

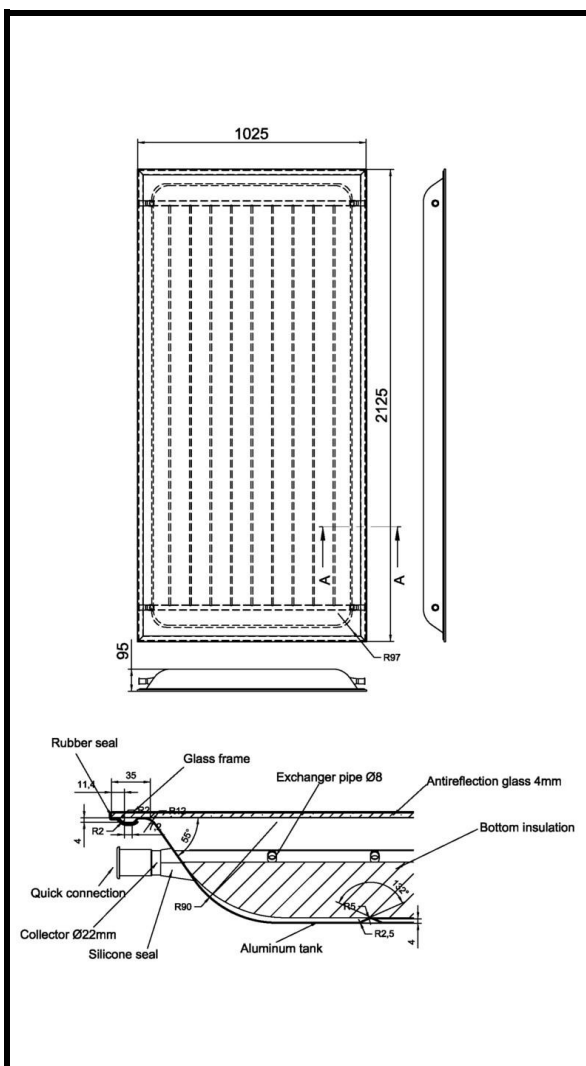
1. TECHNICAL CONSTRUCTION



The thermic solar collector AI-F 2.1 with selective flatbed has a high absorbing surface area, a high efficiency, an easy way of mounting easy connection and a modern design. Suitable for all applications in the field of solar thermal systems, it is adaptable to different surfaces, either flat or pitched roof, while also allowing the installation on the facade.

ABSORBER:	Metallic absorber made of copper or aluminum or carbon steel pipes and absorber plate with highly-selective metal-ceramic film, laser-welded, totally built by AI SOLAR
INSULATION:	The insulation of the collector is made of mineral wool with layers of 50 mm thickness in the back.
FLATBED:	The solar collector AI F 2. 1 is equipped with a protective surface made of a tempered prismatic safety glass with low iron content, which optimizes the transmission results and reduces the reflections of sun.
CONTAINMENT SYSTEM:	The containment structure that protects the absorber consists of a stainless steel or anodized aluminum or aluzinc printed tank of our production.

1.1 TECHNICAL DATA AND DIMENSIONS



Dimensions	1025 x 2125 x 95 mm
Gros surface area	2,178 sqm
Absorber surface area	1,857 sqm
Liquid content	1,231 l
Solar glass thickness	4 mm prismatic
Level of glass trasmittance	91,5%
Thermic insulation thickness	50 mm flat
Absorber	<ul style="list-style-type: none"> • Copper/Aluminium • Copper/Copper • Aluminium / Aluminium • Carbon steel/Aluminium
Absorption	95%
Emission	5%
Operating pressure	6 bar
Max pressure	9 bar
Testing pressure	16 bar
Max temperature	250 °C
Stagnation temperature At 1000 W/m² and 30 °C	205°C
Pressure loss values	2,11 mbar with 112 l/h
Weight	38,5 kg
Certification	EN 12975 / SRCC OG-100

High efficiency guaranteed by the absorber

Socket for quick connection

Laser welded pipes

Sensor inside the panel

1.2 DIAMETER OF CONNECTION PIPES

Total surface area (sqm)	ca 5	ca 7,5	ca 12,5
Diameter copper (mm)	10 – 12	15	18
Diameter steel (mm)	DN 16		DN 20

1.3 INFLUENCE OF SNOW AND WIND ON THE COLLECTORS

Height of placement above floor	Wind speed	Mass in kg protect a collector against uplift by the wind		Load of the roof for wind, snow and weight of a collector	
		Inclination 45°	Inclination 20°	Inclination 45°	Inclination 20°
0 – 8 m	100 km/h	80 kg	40 kg	320 kg	345 kg
8 – 20 m	130 km/h	180 kg	90 kg	470 kg	430 kg
20 – 100 m	150 km/h	280 kg	150 kg	624 kg	525 kg

NOTE: Values of this chart are only indicative. The final evaluation of these parameters must be made by the installer.

2. GUIDELINES FOR THE HANDLING AND TRANSPORTATION

Solar collectors are separately packed in carton boxes or in wood boxes and stacked on pallets for transport. Each carton box weighs 40 kg. Take this information into account for the safe handling of the solar collector (refer to regulations on safety and health at work).

3. ASSEMBLY INSTRUCTIONS

Installation must be executed only by trained personnel. The framework and its connections to the masonry part should be checked by a structural engineer and depends on local conditions and surroundings.

3.1 STATICS

Installation may only be executed on sufficiently robust roofs or surfaces. Robustness of the roof or frame must be checked on site by a structural engineer before the installation of collectors. At this point it is very important to check the suitability of the casing, especially the seal screw connection, to fix the collectors. The inspection of the complete frame in accordance with work regulations is necessary above all in areas with significant snowfall, or in areas exposed to strong winds. It is therefore necessary to take into consideration all the characteristics of the installation area (gust of winds, vortices, etc...) that can lead to increased loads on structures.

3.2 CONNECTIONS

Collectors must be connected in series with original fittings and seals provided by FDE Solar. If there are no flexible tubes planned as connection elements, adequate compensation devices have to be considered for the connecting pipelines to avoid deformations caused by temperature drops (expansion bend, flexible pipes). In such cases it is possible to attach in series a maximum of 6 collectors. It is necessary to verify the correct position of the flat seals into their site. It is also important to hold tight one fitting with a wrench while fixing the other one with a pliers or a wrench in order to prevent damages to the absorber. All tubes of the hydraulic pipe network have to be insulated in order to resist to high temperature and in accordance with valid regulations. Insulations must be protected against weather and animal that may ruin the system.

3.3 COLLECTORS' PITCH/ GENERAL

Collectors are suitable for a minimum pitch of 15°, up to a maximum of 75°. The vents and vent manifold of the collectors are not be closed at the moment of assembly of the system. All the collectors' connections, the vent and abat-vent must be protected against dust and impurity. In systems with a summer load (sanitary hot water production), the collector has to be installed from east to west with a pitch between 20° and 60°. Ideal is a southward orientation and a pitch equal to the latitude of the position – 10°. In systems with winter load (systems which produce both sanitary hot water and heating), the solar collector should be installed southward (south-east, south west) with a pitch of more than 35°. Ideal is a south orientation and a pitch equal to the latitude of the position + 10°.

3.4 RINSING AND FILLING

For safety reasons filling may only be executed only in absence of sunlight. In particularly frosty areas it is necessary to use a 40% solution of glycol for flat collectors. Antifreeze has to be mixed with water before filling. In case of flushing, before filling the antifreeze pay attention to possible residues of water in the collector which could freeze.

3.5 VENT / BLEED

A vent/bleed has to be done:

- At the start of operation (after the filling)
- When necessary, for example in case of failures.

Verify carefully the complete vent/bleed of the system. Danger of scalding with the liquid contained in the collectors! Therefore, do only act the vent valve when the temperature is below 60°C. When you vent the system, collectors may not be hot. In any case cover the collectors and vent the system, possibly in the morning.

3.6 CHECK OF HEAT TRANSFER FLUID

The heat transfer fluid has to be checked at least every 2 years, to control its anti-freeze ability and its pH value.

- Check the antifreeze with a special instrument, refractometer or densimeter, (nominal value ca. -30°C): if the limit of -26°C is exceeded, then substitute or add antifreeze.
- Check the pH with a litmus paper (face value ca.7,5): If the value is below the limit of 7, you should substitute the mix.

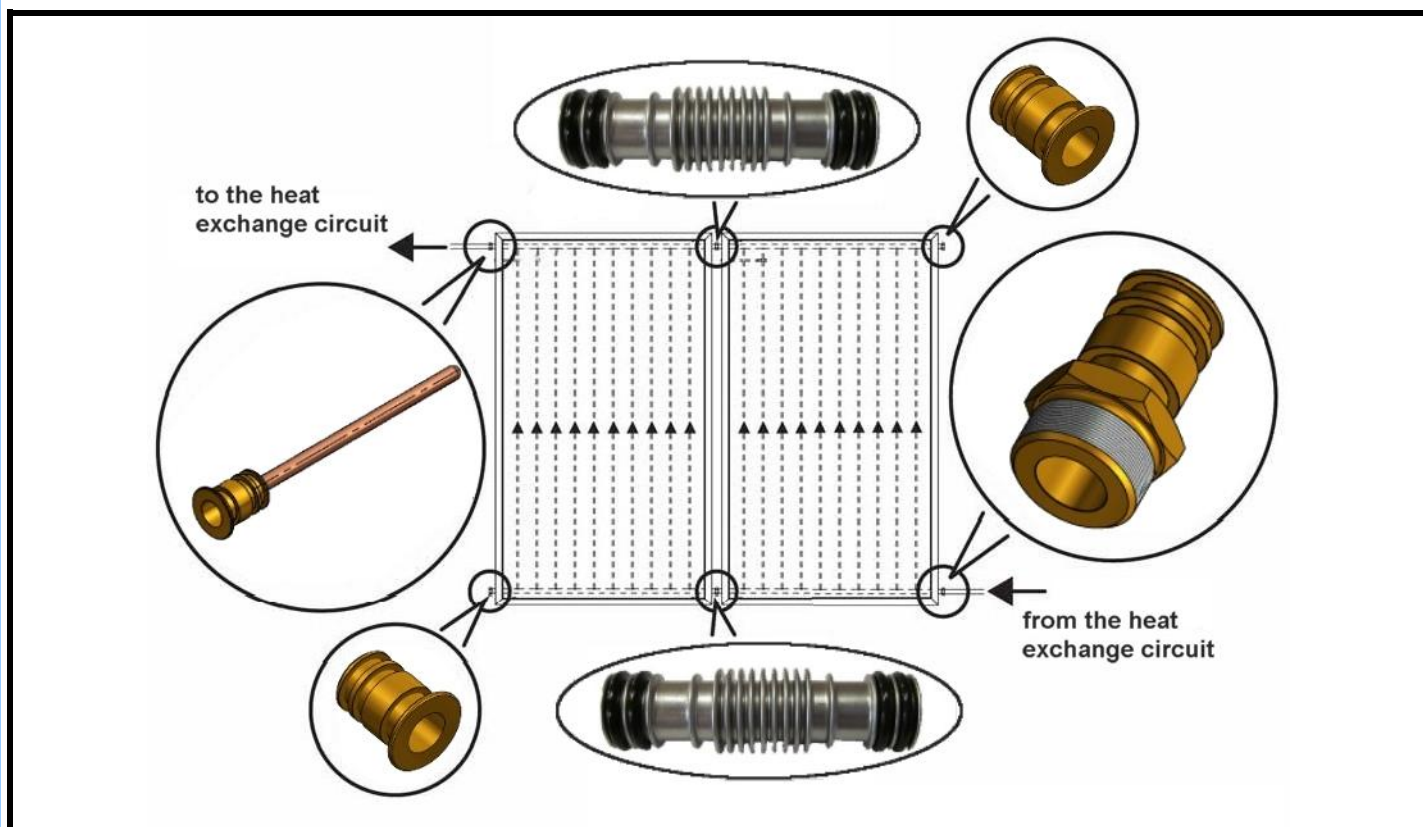
4. RECOMMENDATIONS FOR PROTECTION AGAINST LIGHTNING

The metal pipes of the solar circuit must be connected by a conductor (yellow-green), of at least 16 mm² Cu (H07 VU or R), with the main bar of the potential compensation. If a lightning has already been installed, the collectors can be integrated into the existing system. Otherwise it is possible to do the earthing with an underground cable. The duct must be placed outside the house. The underground cable must also be connected to the compensation bar through a pipe of the same diameter. It is recommended to connect the underground cable with eyelet terminals inside of the collector locking screws to the supports hangers.





5. LINKS AND CONNECTIONS

The collectors are connected among one another so that the heat transfer fluid flows through them in parallel. For this purpose, the four attachments between the copper panels must be connected among one another by steel expansion joints with quick coupling. One of the four attachments of the collectors at the end of the series must be closed by quick coupling plugs. The connection to the heat exchange circuit that plugs with the heat exchanger must be done on the side of the sensor of the last collector in series. The connection to the circuit that returns to the exchanger must be done with the pipe at the bottom of the first panel of the series (see figure). It is also possible to connect more than one line of collectors. The circuit must be hydraulically balanced.

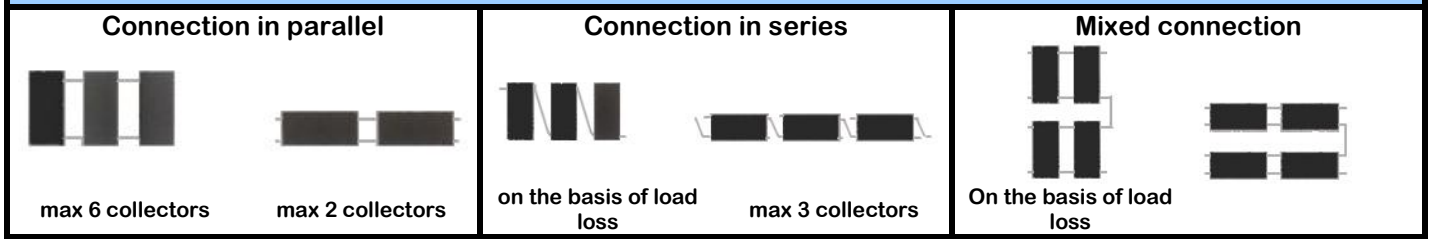
The following parts of fittings, depending on the configuration of the installation, can be used for the solar collector attachments:



CONNECTION ELEMENTS

Picture	Description	Picture	Description
	Sensor housing/holder		Fitting for pipes connection
	Locking plug		Fitting for panel connection

CONNECTION SOLUTION:



5.1 POSITIONING OF THE SENSOR

The temperature sensor is mounted in the collector pipe. To mount the sensor only material with adequate resistance to high temperatures (up to 250° C for sensor element, contact paste, cables, seal materials, insulation.) must be used.

6. COLLECTOR FILLING

Before starting-up the plant it is necessary to proceed with the steps as below.

- SYSTEM WASHING AND LEAK TIGHTNESS TEST:** If copper pipes were used and hard-soldering has been executed, it is necessary to wash out the residuals. Subsequently, run the leak tightness test. The solar collector must be immediately filled with a mixture of glycol and water as it might still contain water (danger of frost).
- WATER + GLYCOL PREMIXING:** The glycol is not included in delivery. Water and glycol are mixed in a separate container before filling the system (e.g. 40% glycol and 60% water to provide resistance to freezing at -20 ° C).

Antifreeze	Temperature	Density
50%	- 30°C	1,045 kg/dm ³
40%	- 20°C	1,037 kg/dm ³
30%	- 15°C	1,029 kg/dm ³

The propylene glycol filled into the system must be suitable for solar applications as it maintains its characteristics in the range of -32 to 180° C. It is also non-toxic, biodegradable and biocompatible. Do not fill pure glycol in the plant, only add glycol and water previously mixed together. Do not use manual or automated filling systems. In the presence of a very high content of chlorine is necessary to use distilled water into the mixture.

7. PLANT SETTING

Fixing solar collector FDE 2.1 is very easy, as it is equipped on both sides of two aluminum saddles with M8 threaded studs to which screws M8 x 30 mm can be connected. Screws have to be inserted into the proper hole, connecting this way to the brackets supplied.

The attachment can be done above the tile or under the tile with the brackets.
(see the pictures below)



Bracket for mounting above tile



Mounting bracket for under tile