PDP3 Series

3” Helical Solar Pump Complete Solution Kit

BIA-PDP3 SOLAR250 - 808691
BIA-PDP3 SOLAR370 - 808692
BIA-PDP3 SOLAR750 - 808694

Kit includes:

Brushless submersible helical motor

PDP3 Solar Controller

30 meters cable

Float/Level Switch with 30 meters cable

Nylon safety rope

Non-return valve

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2. Symbols used in this manual

	Warning - Electrical safety
	Warning – Potential consequences of use outside of intended application(s). Includes environmental condition warnings.
	Mandatory warning
	Warning to disconnect power
	Read carefully

3. Introduction

Thanks for your purchase of a BiANCO NXT PDP3 SOLAR pump solution.
No more external energy costs! Just harvest the sun to move your water.

The 3" helical rotor PDP3 can be installed down a bore, in a tank or fitted to a pontoon to supply from an open body of water. It provides a kitset solution that requires only moderate DIY skills to install and has little ongoing maintenance requirement.

While this kit is very simple, please read this manual fully and carefully before you start. Progressive Cavity / Helical Rotor pumps can produce extremely high discharge pressures and any electrical energy must always be treated with care. Stay safe and get the important details right so you can enjoy the benefits of your purchase.

4. Key Features and Protections

- Low voltage permanent magnet DC motor
- High efficiency MPPT and Vector Control
- Dry run protection from low level float
- Easy-to-install output side control from a float or (reverse acting) pressure switch
- Over-load protection
- Over-current protection
- Over-voltage protection
- Low-voltage protection
- Lost Phase protection
- Stall protection

Glossary of Electrical Terms	
Term	**Definition**
Voc (V)	Volts open circuit, nothing connected
Vmp or Vmpp (V)	Volts maximum power point, under load
Isc (A)	Amps short circuit
Imp or Impp (A)	Amps maximum power point
DC Power in Watts	Vmp x Impp

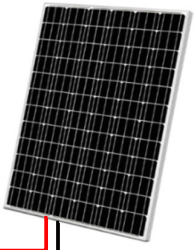
5. Warnings and Cautions

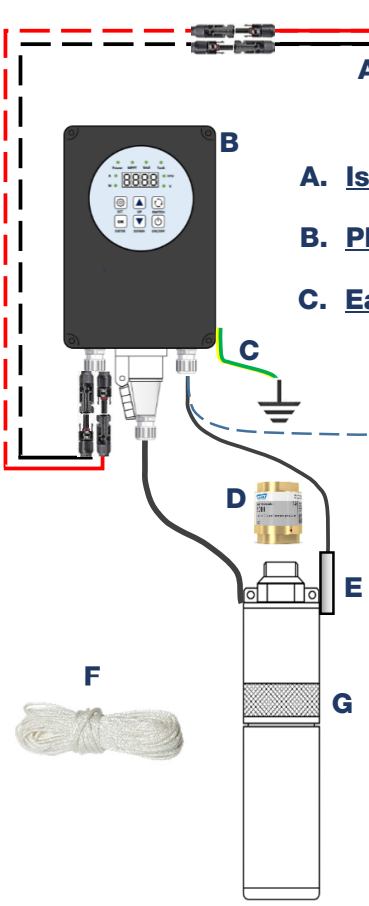
	Please read the manual fully and carefully before starting. Retain the manual for future reference.
	Solar panels create electrical energy when exposed to light. At all times, treat solar panels as live and handle with care.
	Any changes or modification to the wiring must be carried out by competent, skilled and suitably qualified personnel only.
	The PDP3 controller has internal capacitors that MUST be allowed to discharge before handling the motor. Allow 2 minutes for stored energy to dissipate before handling the pump/motor.
	Never open the cover while controller is connected to an electrical supply. Disconnect and allow 2 minutes for the internal electronics to discharge before opening the cover.
	The controller is IP65 rated but should not be exposed to direct sunlight. Install the controller where it has excellent ventilation away from direct sunlight or exposure to adverse weather.
	Solar arrays are an attractive earth path for lightning strikes. Ensure the panels and controller are well earthed.
	Helical rotor pumps must be used in a clean water, sediment-free environment. Even a small amount of sand may lead to screw wear, jamming or performance degradation.
	This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

6. Kit Contents and Technical Specifications

Solar Panels and their mounting system (where applicable) are supplied separately and come with their own instructions.

The Max Voc and Max Current (A) capabilities of the motor and the controller must always be respected. Fitting additional or incorrectly rated panels will cause serious harm or irreparable harm to the controller and motor voiding warranty.





A. **Isolator Switch** with M/F MC4 solar connecters.

B. **PDP3 Solar Controller** matched to suit the applicable pump model.

C. **Earth Strap** 2.5m long, 4mm^2. Connects externally to the

Optional: Float or Reverse Acting Pressure Switch

D. **Check/Non-return Valve** 1" BSPF.

E. **Low voltage, low water float** fitted with 30m cable to provide low water level protection.

F. **30m nylon safety rope**

G. **iSOLAR PDP3 helical rotor pump and motor** fitted with 30m 2.5mm^2 power cable including earth and supplied with a weather-proof 4 Pin (IP54 rated) plug. Outlet 1" BSPM.

Maximum Pump Submergence is 100m

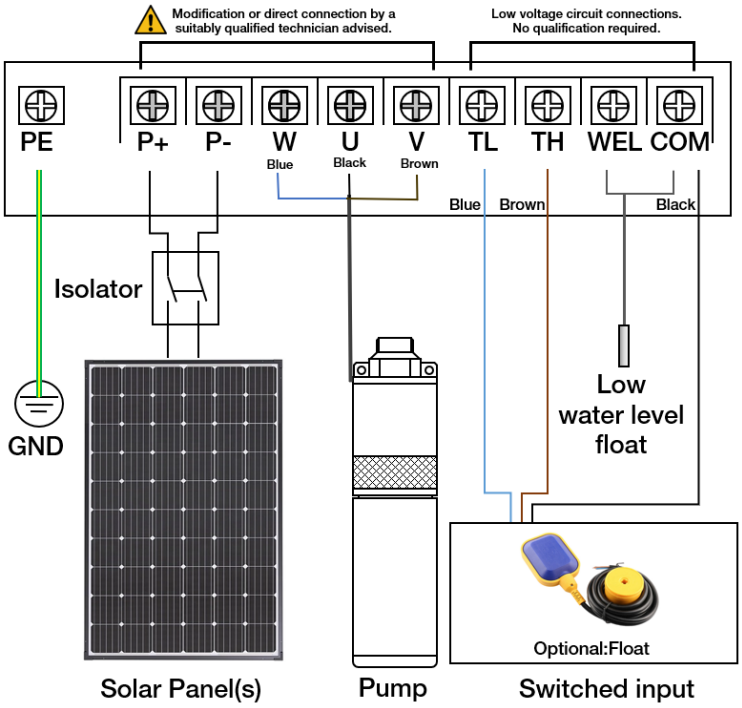
Model	Part No	Motor kW/hp	Hmax	Controller	Solar Array	Vmp	Max VOC	Max Amps
PDP3 250	808691	0.25kW / 1/3hp	60m	24V	1 x (400W)	18 – 40V	48V	15A
PDP3 370	808692	0.37kW / 1/2hp	80m	48V	2 x (400W) in series	40 – 76V	96V	15A
PDP3 750	808694	0.75kW / 1hp	140m	96V	3 x (400W) in series	80 – 150V	180V	15A

Solar array recommendation indicative only. Consult the pump curve to determine the input power required

Solar inputs must respect the Voc and Max Current (Amperage) values

7. Electrical Connections

Any electrical alterations or additional connections should be carried out by a suitably qualified technician. Isloate the controller before removing the cover to access the low voltage circuit connections. The controller is IP65 rated. It should not be exposed to direct sunlight. Install the controller where it has excellent ventilation and away from direct sunlight or exposure to adverse weather. Installation inside a separate open fronted enclosure is suggested.

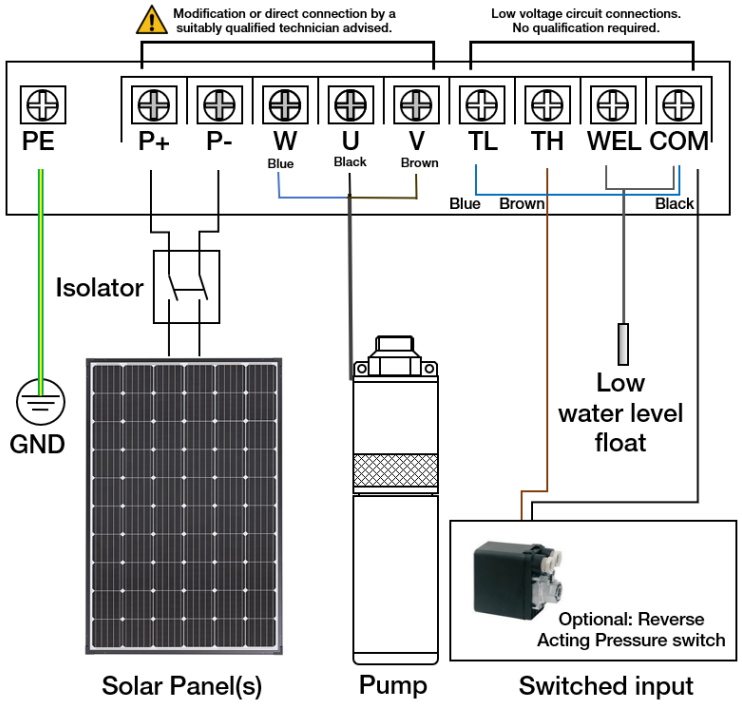


LOW-LEVEL FLOAT

Closed circuit to run

CONTROL FLOAT

Open circuit to run



REVERSE ACTING PRESSURE SWITCH

Open circuit to run

7. Electrical Connections cont.

Locate the solar array and the controller as close to your water source as possible.

PDP3 pumps consume only low levels of input power, so it is important that energy losses are minimised to ensure performance expectations are met.

808691 - BIA-PDP3 SOLAR250	**30m**	Total acceptable cable length per model, from panels to pump motor, when using 2.5mm² cable, to keep energy losses less than 10%
808692 - BIA-PDP3 SOLAR370	**51m**	
808694 - BIA-PDP3 SOLAR750	**96m**	

If intending to extend the power cable, use this chart as a guide. Exact cable size will vary according to the input characteristics and technical specifications of the solar panel. Calculations assume 5% loss.

Solar Panel Input					Cable length (Up to 'x' Meters)					
Watts	Panels	Max VOC	Vmpp	Amps	< 10	< 25	< 30	< 50	< 75	< 100
					CROSS SECTION MM²					
400	1 x 400	48V	35	10	2.5	2.5	2.5	6	10	10
800	2 x 400	96V	70	10	2.5	2.5	2.5	2.5	4	6
1200	3 x 400	150V	105	10	2.5	2.5	2.5	2.5	2.5	4

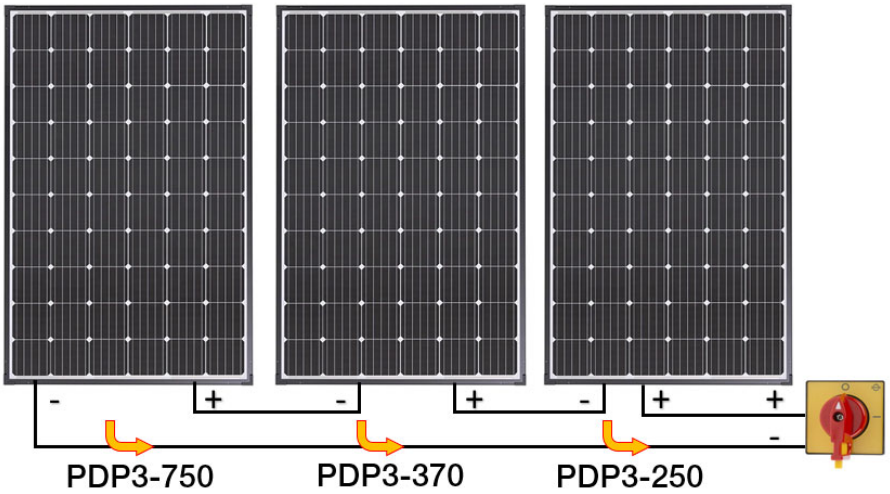
Total cable length measured from the solar array to the pump motor.

The Max Voc (V) and Max Current (A) capabilities of the motor and the controller must be respected.

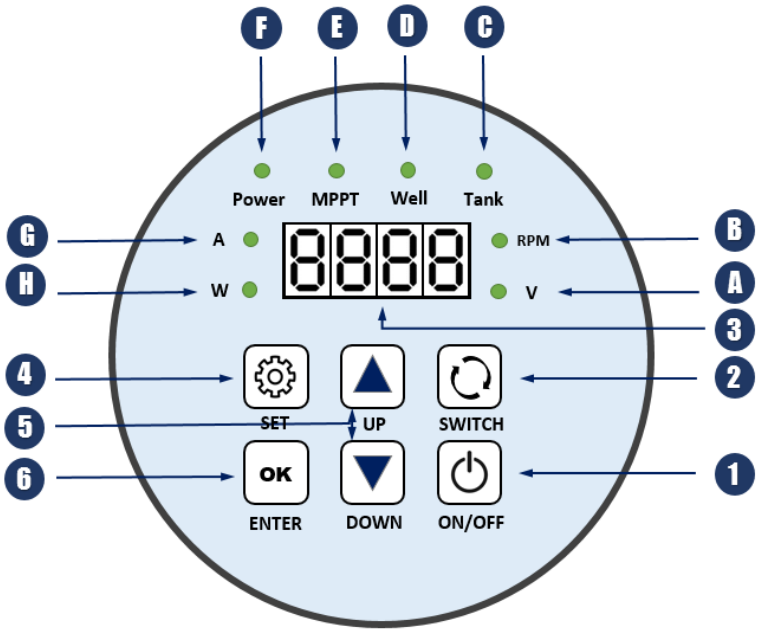
Fitting additional panels or incorrectly rated panels will cause serious harm or irreparable damage to the controller and motor voiding warranty

PDP3-250 power is supplied by a single panel.

PDP3 - 370 and 750 models - panels must be wired in series.



8. Display



Before turning the controller on, ensure the pump is completely immersed, that any isolators are switched on and flow control valves are open.

9. Display Functions Explained

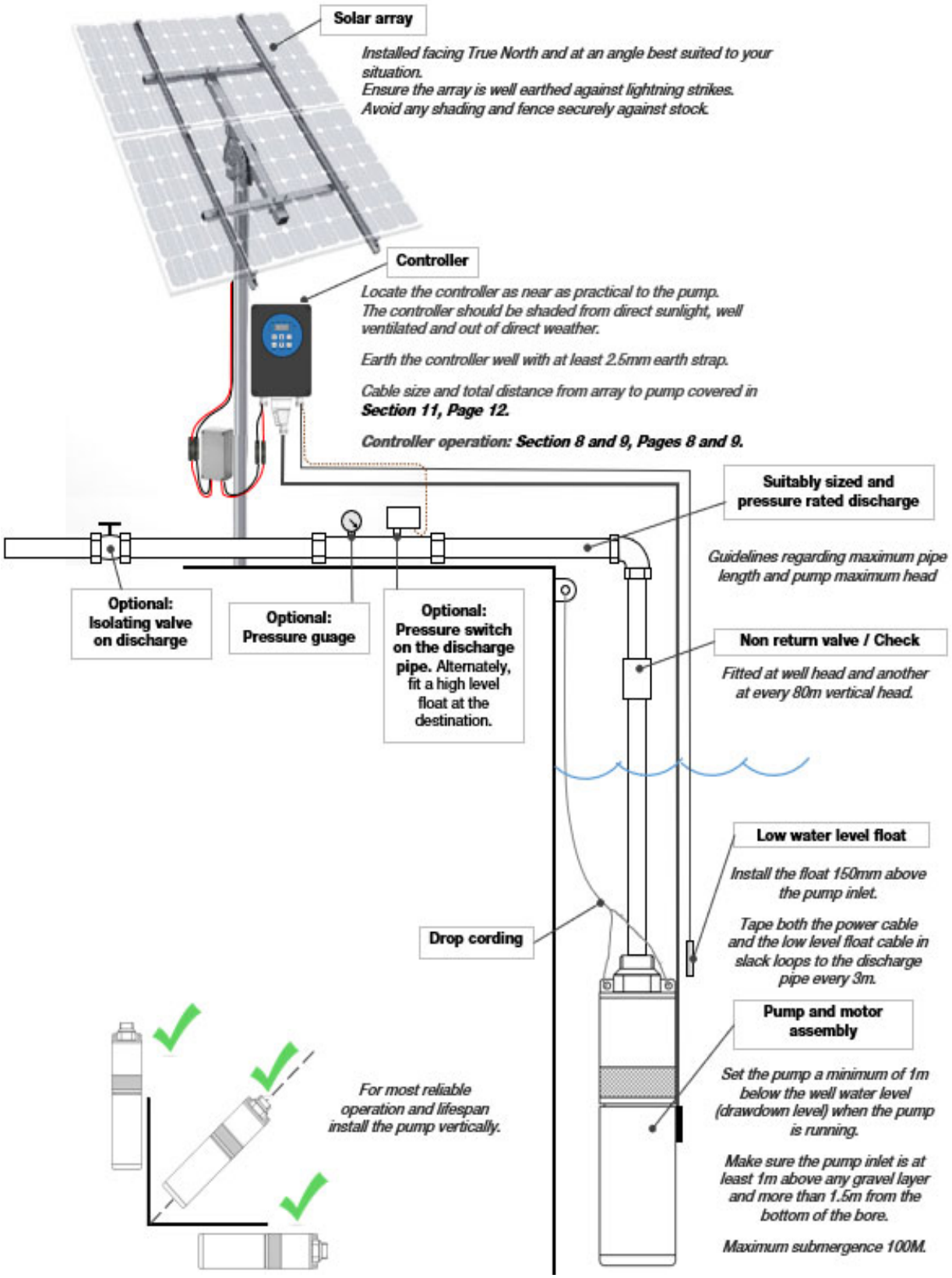
No.	Name	Function
1	ON/OFF	Press ON/OFF button to turn the pump controller on and commence operation. Press again to turn the pump controller off. *To see if the pump is running press SWITCH to display RPM*
2	SWITCH (Display Scroll)	Repeated presses scroll through real time operating values **Voltage / Pump Speed / Amperage / Wattage.** LEDs illuminate to show which value is displayed
3	DIGITAL DISPLAY	Displays alpha numeric fault codes and operating values
4	SET	Used to enter the programming mode
5	UP AND DOWN ARROWS	Used to increase or decrease program parameters
6	ENTER (OK)	Used to accept a programming change

A	VOLTAGE	**LED illuminated** – Display showing voltage value
B	RPM	**LED illuminated** – Display showing motor speed
C	TANK	**LED illuminated** – Pump operation suspended as the pressure side input indicates no water required. Associated with TL, TH and COM terminals.
D	WELL	**LED illuminated** – Pump operation suspended. Low level float indicates insufficient water. 10 min delay prior to restart. Associated with WEL and COM terminals. Also serves as a pump failure alarm indicator.
E	MPPT	**LED illuminated** – MPPT function active
F	POWER	**LED illuminated** – Input power available
G	AMPERAGE	**LED illuminated** – Display showing amperage value
H	WATTAGE	**LED illuminated** – Display showing wattage value

10. Alarm Parameters and Meaning

CODE	Fault Description	What to look for / Possible causes
P0	Hardware over-current	Motor and Controller mismatched Motor short circuit or cable damage
P43	Phase protection	Motor phase absence or U,V,W wiring issue
P46	Stall protection	Motor and Controller mismatch? The wet end may be jammed or connected incorrectly Disconnect from power, inspect and clean.
P49	Software over-current	Motor short circuit or cable damage
P50	Low Voltage protection	Input voltage is too low
P51	High Voltage Protection	Input voltage is too high
P48	Dry-run protection	Check the water level and ensure the pump is fully submerged
P60	High Temperature protection	Controller temperature is too high. Ensure the controller is installed away from direct sunlight, protected from the weather and adequately ventilated
PL	Power shortage or stall	Input power may be too low. The wet end may be jammed or connected abnormally. Disconnect from power, inspect and clean.
ALARM	Polarity error	Input power positive / negative wiring error

11. Installation



11. Installation cont.

White International shall not be held responsible for damage caused by improper installation, use of incorrect cable specifications, negligent or careless handling, lightning, improper voltage supply, corrosion due to impure water, wear caused by sand, gravel or other abrasives in the water being pumped.

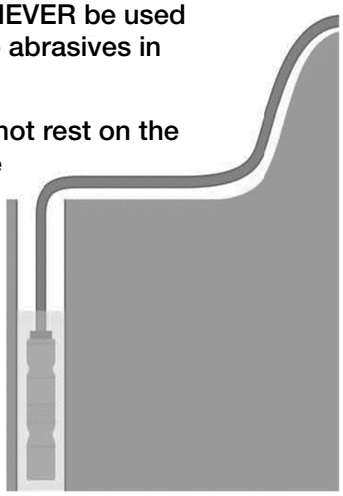
GENERAL PRECAUTIONS

- Never support the weight of the pump by the drop cable/safety rope or by the power cable. An unstrained safety rope must be connected to the bore pump suspended on poly pipe. This line should be fastened to the lifting hook of the pump. The other end should be fastened at the top of the bore casing/cap.
- The voltage shown on the nameplate of the controller and motor must match.
- Never install additional solar panels other than what has been supplied. The maximum and voltage and current specifications must be respected.
- Fit the low-level float to ensure the pump switches off should the water level fall to 150mm above the pump suction inlet.

  An absent or inactive low water level float will result in damage should the pump run dry voiding warranty.
- Water temperature has an impact on pump performance. Recommended water temperature of 10° to 40° C.
- A check valve is included with the kit. It must be installed on the pump outlet or at the well head. Additional check valves for heads greater than 80 metres may be necessary. These will reduce water hammer shocks to the pump.

Borehole installations

- Damage to the pump or motor caused by abrasive or corrosive water is not covered by the Warranty.
  To prevent damage to the pump by aggressive water, an analysis of the bore water should be carried out prior to installation to ensure pump suitability.
  Note: Sand content not to exceed 100g/m3 of water pumped.
- The bore must be clean before installation. A helical pump must NEVER be used to bail a new bore. Warranty does not cover failure or wear due to abrasives in the water.
- Know the total depth of the bore and ensure that the pump does not rest on the bottom or in sand. Ensure 1.5 metres clear below the pump to the bottom of the bore.
- Know the pumping level (drawdown level) of the bore and ensure that the pump remains submerged.
  Minimum water level should be 150mm above the pump inlet
- Never install borehole submersibles in a crooked bore without first lowering a gauge which is the same diameter and length as the pump to be used into the bore.
  If the gauge does not bind, it is safe to install the pump.

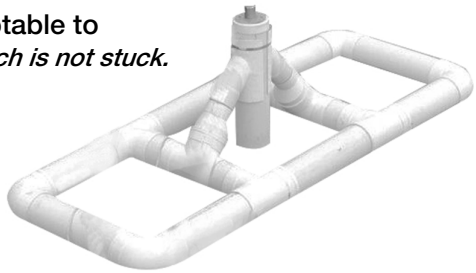


11. Installation cont.

In-tank installations

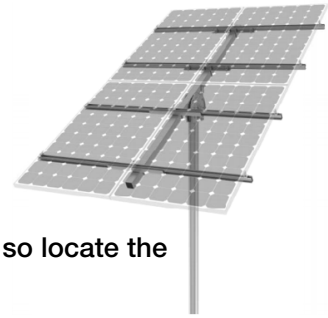
- The pump can be installed vertically or horizontally.
- Fit the non-return valve to the top of the pump.
- Rigid piping is recommended to prevent the pump twisting.
- Include a flushing or scour valve on the base of tank to enable periodic cleaning of the tank bottom to minimise silt build-up.

Pumping from an open body of water – Pond or Stream



- Vertical installation ensures best lifespan, but it is acceptable to sling the pump horizontally. *Ensure the low-level float switch is not stuck.*
- Ensure the water is drawn constantly from below the water surface and without contamination.
- A simple, buoyant method of mounting the pump is to build a pontoon from PCV fittings.

Solar Array



- The solar array must face True North.
- The solar panel angle should correspond to the latitude of the site. Consult the instructions supplied with the solar array to assist your decision regarding the best angle for your situation.

As a rule of thumb, solar panels should be more vertical during winter to gain more of the low winter sun, and flatter during summer to maximize the output.

- Any shading whatsoever will reduce the solar panel(s) performance so locate the panels with this in mind.
- Clean the panels periodically to remove dust and bird droppings.
- Ensure the array is earthed to ground in the event of lightning strike.
- Protect the array and controller from stock.

Low voltage low water level float (closed circuit to run)

- The low-level float MUST be fitted to prevent the pump running dry.
- The low-level float must be a minimum of 150mm above the pump inlet.
- If the float shuts the pump down due to a lack of water, the LED on the controller labelled 'WELL' will illuminate.
  When the water level rises the pump will restart after a **10-minute delay.**

Low level float-switch cable lengthening

To ensure the strongest electrical signal and to prevent possible interference, White International **recommend the joint is soldered.**

Appropriate heat shrink tubing must be used to insulate wires and prevent moisture ingress.

Controller and DC input power isolator

- Install the controller where it is shielded from adverse weather and out of direct sunlight. Mounting in the lee of the array or inside an additional enclosure is recommended.
- Earth the controller body to ground.

11. Installation cont.

Pressure pipe selection

Helical rotor type pumps such as the PDP3 are able to generate very high pressures, particularly if they continue to operate in a no-flow situation.

Where practical, an open loop system is desirable.

Model	Hmax	Approx. pressure Bar/PSI
PDP3 250	60m	5.7 / 82.6
PDP3 370	80m	7.8 / 113.1
PDP3 750	140m	13.7 / 198.7

- Select and use suitably pressure rated water delivery piping.
- It is strongly recommended to fit a switching device to the delivery line to prevent closed head operation.

Pressure pipe sizing

The PDP3 range has a maximum output flow of 25 lpm so the resulting pipe friction losses are low. The correct pipe sizing allows for the possibility of very long delivery piping.

The following table is a 'worst possible case' example. The pressure loss values per 100m of pipe length are for 16 bar rated pressure supply pipe at 25lpm.

Pipe size	Friction loss per 100m of pipe at 25 lpm	If unsure, increasing the pipe size by one size will result in a substantial reduction to the pipe friction losses.
MD**25**PN16	14.60m	
MD**32**PN16	4.55m	
MD**40**PN16	1.56m	
MD**50**PN16	0.53m	

Note this table does not automatically infer the need to use 16 bar pressure rated pipe.

Optional switching

- An input connected to TL/TH and COM terminals allows the user to fit some form of switch such as a float in the destination tank to turn the pump off when the tank level has risen. Alternately, by fitting a double acting ballcock to the tank inlet a suitably adjusted pressure switch will turn off the pump when the ballock closes (tank full) and the pipe pressure rises. This circuit must be OPEN to run.
- When the switch circuit stops the pump running, the LED on the controller labelled 'TANK' will illuminate. When the float or pressure switch circuit opens again pump operation will re-commence immediately.

12. Operation summary

- Ensure all electrical connections are joined correctly and there are no bare wires.
- Ensure any output valves fitted to the system are open.
- Check the DC input isolator is switched on.
  The 'POWER' LED will illuminate when there is power available.

1. Press the ON/OFF button to commence operation.

The controller assesses the available energy. If the minimum threshold is met the pump will start immediately. To check whether the pump is running, press SWITCH to display RPM.

The controller varies the pump running speed and therefore flow output depending on the energy available. Default RPM is 3600.

2. Repeated presses of the controller SWITCH button allows the user to cycle through the Voltage, Pump speed (RPM), Current (Amperage) and Input Power (Wattage) parameters. The LEDs to the left and right of the display will illuminate to indicate which parameter value is displayed.

The controller employs MPPT and Vector control to achieve maximum efficiency. Solar energy changes constantly especially on cloudy days. The display values will be constantly changing as the pump adjusts to optimise the output based on the available input power.

Note that the wattage value indicates what the pump is currently consuming. It is not a measure of solar array output. It is normal that the values are constantly changing.

3. Pressing the INCREASE and DECREASE buttons will alter the maximum pump RPM in set intervals of 4000 / 3600 / 3000 / 2400. The controller will not store this change. Once the power cycles the controller returns to its default setting (3600 rpm).

4. If the low water level float circuit shuts the pump down (CLOSED circuit to activate) due to a lack of water, the LED on the controller labelled 'WELL' will illuminate. When the water level rises again the pump will restart after a 10-minute delay.

5. Should the output switch circuit (float or pressure switch if fitted) stop the pump running, the LED on the controller labelled 'TANK' will illuminate. Pumping will re-commence immediately when the float or pressure switch circuit opens again.

6. If for any reason the pump has a fault, or the unit is protecting itself, the controller will display the appropriate alarm code. The codes are listed in Section 10, Page 9.

7. To suspend operation, press the ON/OFF button on the controller.

13. Warranties – Terms and Conditions

This warranty is given in addition to the consumer guarantees found within the Australian Competition and Consumer Act 2010 (Cth) for goods purchased in Australia and the Consumer Guarantees Act 1993 NZ for goods purchased in New Zealand:

1) White International Pty Ltd / White International NZ Ltd (White International) warrant that all products distributed are free from defects in workmanship and materials, for their provided warranty period as indicated on the top or opposite side of this document. Subject to the conditions of the warranty, White International will repair any defective products free of charge at the premises of our authorised service agents throughout Australia and New Zealand if a defect in the product appears during the warranty period. If you believe that you have purchased a defective product and wish to make a claim under this warranty, contact us on our Sales Hotline on 1300 783 601, or send your claim to our postal address or fax line below and we will advise you as to how next to proceed. You will be required to supply a copy of your proof of purchase to make a claim under this warranty.

2) This warranty excludes transportation costs to and from White International or its appointed service agents and excludes defects due to non-compliance with installation instructions, neglect or misuse, inadequate protection against the elements, low voltage or use or operation for purposes other than those for which they were designed. For further information regarding the suitability of your intended application contact us on our Sales Hotline on 1300 783 601. If you make an invalid claim under this warranty, the original product will be sent back to you unrepaired.

3) This warranty refers only to products sold after the 1st January 2012, and is not transferable to another product type and only applies to the original owner, purchaser or end user, and is in addition to the consumer guarantees found within the Competition and Consumer Act 2010 (Cth) for goods purchased in Australia and the Consumer Guarantees Act 1993 (NZ) for goods purchased in New Zealand.

4) Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure. 2 YEAR WARRANTY

5) To the fullest extent permitted by law, White International excludes its liability for all other conditions or warranties which would or might otherwise be implied at law. To the fullest extent permitted by law, White International's liability under this warranty and any other conditions, guarantees or warranties at law that cannot be excluded, including those in the Competition and Consumer Act 2010 (Cth), is expressly limited to: (a) in the case of products, the replacement of the product or the supply of equivalent product, the payment of the cost of replacing the product or of acquiring an equivalent product or the repair of the product or payment of the cost of having the product repaired, is at the discretion of White International or a 3rd party tribunal elected under the Competition and Consumer Act 2010 (Cth) for goods purchased in Australia and the Consumer Guarantees Act 1993 (NZ) for goods purchased in New Zealand; and

6) To the fullest extent permitted by law, this warranty supersedes all other warranties attached to the product or its packaging.

7) In the case of services, supplying the services again or the payment of the cost of having the services supplied again, is at the discretion of White International or a 3rd party tribunal elected under the Competition and Consumer Act 2010 (Cth) for goods purchased in Australia and the Consumer Guarantees Act 1993 (NZ) for goods purchased in New Zealand.

8) Our warranty commences from the date of purchase of the above-mentioned pumps. Proof of purchase is required before consideration under warranty is given.

Record your date of purchase in the space below and retain this copy for your records.

Date of Purchase .....**Model Purchased** .....

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