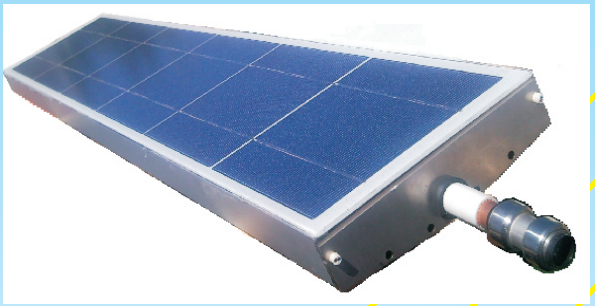
SHT Solar Hybrid Technologies NZEB

New generation Photovoltaic panels
22.8% efficiency and double Voltage

Changes in weather
alteration of the collectors



A double installation in one and the same area

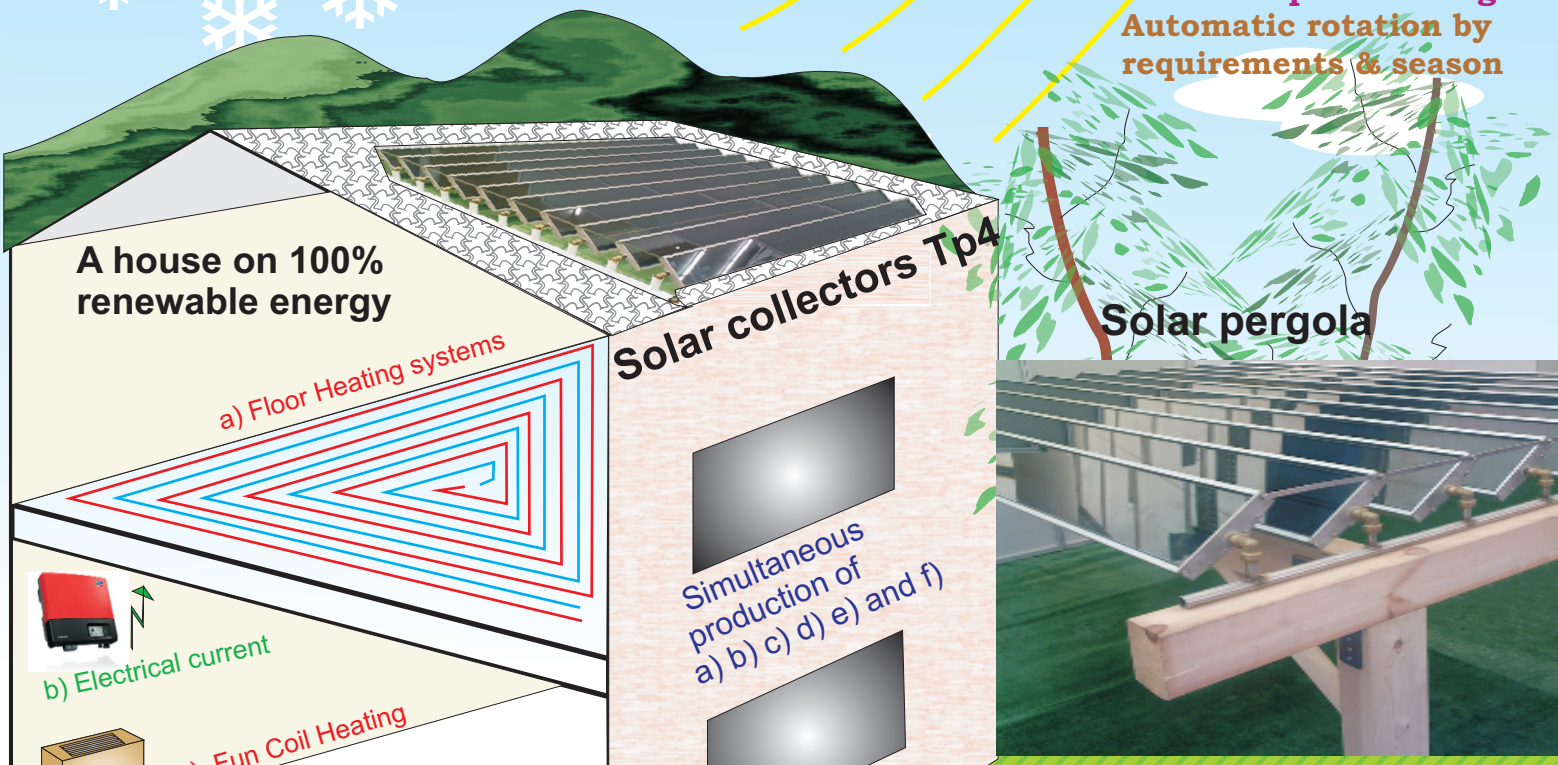
SOLAR-ENERGY REVOLUTION !!!

Double faced hybrid solar collectors TP4

* thermodynamics for floor heating systems
** photovoltaics with hybrid cooling effect
*** domestic hot water
**** swim-pool heating

Automatic rotation by requirements & season

Thermodynamics on the one
and
photovoltaics on the other



Now !
Efficiency 22,8%
with 'half-cut cells'
and doubled Voltage

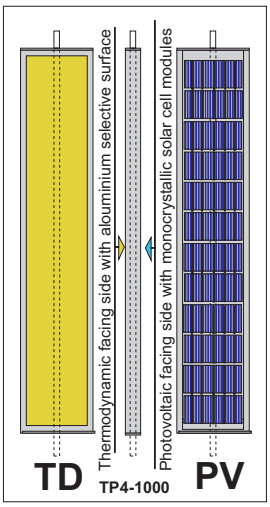
TKM/TP4

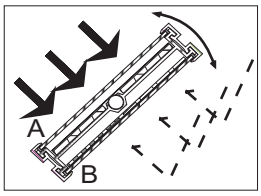
Technical characteristics of photovoltaic modules and additive material for energy collection & usage

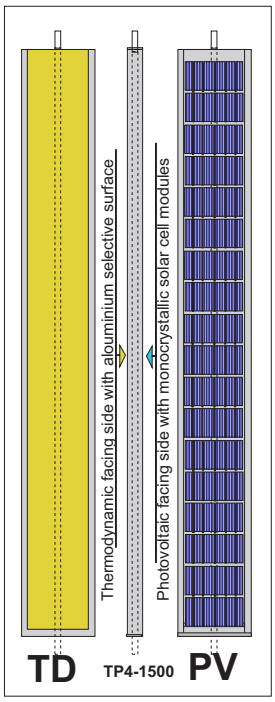
Solar Hybrid Technologies

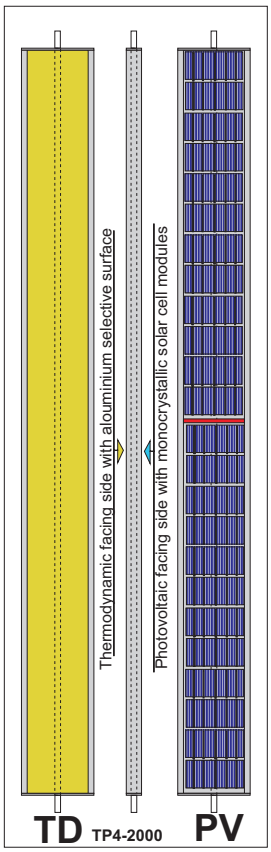
Project developing company
Av. Kifisou 38 (KTEL) 10442 Athens

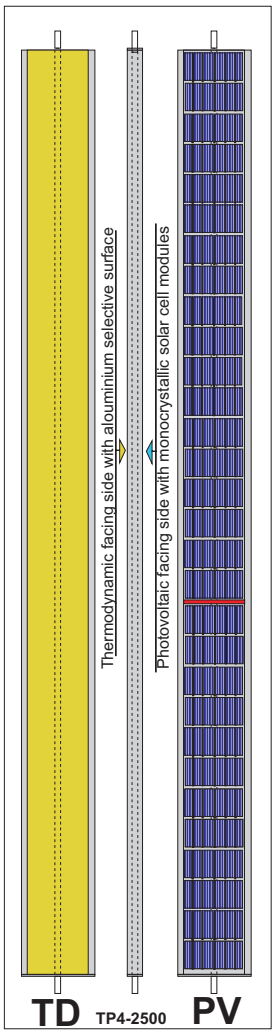
Technical characteristics of solar Twin-faced Multi-Panel TP4-Enersol

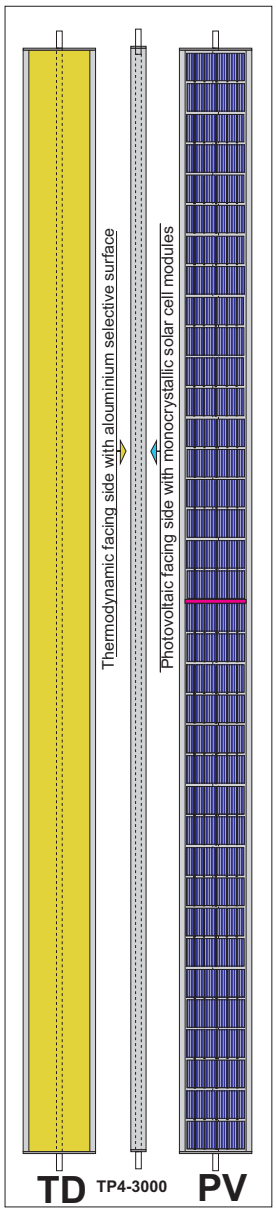










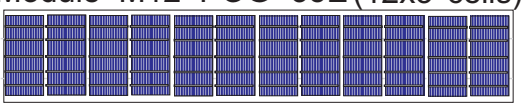


The twin faced TP4-Multipanel TD/PV/PVT can be rotated 360' around its central pipe, exposing either the main facing side (A) 'thermodynamic mode', or the other facing side (B) 'photovoltaic' mode towards the solar radiation. Both sides are equipped with quadruple solar sensors for the Tp4 solar tracker with the 'Four Season' energy yield automatic program.

The length of the solar collectors, correspondes to the total length of the 'multiple' photovoltaic modules incorporated. Two PV-modules are available, 12-cell and 18-cell. Both types can be combined in one frame e.g. (12 or 18 or 12+12 or 12+18 or 18+18) obtaining the standard sizes.

The photovoltaic modules incorporated are connected in serie within the solar collector frame. It is possible to exchange any of the PV modules at the building site, without emptying water or any dismounting of the solar panels, from the central distribution solar hot water piping.

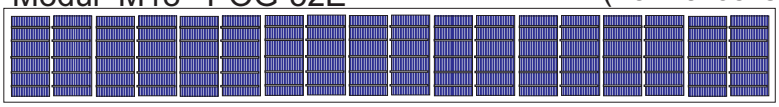
Module M12 POG -35E (12x3"cells)



Technical specifications

Dimensions	996 x 176 x 6 mm
Maximum Power	34,5 Watt
Module efficiency	22,8 %
Open Voltage (Voc)	7,.01 V
Short Current (Isc)	4,89 A
Mpp Voltage (Vpm)	8,22 V
Mpp Current (Ipm)	5,14 A
Max System Voltage	1000 V
Power Tolerance	+/- 1 %
(Temp. Coefficient voltage	- 0,346 %/K
(Temp. Coefficient current	+ 0,036 %/K)
(Temp. Coefficient power	- 0,460 %/K)
Norm STC (AM1.5, 1000W/m2, 25'C)	

Modul M18 POG-52E (18 x 3"cells)



Technical specifications

Dimensions	1493 x 176 x 5 mm
Maximum Power	51.75 Watt
Module efficiency	22.8 %
Open Voltage (Voc)	10,5 V
Short Current (Isc)	4.89 A
Mpp Voltage (Vpm)	12,33 V
Mpp Current (Ipm)	5,14 A
Max System Voltage	1000 V
Power Tolerance	+/- 1 %
(Temp. Coefficient voltage	- 0,346 %/K
(Temp. Coefficient current	+ 0,036 %/K)
(Temp. Coefficient power	- 0,460 %/K)
Norm STC (AM1.5, 1000W/m2, 25'C)	

Panel type	TP4-1000	TP4-1500	TP4-2000	TP4-2500	TP4-3000	Παρατηρησεις
Panel length	1000	1500	2000	2500	3000	mm
Panel width	198	198	198	198	198	mm
Panel height	50	50	50	50	50	mm
Hydro-pipe length	1146	1626	2126	2616	3096	mm
Collector weight	7.6	11.2	14.4	18.0	21.6	kg
Module combination	1xM12	1xM18	2xM12	M12+M18	2xM18	mm
Nom. Output	34.5 W	51.75 W	69 W	86.25 W	103.5 W	Watt

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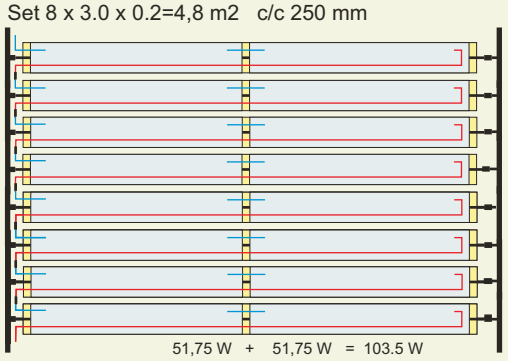
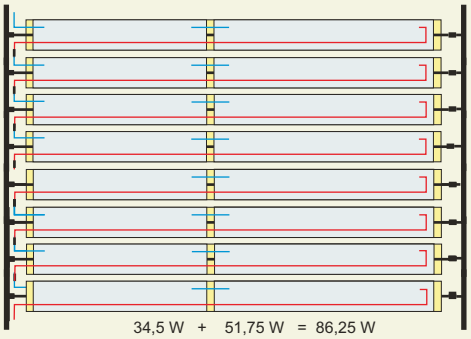
Solar collector set of 8 panels

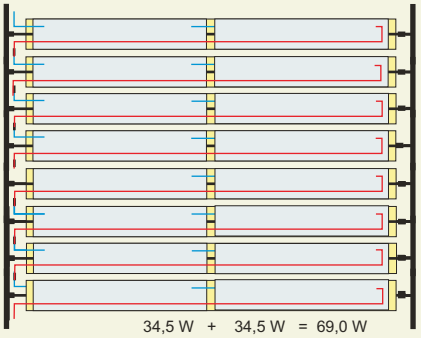
Set 8 x 3.0 x 0.2=4,8 m2 c/c 250 mm



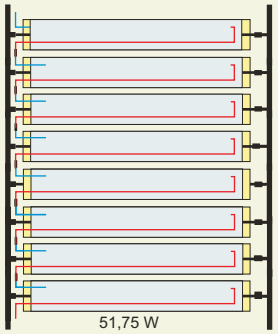
Set 8 x 2.5 x 0.2=4.0 m2 c/c 250 mm



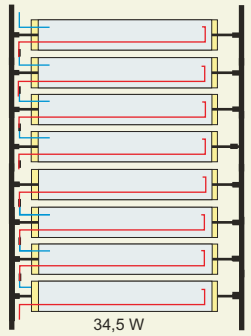
Set 8 x 2.0 x 0.2=3,2 m2 c/c 250 mm



Set 8 x 1.50 x 0.2=2.4 m2 c/c 250 mm



Set 8 x 1.0 x 0.2=1.6 m2 c/c 250mm



Solar set output data

Each mounting set consists of 8 panels
with 2 modules of 18+18 cells = 36 PV-cells
Mounting area 3.253 m x 2,0 m = 6,5 m2

Electrical connection		Pm	Vpm	Ipm
All in serie	1 x 8	828W	171,0 V	4,9 A
Semi-serial	2 x 4	828W	84,7 V	9,8 A
Semi-paralle	4 x 2	828W	42,3 V	19.6 A
All in paralell	8 x 1	828W	21,2 V	39.1 A

Each mounting set consists of 8 panels
with 2 modules of 12+18 cells = 30 PV-cells
Mounting area 2,75 m x 2,0 m = 5,5 m2

Electrical connection		Pmax	Vmpp	
Electrical connection		Pm	Vpm	Ipm
All in serie	1 x 8	690W	141,1 V	4,9 A
Semi-serial	2 x 4	690W	70,6 V	9,8 A
Semi-paralle	4 x 2	690W	35,3 V	19.6 A
All in paralell	8 x 1	690W	17,6 V	39,1 A

Each mounting set consists of 8 panels
with 2 modules of 12+12 cells = 24 PV-cells
Mounting area 2,25 m x 2,0 m = 4,5 m2

Electrical connection		Pm	Vpm	Ipm
All in serie	1 x 8	552W	112,9 V	4,9 A
Semi-serial	2 x 4	552W	56,4 V	9,8 A
Semi-paralle	4 x 2	552W	28,2 V	19.6 A
All in paralell	8 x 1	552W	14,1 V	39,1 A

Each mounting set consists of 8 panels
with 1 modules of 18 cells = 18 PV-cells
Mounting area 1.75 m x 2,0 m = 3.5 m2

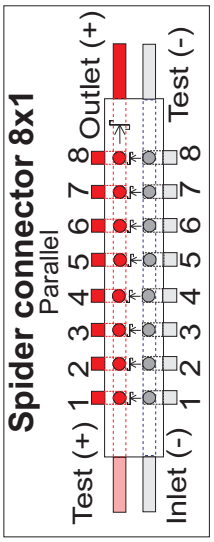
Electrical connection		Pm	Vpm	Ipm
All in serie	1 x 8	414W	84,7 V	4,9 A
Semi-serial	2 x 4	414W	42,3 V	9,8 A
Semi-paralle	4 x 2	414W	21,2 V	19.6 A
All in paralell	8 x 1	414W	10,6 V	39,1 A

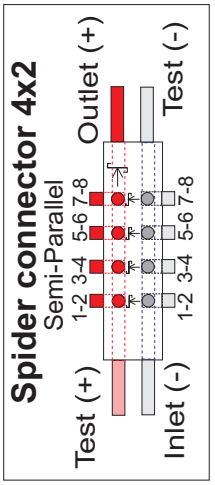
Each mounting set consists of 8 panels
with 1 modules of 12 cells = 12 PV-cells
Mounting area 1,25 m x 2,0 m = 2,5 m2

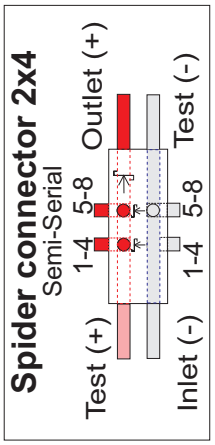
Electrical connection		Pm	Vpm	Ipm
All in serie	1 x 8	276W	56,4 V	4,9 A
Semi-serial	2 x 4	276W	28,2 V	9,8 A
Semi-parallel	4 x 2	276W	14,1 V	19.6 A
All in paralell	8 x 1	276W	7,1 V	39,1 A

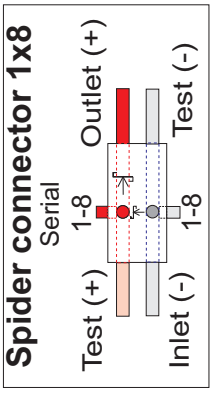
For more details see technical handbook

Wiring boxes









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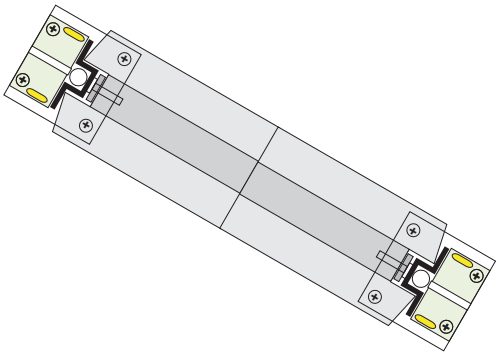
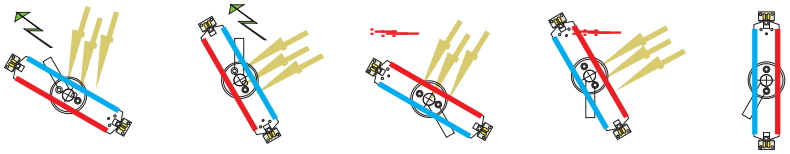


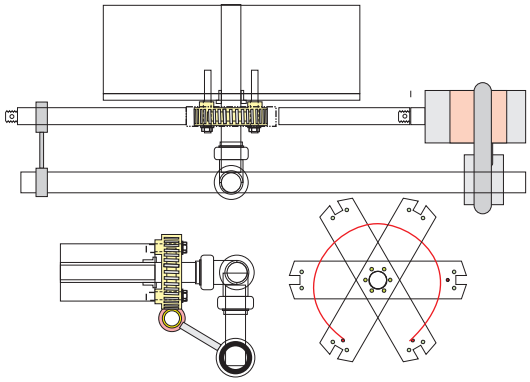
Twin Solar Sensors

Twin faced solar tracking system TP4

The double faced tracking eye rotates together with the collector, tracking the panels towards the sun. Depending on season and functional mode it operates with one or the other sensor eye which is positioned on the front collector.

A special feature is the automatic safe and clean vertical position in which the panels are exposed to the rain for self cleaning and also protected against snow and hail.





360’ Rotation Device

360’ Rotating device TP4 Worm-Gear Drive

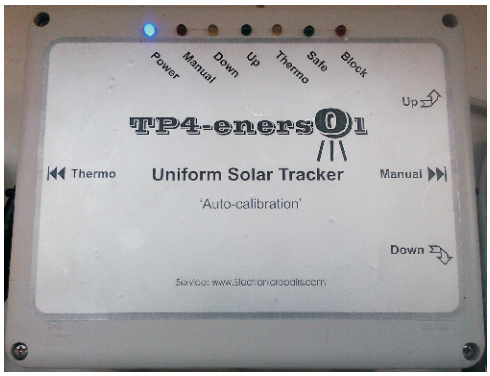
An Inox worm-gear wheelis mounted on the solar panel ..

Paralell to the water distribution pipe goes the worm-gear axes in stainless steel, laying under the worm-gear wheels and fixed together onto the water distribution pipe.

The electric motor is mounted on either side turning the endless screw in order to position the panels to the sun.

The motor is controlled by a solar tracking unit in order to make seasonal changes of functioning side with an automatic safety positioning for rain, snow and hail.

Technically one motor can cover the rotation of up to 4 collector sets (8 meters) in each row of panels.



Dual Solar Tracker

Dual Solar Tracker - Thermal (TD) & Photovoltaic (PV)

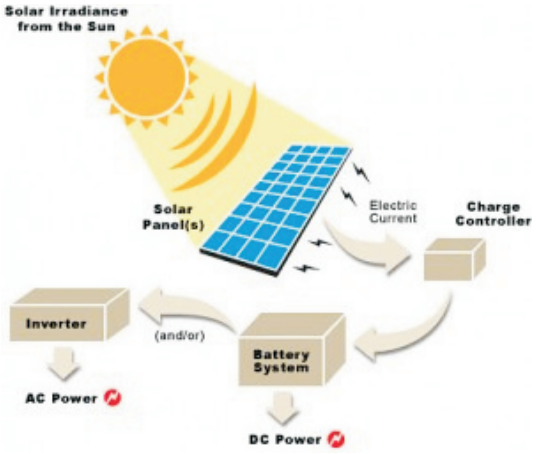
Selection of TD or PV energy is obtained automatically by energy demand controller or manually by Thermal switch.

Rotation of panels for exchange of functional side TD or PV is achieved automatically by sensors or energy commands.

Manual switch turns off tracking and gives control to the up and down switches to move the panels to any fixed position, for testing purposes under certain variable conditions and also allowing the easy cleaning of both sides of the solar panels.

Led indications and emergency vertical safety command is available as optional for direct control of the exterior unit.

For the connection of more than one row & motor an extra exterior relay box is required.



Solar System Flexibility

Flexibility of PV sets combined with any peripherals

The wide range of available panel-sets gives an opportunity to select almost any make and type of peripheral equipment.

* Power (Pm) from 35 to 1000 Watt / set
* Voltage (Ump) from 6 to 200 VDC / set
* Current (Imp) from 5 to 50 Amp / set

Thus the mechanical designer can easily adapt the system to either low, medium or high voltage existing peripherals like converters, batteries, loaders, inverter, cables etc.

*Low panel height (200) makes installations non-visible
*East-West solar tracking doubles the daily insolation hours.
*Flat roof- and pergola-installtions without wind disturbance
*Heating in winter and electricity for cooling in summer.
*More than twice the energy compared to any other systems.

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