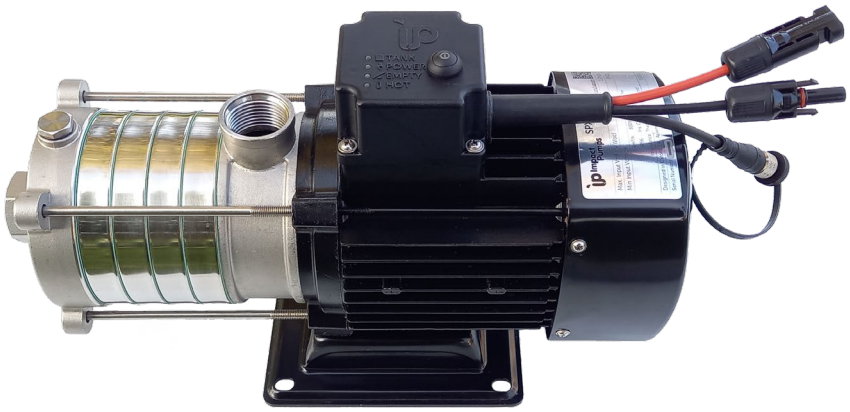
SolarPlex SPX-800-5

User Guide



To access further support, including in other languages such as:

- Français,
- Español,
- Português,

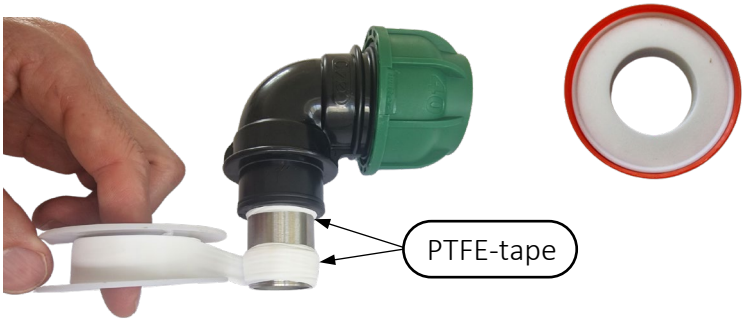
Visit www.impactpumps.com/support or scan this code:

V2.4 10th Aug 2024

SolarPlex SPX-800-5

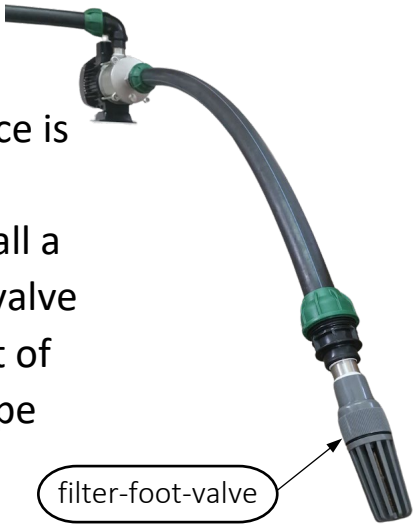
Quick Start Guide

1 Seal the pipe connectors into the pump threads using PTFE-tape



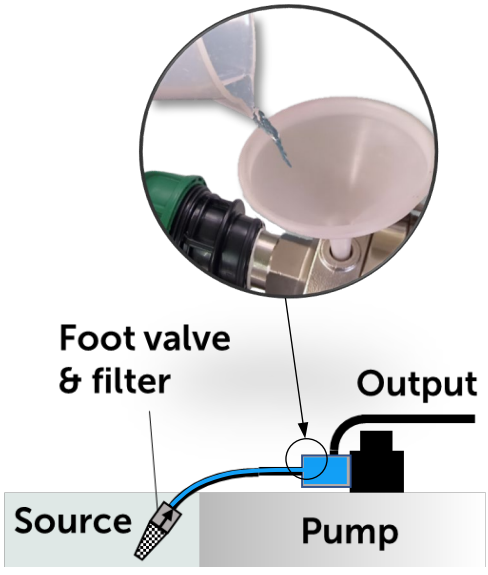
2 Attach the pipe

3 If the water source is below the pump, install a filter-foot-valve on the inlet of the inlet pipe

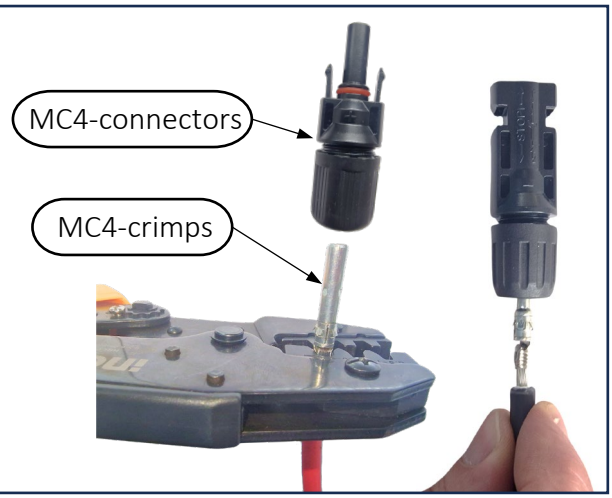


4 ⚠ **VERY IMPORTANT**

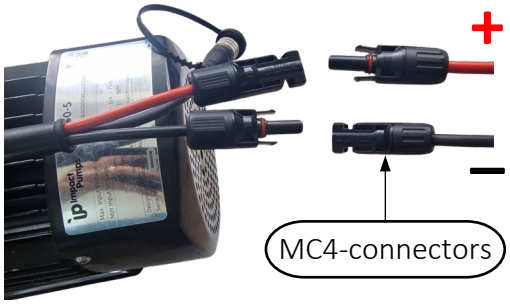
Prime the pump and inlet pipe completely full with water



5 Use pliers to crimp the wires to the MC4-crimps. Then push the crimp into the plastic MC4-connectors until a click can be heard and the wire cannot be pulled out. Then tighten the nut.



6 Connect the PV panels to the pump with the MC4-connectors



The open-circuit PV panel voltage (Voc) should be less than 105V. For maximum pump power, the PV panel maximum power voltage (Vmp) should be greater than 72V under standard test conditions, i.e. a PV panel temperature of 25 °C.

7 Press the button to turn the pump off or on

8 Squeeze the barbed tabs as shown to disconnect the MC4 connectors

Please refer to page 15 for any troubleshooting

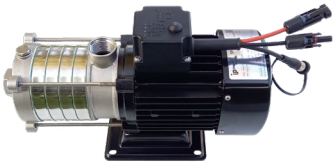
SolarPlex SPX-800-5

Overview

The SolarPlex SPX-800-5 is a horizontal 5-stage centrifugal surface pump designed for solar and other DC-powered applications. It features integrated advanced MPPT and Field-Oriented motor control and is fully scalable for power inputs from 100W-800W, setting a new benchmark in PV-powered water pumping. The SPX-800-5 also features overspeed, overheat and locked-rotor protections as standard, with optional level sensor inputs for shallow well and tank applications. The suction lift of the SPX-800-5 can be extended from 7m to up to 60m with Impact Pumps' FlexExtend range of Suction Lift Extenders.

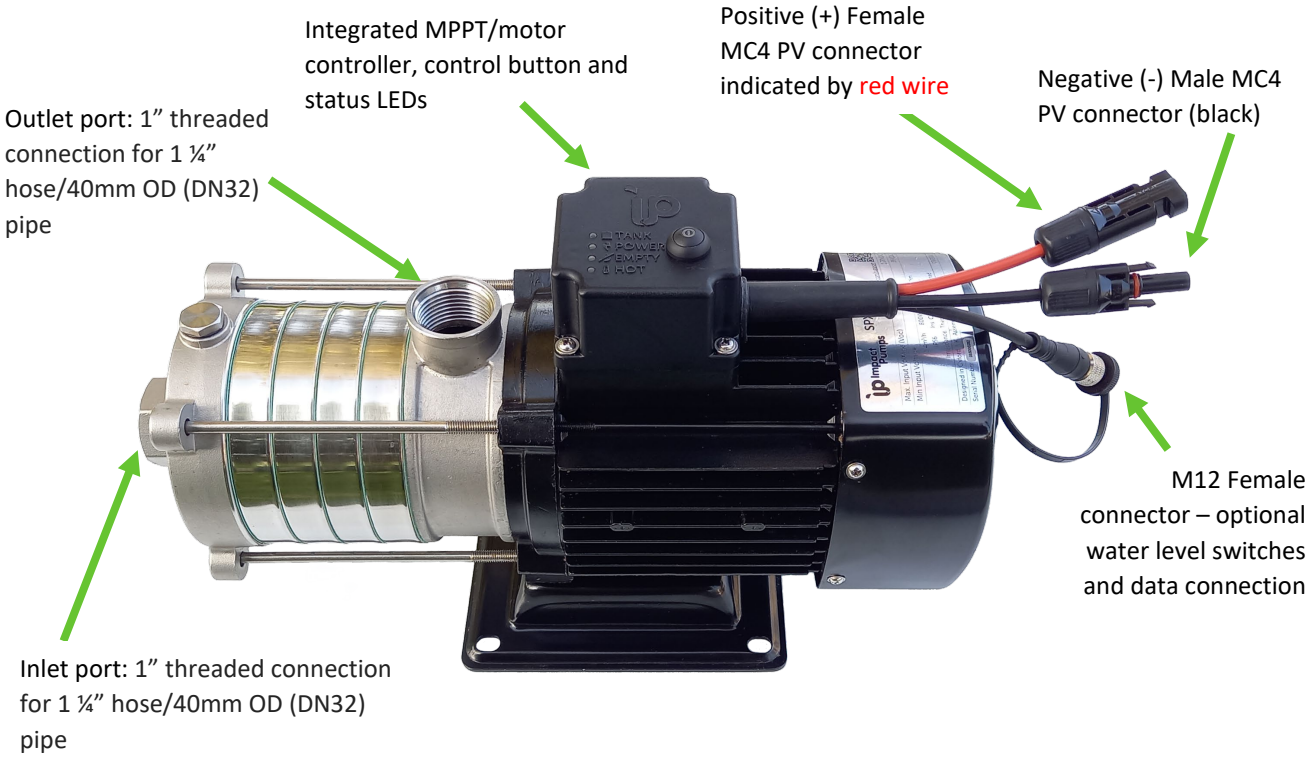
Contents

1. Introduction



This guide explains how to operate the SolarPlex SPX-800-5 solar powered surface pump. Please ensure all installation requirements are met as per our warranty terms and manufacturers' guidance notes. Correctly operated, the SolarPlex SPX-800-5 has been designed to give years of trouble-free service and peace of mind.

2. Ports and electrical connections

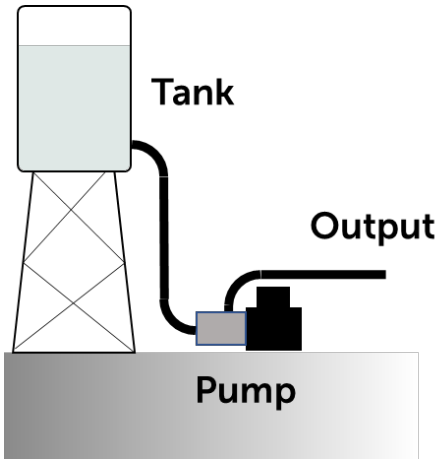


SolarPlex SPX-800-5

WARNING! ISOLATE ALL ELECTRICAL POWER CONNECTIONS BEFORE PRIMING. DO NOT OPERATE THE PUMP WITHOUT WATER INSIDE THE PUMP CHAMBER.

3. Pumping from a closed tank[1]

(e.g. domestic water supply)

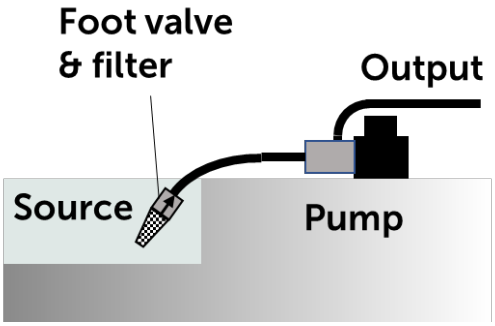


- Ensure the inlet pipe/hose is free from leaks and filled with water at all times;
- Ensure the outlet pipe/hose is raised above the SolarPlex where possible;
- Protect the SolarPlex from direct sunlight where possible.

The SolarPlex SPX-800-5 can be used to lift water from up to 60m below in combination with Impact Pumps' FlexExtend range of Suction Lift Extenders. For further information, please consult www.impactpumps.com/the-flexextend/.

4. Pumping from an open water source[2]

(e.g. a lake, pond, river or shallow well)



- Locate the SolarPlex as close to the water level as possible in a dry location with no risk of flooding/partial immersion;
- Connect the inlet port to a foot valve and inlet filter (purchase separately);
- Ensure the inlet pipe/connections are free from leaks;
- Locate the inlet end below the waterline;
- Protect the SolarPlex from direct sunlight where possible.

[1] In applications where the water source is located **above** the pump e.g. in a tank, as shown, a foot valve is not required. Note: This section also applies to deep-water lifting in combination with Impact Pumps' FlexExtend range of Suction Lift Extenders. For further information, please refer to the SolarPlex Extend User Guide at https://www.impactpumps.com/support/

[2] In applications where the water source is located **below** the pump e.g. in a shallow well, as shown.

5. Setup and priming

The pump should be primed full of water before use. The small priming port on top of the pump (shown to the right) may be used.
In closed tank applications, with positive pressure on the inlet port, the pump may be primed through the inlet port instead. In this case, trapped air should be released through the priming port. In open water source applications with negative pressure at the inlet (drawing water from below), the pump should be primed by filling with water through the priming port, as shown.

THE INET PIPE MUST ALSO BE FULL AND FREE OF AIR. Any air locks in the inlet pipe must be removed prior to start up. In open water source applications with negative inlet pressure, fitting a non-return valve (foot valve) to the inlet hose (directly coupled to an inlet filter as shown below), will help to avoid further air locks after priming provided the inlet is submerged below the water line.

If you are pumping from an open water source like a river or pond you will need to install a foot valve with filter on the inlet of the inlet pipe. This prevents the pump becoming blocked with debris as well as keeping the inlet pipe full of water while priming the pump full of water.:

The SolarPlex SPX-800-5 is supplied with **1" BSP (G1") Female** threaded inlet and outlet ports. These should be connected to your application with **40mm OD pipe or 1¼" hoses** using standard full-bore pipe fittings, purchased separately. For information on Impact Pumps' latest range of surface accessories, see www.impactpumps.com/solarplex.

SolarPlex SPX-800-5

6. Electrical power input connections

Once the SolarPlex SPX-800-5 inlet and outlet connections have been made and the pump has been primed, it may be connected to a PV array or another suitable DC power supply.

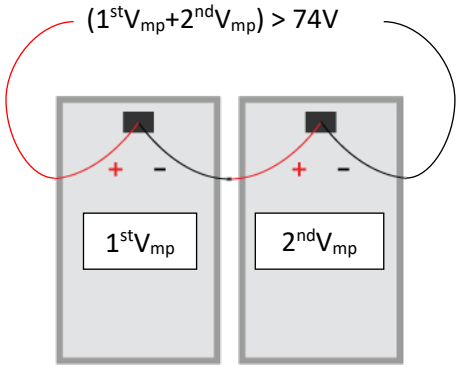
WARNING! ENSURE THAT ALL CONNECTORS ARE CLEAN AND DRY.
THE POWER SUPPLY VOLTAGE SHOULD NOT EXCEED 105V.
Note: Red sleeved lead connections are 'positive'

Connect PV panels to the NEG (negative) and POS (positive) terminals. The SPX-800-5 is provided with standard MC4 solar connectors as shown in section 2 on page 4. The open-circuit PV panel voltage (Voc) should be less than 105V. For the pump to deliver maximum power the maximum power PV panel voltage (Vmp) should be greater than 66V under standard test conditions (STC), i.e. a PV panel temperature of 25°C. In air temperatures of 25°C -30°C PV panels will heat up in the sun to between at 50°C-60°C and so will produce 10-15% less voltage than under standard test conditions, i.e. a PV panel temperature of 25°C. Therefore Impact Pumps Recommends using panels with a combined rated Vmp of at least 74V, please consult the IMPACT PUMPS SPX-800-5 datasheet for further detials.

When the PV panels are connected, the POWER LED light on the pump controller box will show constant amber and the pump will auto-start after 5 seconds. The pump will initially start in default 800W maximum power mode, and the POWER LED light will show constant blue.

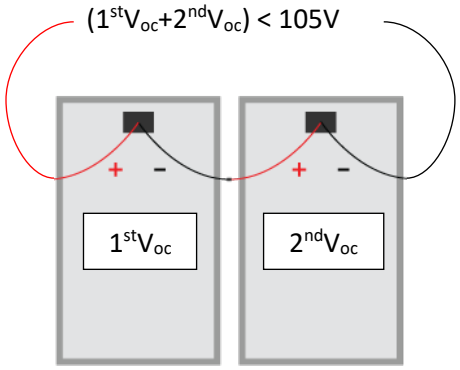
Minimum **Vmp** Voltage
To deliver the full 800W of power to the SolarPlex, the PV panels should have a combined maximum power voltage under standard tst conditions (STC V_{mp}) of more than 74V. This is likely to require at least 2 panels, connected in series as shown.

For the minimum input voltage needed to obtain lower power ratings, please consult the IMPACT PUMPS SPX-800-5 datasheet.



Maximum **Voc** Voltage

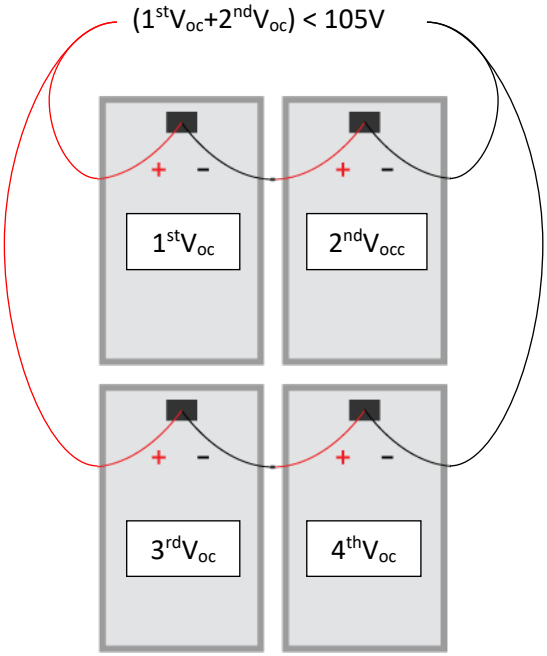
The total **sum** open circuit voltage (V_{oc}) **of any PV panels wired in series should always be** less than 105V. If the Voc is higher than 105V the overvoltage protection will stop the pump from running, The two panels shown in this diagram are wired in series.



Tip: Parallel Wiring

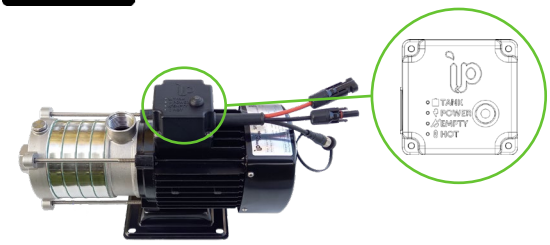
There is no limit to the number of PV panels that can be wired in parallel to the SolarPlex. Parallel wiring increases available current and not voltage. The SolarPlex SPX-800-5 automatically limits the maximum current drawn from the PV panels to within the safe limit of 15A or 800W.

For example, if all the voltages of the 4 panels shown in this diagram are the same then the voltage of the 3rd and 4th PV panels would not add any extra voltage to the total sum open circuit voltage of the 1st and 2nd panels. Instead, the 3rd and 4th panels will add to the available current and power up to the safe automatic limit set by the pump.

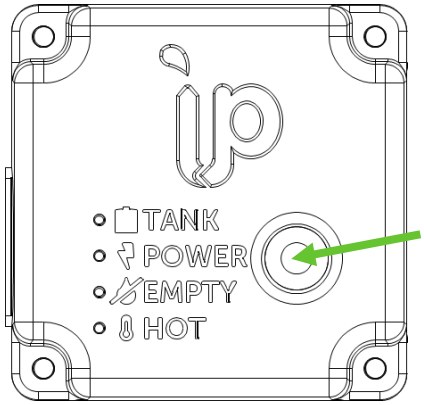


7. Connecting, stopping and starting the pump

WARNING! ISOLATE OR COVER PV PANELS WHEN CONNECTING THE PUMP. ENSURE ALL MECHANCIAL AND ELECTRICAL CONNECTIONS HAVE BEEN FITTED SECURELY BEFORE UNCOVERING PANELS OR SWITCHING ON POWER SUPPLY.



The control button and status LED lights can be found on the motor controller box as shown.

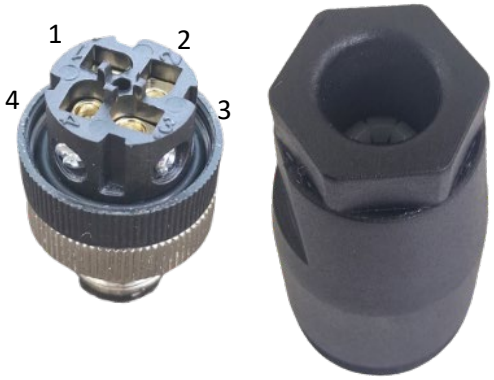


Once a power connection is made, the SolarPlex SPX-800-5 will automatically start in its default MPPT mode, operating at the maximum power available from the connected PV array or power supply up to a maximum rated power of 800W. To **stop and start** the pump, short-press the control button indicated (for up to 2 seconds). For further information on alternative operating modes and LED light display information, refer to sections 9 & 10.

SolarPlex SPX-800-5

8. Level switches and data communications

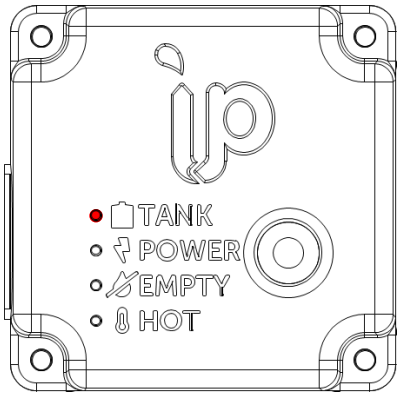
The SPX-800-5 is fitted with a standard 5-pin Female M12 connector which allows for optional connection to up to two level switches using a mating SolarPlex M12 Switch Adapter (SPX-SA) which is available separately from Impact Pumps for those customers wishing to install level sensing. If left disconnected (open circuit), the SPX-800-5 will default to running unless stopped with the control button (see section 9). The dust cap provided should be used to prevent short circuits if level sensing and data readout are not required. Pins 1 to 4 are for level sensing, the 5th pin on the M12 Female Connector provides a data connection for use with the SolarPlex Data Logger (SPX-Log) or the SolarPlex PAY-Earn controller (SPX-PAY-Earn). If you require data logging, contact your dealer for further information.



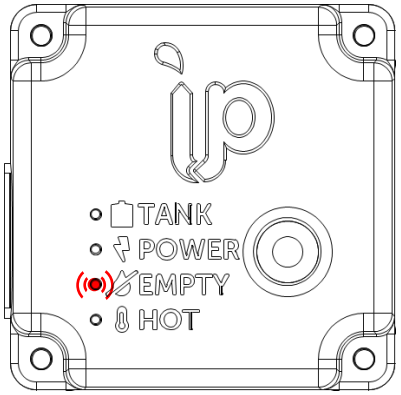
SolarPlex M12 Switch Adapter Screw Terminals

The SolarPlex M12 Switch Adapter (SPX-SA) is shown in the image above, the terminals are labelled on the adapter

1. Pump stops and TANK when the water level switch connects terminals 1 & 4
2. Pump stops and EMPTY when the water level switch connects terminals 2 & 3



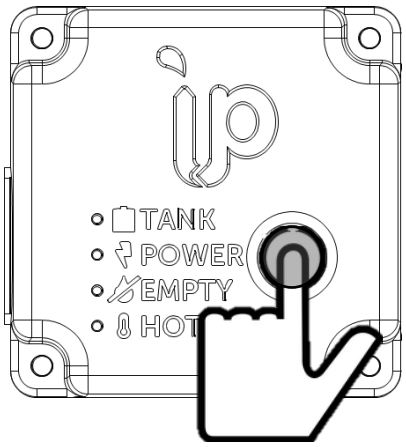
TANK full water level sensor
If screw terminal 1 of the M12 Switch Adapter is connected to screw terminal 4 by a Normally Open (NO) water level switch or otherwise, the pump will stop and the TANK LED light will show constant red. This channel may be used (for example), to stop the pump if it is delivering to a full tank.



EMPTY tank or well water level sensor
If screw terminal **2** of the M12 Switch Adapter is connected to screw terminal **3** by a Normally Open (NO) water level switch or otherwise, the pump will stop and the EMPTY LED light will flash red. This channel may be used to stop the pump if it is drawing water from a tank or well if the level descends too low.

9. Control button actions

The SolarPlex SPX-800-5 may be stopped, started or operated in "power limited modes" using the control button on the integrated MPPT/motor control box.



1 short-press (up to 2 seconds) will stop the pump. The POWER LED light will change from constant **blue** to constant amber (POWER).

When stopped, 1 short-press (up to 2 seconds) will start the pump. It will start in its default 800W Maximum Power mode unless a power limited mode has previously been selected and saved to memory. In this mode, the POWER LED light will show constant blue.

Power limited modes

In some applications[3], it may be useful to limit the power of the SolarPlex SPX-800-5. For example, if a large solar array is used to benefit from good performance at the ends of the day or in cloud and;

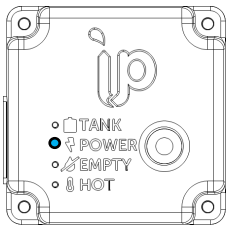
- your water source is routinely running dry and/or unable to yield the daily volumes that the SolarPlex SPX-800-5 can pump in the middle day;
- the SolarPlex SPX-800-5 is delivering to a system that may be damaged by its high (75m) maximum output head at 800W input power;
- the SolarPlex SPX-800-5 is delivering to a system that may be damaged by its high (5.4 m^3/h) maximum output flow rate at 800W input power;
- you don't need the high daily volumes that the SolarPlex SPX-800-5 can deliver and wish to prioritise maximising the service life of your system;

you may consider limiting its power rating[4] to a lower maximum level than 800W.

[3] When operating in combination with Impact Pumps' standard FlexExtend model (**SLX-40-S)**, the SolarPlex SPX-800-5 should be operated in 600W maximum power mode or lower to avoid unnecessary safety valve actuations. The SolarPlex SPX-800-5 can be operated at any power level in combination with the High-Flow FlexExtend (**SLX-40-HF).**

[4] Note that the SolarPlex will automatically switch into Maximum Power mode and continue to extract as much power as possible from your PV solar array or DC power source (up to a limit of 800W) when the power available drops below its set power limit in power limited modes.

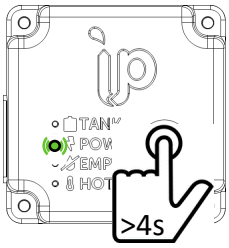
SolarPlex SPX-800-5



Default 800W Maximum Power mode

In the default setting, the POWER LED light shows constant blue, to indicate that the pump is running at full power and will accept up to 800W of electrical power input when available.

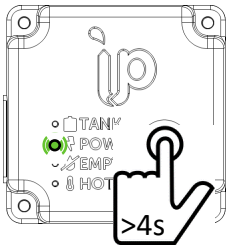
↓



100W maximum power mode

Push and hold the control button once for at least 4 seconds to enter 100W power limited mode. In this mode, the POWER LED light will intermittently show one green flash.

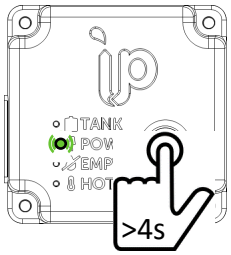
↓



200W maximum power mode

Push and hold the control button again for at least 4 seconds to enter 200W power limited mode. In this mode, the POWER LED light will intermittently show two green flashes.

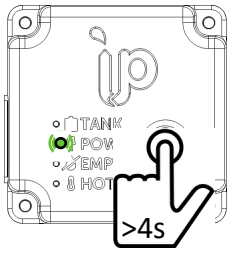
↓



300W maximum power mode

Push and hold the control button again for at least 4 seconds to enter 300W power limited mode. In this mode, the POWER LED light will intermittently show three green flashes.

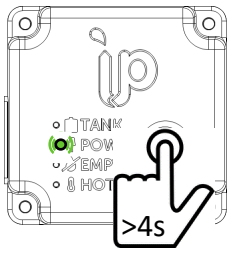
↓



400W maximum power mode

Push and hold the control button again for at least 4 seconds to enter 400W power limited mode. In this mode, the POWER LED light will intermittently show four green flashes.

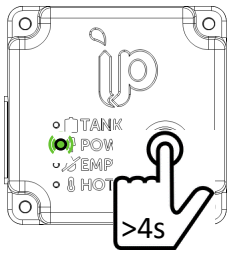
↓



500W maximum power mode

Push and hold the control button again for at least 4 seconds to enter 500W power limited mode. In this mode, the POWER LED light will intermittently show five green flashes.

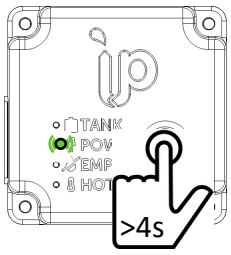
↓



600W maximum power mode

Push and hold the control button again for at least 4 seconds to enter 600W power limited mode. In this mode, the POWER LED light will intermittently show six green flashes.

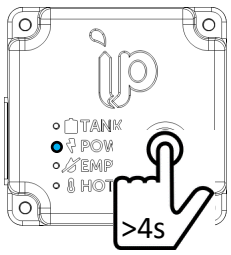
↓



700W maximum power mode

Push and hold the control button again for at least 4 seconds to enter 700W power limited mode. In this mode, the POWER LED light will intermittently show seven green flashes.

↓



Return to default 800W Maximum Power mode

Push and hold the control button once more for at least 4 seconds to return to the default maximum power output mode. In this mode, the POWER LED light will once again show constant blue.

Tip: To remove a reduced power limit from the pump quickly, simply push and hold the button down until the POWER LED light turns from green to blue[5].

WARNING: POWER LIMITED MODES ARE ONLY SAVED TO MEMORY AFTER 4 MINUTES OF OPERATION. IF POWERED DOWN SOONER, THE PUMP WILL RESTART IN DEFAULT 800W MAXIMUM POWER MODE OR THE PREVIOUSLY SAVED MODE IF THERE WAS ONE.

[5] i.e. you do not have to scroll through the power limits to return to the default setting.

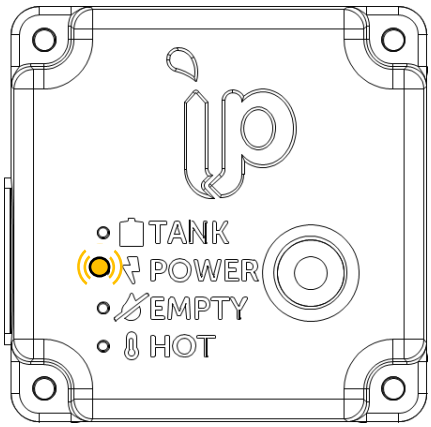
SolarPlex SPX-800-5

10. Pump reset and protection features

The SolarPlex comes with an innovative controller board with reset and protection features. The board will respond to various circumstances that could be dangerous or cause damage. LED lights denote different pump protection modes.

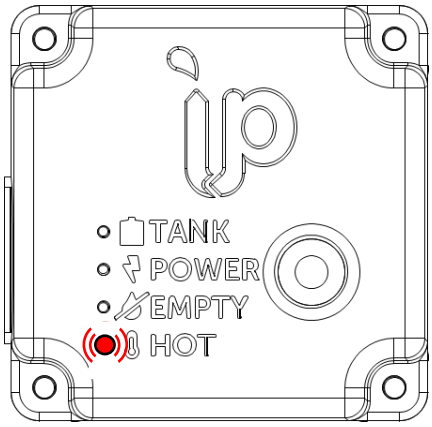
If the pump stops but no error code is displayed by the LED lights, this indicates power supply interruption or overspeed due to trapped air or dry-running. If this occurs, isolate the pump and bleed air or re-prime it through the priming port (see section 5). Check all electrical connections before attempting to re-start.

Low power warnings

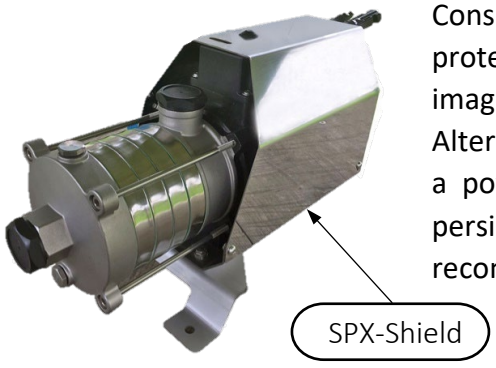


Input power too low. The POWER LED light will flash amber once every two seconds. **All other LED lights will be off.** This may indicate that the maximum-power voltage (V_{mp}) of the PV array or power supply is too low or that sunlight levels are too low for your pump to operate.

Temperature warnings

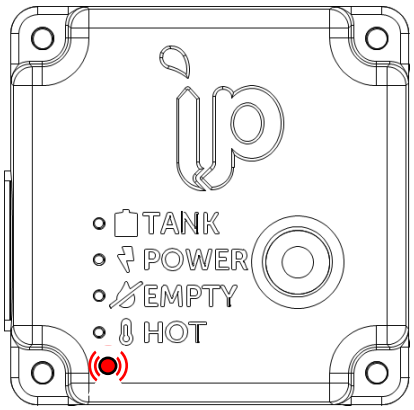


Pump too hot: The HOT LED light will fast-flash red, on and off for equal durations, two times every second. The pump will stop running and wait for the pump to cool down and then auto-restart. The SolarPlex SPX-800-5 is actively fan cooled and will turn itself off to prevent damage if the power electronics temperature exceeds 85°C or the internal motor windings exceed 100°C. These high temperatures will only occur if the pump is left in direct sunlight, without shading, in a hot climate and while running at high power.



Consider providing shading, for example by installing the protective SolarPlex Shield (SPX-Shield) shown in the image on the left which is available from your distributor. Alternatively, move the pump to a cooler location or select a power limited mode (see section 9). If the problem persists, disconnect power, wait several minutes and reconnect.

Input Power Warnings!

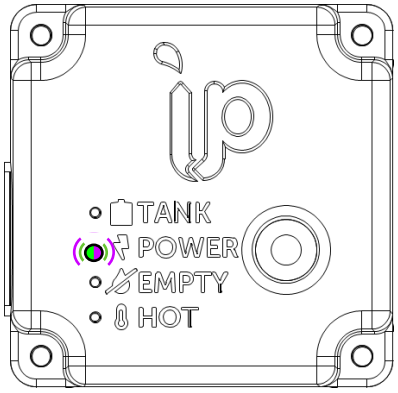


Input voltage TOO HIGH The POWER LED light will fast-flash red, on and off for equal durations, two times every second. This may indicate that the open-circuit voltage (Voc) of the PV array or power supply is too high. Immediately isolate or disconnect to avoid damage to equipment and refer to section 6 of this guide.

Input current TOO HIGH The POWER LED light will intermittently show **2** red flashes. This may indicate a short circuit of the electronics. Immediately isolate or disconnect to avoid damage to equipment. Remove the pump and inspect the wiring for damage.

Motor current TOO HIGH The POWER LED light will intermittently show **3** red flashes. This may indicate a short circuit in the motor electronics. Immediately isolate or disconnect to avoid damage to equipment. Remove the pump and inspect the motor for any damage.

Non-user serviceable error codes



Error codes shown by intermittent green and purple flashes of the POWER LED light are not user serviceable. Nonetheless, they may indicate faulty data communications, if relevant. If any LED colour or flashing codes appear which are not listed here, please make a careful note of which LED is showing an error warning, their colour and the flashing sequence of the warning including the duration of any flashes

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11. Quick Troubleshooting Guide

Problem		Solution	Further Details:
Pump	all lights are off	Check the PV panels and wires are correctly wired and supply more than 30V	Page 2
does	TANK	Check if the tank is full then disconnect the tank water sensor and replace if broken or damaged	Page 9
not	POWER	Disconnect the power supply, reduce the voltage and read page 14 for further details	Page 14
run	POWER only	Check the voltage is high enough then press the button	Page 13
and:	POWER	If disconnecting then reconnecting the power supply does not help, please contact your distributor or Impact Pumps using the link below	Page 14
	EMPTY	Check if the water inlet is full then disconnect the EMPTY water sensor and replace if broken or damaged	Page 9
	HOT	Shade the pump from the sun and allow it to cool down	Page 13
Pump runs but there is less flow or pressure than expected		If POWER flashes green hold the power button until POWER is blue	Page 10
		Check the PV panels are clean, unshaded and provide more than 66V then check if the inlet is blocked	Page 7
Pump runs for a short time but turns itself off		Check if the pump and inlet hose are full with water then check the inlet for any blockage or debris	Page 1 & below
Pump inlet blocked with mud		Carefully wash the pump inlet with pressurised water from another pump or with plastic brush bristles, do not use a hard object because this can cause damage	

To access further support, including in other languages such as:

- Français,
- Español,
- Português,

Visit www.impactpumps.com/support or scan this code: