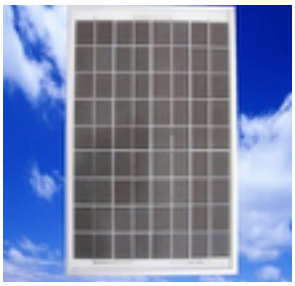

L-HPK 25/12 is a **Micro home power kit** is a package for producing power to houses that are off grid. Here we operate with no grid and power by sun only enough for a smaller family to get lamps + power for a little extra. Components are of highest quality and most key parts are European brands. System is designed for tropical areas where demands are very high and a long maintenance free like time is a dream. Design criteria was to offer a system where nothing needs service and rapid in 5 years and most parts handle at least 10-15 years or more.

Solar panels with 25W output is the key component and here we have selected a model based on multi crystalline silicon. They are best in this range of smaller panels and have a good proven reliability. This is a rather large panel for this type of system to give power even rainy days and weeks. We have 12 volt power in house and no inverter to keep costs down.

Solar panels in a tropical area will generate electrical power measured in Kilo-Watt-Hours. (KWH) These shall be charged into the battery in a good way. We use a 25 W solar panel get a output value that is highly depending on local sunshine. This can differ 55 in a single country. The battery shall match the panel in output. 4-5 hours of sun shall typically give enough power for 24 hours operation in house.

25 W solar panel

Dimension 547x350x30 mm with frame
Max voltage 18 volt
Multi crystalline panel
Max current 1.5 A
Weight 2.8 Kg

Out put per day in tropical areas is about 0.10 KWH / day. We have very large variations between a cloudy and rainy day and a full sunshine day. Extra margins are needed to get power the rainy and cloudy days.
Table at right shows a calculation from data base in Burundi in Africa that is very typical for this area. Here we see months differs 30% in sun power. Local variations over a country can be rather large so extra margins are needed for an universal solution.

Fixed system: inclination=-7°, orientation=0° (Optimum at given orientation)				
Month	E_d	E_m	H_d	H_m
Jan	0.10	2.97	5.29	164
Feb	0.10	2.86	5.68	159
Mar	0.11	3.37	6.04	187
Apr	0.10	3.12	5.75	173
May	0.11	3.32	5.88	182
Jun	0.12	3.45	6.30	189
Jul	0.12	3.70	6.57	204
Aug	0.12	3.68	6.61	205
Sep	0.11	3.39	6.31	189
Oct	0.10	3.23	5.82	180
Nov	0.09	2.68	4.93	148
Dec	0.09	2.82	5.03	156
Yearly average	**0.106**	**3.22**	**5.85**	**178**
Total for year		**38.6**		**2140**

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Battery system is the key to reliability and the most critical component in the system. Good design and components is needed to have a good function for several years. Deep cycling of battery and charging temperatures are key key numbers to get a reliable design and life time. Lead GEL battery shall not be cycled more that 30-40% of its capacity to get a good and reliable life time. High temperatures is best to combine with max 30% deep cycling. If colder can be over 40% but care gives long life.This is the best solar battery from Germany called Solar dryfit series. It its a Gel battery and not the cheaper AGM series and It is 100% spill safe. The cheap to buy battery is normally the costly battery after 5 years. Cheap = more costly is very obvious here. Lead GEL is better than an AGM battery.

Battery selection in short with some criteria with day cycling

Battery model	Ambient temperature	Deep cycle	Lifetime
Lead Car SMA type	20 C	30-40%	6 months
Lead Car SMA type	30 C	30-40%	2-3 months
Lead AGM Datapack	25-30C C	40%	4-6 years

We use an AGM battery here to have best life time and no problems. Battery have no need for maintenance and no water to add as it is sealed.

Solar charger system PWM Charger

The solar charger is here a key component that can change a lot of performance. PWM that is Pulse width modulation is reliable. We have a good design that is cost efficient and best quality. There is also a USB Mobile phone charger output at front.

12 Volt DC operation

Direct 12 DC simplifies a lot and cut costs. Low voltage reduce the problems with electrical security hazards and accidents a lot. 12 volt is also similar to car service is far simpler as a service man from a car can often assist. 12 V have no demand for certified electricians when installed. There are also many accessories available when needed like TV, Radio and small fridges.

Cable set between solar panels and inverter

All kits have a 5 meter double solar panel cable to be used from the panel to the solar charger. This is a weather resistant cable as it is used out door in rain and with lots of sun and corrosion.

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Cable and fuse set for battery and electronics

Cable set 2 meter long between charger and battery with an automatic fuse to prevent problems. There is a switch here to turn all on and off.

Cable set and all needed parts for installation

We deliver 4 led lamps with built sun switch for on and off and 10 meter rugged cable with screw connectors to make installation house. 3 junction boxes included. This is what is needed in most houses to get all installed and working.
All what is needed is in the box with all other parts.

Lamp unit with socket and lamp unit / led bar for 24 volt DC direct operation

Lamp kit contains 4 LED lamps operating at 12 volt. There is an integrated switch to turn on and off. We deliver all cables to connect and a screw driver for installation works . Lamps have a typical life time of 10 years. The light tube design gives less shadows.

Content of the large solar home kit.

1 pcs	25 W	Solar panel +1 meter cables and MP4 connectors
1 set	5 meter	Junction cable with MP4 connectors between panel and charger
1 pcs	12 volt 10A	PWM solar charger for 12 volt battery operation.
1 pcs	USB	Mobile phone charger output
1 pcs	USB Cable	Mobile phone charger cable and universal connector
1 set	2 meter	Cable set between charger and battery pack with fuse
1 pcs	Battery	Lead Gel battery 12 AH 12 Volt Data-Safe long life 10 years. Japanese.
1 set	Cables	Set of all cables between battery + inverters + fuse etc. Length 1 meter.
2 pcs	Junction	Box for position close to inverter and battery.
10 M	24 Volt	Cable 2x1.5 mm2 type EKK Light that is a rugged 230 Volt cable
4 pcs	Lamp	Lamp with lamp housing 12 volt and 3 W led lamp included. Switch in unikt
1 bag	8 mm	Cable clips 8 mm diameter of cable
1 pcs	Paper	Manual with photo assembly instruction for unqualified electricians

Calculation criteria for small home system

4 pcs 3 W led lamps	5 hours per day = 60 WH per 24 hours
1 pcs Mobile phone chargers	Intermittent 24 = 10 WH per 24 hours

Summary in KWH per 24 hours **Total 70 WH / Day**

1 panels of 25 W / each gives typical 0.1 KWH / day in central Africa like Bujumbura area

Margin about 30 % as security if used like this. Less 30% adds days with bad weather and lost power ar late evenings.

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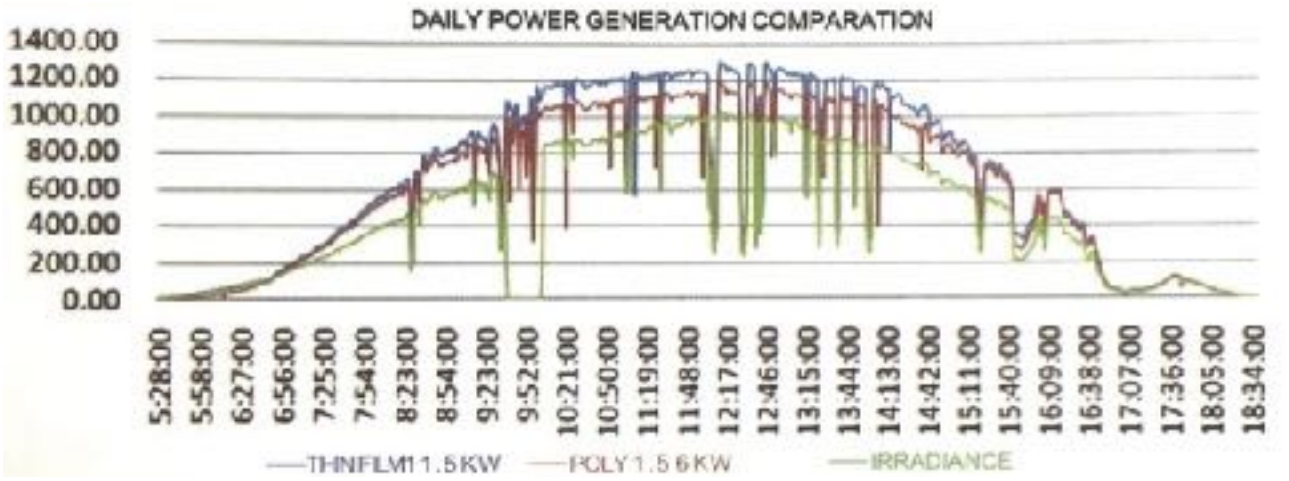

Typical output from a solar panel a sunny day with breaks for clouds bow and then. If day is very cloudy output can be dropped to 10% of panel output. If there are a week with clouds the time for lamps will be shorter and limited.

Photos from Gakwende handicap centre and Mututu school. Panels here are a bitr larger as system feed much more in lamps + 230 Volt and a PC computer system. All in Burundi.

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