

Electricity
from Water
with PowerPal.



Micro and Mini Hydroelectric Generators.



Power outputs from 200W to 30kW



**Asian Phoenix Resources Ltd.
A Canadian Corporation**

village power • cottages • holiday cabins • survey camps • industrial use • grid tie

We at PowerPal are committed to providing affordable and reliable renewable energy for both developing countries and remote locations everywhere. We realize that PowerPal is often a major investment for our customers, whether it is for a single 200W generator for a farmer or a consortium of business interests planning a larger power project. Our aim is to provide reliable and robust solutions that are competitively priced and do what they're supposed to do – bring you the power where you need it.

PowerPal Low Head

Models MHG-200LH, MHG-500LH & MHG-1000LH
Power outputs: 200W – 1000W

A simple AC single-phase, brushless permanent magnet alternator is attached to a propeller turbine. All or part of the stream flow is diverted into an intake canal where it forms a vortex, causing the propeller to rotate as it exits through a draft tube to flow free again. All that is required is a vertical drop (head) and a sufficient rate of water flow, which are commonly obtained by installing PowerPal on a small waterfall, dam or diversion trench. Electricity passes along a wire and into a house, where an electronic load controller (supplied) stabilizes the voltage to 110V or 220V to protect electrical appliances during use. The ELC can also be used to set other voltages such as 120V, 230V or 240V. Being lightweight & portable, Installation is very simple and is explained in the Instruction Manual. Once installed there are no running costs and maintenance costs are extremely low.



	MHG-200LH	MHG-500LH	MHG-1000LH
Water head	1.5m		
Water flow	35 l/sec	70 l/sec	130 l/sec
Output power	200W	500W	1000W

PowerPal High Head

Models MHG-200HH & MHG-500HH
Power outputs: 200W – 500W

The same AC single-phase, brushless permanent magnet alternator that is used for the Low Head series is used here and attached to a Turgo turbine. All or part of the stream flow is diverted through a PVC or other pipe and down to the turbine, eventually to be carried away along a drainage trench. The bearings are sealed and need replacing every few years – no other maintenance is necessary. If submerged in water simply dry PowerPal in the sun and use again. This series also comes complete with its own ELC and the voltage range is the same as for the Low Head models.



	MHG-200HH			MHG-500HH			
Water head	5m	6m	7m	8m	9m	10m	11m
Water flow	6.3 l/sec	6.4 l/sec	7.4 l/sec	7.9 l/sec	8.4 l/sec	8.9 l/sec	9.1 l/sec
Output power	160W	200W	275W	325W	390W	460W	520W

PowerPal T1 & T2 Turgo

Models MHG-T1 & MHG-T2
Power outputs: 660W-2kW

The PowerPal T1 & T2 Turgo Series is another simple system consisting of a turbine with generator attached. Generator power output is from 660W to 2.0kW depending on head and flow. The T1 is fitted with a 1kW capacity generator and the T2 is fitted with a 2kW version. All or part of the stream flow is diverted through a 12cm diameter steel penstock pipe and down to the turbine. Output voltage and frequency are controlled by our electronic load controller (with ballast).



	MHG-T1				MHG-T2			
Water head H	8m	9m	10m	11m	12m	14m	16m	17m
Water flow Q	21 l/sec	22 l/sec	23 l/sec	23 l/sec	26 l/sec	28 l/sec	30 l/sec	30 l/sec
Turbine output	880W	1.04kW	1.2kW	1.33kW	1.62kW	2.05kW	2.5kW	2.66kW
Gen. output	660W	780W	900W	1.00kW	1.22kW	1.54kW	1.88kW	2.00kW

PowerPal T8 & T16 Turgo

Models MHG-T8 & MHG-T16
Power outputs: 4.7kW – 16kW

This PowerPal Turgo Series offers a complete ‘water to wire’ system with integral turbine, generator, ballast controller and valve flow control. The T8 model has a single valve and produces from 4.7kW to 8kW of electricity while the T16 model (pictured) has two valves to produce from 9.4kW to 16kW. The turbines are of high-speed Turgo design and have high quality stainless steel runners. The runner is directly coupled to the generator for maximum efficiency. All or part of the stream flow is diverted through a 15cm diameter steel penstock pipe and down to the turbine. Output voltage and frequency are controlled by our ELC (& ballast).



	MHG-T8						MHG-T16					
Water head H (m)	24m	26m	28m	30m	32m	34m	24m	26m	28m	30m	32m	34m
Water flow Q (l/sec.)	33.3	34.6	36.0	37.2	38.4	39.6	66.6	69.2	72.0	74.4	76.8	79.2
Turbine output (kW)	5.9	6.6	7.4	8.2	9.0	10.0	11.8	13.2	14.8	16.4	18.0	20.0
Gen. output (kW)	4.7	5.3	5.9	6.6	7.2	8.0	9.4	10.6	11.8	13.1	14.4	16.0

PowerPal Mill Series

Models MSG - Open Flume & MSG - Forced Pipe
Power outputs: 4kW – 30kW

The PowerPal Mill Series is designed for sites that have a low head and large flow capacity. Although there are many such sites where the Mill Series may be used, this makes them particularly ideal for old mill workings especially in Europe and North America. The turbines are Semikaplan and come in either open flume or forced pipe arrangement. Various options are available for governing, power output etc. These systems are made to order to suit specific site parameters.



Typical water heads:	1.5m to 5m
Typical water flows:	200 l/sec to 2000 l/sec

PowerPal Cross-flow Series

Models CF2-20/10-32, CF2-25/10-32, CF2-32/10-40, CF2-40/10-50 & CF2-50/25-50
Power outputs: 5kW – 30kW

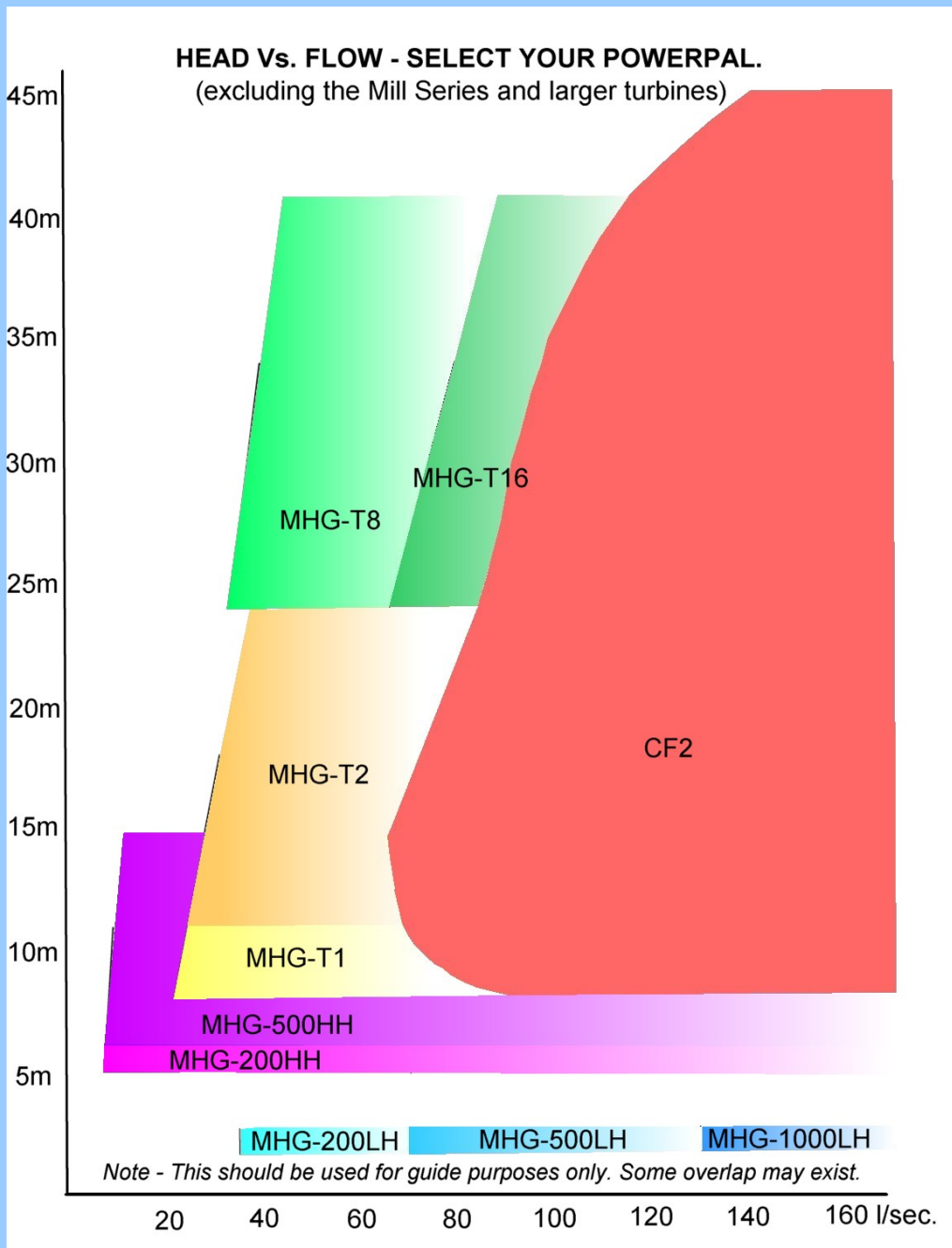
This PowerPal series can be made in many combinations to suit sites with heads between 8m and 100m and flows between 66 l/sec and 1.6m³/sec. The model numbers e.g. 20/10-32 refer to the runner diameter (20cm) and the runner width (from 10cm to 32cm). Variable control compensates for seasonal flow availability down to 20% of maximum. The energy storage flywheels (where applicable) both source and sink shaft power in no load – full load and other transient event conditions. These are sized for operational compatibility with all types of ballasts. Power output is standard at 400VAC 3-phase although 220VAC single-phase is available for the smallest models. Both ends of the turbine main shaft are available for mechanical power or energy storage. These systems are also made to order to suit specific site parameters.



Other Turbines & Services

We also offer Francis, Pelton and Turgo turbines to produce outputs up to 30kW. We can supply runners or turbines alone, or as part of an integrated system package including generator, governor, controls etc.





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