

Dial up the sun whenever you need it

PowerFlow Sundial®



Installers

- **Designed for Retrofit**
- **Existing PV system is Unaffected**
- **Modular, expandable over time**
- **1 hour install time**
- **Wall hung**
- **FREE Design software**

System Owners

- **Safe, reliable, long lasting Lithium Iron Phosphate battery**
- **Next generation capture and release technology**
- **Increased efficiency for greater savings**
- **Integrated LCD display**
- **Night rate capture option**
- **Automotive grade metallic silver and carbon fibre finish**

Utilities

- **Improves grid stability**
- **Scalable to utility size projects**
- **Design ready for demand side response**
- **G83/2 Regulatory Compliant**

Introduction

PowerFlow Sundial is a new innovative patent pending energy storage device designed to solve the problem of storing excess generation from solar or wind energy.

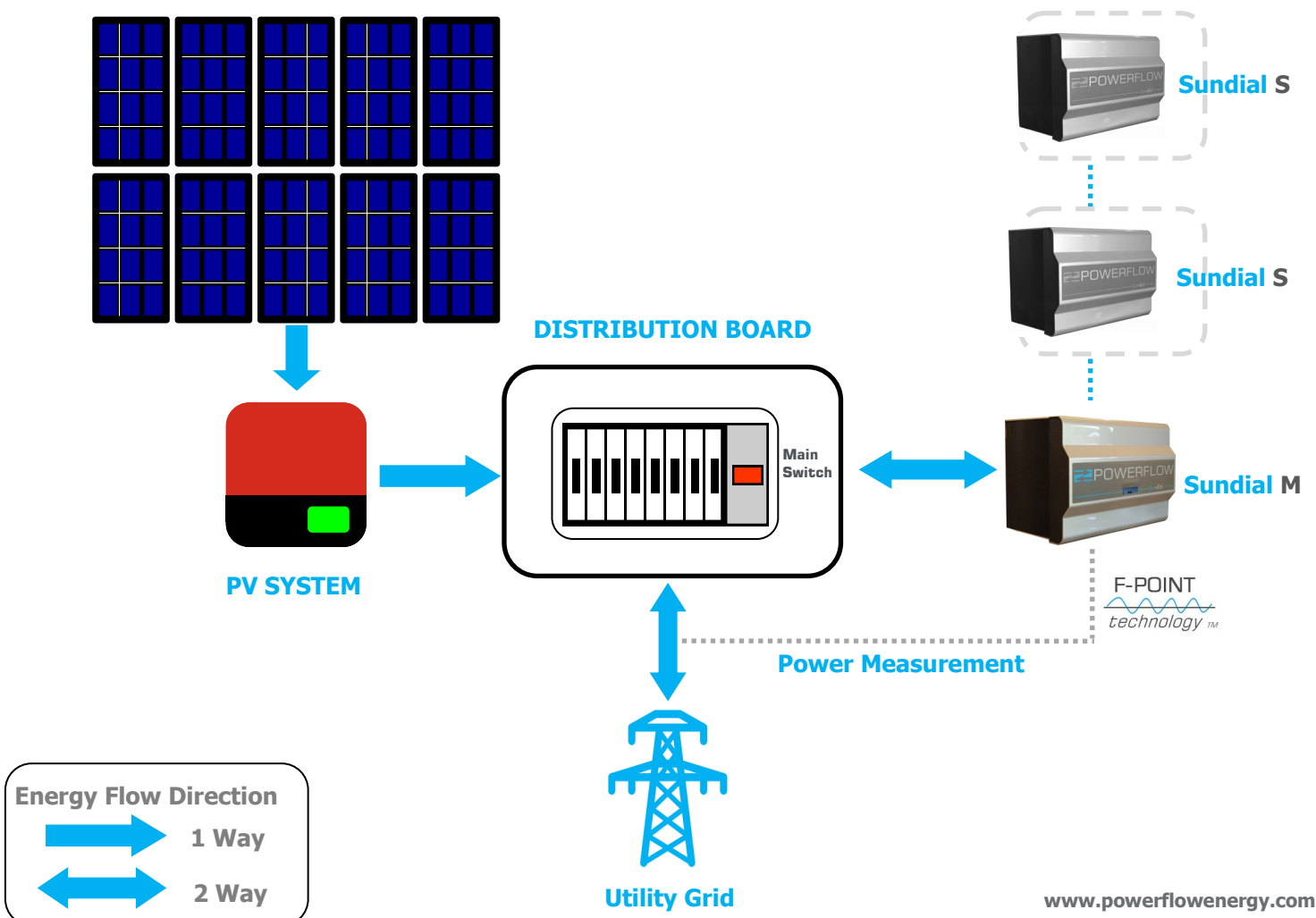
Sundial works by instantaneously capturing and releasing electrical energy stored in the integrated Lithium Iron Phosphate battery pack.

The capture and release system reacts to the building's demand profile rather than the time of day or night. Energy release occurs quickly, and at an industry leading efficiency rate, helping to increase self consumption and reduce energy bills. With the added benefit of F-POINT *technology*®,

PowerFlow's Advanced Power Control method at its heart, combined with new design and manufacturing techniques to reduce cost, but not quality. PowerFlow's Sundial is the new generation of energy storage products. The Sundial system is made up of two options. Sundial M is needed to start the storage system and is also used to control the overall energy balance. Multiple Sundial S units can be added to increase system capacity if required.



Typical System Layout



Main Features

Self-Regulating fast reacting capture and release of energy

Existing hybrid inverters are unable to release energy at the same time as the solar generation system, which is why energy capture during the day and release at night is currently the most common. This approach does not fully solve the demand smoothing problem. Sundial is different. It is able to work at the same time as the PV system, either capturing or releasing energy on demand. This means every opportunity for energy capture is utilised at the greatest possible efficiency. In addition, Sundial is able to do this proportionally. This patent pending approach means Sundial tracks the import and export levels automatically, ramping power input and output up or down in order to fully match the building's energy requirement. The accuracy of this new technique is an industry first from PowerFlow.



Compatible with any existing or new solar PV system

Sundial does not affect the existing PV system as its only connection is via the building's AC distribution system. This means it's compatible with any new or previously installed system.

This distributed approach also means there is no requirement to replace the existing solar inverter(s), therefore offering both a material and installation cost saving.



Fully automated Plug and Play installation

Sundial has been designed to be quick and easy to install.

The custom made sealed enclosure, combined with PowerFlow designed smart electronics, result in a convective cooling concept with no cooling fans for quiet operation.

G83/2 Compliant

PowerFlow's Sundial is a grid connected AC coupled energy storage system. This means that it works alongside the solar inverter, disconnecting from the main supply should a power outage occur.

Long lasting SAFE Lithium Iron Phosphate battery architecture

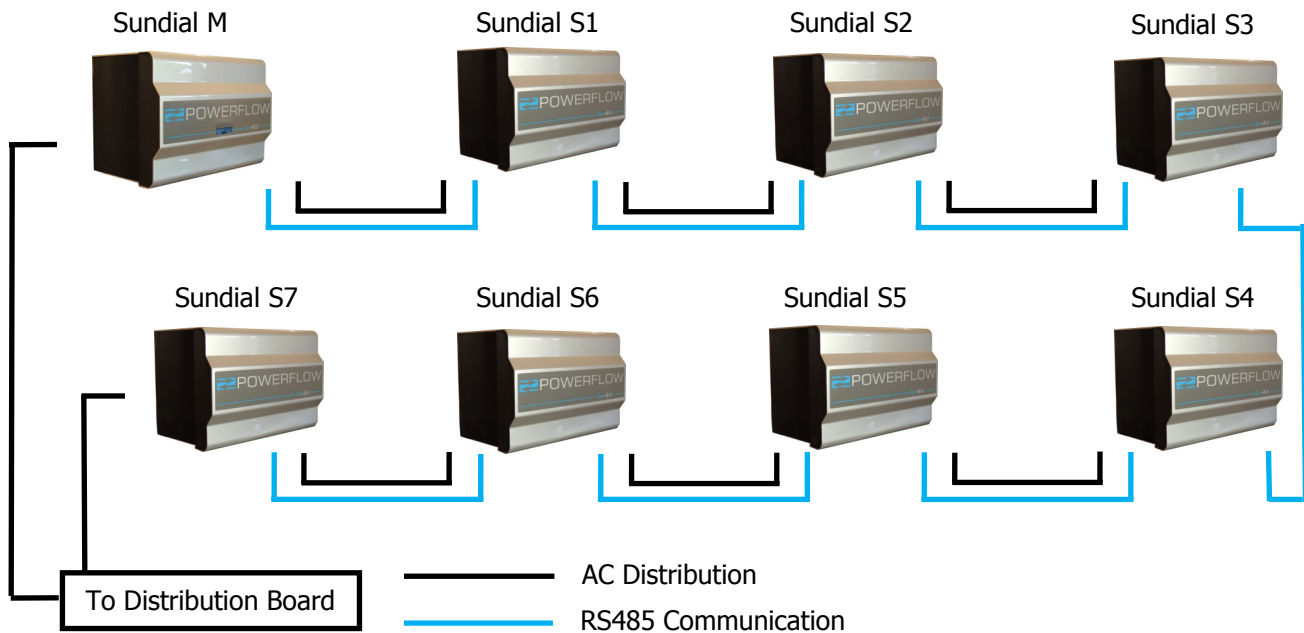
Sundial incorporates Lithium Iron Phosphate (LiFePO₄) battery architecture. Lithium Iron Phosphate is inherently safer than Lithium Ion and longer lasting than lead acid derivatives. It is therefore much more suitable for grid connected storage applications where energy density (capacity vs size & weight) is not so critical. During development, careful design consideration was given to the charge and discharge characteristics of Sundial's lithium battery pack in order to protect its life cycle. In order to achieve this, anti-ageing hardware and software have been developed from the ground up in order to minimise heat build-up and aid cell balancing. This in turn leads to longer battery life.

PowerFlow anticipate a 15 year life expectancy, with cycle life exceeding 6000 cycles. We will also be offering a battery exchange program, where a used battery pack can cost effectively be exchanged for a new one, with the old pack being recycled or re used in third world applications.



Modular system for complete design flexibility

Sundial's modular design means any size system can be easily integrated into any solar PV generator. From 2.0kWh single phase to 96kWh 3 phase, Sundial can be utilised for both domestic and commercial applications. Further expansion is also possible for utility scale projects on request.



Standard Domestic Example: Recommended PV Size 1.5 - 3.0kWp



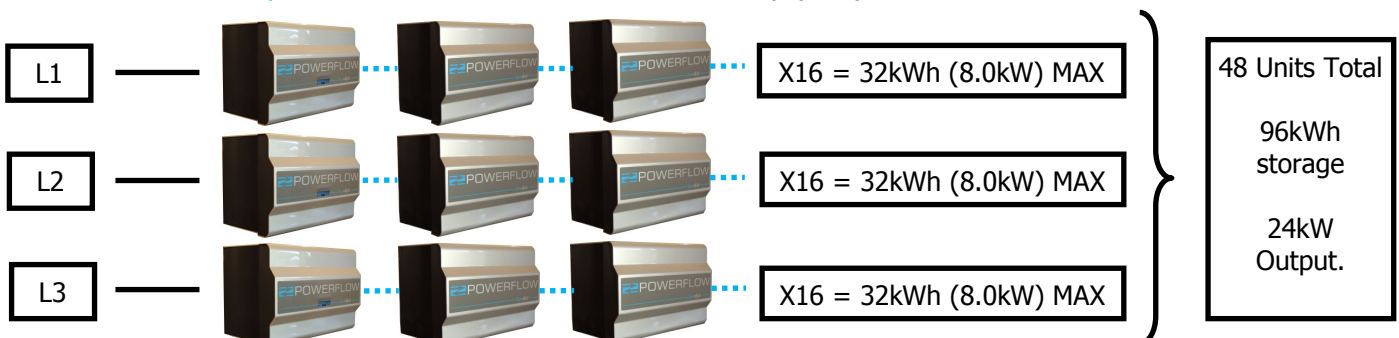
Medium Domestic Example: Recommended PV Size 3.0 - 6.0kWp






Large Domestic Example: Recommended PV Size 6.0 - 10.0kWp



Commercial Example: Recommended PV Size 10.0kWp per phase



TECHNICAL DATA Product Code	Sundial M (SDM-2.0-500)	Sundial S (SDS-2.0-500)	Sundial S (SDS-1.0-250)
			
Battery	Lithium Iron Phosphate (LiFePO4)	Lithium Iron Phosphate (LiFePO4)	Lithium Iron Phosphate (LiFePO4)
Maximum Battery Capacity	2.0kWh	2.0kWh	1.0kWh
*Number of Cycles: 80% DOD	> 6000	> 6000	> 6000
Nominal Battery Capacity	1.6 kWh	1.6 kWh	0.80 kWh
*Battery Life Expectancy	15 Years	15 Years	15 Years
Under/Over Voltage Protection	Yes	Yes	Yes
Under/Over Charge Current Protection	Yes	Yes	Yes
Under/Over Discharge Current Protection	Yes	Yes	Yes
Cell Balancing / Anti-Aging Protection	Yes / Yes	Yes / Yes	Yes / Yes
AC Input / Output			
Input / Output Voltage: Nominal / Range	230V / 180-270V	230V / 180-270V	230V / 180-270V
Input / Output Voltage: Nominal / Range	50Hz / 47.5-55Hz	50Hz / 47.5-55Hz	50Hz / 47.5-55Hz
Nominal Input power (With power factor correction)	300W (6 x 50W adaptive)	300W (6 x 50W adaptive)	150W (3 x 50W adaptive)
Nominal Real Output Power (With reactive power factor control)	500W (4x 125W adaptive)	500W (4x 125W adaptive)	250W (2 x 125W adaptive)
Max Apparent Output Power	580VA	580VA	290VA
Reactive Power Factor Control	1 (Unity) 0.8cap, 0.8ind, Dynamic	1 (Unity) 0.8cap, 0.8ind, Dynamic	1 (Unity) 0.8cap, 0.8ind, Dynamic
Inverter Topology	HF / Galvanic Isolation	HF / Galvanic Isolation	HF / Galvanic Isolation
Start up power: Export / Import	120w / 200w	120w / 200w	120w / 200w
Total Harmonic Distortion (odd)	<3%	<3%	<3%
Operational Data			
Max Number of Devices (per phase)	1	15	30
Max number of Devices per string	1	4	8
Max Nominal Storage Capacity (per phase)	1.6kWh	24.0kWh +	24.0kWh +
Max Nominal Output Power (per phase)	500W	7500W	7500W
Input / Output Power Connection	Plug and Play (PowerFlow Speed-Fit)	Plug and Play (PowerFlow Speed-Fit)	Plug and Play (PowerFlow Speed-Fit)
Measurement and Power Control Method	F-POINT <i>technology</i> ®	F-POINT <i>technology</i> ®	F-POINT <i>technology</i> ®
Communication Bus / Connection	RS485-PFLIN / RJ45	RS485-PFLIN / RJ45	RS485-PFLIN / RJ45
WiFi, Ethernet Access with web server	(available Dec 2016)	(available Dec 2016)	(available Dec 2016)
Ambient Temperature Range	-20°C to +60°C	-20°C to +60°C	-20°C to +60°C
Optimum Battery Temperature Range	0°C to +40°C	+5°C to +40°C	+5°C to +40°C
Cooling Concept	Convective (fan less)	Convective (fan less)	Convective (fan less)

TECHNICAL DATA	Sundial M (SDM-2.0-500)	Sundial S (SDS-2.0-500)	Sundial S (SDS-1.0-250)
General Data			
Dimensions (L /H /D)	440 / 300 / 280 mm	440 / 300 / 280 mm	440 / 300 / 280 mm
Enclosure Weight (Kg)	34 kg	32 kg	20 kg
Mounting Type	Wall Hung	Wall Hung	Wall Hung
Compatible with PowerFlow ERS immersion heating	Yes	Yes	Yes
Battery Enclosure Ingress Protection	IP44	IP44	IP44
Cooling Architecture Ingress Protection	IP20	IP20	IP20
Crystal Clear LCD Display / LED status indicator	Yes / Yes	No / Yes	No / Yes
Compliant Certification Standards	EN 50438, VDE 4105, CEI 0-21, G83/2, EN 62109-1, EN 62109-2, EN 61000-2-3-6, EN 61000-6-1, RoHS, CE	EN 50438, VDE 4105, CEI 0-21, G83/2, EN 62109-1, EN 62109-2, EN 61000-2-3-6, EN 61000-6-1, RoHS, CE	EN 50438, VDE 4105, CEI 0-21, G83/2, EN 62109-1, EN 62109-2, EN 61000-2-3-6, EN 61000-6-1, RoHS, CE
Anti-Islanding Protection	Yes	Yes	Yes
Backup Power Availability	N/A	(available 2017)	(available 2017)
Country of Manufacture	England	England	England
Enclosure	Custom Aluminium Designed (sealed)	Custom Aluminium Designed (sealed)	Custom Aluminium Designed (sealed)
Colour	Metallic Silver / Carbon Fibre	Metallic Silver / Carbon Fibre	Metallic Silver / Carbon Fibre
Internet Monitoring Gateway with App	(available late 2016)	(available late 2016)	(available late 2016)
**Warranty: Battery / Electronics	10 Years / 5 Years	10 Years / 5 Years	10 Years / 5 Years

*Battery cycle life and life expectancy figures are best estimates based on lab test data of cell degradation over charge and discharge cycles, These values are estimates only and are not a guarantee

** Warranty subject to terms and conditions, see latest warranty documentation for further details.
 Battery warranty is 10 years or 6000kWh which ever comes first.
 Product Specification is subject to change without notice.

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