

SHT

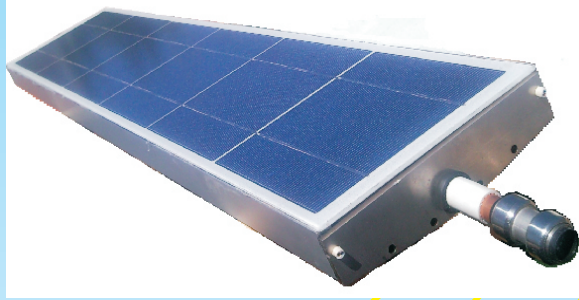
Solar Hybrid Technologies

Green-Tech

New generation Photovoltaics

Changes in weather
alteration of the collectors

Thermodynamics on the one
and
photovoltaics on the other



A double installation in one and the same area

SOLAR-ENERGY REVOLUTION !!!

Double faced hybrid
solar collectors TP4

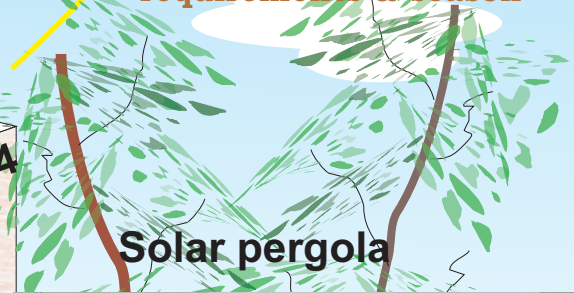
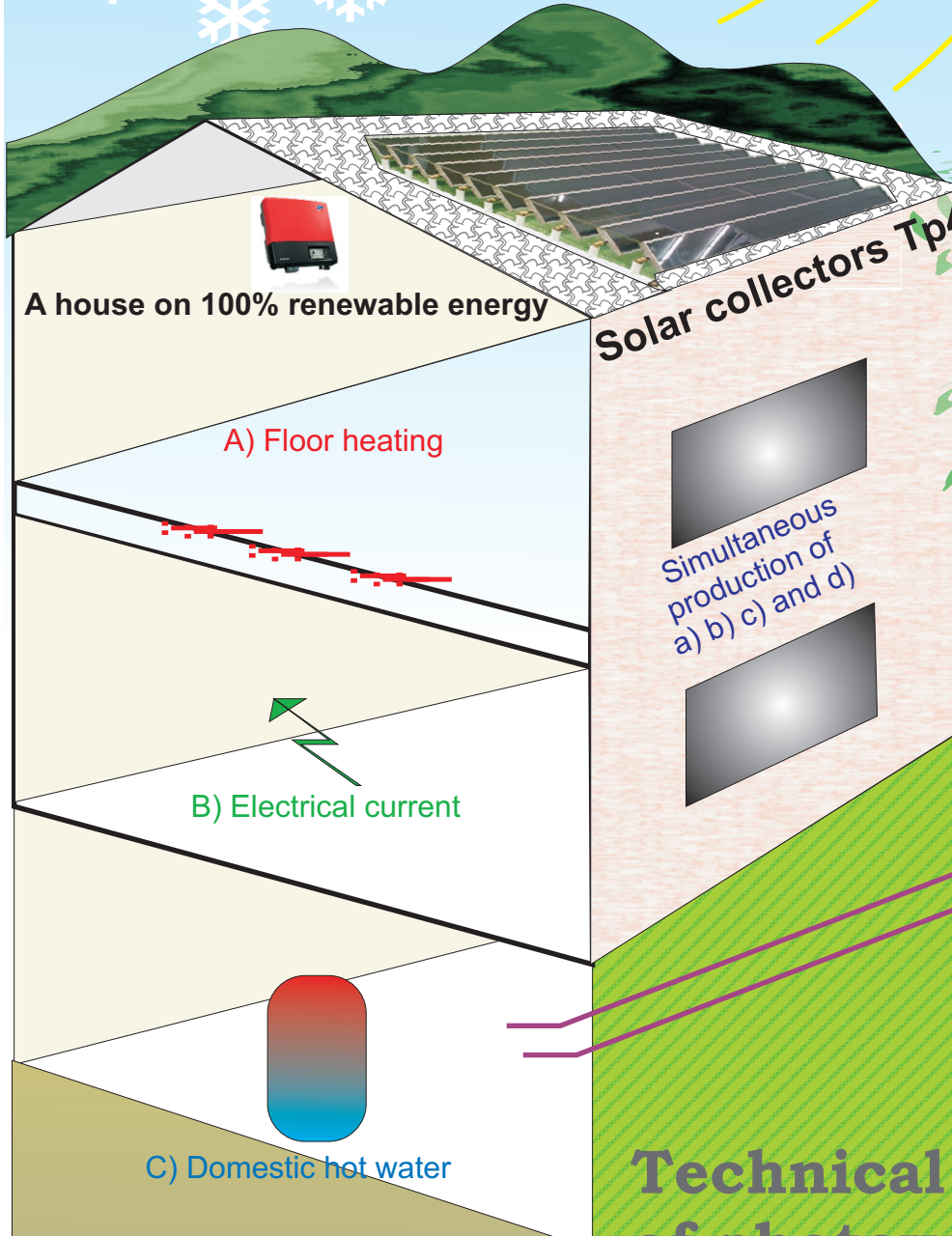
* **thermodynamics for
floor heating systems**

** **photovoltaics with
hybrid cooling effect**

*** **domestic hot water**

**** **swim-pool heating**

Automatic rotation by
requirements & season



Solar pergola



D) Swimming pool heating

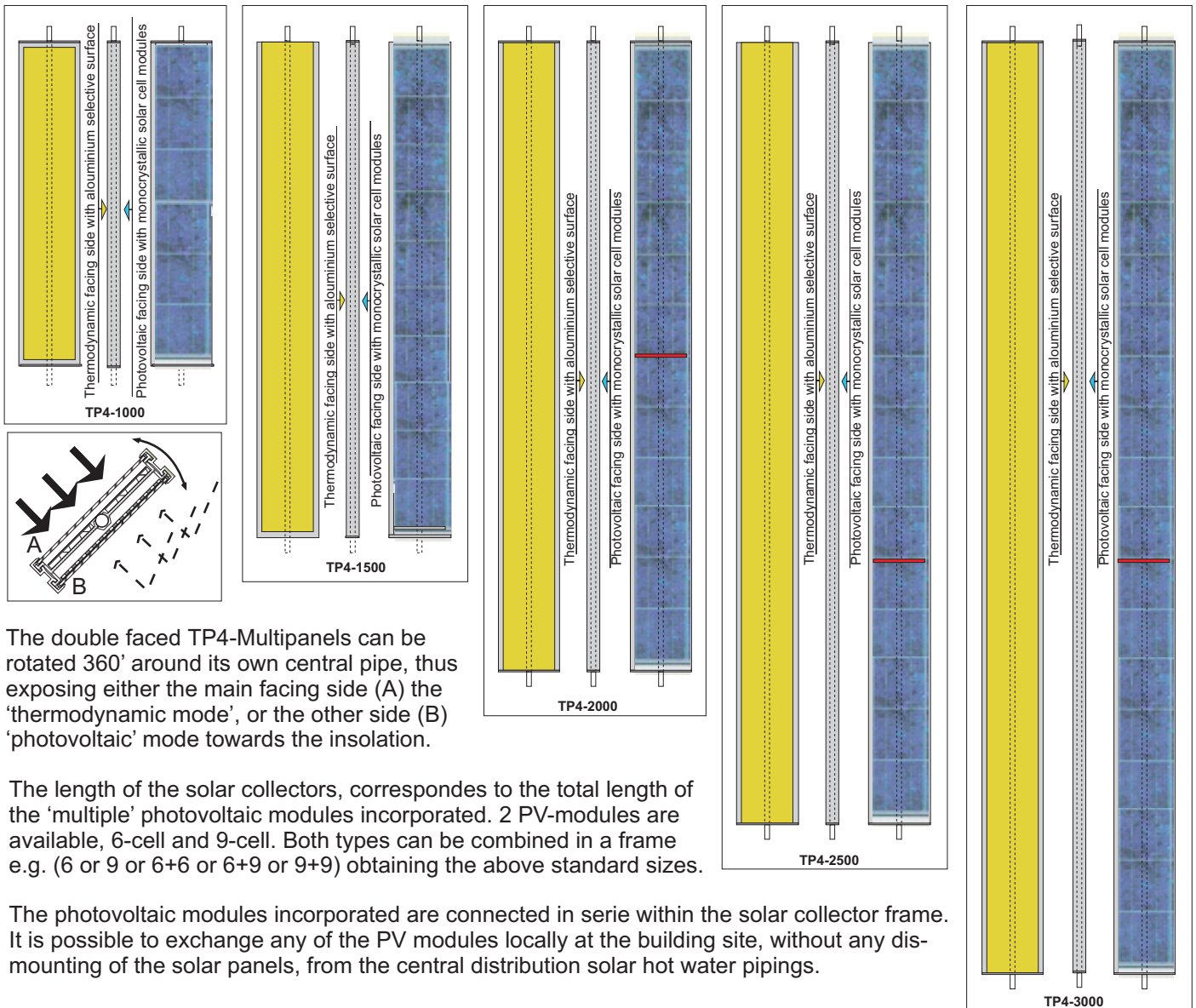
TKM/TP4

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

SHT
Solar Hybrid Technologies
Project developing company

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



The double faced TP4-Multipanels can be rotated 360° around its own central pipe, thus exposing either the main facing side (A) the 'thermodynamic mode', or the other side (B) 'photovoltaic' mode towards the insolation.

The length of the solar collectors, corresponds to the total length of the 'multiple' photovoltaic modules incorporated. 2 PV-modules are available, 6-cell and 9-cell. Both types can be combined in a frame e.g. (6 or 9 or 6+6 or 6+9 or 9+9) obtaining the above 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 locally at the building site, without any dismounting of the solar panels, from the central distribution solar hot water pipings.

Modul M6 GYS-33E (6x6" cells)

Technical specifications

Dimensions	1000 x 176 x 6 mm
Maximum Power	33 Watt
Module efficiency	22.4%
Open Voltage (Voc)	4,10 V
Short Current (Isc)	9,88 A
Mpp Voltage (Vpm)	3,50 V
Mpp Current (Ipm)	9,37 A
Max System Voltage	1000 V
Power Tolerance	+/- 1 %
(Temp. Coefficient voltage)	-12,84 mV/°K
(Temp. Coefficient current)	+ 4,93 mA/°K
(Temp. Coefficient power)	- 0,43 %
Norm STC (AM1.5, 1000W/m2, 25°C)	

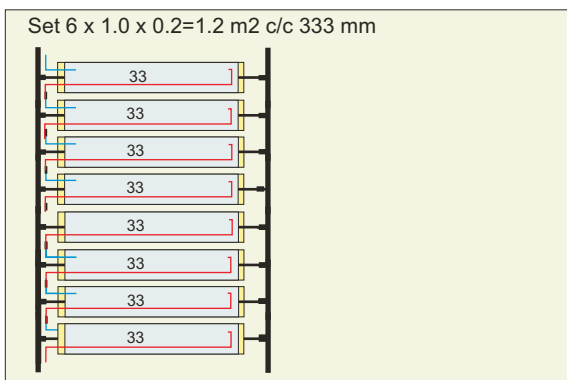
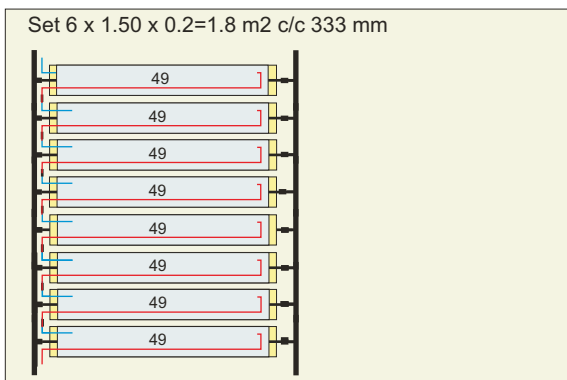
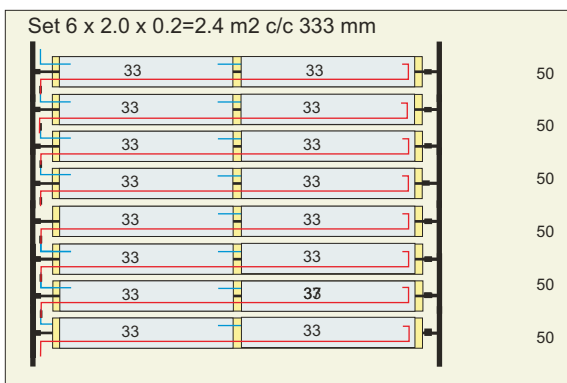
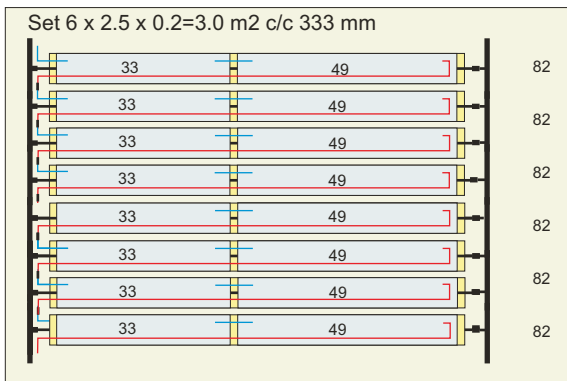
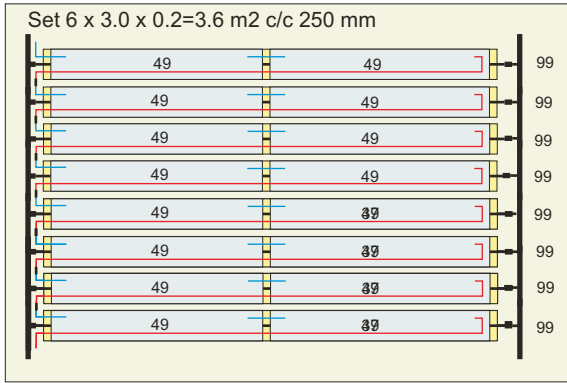
Modul M9 GYS-49E (9x6" cells)

Technical specifications

Dimensions	1500 x 176 x 6 mm
Maximum Power	49 Watt
Module efficiency	22.4 %
Open Voltage (Voc)	6,15 V
Short Current (Isc)	9,88 A
Mpp Voltage (Vpm)	5,26 V
Mpp Current (Ipm)	9,37 A
Max System Voltage	1000 V
Power Tolerance	+/- 1 %
(Temp. Coefficient voltage)	-12,84 mV/°K
(Temp. Coefficient current)	+ 4,93 mA/°K
(Temp. Coefficient power)	- 0,43 %
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	1xM6	1xM9	2xM6	M6+M9	2xM9	mm
Nom. Output	33 W	49 W	66 W	98 W	99 W	Watt

Solar collector mounting sets



Solar set output data

Each mounting set consists of 8 panels with 2 modules of 9+9 cells = 18 PV-cells
Mounting area 3.253 m x 2,0 m = 6,5 m²

Electrical connection	Pm	Vpm	lpm
All in serie	1 x 8	788W	84 V 9.4 A
twin combination	2 x 4	788W	42 V 18.7 A
triple combination	4 x 2	788W	21 V 37.5 A
All in paralell	8 x 1	788W	10.5V 75.0 A

Each mounting set consists of 8 panels with 2 modules of 6+9 cells = 15 PV-cells
Mounting area 2,75 m x 2,0 m = 5,5 m²

Electrical connection	Pmax	Vmpp	lpm
All in serie	1 x 8	656W	70,1V 9.4 A
twin combination	2 x 4	656W	35.0V 18.7 A
triple combination	4 x 2	656W	17.5V 37.5 A
All in paralell	8 x 1	656W	8.8V 75.0 A

Each mounting set consists of 8 panels with 2 modules of 6 cells = 12 PV-cells
Mounting area 2,25 m x 2,0 m = 4,5 m²

Electrical connection	Pm	Vpm	lpm
All in serie	1 x 8	525W	56.1V 9.4A
twin combination	2 x 4	525W	28.0V 18.7A
triple combination	4 x 2	525W	14.0V 37.5A
All in paralell	8 x 1	525W	7.0V 75.0A

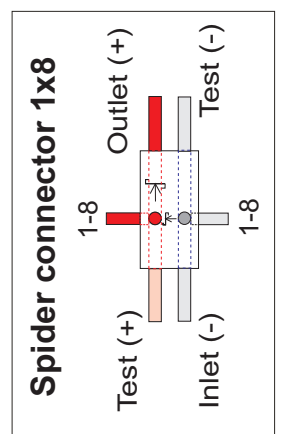
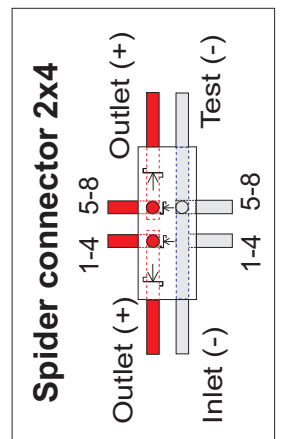
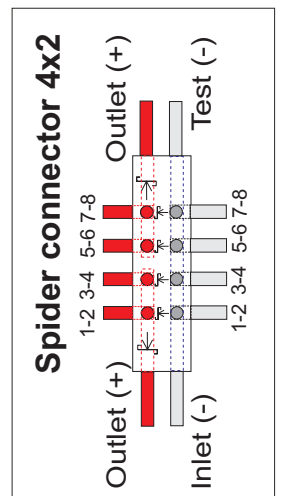
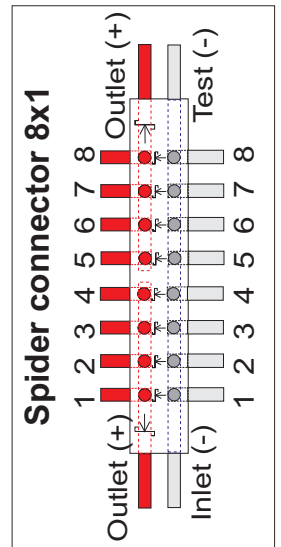
Each mounting set consists of 8 panels with 1 modules of 9 cells = 9 PV-cells
Mounting area 1.75 m x 2,0 m = 3.5 m²

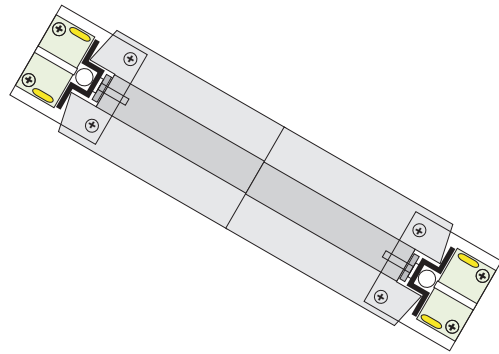
Electrical connection	Pm	Vpm	lpm
All in serie	1 x 8	394W	42.0 V 9.3 A
twin combination	2 x 4	394W	21.0 V 18.7 A
triple combination	4 x 2	394W	10.5 V 37.5 A
All in paralell	8 x 1	394W	5.3 V 75.0 A

Each mounting set consists of 8 panels with 1 modules of 6 cells = 6 PV-cells
Mounting area 1,25 m x 2,0 m = 2,5 m²

Electrical connection	Pm	Vpm	lpm
All in serie	1 x 8	263W	28.0 V 9.4A
twin combination	2 x 4	263W	14.0 V 18.7A
triple combination	4 x 2	263W	7.0 V 37.5A
All in paralell	8 x 1	263W	3.5 V 75.0A

Wiring boxes

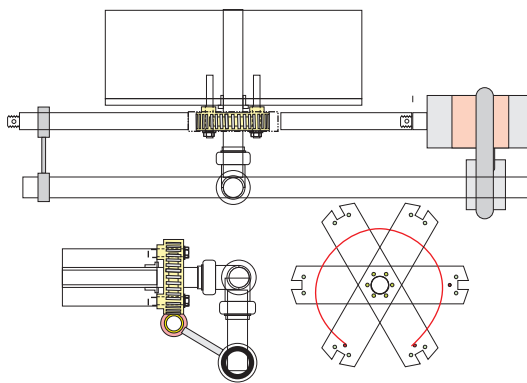
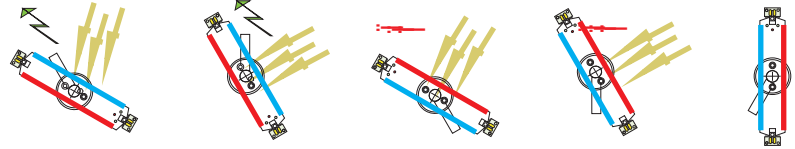




Twin Solar Sensors

Twin faced solar tracking system TP4

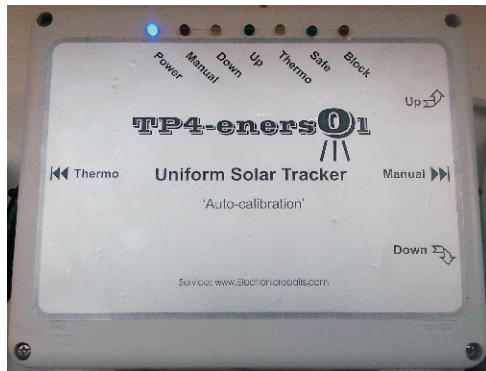
The double faced tracking eye rotates together with the collector, tracking the panels towards the sun. Depending on season and functional mode it operates with one or the other sensor eye which is positioned on the front collector. A special feature is the automatic safe and clean vertical position 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

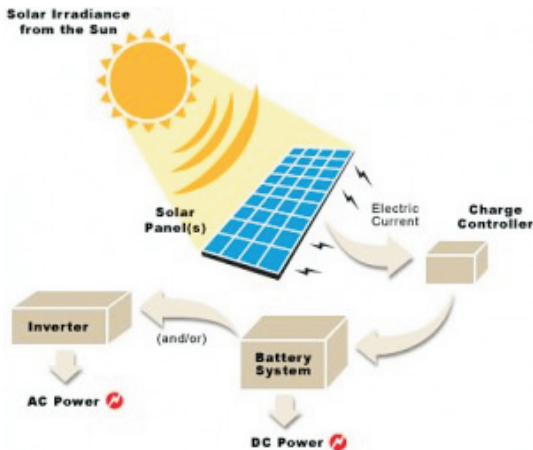
An Inox worm-gear wheel is mounted on the solar panel .. Paralell to the water distribution pipe goes the worm-gear axes in stainless steel, laying under the worm-gear wheels and fixed together onto the water distribution pipe. The electric motor is mounted on either side turning the endless screw in 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 33 to 1000 Watt / set
- * Voltage (Ump) from 3 to 100 VDC / set
- * Current (Imp) from 10 to 100 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.