

# Mono<sup>®</sup>

National Oilwell Varco

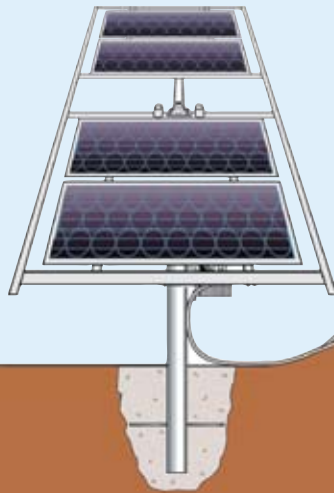
## Sun-Ray<sup>®</sup> Solar Powered Surface Pumps



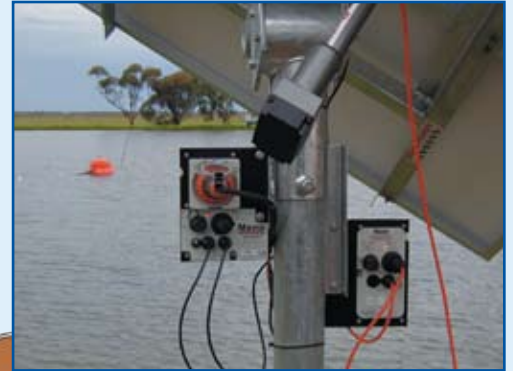
The most water from your panels  
The utmost reliability

Mono<sup>®</sup> 

# Mono Sun-Ray Solar Kits



**Choose Surface Mounted or Floating**



- ✓ **COMPACT, GUTSY CP PUMPS**
- ✓ **MPPT POWER MAXIMISER**
- ✓ **EASY PRIMING**
- ✓ **TRACKER OR FIXED**
- ✓ **ROTOR / STATOR SIMPLICITY**
- ✓ **NO MORE FUEL BILLS**
- ✓ **NO MORE CREAKY, CRANKY WINDMILLS**

System Size (Watts)	150	225	300	375	450	525	600
<b>CAPACITY 1000's Litres per day (m<sup>3</sup>per day)*</b>							
<b>Head (m)</b>							
5	17.5	20.2	45.7	51.4	75.2	87.1	93.7
10	12.6	17.7	31.0	41.4	48.6	59.8	71.1
15	8.8	14.7	21.4	29.5	37.7	43.5	49.8
20	6.3	11.2	14.8	21.7	28.2	34.8	40.3
25	4.6	8.5	12.5	16.3	21.6	27.0	32.4
30		6.6	9.8	15.6	19.4	23.2	25.2

\*Based on Tracking Array with a radiation level of 6.5kWh/m<sup>2</sup>day.



## MPPT

### Cruise Control for your Mono Solar Pump

The MPPT is a micro processor that continuously regulates the voltage from the solar panels, sending the most maximum possible power to your pump whether it is late or early, cloudy or sunny.

### Control at your fingertips

The MPPT control box features 5 system status lights, easy plug & socket connections, float and pressure switch and a communications port for the handheld diagnostic and control unit (left).



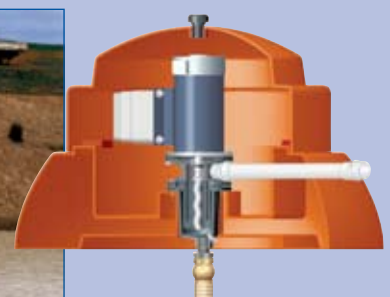
## Floating Solar Kits

For the simplest water supply under the sun!

- ✓ **NEVER NEED PRIMING**
- ✓ **HIGH STABILITY**

**So simple to install, and you will never have to worry about water level again. Wide range to choose from.**

Complete with streamlined floating pontoon, MPPT (Maximum Power Point Tracker) and power cable to suit your application needs.



# Mono High Transfer Solar

## Higher heads and volumes



System Size (Watts)	150	225	300	375	450	525	600	750	900	1050	1200	1350	1575
<b>CAPACITY 1000's Litres per day (m<sup>3</sup>per day)*</b>													
<b>Head (m)</b>													
5	17.5	20.2	45.7	51.4	75.2	87.1	93.7	82.9	94.9	100.0	135.4	140.5	145.5
10	12.6	17.7	31.0	41.4	48.6	59.8	71.1	60.6	81.1	89.6	119.5	128.0	136.2
15	8.8	14.7	21.4	29.5	37.7	43.5	49.8	43.7	63.0	76.4	97.0	111.5	124.3
20	6.3	11.2	14.8	21.7	28.2	34.8	40.3	42.1	46.1	70.2	82.2	89.7	96.6
25	4.6	8.5	12.5	16.3	21.6	27.0	32.4	38.4	44.1	57.0	67.9	78.8	88.4
30		6.6	9.8	15.6	19.4	23.2	25.2	33.6	41.6	45.9	55.6	65.3	78.9
35		5.0	6.9	13.6	17.6	20.8	23.6	29.4	38.8	42.5	44.9	46.6	48.0
40		4.7	6.5	12.1	15.6	18.5	21.7	25.7	35.1	40.3	43.2	45.1	47.1
45		4.5	6.1	10.6	14.0	16.4	19.4	22.5	31.5	37.7	41.2	43.6	45.9
50		4.2	5.8	9.5	12.6	15.0	17.6	22.0	28.7	34.3	39.0	41.8	44.4
55			5.4	8.3	11.2	13.3	15.9	19.6	26.8	31.1	36.6	39.9	43.1
60			5.2	6.7	9.7	12.2	14.4	17.4	24.4	28.3	33.5	37.8	41.5
65				6.4	8.9	10.8	13.1	15.4	22.2	25.7	30.6	35.4	39.7
70				5.9	7.9	9.8	11.7	14.9	20.6	24.8	28.0	32.5	37.9
75				5.7	6.6	8.6	10.6	13.3	19.1	22.7	26.5	29.8	35.8
80				5.4	5.8	7.7	9.3	11.8	17.4	20.7	24.8	27.3	33.6
85						6.6	8.4	11.2	15.7	18.9	22.8	25.0	30.9
90						5.7	7.2	9.8	14.6	17.1	20.9	22.8	28.5
95						4.7	6.3	8.5	13.3	15.5	19.0	22.6	26.2
100						3.9	5.4	7.2	11.9	14.8	17.9	20.7	24.8
105								6.1	10.6	13.3	16.6	19.0	23.4
110								5.6	9.6	11.9	15.1	17.2	21.9
115								4.6	8.4	10.5	13.6	15.6	20.2
120								3.6	7.2	9.2	12.1	14.0	18.4

- Options**
- Post Mount Stationary Frame
  - GPS Tracking Frame
  - Pressure or Float Switch
  - Maximum speed control

\*Based on Tracking Array with a radiation level of 6.5kWh/m<sup>2</sup>day. On sunny days delivery will be higher; on cloudy or stormy days delivery will be lower.

### Maintenance. Think Ahead!

Now's the time to choose between a centrifugal, with all its complications - or the simple life of a Mono owner. The resilient rubber stator lasts for ages and you can replace it in minutes at surprisingly low cost.



# Answers to Frequently Asked Questions

## On cloudy days

A Mono Solar Pump keeps working even in low light. When it is cloudy, your Mono will slow down but because it has no minimum speed (unlike a centrifugal pump), it will keep delivering water.

## Daily Flow Rates

Minute by minute flow is irrelevant to a system that pumps from dawn to dusk. Our figures are based on the daily average performance of a pump. Flow will be highest on sunny days when you most need water.

## Weather Resistance

Solar panels are far more cyclone resistant than windmills. All array frames have been designed to withstand 140km/hr winds and can be easily modified to withstand 210km/hr storms. The toughened glass panels are famous for their resistance to hail.

## Pump and Panel Life

Mono Pumps can last for decades. We do not yet know how long it takes to wear out solar panels. Our first installations were installed in 1985 and are still going strong many years later. Their owners expect many more years of reliable pumping power.

## How Mono Solar Pumps work without batteries

Other solar pump motors need batteries to keep up speed, wasting up to 30% of the electrical energy in the process. Mono Solar Pumps use the same DC (direct current) produced by the panels. Add Mono's low-speed pumping power and the electrical efficiency of the MPPT and you have today's most productive solar pumping systems.

## Store Energy as Water

The simplest way to store solar energy is to use gravity by pumping water into elevated tanks.

## Budgeting for Solar

A solar pumping system costs about the same as an old-fashioned windmill. And your Mono solar powered pump will quickly pay for itself in savings on diesel, petrol or electricity.

## Water Level Protection

Like any electric pump, your Mono solar pump can be controlled with pressure and/or float switches. A connector on the MPPT control box makes it easy to protect against dry bores or full water storage.

# GPS Tracking Array



The Mono GPS Tracker (patent applied for) will ensure that your solar modules are always facing the sun. The GPS Tracker overcomes the problems that are traditionally associated with refrigerant gas and light sensor trackers to ensure 100% tracking accuracy in all conditions.

A GPS (Global Positioning Satellite) sensor built into the controller provides precise latitude, longitude and time. This is all that the controller needs to calculate the exact position of the sun and correctly position the solar array.

Features	Benefits
Not dependent on light	Will track in overcast conditions, always ready for breaks in the cloud
Not dependent on heat	Will track in cold conditions, ready before the sun comes up
Fully rigid design	Not affected by wind
Built in GPS sensor	Simple installation, no calibration required
Automatic Calibration	No accumulated time error
No external sensors	No replacement of damaged sensors
Single button start	Simple to install, fully automatic
Designed to meet Australian Standards	Safe, fully engineered frame design
Excellent tracking accuracy	Maximise the power generated by the array
No refrigerant gas	Friendly to the environment
75° East / West tilt angle	More time pointing directly at the sun

# Computer Aided Solar Selection

## CASS - Computer Aided Solar Selection

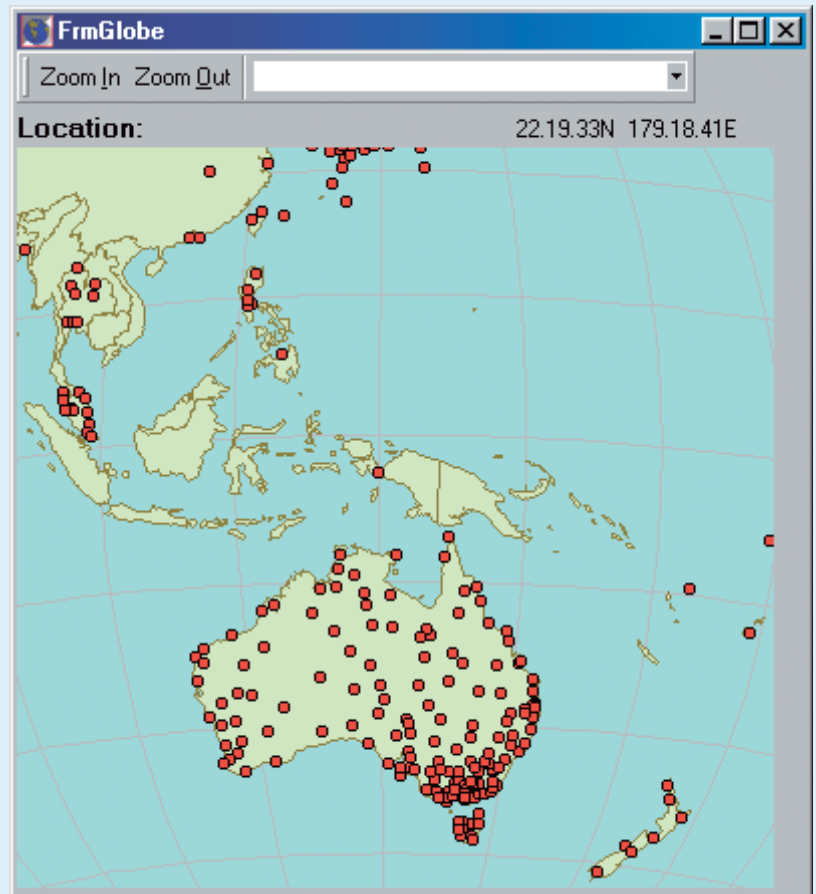
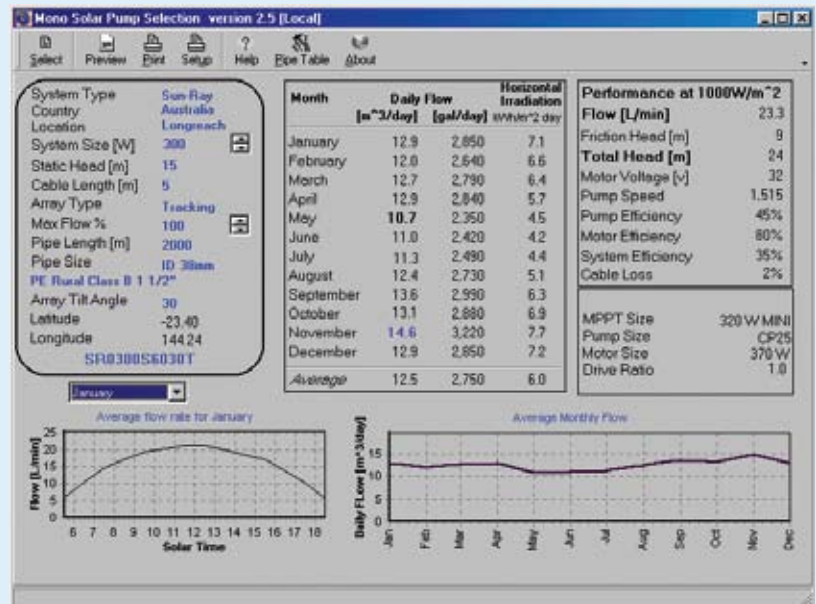
Mono Pumps can accurately predict the daily average flow you can expect from your solar pumping system for every month of the year for hundreds of locations.

Through the development of CASS (Computer Aided Solar Selection) the flow-rate of every system in the Mono Pumps solar range can be predicted for hundreds of locations around the world.

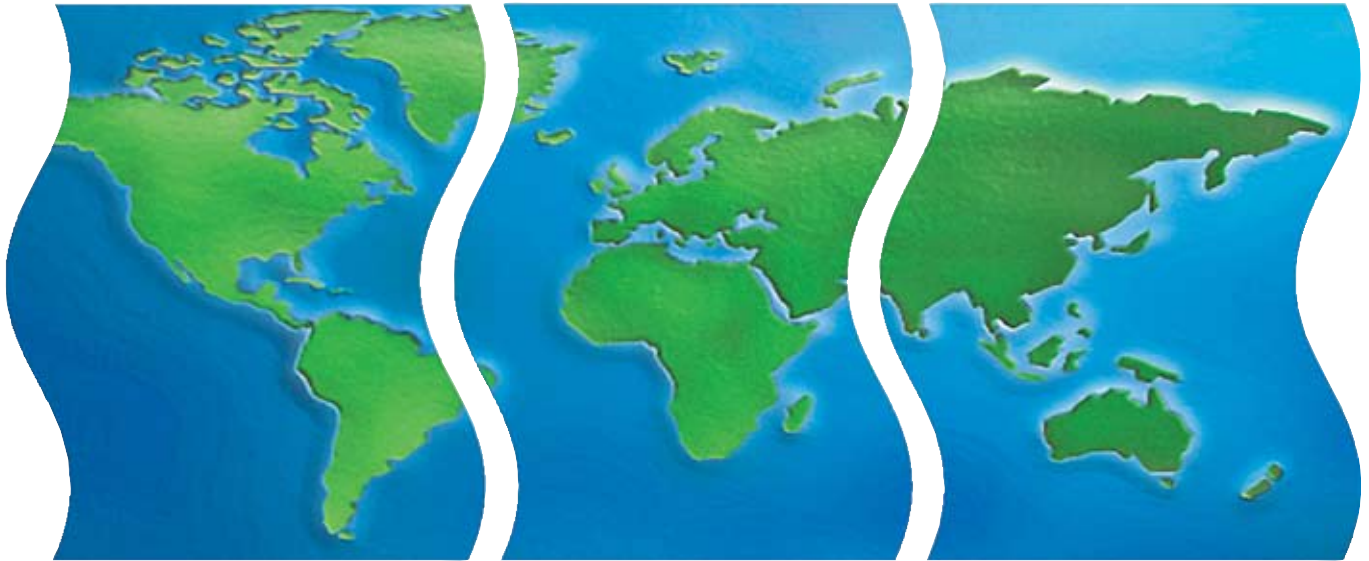
All that you need to do is enter your location, select the type of pumping system that you want to use, the size of solar array that you intend to use and the size and length of discharge pipework that you will be using. CASS will predict the flow-rate of your system, with your pipework, in your location.

CASS uses historical meteorological data and the results of extensive system testing to accurately model the installation and predict the system output.

It is easy to model a variety of systems to determine exactly which Mono Pumps solar pump will meet your flow requirements.



# Mono Pumps Around the World



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*Your feedback will assist Mono in providing better service and becoming a better company in meeting your requirements.*



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