

## INSTALLATION MANUAL & USERS MANUAL



**DOMESTIC SOLAR WATER HEATER**



**THERMOSIPHON SYSTEM**

**CLOSED CIRCUIT**

**MODELS EUROSTAR :**

**120-1-175/120-1-200/150-1-200/150-1-250/200-1-200/200-1-250/200-1-270/200-2-175/300-2-200**



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## **1. Observance of the instructions and standards.**

1.1. It is very important to follow these installation, operating and maintenance instructions, in order to avoid danger of death, injury, property damages, and to have your device functioning properly in the long run.

The company that manufactured and/or supplied this solar system has no liability for the installer and/or the user in case these instructions have not been followed carefully.

1.2. Whether further information or clarifications are needed, please contact the supplier of the product.

1.3. This solar system has been manufactured and tested under the European standards:

EN 12975-1: Thermal solar systems and components – Solar collectors -part 1: General requirements.

EN 12975-2: Thermal solar systems and components – Solar collectors – part 2 : test methods.

EN 12976-1: Thermal solar systems and components – Factory made systems - part 1: General requirements.

EN 12976-2: Thermal solar systems and components – Factory made systems – part 2: Test methods.

## **2. Description of solar system and components**

### **2.1 General Description**

This solar system is a closed loop thermosiphon unit which delivers hot water for domestic use. It consists from the collector, the accumulation tank, the support system, the hydraulic accessories and the thermo-convention liquid.

Four nominal sizes of accumulation tanks are combined with four different sizes of collectors as the table below:

MODEL	TANK NOMINAL SIZES				COLLECTOR NOMINAL SIZES			
	120 ltrs	150 ltrs	200 ltrs	300 ltrs	1,75m <sup>2</sup>	2,00m <sup>2</sup>	2,50m <sup>2</sup>	2,70m <sup>2</sup>
<b>120-1-175</b>	1				1			
<b>120-1-200</b>	1					1		
<b>150-1-200</b>		1				1		
<b>150-1-250</b>		1					1	
<b>200-1-200</b>			1			1		
<b>200-1-250</b>			1				1	
<b>200-1-270</b>			1					1
<b>200-2-175</b>			1		2			
<b>300-2-200</b>				1		2		

**Other combinations are available upon request**

## 2.2. Collector

The collectors are manufactured in 4 sizes with nominal area of 1,75m<sup>2</sup> -2, 00m<sup>2</sup>-2.50m<sup>2</sup> -2,70m<sup>2</sup>. The absorbers of the collectors are made by copper tubes and the fins area by copper or aluminum fins selective or non selective. The fins are welded to the tubes by ultrasonic or laser welding. The frame of the collector is made by extruded aluminum epoxy oven painted to resist ambient conditions.

The glass cover is a "prismatic securit" glass of 4mm thickness for maximum penetration of solar irradiation. At the back and sides of the absorber there is sufficient insulation of rock wool and glass wool to minimize heat losses and resist stagnation temperatures.

Technical data of collectors as the table below:

	Nominal size (m <sup>2</sup> )			
	1,75	2,00	2,50	2,70
<b>Length (mm)</b>	1760	1970	1970	2145
<b>Width (mm)</b>	1000	970	1175	1248
<b>Depth (mm)</b>	86	86	86	86
<b>Weight (kg)</b>	38,0	41,0	49,0	55,1

Stagnation temperature: 100-140°C (depending on selected by client type of absorber's fins)

Test pressure: 10 bar

Operating pressure: 6 bar

## 2.3. Accumulation tank (cylinder)

The solar accumulation tank is an indirect (double circuit) hot water horizontal cylinder. The inner surface is enameled at 850°C to guarantee potable sanitary water for long life. Additionally it is protected against rusting with a large magnesium anode.

The ecologic polyurethane foam insulation guarantees minimum thermal losses even at very low ambient temperatures. The external cover of the tank can resist any extreme weather conditions for life. The internal jacket-type heat exchanger with large surface guarantees the energy transfer to the domestic hot water.

The hot water exits from the hottest zone (level) of the tank. At the same time equal quantity of cold water enters the tank at the coldest zone (level). The solar tank can be optionally (accessory) equipped with immersion electric heater (electric element) for use when not enough solar irradiation is available. The immersion electric heater is available in 2 kW or 3kW or 4 kW at 230 Volt. It is equipped with control thermostat set at 60° C and safety thermostat (thermal cut out) manually reset.

Technical Data of tanks as table below:

	Nominal size			
	120	150	200	300
<b>Length (mm)</b>	1070	1320	1320	2080
<b>Diameter (mm)</b>	500	500	530	530
<b>Weight (kg)</b>	53	59	67	106
<b>Capacity (ltr) (Incl. h.exchanger)</b>	115	143	179	290
<b>Test pressure (bar)</b>	15	15	15	15
<b>Operating pressure (bar)</b>	10	10	10	10
<b>Max temperature (°C)</b>	90 °C	90 °C	90 °C	90 °C
<b>Cold &amp; hot water connectors (male)</b>	½"	½"	½"	½"

## 2.4 Support system

The support system is made from galvanized pressed steel. It is designed for flat roof installation as well as for inclined tiled roof. It can be installed at 4 different inclinations. 18°-25°-32°-40°, so it can meet any roof slope.

The support system can withstand wind velocity up to 120 km/hr. and weight of snow up to 80cm height.

In order to assembly the support system the following tools are needed.

- Spanner 10mm      1 X 
- Spanner 13mm      1 X 
- 2 Spanners 17mm      2 X 
- Screwdriver      1 X 
- Drill Ø10 (for fastening the system on the roof) 

The material list for each set of support system is:

	Part	MODEL								
		120-1-175	120-1-200	150-1-200	150-1-250	200-1-200	200-1-250	200-1-270	200-2-175	300-2-200
<b>SET OF SUPPORT FRAME PARTS</b>										
01	A1 profile in Π section 1465mm	2	2	2	2	2	2	-	2	2
02	A2 profile in Π section 1570mm	-	-	-	-	-	-	2	-	-
03	Tank support 280x195mm	2	2	2	2	2	2	2	2	2
04	D1 profile in Π section 2192mm	2	2	2	2	2	2	-	2	2
05	D2 profile in Π section 2370mm	-	-	-	-	-	-	2	-	-
06	X1: bracket 1248mm (*)	4/-	4/-	4/-	4/-	4/-	4/-	4/-	4/-	2/-
07	X2: bracket 1667mm (*)	-	-	-	-	-	-	-	-	2/-
08	E1 :angle Z shape 2000mm	-	-	-	-	-	-	-	2	2
09	Stainless steel strips 670mm (for inclined roof) (*)	-/4	-/4	-/4	-/4	-/4	-/4	-/4	-/4	-/4
10	Insulated copper pipe Ø15mm (for close loop cold water)	2.12m	2.30m	2.27m	2.37m	2.27m	2.37m	2.57m	2.56m	2.49m
11	Insulated copper pipe Ø 15mm (for close loop hot water)	0.43m	0.42m	0.39m	0.48m	0.39m	0.48m	0.52m	0,895m	0.60m
<b>SET OF FITTINGS</b>										
12	Compression Elbow Male ½" x Ø15	2	2	2	2	2	2	2	2	2
13	Compression Elbow Ø22 x Ø15	2	2	2	2	2	2	2	2	2
14	Compression End Cap Ø22	2	2	2	2	2	2	2	2	2
15	Compression Connector Ø22 x Ø22	-	-	-	-	-	-	-	2	2
16	Pressure Safety Valve 10 bar (for open loop)	1	1	1	1	1	1	1	1	1
17	Pressure Safety Valve 2,5 bar (for closed loop)	1	1	1	1	1	1	1	1	1
<b>SET OF BOLTS AND NUTS</b>										
18	Bolt M10x16 (DIN 933/8.8) (*)	16/12	16/12	16/12	16/12	16/12	16/12	16/12	16/12	16/12
19	Nut M10 (DIN 934/8) (*)	17/12	17/12	17/12	17/12	17/12	17/12	17/12	17/12	17/12
20	Bolt M10x20 (DIN 933/8.8) (*)	1/-	1/-	1/-	1/-	1/-	1/-	1/-	1/-	1/-
21	Washer Ø10 (DIN 125) (*)	1/-	1/-	1/-	1/-	1/-	1/-	1/-	1/-	1/-
22	Bolt M6x20 (DIN 933/8.8)	4	4	4	4	4	4	4	8	8
23	Washer Ø6 (DIN 9021)	4	4	4	4	4	4	4	8	8
24	Anchored Bolt M8x60 (DIN 571)	4	4	4	4	4	4	4	4	4
25	Plastic Rawlplugs D10 (*)	4/-	4/-	4/-	4/-	4/-	4/-	4/-	4/-	4/-
26	Cross Recess Counter Sunk Head Bolt M8x20 (DIN 7969)	-	-	-	-	-	-	-	4	4
27	Washer Ø 8 (DIN 9021)	-	-	-	-	-	-	-	4	4
28	Nut M8 (DIN 934/8)	-	-	-	-	-	-	-	4	4
29	St. steel angles 32 x 45 x 45mm (for inclined roof) (*)	-/2	-/2	-/2	-/2	-/2	-/2	-/2	-/2	-/2
<b>OPTIONAL</b>										
30	Decorative cover 990mm	1	1	1	-	1	-	-	-	-
31	Decorative cover 2000mm	-	-	-	-	-	-	-	-	1
32	Decorative cover 1250mm	-	-	-	1	-	1	1	1	-

(\*) Required quantities for: **flat roof / inclined roof (tiles)**

(All the other quantities are the same for flat roof or inclined roof installation)

## 2.5. Thermo convention liquid

The thermal energy collected from the solar irradiation by the collector/s is transferred to the heat – exchanger of the tank by the thermoconvention liquid, which is naturally recirculated by the thermosiphonic principle in the closed loop -system. The jacket-type heat exchanger is heating the domestic consumption water. The solution contains inhibitors for antirust protection and propylenoglycol for antifreeze protection up to -15°C. If lower temperature protection is needed please consult your supplier.

The solution is a non toxic, non-flammable chemical liquid; however normal protection measures should be taken during handling. Keep it away from children.

Eyes protection: Protective glasses must be used.

Skin protection: PVC or rubber gloves must be used.

- In case of contact with eyes, wash eyes with plenty of water for 15 minutes (with open eyelids)
- In case of contact with skin simply wash with water and soap.

### **Physical Properties:**

Phase: liquid

Color: Light red

Odor: nearly odorless

Specific gravity at 20°C : 1,03g/cm<sup>3</sup>

Freezing point: -15°C

Boiling point: 106°C

Packing: Containers of    12 ltr for 120 and 150 ltr tanks  
                                     18 ltr for 200 ltr tanks  
                                     25 ltr for 300 ltr tanks

## **3. WARNINGS**

Before starting installation, the installer should read and observe carefully the following warnings in order to avoid danger of death, injury or property damages.

3.1. You may elevate on roof the parts of the solar system, ONLY when an internal staircase of enough width, exists in the building reaching the roof. Otherwise you must use a proper CRANE to elevate the parts. It is not allowed to stand at the edge of any roof (flat or inclined) and pull by ropes any part. DANGER OF DEATH.

3.2 The collectors have a large surface exposed to wind. NEVER install a system with strong winds. Choose a calm day. DANGER OF DEATH or heavy injury.

3.3. If the installation will be on an inclined roof (tiles), there is danger of slipping. Use always SAFETY BELTS (securely fastened) from a higher position of roof. DANGER OF DEATH.

3.4. After completion of the installation make sure that all bolts and nuts are fastened well and the whole system is securely fastened to the roof. The support system can withstand air velocities up to 120 km/hr. Make sure that the fastening on roof can withstand as well at least same air velocity. DANGER OF DEATH.

3.5. Frequently some parts of the support systems have sharp edges. Use always gloves when you are handling the support system, in order to avoid danger of injuring the hands. DANGER OF INJURY.

3.6. The collectors when exposed to solar irradiation during installation get very hot; above 120° C in 2-3 minutes. There is danger of burning the hands when touching the copper piping outlets. You must leave the carton package cover ON the glass until completion of the installation, or you must use thermo resistance gloves. DANGER OF INJURY.

3.7. If you are using hands to position the tank on the support system at least 2 people are needed for systems 120-150-200 and 4 people for 300 ltr.

It is preferred to use a crane. In this case make sure that the pulling belts are on each side between the piping outlets of the boiler so that it cannot slip.

3.8. In cases where the solar system is large and the hot water consumption is low, the hot water in the solar tank may reach temperatures up to 90°C. In this case there is danger of burns for the user, especially for children.

It is strongly recommended to install a thermostatic mixing valve set at 55-60°C anywhere at the hot supply piping and before the hot outlets of the building (before taps, showers, e.t.c.)

3.9. If the solar system is equipped with the (optional) electric immersion heater, the electrical connection should be done by a fully licensed electrician following the national rules for electric installation.

The immersion heater is single phase 230 Volt of 2kw or 3 Kw or 4 Kw power.

There is an "earth point" on the flange of the heater which must be connected to the central "earth" of the building. In any case the support of the solar system must be "earthed" with copper wire of 16 mm<sup>2</sup> to the earthing grid of the building. This will also serve as lightning protection.

3.10 In a solar system equipped with the optional electric heater, after completion of electrical and plumbing installation test the operation of the electric heater and thermostat, ONLY AFTER FILLING the tank with city water. Otherwise the electric heater will be fused out. (destroyed)

3.11 Make sure that before filling the tank with city water the pressure safety non-return valve has been installed on the cold water inlet with the arrow pointing to the tank. This valve will open and release the pressure when by overheating or other reason it has exceeded 10 bar.

3.12. When handling the thermo-convention liquid make sure that you wear protective glasses for the eyes and gloves for the skin.

3.13. When temporarily leave the collectors on the roof during installation ALWAYS position them with glass facing the sky. Otherwise there is danger that water from rain may enter the collector from the back side through the ventilation holes. If this happens the insulation will be wet and the glass will have humidity on inside surface. Drying will take a very long time.

#### **4. RECOMENDATIONS**

4.1 The cold water piping should withstand pressure of 10 bar. The hot water piping should withstand temperature of 95° C at pressure 10 bar.

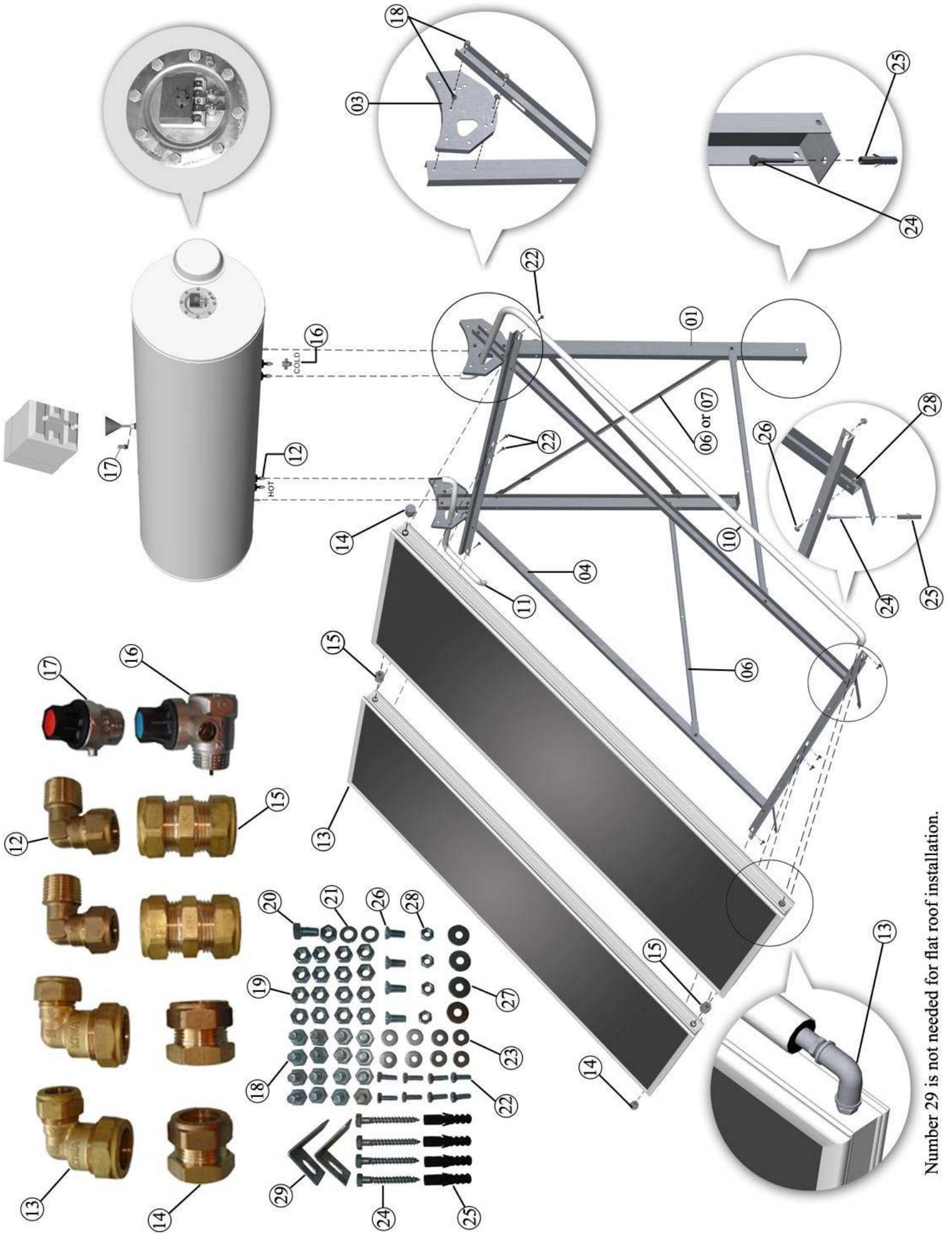
4.2. The cold and hot water piping should be well insulated to eliminate heat losses and prevent as possible freezing. The insulation material should withstand weather conditions like rains, snow and solar irradiation.

4.3. On the hot water supply piping, install a reliable thermostatic mixing valve set at 55°C to 60 °C to prevent higher temperature hot water to reach the consumption points.









## 7. INCLINED ROOF-TILES

### **ASSEMBLY INSTRUCTIONS FOR SYSTEMS WITH 1 COLLECTOR :**

**MODELS: 120-1-175/120-1-200/150-1-200/150-1-250/200-1-200/200-1-250/200-1-270**

#### **Assembly steps:**

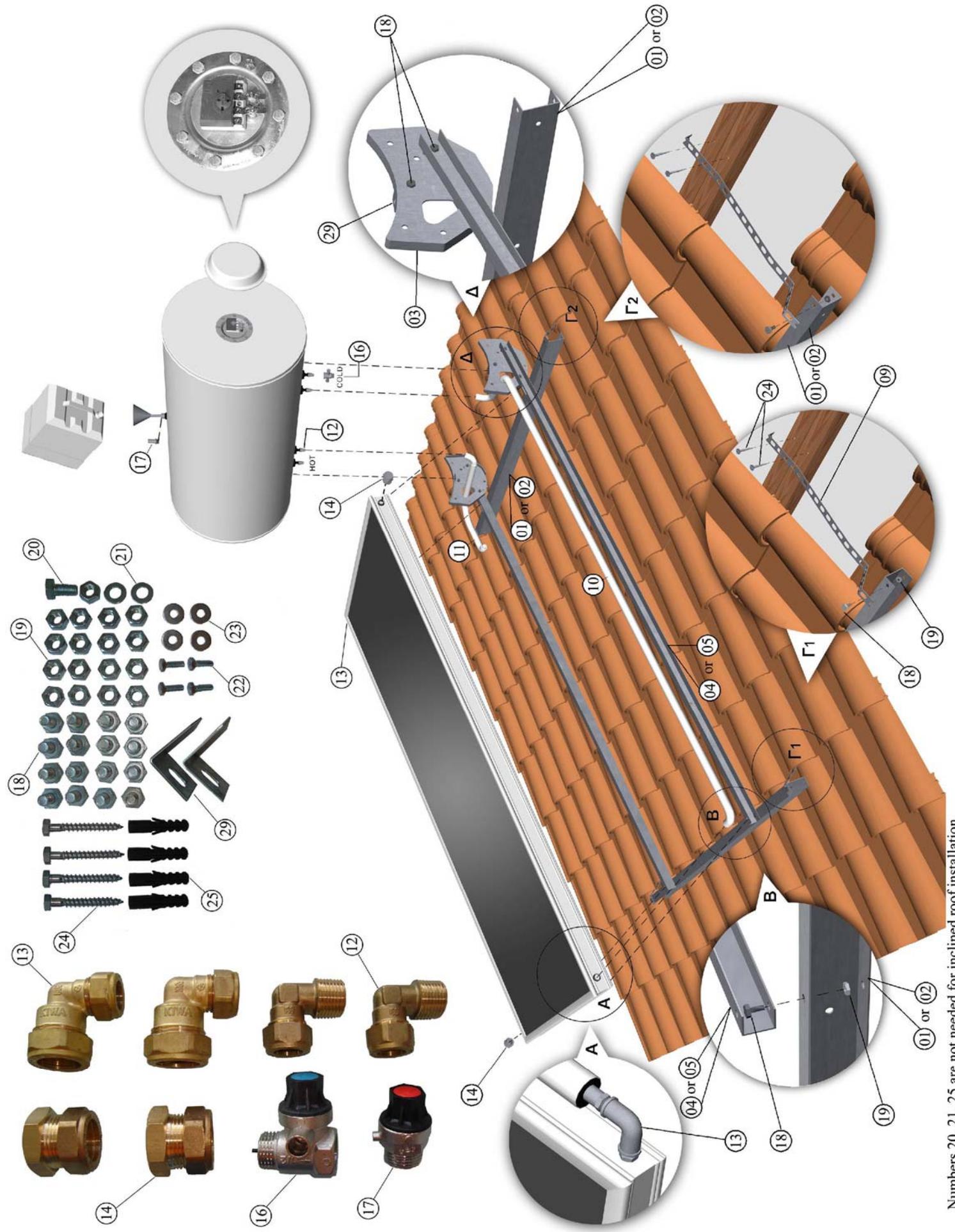
- 7.1 Open the pack of the support system. Identify the items from table (page 5) and the drawing next page.
- 7.2 Assembly the parts among themselves using the set of bolts and nuts included in the pack. When assembling the tank supports to the profiles D1 (or D2), pay attention to use the proper pair of holes to match the roof inclination, so that the tank would remain (as close as possible) vertical. Make sure to use the 2 angles (part 29) for fastening the tank. At this stage do not fasten tight the bolts.
- 7.3 Fix the support system on the roof structure as shown on drawing. Make sure that this kind of fixing is suitable to withstand at least 120 Km/hr wind speed. If in doubt, consult your supplier, or your engineer for possible alternative way of fixing.
- 7.4 Fix collector on support as shown on drawing using the M6X20 bolts and washers. Do not fasten tight yet
- 7.5 Position the tank on supports. Two people for 200 ltr and four people for 300 ltr are needed to handle it from each end. Fasten well with the 2 bolts M10X30 the tank on the support system. (The 2 bolts are already mounted on the tank and have to be temporarily removed before placing the tank on the support).
- 7.6 Now, fasten well the collector on support and then fasten well all the parts of the support system among themselves.
- 7.7 Connect the insulated copper (or plastic) pipes at closed loop system. The long pipe is for cold return to bottom of collector. The short pipe is for hot supply from top of collector. Make sure that you fasten well the "2 compression" fittings in order to tight the closed loop. Fix and fasten well the 2 compression end caps on the 2 remaining open ends of the collector.
- 7.8 Connect the non-return pressure safety valve on the cold water inlet of tank making sure that the arrow is pointing towards the tank (upwards).
- 7.9 Connect cold water supply using always a shut-off water valve. (Make sure the pipes are well insulated).
- 7.10 Connect hot water outlet piping to consumption points. It is strongly recommended to install a thermostatic mixing valve set at 50-55°C on the hot water piping anywhere before the consumption points. (Make sure the pipes are well insulated).
- 7.11 Fill the tank with cold water. Leave open one "tap" of hot water, so that air will be flushed out and the tank will be completely filled up.
- 7.12 Fill up the closed loop system with thermo-convention liquid from the top pipe of tank. Make sure that no air-bubbles are coming out so filling is completed.
- 7.13 Screw pressure relief valve 2,5 bar for closed loop system to the top pipe of the tank.
- 7.14 Check for leakages on open or closed loop system.
- 7.15 The (optional) electric heater should be connected by a fully licensed electrician following the national standards for electric installations.

Connections points on thermostat:

No 1 : Line (220 volt)  
No 4 : Neutral

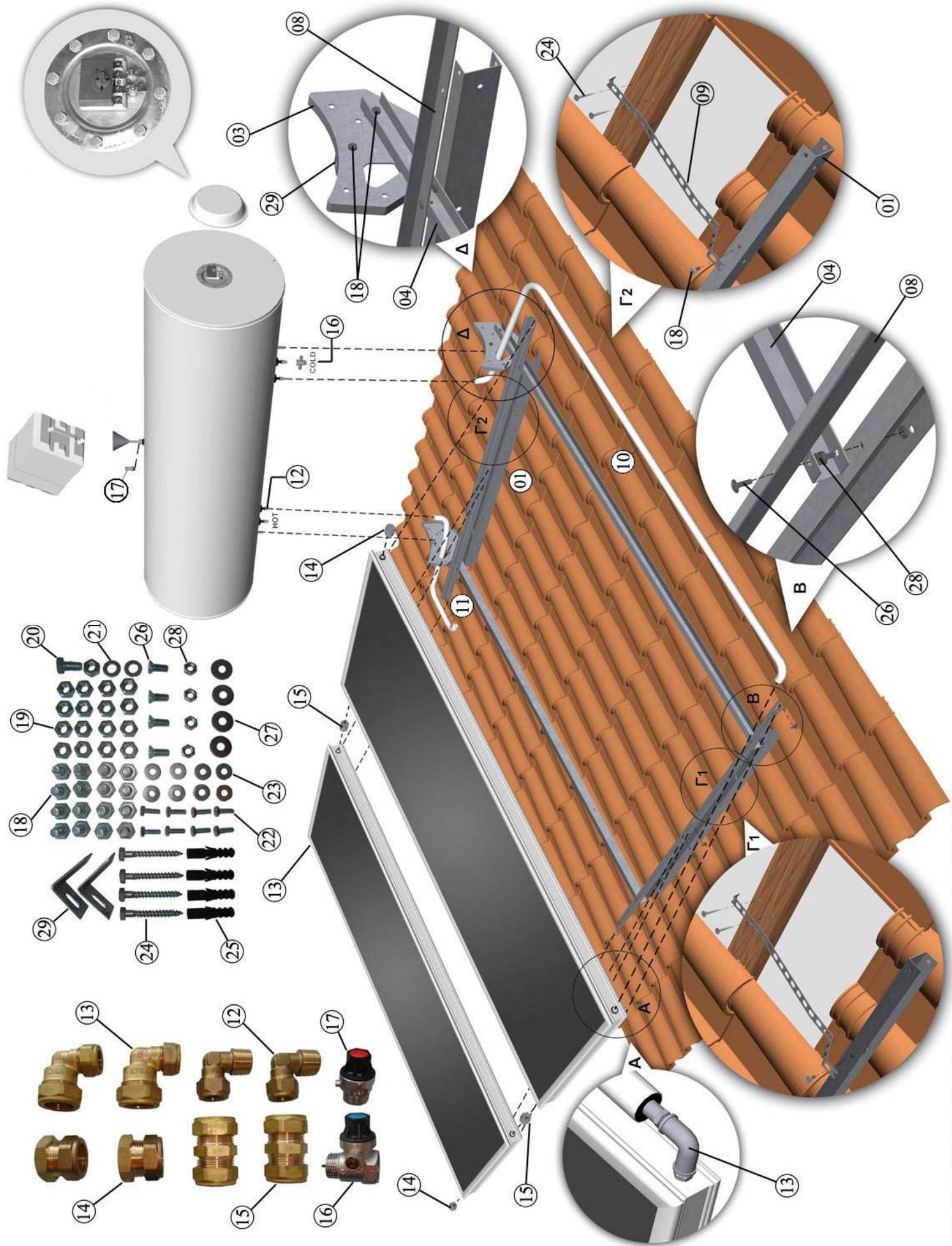
On metal flange

:  earth



Numbers 20, 21, 25 are not needed for inclined roof installation.





Numbers 20, 21, 25 are not needed for inclined roof installation.

## **9. CHECK LIST FOR INSTALLER**

Before leaving from the installation, make sure that:

1. Cold and hot insulated pipes of closed loop system have a continuous ascending slope to the tank. Small partitions of the piping is allowed to be horizontal, but never descending to the tank. This will allow the air bubbles to move towards the tank, in the internal expansion tank and would not obstruct recirculation.
2. The closed loop system is operating properly. This can be identified, after one hour of sun shine by touching the hand on the hot inlet of tank (from top of collector) and at the same time on the cold outlet (to bottom of collector). There must be a significant temperature difference which means that the natural recirculation is functioning.
3. There is no leakage at the closed loop or open loop circuit.
4. All bolts and nuts of the support system have been tightened very well and that the fixing on roof is made properly to withstand strong winds.
5. Cold supply and hot return piping are properly installed and secured so that the wind will not move them. They should be properly insulated with a certified insulation material of minimum thickness 9mm and maximum thermal conductivity of 0.037 W/m<sup>°K</sup>
6. The (optional) electric heater is functioning properly and the thermostat is set maximum at 55°C to 60°C
7. You have explained to the users the operation of their solar system and the capabilities of the installed model.
8. You have signed and delivered to the owner the guarantee.

## **10. OPERATION INSTRUCTIONS**

- Your solar heater is a two circuit system. The primary circuit recirculates from collectors to a heat exchanger inside the tank, thus transferring solar energy to the domestic water.
- Primary system contains antifreeze glycol for frost protection of collectors.
- Temperature of hot water depends on solar irradiation of the day, season of year, ambient temperature, cold water inlet temperature, time of day using hot water, quantity used.
- Best timing for use: 12.00 noon – 3.00p.m. and 5.00 p.m. to 8.00 p.m.
- If you need hot water early in the morning, avoid excess consumption previous evening.
- For a shower, 30-60 ltr hot water is needed.
- For filling bathtub, 120-150 ltr hot water is needed.
- If your solar system is equipped with the optional electric heater, switch on only when needed and for 1 to 2 hours. NEVER leave electric heater permanently ON. The thermostat is adjusted to 55°C-60°C.

## **11.MAINTENANCE INSTRUCTIONS**

For long-life of your solar heater follow below given instructions:

- At least once a year check for excessive dust on collectors. Wash with cold water at early morning before 10.00 a.m.
- Every two years replace magnesium protection anode. (contact your installer)
- Every 4 years check and paint if necessary with grey color primer the support frame.
- When away from home for long period in summer it would be better to cover the collectors with white cloth (or similar) to prevent overheating.
- At extremely cold winter nights (below 0°C) leave a hot water tap inside house slightly open to prevent pipe freezing.
- If solar heater doesn't warm up with sunshine, check for leakage in primary circuit. Restore the leakage, add antifreeze. Check also for leakages in domestic hot water piping network. Restore if needed.
- When by any reason glass is broken, replace the soonest possible.
- When electric heater is not functioning check for burned fuse or for "safety" contact of thermostat activation. Press inside the button with the mark ▼ to restore and adjust thermostat lower.

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**SOLE S.A.**

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