NOBEL INTERNATIONAL

TECHNICAL MANUAL

COMBI Tanks

Installation, maintenance & use instructions

CONTENTS

GENERAL INFORMATION

In the present manual you will find all necessary instructions with regard to the installation, operation and maintenance of the product.

The company is active in the Solar Energy Field with high-tech equipment, ultra-modern facilities and certified products of high quality. Our experience and know-how support our co operations, before and after sales, both in Europe and internationally.

Nowadays, the necessity for production and saving of energy without at the same time polluting the environment has become common knowledge. The planet's conventional energy resources are diminishing to a threatening level as our society's energy requirements are increasing, generating pollutants that affect the climate's balance. Renewable energy sources promise a solution to the energy problem as well as to pollution. Gradually, the international legislation is changing and encouraging - or even imposing - the use of alternative energy products, with the aim to satisfy energy requirements without endangering the environment.

DOMESTIC HOT WATER CONSUMPTION

Statistically, it is estimated that the mean family consumption is 35 to 50 litres daily per person. If we add the consumption of a washing machine and a dishwasher, when these are connected to the solar water storage tank, then each requires 20 litres per day (per wash). Thus, a family of four, for example, with a mean hot water consumption of 40 litres per person, needs an 160 litres solar water heater. If household appliances connected to the solar water heater are added, then the demand increases by at least 40 litres daily. In order to take full advantage of the solar water heater, maximum use of hot water should be made during daytime, so that the system can continuously produce hot water during the daylight hours, maintaining thus its maximum efficiency.

SOLAR WATER HEATING

The collecting surface absorbs solar energy and heats the liquid (water or antifreeze mixture) that circulates in the water element. This liquid is directed to the water storage tank where it heats the water. The factors that affect the temperature of the water supplied by a solar system are many and their values vary according to the season, the time of day and the location. Keeping in mind that the solar system is a system that is exposed to the weather conditions, basic parameters affecting its performance are the mains water temperature, the available solar energy and the ambient temperature. The mains water does not have a constant temperature throughout the year, being much colder in winter compared to summer. Considering 45°C as a satisfactory temperature for the domestic hot water (in order to fulfil the needs of a home) and based on statistic values, in winter the temperature of the mains water has to be increased by approximately 35°C, whereas during the summer the increase is 20°C.
Similarly, the available solar energy does not remain the same throughout the year, being much less in the winter months than in the summer months. During periods of reduced sunlight and low ambient temperatures, the solar water storage tank assures the preheating of the water and is assisted by an electrical heating element or the central heating water storage tank (triple action solar water storage tanks). As far as night-time temperature losses are concerned, these are limited as much as possible by the solar system's powerful thermal insulation. They are nevertheless affected by ambient temperatures, which vary depending on the location and the weather.

COMBI SYSTEMS

The Combi (combination) tank with integrated domestic hot water tank combines both applications in an ideal way. Various heat generators can be connected to this tank without enormous control efforts.

Solar heating systems often contain two storage tanks: the **buffer storage tank** to provide storage capacity for **backup heating** (space heating) purposes and the **hot water tank** to heat potable water used for baths, showers and so on. To save space and to avoid the need for complex regulation strategies controlling the distribution of the thermal energy between both storage tanks, the so called **Combi systems** have been developed, which solve both problems by their design.

Among the most widely-used types of combi systems are the tank-in-tank storage systems. They consist of a big buffer tank containing the heating-circuit water; inside of this big tank a second, smaller inner tank containing potable water is used to provide hot water. So as the solar system heats the heating-circuit and the potable water simultaneously, the distribution of warmth between both circuits is governed automatically by the design of the tank. A heat exchanger transfers heat from the collector to the heating-circuit water in the outer shell; the surface of the inner tank transfers heat from the heating-circuit water to the potable water.

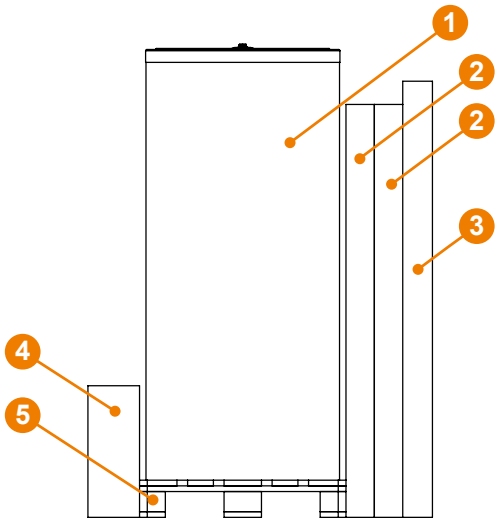
PACKAGING

Each model packaging contains all the necessary equipment:

1. Water storage tank
2. Collectors*
3. Support base system & fittings and accessories*
4. Hydraulic Unit*

** Optional*

The water storage tank is placed over a palette and tightened with a stretch film. The collector is packed in a carton box. All the parts of the support base system, with the connection fittings, the antifreeze liquid and the other accessories are packed in a carton box. The fittings and the accessories of each appliance appear in the following table *(If optional goods (*) are purchased)*:



1. Boiler
2. Collector(s)
3. Support base, fittings & Accessories
4. Hydraulic Unit
5. Palette

COMBI SYSTEMS FITTINGS & ACCESSORIES					
FITTING & ACCESSORIES FOR COLLECTORS			KIT FOR FC BOILER		
	Quantity	Description		Quantity	Description
	2 PCS	END CAP Ø22 COPPER		1 PC	HYDRAULIC UNIT - DIFFERENTIAL THERMOSTAT
	1 PC	MEC. TIGHTENED FEMALE CONNECTOR 3/4, Ø22		1 PC	COLLECTOR SENSOR (BLACK)
	1 PC	T CONNECTOR WITH MANUAL VENTILATION & SENSOR OPTION		2 PCS	WATER STORAGE TANK SENSOR (GREY)
	2n*- 2 PCS	CONNECTOR Ø22 COPPER X Ø22 COPPER		1 PC	DIFFERENTIAL THERMOSTAT INSTRUCTIONS
				1 PC	HYDRAULIC UNIT INSTRUCTIONS
				1 PC	EXPANSION TANK
				1 PC	INOX FLEXIBLE TUBE

* n: number of collectors

LABELING

COMBI boilers are identified by a sticker including all the details of the product. The information provided on the sticker are important for the future identification of the product.

COMBI TANK **TYPE: xxxlt / xxxlt / xHE**

Capacity outer tank: xxx lt
Capacity inner tank: xxx lt
Weight: xxx kg
Max. working pressure (outer): xxx bar
Max. working pressure (inner): xxx bar
Max. working temperature: xxx °C
Lower heat exchanger surface S1: xxx m² *
Max. pressure of heat exchangers: xxx bar *

IP23 **MADE IN EU**
CE
S/N: xxxxxx
Date: xx/xxxx

** When applied*

COMBI TANK TECHNICAL DATA

- **Inner hot water tank:** Enameled according to DIN 4753.
- **Outer buffer heating tank** - S 235 JR high quality steel
- **External housing** of special PVC & highly resistant ABS caps of excellent aesthetics.
- **The tanks are checked individually** upon exit from the enameling unit, assuring the top quality of the enamel.
- **Thermal insulation:** which minimises heat losses, maintaining the hot water temperature: highly efficient Soft PU insulation 100 mm
- **External thermoindicator** for direct temperature monitoring
- **Automatically regulated thermostat** with bipolar protection and auxiliary fuse*
- **4 pockets for thermosensors** (for accurate temperature data transmission)
- **4 (left side) + 5 (right side) system connections**
- **Inlet connection** (cold water) on the top of the tank
- **Outlet connection** (hot water) at the bottom of the tank
- **Air ventilation**
- **Draining outlet**

- **Electrical components:**
  - Heating element rated according to the local regulations of the country of destination*
  - Automatically regulated thermostat with bipolar protection and auxiliary fuse*

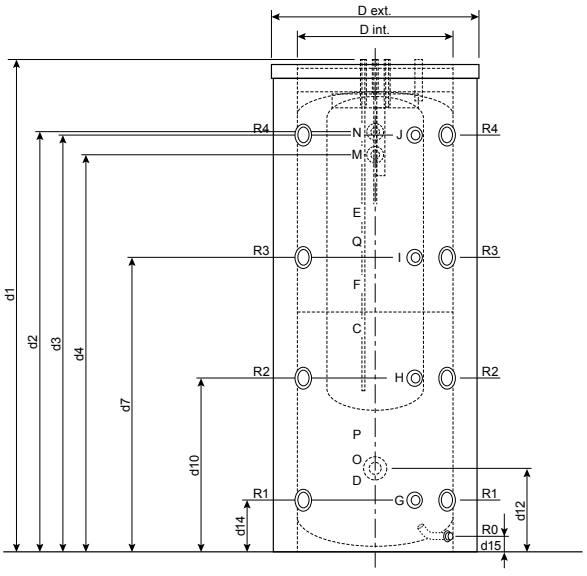
** The Electrical components are optional and provided to order (electricity to be used as a back up power).*

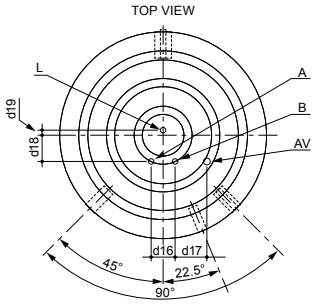
*All electrical components are CE marked according to **EN 60335-1 and EN 60335-2-21**.*

Model	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	d11	d12	d13	d14	d15	d16	d17	d18	d19	D Ext.	D. Int
Combi 600 0HE	2065	1747	1738	1657	-	-	1230	-	-	722	-	307	-	214	67	100	130	110	22	850	650
Combi 600 1HE	2065	1747	1738	1657	-	-	1230	-	934	722	489	307	289	214	67	100	130	110	22	850	650
Combi 600 2HE	2065	1747	1738	1657	1408	1257	1230	1107	934	722	489	307	289	214	67	100	130	110	22	850	650
Combi 800 0HE	1956	1600	1502	1500	-	-	1122	-	-	742	-	400	-	362	81	100	150	100	22	990	790
Combi 800 1HE	1956	1600	1502	1500	-	-	1122	-	1022	742	582	400	362	362	81	100	150	100	22	990	790
Combi 800 2HE	1956	1600	1502	1500	1509	1378	1122	1122	1022	742	582	400	362	362	81	100	150	100	22	990	790
Combi 1000 0HE	2141	1795	1775	1695	-	-	1304	-	-	833	-	400	-	362	81	100	150	100	22	990	790
Combi 1000 1HE	2141	1795	1775	1695	-	-	1304	-	1187	833	582	400	362	362	81	100	150	100	22	990	790
Combi 1000 2HE	2141	1795	1775	1695	1747	1502	1304	1360	1187	833	582	400	362	362	81	100	150	100	22	990	790
Combi 1500 0HE	2216	1740	1726	1640	-	-	1293	-	-	860	-	470	-	427	40	100	150	110	22	1200	1000
Combi 1500 1HE	2216	1740	1726	1640	-	-	1293	-	1087	860	647	470	427	427	40	100	150	110	22	1200	1000
Combi 1500 2HE	2216	1740	1726	1640	1733	1461	1293	1293	1087	860	647	470	427	427	40	100	150	110	22	1200	1000

FC0: buffer **FC1:** boiler with 1 HE (solar) **FC2:** boiler with 2HE (solar and backup) ***units in mm**

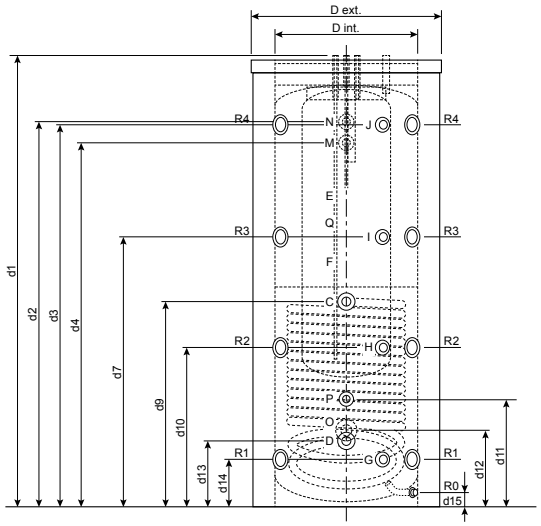
COMBI 0HE

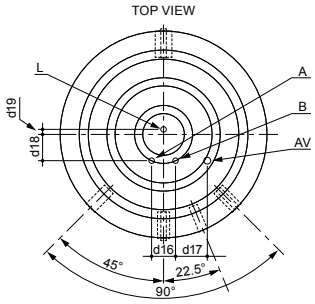




	Description	600lt	800lt	1000lt	1500lt
A	Cold water inlet	½" M	1" M	1" M	1" M
B	Hot water outlet	½" M	1" M	1" M	1" M
AV	Air ventilation	½" F	½" F	½" F	½" F
L	Recirculation	½" M	½" M	½" M	½" M
M	Thermometer	Ø14 x 1.5	Ø14 x 1.5	Ø14 x 1.5	Ø14 x 1.5
N	Thermoregulator	½" F	½" F	½" F	½" F
O	Heating element	1 ½" F	1 ½" F	1 ½" F	2" F
R0	Level 0	¾" M	1 ½" M	1 ½" M	¾" M
R1	Level 1	1 ½" F	1 ½" F	1 ½" F	2" M
R2	Level 2	1 ½" F	1 ½" F	1 ½" F	2" M
R3	Level 3	1 ½" F	1 ½" F	1 ½" F	2" M
R4	Level 4	1 ½" F	1 ½" F	1 ½" F	2" M
G	Sensor pocket 1	½" F	½" F	½" F	½" F
H	Sensor pocket 2	½" F	½" F	½" F	½" F
I	Sensor pocket 3	½" F	½" F	½" F	½" F
J	Sensor pocket 4	½" F	½" F	½" F	½" F

COMBI 1HE





	Description	600lt	800lt	1000lt	1500lt
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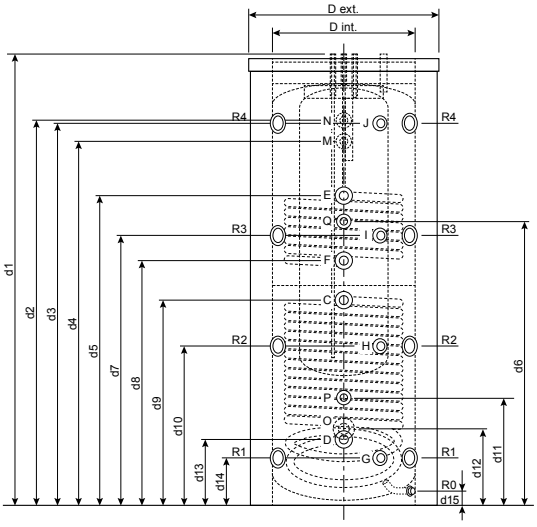
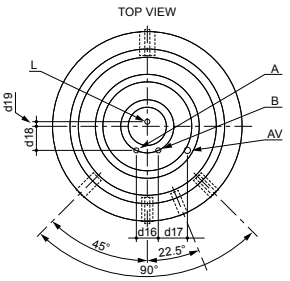
L	Recirculation	½" M	½" M	½" M	½" M
M	Thermometer	Ø14 x 1.5	Ø14 x 1.5	Ø14 x 1.5	Ø14 x 1.5
N	Thermoregulator	½" F	½" F	½" F	½" F
O	Heating element	1 ½" F	1 ½" F	1 ½" F	2" F
R0	Level 0	¾" M	1 ½" M	1 ½" M	¾" M
R1	Level 1	1 ½" F	1 ½" F	1 ½" F	2" M
R2	Level 2	1 ½" F	1 ½" F	1 ½" F	2" M
R3	Level 3	1 ½" F	1 ½" F	1 ½" F	2" M
R4	Level 4	1 ½" F	1 ½" F	1 ½" F	2" M
G	Sensor pocket 1	½" F	½" F	½" F	½" F
H	Sensor pocket 2	½" F	½" F	½" F	½" F
I	Sensor pocket 3	½" F	½" F	½" F	½" F
J	Sensor pocket 4	½" F	½" F	½" F	½" F
P	Temperature sensor coil 1	½" F	½" F	½" F	½" F
Q	Temperature sensor coil 2	½" F	½" F	½" F	½" F
C	Lower HE Inlet	1" F	1" F	1" F	1 ½" M
D	Lower HE Outlet	1" F	1" F	1" F	1 ½" M

COMBI 2HE





	Description	600lt	800lt	1000lt	1500lt
A	Cold water inlet	½" M	1" M	1" M	1" M
B	Hot water outlet	½" M	1" M	1" M	1" M
AV	Air ventilation	½" F	½" F	½" F	½" F
L	Recirculation	½" M	½" M	½" M	½" M
M	Thermometer	Ø14 x 1.5	Ø14 x 1.5	Ø14 x 1.5	Ø14 x 1.5
N	Thermoregulator	½" F	½" F	½" F	½" F
O	Heating element	1 ½" F	1 ½" F	1 ½" F	2" F
R0	Level 0	¾" M	1 ½" M	1 ½" M	¾" M
R1	Level 1	1 ½" F	1 ½" F	1 ½" F	2" M
R2	Level 2	1 ½" F	1 ½" F	1 ½" F	2" M
R3	Level 3	1 ½" F	1 ½" F	1 ½" F	2" M
R4	Level 4	1 ½" F	1 ½" F	1 ½" F	2" M
G	Sensor pocket 1	½" F	½" F	½" F	½" F
H	Sensor pocket 2	½" F	½" F	½" F	½" F
I	Sensor pocket 3	½" F	½" F	½" F	½" F
J	Sensor pocket 4	½" F	½" F	½" F	½" F
P	Temperature sensor coil 1	½" F	½" F	½" F	½" F
Q	Temperature sensor coil 2	½" F	½" F	½" F	½" F
C	Lower HE Inlet	1" F	1 ½" F	1 ½" F	1 ½" M
D	Lower HE Outlet	1" F	1 ½" F	1 ½" F	1 ½" M
E	Upper HE Inlet	1" F	1" F	1" F	1 ½" M
F	Upper HE Outlet	1" F	1" F	1" F	1 ½" M

COMBI 0HE					
MODEL		600	800	1000	1500
Actual capacity buffer tank	l	461	616	750	1184
Actual capacity hot water tank	l	142	184	184	302
Net Weight	kg	139	198	211	293
Insulation	mm	100	100	100	100
Buffer tank max. working temperature	°C	95	95	95	95
Hot water tank max. working temperature	°C	95	95	95	95
Buffer tank nominal pressure	MPa	0.3	0.3	0.3	0.3
Hot water tank max. pressure	MPa	1	1	1	1

COMBI 1HE					
MODEL		600	800	1000	1500
Actual capacity buffer tank	l	447	590	702	1153
Actual capacity hot water tank	l	142	184	184	302
Net Weight	kg	167	241	296	348
Insulation	mm	100	100	100	100
Heat exchanger surface	m^2	2.25	2.89	3.3	3.47
Heat exchanger content	l	13.7	26.2	29	31.4
Buffer tank max. working temperature	°C	95	95	95	95
Hot water tank max. working temperature	°C	95	95	95	95
Coil heat exchanger max. temperature	°C	110	110	110	110
Buffer tank nominal pressure	MPa	0.3	0.3	0.3	0.3
Hot water tank max. pressure	MPa	1	1	1	1
Coil heat exchanger max. pressure	MPa	0.6	0.6	0.6	0.6

COMBI 2HE					
MODEL		600	800	1000	1500
Actual capacity buffer tank	l	440	578	693	1128
Actual capacity hot water tank	l	142	184	184	302
Net Weight	kg	180	264	315	384
Insulation	mm	100	100	100	100
Lower heat exchanger surface	m^2	2.25	2.89	3.3	3.47
Upper heat exchanger surface	m^2	1.04	1.54	1.54	2.3
Lower heat exchanger content	l	13.7	26.2	29	31.4
Upper heat exchanger content	l	6.4	9.4	9.4	20.5
Buffer tank max. working temperature	°C	95	95	95	95
Hot water tank max. working temperature	°C	95	95	95	95
Coil heat exchanger max. temperature	°C	110	110	110	110
Buffer tank nominal pressure	MPa	0.3	0.3	0.3	0.3
Hot water tank max. pressure	MPa	1	1	1	1
Coil heat exchanger max. pressure	MPa	0.6	0.6	0.6	0.6

GENERAL PREVENTION MEASURES

- Please respect the instructions related to accidents prevention and the safety rules during the installation of the solar thermal systems as well as the piping.
- Please keep the work place clear and free of objects obstructing the execution of works.
- Do not let children, pets and other people to come in contact with the tools or close to the working place. This has to be respected, especially in case of existing buildings renovation.
- Store the antifreeze liquid in a safe place away from children.
- During the execution of maintenance, service or installation modification works, please remove the electrical devices and tools current collector or protect the electrical devices and electrical tools against unintended activation.
- Use only the tools intended to be used for this specific solar system. The use of other components or inappropriate tools can cause accidents.

Requirements related to the personnel

- The installation of our Solar Thermal systems can only be undertaken by authorized specialized companies and trained personnel.
- Works in electrical installations or conductors have to be executed by trained & specialized electro technicians only.

Labour uniforms

- Have protection glasses on, as well as appropriate work uniform, protection shoes, protection helmet and special long hair net.
- Do not wear baggy clothes or jewelry, as they me be trapped in movable parts.
- If, despite the use of protection glasses, antifreeze liquid comes in contact with your eyes, wash off your eyes with plenty of water and with the eyes wide open.
- Please wear protection helmet during the installation works executed at the level of or above the head.

Installation of the water storage tank

- For the transportation, mounting & installation of the tank use forklifts suitable for the dimension and weight of the tank.
- Please protect the enameling surface from beatings during transportation and installation.
- Due to the tank's weight, there is a risk of accidents. Please make sure that the bearing capacity of the ground where the tank is going to be installed is adequate, when the tank is full.

INSTRUCTIONS FOR THE INTERCONNECTION OF COLLECTORS IN SOLAR FIELDS

In a central collector bank, the maximum number of collectors, must not be greater than seven-eight (e.g. 14-16m^2) per row. The collector banks must be connected in parallel between themselves and at a distance of 90cm (when at an angle of 25°) to 120 cm (when at an angle of 40°). At the beginning and the end of each line, there must be a valve and a 3/4" x 1/2" x 3/4" T-piece for the installation of a submersible thermometer. In addition at the end of the last row, the differential thermostat sensor be placed in place of the collector's sensor (Ø8). The temperature difference of the differential thermostat must be set to 8°C, when the boiler sensor is at the top point and to 10°C, when the boiler sensor is at mid point. For example, for a 20m^2 bank of collectors (i.e. 10 collectors of 2m^2) we recommend: 20m^2 x 40 lt/m^{2}h = 800 lt/h and Ø18 diameter piping connecting the collectors to the boiler, insulated with the respective insulation.

RECOMMENDATIONS ON HEAT TRANSFER MEANS AND SAFETY AND PROTECTION MEASURES DURING FILLING, OPERATION AND MAINTENANCE OF THE SYSTEM

For the protection of the collectors' circuit from frost, a solution of water and propylene glycol is used, which is non-toxic, at a ratio suitable to provide frost protection down to -10° within the collector at an exterior temperature of -20°.
Once the system has been placed and until the installation is complete the glass panels of the collectors must remain covered, until the boiler is filed with service water, so as to avoid the boiling of the filling liquid or the breakage of the glass.

The system must have the filling liquid replaced or topped up every 2 - 3 years. The filling must be accomplished with a suitably diluted liquid. In addition, the circuit needs the provision of a differential thermostat with a sensor for the protection of the circuit from frost which shall activate the circulation pump when the internal temperature reaches +4°C.

Additionally, under no circumstances must the automatic filling valve be left open, as there is the danger that if the collector bank has a small leak at some point which is leaking water, the automatic filling valve (if left open) will continuously top up the system with water and so the ratio of the anti freeze liquid will be altered and the collectors may break at the first sign of frost.

MAXIMUM OPERATING PRESSURE, PRESSURE DROP, MAXIMUM AND MINIMUM ANGLE

The maximum operating pressure (taking into account the increase in pressure due to the water's expansion) must not exceed 400 kPa. The ideal water flow in a central system is 40 lt/m^{2}h to 70 lt/m^{2}h and the pressure drop per meter of installed pipe (supply and return to the collectors) is 30mm of water. This is the data that is used for calculating the dimensions of the circulation pump in each installation.

NOTE: *To the pressure drop of 30mm of water per meter of installed pipe one must add 10mm of water per square meter of installed collector.*

A basic factor in the optimum performance of the system is the correct selection of angle and orientation, in relation to the installation site and the period during which we want the maximum yield. The solar system must be oriented so that the collecting surface faces the geographical south for the northern hemisphere (and the geographical north for the southern hemisphere), i.e. it should always face the equator. Any deviation in the orientation means a drop in the system's performance. If a deviation from the correct orientation cannot be avoided, then the system's performance must be corrected by increasing the collector surface, after study and evaluation of the particular circumstances. As the solar radiation's angle of attack changes over time and in relation to the system's installation site, the collector's angle shall have to be equal to the site's latitude ±5°. At this angle the maximum yield is achieved on an annual basis. The system must not be shaded by trees, buildings or other obstacles so as to ensure 4 hours of unimpeded exposure of the collector area during the midday hours.

HYDRAULIC UNIT

It contains all the basic accessories required for the connection of the collectors to the boiler.

- For the connection of the hydraulic unit to the solar circuit (collectors, system heat exchanger to the inferior part of the boiler) please refer to the hydraulic diagram of solar systems.
- The connection of the expansion vessel to the safety valve of the solar hydraulic unit should have a maximum length of 2 meters, with no bends and no air accumulation points. The union nut should have a diameter of 3/4".
- After having connected the hydraulic unit, the closed loop should be cleaned. System cleaning is carried out with water for 15 minutes, by isolating the circulation pump with the two valves before and after, and by opening the two filling/evacuation valves. The valves for the connection of plastic pipes are male.
- Prior to filling the closed loop with the anti-freeze liquid it is necessary to check the sealing of all the connections. During the cleaning, for example, you can shut one of the two filling/evacuation valves and use a compression pump or water compression from the network to raise the pressure of the circuit to 5 bars for 15 minutes.

  ATTENTION! The expansion tank has to be isolated to avoid surpassing the maximum operating pressure.
- The mixing of the anti-freeze liquid must be carried out prior to the filling and at a ratio suitable to resist the minimum ambient temperature at which it is going to operate.
- System filling may be executed either from the upper side of the collector by gravity or through the compression pump from the hydraulic unit. Operating pressure from 1.5 to 3 bars can be executed with pump filling or with the water compression from the network. Constantly check all ventilation points as you fill the circuit.
- All installations and the relative attachments have to conform to the current local regulations (electrical, hydraulic, building, sanitary etc.) in force.
- It is recommended to place a vessel under the hydraulic unit of a capacity suitable to collect the anti-freeze liquid that may run from the security valve. The presence of this vessel is particularly useful during the filling and ventilation phases or during hydraulic testing, as the valve opens at 6 bar.

HYDRAULIC UNIT DESCRIPTION

Pumping, regulating, venting unit for forced circulation solar systems. In the hydraulic system, hydraulic balancing, flow measurement and venting can be performed directly in the station. The built-in SETTER Inline PF valve allows the required quantity of liquid in the primary circuit to be exactly and simply set and checked. The continuous venting system meets the most demanding requirements and keeps the system free of air. Systems which are air-free and correctly balanced hydraulically guarantee optimal energy efficiency, and are thus more cost-effective in the framework of the energy-saving directives laid down by law.

Using the scale, which is pre-calibrated for glycol, the technician can set and check the exact flow-rate values on-site. Neither training courses nor expensive measuring devices are required. Installation and venting can be carried out by one person working unaided.

HYDRAULIC UNIT TECHNICAL DATA

Maximum operating temperature:
- Depression (vaporizer side): TB 160°C
- Return (pump side): TB 110°C

Maximum operating pressure: PB 8 bar
- Propulsion compression safety valve: 6 bar

Ventilation pipe: made of brass

Brass valve components

Internal parts: made of stainless steel, brass and plastic. Level index made by borosilicate material. O Ring EPDM **weatherseals.**
Plain weatherseals resistant to high temperatures and suitable for solar installations.

Insulating material: EPP.
Thread according to DIN 2999/ISO 7 and ISO 228 standards.

Measurement accuracy: ±10% (from the final value).

Anti-freeze liquid
- Water mixture with common anticorrosive and anticoagulant additives (liquid viscosity scale U = 2.3mm²/s).
- Heating and cooling water

I. Pipeline from collectors (Rp ¾" EN 10226-1)

II. Pipeline towards boiler (Rp ¾" EN 10226-1)

III. Pipeline towards collectors (Rp ¾" EN 10226-1)

IV. Pipeline from boiler (Rp ¾" EN 10226-1)

V. Connection pipeline of the expansion tank (G ¾" ISO 228-1)

VI. Evacuation pipeline of the safety valve (Rp ¾" EN 10226-1)

1. THERMOMETER

The thermometer with a range from 0°C to 120°C constantly indicates the medium temperature in the flow circuit. The temperature is recorded directly in the medium to minimize the reaction time. The sensor is inserted in a protective pipe so that in can be exchanged without having to empty the system. The thermometer is fitted on a special construction ball valve with an integrated non return valve.

2. WALL ASSEMBLY

For an easy installation, the hydraulic unit has a base slab.

3. DIFFERENTIAL THERMOSTAT

Checks the hot water circulator of the collectors and the burner It has 3 temperature sensors. Measures collector and boiler water temperature. It receives many possible parameters. It can execute delayed operation start up.

4. SAFETY VALVE

The safety valve guarantees the system data protection against extreme pressures in all function phases.

5. MANOMETER

The manometer, with a range of 0-10 bar indicates the system's pressure.

6. CIRCULATION PUMP

This circulation pump, included as standard in the scope of delivery and integrated in the system, covers a large delivery range. The required operating point can be preselected using one of the three levels. A defective pump ca be replaced without having to empty the system using the stop cocks on the suction side (Setter Inline PF) and the pressure side (ball valve).

7 - 8. BALL VALVE FOR THE EASY FILLING AND EMPTYING OF THE CIRCUIT

9. SETTER INLINE PF BALANCING VALVE

Precision adjustment at the balancing valve allows the required delivery quantity to be adapted to system requirements. Flow rate indication is constant, i.e. the adjustment can be immediately verified by means via the flow rate indicator. The indicator is precalibrated for a medium viscosity of 2.3mm^2/s. This does away with the need for correction curves. The connection flange on the outlet side is directly screwed onto the 1 1/2'' pump connector fittings which means there are no seal locations for further adapter component.

10. VENTING TANK WITH BLEEDER VALVE

Venting tank with bleeder valve. The purpose of the venting tank is to remove air from the medium flowing through the tank. The venting tank can hold up to approx. 250 ml of air and has a bleeder valve for releasing the air. The bleeder valve is routed to the outside through the insulation which means that in can be accessed even when the insulating casing is on. The outlet has a suitable fitting for easy attachment of a hose. The frequency and quantity of the collected air can be used to check the leak tightness of the system.

HYDRAULIC UNIT CONNECTION

1. Connect the pipeline of the upper part of the collector to the hydraulic unit (position I)
2. Connect the pipeline of the upper part of the collector's heat exchanger to the hydraulic unit (position II).
3. Connect the pipeline of the collector's bottom part to the hydraulic unit (position III).
4. Connect the domestic water heat exchanger outlet to the hydraulic position IV.
5. Connect the expansion tank's pipeline (to the position V).
6. Connect the evacuation pipeline of the safety valve to the position VI of the hydraulic unit.

   NOTE: *The safety valve should have a drain pipe connected to its outlet. This pipe should run to ground level where hot water discharge is safe and clear of any paved areas. Do not seal or block the ends of this drain pipe or the valve outlet. Antifreeze solution may be drained from this pipe during high irradiation situations.*

7. Connect sensor Nr. 13 (S1 FKP 6) to the collector's upper part.
8. Connect sensor Nr. 14 (S2 FRP 6) to the lower coil sensor position.
9. Connect sensor Nr. 15 (S3 FRP 6) to the upper coil sensor position.

POST INSTALLATION INSTRUCTIONS

Before using the system make a final check. Open all the valves and check for any kind of leakage. Repeat the inspection after 30 minutes. Check if the system is filled with water and antifreeze fluid according to the company's instructions. In case of any failure condition a specialized technician should be called in.

The solar water heater, in order to reach its highest efficiency rate, needs some hours (depending on the weather conditions and the solar radiation) after the completion of its installation. For this reason, even if the sun shines, it is higly recommended not to consume the hot water during the first hours following its installation.

A basic periodic maintenance will assure the long life and high efficiency of the product.

- It is recommended that the appliance is inspected in situ according to the instructions stated in the guarantee twice a year and checked for possible damage (breaking) of the collectors' glass, leaks in the connecting piping to the mains and to the consumption system, inspection of the pipe insulation and cleaning of the glass.
- If the collectors' glass is broken, it should be replaced immediately.
- It is recommended that the glass is washed at an hour of low sunlight to avoid damages due to expansion-contraction, due to temperature changes.
- If the fittings are worn (screws, pugs, piping, etc), these should be replaced at the owner's cost.
- The level of antifreeze in the closed circuit must be checked annually (as it could need toping up), to ensure the efficient operation.
- In cases where there is to be no use of hot water for long periods of time (e.g. during the summer holidays), it is recommended that the collector surface is covered with an opaque cover in order to avoid the building up of high temperatures, which could trip the thermoelectric fuse of the thermostat and cut the electrical circuit.
- During the build-up of high pressure in the thermal tank, it is possible that the safety valve will open and water will run out. This is a normal function that protects the water storage tank from high pressures. It's necessary to add a pressure reducer, safety valve and expansion tank to the mains pipeline.
- Do not switch on the electrical heating element in the following cases:
    - **A)** When the mains water supply has been cut
    - **B)** When the connecting pipes have frozen and there is no water flow from the water storage tank to the taps.

ATTENTION! Place taps with thermostatic regulation up to 38°C for hot water use to prevent burns which may be caused by the high temperature water in the installation.

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