SKORUT® solar

SYSTEMY SOLARNE FOTOWOLTAIKA

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Catalogue of products

SKORUT® solar
SYSTEMY SOLARNE FOTOWOLTAIKA

17 YEARS OF EXPERIENCE

I. About us

II. Solar systems
2.1. What is the most important when choosing solar collectors for domestic hot water?
- 2.1.1. Actual water consumption
- 2.1.2. Location of solar collectors

2.2. What do you gain by installing collectors today?
2.3. The table of solar systems
2.4. Solar kits

EN 12976

III. Collectors
3.1. Introduction
3.2. Collector technical cards
3.3. Determinants of the quality
3.4. Ways to install solar collectors

IV. Photovoltaics
4.1. Introduction
4.2. Application of photovoltaic cells
4.3. Elements of the kit
4.4. Photovoltaic systems
4.5. Examples of on-grid sets
4.6. TWIN

EN 12976

V. Solar lamps
5.1. Introduction
5.2. Offer of solar lamps
- Swan
- Shark-80 / Shark-60
- Stork
- Crane
- Goose
- Ostrich
- Octopus

ROOF

VI. Products
6.1. Collectors
6.2. Photovoltaics
6.3. Tanks
6.4. Expansion vessels
6.5. Pump stations
6.6. Controllers
6.7. Inverters

VII. Accessories
7.1. Solar accessories
7.2. Photovoltaic accessories

VIII.References

ECO

I. About us

17 YEARS OF EXPERIENCE

Join Us!

Skorut Systemy Solarne®Sp. z o.o. was founded in 1997 by introducing innovative devices that use renewable energy sources to Polish market. For the last 17 years, the company has been one of the leading Polish flat plate collector producers and a pioneer of environmentally friendly technologies. The elements used in our solar systems meet the high requirements in terms of quality, performance, safty and easy installation.

In 2004 the company opened a modern production line of solar panels. Producing high-performance and cost-effective flat solar panels, Skorut Systemy Solarne has completed more than 70 000 m 2 of solar thermal systems in total - for both institutional and individual clients.

Our motto is quality, professionalism and above all customer satisfaction. This is confirmed by numerous references, which were given by our clients.

Join Us!

SKORUT Systemy Solarne®Sp.z o.o. has 17 years of experience in realization of investments in the field of renewable sources of energy, mainly solar energy for both individual and institutional clients. Our company is a manufacturer of high performance flat liquid collectors, on the base of which we realized the largest installation in Europe which had 3500 collectors.

Thanks to the staff which consisting of experienced designers and installers we have the capability to realize any investment and we are not afraid of difficult subjects requiring fast, efficient operation and impeccable coordination. Briefly presenting the achievements of our company, we hope that they will encourage you to cooperate with us.

Join Us!

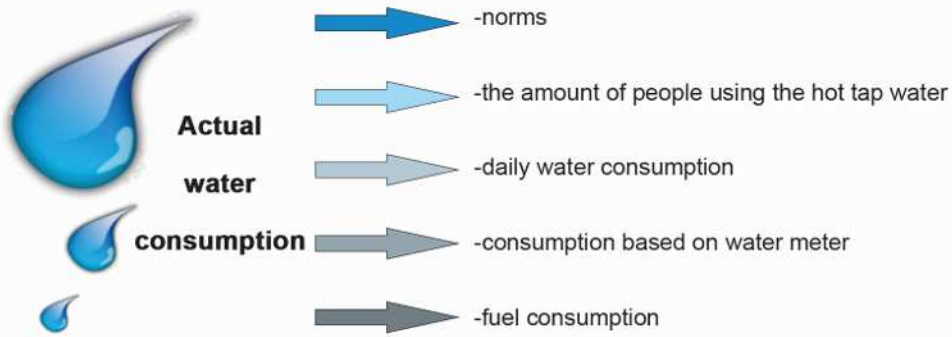
- proffesional projects

- modern technologies

2.1. What is the most important when choosing solar collectors for domestic hot water?

2.1.1. Actual water consumption

One of the most important factors is the proper selection of the number of collectors. To do so, firstly the consumption of hot water should be objectively assessed.



Norms- in the Polish Minister's of Infrastructure Regulation on determination of average water consumption standards, the values are overestimated. This can result in oversizing the installation, while choosing the amount of collectors.
The amount of people using the hot water- usually it is assumed as 1-1.3m2 of absorber surface per person.
Daily water consumption – when reading from the cold water meter it is possible to estimate that about 50% of consumption is used on hot water.
Consumption based on meter- it is the best and the most reliable way to define consumption of hot tap water. Unfortunately in most households there are no such counters.
Fuel consumption- usually it is difficult to actually estimate the energy consumption needed to heat the hot tap water based on spent fuel. Other house devices like gas stove will overstate the demand.

Generally, actual water consumption is estimated on the basis of the amount of people using hot water. The table below shows selection the number of collectors and tank capacity.

	3-4 people	5-6 people	7-9 people
numbers of collectors	2	3	4
tank capacity	200 - 300 litres	300 - 400 litres	400 - 500 litres

Remember that choosing too many collectors is not good for the installation – there is a possibility to overheat it and thus shorten its life. Also, why should we overpay?

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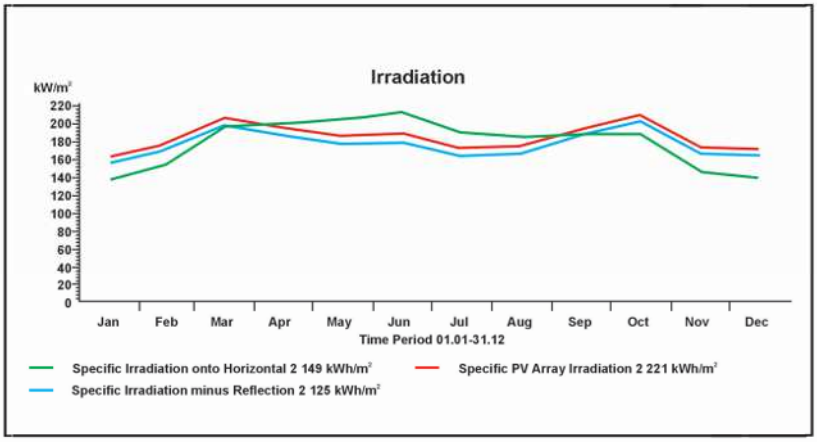
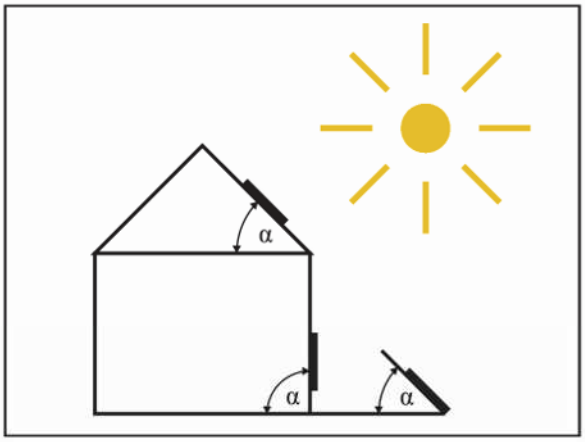
2.1.2. Location and position of solar collectors



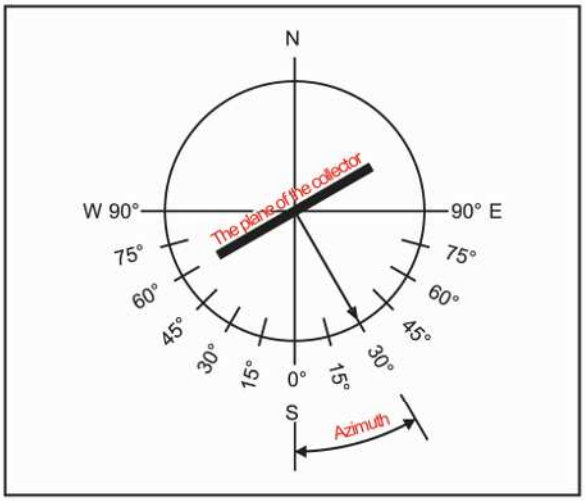
Irradiation annual in the Gulf States

There is a growing interest in utilizatzion of solar energy in the Gulf countries as the country is blessed with abundant solar flux throughout the year. The Persian Gulf have one of the highest solar irradiation in the world, estimated atapproximately 2,221 thermal kWh of solar radiation per square meter.



Angle of inclination

A significant role in proper use of solar energy is played by the angle of solar panel inclination against the horizontal surface. The inclination angle depends on the angle of sunrays,since it should falls perpendicular to the collector's surface. An optimal angle of inclination depends on the collector's exposure period. During winter it should be 60°, and by Summer 30°. In practice, the recommended inclination angle is about 45°.



Azimuth

Another parameter for a position of collector is azimuth, which shouldn't deviate from 0° (South direction). It is not always possible, that's why it is allowed to deviate from the South up to 45° (wherein more beneficial is to deviate to the West).

The main advantages of installating solar system are:

1. Integration with existing installation of central heating and hot tap water.

Deciding on solar installation we do not have to modify an existing one. Solar systems are chosen so that they can cooperate with the existing installation without any problem. Additionally, there is no obligation to replace the tank, provided that, existing has two coils. The whole looks very simple: assemble solar collectors, connect solar installation with the bottom of the coil tank, at the top connect the power and then the whole is strapped to an existing hot water system.

2. Hot water for free – savings in accounts

Average payback period of investment from solar collectors ranges from a few to several years (it is usually a period of 5-7 years). So the investment has the ability to be returned after a few years. Solar systems are extremely durable and the investment will give us benefits itself for many years. The attractiveness of solar systems will increase even more with time. And due to at least two reasons.

- Firstly, Solar kits save a fixed percentage of energy. It means that the higher prices of other energy carriers the greater amounts of savings. Further increases of gas, oil, coal or electricity prices are inevitable.
- Secondly, in contrast to still increasing prices of other energy carriers (gas, fuel oil, coal or current electricity), solar kits prices are decreasing. This is a result of their popularity, which allows for a mass production, and the continuous technological progress lowering production costs.

3. Ecology

Thanks to the use the clear energy, which is the Sun, we reduce the emission of substances polluting the environment. To the atmosphere gets less CO_2, CO, SO_2, NO_2, and many other toxic dusts. Thanks to the "solar roofs" we contribute to protect against global warming.When planning to build a house, it is worth to plan the solar installation at the same time. Then it will turn out that the solar system is much cheaper.

2.3. The table of solar systems from SKORUT Systemy Solarne Sp. z o.o.

SKORUT solar system	Collector type	Number of people	Total collector area	Collectors capacity
Solar system – 2K AS	Askosolar	3-4 people	3,92 m²	2,94kW
Solar system – 2K M1	Max 1	3-4 people	4,64 m²	3,48kW
Solar system – 2K ASM	Askosolar Max	3-4 people	5,06 m²	3,86kW
Solar system – 3K AS	Askosolar	5-6 people	5,88 m²	4,41kW
Solar system – 3K M1	Max 1	5-6 people	6,96 m²	5,22kW
Solar system – 3K ASM	Askosolar Max	5-6 people	7,59 m²	5,79kW
Solar system – 4K AS	Askosolar	7-9 people	7,84 m²	5,88kW
Solar system – 4K M1	Max 1	7-9 people	9,28 m²	6,96kW
Solar system – 4K ASM	Askosolar Max	7-9 people	10,12 m²	7,72kW
Solar system – 6K AS	Askosolar	3-4 people+ central heating	11,76 m²	8,82kW
Solar system – 6K M1	Max 1	3-4 people+ central heating	13,92 m²	10,44kW
Solar system – 6K ASM	Askosolar Max	3-4 people+ central heating	15,18 m²	11,58kW
Solar system – 9K AS	Askosolar	4-7 people + pool	17,64 m²	13,23kW
Solar system – 9K M1	Max 1	4-7 people + pool	20,88 m²	15,66kW
Solar system – 8K ASM	Askosolar Max	4-7 people + pool	20,24 m²	15,44kW

Select a solar system for yourself.

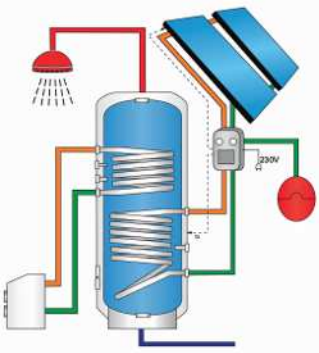
2.4. Solar sets.

Solar sets of **SKORUT Systemy Solarne®** are designed for heating water but can also support central heating. Our specialists have selected the highest quality products, giving you highly functional kits. The base of each product includes: solar collectors, water tank, expansion vessels and pumping/ control group. Additionally, the offer from our company includes fastening systems, supports on the roof, valves, lagging and all other necessary items.

Solar system - 2K AS set

Askosolar system

Take the SET



Set characteristic:

Number of collectors:	**2 pieces**
Collector type:	Askosolar
Collector gross area:	3,92 m2
Collector active surface area:	3,64 m2
Installation type:	d.h.w.
Domestic hot water storage tank:	300 l
Collector power:	2,94 kW

THE SET INCLUDES:

Askosolar collector	2 pcs
300l hot water tank	1 pcs
Collector connection set	1 pcs
Collector connector	1 pcs
Complete solar station 1.1	1 pcs
Solar expansion vessel 18l	1 pcs
Concentrated solar agent 10l	1 pcs
Roof fixing kit for two collectors vertically next to each other - aluminium	1 set
Mounting grip for collector	6 pcs
Solar regulator	1 pcs
Solar expansion vessel mounting kit	1 pcs

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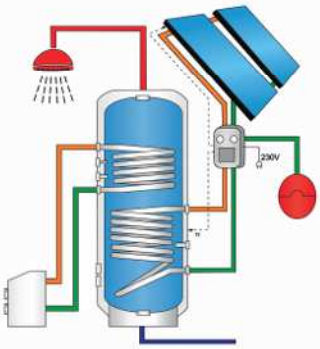
Solar system - 2K M1 set — MAX 1 system

Take the SET



Set characteristic:

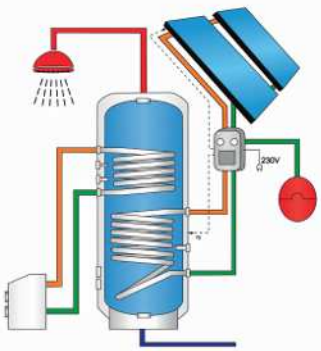
Number of collectors:	**2 pieces**
Collector type:	MAX 1
Collector gross area:	4,64 m2
Collector active surface area:	4,26 m2
Installation type:	d.h.w.
Domestic hot water storage tank:	300 l
Collector power:	3,48 kW

THE SET INCLUDES:

MAX 1 collector	2 pcs
300l hot water tank	1 pcs
Collector connection set	1 pcs
Collector connector	1 pcs
Complete solar station 1.1	1 pcs
Solar expansion vessel 18l	1 pcs
Concentrated solar agent 10l	1 pcs
Roof fixing kit for two collectors vertically next to each other - aluminium	1 set
Mounting grip for collectors	6 pcs
Solar regulator	1 pcs
Solar expansion vessel mounting kit	1 pcs

Solar system - 2K ASM set — Askosolar MAX system

Take the SET



Set characteristic:

Number of collectors:	**2 pieces**
Collector type:	Askosolar MAX
Collector gross area:	5,06 m2
Collector active surface area:	4,70 m2
Installation type:	d.h.w.
Domestic hot water storage tank:	300 l
Collector power:	3,86 kW

THE SET INCLUDES:

Askosolar MAX collector	2 pcs
300l hot water tank	1 pcs
Collector connection set	1 pcs
Collector connector	1 pcs
Complete solar station 1.1	1 pcs
Solar expansion vessel 18l	1 pcs
Concentrated solar agent 10l	1 pcs
Roof fixing kit for two collectors vertically next to each other - aluminium	1 set
Mounting grip for collectors	6 pcs
Solar regulator	1 pcs
Solar expansion vessel mounting kit	1 pcs

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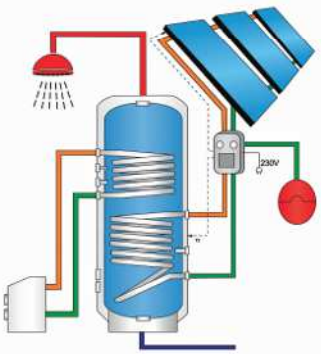
Solar system - 3K AS set — Askosolar system

Take the SET



Set characteristic:

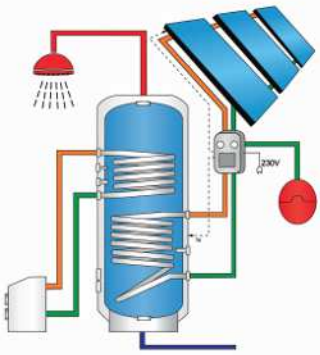
Number of collectors:	**3 pieces**
Collector type:	Askosolar
Collector gross area:	5,88 m2
Collector active surface area:	5,46 m2
Installation type:	d.h.w.
Domestic hot water storage tank:	300 l
Collector power:	4,41 kW

THE SET INCLUDES:

Askosolar collector	3 pcs
300l hot water tank	1 pcs
Collector connection set	1 set
Collector connector	1 pcs
Complete solar station 1.1	1 pcs
Solar expansion vessel 18l	1 pcs
Concentrated solar agent 10l	1 pcs
Roof fixing kit for three collectors vertically next to each other - aluminium	1 set
Mounting grip for collectors	6 pcs
Solar regulator	1 pcs
Solar expansion vessel mounting kit	1 pcs

Solar system - 3K M1 set — MAX 1 system

Take the SET



Set characteristic:

Number of collectors:	**3 pieces**
Collector type:	MAX 1
Collector gross area:	6,96 m2
Collector active surface area:	6,39 m2
Installation type:	d.h.w.
Domestic hot water storage tank:	300 l
Collector power:	5,22 kW

THE SET INCLUDES:

MAX 1 collector	3 pcs
300l hot water tank	1 pcs
Collector connection set	1 set
Collector connector	2 pcs
Complete solar station 1.1	1 pcs
Solar expansion vessel 18l	1 pcs
Concentrated solar agent 10l	2 pcs
Roof fixing kit for three collectors vertically next to each other - aluminium	1 set
Mounting grip for collectors	6 pcs
Solar regulator	1 pcs
Solar expansion vessel mounting kit	1 pcs

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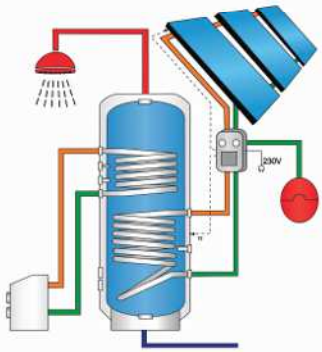
Solar system - 3K ASM set

Askosolar MAX system

Take the SET



Set characteristic:

Number of collectors:	**3 pieces**
Collector type:	Askosolar MAX
Collector gross area:	7,59 m2
Collector active surface area:	7,05 m2
Installation type:	d.h.w.
Domestic hot water storage tank:	400 l
Collector power:	5,79 kW

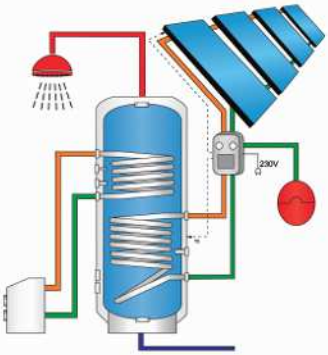
THE SET INCLUDES:

Askosolar MAX collector	3 pcs
400l hot water tank	1 pcs
Collector connection set	1 set
Collector connector	1 set
Complete solar station 1.1	1 pcs
Solar expansion vessel 25l	1 pcs
Concentrated solar agent 10l	2 pcs
Roof fixing kit for three collectors vertically next to each other - aluminium	1 set
Mounting grip for collectors	6 pcs
Solar regulator	1 pcs
Solar expansion vessel mounting kit	1 pcs

Solar system - 4K AS set

Askosolar system

Take the SET



Set characteristic:

Number of collectors:	**4 pieces**
Collector type:	Askosolar
Collector gross area:	7,84 m2
Collector active surface area:	7,28 m2
Installation type:	d.h.w.
Domestic hot water storage tank:	400 l
Collector power:	5,88 kW

THE SET INCLUDES:

Askosolar collector	4 pcs
400l hot water tank	1 pcs
Collector connection set	1 set
Collector connector	3 pcs
Complete solar station 1.1	1 pcs
Solar expansion vessel 25l	1 pcs
Concentrated solar agent 10l	2 pcs
Roof fixing kit for four collectors vertically next to each other - aluminium	2 set
Mounting grip for collectors	8 pcs
Solar regulator	1 pcs
Solar expansion vessel mounting kit	1 pcs

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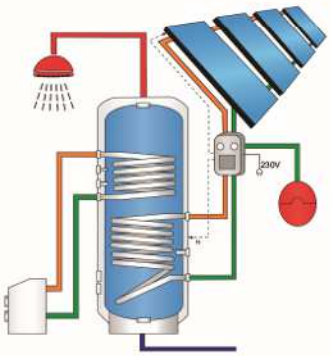
Solar system - 4K M1 set — MAX 1 system

Take the SET



Set characteristic:

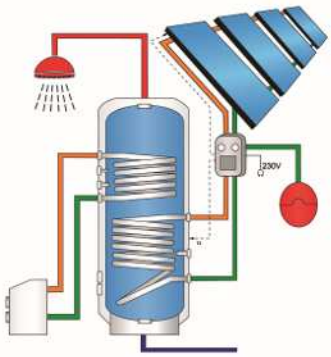
Number of collectors:	**4 pieces**
Collector type:	MAX 1
Collector gross area:	9,28 m2
Collector active surface area:	8,52 m2
Installation type:	d.h.w.
Domestic hot water storage tank:	500 l
Collector power:	6,96 kW

THE SET INCLUDES:

MAX 1 collector	4 pcs
500 l storage tank	1 pcs
Collector connection set	1 set
Collector connector	2 set
Complete solar station 1.1	1 pcs
Solar expansion vessel 25l	1 pcs
Concentrated solar agent 10l	2 pcs
Roof fixing kit for four collectors vertically next to each other - aluminium	2 set
Mounting grip for collectors	8 pcs
Solar regulator	1 pcs
Solar expansion vessel mounting kit	1 pcs

Solar system - 4K ASM set — Askosolar MAX system

Take the SET



Set characteristic:

Number of collectors:	**4 pieces**
Collector type:	Askosolar MAX
Collector gross area:	10,12 m2
Collector active surface area:	9,40 m2
Installation type:	d.h.w.
Domestic hot water storage tank:	500 l
Collector power:	7,72 kW

THE SET INCLUDES:

Askosolar collector	4 pcs
400l hot water tank	1 pcs
Collector connection set	1 set
Collector connector	2 set
Complete solar station 1.1	1 pcs
Solar expansion vessel 25l	1 pcs
Concentrated solar agent 10l	2 pcs
Roof fixing kit for four collectors vertically next to each other - aluminium	2 set
Mounting grip for collectors	8 pcs
Solar regulator	1 pcs
Solar expansion vessel mounting kit	1 pcs

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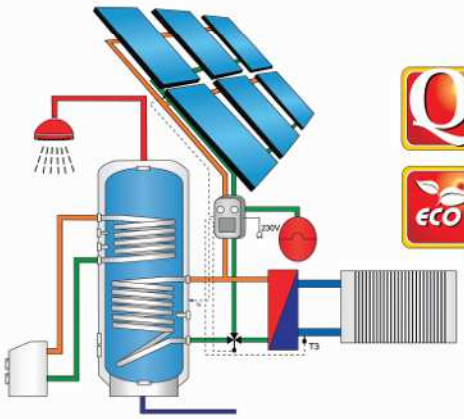
Solar system - 6K AS set — Askosolar system

Take the SET



Set characteristic:

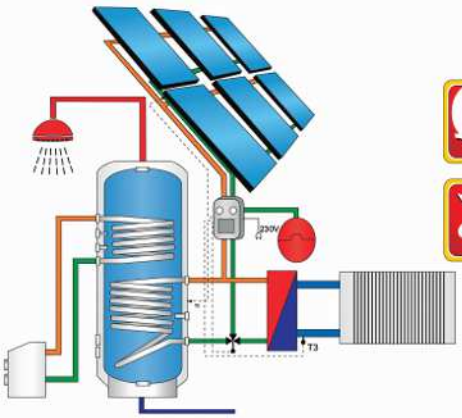
Number of collectors:	**6 pieces**
Collector type:	Askosolar
Collector gross area:	11,76 m2
Collector active surface area:	10,92 m2
Installation type:	d.h.w.+central heating
Domestic hot water storage tank:	750/150 l
Collector power:	8,82 kW

THE SET INCLUDES:

Askosolar Collector	6 pcs
750/150 l KOMBI tank	1 pcs
Collector connection set	2 set
Collector connector	4 pcs
Complete solar station 1.1	1 pcs
Solar expansion vessel 50l	1 pcs
Concentrated solar agent 10l	3 pcs
Roof fixing kit for three collectors vertically next to each other - aluminium	2 set
Mounting grip for collectors	12 pcs
Solar regulator	1 pcs
Solar expansion vessel mounting kit	1 pcs

Solar system - 6K M1 set — MAX 1 system

Take the SET



Set characteristic:

Number of collectors:	**6 pieces**
Collector type:	MAX 1
Collector gross area:	13,92 m2
Collector active surface area:	12,78 m2
Installation type:	d.h.w.+central heating
Domestic hot water storage tank:	750/150 l
Collector power:	10,44 kW

THE SET INCLUDES:

MAX 1 collector	6 pcs
750/150 l KOMBI tank	1 pcs
Collector connection set	2 set
Collector connector	4 pcs
Complete solar station 1.1	1 pcs
Solar expansion vessel 50l	1 pcs
Concentrated solar agent 10l	3 pcs
Roof fixing kit for three collectors vertically next to each other - aluminium	2 set
Mounting grip for collectors	12 pcs
Solar regulator	1 pcs
Solar expansion vessel mounting kit	1 pcs

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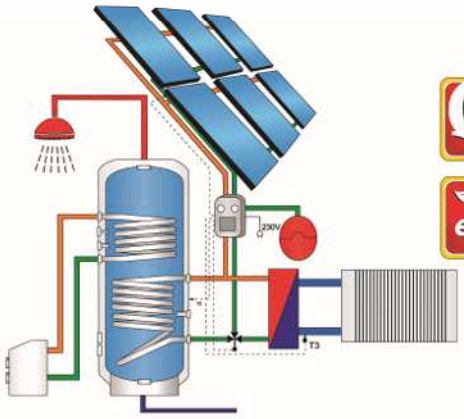
Solar system - 6K ASM set — Askosolar MAX system

Take the SET



Set characteristic:

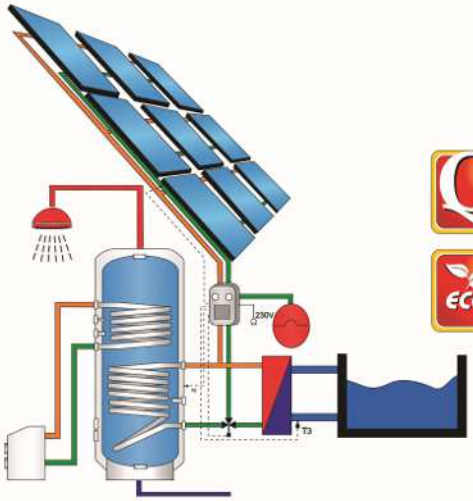
Number of collectors:	**6 pieces**
Collector type:	Askosolar MAX
Collector gross area:	15,18 m2
Collector active surface area:	14,10 m2
Installation type:	d.h.w.+ central heating
Domestic hot water storage tank:	750/150 l
Collector power:	11,58 kW

THE SET INCLUDES:

Askosolar MAX collector	6 pcs
750/150 l KOMBI tank	1 pcs
Collector connection set	2 set
Collector connector	2 set
Complete solar station 1.1	1 pcs
Solar expansion vessel 50l	1 pcs
Concentrated solar agent 10l	3 pcs
Roof fixing kit for three collectors vertically next to each other - aluminium	2 set
Mounting grip for collectors	12 pcs
Solar regulator	1 pcs
Solar expansion vessel mounting kit	1 pcs

Solar system - 9K AS set — Askosolar system

Take the SET



Set characteristic:

Number of collectors:	**9 pieces**
Collector type:	Askosolar
Collector gross area:	17,64 m2
Collector active surface area:	16,38 m2
Installation type:	d.h.w.+ pool
Domestic hot water storage tank:	400 l
Collector power:	13,23 kW

THE SET INCLUDES:

Askosolar collector	9 pcs
400l hot water tank	1 pcs
Collector connection set	3 set
Collector connector	6 pcs
Complete solar station 1.1	1 pcs
Solar expansion vessel 80l	1 pcs
Concentrated solar agent 10l	5 pcs
Roof fixing kit for three collectors vertically next to each other - aluminium	3 set
Mounting grip for collectors	18 pcs
Solar regulator	1 pcs
Solar expansion vessel mounting kit	1 pcs

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Solar system - 9K M1 set — MAX 1 system

Take the SET

Set characteristic:

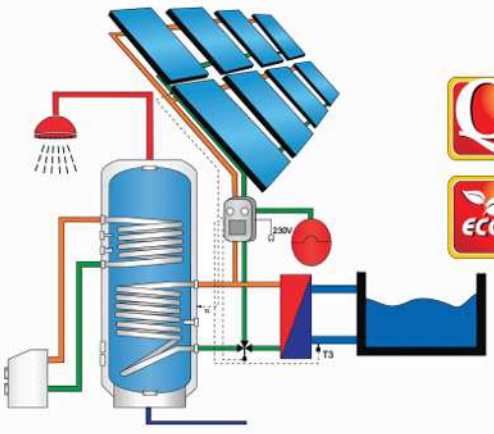
Number of collectors:	**9 pieces**
Collector type:	MAX 1
Collector gross area:	20,88 m2
Collector active surface area:	19,17 m2
Installation type:	d.h.w.+ pool
Domestic hot water storage tank:	400 l
Collector power:	15,66 kW

THE SET INCLUDES:

MAX 1 collector	9 pcs
400l hot water tank	1 pcs
Collector connection set	3 set
Collector connector	6 pcs
Complete solar station 1.1	1 pcs
Solar expansion vessel 80l	1 pcs
Concentrated solar agent 10l	5 pcs
Roof fixing kit for three collectors vertically next to each other - aluminium	3 set
Mounting grip for collectors	18 pcs
Solar regulator	1 pcs
Solar expansion vessel mounting kit	1 pcs

Solar system - 8K ASM set — Askosolar MAX system

Take the SET



Set characteristic:

Number of collectors:	**8 pieces**
Collector type:	Askosolar MAX
Collector gross area:	20,24 m2
Collector active surface area:	18,80 m2
Installation type:	d.h.w.+ pool
Domestic hot water storage tank:	400 l
Collector power:	15,44 kW

THE SET INCLUDES:

Askosolar MAX collector	8 pcs
400l hot water tank	1 pcs
Collector connection set	2 set
Collector connector	2 set
Complete solar station 1.1	1 pcs
Solar expansion vessel 80l	1 pcs
Concentrated solar agent 10l	5 pcs
Roof fixing kit for three collectors vertically next to each other - aluminium	2 set
Mounting grip for collectors	16 pcs
Solar regulator	1 pcs
Solar expansion vessel mounting kit	1 pcs

3.1. Introduction.

Technology with ecology

Collectors from ***SKORUT Systemy Solarne®*** company stand out due to their efficiency. Thanks to this, we can use free solar energy and get a significant reduction in costs of preparing hot tap water, swimming pool water and to support building heating. Elements which we use meet high standards either in terms of quality or safety and easy handling. Collectors include absorber with selective coating, one of the best quality selective coatings being used nowadays on the market. That is why conversion into thermal energy reaches efficiency of solar collectors is above 82%. Depending on individual preferences of our clients we offer collectors:

Askosolar	**1750 x 1137 x 80 mm**
MAX 1	**2037 x 1134 x 80 mm**
Askosolar MAX	**2224 x 1137 x 80 mm**
SK 2,52 Collector	**2393 x 1137 x 80 mm**
SK 2,2 Collector	**2098 x 1137 x 80 mm**

NEW!

Energy with benefit

All types of ***SKORUT Systemy Solarne®*** collectors are characterized with meandrical water flow. In contrast to collectors with harpflow, it has many advantages. First of all it provides an uniform use of the absorber. It is very easyvent froom unwanted air. Besides, such absorber solution leads to safe exploitation even in the absence of heat load as well as achieve high temperature. Then, glycol solution inside the collector evaporates slowly, this process starts at the top of a collector (wherein the pressure is the lowest) and slowly advances downwards. Since there is a single tube, this process is not as rapid, after evaporation of the refrigerant the vapor overheats and does not absorb large amounts of heat. Because of the lack of hydraulic connections inside the collector casing the risk of leaks is minimized.

Smart investment

SKORUT Systemy Solarne® collectors are usually installed on roofs. This space favors their effective and collision-free work. Our collectors despite their large absorption area are one of the lightest on the market. This effect was achieved through aluminum casing. Solar installation thanks to special mounting systems can be done at building under construction or existing one. Before planning the investment you should take this into consideration and define what needs should be realized by the installation. Additionally we provide assistance in obtaining grants from the Polish National Fund for Environmental Protection and Water Management and other institutions.

SKORUT® solar
SYSTEMY SOLARNE FOTOWOLTAIKA

Highly efficient solar collector will not guarantee optimal exploitation of the entire solar installation. **The essential is the complete system solution of the solar installation, which consists of:**

- Properly chosen expansion vessel
- Storage Heater
- Bicornate solar station equipped with an electronic flow sensor
- Solar controller provides optimal operation of the system, and being capable of detecting possible faults
- High quality of solar installation - stainless steel hoses in a single isolation

Solar installations are usually used in:

- Heating domestic hot water – solar system should compensate for 90% of the heat demand in summer months and 50-60% across the year.

- Supporting central heating – recommended for low energy demand buildings and those which use low-temperature heating system in large part of the, eg. floor or wall heating.

- Swimming pool heating – in case of heating a swimming pool, the choice of installation is dictated by circumstances, eg. outdoor or indoor pool, covered or uncovered one and above all the total area of the swimming pool. Due to water's low temperature it is one of the best of solar energy receiver.

What do you have to note when building the solar installation?

- Proper selection of the amount of the collectors.
- Assurance of proper flow and temperature settings.
- Correct location of solar collectors mounting.
- Performing of the installation and startup according to manufacturer's instructions by qualified staff.

Askosolar collector 1750 x 1137 x 80

Highly efficient flat collector transforms the Sun's rays into thermal energy. It is suitable for domestic hot water heating, boiler water or water in swimming pools. Because of high quality of TINOX CLASIC coating and optimal thermal insulation, the heat losses are limited to minimum. Transport of thermal energy takes place due to freezing resistant polypropylene solar fluid. Apart from optimized performance, the emphasis during designing has been put on, above all, on vitality and ease of the installation.

Collectors are anodized.
Tubes inlet/outlet – two connections on the shorter side of the collector.

Askosolar collector	
Dimensions (LxWxT):	1750×1137×80 mm
Area:	1,96 m^2
Weight:	38,0 kg
Efficiency:	η_o = 81,4%
Heat loss coeficient:	k_1 = 1,121 W/m^2K k_2 = 0,038 W/m^2K^2
Incidence angle modifier:	$k_{(50)}$ = 0,98
Nominal heat output	1,47 kW

η_o , k_1, k_2 with respect to the surface of the device

Hydraulics

Heat transfer agent volume: 1,3l
Minimum flow (up to 5 collectors in a row): 2,50 l/min
Heat losses (at 2,5 l/min – water): 62 mbar
Connection: 12 mm copper pipe
Type of the connection: terminal connector
Allowable operating pressure: 10,0 bar
Test pressure: 15,0 bar
Temperature in the stagnation: 220°C

Absorber	
Emission:	ε = 4,0%
Absorption:	α = 95,0%
Absorber's area:	1,82 m^2
Material:	copper
Coating:	highly selective absorber coating

Casing

Material: Aluminium - black anodized
Sealing: EPDM / silicone
Thermal insulation: 50 mm of mineral wool
Tempered solar glass: low iron content, high light transmission
Glass thickness: 4,0 mm

Determinants of the quality and certifications

- High efficiency of the system due to high quality of the absorber's coating
- Small heat losses because of the optimal thermal insulation
- Adapted to installation in many systems: on the roof, in the roof, on flat roof
- Type of installation: vertical – one next to another or horizontal – one above another
- Durable anodized aluminum frame ensures long life
- High safety and long time of operation achieved by specially developed installation system, installation kits, connectors of collectors and accessories
- CE mark
- Tested according to PN-EN 12975-2; 2007

SKORUT solar
SYSTEMY SOLARNE FOTOWOLTAIKA

MAX 1 collector 2037 x 1134 x 80 mm

Highly efficient flat collector transforms the Sun's rays into thermal energy. It is suitable for domestic hot water heating, boiler water or water in swimming pools. Because of high quality of TINOX CLASIC coating and optimal thermal insulation, the heat losses are limited to minimum. Transport of thermal energy takes place due to freezing resistant polypropylene solar fluid. Apart from optimized performance, the emphasis during designing has been put on, above all, on vitality and ease of the installation.

Collectors are anodized.
Inlet/outlet tubes – two connections on the shorter side of the collector.

MAX 1 collector

Dimensions (LxWxT):	2037×1134×80 mm
Area:	2,32 m^2
Weight:	44,0 kg
Efficiency:	η_o = 81,7%
Heat loss coeficient:	k_1 = 2,741 W/m^2K k_2 = 0,0147 W/m^2K^2
Incidence angle modifier:	$k_{(50)}$ = 0,93
Nominal heat output	1,74 kW

η_o , k_1, k_2 with respect to the surface of the device

Hydraulics

Capacity of the heat carrier: 1,54 l
Minimum flow (up to 5 collectors in a row) : 2,50 l/min
Heat losses (at 2,5 l/min – water): 62 mbar
Connection: 12 mm copper pipe
Type of the connection: terminal connector
Allowable operating pressure: 10,0 bar
Test pressure: 15,0 bar
Stagnation temperature: 194°C

Absorber

Emission:	ε = 4,0%
Absorption:	α = 95,0%
Absorber's area:	2,13 m^2
Material:	copper
Coating:	highly selective absorber coating

Casing

Material: Aluminium - black anodized
Sealing: EPDM / silicone
Thermal insulation: 50 mm of mineral wool
Tempered solar glass: low iron content, high light transmission
Glass thickness: 4,0 mm

Determinants of the quality and certifications

- High efficiency of the system due to high quality of the absorber's coating
- Small heat losses because of the optimal thermal insulation
- Adapted to installation in many systems: on the roof, in the roof, on flat roof
- Type of installation: vertical – one next to another or horizontal – one above another
- Durable anodized aluminum frame ensures long life
- High safety and long time of operation achieved by specially developed installation system, installation kits, connectors of collectors and accessories
- CE mark
- Tested according to PN-EN 12975-2; 2006

SKORUT solar
SYSTEMY SOLARNE FOTOWOLTAIKA

Askosolar MAX collector 2224 x 1137 x 80mm

Highly efficient flat collector transforms the Sun's rays into thermal energy. It is suitable for domestic hot water heating, boiler water or water in swimming pools. Because of high quality of TINOX Energy Cu coating and optimal thermal insulation, the heat losses are limited to minimum. Transport of thermal energy takes place due to freezing resistant polypropylene solar fluid. Apart from optimized performance, the emphasis during designing has been put, above all, on vitality and ease of installation.

Collectors are anodized.
Inlet/outlet tubes – four connections on longer sides of the collector.

Askosolar MAX collector

Dimensions (LxWxT):	2224×1137×80 mm
Area:	2,53 m^2
Weight:	55,0 kg
Efficiency:	η_o = 82,8%
Heat loss coeficient:	k_1 = 2,699 W/m^2K k_2 = 0,0106 W/m^2K^2
Incidence angle modifier:	$k_{(50)}$ = 0,96
Nominal heat output	1,93 kW

η_o , k_1, k_2 with respect to the surface of the device

Absorber

Emission:	ε = 4,0%
Absorption:	α = 95,0%
Absorber's area:	2,36 m^2
Material:	copper
Coating:	highly selective absorber coating

Casing

Material: Aluminium - black anodized
Sealing: EPDM / silicone
Thermal insulation: 50 mm of mineral wool
Tempered solar glass: low iron content, high light transmission
Glass thickness: 4,0 mm

Hydraulics

Capacity of the heat carrier: 2,2 l
Minimum flow (up to 10 collectors in a row) : 1,50 l/min
Heat losses (at 2,5 l/min – water): 64 mbar
Connection: 22 mm copper pipe
Type of the connection: terminal connector
Allowable operating pressure: 10,0 bar
Test pressure: 13,0 bar
Stagnation temperature: 222°C

Determinants of the quality and certifications

- High efficiency of the system due to high quality of the absorber's coating
- Small heat losses because of the optimal thermal insulation
- Adapted to installation in many systems: on the roof, in the roof, on flat roof
- Type of installation: vertical – one next to another
- Durable anodized aluminum frame ensures long life
- High safety and long time of operation achieved by specially developed installation system, installation kits, connectors of collectors and accessories
- CE mark
- Tested according to PN-EN 12975-1: 2006+A1:2010

SKORUT solar
SYSTEMY SOLARNE FOTOWOLTAIKA

SK 2,52 collector 2393 x 1137 x 80mm

Highly efficient flat collector transforms the Sun's rays into thermal energy. It is suitable for domestic hot water heating, boiler water or water in swimming pools. Because of high quality of TINOX Energy Cu coating and optimal thermal insulation, the heat losses are limited to minimum. Transport of thermal energy takes place due to freezing resistant polypropylene solar fluid. Apart from optimized performance, the emphasis during designing has been put, above all, on vitality and ease of the installation.

Collectors are anodized.
Inlet/outlet tubes – four connections on longer sides of the collector.

SK 2,52 Collector	
Dimensions (LxWxT):	2393×1137×80 mm
Area:	2,72 m^2
Weight:	47,7 kg

Absorber	
Emission:	ε = 4,0%
Absorption:	α = 95,0%
Absorber's area:	2,54 m^2
Material:	copperplate 0,2mm
Coating:	highly selective absorber coating

Hydraulics

Minimum flow
(up to 10 collectors in a row): 1,50 l/min
Connection: 22 mm copper pipe
Type of the connection: terminal collector

Casing

Material: Aluminium - black anodized
Sealing: EPDM / silicone
Thermal insulation: 50 mm of mineral wool
Tempered solar glass: low iron content, high light transmission
Glass thickness: 3,2 mm

Determinants of the quality and certifications

- High efficiency of the system due to high quality of the absorber's coating
- Small heat losses because of the optimal thermal insulation
- Adapted to installation in many systems: on the roof, in the roof, on flat roof
- Type of installation: vertical – one next to another
- Durable anodized aluminum frame ensures long life
- High safety and long time of operation achieved by specially developed installation system, installation kits, connectors of collectors and accessories
- CE mark

SKORUT solar
SYSTEMY SOLARNE FOTOWOLTAIKA

SK 2,2 collector 2098 x 1137 x 80mm

Highly efficient flat collector transforms the Sun's rays into thermal energy. It is suitable for domestic hot water heating, boiler water or water in swimming pools. Because of high quality of TINOX Energy Cu coating and optimal thermal insulation, the heat losses are limited to minimum. Transport of thermal energy takes place due to freezing resistant polypropylene solar fluid. Apart from optimized performance, the emphasis during designing has been put, above all, on vitality and ease of the installation.

Collectors are anodized.
Inlet/outlet tubes – two connections on the shorter side of the collector.

SK 2,2 Collector	
Dimensions (LxWxT):	2098×1137×80 mm
Area:	2,39 m^2
Weight:	40,3 kg

Absorber	
Emission:	ε = 4,0%
Absorption:	α = 95,0%
Absorber's area:	2,22 m^2
Material:	copperplate 0,2mm
Coating:	highly selective absorber coating

Hydraulics

Minimum flow
(up to 5 collectors in a row) : 2,50 l/min
Connection: 12 mm copper pipe
Type of the connection: terminal collector

Casing

Material: Aluminium - black anodized
Sealing: EPDM / silicone
Thermal insulation: 50 mm of mineral wool
Tempered solar glass: low iron content, high light transmission
Glass thickness: 3,2 mm

Determinants of the quality and certifications

- High efficiency of the system due to high quality of the absorber's coating
- Small heat losses because of the optimal thermal insulation
- Adapted to installation in many systems: on the roof, in the roof, on flat roof
- Type of installation: vertical – one next to another
- Solid anodized aluminum frame ensures long life
- High safety and long time of operation achieved by special developed installation system, installation kits, connectors of collectors and accessories
- CE mark

SKORUT solar
SYSTEMY SOLARNE FOTOWOLTAIKA

TWIN collector 1661 x 1021 x 80mm

TWIN collector is a modern device which combines photovoltaic module and high efficiency flat plate collector. Photovoltaic module produces electricity from the sun, meanwhile the flat collector has a double function: it cools the photovoltaic panel increasing its efficiency and supplies hot water. Thermal energy transport works by polypropylene solar fluid. Next to the optimized performance, a big emphasis in the design has been placed foremost on the viability and ease of assembly.

TWIN Collector

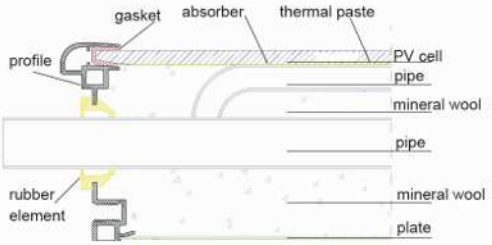
Dimensions (LxWxT):	1661x1021x80 mm
Area:	1,61 m^2
Weight:	41,5 kg
Heat loss coefficient	$a_{1A=}$ 7,6 W/m^2K
Efficiency:	$\eta_{0A=}$ 52 %

Absorber

Emission:	ε = 4,0%
Absorption:	α = 95,0%
Material:	copper
Coating:	highly selective absorber coating

Housing

Material: Aluminium- silver, anodized
Sealing: EPDM / silicon
Thermal insulation: 50 mm of mineral wool



Removing tubes – four connections on the shorter sides of the TWIN collector.

Hydraulics

The volume of heat medium: 2,0 l
Test pressure: 15 bar
Max. test pressure: 10 bar
Connection: 22 mm copper pipe

Parameters

P.. max	230 Wp
V max	29,70 V
I max	7,75 A
V oc	36,90 V
I sc	8,35 A

Annual yield per one collector average temperatures of 3 collectors (Tm) in 4 standard locations

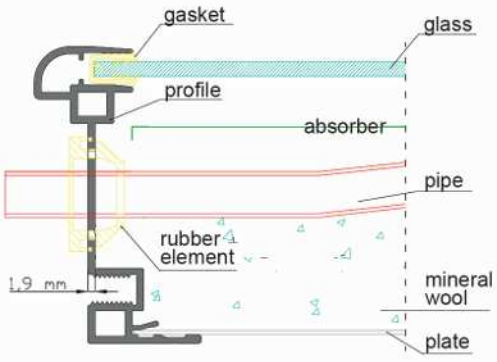
Localization	annual yield for Tm=20	annual yield for Tm=35	annual yield for Tm=50
Athens	1352 kWh	747 kWh	386 kWh
Davos	820 kWh	451 kWh	213 kWh
Sztokholm	617 kWh	318 kWh	148 kWh
Würzburg	682 kWh	343 kWh	158 kWh

Determinants of the quality of SKORUT Systemy Solarne collectors:

- High efficiency heating row 82%.
- **High selective absorber coating TiNOX** - solar radiation absorption coefficient of 95%, emission coefficient in the infrared radiation spectrum 4% - reducing convective heat losses from the absorber to the surrounding area and an increase in efficiency of the collector.
- **Meandrical water flow -** even use of absorber surface - allows for easier venting.
- **CE mark** - Safety sign - safe product.
- **Versatile and quick collector mounting system -** using appropriately designed rails, brackets and couplings taking into account the thermal expansion of the individual components. This allowed us to significantly extend system lifespan and shorten installation time.
- **High quality of technology and low price of product** in contrast to expensive vacuum tube collectors, which high price is not relevant to their lower performance compared to our collectors.
- **Certificated** by accredited international research unit, confirming the high performance operation of the collector: high efficiency and low heat loss factors.

Furthermore:

- **No hydraulic connections** inside MAX1 or Askosolar collectors and minimized number of connections in the Askosolar Max collector - hermetic and trouble-free.
- **Optimal thermal insulation** - small energy losses.
- **Sturdy, lightweight aluminum frame** - long service life and simplified shipments due to light weight.
- **Special shape of the collector casing** to adjust its mounting depending on conditions.
- **An effective system of natural ventilation of the collector.**
- **Quick-connectors system** - durability of hydraulic connections, reduced number heat loss or leak points in the collector.
- **Approved solar glass with a thickness of 4 mm** with reduced content of iron oxides, minimizes absorption of solar radiation through the glass.
- **Anodized collector frame** - aluminum protects against corrosion or mechanical damage and its color absorbs heat energy. Additionally, anodized black frame is much more durable than commonly used painting methods.
- **High esthetics of collector**, installation and connection.
- **Best value for money.**
- **Does not interfere with the ecological balance.**

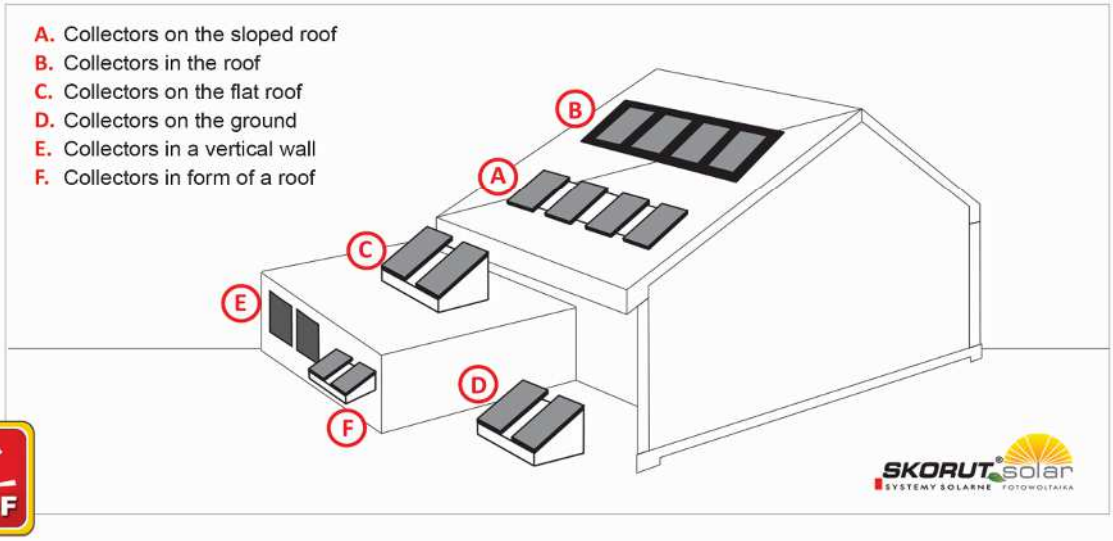


- cross section of the collector - drawing preview image

Your Collector ECO FRIENDLY

3.4. Ways to install solar systems.

One of the most important elements in placement of collectors is proper placement against directions of the world. Collectors optimally should be directed south. If the roof is directed other way, supporting structures that face collectors in the right direction could be applied. It is worth to consider if it is not better to install them in another place. It should be also remembered not to make collectors shaded with trees, another building and so on.



Another important element which has the influence on the proper placement of collectors is an angle which they form with the ground's surface. The sunrays should fall perpendicular on the active surface of the collector. The optimal angle of inclination depends on the collector's exposure period. During winter it should be 60° and in summer 30°. In practice, the recommended angle is about 45°.

The scale of an annual energy yield of the radiation in relation to the optimal yield depending on the change of the angle inclination and azimuth (%).

Azimuth angle	Angle of inclination								
	10°	20°	30°	40°	50°	60°	70°	80°	90°
0° - The South	90	100	100	100	100	95	90	80	70
+10° West / -10° East	90	100	100	100	100	95	90	80	70
+20° West / -20° East	95	100	100	100	100	95	90	80	70
+30° West / -30° East	95	95	100	100	95	95	90	80	70
+40° West / -40° East	95	95	95	95	95	90	80	80	70
+50° West / -50° East	95	95	95	95	90	90	80	70	70
+60° West / -60° East	95	95	95	90	90	80	80	70	60
+70° West / -70° East	95	90	90	90	80	80	80	70	60
+80° West / -80° East	90	90	90	90	80	80	70	70	60
West / East	90	90	90	80	80	70	70	60	50

The greatest amount of energy we obtain when the surface of a collector is directed perpendicularly to the solar radiation direction. Solar installation, located to the south with 20°-50° inclination from the horizontal plane, gives the highest energy profit per year. Furthermore, at deviation of 30° to the east or to the west, energy yield is still beneficial. With larger deviations southeast, southwest an installation with a greater angle than 30°-40° is recommended.

4.1. Introduction.

Photovoltaic cell is the main element of photovoltaic system. Cells are connected in series or in parallel to form a photovoltaic module. Finally, the photovoltaic installation is formed, which consists of many modules. They produce a constant current. The level of current and voltage on terminals of the installation depends on the connection (serial or parallel) of modules, solar radiation and temperature.

4.2. The use of photovoltaic cells.

- Consumer electronics eg watches, calculators, battery chargers etc.
- Powering road signs: eg warning signals, light traffic signs, emergency telephones on highways.
- Powering the telecommunication systems: eg portable or fixed transceiver stations , radio and television relay stations, mobile relay stations.
- Powering alarm warning systems: eg land and marine radio beacons, beacons for marine and inland waters, warning lights at the top of mountains, high buildings.
- Railway transport eg emergency power train control systems, emergency telephones.
- Powering of land and marine monitoring stations.
- In the agriculture and farming, photovoltaic systems are well suited for powering low power devices as drying herbs, vegetables, etc., greenhouse heating and ventilation, aeration fish ponds and lakes, water pumping, etc.
- Powering the freestanding houses and shelters.
- In the cities, photovoltaic modules can be used to power eg parking meters, ticket vending machines, clocks.
- At residential and office buildings connected to the electricity grid.
- Photovoltaic power plants.
- Billboards.
- Photovoltaic trailer.

4.3. Elements of the set.

SPV module

- **Monocrystalline**

The complete panel consists of single cells, which are formed from uniform silicon crystal in an ordered internal structure. The basis for the formation of cells are suitable silicon blocks. They are cut to layers, which thickness is about 0,3mm. Their efficiency is higher than efficiency of polycrystalline and amorphous modules.

- **Polycrystalline otherwise multicrystalline**

Polycrystalline modules are built from cells, consisting of many little crystals of silicon. The effect is a patchy surface, which pattern reminds frost on glass.

- **Amorphous otherwise Thin-film**

They are characteristic by different silicon structure. This technology creates a possibility of savings in raw material. Two microns thick only, layer of silicon is deposited on the surface of another material, such as glass.

In this kind of panels we cannot distinguish single cells. Amorphous modules are usually used in small devices, such as calculators or watches, even though they are also used in larger systems to power whole houses.

Charge controller

As the name suggests, is used to control the operation. Prevent overloading and unloading the battery. They appear in standalone installations.

Accumulator

Serves to store energy produced by the PV module. Loaded battery supplies electricity to receivers, if there is no solar radiation or if it is insufficient (eg. by night). It is a form of buffer allowing using energy out of the operation period of autonomous modules and backuped regardless of whether the electricity produced is direct current (DC) or alternating current (AC). Most batteries used in photovoltaic systems is maintenance-free.

Inverter

Change direct current (DC) produced by photovoltaic modules into alternating current (AC), which is necessary to power most of devices. It occurs in an autonomous installations, when you need an access to AC current or in systems cooperating with power grid.

Wiring

Using special cables resistant to UV radiation and system connectors.

Equipment for parameters surveillance Safeguards

As in all electrical installations there are devices used for surveillance and security.

4.4. Photovoltaic systems.

Photovoltaic system is an installation which is equipped with proper devices group enabling utilization of energy produced in photovoltaic modules. **There are three basic configurations of photovoltaic systems: off-grid (island, autonomous), hybrid and connected to the grid (on-grid).**

- **Freestanding systems** (autonomous), unplugged from the grid – an autonomous source of energy.

  Freestanding systems use only the energy produced in photovoltaic cells. Such a system consists of photovoltaic panel, battery and charge regulator. Batteries must have enough capacity to provide energy at night and during periods of bad weather. Usage of these systems has a very wide range: consumer electronics, power road signs, billboards and many others.

- **Systems connected to the grid.**

  Systems connected to the grid can be in a form of power plant with a big amount of photovoltaic panels feeding the energy to the grid. Another use of those systems can be powering buildings connected to the grid, wherein we take energy from the grid only if the demand for it is higher than its production in photovoltaic cells. Those systems are connected to the grid through the inverter. Batteries in this type of a system are not required, because the grid is able to take all of produced energy by photovoltaic system.

- **Hybrid systems.**

  Hybrid systems are combination of photovoltaic panel and other system of producing the energy such as diesel generator, gas or wind. For effective assurance of using various ways of producing the energy, hybrid systems have usually more complicated control systems than freestanding systems. Thanks to use another source of energy photovoltaic panel in hybrid system can be smaller than in an analogous freestanding system. That is why in some cases hybrid system can be cheaper. They are used in power warning systems: eg. land and marine, warning lights at the top of mountains, high buildings, powering freestanding houses, shelters and many others.

Types of photovoltaic systems according to the mounting types:

- **Roof systems** - applied on or instead of roofing material, which form tight roofing.
- **Wall systems –** for installation on vertical walls of buildings up to 200m. They can be formed as “cold” façade producing energy and as double glazed segments used in “hot” facade.
- **Shading systems –** designed specially to shade during summer time windows located on south wall of a building. It increases work comfort and it decreases cooling costs.

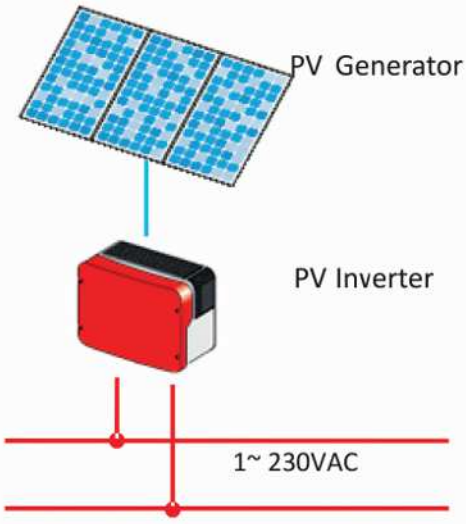
In contrast to collectors, PV systems have about 18% of efficiency. The important difference is also the fact that photovoltaic systems work all year long – they absorb solar radiation which reaches the Earth. The most durable cells are made of monocrystalline silicon and they work up to 25 years.

4.5. Examples of sets for grid

The easiest way to apply PV devices is on-grid system – cooperation with power grid.
Photovoltaic module is made of many photovoltaic cells, which using the internal connections they produce current supplied to electrical sockets located in the back of the module. However, it is a constant current. Most devices used in industry, offices and households are designed and adapted to alternating voltage. It forces the use in photovoltaic systems, an inverter which changes a constant current into an alternating current of 230V. PV systems mostly work this way, that all produced current goes to the grid, and mounted counter shows the amount of produced energy. The client deals with the energy company based on the difference of counter energy collected and produced. Photovoltaic power plants 1.4, 3; 5; 7.4 kW are designed for houses, households and service buildings.

The set consists of:

- AC/DC inverter
- photovoltaic modules
- DC wiring
- support structure



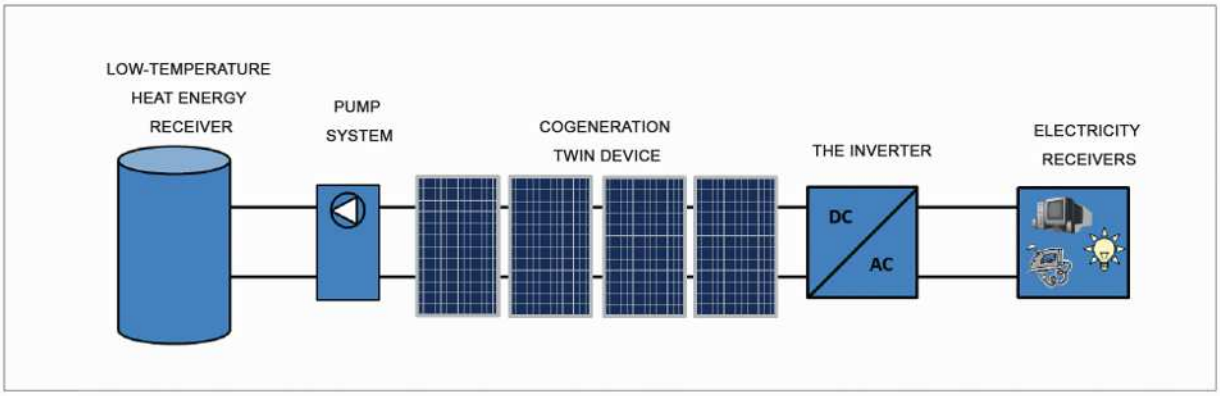
Power	1,4 kW	3,5 kW	5 kW	7,4 kW
Module count	6	13	22	32
Type of installation	on-grid -cooperation with power grid	on-grid -cooperation with power grid	on-grid -cooperation with power grid	on-grid -cooperation with power grid
Type of module	polycrystalline 230Wp	polycrystalline 230Wp	polycrystalline 230Wp	polycrystalline 230Wp
Max. power of modules	1,38 kWp	2,99 kWp	5,06 kWp	7,36 kWp
Area of modules	~10,5 m^2	~22,5 m^2	~38 m^2	~55 m^2
Inverter type	Sunny Boy 1200	Sunny Boy 300 TL-20	Sunny Boy 5000 TL -20	Sunny Mini Central 8000 TL

4.6. TWIN.

The effect of constant observations of modern worldwide trends in the development of PVT technologies and the wide experience of **SKORUT Systemy Solarne® Sp.z o.o.** in the field of installations using solar energy is a hybrid module called TWIN. A photovoltaic module with heating collector is highly efficient convertor of solar radiation into direct current electricity and heat.

The main advantages of TWIN are:

- It is a cogeneration device with the possibility of the converters working independently from each other
- High efficiency in producing both heat energy and direct current electricity
- Quick and easy installation
- Each converter can work on its own. It is also possible to stop the process of the energy transportation in every case without any negative influence on the device
- Effective cooperation with heat pumps
- High longevity - reaching 30 years of constant work
- May find use in small installations near houses as well as in huge industrial electric power stations



The solar and photovoltaic panels, using the most advanced technologies produced by **SKORUT Systemy Solarne®**, guarantee and allow to reduce costs of heating and using electricity, they also make the receiver independent from other suppliers and the increases in prices of fossil fuels. This environmentally friendly and costless source of energy actively contributes to reduction of the CO_2 emission to the atmosphere and the energy-related safety of the receiver.

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4.7. The use of TWIN collector.

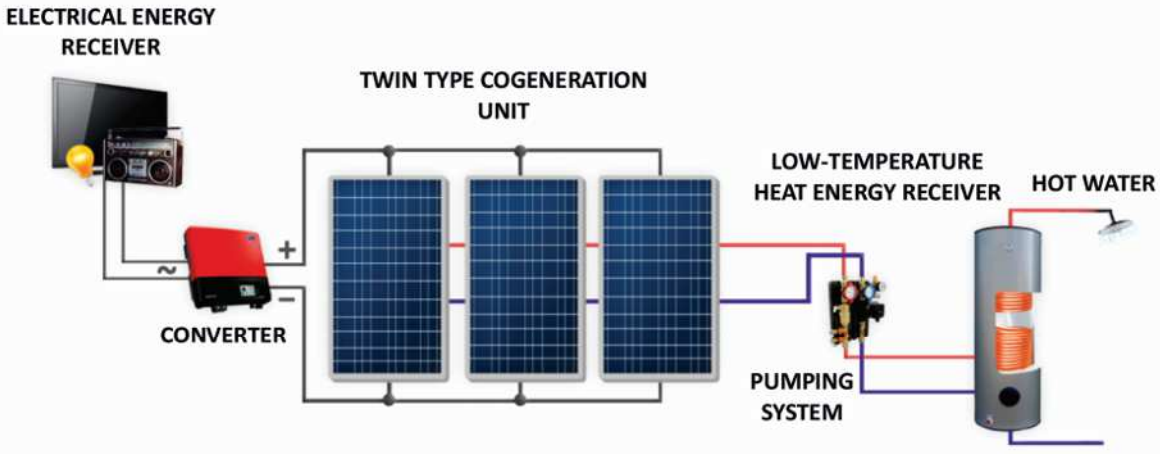
Photovoltaic modules produce electricity from the sun and supply the power proportionally to the solar radiation. However, with the increase of the solar radiation, the temperature of photovoltaic cells increases too and then their efficiency decreases. To prevent it, the photovoltaic module with cooling has been used – TWIN collector.

By using TWIN type collectors we can obtain both electrical and heating power from the sun. The heating medium flowing through the TWIN collector cools down photovoltaic cells thus increasing their performance. The heat receiver in TWIN-based systems should be an object with the lowest possible operating temperature. For example: lower heating coil of the DHW tank, the ground source in heat pump installations, process water, etc.

Using cogeneration devices such as TWIN we get more electric power than with equivalent photovoltaic modules. In addition, we use the heat generated during the process of cooling of photovoltaic cells.

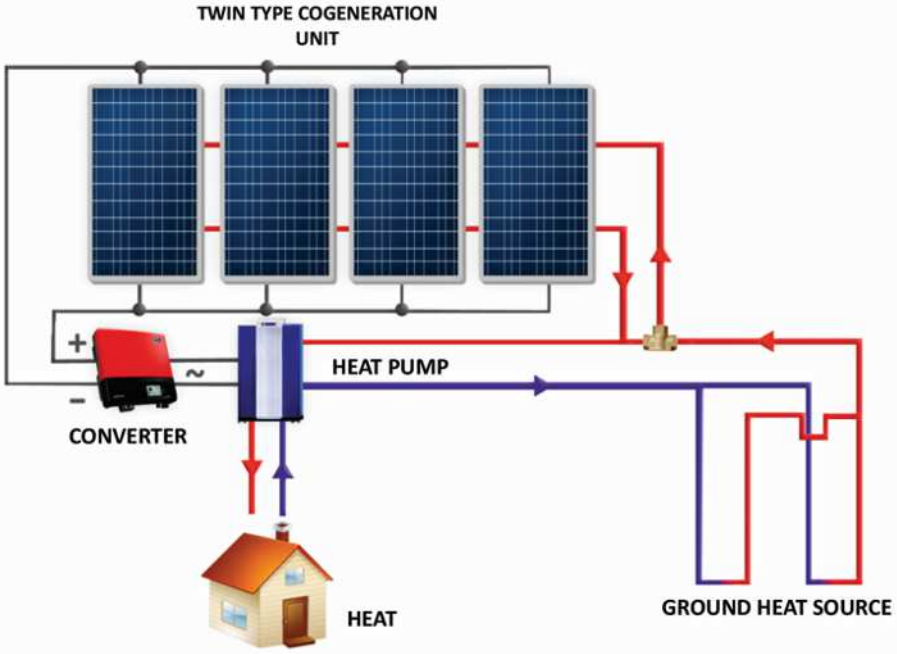
TWIN - energy for heating and electricity

The heating medium flowing through the TWIN is heated, then thermal energy is passed through the heating coil to the tank. Direct current produced by the PV cells is converted to alternating current by the DC / AC inverter and supplies electrical power to selected receivers or is directly fed into the power grid.



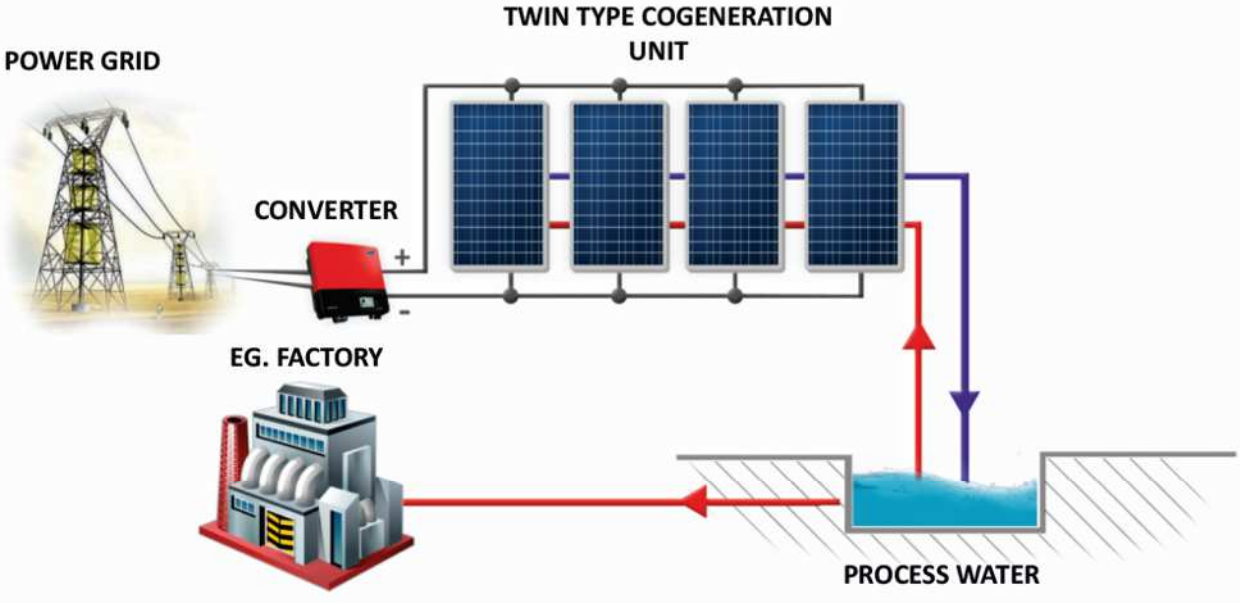
TWIN and heat pumps

TWIN unit reheats the ground heat source and assists the heat pump at the same time providing electrical energy for it, thus reducing the cost of the heat pump operation.



TWIN - industrial application

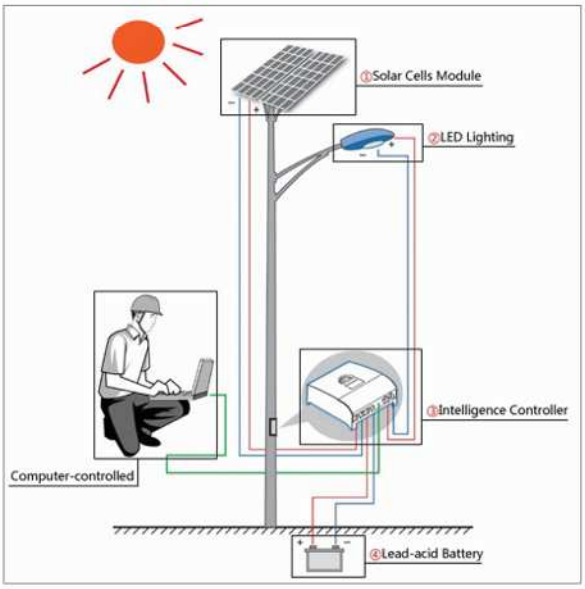
TWIN type collectors heat process water e.g. in industrial plants. Produced electricity is used to supply its own needs or is directly fed back into the grid.



V. Solar lamps

5.1. Introduction.

Solar LED Street Lights / Solar Lantern - Solar LED works without power supply. Completely based on solar energy, which is unlimited, safe and environmentally friendly. The system mainly consists of solar panel, LED light source, charge controller and a battery. During the day, while the sun is shining, the solar panel converts solar energy into electricity and stores it in the battery. At night or during cloudy and rainy days, the sensor controller can calculate the brightness of daylight and automatically turn on the light. The battery provides power for lighting LEDs.

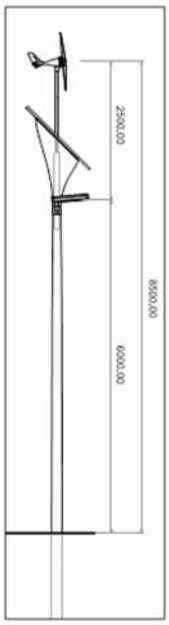


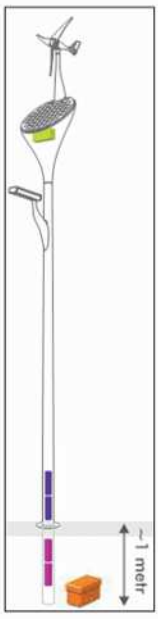
5.2. Solar lamps offer.

product **Swan** article no. 07.01.01

Combining the wind and the sun into comprehensive, standalone, and elegant solutions.

No.	code	column height	lamp power	PV module	battery	regulator
1.	"SWAN" with wind turbine	8,5 m	30 W	PV : 2 x 180Wp Wind turbine: 600 W	2x 185Ah	1x10A nightlight
2.	"SWAN" Without Wind turbine	8,5 m	30 W	PV : 2 x 180Wp	2x 185Ah	1x10A nightlight





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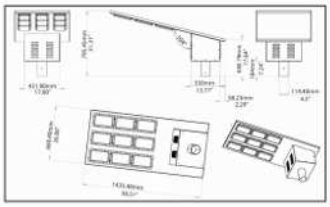
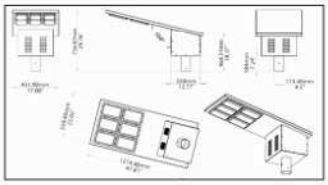
product

Shark-80 / Shark-60

article no.
07.01.02

The Shark-80 lamp, designed to be powerful and efficient, is an ideal solution for illuminating open areas. Shark-80 can illuminate parking areas, pathways, security perimeters and many more.





Technical draft Lamp ML-80 on the top, technical draught Lamp ML-60 on the bottom.

Sample project with Lamp Shark-80

No.	code	column height	lamp power	PV module	battery	regulator
1.	ML60	not included *	LED	87Wp	65Ah	1x10A nightlight
2.	ML80	not included *	LED	130Wp	65Ah	1x10A nightlight

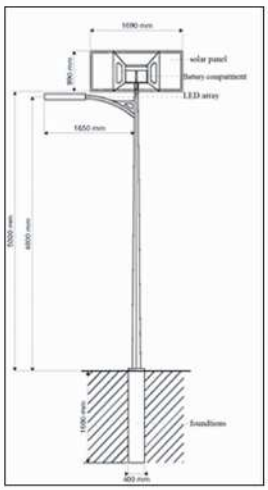
* ML60 [Recommended installation height of 30ft (7,5m)]
* ML80 [Recommended installation height of 30ft (9m)]
It is possible to choose the version of the pole.

product

Stork

article no.
07.01.03

Code: “Stork”
Mast height: 5m
The amount of LED light sources: 4m
Single light source (BII): 2 x 8W
Luminous flux: 2 x 900 lm
Light color (pure white): 5000-7000K
Control motion sensor: optional
Control programmer working time: optional
Can change the color



No.	code	column height	lamp power	PV module	battery	regulator
1.	Stork	5m	1800 lm	225Wp	100Ah	1x10A nightlight

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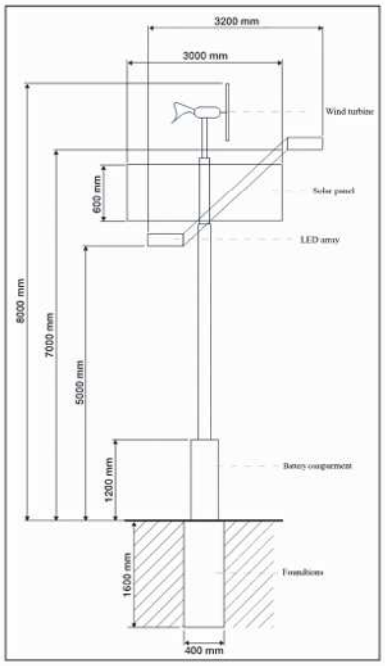
product **Crane** article no. 07.01.04

Code: “CRANE”
Mast height: 8m
The amount of LED light sources: 5-7m
Single light source (BII): 2 x 28W
Luminous flux: 2 x 2900lm
Light color (pure white): 5000-7000K
Turbine power: 600 W
Control motion sensor: optional
Control programmer working time: optional
Other colors available

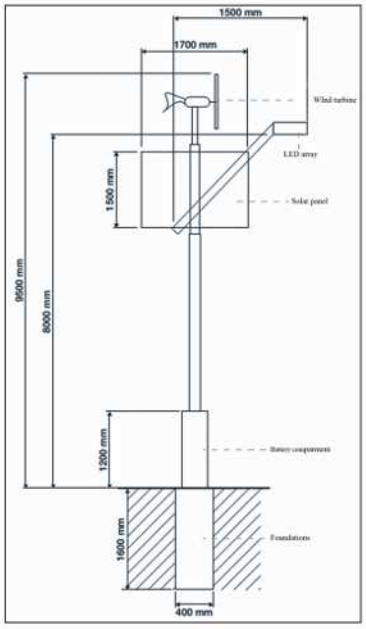
No.	code	column height	lamp power	PV module	battery	regulator
1.	"CRANE" with wind turbine	8m	2x 2900 lm	2x 180Wp	200Ah	1x10A nightlight
2.	"CRANE" without wind turbine	8m	2x 2900 lm	2x 180Wp	200Ah	1x10A nightlight



product **Goose** article no. 07.01.05

Code: “GOOSE”
Mast height: 9,5m
The amount of LED light sources: 8m
Single light source (BII): 2 x 28W
Luminous flux: 2 x 2900lm
Light color (pure white): 5000-7000K
Turbine power: 600 W
Control motion sensor: optional
Control programmer working time: optional
Other colors available

No.	code	column height	lamp power	PV module	battery	regulator
1.	"GOOSE" with wind turbine	9,5m	2x 2900 lm	2x 180Wp	200Ah	1x10A nightlight
2.	"GOOSE" without wind turbine	9,5m	2x 2900 lm	2x 180Wp	200Ah	1x10A nightlight



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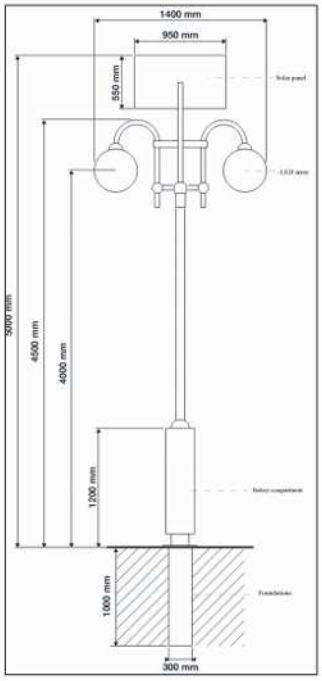
product **Ostrich** article no. 07.01.06

Code: “OSTRICH”
Mast height: 5m
The amount of LED light sources: 4m
Single light source (BII): 2 x 8 W
Luminous flux: 2 x 900lm
Light color (pure white): 5000-7000K
Control motion sensor: Optional
Control programmer working time: Optional
Other colors available

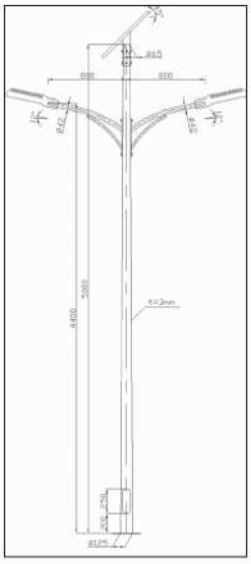


No.	code	column height	lamp power	PV module	battery	regulator
1.	Ostrich	5m	2x 900 lm	90 / 130 W	75 - 100Ah	1x10A nightlight

product **Octopus** article no. 07.01.07

Street lamps based on LED technology is currently the most efficient light source to illuminate the highways, intersections and streets. The product is very well suited for all kinds of residential lighting, multi-lane roads, squares, parking lots, warehouses and gardens.

No.	code	column height	lamp power	PV module	battery	regulator
1.	OCTOPUS-120W/500W/10m	10m	>15600 lm	2x 250 W	2x 180 Ah	1x10A nightlight
2.	OCTOPUS-100W/360W/10m	10m	>13000 lm	2x 180 W	2x 150 Ah	1x10A nightlight
3.	OCTOPUS-60W/240W/8m	8 m	>6000 lm	2x 120 W	2x 100 Ah	1x10A nightlight
No.	**code**	**column height**	**lamp power**	**PV module**	**battery**	**regulator**
4.	OCTOPUS-40W/240W/6m	6m	> 5200 lm	2x 120 W	2x 90 Ah	1x10A nightlight
5.	OCTOPUS-30W/200W/5m	5m	> 3000 lm	1x 200 W	2x 200 Ah	1x10A nightlight



VI. Products

6.1. Collectors.

SKORUT® solar
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product **MAX 1 Collector** article no. 01 01 01

Description	
Size:	2037 x 1134 x 80 mm / 44 kg
Area:	2,317 m2 (gross) 2,13 m2 (absorber)
Emission:	*e*=4,0%
Absorption:	*α* = 95,0 %
Connection:	ø12 mm, 1 inlet, 1 outlet on the shorter side
Characteristic:	ø12 mm meander pipes; tempered solar glass, 4mm thick
Color:	aluminum, anodized aluminum
Montage:	various solutions

product **SK 2,52 Collector** article no. 01 01 04

Description	
Size:	2393x1137x80 / 47.7 kg
Area:	2,72 m2 (gross) 2,54 m2 (absorber)
Issue:	*e* = 4,0 %
Absorption:	*α* = 95,0 %
Connection:	ø22 mm, 2 inlets and 2 outlets on the longer sides
Characteristic:	ø10 mm meander pipes; tempered solar glass with double-sided antireflective coating, 3,2mm thick
Color:	special aluminum profile, anodized black
Montage:	various solutions

product **Askosolar Collector** article no. 01 01 02

Description	
Dimensions:	1750 x 1137 x 80 mm / 38 kg
Area:	1,961 m2 (gross) 1,818 m2 (absorber)
Emission:	*e* = 4,0 %
Absorption:	*α* = 95,0 %
Connection:	ø12 mm, 1 inlet, 1 outlet on the shorter side
Characteristic:	ø12 mm meander pipes; tempered solar glass, 4mm thick
Color:	aluminum, anodized aluminum
Montage:	various solutions

product **SK 2,2 Collector** article no. 01 01 05

Description	
Size:	2098x1137x80 /40.3 kg
Area:	2,39 m2 (gross) 2,22 m2 (absorber)
Issue:	*e* = 4,0 %
Absorption:	*α* = 95,0 %
Connection:	2 branch pieces on longer site
Characteristic:	ø10 mm meander pipes; tempered solar glass with double-sided antireflective coating, 3,2mm thick
Color:	special aluminum profile, anodized black
Montage:	various solutions

product **Askosolar MAX Collector** article no. 01 01 03

Description	
Size:	2224 x 1137 x 80 mm /55 kg
Area:	2,53 m2 (gross) 2,36 m2 (absorber)
Emission:	*e* = 4,0 %
Absorption:	*α* = 95,0 %
Connection:	4 branch pieces on longer site
Characteristic:	ø12 mm meander pipes; tempered solar glass, 4mm thick
Color:	aluminum, anodized aluminum
Montage:	various solutions

product **TWIN Collector** article no. 01 01 06

Description	
Size:	1661 x 1021 x 80 /41,5 kg
Area:	1,69 m2 gross 1,61 m2 PV
Issue:	*e* = 4,0 %
Absorption:	*α* = 95,0 %
Connection:	22 mm, 2 inlets and 2 outlets on the shorter sides
Characteristic:	12 mm meander pipes
Cell count per panel:	60 pcs.
Cell size:	(6") 156x156 mm
Color:	silver
Montage:	various solutions

6.2. Photovoltaics.

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product **SPV 225 Module** article no. 05 01 05

Description

Technical data:
Casing: aluminium
Colour: silver
Dimensions: 1637x997x35
Weight: 20 kg
Cell count per panel: 60 pcs.
Size: (6'') 156x156 mm
Parameters:
PMPP: 225W +3/ -0%
UMPP: 29,50V
IMPP: 7,63A
VOC: 36,80V
ISC: 8,20A
USYS: 1000V

product **SPV 230 Module** article no. 05 01 04

Description

Technical data:
Casing: aluminium
Colour: silver
Dimensions: 1637x997x35
Weight: 20 kg
Cell count per panel: 60 pcs.
Size: (6'') 156x156 mm
Parameters:
PMPP: 230W +3/ -0%
UMPP: 29,70V
IMPP: 7,75A
VOC: 36,90V
ISC: 8,35A
USYS: 1000V

product **SPV 240 Module** article no. 05 01 02

Description

Technical data:
Casing: aluminium
Colour: silver
Dimensions: 1637x997x35
Weight: 20 kg
Cell count per panel: 60 pcs.
Size: (6'') 156x156 mm
Parameters:
PMPP: 240W +3/ -0%
UMPP: 30V
IMPP: 8,00A
VOC: 39,49V
ISC: 8,40A
USYS: 1000A

Polycrystalline photovoltaic modules

Type	Cell count per panel	Type of the cell	Technology	Power [W]	Article no.
SPV 250	60	156x156 mm	polycrystalline	250	05 01 00
SPV 245	60	156x156 mm	polycrystalline	245	05 01 01
SPV 240	60	156x156 mm	polycrystalline	240	05 01 02
SPV 235	60	156x156 mm	polycrystalline	235	05 01 03
SPV 230	60	156x156 mm	polycrystalline	230	05 01 04
SPV 225	60	156x156 mm	polycrystalline	225	05 01 05
SPV 220	60	156x156 mm	polycrystalline	220	05 01 06
SPV 215	60	156x156 mm	polycrystalline	215	05 01 07
SPV 210	60	156x156 mm	polycrystalline	210	05 01 08
SPV 205	48	156x156 mm	polycrystalline	205	05 01 09
SPV 180	48	156x156 mm	polycrystalline	180	05 01 10
SPV 175	48	156x156 mm	polycrystalline	175	05 01 11
SPV 170	48	156x156 mm	polycrystalline	170	05 01 12
SPV 165	48	156x156 mm	polycrystalline	165	05 01 13
SPV 145	36	156x156 mm	polycrystalline	145	05 01 14
SPV 140	36	156x156 mm	polycrystalline	140	05 01 15
SPV 130	36	156x156 mm	polycrystalline	130	05 01 16
SPV 120	36	156x156 mm	polycrystalline	120	05 01 17

6.3. Water tanks.

Solar heater type BE ERM i BE ERMR

- vertical tank; Skay coated
- enamel and magnesium anode according to DIN 4753
- with one heating coil (160-500 litres) BE ERM model
- with two heating coils (200-500 litres) BE ERMR model
- tanks can be equipped with a SH type heater
- high quality insulation of freon-free foam, 50 mm thick

Type	Nominal volume	Height mm	Diameter mm	Lean height mm	Heating coil surface m²	Article No.
BE 300 ERMR	300	1797	610	1860	5,8/8,9	02 01 02
BE 400 ERMR	400	1832	680	1930	5,9/11,5	02 01 03
BE 500 ERMR	500	1838	760	1965	6,2/12,6	02 01 04

* other models available

Solar heater type HT ER and HT ERR

- vertical standing tank; metal coated
- enamelled inside according to DIN 4753
- with one heating coil (140-500 litrów) HT ER model
- with two heating coils (200-500) HT ERR model
- mounted cover and blank flange
- inspection flange allowing installation of electric heater
- insulation of P type freon-free foam 50 mm thick

Type	Nominal volume	Height mm	Diameter mm	Lean height mm	Heating coil surface m²	Article No.
HR 300 ERR	300	1797	610	1835	1,20/0,7	02 01 16
HR 400 ERR	400	1832	380	1885	1,45/0,7	02 01 17
HR 500 ERR	500	1838	760	1910	1,76/0,8	02 01 18

* other models available

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6.3. Water tanks.

Solar heater type SISS

- hot water tank inside heating water (buffer) tank
- possible cascade connection
- high performance heating coil fitted into buffer tank
- insulation: 100 mm foam with outer skay coating
- a smaller enamelled tank fits inside buffer tank
- additional electric heater available

Type	Heating water tank volume [litres]	Height mm	Diameter mm	Lean height mm	Heating coil surface m²	Article No.
SISS 750/150	600	1800	990	1840	2,4	02 01 25
SISS 900/200	700	2150	990	2180	3	02 01 26

* other models available

Solar heater type FRMR

- first flange blinded, the second not
- 100 mm of Eco-Skon insulation
- built-in Mg anode type VT-N, errant current anode VT-S
- two high performance heating coils
- enamelled according to DIN 4753

Type	Heating water tank volume [litres]	Height mm	Diameter mm	Lean height mm	Heating coil surface m²	Article No.
VT-N 800 FRMR	800	2000	1000	1960	850	02 01 32
VT-S 800 FRMR	800	2000	1000	1960	850	02 01 33
VT-N 1000 FRMR	1000	2350	1000	2300	850	02 01 34
VT-S 1000 FRMR	1000	2350	1000	2300	850	02 01 35

* other models available

6.3. Water tanks.

Solar heater type SF/2

- vertical standing tank with additional heating coil for utilization of solar power
- surface enamelled according to DIN 4753
- Mg anode
- electric heater connection: Rp 1 ½"
- insulation rigid freon-free foam PUR with coloured foil coating
- additional electric heater available

Type	Nominal volume [l]	Diameter mm	Lean height mm	Heating coil surface m²	Article No.
SF 300/2	295	600	1892	0,8/1,55	02 02 01
SF 300/2*	298	700	1472	0,85/1,45	02 02 02
SF 400/2	380	700	1738	1,05/1,80	02 02 03
SF 500/2	470	700	2044	1,30/1,90	02 02 04
SF 1000/2	995	1010	2025	2,37/4,74	02 02 05

Solar heater type SG (K)

- enables connection of several heat sources (central heating boiler, fireplace, solar, heat pump)
- available types: without heating coils, with one heating coil inside internal tank or two heating coils
- big outer tank not enamelled, small internal domestic hot water tank enamelled with Mg anode
- insulation – hard polyurethane foam or dismountable soft one (on demand)

Type (w/ one or two heating coils)	Heating water volume [l]	Domestic hot water volume [l]	Height mm	Diameter mm	Lean height mm	Heating coil surface m²	Article No.
SG (K) 500/160	340	160	700	1670	1810	1,0/2,1	02 03 08
SG (K) 800/200	600	200	900	1620	1853	1,0/2,4	02 03 09
SG (K) 1000/200	800	200	900	1820	2030	1,0/2,4	02 03 10

* other models available

6.3. Water tanks.

Solar heater type SGW(S) B

- includes three heating coils: one for central heating, another for solar collectors, the other for additional heat source
- coated in hard polyurethane foam
- Mg anode

Type	Domestic hot water tank volume [l]	Height mm	Diameter mm	Lean height mm	Heating coil surface m²	Article No.
SGW(S) B	300	1450	670	1597	1,4	02 03 01
SGW(S) B	400	1660	700	1801	1,8	02 03 02
SGW(S) B	500	1890	600	1982	2	02 03 03
SGW(S) B	1000	1900	900	2102	2,7	02 03 04

* other models available

Solar heater type SGW(S) M

- includes three heating coils: one for central heating, another for solar collectors, the other for additional heat source
- coated in hard polyurethane foam
- Mg anode

Type	Domestic hot water tank volume [l]	Height mm	Diameter mm	Lean height mm	Heating coil surface m²	Article No.
SGW(S) M.	300	1450	670	1597	1,0/0,7	02 03 05
SGW(S) M.	400	1660	700	1800	1,8/1,1	02 03 06
SGW(S) M.	500	1850	700	1978	2/1,1	02 03 07

* other models available

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6.4. Solar installation expansion vessels

Type S expansion vessel

Type S expansion vessel were designed for use in solar installations with high antifreeze agent percentage (up to 50%). Equipped with threaded connection and non-replaceable membrane, external layer – powder painted. From 33 litres up, mounting brackets.

Type bar/ 120°C	Nominal volume	Weight/kg	Diameter mm	Height mm	Connection type	Initial pressure /bar	Article No.
S	2	1,1	132	260	3/4''	0,1	03 01 01
S	8	2,7	206	321	3/4''	1,5	03 01 02
S	12	2,8	280	298	3/4''	1,5	03 01 03
S	18	3,8	280	378	3/4''	1,5	03 01 04
S	25	4,8	280	498	3/4''	1,5	03 01 05
S	33	9,2	354	458	3/4''	1,5	03 01 06
S	50	12,5	409	469	1''	3,0	03 01 07
S	80	17,0	480	538	1''	3,0	03 01 08
S	100	22,7	480	671	1''	3,0	03 01 09
S	140	29,0	480	913	1''	3,0	03 01 10

Expansion vessels for heating, solar and cooling installations type N, NG and G

These vessels stand out from others, by diversity of their applications. Most commonly used in single family houses, housing and industry complexes. Equipped with non-replaceable (N and NG) and replaceable (G) membrane.

Type bar/ 120°C	Nominal volume	Weight/kg	Diameter mm	Height mm	Connection type	Article No.
NG	8-50	2.3-9.0	206-409	286-469	3/4''	03 02 01-03 02 06
NG	80-140	12.0-21.9	480	538-886	1''	03 02 07-03 02 09
N	200-400	25.1-55.0	634-740	758-1066	1''	03 02 10-03 02 13
N	500-1000	79.0-120.0	740	1286-2406	1''	03 02 14-03 02 17
G	100	16.5	480	856	1''	03 03 15
G	200-300	36.5-41.6	634	972-1273	1 1/4''	03 03 16-03 03 17
G	400-1000	51.0-158.0	740	1253-2593	1''	03 03 18-03 03 22
G	1000-5000	223.0-918.0	1000-1500	1973-3588	DN 65/PN 6	03 03 23-03 02 28

SKORUT solar
SYSTEMY SOLARNE FOTOWOLTAIKA

6.4. Drinking water expansion vessels

Type DE expansion vessels

Designed for installations that are not subject to the requirements of DIN 1988, eg. fire protection systems, domestic hot water systems, floor heating systems, without flow, cut-off and drain valves.

- PZH (Polish National Institute of Hygiene) atested non-replaceable membrane
- parts in contact with water are corrosion protected
- permit in accordance with the Pressure Equipment Directive concerning 97/23 WE
- powder painted in blue
- initial pressure 4,0 bar

Type 10 bar/ 70°C	Nominal volume	Weight/kg	Diameter mm	Height mm	Connection type	Initial pressure / bar	Article No.
DE	2	1,0	132	260	3/4''	0,1	03 05 01
DE	8	1,9	206	321	3/4''	1,5	03 05 02
DE	12	2,5	280	298	3/4''	1,5	03 05 03
DE	18	3,0	280	378	3/4''	1,5	03 05 04
DE	25	3,9	280	498	3/4''	1,5	03 05 05
DE	33	6,9	354	458	3/4''	1,5	03 05 06
DE	40	8,0	354	458	3/4''	1,5	03 05 07
Type 16 bar/ 70°C							
DE	8	2,7	206	538	3/4''	3,0	03 05 18
DE	12	2,8	280	671	3/4''	3,0	03 05 19
DE	25	5,1	280	913	3/4''	3,0	03 05 20
Type 25 bar/ 70°C							
DE	8	3,4	206	538	3/4''	3,0	03 05 29

Type DD expansion vessel

Type DD expansion vessels are designed for domestic hot water installations, increasing pressure and heating water according to DIN 1988. Non-replaceable membrane is PZH attested. Flow vessel equipped with High-Flow flow directing unit. Permitted in accordance with the Pressure Equipment Directive concerning 97/23 WE. Powder painted in green or white; on the outside and in the inside. Initial pressure of 4,0 bar. Possibility to install „FLOWJET" flow valves.

Type 10 bar/ 70°C	Nominal volume	Weight/kg	Diameter mm	Height mm	Connection type	Article No.
DD	2	1,1	132	260	3/4''	03 04 01
DD	8	2,7	206	336	3/4''	03 04 02
DD	12	2,8	280	310	3/4''	03 04 03
DD	18	3,8	280	395	3/4''	03 04 04
DD	25	4,8	280	498	3/4''	03 04 05
DD	33	9,2	354	466	3/4''	03 04 06
Type 25 bar/ 70°C						
DD	8	3,4	206	330	3/4''	03 04 07

SKORUT solar
SYSTEMY SOLARNE FOTOWOLTAIKA

6.5. Pump station.

SP1 pump station

article no.
04 01 01

Station consists of high-temperature flow regulating rotameter, solar pump, two cut-off valves with built-in thermal valves and termometers. Solar valve with nominal pressure of 6 bar and manometer.

Dimensions	280 x 370
Input/output diameter	3/4''
Max. pressure	10 bar
Valve material	brass CW 617 N, stainless steel
Sealers	EPDM Perox, Fluorired rubber
Body	cast iron
Power input	1x230Vac 50/60 Hz
Flowmeter	ROTAMETER

SP1E pump station

article no.
04 01 02

Station has an insulation layer and consists of safety group with manometer for 0-10 bar range, two cut-off valves with built-in valves and termometers for 0-160°C range, air separator, service-filling valves, electronic flowmeter, expansion vessel connection, insulated casing and wall fixing system.

Dimensions	280 x 370
Input/output diameter	3/4''
Max. pressure	10 bar
Valve material	brass
Sealers	EPDM Perox
Body	cast iron
Power input	1x230Vac 50/60 Hz
Flowmeter	electronic

SP Exclusive pump station

article no.
04 01 03

Its main purpose is to optimize operation of small and medium solar installations. Additionally integrated with all of the valves required to work solar mode. Pump station air separator removes the bubbles of air during the operation and ensures effective operation of instalation.

- safeguard devices are integrated in return parts of the circuit, which ensures low thermal stress of components
- constant, temperature based regulation of the flow
- precise heat measurement through flow monitoring system with flowmeter
- 3-stage circulation pump or high-performance pump
- flowmeter or flow sensor
- solar circuit manometer

6.6. Regulators.

Solar regulator SOLO

article no. 04 02 01

Applied in single user installations
- collector and water tank temperature sensors
- 1 or 3 type PT 1000 temperature inputs
- termal circulation regulation
- 4 optional programs

Solar regulator DUO

article no. 04 02 02

Applied in single or two user installations
- 3 or 4 type PT 1000 temperature inputs
- collector and water tank temperature sensors
- circulation control through request button/flow switch
- 7 optional programs
- FEATURES: heating, thermal regulation of circulation, pulse regulated circulation and overload can be limited by two individual time channels

Freely programable regulator MR208 – MULTICO

article no. 04 02 03

A regulator perfectly suited for automation of advanced systems with multiple heat sources (systems with collectors, coal boilers, etc.)
- 1 type PT 1000 temperature input
- 8 type KTY81-210 temperature inputs
- ability to continuously regulate small pomp
- as an option it can be equipped with communication module enabling remote access via LAN/WAN network

Freely programable regulator MR65 MULTICO

article no. 04 02 04

- 1 type PT 1000 temperature input
- 4 type KTY81-210 temperature inputs
- maxmial buffer temperature control
- collector system Vacation Mode, turned on for specific number of days or indefinitely
- collector overheating protection

SOLARCOMP 912 regulator

article no. 04 02 05

Designed to control more advanced home solar systems:
- 11 operation schemes
- 4 PT1000 inputs, one 230V~/1(0,6)A output with pump speed regulation and one 230V~1(0,6)A relay output
- fluent pump control – regulator fluently adjusts the speed of pump transferring heat to the tank, which allows economical usage of solar energy (energy can be obtained from collector even in bad weather conditions)
- protective functions
- Vacation Mode
- Manual Mode

SOLARCOMP PRO regulator

article no. 04 02 06

The SOLARCOMP PRO regulator is designed for controlling extensive solar systems:
- you can choose from 28 different work modes, allowing to regulate: systems with two collector fields, swimming pool systems, multiple tanks systems
- 6 PT1000 inputs, one 230V~/1(0,6) A output with pump speed regulation
- three 230V~1(0,6)A relay outputs

ST 402 solar regulator

article no. 04 02 07

This regulator enables system operation in three different modes: automatic, manual (forced), turned off .
- 4 type PT1000 temperature inputs
- pump operation control (or pump and valve)
- collector overheat and freezing protection
- collector and water tank temperature sensor

ST 448 solar regulator

article no. 04 02 08

This regulator enables control and regulation of solar system in 9 system configurations, it also has a big LCD display.
- 4 type PT1000 temperature inputs
- collector overheat and freezing protection
- ability to instal ST-65 GSM module
- collector and water tank temperature sensor
- can be mounted in OM-01 casing in boiler

6.7. Inverters.

Inverters

On-grid inverters –
on-grid/off-grid systems




Name	Sunny Boy 1200	Sunny Boy 4000TL	SMC 8000TL	STP 17000TL
U_{AC}	230V	230V	230V	400V
P_{maxAC}	1200W	4000W	8000W	17000W
I_{AC}	6,1A	22A	35A	24,6A
U_{maxDC}	400V	550V	700V	1000V
P_{maxDC}	1320W	4200W	8250W	17410W
	92,1%	96,4%	97,7%	97,8%
Weight	23 kg	25 kg	33 kg	64 kg
Dimensions	440 x 339 x 214	470 x 445 x 180	468 x 613 x 242	665 x 690 x 265
Article no.	05 02 01	05 02 02	05 02 03	05 02 04

Island inverters –
off-grid systems




Name	Sunny Island 2012	Sunny Island 3324	Sunny Island 4248	Sunny Island 5048
U_{AC}	230V (202-253)	230V (202-253)	230V (202-253)	230V (202-253)
P_{nom}	2000W	3300W	4200W	5000W
I_{AC}	8,7A	14,5A	18A	35A
U_{bat}	12V	24V	48V	48V
	93%	94,5%	95%	95%
Weight	19 kg	39 kg	39 kg	63 kg
Dimensions	470 x 445 x 185	390 x 590 x 245	390 x 590 x 245	467 x 612 x 235
Article no.	05 02 05	05 02 06	05 02 07	05 02 08

PV plant monitoring



Sunny Webbox	Sunny Sensorbox	Sunny Beam
Remote monitoring of PV installation, diagnostics and configuration via Internet, system parameters archiving. Article no.: 05 02 09	Irradiation, outdoor temperature, wind speed measurement. Remote data acquisition. Article no.: 05 02 10	Wireless inverters monitoring. Intuitive operation. Bluetooth. Article no.: 05 02 11

7.1. Solar accessories.

SOLAR ACCESSORIES OFFERED BY SKORUT SOLAR SYSTEMS

	Name	Description	Article no.
	Solar system filling station	Complete station consists of pump, glycol tank, filter, connection hose.	06 02 07
	KTY 81-210 temperature sensor	Semiconductor temperature sensor used for temperature measurement in water tanks, buffer tanks, central heating installations. Sensor equipped with 1,5m of PCV insulated cable.	06 01 01
	PT1000 temperature sensor	Semiconductor temperature sensor used for temperature measurement in water tanks, buffer tanks, central heating installations. Sensor equipped with 1,5m of PCV insulated cable or temperature resistant silicone insulation.	06 01 02
	Concentrated solar agent 10l	40% propylene glycol, 60% water	06 02 08
	Refractometer	Temperature measurement range from 0 °C to -50 °C	06 01 03
	MAX1collector connectors	Hydraulic connection between collectors	06 01 05
	2/3/4/5 collectors roof mounting set	Frame covering, graphite black mounting RAL 9011 for vertical mounting in the roof next to each other 2-5 collectors	01 02 01 01 02 02 01 02 03 01 02 04
	Flat roof collector support vertical mounting	Includes: frame, support, hook handle. Vertical mounting on a flat roof, side by side.	01 02 11
	Collector cross support for vertical mounting	Includes: support, handles. For vertical installation of solar on a flat roof.	01 02 12
	Flat roof collector support horizontal	Includes: frame, supports, hooks, handles. For horizontal mounting on a flat roof, next to each other at an angle of 45° collectors, 2 collectors = 3 sets	01 02 13
	Collector cross support for horizontal mounting	Includes: frame, support, hook handle. For the horizontal mounting on a flat roof, side by side.	01 02 14

7.1. Solar accessories.

SOLAR ACCESSORIES OFFERED BY SKORUT SOLAR SYSTEMS

	Name	Description	Article no.
	Regulating valve	One valve with 5 functions: presetting, measuring, cutting off, filling and emptying.	06 02 01
	High temperature ball valve	Reduced active cross section, PN16, continuous work temperature max. 120 °C, short-term startup temperature max. 160 °C, plastic handle, elongated on both sides female thread.	06 02 02
	Thermostatic valve	Thermostatic anti-scalding valve, settings: 35-65 °C, diameter ½"; ¾"; 1"; 1¼"	06 02 03
	Rubber lagging	High UV and temperature resistance. Max. temperature 150°C, easy installation. All diameters available.	06 03 01 - 06 03 04
	Lagging	Used as thermal, acoustic insulation in central heating. Non-flammable, easy to install, inhibits corrosion, no moisture absorption, good insulating properties. Different diameters.	06 03 05 - 06 03 08
	Solar hose	Solar hose consists of a double braided hose pipe of stainless steel which is covered with insulating UV-resistant cover. Along the hose a dual electric wire coated in silicone is routed, which is used to connect the collector temperature sensor. Hose ends on both sides with brass ¾" nuts.	06 01 06
	Swimming pool shell and tube heat exchangers	High efficiency: higher heat transfer coefficient in comparison with conventional tubular and plate heat exchangers. Vertical installation, a variety of types, low operating costs. W type heat exchangers used in swimming pool installations.	07 01 01 - 07 01 02
	Soldered plate heat exchangers	Soldered plate heat exchangers are flow devices. These countercurrent exchangers are made entirely of stainless steel as a construction indecomposable. Tightness of the construction and permanent connection of plates is provided by soldering in a vacuum oven process.	07 01 03 - 07 01 04

7.2. Photovoltaic accessories

	Name	Description	Article no.
	4/5 or 4/1 cable	Length: 500 or 100 m, cross section surface 4mm^2; max. current: 60A; max. voltage 1000V.	05 03 01 - - 05 03 02
	6/5 or 6/1 cable	Length: 500 or 100 m, cross section surface 4mm^2; max. current: 90A; max. voltage 1000V.	05 03 03- -05 03 04
	Charge regulator	Max. input and output voltage: 20A or 60A; Current system: 12/24V; Dimensions: 89x90x38 mm.	05 03 05 - 05 03 06
	T-connector	Used to split solar cables.	05 03 07
	Connector 1	Used to connect two modules with each other.	05 03 08
	Connector 2	Used to connect two modules with each other.	05 03 09
	SolDro 1.0 SolDro 2.0	Reflective road sign: lamp holder, LED light, pole, support structure, table, PV module, battery, regulator, battery case, mountings.	05 05 02 - 05 05 03
	Batteries	Batteries Recommended application: - UPS system - central batteries - power systems - devices with cyclical operation - mobile equipment - small traction	05 04 01 - 05 04 24

Skorut Systemy Solarne® Sp. z o.o. is one of the leaders among the Polish producers of the devices using renewable energy sources. Having 17 years of experience in this field, it is a pioneer in designing and realization of technologies devoted to protection of the environment. We have compleated such investment as:

RADOGOSZCZ ZACHÓD HOUSING ASSOCIATION IN ŁÓDŹ


LIST REFERENCYJNY

We performed the largest solar installation in Poland in Lodz on 57 apartment blocks. A total of 3,459 solar panels were installed with a total area of 7,367.67 m² and capacity of 5880.3 kW.

HOUSING ASSOCIATION OF JAN ZAMOYSKI IN ZAMOŚĆ


LIST REFERENCYJNY

Installation of solar collectors for 21 blocks Housing Association in Zamosc 1 106 units with an area of 2,355.78 m² and capacity of 1,880.2 kW

SZCZAWNICA MUNIPACITY

Installation of complete solar installations for household objects and collective accommodation under the Low Emission Reduction Through Use of Renewable Energy Sources programme for individual and the collective housing in the city of Szczawnica. Mounted on 378 single-family homes, including 1,574 solar panels with total area of 3,714.64 m² and capacity of 3097.82 kW.

FWP Sp. z o.o.

The modernization of heating systems in 10 holiday homes for FWP Sp. z o.o. located throughout the Poland. A total of 1,009 solar panels were installed with a total area of 2,149.17 m² and capacity of 1715.30 kW

EURO-CENTRUM
Science&Technology Park in Katowice

Skorut Systemy Solarne set up a laboratory dealing with environmentally friendly and energy efficient systems. Many parameters of various technologies 3 types of solar collectors, 3 types of PV modules, 2 types of heat pumps and 2 types of ventilation heat recovery units, can be monitored with dedicated SCADA system.

CHARSZNICA MUNICIPALITY

Installation of renewable energy systems on 4 public service buildings and 502 private houses in Charsznica Municipality. A total of 1,045 solar collectors were installed with an area of 2,424.40 m^2 and capacity of 2047.20 kW

MSZANA DOLNA MUNICIPALITY

Construction works involving supply and installation of 6,030 solar panels with a total area of 14 170.5 m^2 for Mszana Dolna municipality and partner municipalities, as well as 6 installations in public service buildings.

HOSPITAL IN GŁUCHOŁAZY

Performance of the solar heating system powered by a battery 120 solar collectors with an area of 255.6 m^2 and the absorption power of 204 kW.

SPORT AND RECREATION CENTER IN JAROSŁAW

The installation included installation of 90 units of solar collectors, three heat pumps operating on six 45 meters deep wells and the installation of heat recovery devices from ice rink chilling system, installation of tanks, valves, heating, electrical and water installations.

WROCLAW UNIVERSITY OF TECHNOLOGY

Installation of 120 pcs of PV modules - Technical University Wrocław approx. 15 kW Power.

CANOE TRACK IN KRAKOW

Installation of 90 solar collectors on steel structure mounted on the roof. A total area of 226.8 m^2 and the absorption capacity of 180 kW.

KSIĘŻPOL MUNICIPALITY

Construction works involving the installation of 992 photovoltaic panels with a capacity of 22,816 kW and solar collectors in the amount of 2,384 units with a total area of 45296 m^2 on residential buildings and 16 public service buildings in Księżpol Municipality.

THE PASSIVE BUILDING IN SUŁKOWICE

Our company has built an office building using modern, energy efficient technologies. The building was built in slope, the rest of the building is glazed, so that you minimize the need for lighting energy. The heating function of the building is covered by a fully low temperature II-stage brine / water heat pump with power of 12.5/24 kW, which feeds the floor heating. In addition, the building is equipped in installation of solar panels that provides hot water.
A characteristic feature of the building is barrier around the roof, which has TWIN modules attached. 12 TWIN panels directed to the east and 18 to the south. Each installation has separate counters (electricity, heat, heat pump). This provides an opportunity, to keep track of yields and savings, we were able to provide.

Being a pioneer with innovative devices on the Polish market, the company has extensive experience backed up with the following investments:

- 14 hospitals _____1750 pcs of collectors
- 26 public pools _____2340pcs of collectors
- 30 industrial plants_____3600 pcs of collectors
- 70 social house assistance____16800 pcs of collectors

COOPERATION with SKORUT System Solar

Keeping In mind that high quality and service standard are the key to success, we invite business partners valuing long-term and partnership based cooperation, to contact us at: office@skorutsolarsa.co.za

We ensure professional backup, clear cooperation rules, as well as promotional materials and specialized product training.

We are a company that is active in social life, through its production-sales operations and its influence on social-economic environment, but also various activity towards natural environment protection.

The rules of development for our company were based on aspiring to satisfy our clients through creating highest quality products and achieving economic success with unwavering respect for social, economical and environmental values.

Explanation of symbols used in the catalogue

Market experience


Meander flow of heating agent


Aplicable in industry

Product compatible with PN-EN 12975-1:2006 +A1:2010


CE mark - safe product


Mountable on public service buildings or housing districts

Product compatible with EN 12976-2:2006

Conversion of solar energy into heat energy

Does not disturb ecological balance

Mounting on flat or slope roof

Absorbtion of sunrays


High quality