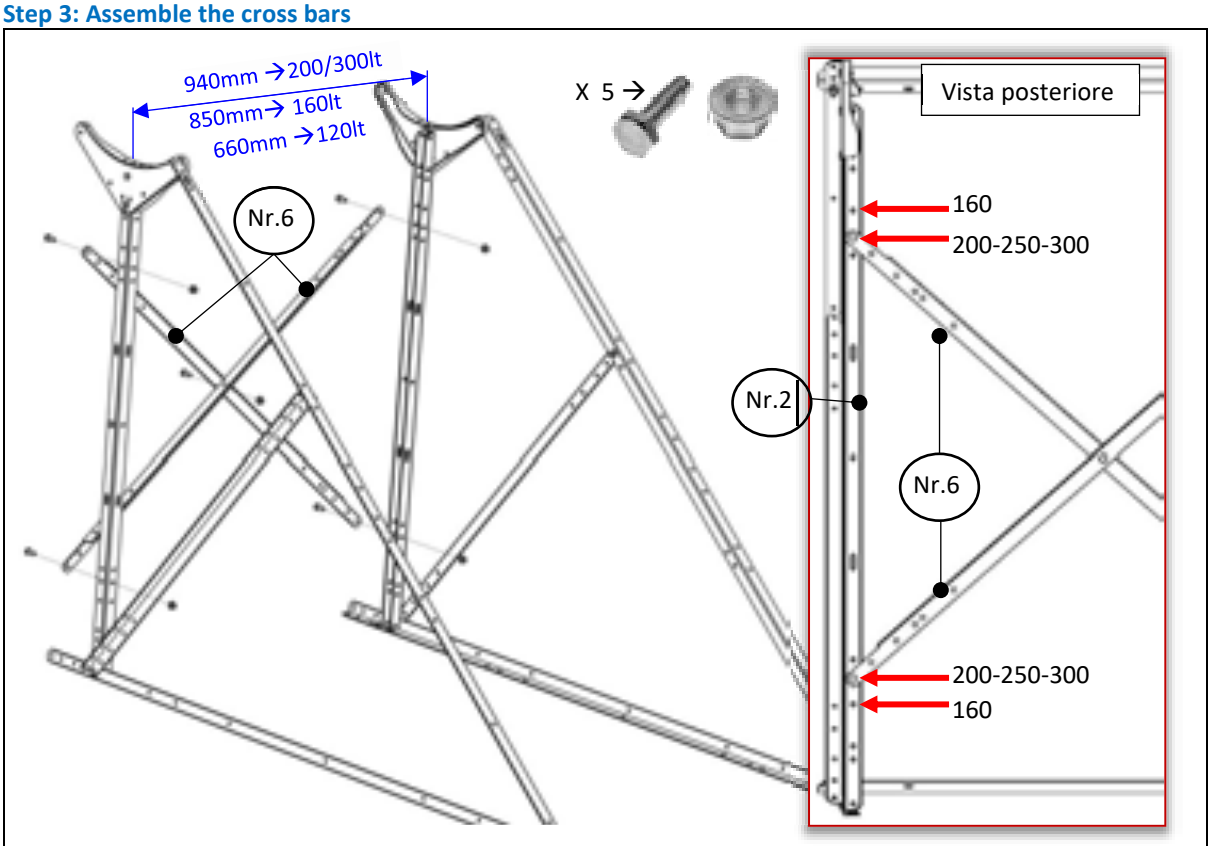
Assemble the vertical beams Nr.2 in 2 pairs, each pair will form a new "П" profile, that will be connected to the boiler supports Nr.3. Use M8x20 bolts and nuts. Fully tighten bolts.

Step 2: Assemble the side frames on the support mounts



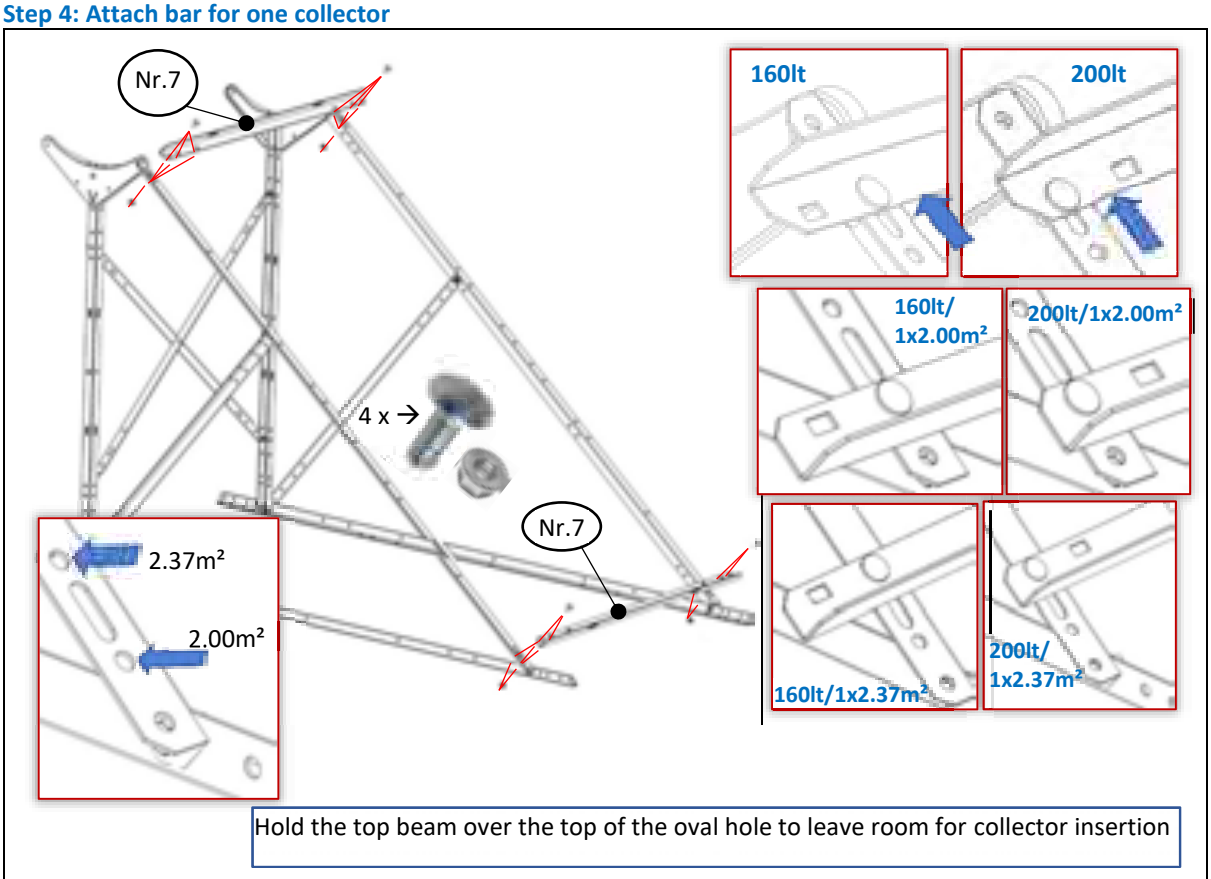
Use M8x20 bolts and nuts. This step is the same for all configurations. **Tighten the bolts completely.**

Step 3: Assemble the cross bars



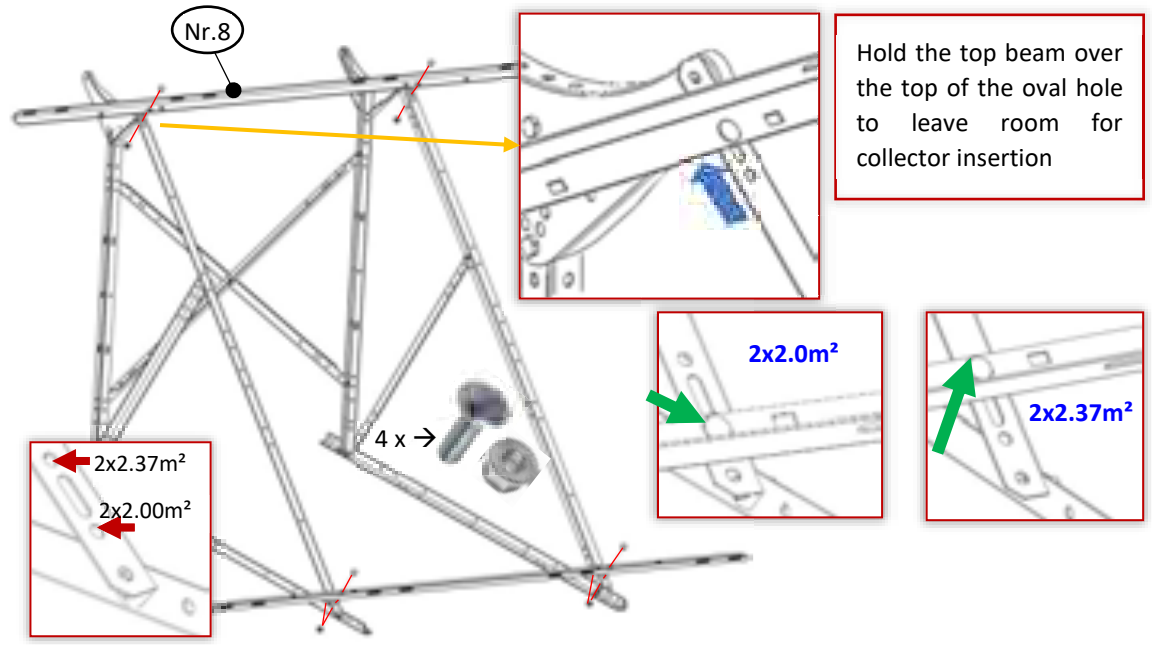
Use M8x20 bolts and nuts. Better tighten these bolts after the accumulator is fixed on the support

Step 4: Attach bar for one collector



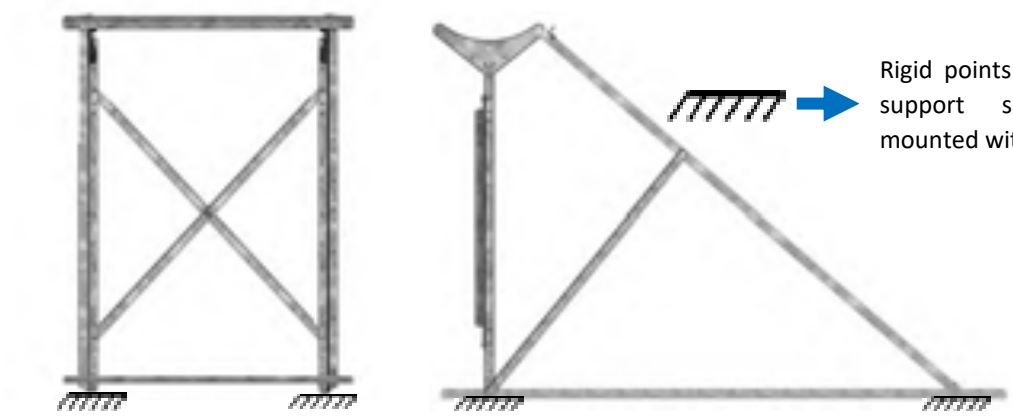
Use M8x16 oval head square neck bolts and nuts. Fully tighten only bolts on the lower beam Nr.7

Step 4: Attach bar for two collectors

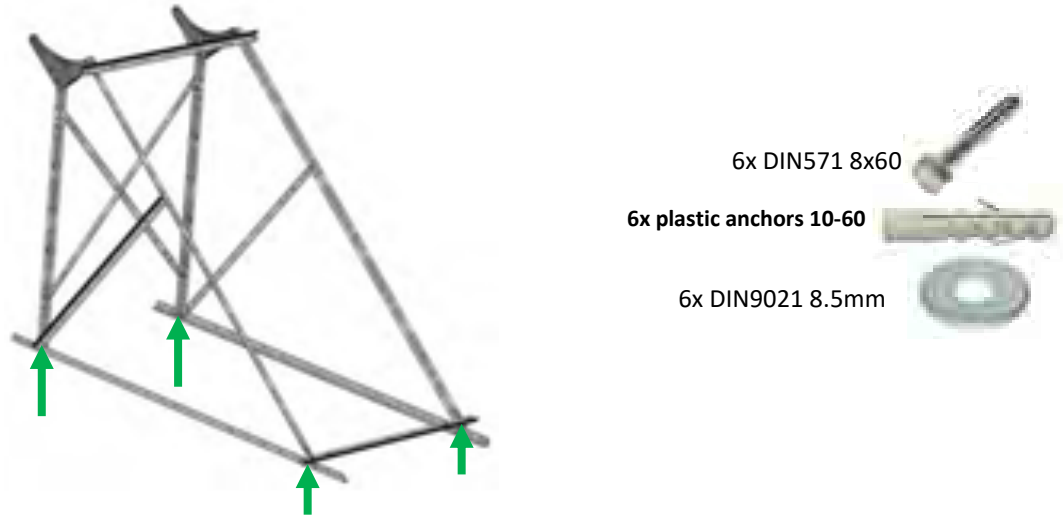


Use M8x16 oval head square neck bolts and nuts. Fully tighten only bolts on the lower beam Nr.8

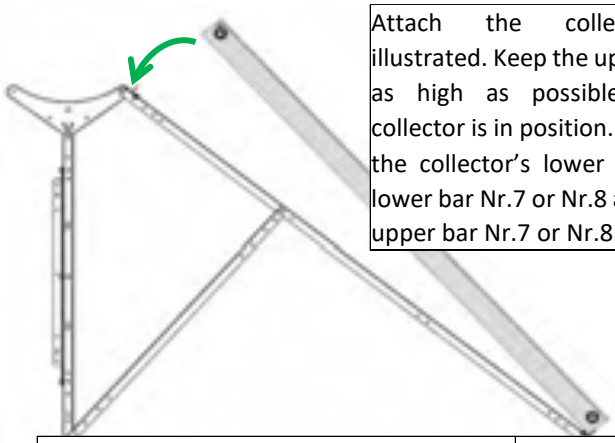
Step 5: Fix the stand on rigid supports



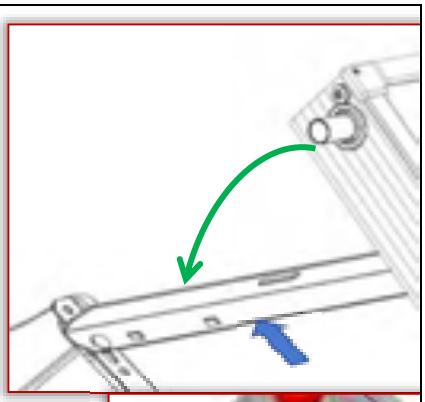
The support must be mounted in all 4 points shown on a rigid surface or at least slabs



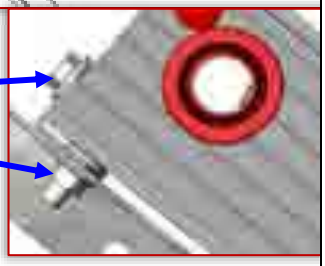
Step 6: Attach the collector/s

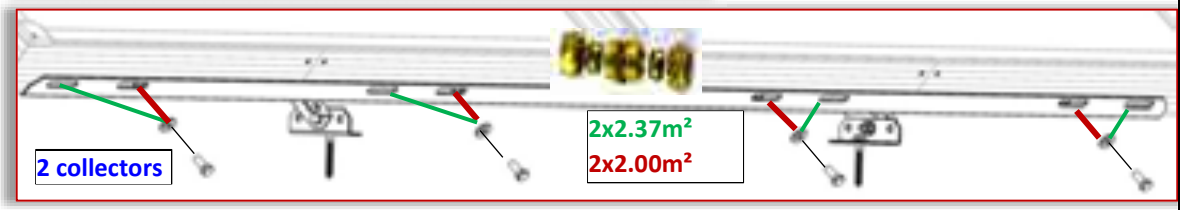


Attach the collectors like illustrated. Keep the upper bar Nr.7 as high as possible until the collector is in position. First tighten the collector's lower part on the lower bar Nr.7 or Nr.8 and then the upper bar Nr.7 or Nr.8.



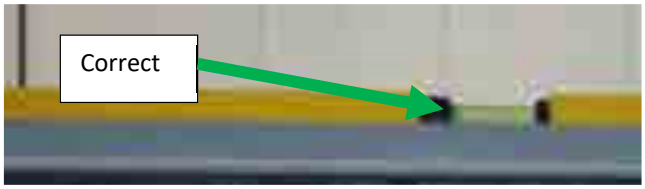
After the collector is placed and tighten, do not forget to tighten the oval bolts that hold the upper bar Nr.7 or Nr.8 on the support.



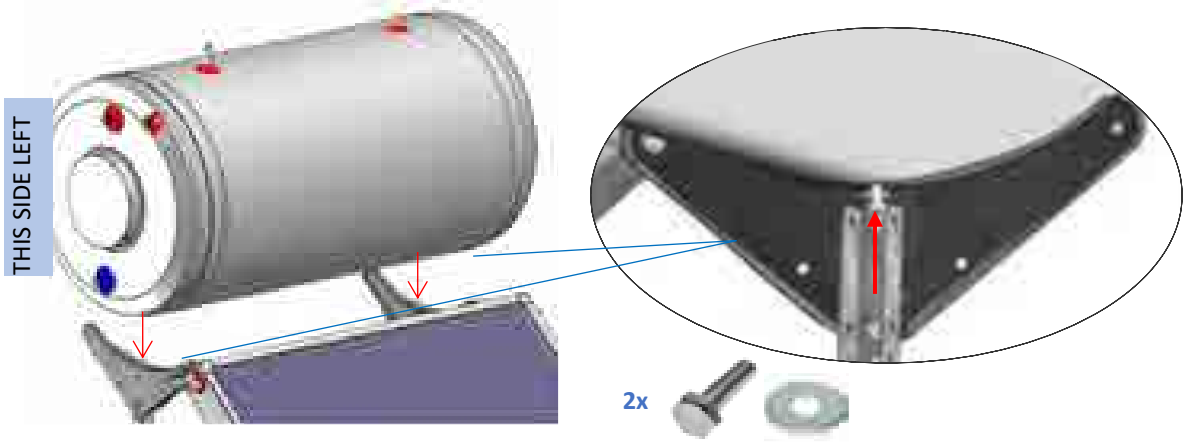


Level the collectors

Place a spirit level on the top horizontal surface of the manifold and verify that the installation is completely parallel to the ground plane.

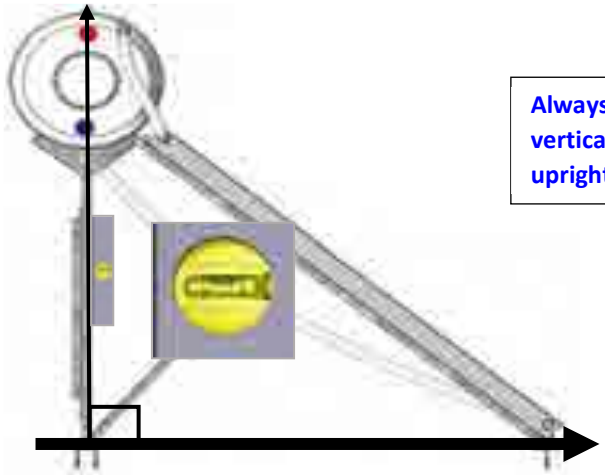


Step 7: Attach the tank



Attach the tank with the correct orientation illustated above. **Tighten the tank on the tank support using the bolts and washers**

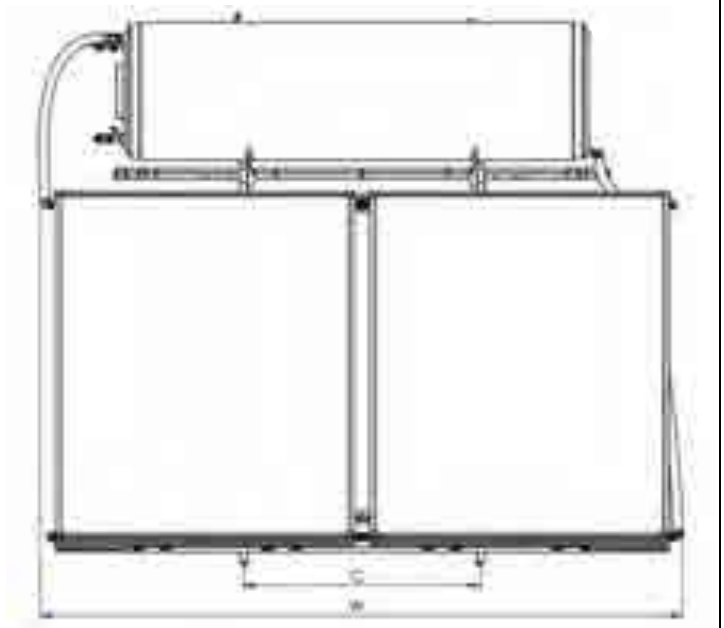
⚠ **The accumulator support beams must stand vertical to the ground**

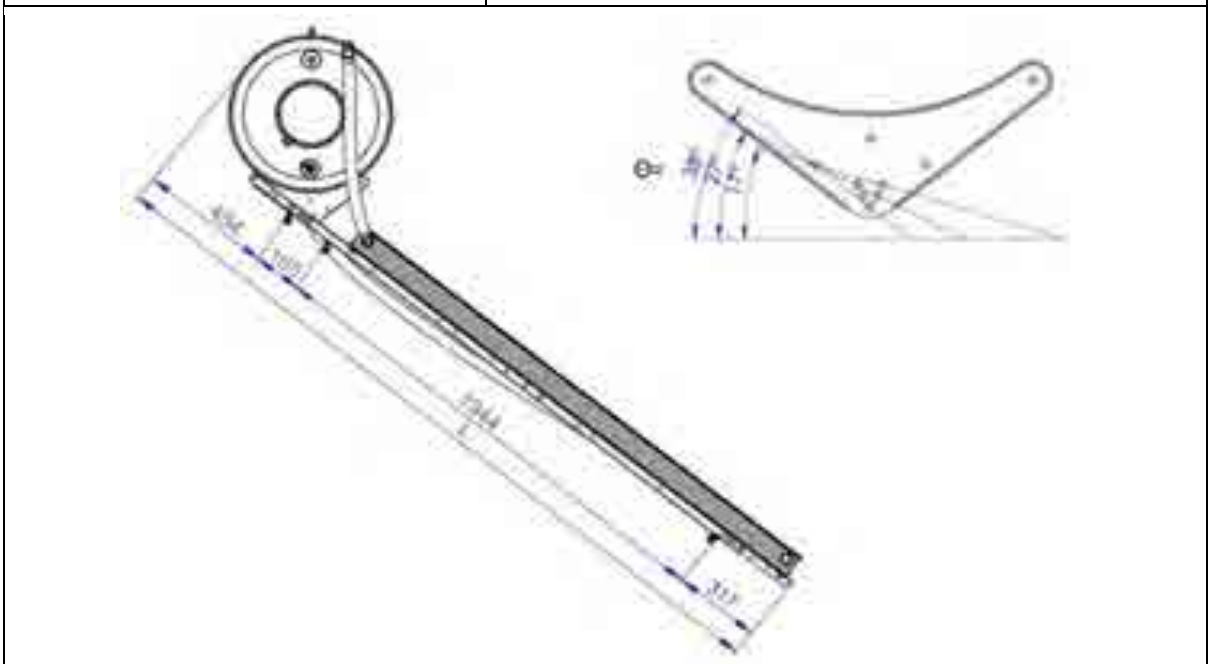


Always check that the tank beam is straight and vertical to the ground. Also check the tank to stay upright too as illustrated here

7.2 Frame assembly for inclined roof configurations with 1-or 2 collectors 2.00 or 2.37m²

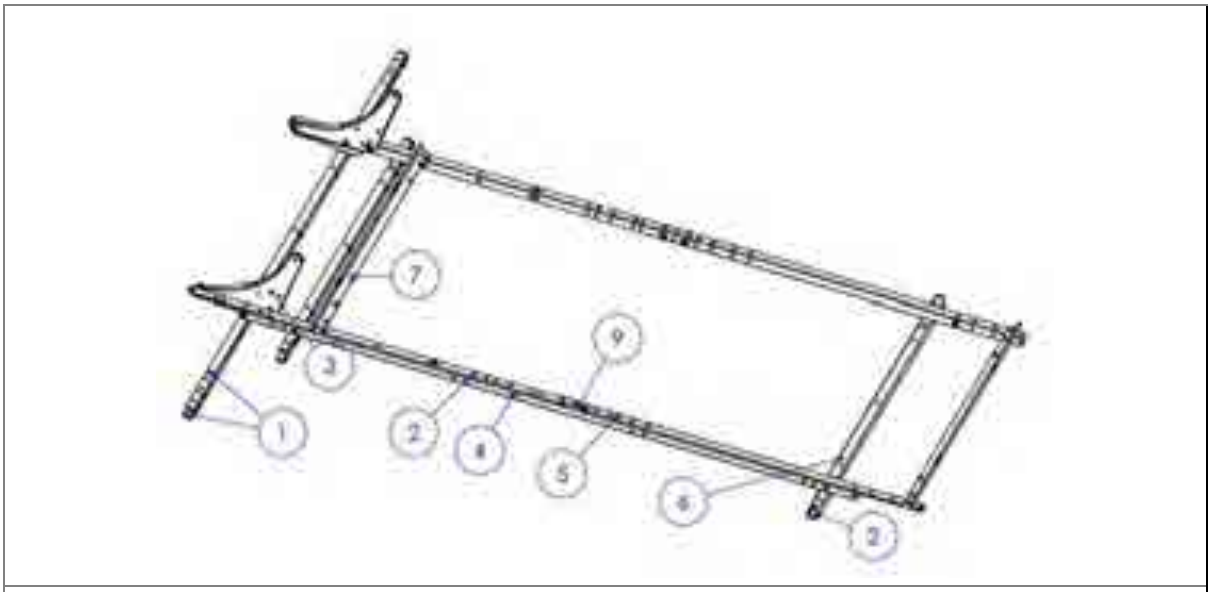
7.2.1 Dimensions

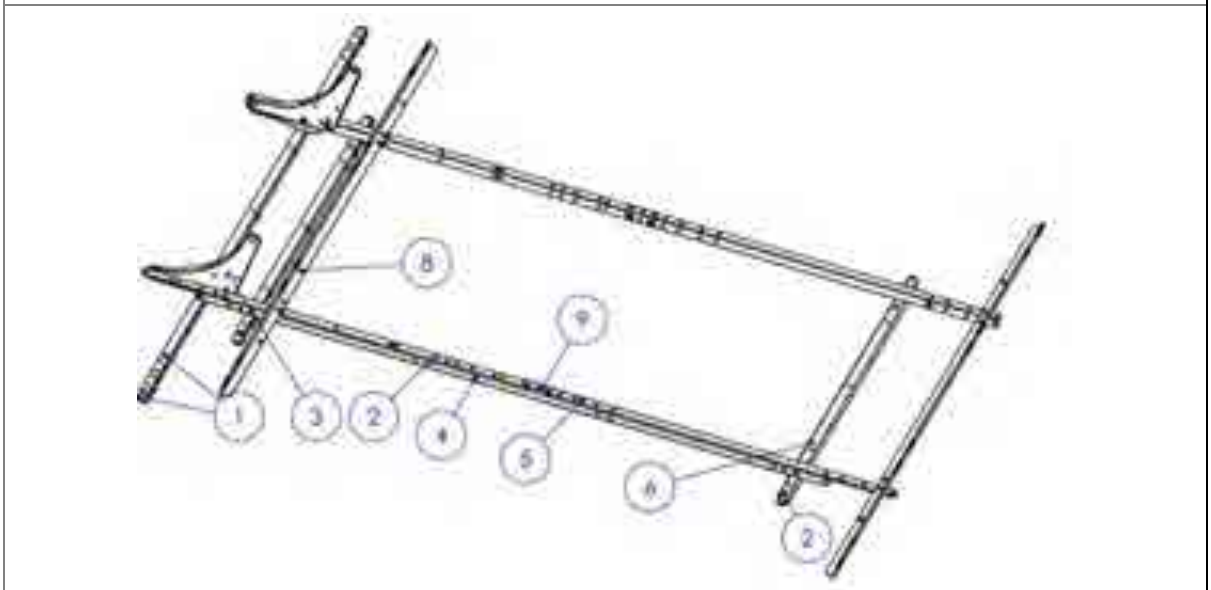
1xcollector	2xcollectors
	



Model	C [mm]	W [mm]		L [mm]
160lt-2.00m²	915	1320		2715
160lt-2.37m²	915	1320		2715
200lt-2.00 m²	1005	1450		2715
200lt-2.37 m²	1005	1450		2715
200lt-2x2.00 m²	1005	2180		2715
250lt-2x2.00 m²	1005	2180		2715
250lt-2x2.37 m²	1005	2600		2715
300lt-2x2.00 m²	1005	2180		2715
300lt-2x2.37 m²	1005	2600		2715

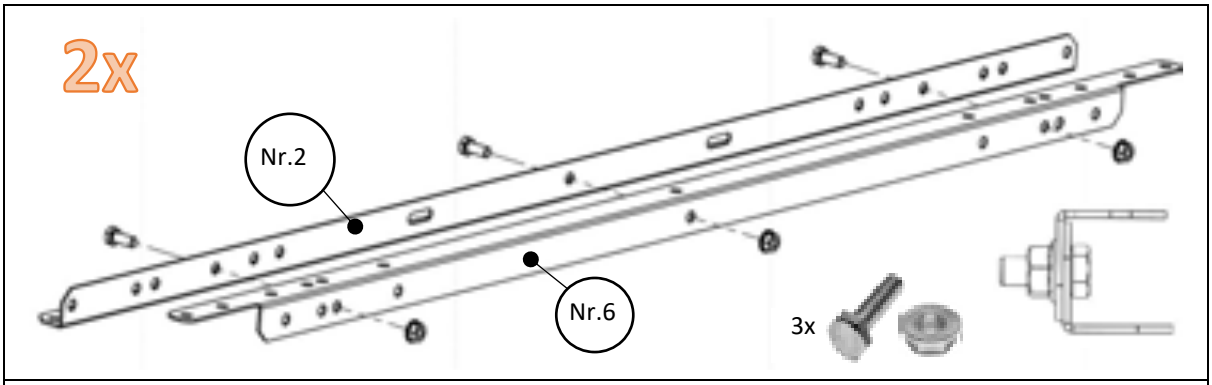
7.2.2 Inclined roof support composition



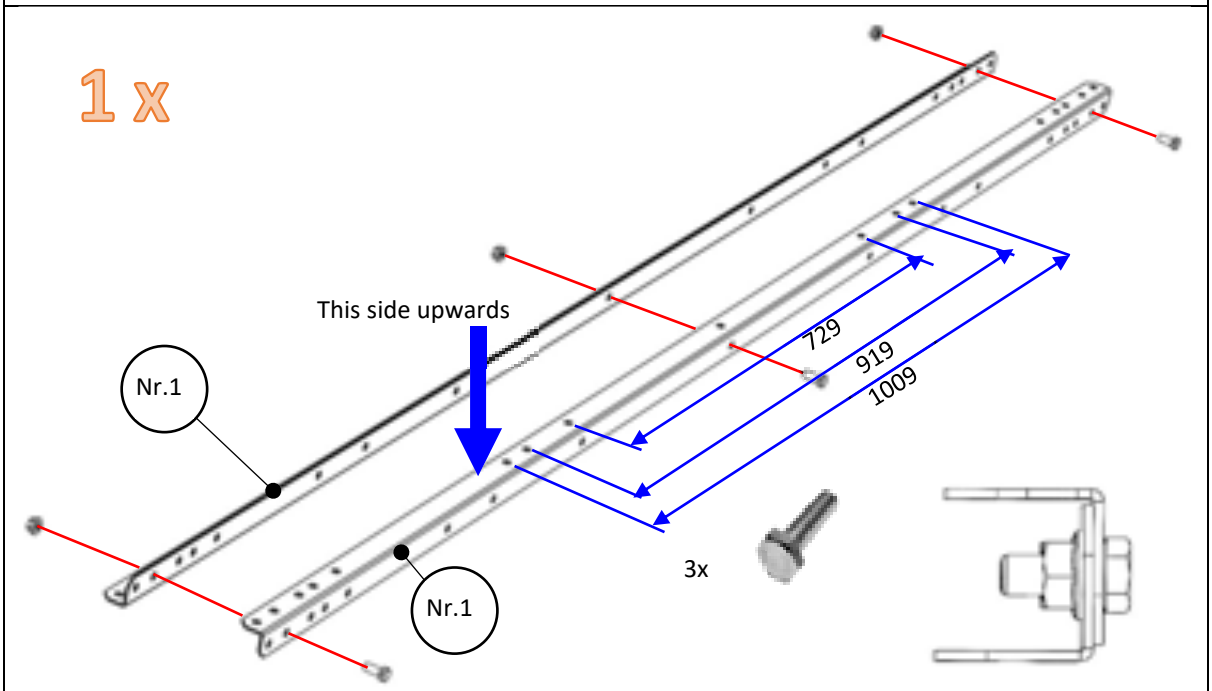


COMPONENTS		Configurations with 1x collector	Configurations with 2 collectors
1	Bar “L” 2094mm (209460200000U)	2	2
2	Bar “L” 1263 mm (126360202024S)	4	4
3	Accumulator support (BSUNISXK00001)	2	2
4	Bar “L” 2062mm (206260202024U)	2	2
5	Bar “L” 1143mm (114360202024S)	2	2
6	Bar “L” 1245 mm (124560202024U)	2	2
7	Bar “L” 1060 mm (10606020CO1NU)	2	0
8	Bar “L” 2000 mm (20006020CO2NU)	0	2
9	Bar “L” 95mm (009560200000U)	2	2
9	Bolts DIN933 M8X20	27	31
10	Bolts DIN933 M8X30 yellow zinc	4	4
11	Square neck bolt DIN603 M8x16	4	4
12	Flanged nut DIN6923 M8	29	29
13	Washer DIN9021Ø8,5	22	26
14	Anchor bolt DIN571 M8x60	-	-
15	Nylon Plug 10x60	-	-

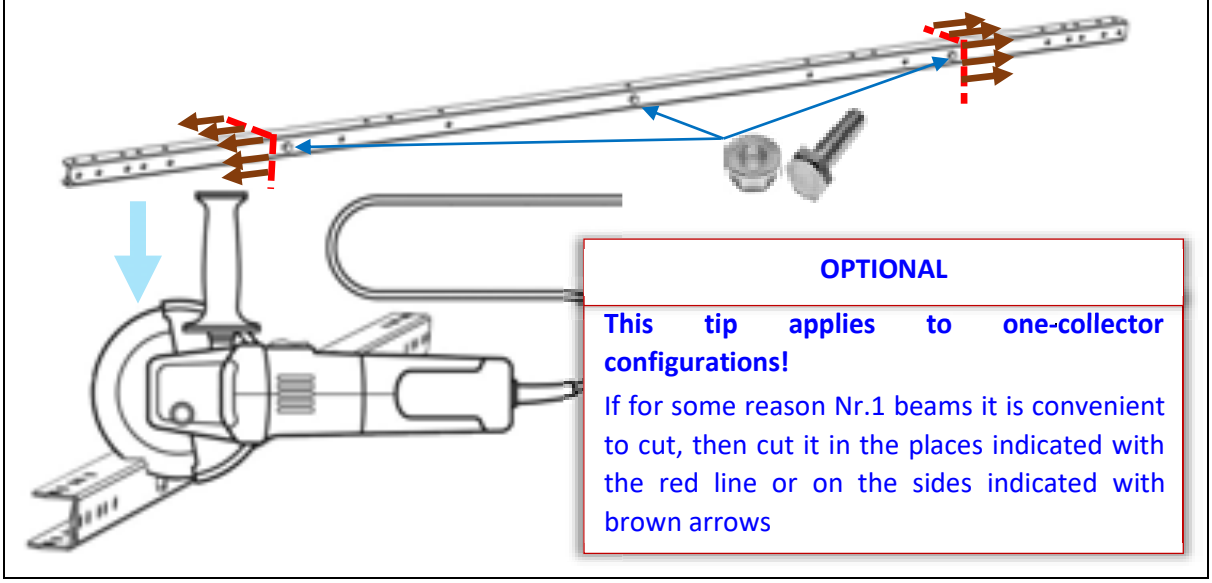
Step 1: Assemble the lower traverse beam



Prepare 2 pairs. Utilize bolts M8x20 and nuts M8, at the exact positions. **Fully tighten these bolts**



Use M8x20 bolts and M8 nuts, in the exact positions. **Tighten these bolts completely**

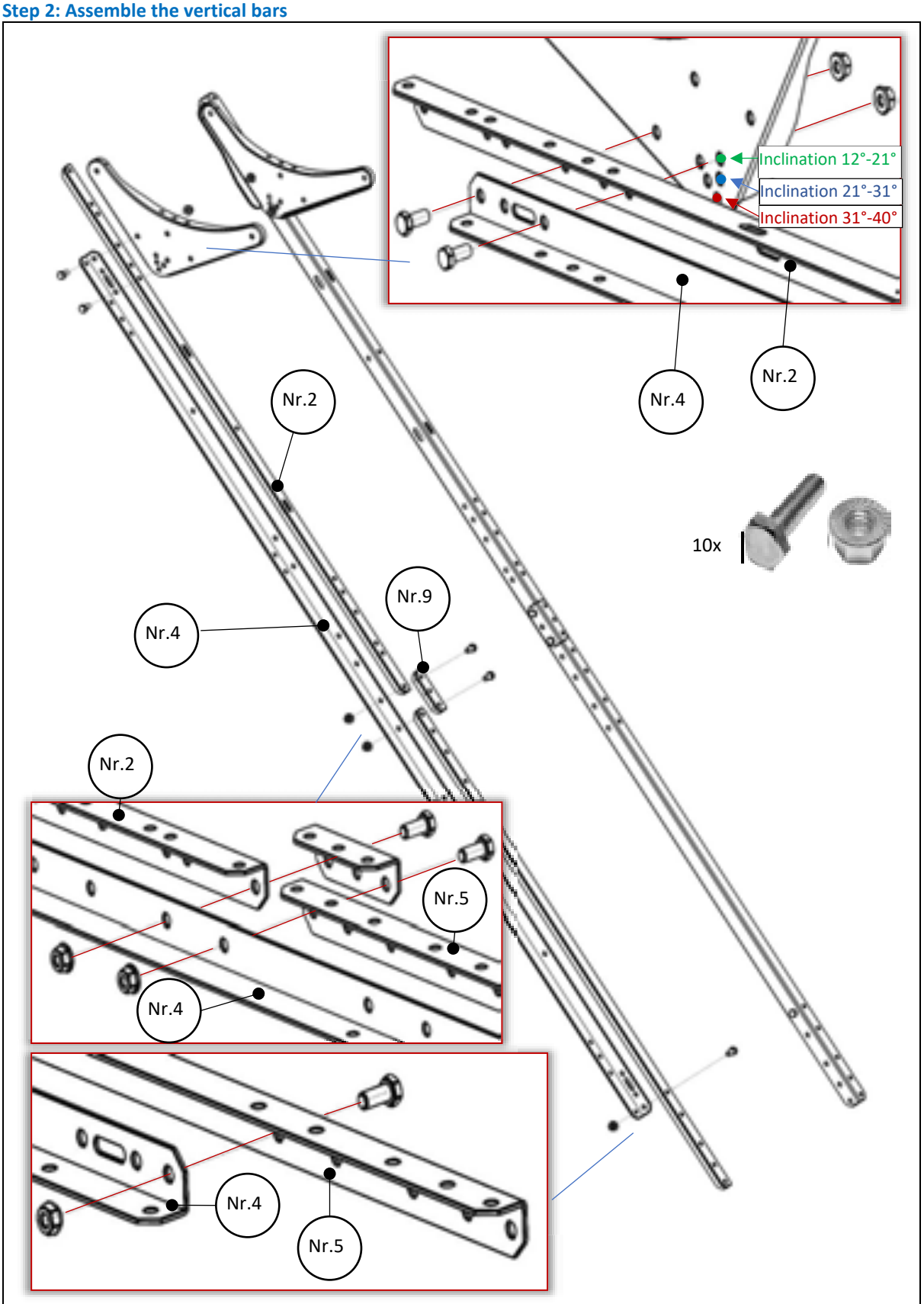


OPTIONAL

This tip applies to one-collector configurations!

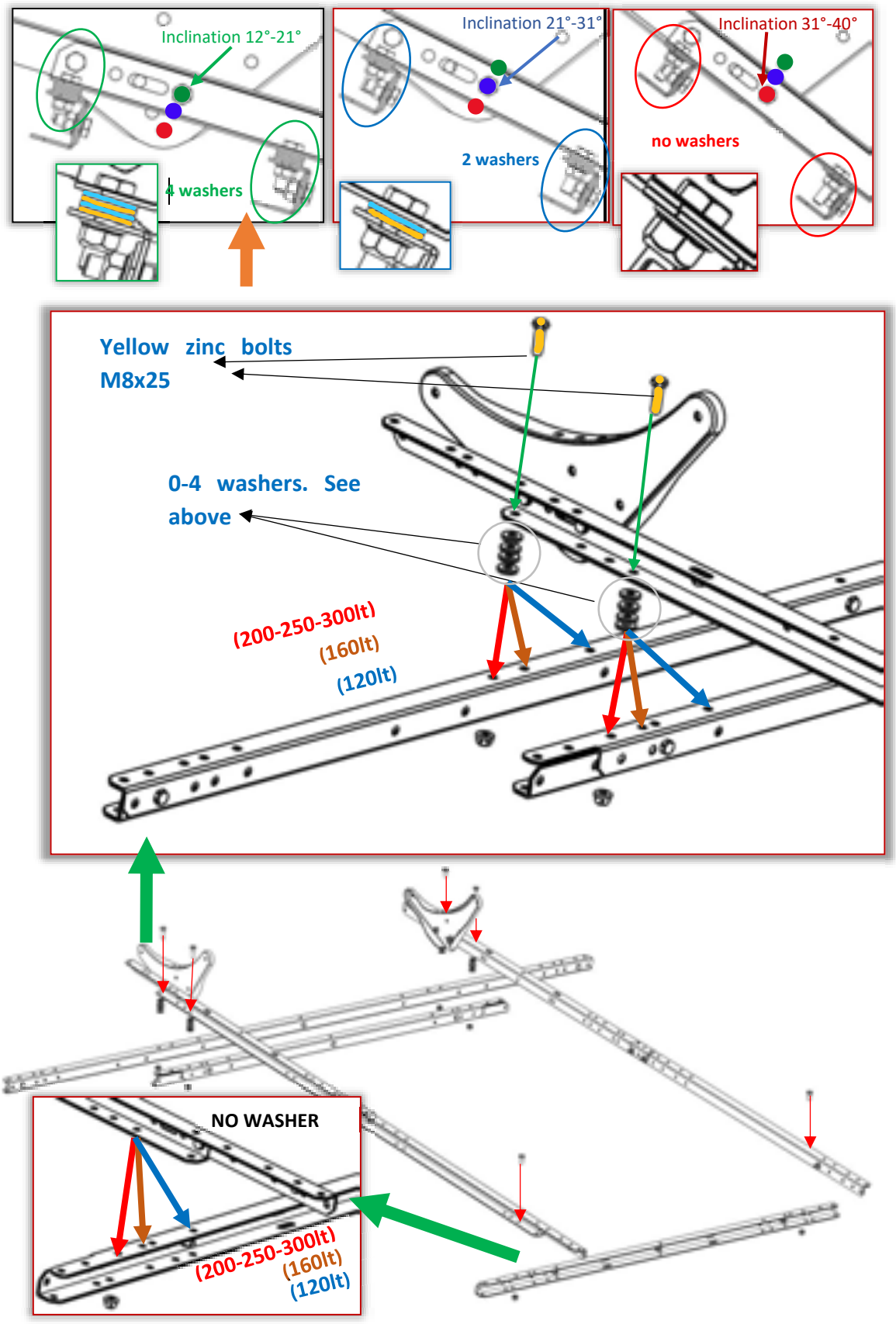
If for some reason Nr.1 beams it is convenient to cut, then cut it in the places indicated with the red line or on the sides indicated with brown arrows

Step 2: Assemble the vertical bars



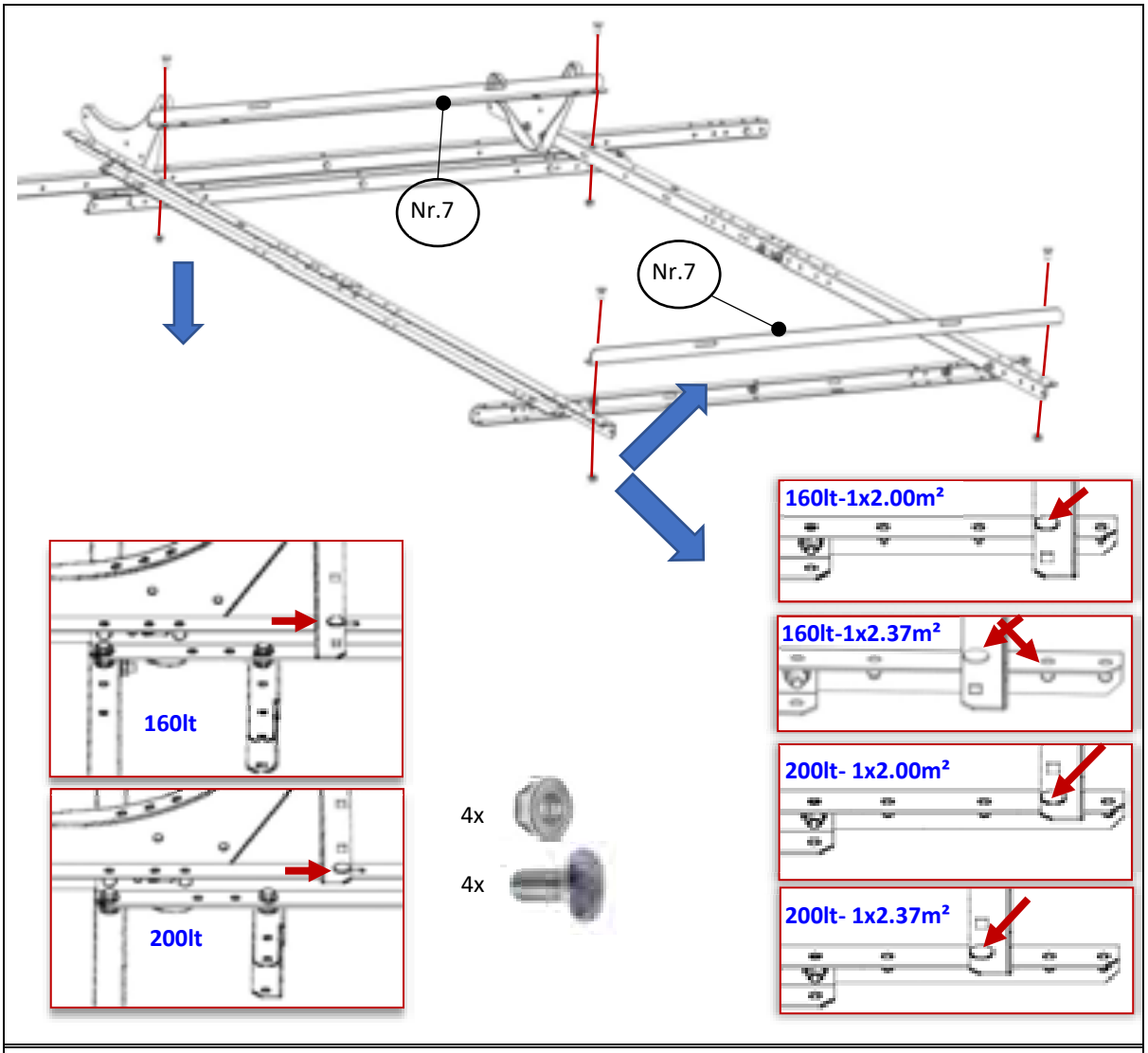
Utilize bolts M8x20 and nuts M8, at the exact positions. **Fully tighten these bolts**

Step 3: Assemble lower traverse beams with the upper vertical beams



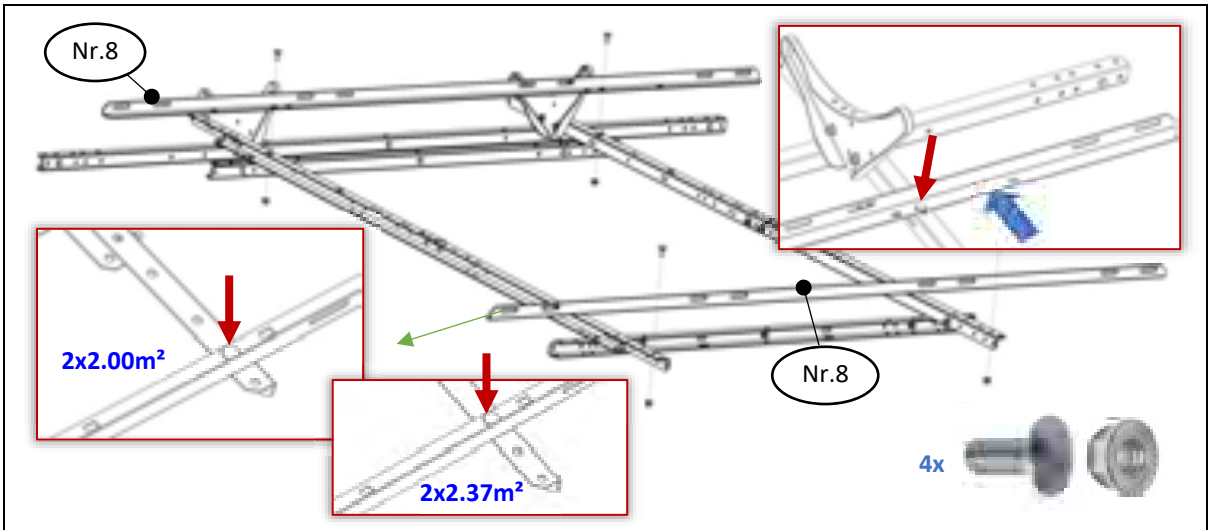
Utilize bolts M8x30 yellow Zinc bolts, nuts and washers on the back and standard bolts and nuts M8, at the front positions. **Fully tighten these bolts**

Step 4: Attach bar for one collector



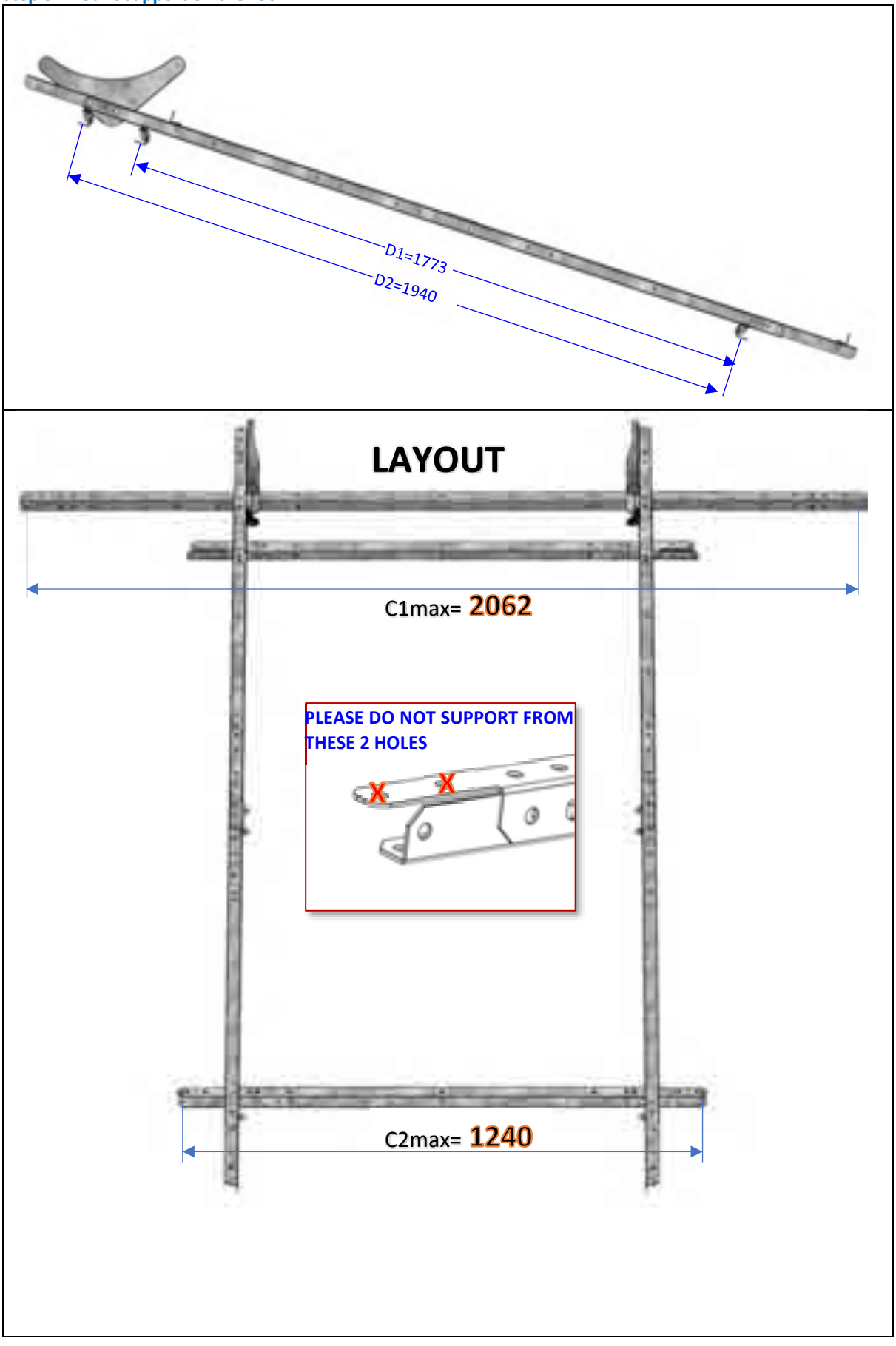
Use M8x16 oval head square neck bolts and nuts. Fully tighten only bolts on the lower beam Nr.7
Keep the upper beam on the top of the oval hole in order to leave space for the collector to fit.

Step 4: Attach bar for two collectors

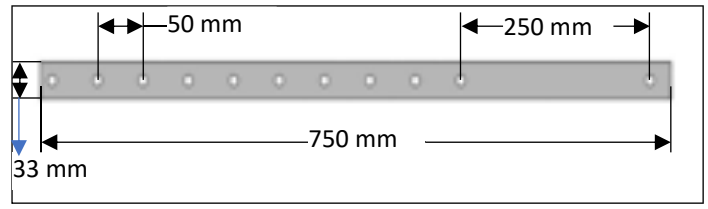


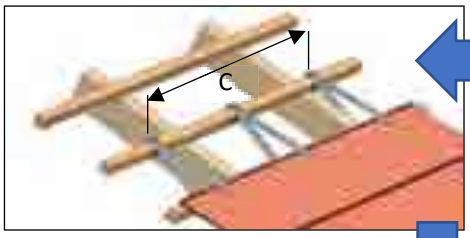
Use M8x16 oval head square neck bolts and nuts. Fully tighten only bolts on the lower beam Nr.8

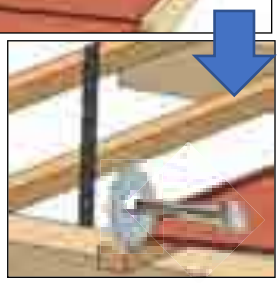
Step 5: Mount support on the roof

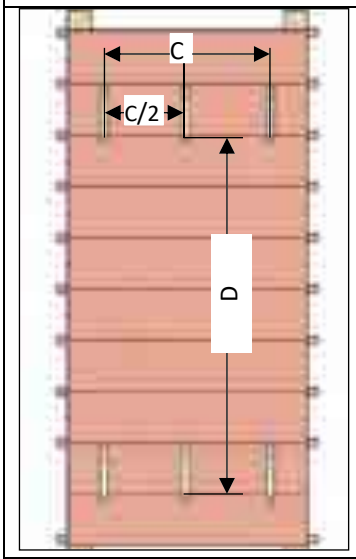


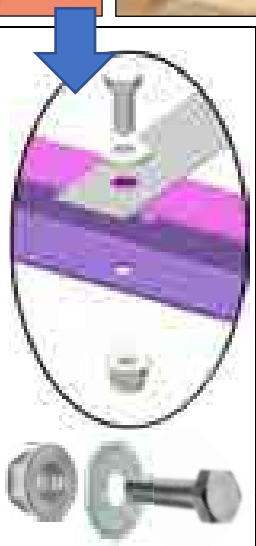
5.1: Mounting option 1: Inox strips









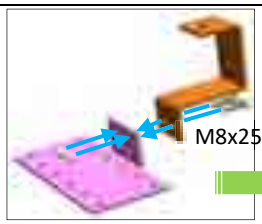


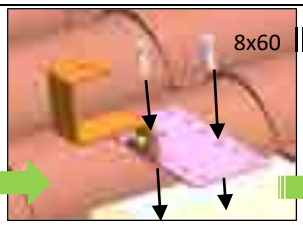
Option 1: Inox strips		
a/a	Description	Qty
1	Inox strips	6
2	Bolt DIN933 M8x20	6
3	Nut DIN6923 M8	6
4	Washer DIN9021 Ø8,5	18
5	Anchor bolt DIN571 M8x60	12

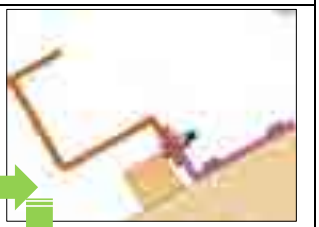
Use 1 or 2 anchor bolts 8x60 with washers for fixing on roof and 8x20 bolts with nuts and washers for hanging the support on the strips

Check layout in previous page for spacing C is C1 or C2, D is D1 or D2

5.2: Mounting option 2: Hook plates

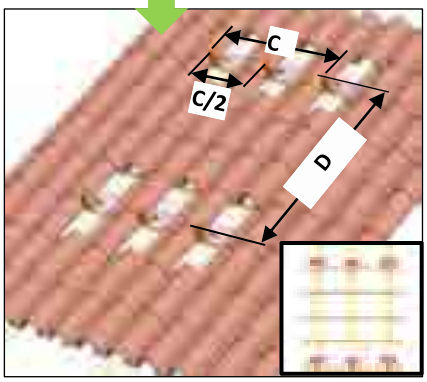




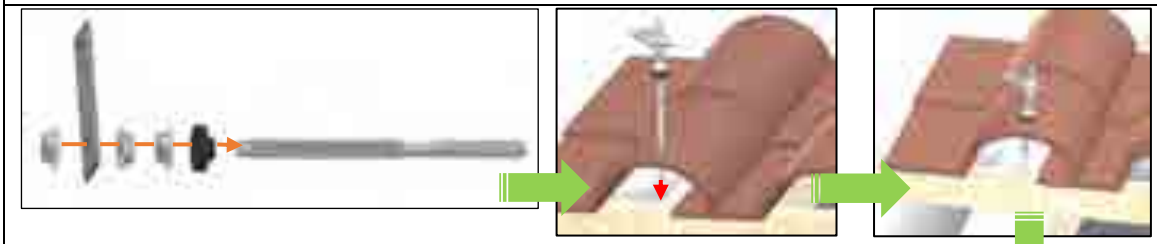


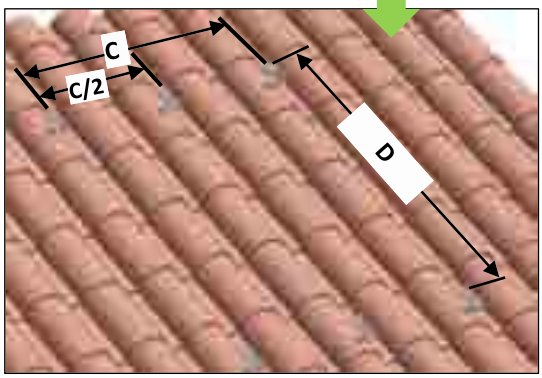
Option 2: hook plates			
a/a	**Description**	**120-160lt**	**200-300lt**
1	Perforrated plate	4	6
2	‘’ς’’	4	6
3	Bolt DIN933 M8x25	12	18
4	Nut DIN6923 M8	12	18
5	Anchor bolt DIN571 M8x60	8	12

Check layout in previous page for spacing C is C1 or C2, D is D1 or D2



5.3: Mounting option 3: Inox Dowel screws

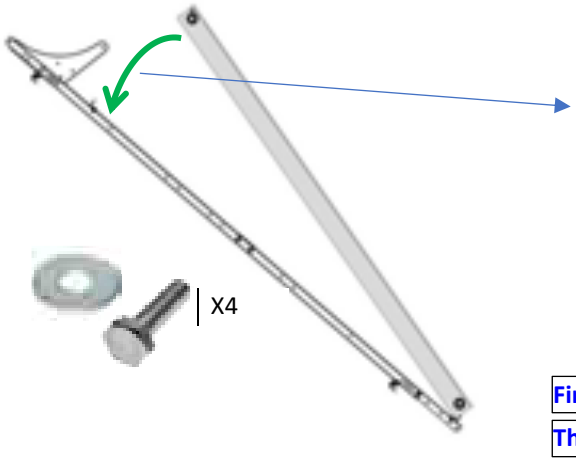


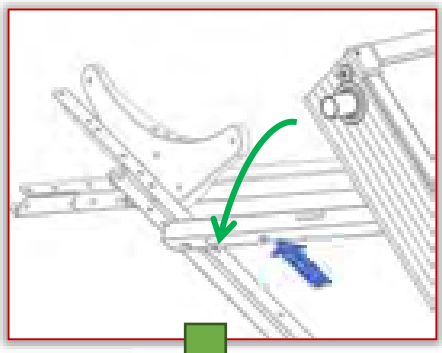


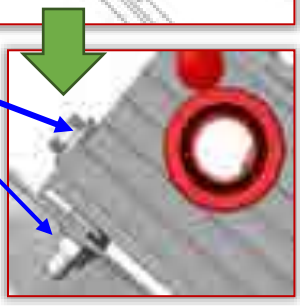
Option 3: Dowel screw		
a/a	Description	Qty
1	Dowel screw M10x300	6
2	Connecting plate	6
3	Nut DIN6923 M10	18
4	Bolt DIN933 M8x20	6
5	Nut DIN6923 M8	6

Check layout in previous page for spacing C is C1 or C2, D is D1 or D2

Step 6: Attach the collector/s

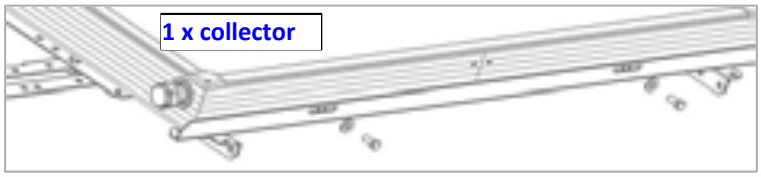


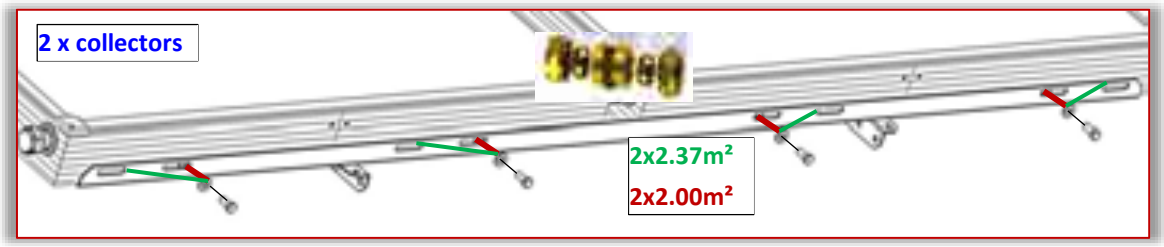




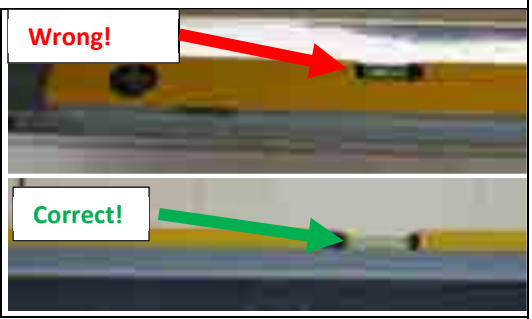
After the collector is placed and tighten, do not forget to tighten the oval bolts that hold the upper bar Nr.7 on the support.

Attach the collector like illustrated. Keep the upper bar Nr.7 or 8 as high as possible until the collector is in position. First tighten the collector's lower part on the lower bar Nr.7 or 8 and then the upper bar Nr.7 or Nr.8



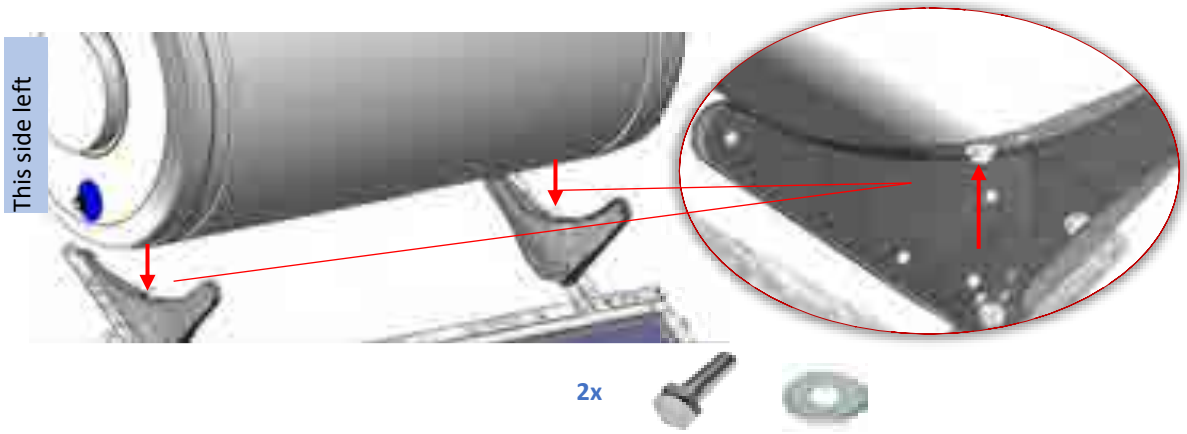


Level the collectors



Place a spirit level on the top horizontal surface of the manifold and verify that the installation is completely parallel to the ground plane.

Step 7: Attach the tank



Attach the tank with the correct orientation illustated above. T**ighten the tank on the tank support using the bolts and washers**