English

Installation, Operation and Maintenance Instructions

Solar Tracking

Retrofit Kit

Mono®

One Company, Unlimited Solutions

MPA561/6

Contents

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Warranty

Warranty Statement

1. Solar Arrays manufactured by Mono Pumps are covered by warranty for a period not exceeding twenty four months from purchase.

2. Mono Pumps will make good by repair, or at their option, the replacement of faulty parts under warranty, providing always that:
   (a) The equipment was correctly installed and properly used in accordance with Mono Pumps Installations and Operating instruction and accepted codes of good engineering practice.
   (b) The claim for goods under warranty arises solely from faulty design, material or workmanship.
   (c) The repair is carried out in the Mono factory or by an authorised agent or distributor appointed by Mono Pumps.
   (d) All freight costs to and from the factory or repair agent are to be paid by the purchaser.

3. In the case of equipment or components which are not of Mono manufacture, but supplied by them, the warranty is limited to that extended by the suppliers or manufacturers of such equipment.

4. Mono Pumps warranty does not cover any of the following:
   (a) Claims for third party liability of damage caused by failure of any of the company's products.
   (b) Damage caused by abnormal operating conditions, war, violence, storm cataclysm or any other force.
   (c) Damage caused by the equipment being used for an application for which it is not recommended.
   (d) Damage caused by sand or abrasive materials, corrosion due to salt water or electrolytic action.

5. The decision of Mono Pumps in relation to any claims or disputes over warranty is final.

6. The warranty is in lieu of all other warranties and conditions expressed or implied, written or oral, statutory or otherwise, which are hereby negated and excluded.

7. This express warranty does not exclude any conditions or warranty implied by the Trade Practices Act 1974 or separate State laws and in addition to any other right, that the original purchasers or any subsequent purchaser may have at law.

In case of claim please contact your Authorised Mono Dealer or contact Mono Pumps (Australia) Pty. Ltd.

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Introduction

Introduction

The Solar Tracking Retrofit Kit has been designed as an upgrade kit for the existing Mono gas tracking solar systems.

The Electric Solar Tracker is designed to give greatly increased daily output from the solar modules and to continue to operate with virtually no maintenance for many years. The Mono electric tracker is a GPS controlled system, to ensure the optimum preformance at all times.
Remember that with a Solar Tracker, the power from the sun is optimised throughout the day. However there is little power available when the sun is less than 15 degrees above the horizon.

The Kit Consists of:

* Electric Tracker Controller
* Linear Actuator
* Mounting Bracket
* Cable for connection to Solar Panels

Electronic Tracking Controller

Description

The Electronic controller / motor system is used to drive a solar module frame. The controller drives a 300mm stroke linear actuator to position the array frame perpendicular to the Sun's movement. The Tracking controller utilises a Global Positioning Sensor to extract satellite time and longitude, from this information the controller will then calculate the position of the sun relative to the controller's longitude. The controller will then drive the actuator to the calculated position which inturn moves the frame to the appropriate position.

Features

Simple installation.

Sensorless motor positioning.

GPS solar position calculation.

2 LED diagnostic indicators.

Automatic and Manual operation.

30-200V input Battery charging.

Com Port – Solar Display Unit connection.

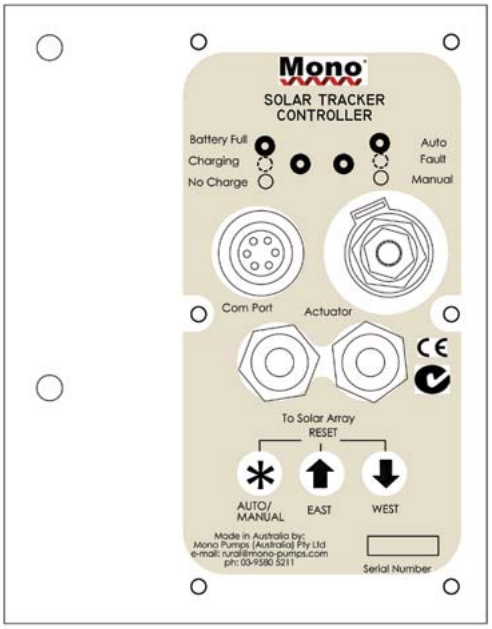
Plug and Socket connections.

Motorised Linear Actuator.

Excellent Low Light Performance.

Accurate Solar Tracking.

75 Degree Total tracking angle.



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Tracking Controller

Electrical

Solar Array Input

Power:	3W Maximum.
Voltage:	30 to 200 VDC.
Solar Array:	150 Watts to 600 Watts.

Actuator Output

Voltage:	12 VDC.
Current:	0 to 6 A.

Battery Type

Mono Part Number: SUN E0380
Battery Type: 12V 1.2AH
Long Life Sealed Lead Acid

Com Connector

RS232
9600 baud
rts/cts

Dimensions & Weight Tracker Controller

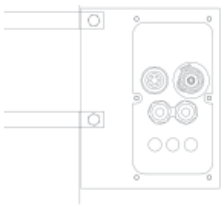
Weight:	3.9 Kg
Dimensions:	Refer Drawings

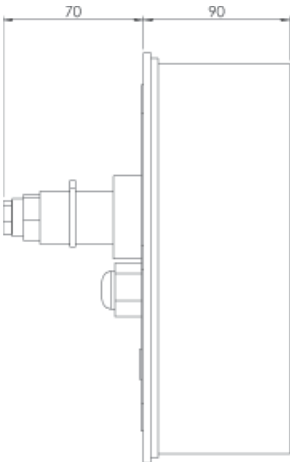
Environmental

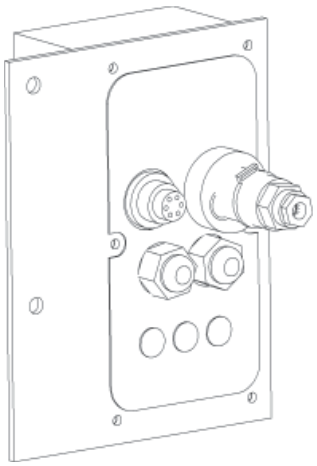
Storage
Temperature: -10 to 60C

Operating
Temperature : -10 to 50C
IP Rating: IP66
Humidity: 95% Max.

All dimensions in mm







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Solar Display Unit

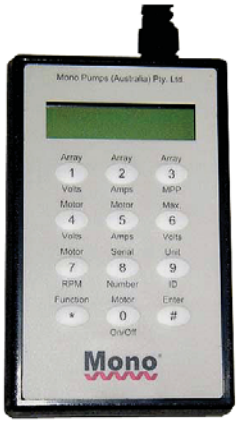
Solar Display Unit

Mono Part Number : SUN DISP UNIT

The Solar Display Unit is an optional accessory that allows the operator to extract data from the Solar Tracker Controller and change software settings within the STC.

The unit has a two line display. The first line displays information on the current operating mode of the controller. Eg. Automatic Mode, Low Battery etc. The second line of the display shows information depending on the currently selected function.

The functions are listed on this page and differ from the text on the keypad of the display of the unit. E.g. To see the array voltage press key 1 then the Enter key. The second line will now display the array voltage. The voltage will be updated continuously until a new function is selected.



The display unit can be powered directly from the STC or from its internal 9 volt battery. If the STC is powered, the Display unit takes power from the STC (i.e. it will operate even if the Display unit battery is flat.) If the STC is not connected to an array or the STC battery is flat, the display unit can power the STC via the Display unit's internal battery.

A list of the primary functions is shown below.

Primary Functions

1 Array Voltage
2 Charge Current
3 Actuator Set Position (mm)
4 Battery Voltage
5 Battery Current
6 Actuator current position (mm)
7 Solar Time (not local time)
8 Serial Number
9 Unit ID version

Second Functions

There are additional functions that can be accessed by pressing the * key followed by the number key and enter.

1 Time offset from GMT
2 Longitude
3 Latitude / Tilt Angle
4 Not used
5 Not used
6 Not used
7 GMT acquisition Time
8 Number of Satellites used
9 Solution Valid (Factory Diagnostics)

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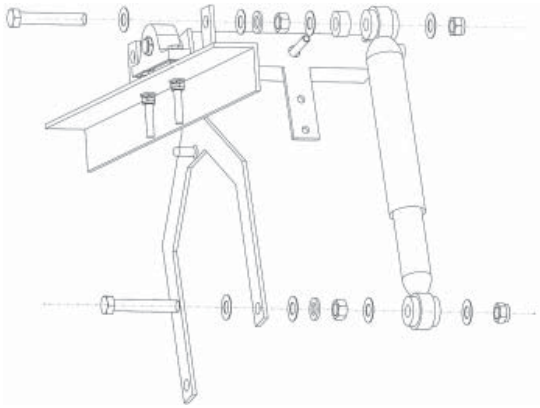
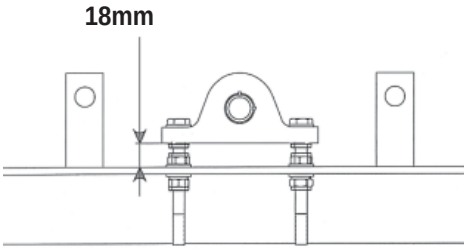
Installation

Installation Instructions

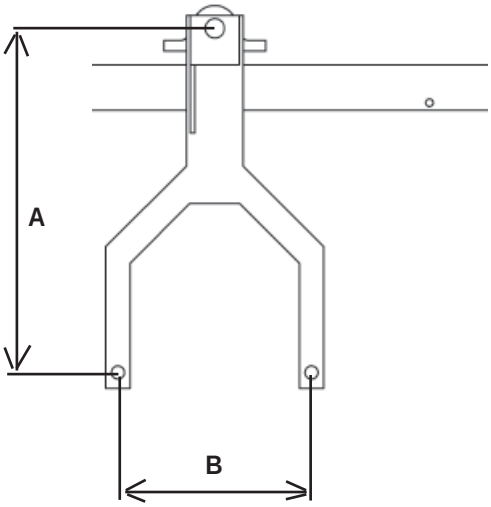
Remove the two shock absorbers. Once these are removed ensure that the frame is held, as the frame will pivot.



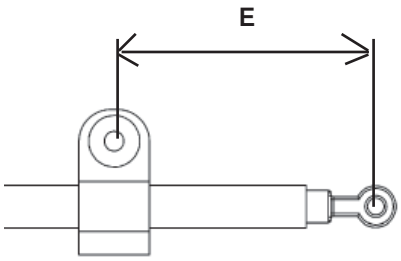
Adjust the bearing blocks so that they are 18mm off the frame, as per the drawing below.



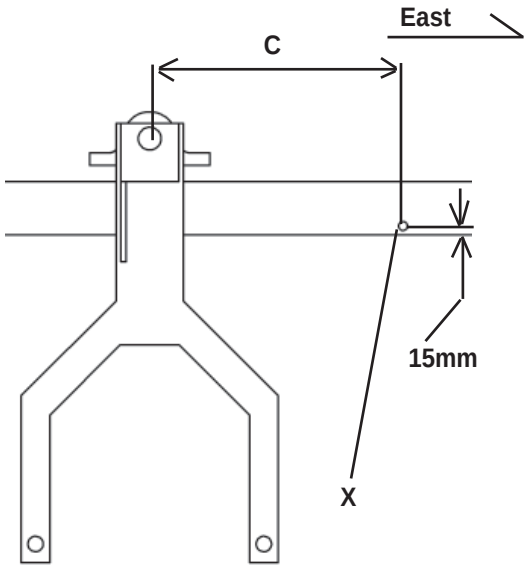
Measure Dimensions A and B off your Solar Array.



Using the tables in appendix 1, dimension C and E can be determined. Dimension E is the position of the bracket on the actuator, which is set as below. Tighten the two bolts on the bracket to ensure this position when the actuator is fully screwed in. On the Linak actuator there is a base bracket with multiple holes. In this case there should not be a need to move the bracket, just use the closest hole to the 'E' measurement. If for some reason the bracket is adjusted on the Linak version, it is important to ensure the two pins are still locking against the plastic housing, else the housing will spin.



Drill an 9.5mm hole in the array frame at point X, in the drawing at the top of this page. This is where the top eyelet of the actuator mounts.



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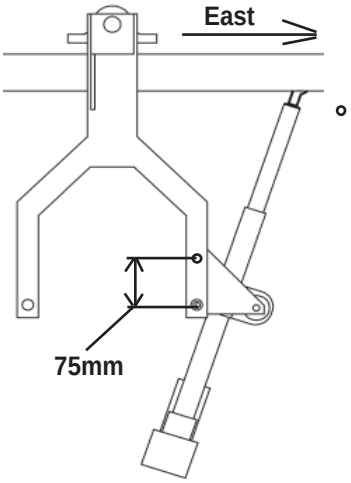
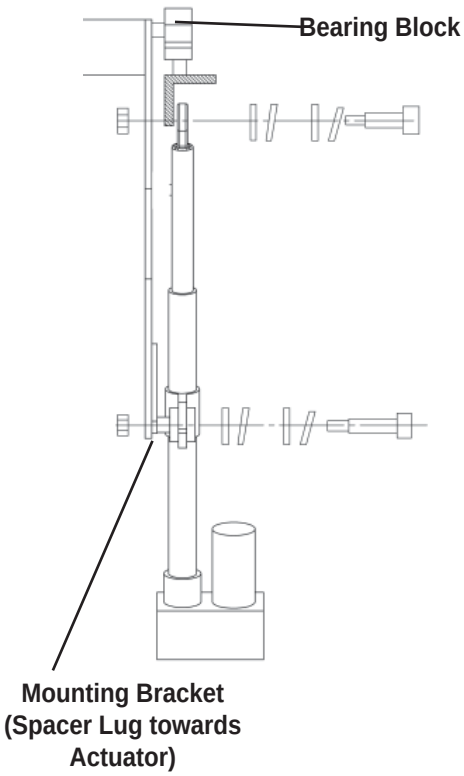
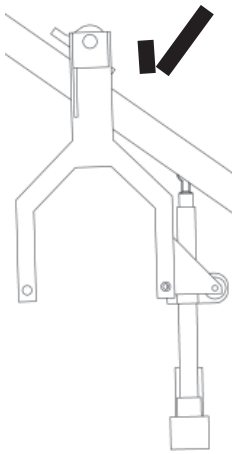
Assemble the bracket to the array frame as shown in the following drawing. This should only require one 10mm hole to be drilled, as shown below. If the array frame has a welded bolt, drill two 9.5 diameter holes for mounting the bracket (line the 16mm hole on the bracket to the reverse side of the welded bolt).

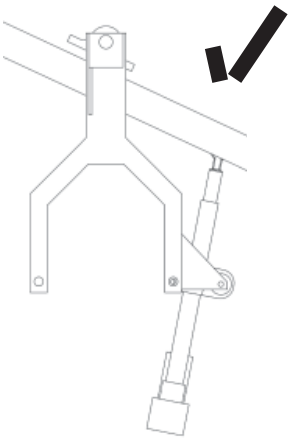


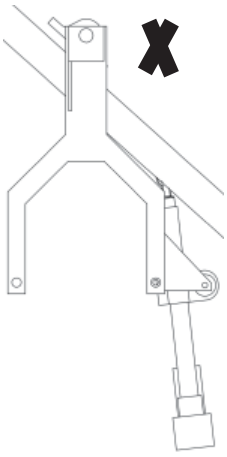


The actuator is mounted using the molybonded shoulder screws. When these are tightened, ensure that the wave washers are not too tight to effect the rotating of the joint. If this is the case remove one of the washers.

When in the fully retracted position (array fully east), the actuator should be vertical, as shown in the following diagrams. If this is not the case, adjust dimension E to achieve this.







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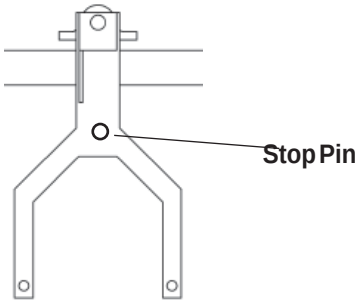
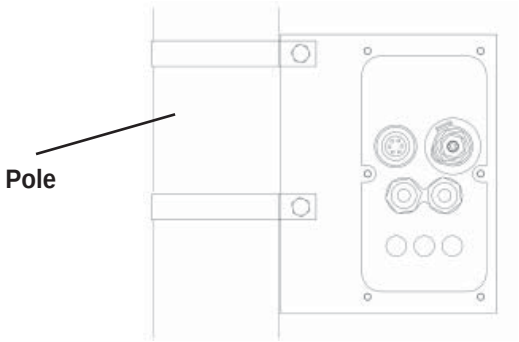
Additional Assembly Information

If the stop pin on the tracker yoke restricts movement of the array, this will need to be cut off.



For fine angle adjustment, the bearing block height can be adjusted. Moving the bolts closer to the frame increases the initial angle.

Mount the tracker controller off the pole using the pole clamps supplied, as shown below. Ensure that the back of the controller faces south.



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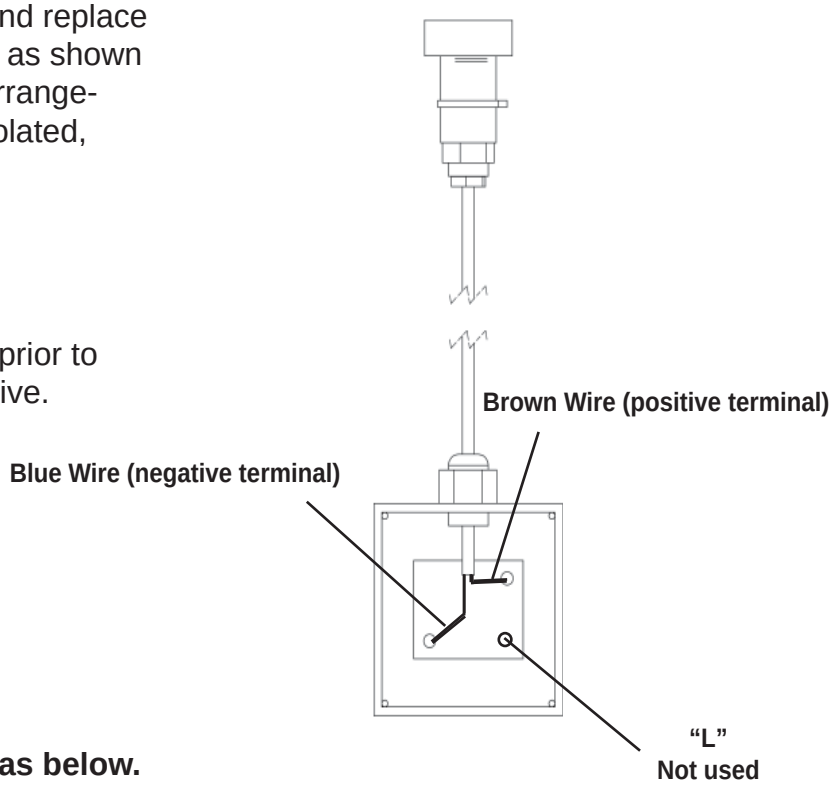
Installation

Connecting of system in the Solar Array

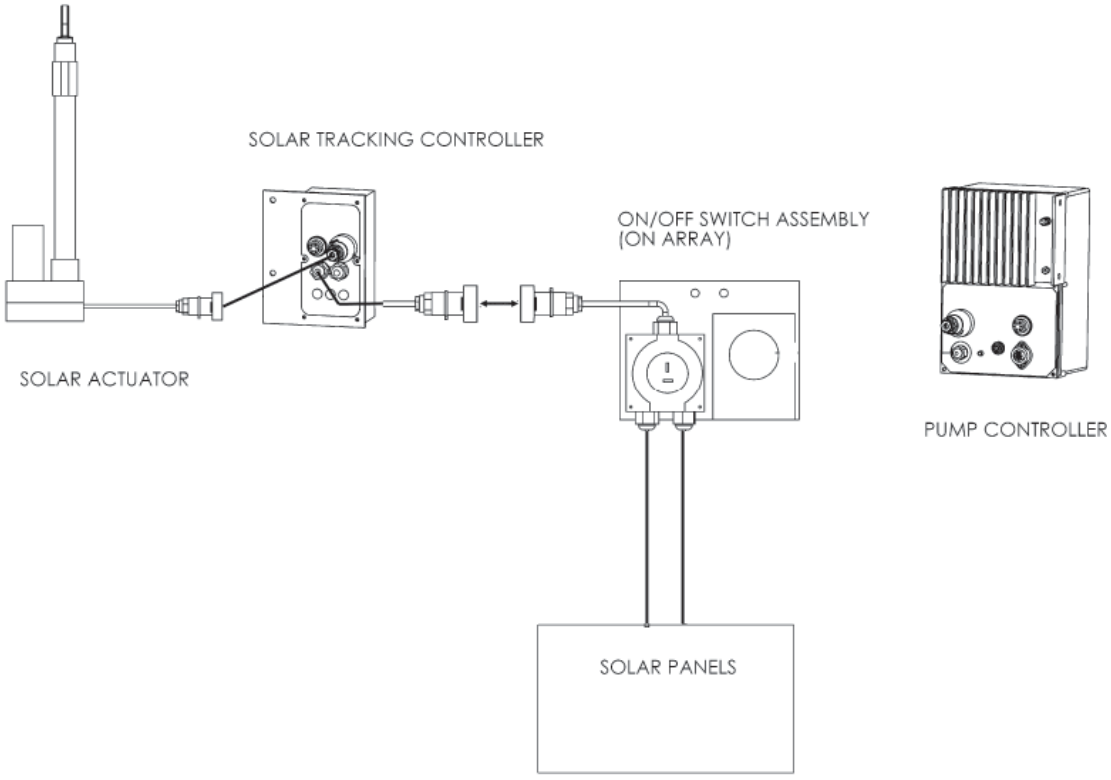
Connect the adapter plug into the 2 pin socket on the solar array. Remove the hole cap from the side of the socket and replace with a cable gland. Wire the plug as shown on the right. Note that with this arrangement, whenever the system is isolated, there is still power to the tracker.

Ensure that the array is covered prior to wiring, to stop the system being live.



System Wiring

Connect the complete system as below.



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Operation

Setup

Install Tracker and connect wiring.

The controller is shipped in a low power sleep state, push any button for one second to commence normal operation. DO NOT push buttons until the unit has been installed.

Push “Auto/Manual” button, the “Auto” indicator will illuminate

If low battery LED starts flashing on installation refer to note 1.

The Solar Frame will immediately track to the east.

After **5-10 minutes**, the unit will track to position.

Note 1: If low battery LED is flashing, the unit will need to be left for between 30 minutes and 24 hours to charge, if the unit is placed in automatic mode it will resume normal operation once the battery is charged.

Modes of operation

Automatic Tracking -

Pushing the Auto/Manual button will toggle the unit between Automatic and Manual Mode. Auto mode will automatically position the solar array towards the Sun. The unit will start at the east at 5:00am solar time, it will start to track from 9:30am to 2:30 pm in 15 minute increments. At 7:00 pm solar time the unit will then “Park” at the Horizontal position.

Manual -

Allows the Solar Array to be positioned manually via the East and West Buttons

East - Moves the array towards the east direction.

West - Move the array towards the west direction.

Reset -

If all three buttons are pushed simultaneously the unit will perform a full reset and re-initialise the automatic tracking function. After reset the unit with be in manual mode. When the reset sequence has been activated the controller will give an audible sound for 2 seconds.

Fault Modes

Low Battery -

The low battery mode will stop the automatic tracking sequence and attempt to charge the battery. This mode will continue for an minimum of 30 minutes up to 24 hours. The unit will continue normal operation after this period.

Motor Jam -

If the motor is jammed while tracking to the west the unit will stop tracking and will reset the next morning.

Note:

If the Auto/Manual Button is pressed the Fault will be cleared and the unit will attempt normal operation.

LED Indicators

The Tracker Controller features two multifunction system status lights (LED’s). The functions of the LED’s are as follows:

<u>Mode LED</u>

Off – Manual Mode

Flashing (1 flash per 2 seconds) – Low Battery

On - Automatic Mode

<u>Charge LED</u>

Off - no charge

Flashing (1 flash per second) – Battery Charging

On – Battery Fully Charged

Battery

To maintain long battery life observe the following conditions:

Always keep the controller connected to the solar array.

Disconnect the battery if the controller is disconnected from a solar array for an extended period time, greater than 1 week.

DO NOT take the unit out of the low power sleep state until the unit has been installed (do not push the buttons until connected to array).

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Maintenance

The solar arrays require minimal maintenance. To maintain maximum power output the modules should be cleaned every six months or whenever dust or bird droppings have built up on the modules.

Every 12 months the following checks should be made:

1. Check all bolted joins to make sure that they are tight.

2. The moving joints of the tracking arrays should be lubricated to insure that the frames continue to track freely.

3. Inspect the condition of all electrical conduits, switches and sockets and replace if any damage is visible.

Wiring of Arrays:
All solar arrays are pre-wired and tested prior to shipment. It should not be necessary for any direct wiring work to take place during installation of the system.

WARNING: Solar arrays can deliver voltage levels up to 170V DC at high light levels. Great care should be taken not to touch wires together, or act as a conductor yourself. Always unplug the electronic pump controller before working on the array. In the event that alterations are required to the array itself, it is essential to cover the front of the array with a blanket or other suitable material to completely stop electrical generation.

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Appendix 1

Set-Up Dimensions (all dimensions in mm)

Table One: For 2 - 6 Panel Arrays

For 2-4 Panel Arrays add 20mm to Dimension E

	Dim B	260	264	268	272	276	280	284	288	292	296	300
Dim A												
432		C=260 E=214	C=261 E=214	C=263 E=214	C=264 E=214	C=265 E=214	C=266 E=215	C=267 E=214	C=269 E=214	C=271 E=214	C=273 E=214	C=274 E=214
434		C=260 E=216	C=261 E=216	C=263 E=216	C=264 E=216	C=265 E=216	C=266 E=216	C=267 E=216	C=269 E=216	C=271 E=216	C=273 E=216	C=274 E=216
436		C= 261 E= 217	C=261 E=218	C=262 E=219	C=265 E=217	C=265 E=218	C=266 E=218	C=270 E=216	C=270 E=218	C=271 E=218	C=273 E=218	C=274 E=218
438		C=261 E=220	C=261 E=220	C=262 E=220	C=265 E=220	C=265 E=220	C=267 E=220	C=270 E=220	C=269 E=220	C=271 E=220	C=273 E=220	C=274 E=220
440		C=261 E=222	C=261 E=222	C=262 E=222	C=265 E=222	C=266 E=222	C=267 E=222	C=270 E=222	C=269 E=222	C=271 E=222	C=273 E=222	C=274 E=222
442		C=261 E=223	C=261 E=224	C=262 E=225	C=265 E=223	C=266 E=223	C=268 E=222	C=270 E=222	C=269 E=225	C=271 E=224	C=273 E=225	C=274 E=225
444		C=261 E=227	C=261 E=227	C=263 E=227	C=265 E=227	C=266 E=227	C=268 E=227	C=270 E=227	C=269 E=227	C=271 E=226	C=273 E=227	C=274 E=227
446		C=261 E=227	C=262 E=227	C=264 E=226	C=265 E=227	C=265 E=228	C=267 E=228	C=270 E=226	C=269 E=228	C=271 E=228	C=273 E=228	C=274 E=228
448		C=260 E=230	C=261 E=230	C=263 E=230	C=265 E=230	C=265 E=230	C=267 E=230	C=270 E=230	C=269 E=230	C=271 E=230	C=273 E=230	C=274 E=230
450		C=260 E=232	C=261 E=232	C=262 E=233	C=264 E=232	C=265 E=232	C=267 E=232	C=267 E=233	C=269 E=232	C=271 E=232	C=273 E=232	C=274 E=232

Table Two: For 7 - 8 Panel Arrays

	Dim B	244	248	252	256	260	264	268	272	276	280
Dim A											
446		C=255 E=226	C=257 E=225	E=259 E=225	C=260 E=225	C=261 E=225	C=262 E=225	C=263 E=227	C=265 E=225	C=267 E=225	C=268 E=225
448		C=255 E=228	C=257 E=227	C=259 E=227	C=260 E=227	C=261 E=227	C=262 E=227	C=263 E=227	C=265 E=227	C=267 E=227	C=268 E=227
450		C=255 E=229	C=257 E=229	C=259 E=229	C=260 E=229	C=261 E=229	C=262 E=229	C=263 E=229	C=265 E=229	C=267 E=229	C=268 E=229
452		C=255 E=231	C=257 E=231	C=259 E=231	C=260 E=231	C=261 E=231	C=262 E=231	C=263 E=231	C=265 E=231	C=267 E=231	C=268 E=231
454		C=255 E=234	C=257 E=233	C=259 E=233	C=260 E=233	C=261 E=233	C=262 E=233	C=263 E=234	C=265 E=233	C=267 E=233	C=268 E=233
456		C=255 E=235	C=257 E=235	C=259 E=235	C=260 E=235	C=261 E=235	C=262 E=235	C=263 E=235	C=265 E=235	C=267 E=235	C=268 E=235
458		C=255 E=237	C=257 E=237	C=259 E=237	C=260 E=237	C=261 E=237	C=262 E=237	C=263 E=237	C=265 E=237	C=267 E=237	C=268 E=237
460		C=255 E=240	C=257 E=240	C=259 E=240	C=260 E=240	C=261 E=240	C=262 E=240	C=263 E=240	C=265 E=240	C=267 E=240	C=268 E=240

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Adelaide	T.	08 8447 8333	F.	08 8447 8373
Perth	T.	08 9303 0444	F.	08 9303 4430
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