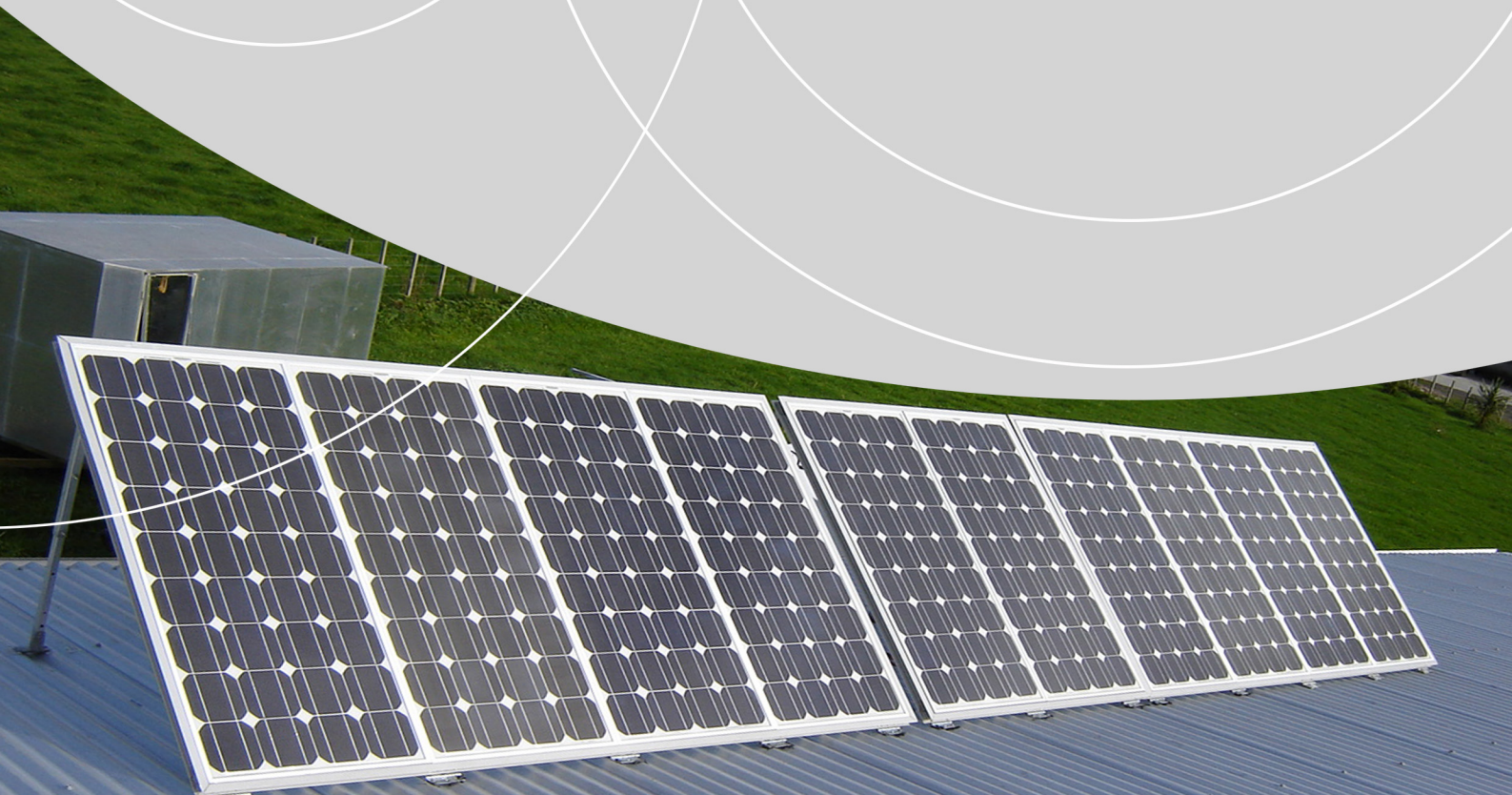


*solarPak*

# ALPHATRON

Packages for Solar Home Systems including:

- PV Modules
- Array support structures
- PV controllers
- Inverter / Chargers
- Batteries
- Connection materials
- Monitoring



# solarPak

Alphatron solarPaks are convenient kits to build stand-alone Solar Home Systems. Each package includes all materials required for the installation of the system: PV modules, support structure, PV controller, Inverter/Charger, battery bank, monitoring, over-current devices and connection materials.

Alphatron solarPaks are configured in such a way that it becomes simple to build a customized solar home system without building the complete system from scratch. Each solarPak is made up from three main system parts: the PV array, the equipment cabinet and the battery bank. These system parts can be mixed and matched to suit the application.

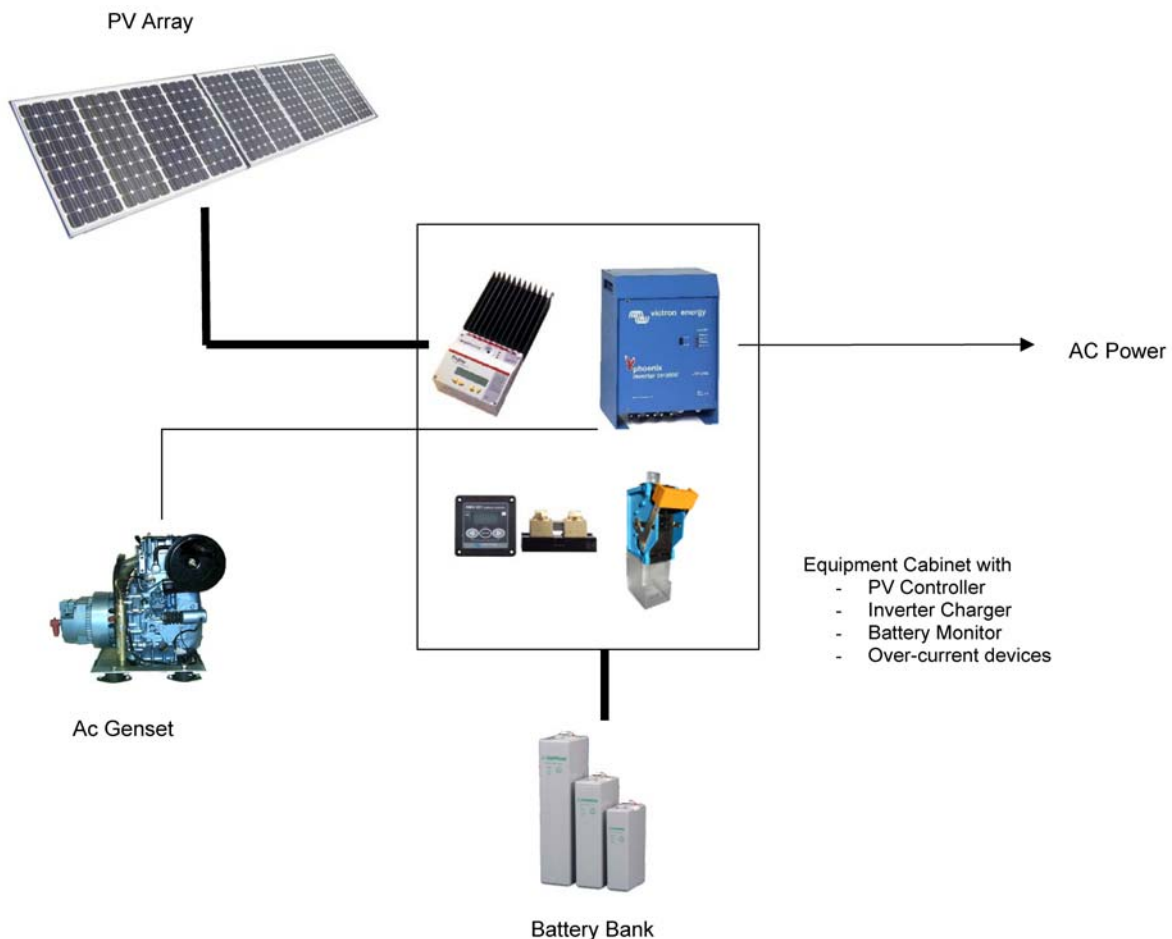
All electronics come pre-wired including necessary over current devices. The solarPak 800 to 3000 come assembled in an equipment cabinet. The only installation

work required on site for these systems is the physical placement of the system parts and the interconnection between the three system parts. The solarPak 3300 to 5000 are assembled on-site on a wall mounted base plate.

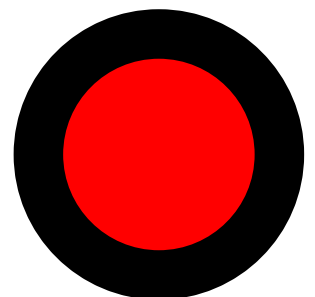
An accurate battery monitor is included to monitor the state of charge and the condition of the battery bank. In addition to charge/discharge current, voltage, remaining capacity etc., this monitor calculates parameters such as time to go, battery charge efficiency, number of cycles, deepest discharge etc.

Each solarPak has an input to connect- and option to auto-start a backup generator (generator not included).

An Alphatron solarPak is configured in 3 easy steps as described below: selecting the PV Array, selecting the Inverter and selecting the Battery Bank.



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## Step 1a : selecting the type of PV Array

The Photo Voltaic (PV) array is the part of the system that collects the energy from the sun and converts it to electricity. Selection of the right PV array for your application takes two steps: first select the type of PV array and then select the size of your PV array.

Alphatron solarPaks come with three types of PV arrays: PVL, Amorphous Framed and Crystalline.



### PVL

PVL is a flexible amorphous silicon laminate that is bonded directly to the roof. PVL are roof integrated PV arrays and do not require a support structure. PVL can be selected for new-builds where a suitable metal roof is used and for existing metal roofs.



### Amorphous Framed

Amorphous framed modules have the following advantages: no glass (very rugged), more generated energy per Wp installed, high shading tolerance, better performance in low light- and scattered light conditions, less affected by negative influences of high temperature. A larger area is required for the same power with amorphous compared to crystalline. Select an amorphous array if sufficient area is available to place the modules.



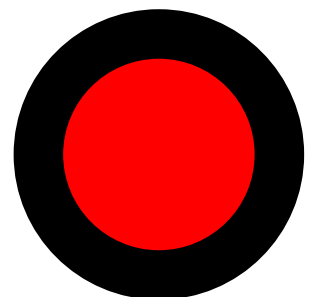
### Crystalline

Framed crystalline array. Crystalline modules have the highest output per surface area. Select a crystalline array when not much space is available to place the PV modules.

### Support structure

If an amorphous framed or a crystalline array has been selected, it will be supplied with a module support structure. The customer can select between a structure for roof mounting or a stand alone support structure. The roof mounted support is available for a tin roof or for a tiled roof.

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## Step 1b: selecting the size of the PV array

The required size of the PV array is determined by the average amount of energy that is consumed each day. The average energy generated each day must be greater than the average energy consumed each day (by at least 20%). So selection of the size of your PV array starts with a careful analysis of your electrical consumption. Your Alpatron dealer can help you with this process.

Every kWh that will not be consumed does not need to be generated and does not need to be stored either. It is worthwhile reducing the consumption by finding energy efficient alternatives for electrical loads wherever possible.

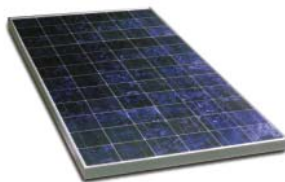
Once the average consumption is known, use the tables below to work out which PV array suits your application. Note that generation in winter can be significantly less than that in summer. If no backup generator is used, special attention must be given to the energy production in winter. Other factors such as geographic location, module inclination and azimuth can also have an effect on actual energy produced. Your Alpatron dealer will be able to advise on this.



| Arrays with PVL amorphous laminates |     |                 |            | Average daily energy production [kWh] |         |         |         |
|-------------------------------------|-----|-----------------|------------|---------------------------------------|---------|---------|---------|
| Module                              | Qty | module dim [mm] | Array [Wp] | AKL Jan                               | AKL Jun | BNE Jan | BNE Jun |
| PVL-68                              | 2   | 2849 x 394      | 136        | 0.72                                  | 0.40    | 0.77    | 0.61    |
| PVL-68                              | 4   | 2849 x 394      | 272        | 1.45                                  | 0.80    | 1.54    | 1.21    |
| PVL-68                              | 6   | 2849 x 394      | 408        | 2.17                                  | 1.21    | 2.32    | 1.82    |
| PVL-68                              | 8   | 2849 x 394      | 544        | 2.90                                  | 1.61    | 3.09    | 2.43    |
| PVL-68                              | 10  | 2849 x 394      | 680        | 3.62                                  | 2.01    | 3.86    | 3.03    |
| PVL-68                              | 12  | 2849 x 394      | 816        | 4.35                                  | 2.41    | 4.63    | 3.64    |
| PVL-68                              | 14  | 2849 x 394      | 952        | 5.07                                  | 2.82    | 5.40    | 4.25    |
| PVL-124                             | 4   | 5007 x 394      | 496        | 2.64                                  | 1.47    | 2.81    | 2.21    |
| PVL-124                             | 6   | 5007 x 394      | 744        | 3.96                                  | 2.20    | 4.22    | 3.32    |
| PVL-124                             | 8   | 5007 x 394      | 992        | 5.28                                  | 2.93    | 5.63    | 4.43    |
| PVL-136                             | 4   | 5486 x 394      | 544        | 2.90                                  | 1.61    | 3.09    | 2.43    |
| PVL-136                             | 6   | 5486 x 394      | 816        | 4.35                                  | 2.41    | 4.63    | 3.64    |
| PVL-136                             | 8   | 5486 x 394      | 1088       | 5.79                                  | 3.22    | 6.17    | 4.85    |

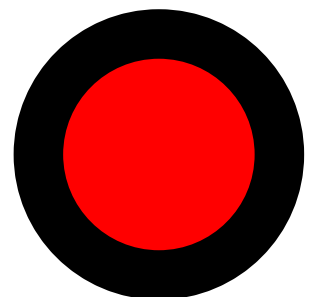


| Arrays with amorphous framed modules |     |                 |            | Average daily energy production [kWh] |         |         |         |
|--------------------------------------|-----|-----------------|------------|---------------------------------------|---------|---------|---------|
| Module                               | Qty | module dim [mm] | Array [Wp] | AKL Jan                               | AKL Jun | BNE Jan | BNE Jun |
| US-64                                | 2   | 1366 x 741      | 128        | 0.68                                  | 0.38    | 0.73    | 0.57    |
| US-64                                | 4   | 1366 x 741      | 256        | 1.36                                  | 0.76    | 1.45    | 1.14    |
| US-64                                | 6   | 1366 x 741      | 384        | 2.04                                  | 1.14    | 2.18    | 1.71    |
| US-64                                | 8   | 1366 x 741      | 512        | 2.73                                  | 1.51    | 2.91    | 2.28    |
| US-64                                | 10  | 1366 x 741      | 640        | 3.41                                  | 1.89    | 3.63    | 2.86    |
| US-64                                | 12  | 1366 x 741      | 768        | 4.09                                  | 2.27    | 4.36    | 3.43    |
| US-64                                | 14  | 1366 x 741      | 896        | 4.77                                  | 2.65    | 5.08    | 4.00    |
| US-64                                | 16  | 1366 x 741      | 1024       | 5.45                                  | 3.03    | 5.81    | 4.57    |



| Arrays with crystalline modules |     |                 |            | Average daily energy production [kWh] |         |         |         |
|---------------------------------|-----|-----------------|------------|---------------------------------------|---------|---------|---------|
| Module                          | Qty | module dim [mm] | Array [Wp] | AKL Jan                               | AKL Jun | BNE Jan | BNE Jun |
| SM200S                          | 2   | 997 x 457       | 110        | 0.54                                  | 0.30    | 0.58    | 0.46    |
| SM200S                          | 4   | 997 x 457       | 220        | 1.09                                  | 0.60    | 1.16    | 0.91    |
| SM340S                          | 2   | 1237 x 557      | 170        | 0.84                                  | 0.47    | 0.90    | 0.70    |
| SM340S                          | 4   | 1237 x 557      | 340        | 1.68                                  | 0.93    | 1.79    | 1.41    |
| SM500S                          | 2   | 1500 x 680      | 250        | 1.24                                  | 0.69    | 1.32    | 1.04    |
| SM500S                          | 4   | 1500 x 680      | 500        | 2.47                                  | 1.37    | 2.63    | 2.07    |
| SM500S                          | 6   | 1500 x 680      | 750        | 3.71                                  | 2.06    | 3.95    | 3.11    |
| SM500S                          | 8   | 1500 x 680      | 1000       | 4.94                                  | 2.75    | 5.27    | 4.14    |

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## Step 2 : Selecting the Inverter

The maximum ac-power demand determines the required size of the inverter. Attention should be given to the maximum nominal power and the maximum surge power required. The maximum surge power is the power peak that occurs when e.g. loads such as refrigeration compressors and power tools are started. Your Alpatron dealer can help with determining the correct maximum ac power demand. Your Alpatron dealer can help with determining the correct maximum ac power demand.

Once the maximum ac-power demand is known, simply choose the right system from the table below.

The battery monitor provides accurate state of charge indication of the battery bank, including time to go, voltage and current etc.

All systems are generator ready. The solarPak 1200 and up have a PowerAssist feature to synchronise to a small generator to provide extra power for peak demand.



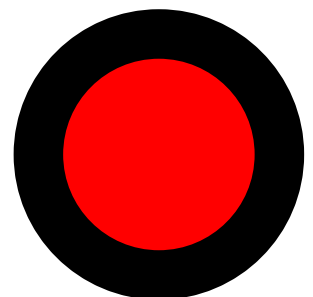
|                    | solarPak 800    | solarPak 1200   | solarPak 1600   | solarPak 3000   |
|--------------------|-----------------|-----------------|-----------------|-----------------|
| Pnom [VA]          | 800             | 1200            | 1600            | 3000            |
| Pmax [W]           | 1600            | 2400            | 3000            | 6000            |
| PowerAssist        | no              | yes             | yes             | yes             |
| DC Voltage [V]     | 24              | 24              | 24              | 24 or 48        |
| Battery monitoring | yes             | yes             | yes             | yes             |
| Generator input    | yes             | yes             | yes             | yes             |
| Auto genstart      | optional        | optional        | optional        | optional        |
| AC-transfer        | Automatic 16A   | Automatic 16A   | Automatic 16A   | Automatic 16A   |
| Max PV amps [A]    | 45              | 45              | 45              | 45              |
| Dimensions [mm]    | 700 x 500 x 250 | 700 x 500 x 250 | 700 x 500 x 250 | 700 x 500 x 250 |



|                    | solarPak 3300     | solarPak 4200     | solarPak 5000     |
|--------------------|-------------------|-------------------|-------------------|
| Pnom [W]           | 3300              | 4200              | 5000              |
| Pmax (1 min) [W]   | 5000              | 7000              | 8400              |
| PowerAssist        | no                | no                | yes               |
| DC Voltage [V]     | 24                | 48                | 48                |
| Battery monitoring | yes               | yes               | yes               |
| Generator input    | yes               | yes               | yes               |
| Auto genstart      | optional          | optional          | optional          |
| Load shedding      | yes               | yes               | yes               |
| AC-transfer        | automatic 56A     | automatic 56A     | automatic 56A     |
| Max PV amps [A]    | 60                | 60                | 60                |
| AC-coupling option | yes               | yes               | yes               |
| Expandable         | no                | no                | yes               |
| Dimensions [mm]*   | 1000 x 1000 x 250 | 1000 x 1000 x 250 | 1000 x 1000 x 250 |

\*) Systems are fitted on a base plate for wall mounting

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## Step 3 : Selecting the Battery Bank

The size of the required battery bank is determined by the average daily consumption and by the required days of autonomy. When a generator is installed, 2 – 3 days of autonomy will generally be sufficient. Without a generator 5 days should suffice.

Flooded (wet) batteries as well as GEL batteries are available. OpzV banks below are GEL, the other options are flooded.



| 24V deep cycle banks |     |       |      |               | Max daily consumption @ days of autonomy |       |       |       |
|----------------------|-----|-------|------|---------------|--|-------|-------|-------|
| Model                | Qty | Block | Ah   | Storage [kWh] | 2 day                                    | 3 day | 4 day | 5 day |
| R220-24-4            | 4   | 6V    | 220  | 2.64          | 1.3                                      | 0.9   | 0.7   | 0.5   |
| L16-24-4             | 4   | 6V    | 375  | 4.5           | 2.3                                      | 1.5   | 1.1   | 0.9   |
| L16-24-8             | 8   | 6V    | 750  | 9             | 4.5                                      | 3.0   | 2.3   | 1.8   |
| OPzV 1000-24-12      | 12  | 2V    | 1000 | 12            | 6.0                                      | 4.0   | 3.0   | 2.4   |

Energy storage indicated is at 50% depth of discharge

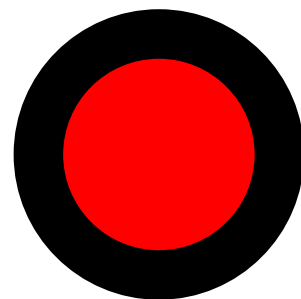
| 48V deep cycle banks |     |       |      |               | Max daily consumption @ days of autonomy |       |       |       |
|----------------------|-----|-------|------|---------------|--|-------|-------|-------|
| Model                | Qty | Block | Ah   | Storage [kWh] | 2 day                                    | 3 day | 4 day | 5 day |
| L16-48-8             | 8   | 6V    | 375  | 9             | 4.5                                      | 3.0   | 2.3   | 1.8   |
| OpzV 600-48-24       | 24  | 2V    | 600  | 14.4          | 7.2                                      | 4.8   | 3.6   | 2.9   |
| OPzV 1000-48-24      | 24  | 2V    | 1000 | 24            | 12                                       | 8     | 6     | 2.4   |

Energy storage indicated is at 50% depth of discharge

For alternative configurations or systems to use with alternative PV Modules, please contact your Alpatron dealer.

Yields are based on mathematical models and average weather data. Actual future results may vary. Alpatron can give no guarantee or accept any liability for actual energy production.

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## Site location

Your average daily consumption  kWh/d

Generator kVA rating (if applicable)  kVA

## Step 1

Type of PV array selected

Support Structure

Your roof angle

Your roof orientation

PV Array selected  (e.g.. US-64-10 for the US-64 array with 10 modules)

Average daily production in January  kWh/d (see table 1b)

Average daily production in June  kWh/d (see table 1b)

## Step 2

Your maximum ac-power demand  VA

Your maximum surge power  W

solaPak selected

Auto genstart required

Generator model

## Step 3

Required days of autonomy  d

Battery bank selected

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