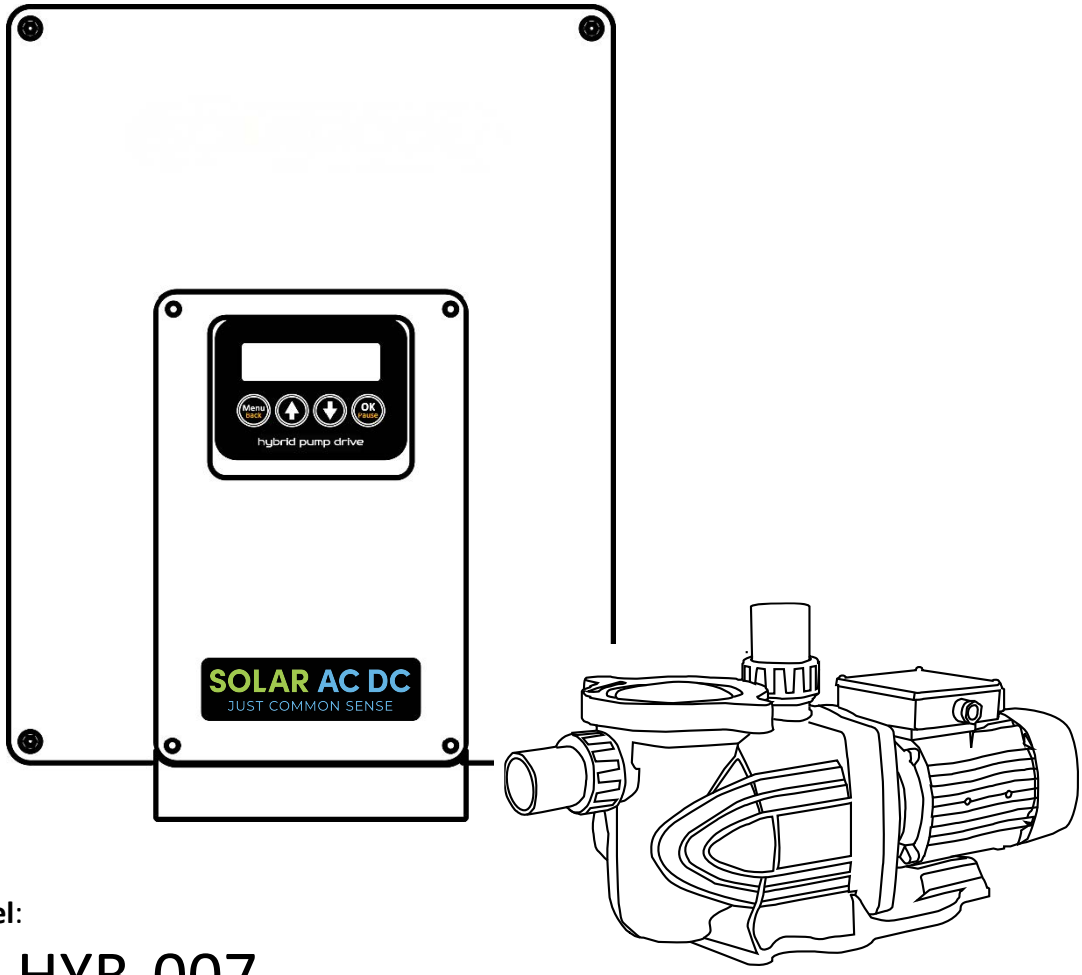
SOLAR AC DC

JUST COMMON SENSE

# Solar Hybrid Swimming Pool Pump and Control Unit




**Model**:

SP-HYB-007

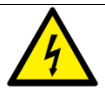
## *Owner and installation Manual*

**Phone 1300 46 2232**

**www.solaracdc.com.au**

Version: V16.4.25

## Symbol Glossary

| Symbols Used | | | |
|---|---|---|---|
|  | Refer to the operating instructions |  | Caution, risk of danger |
|  | Protective conductor terminal |  | Caution, risk of electric shock |
|  | Positive conductor |  | Negative conductor |
|  | Class II Double Insulated | | |

### ATTENTION

The Solar ACDC control unit and pool pump must be installed & serviced by a contractor who is licensed and qualified in pool equipment in accordance with the latest applicable version of AS/NZS 3000. The installation must comply with all the relevant Australian Standards, local and industry regulations.

### ATTENTION

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

### WARNING

Once installed the control unit is powered by TWO SOURCES of Power Supply, both sources must be isolated before working on the appliance.

### PV ARRAY WARNING

When the photovoltaic array is exposed to light, it supplies a DC. voltage to the Solar ACDC controller.

### WARNING

The controller is **only** to be connected to a Solar ACDC specifically designed and configured for use with the Solar ACDC AC/DC controller. It is not for retrofit.

### WARNING

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

**PV ARRAY WARNING**

Designed for maximum array voltage of 380V DC.
Max input power should not be exceeded.

## WARNING

The controller has no user serviceable parts. Opening the cover will void warranty and may expose dangerous voltages.

## ATTENTION

Ensure all glands from the control box are firmly tightened to ensure ingress protection.

## ELECTRICAL WARNING

**All electrical work and permanent wiring must be carried out by a qualified person and in accordance with all current relevant Australian installation standards and local authority requirements.**

**<u>All</u> electrical connections must be terminated before switching any component on. The power to the Solar ACDC control unit, pump and system must NOT be switched on until the system is primed and ready to draw from the pool.**

## WARNING

**RISK OF SUCTION ENTRAPMENT HAZARD, WHICH, IF NOT AVOIDED, CAN RESULT IN SERIOUS INJURY OR DEATH.**

Do not block pump suction, as this can cause severe injury or death. Do not use this pump for wading pools, shallow pools, or spas containing bottom drains, unless the pump is connected to at least two (2) functioning suction outlets. Drain covers must be certified to the latest published edition of ANSI/ASME A112.19.8 or its successor standard ANSI/APSP-16. In Australia AS1926.3 is also an acceptable standard.

## WARNING

A check valve can interfere with the proper operation of certain Suction Vacuum Release System (SVRS) products. To avoid possible entrapment hazard, serious injury, or death, make sure to review the operation/owner's manual of your particular SVRS product before installing the check valve.

**WARNING**

To reduce the risk of property damage or injury, do not attempt to change the backwash (multiport, slide, or full flow) valve position with the pump running.

**ATTENTION**

The pump is for fixed installations only and to be used in conjunction with swimming pool equipment. (e.g. filters). The pump is to be installed in accordance with the relevant requirements of the Australian wiring rules AS/NZS 3000. Also refer to the installation instructions relating to the swimming pool equipment for which the pump will be an integral part. The pump is to be supplied through a residual current device (RCD) with a rated residual operating current of 30mA. If the supply cord is damaged it must be replaced by the manufacturer or its service agent or similarly qualified person in order to avoid hazard.

**WARNING**

Incorrectly installed equipment may fail, causing severe injury or property damage.

**WARNING**

Do not connect system to an unregulated city water system or other external source of pressurised water producing pressures greater than 250 KPA (35 PSI).

Trapped air in the system can cause the filter lid to be blown off, which can result in death, serious personal injury, or property damage. Be sure all air is out of the system before operating.

To minimise risk of severe injury or death, the filter and/or pump should not be subjected to the piping system pressurisation test.

Local codes may require the pool piping system to be subjected to a pressure test. These requirements are generally not intended to apply to the pool equipment, such as filters or pumps.

## BE SURE TO COMPLY WITH THE FOLLOWING SAFETY INSTRUCTIONS:

- Check all clamps, bolts, lids, lock rings, and system accessories to ensure they are properly installed and secured before testing.
- RELEASE ALL AIR in the system before testing.

- Water pressure for test must NOT EXCEED 250 KPA (35 PSI).
- Water temperature for test must NOT EXCEED 38°C (100°F).
- Limit test to 24 hours. After test, visually check system to be sure it is ready for operation.

  Notice: These parameters apply to Solar ACDC equipment only. For non-Solar ACDC equipment, consult the equipment manufacturer.

**WARNING**

Chemical spills and fumes can weaken pool/spa equipment. Corrosion can cause filters and other equipment to fail, resulting in severe injury or property damage. Do not store pool chemicals near your equipment.

**CAUTION**

Do not start pump dry! Running the pump dry for any length of time will cause severe damage and will void the warranty.

**CAUTION**

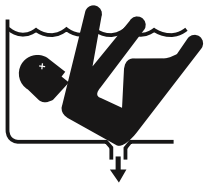
This pump is for use with permanently installed pools and may also be used with hot tubs and spas, if so marked. Do not use with storable pools. A permanently installed pool is constructed in or on the ground or in a building, such that it cannot be readily disassembled for storage. A storable pool is constructed so that it may be readily disassembled for storage and reassembled to its original integrity.

**CAUTION**

Do not install in a non-ventilated area. The pump requires adequate ventilation to maintain air temperature at less than the maximum ambient temperature rating.

**WARNING**

SUCTION HAZARD. Can cause serious injury or death. Do not use this pump for wading pools, shallow pools, or spas containing bottom drains, unless pump is connected to at least two (2) functioning suction outlets.



## WARNING

Pump suction is hazardous and can trap and drown or disembowel bathers. Do not use or operate swimming pools, spas, or hot tubs if a suction outlet cover is missing, broken, or loose. The following guidelines provide information for pump installation that minimises risk of injury to users of pools, spas, and hot tubs:

## Entrapment Protection

The pump suction system must provide protection against the hazards of suction entrapment.

### Suction Outlet Covers

All suction outlets must have correctly installed, screw-fastened covers in place. All suction outlet (drain) covers must be properly maintained. They must be replaced if cracked, broken, or missing. Drain covers must be listed/certified to the latest published edition of ANSI®/ASME® A112.19.8 or its successor standard, ANSI/APSP-16. In Australia, AS1926.3 is also an acceptable standard. The pool must be shut down and bathers must be restricted from entering the pool until any cracked, broken, or missing drain covers are replaced.

### Number of Suction Outlets Per Pump

Provide at least two (2) hydraulically-balanced suction outlets, with covers, as suction outlets for each circulating pump suction line. The centres of the suction outlets (suction outlets) on any one (1) suction line must be at least three (3) feet apart, centre to centre.

The system *must* be built to include at least two (2) suction outlets (drains) connected to the pump whenever the pump is running. However, if two (2) suction outlets run into a single suction line, the single suction line may be equipped with a valve that will shut off both suction outlets from the pump. The system shall be constructed such that it shall not allow for separate or independent shutoff or isolation of each drain.

Additional pumps can be connected to a single suction line as long as the requirements above are met.

### Water Velocity

The maximum water velocity through the suction outlet assembly and its cover for any suction outlet must not exceed the suction outlet assembly and its

cover's maximum design flow rate. The suction outlet (drain) assembly and its cover must comply with the latest version of ANSI®/ASME®
A112.19.8, the standard for Suction Fittings for Use in Swimming Pools, Wading Pools, Spas and Hot Tubs, or its successor standard, ANSI/ASME APSP-16. In Australia, AS1926.3 is also an acceptable standard.

## Testing and Certification

Suction outlet covers must have been tested by a nationally recognized testing laboratory and found to comply with the latest published edition of ANSI/ASME A112.19.8 or its successor standard, ANSI/APSP-16, the standard for *Suction Fittings for Use in Swimming pools, Wading Pools, Spas, and Hot Tubs*. In Australia, AS1926.3 is also an acceptable standard.

## Fittings

Fittings restrict flow; for best efficiency use fewest possible fittings (but at least two (2) suction outlets).

Avoid fittings that could cause an air trap.

Pool cleaner suction fittings must conform to applicable International Association of Plumbing and Mechanical Officials (IAPMO) standard

# Contents

# About

The Solar ACDC Hybrid AC/DC pool filtration pump system, is a true hybrid powered system, that can seamlessly transition between and blend AC mains and DC from a solar array that has 3 or more standard PV panels. The Solar ACDC system offers user flexibility and delivers savings in AC power consumption, when coupled with PV panels. The smart Hybrid drive control unit can run the system solely on Mains AC or add PV panels and if the sun is shining, power your total system free with the added security that Mains power is waiting in the background to seamlessly take over at any time needed, day or night. The system uses the minimum Mains power required by toping up the solar input if required; to reliably perform the task you ask it to do…
The real time clock and multi variable power and speed adjustability, gives un rivaled opportunity to tailor the system to suit your pool and lifestyle. The unit has quickly accessible handy cleaning modes for a quick skim, vacuum or auto /robotic cleaners and the default setting and are adjustable, to suit your pool.

All Solar ACDC systems have an inbuild feature to control and regulate a heating Actuator valve, giving the unique option for households with roof top water heating, to run your complete system using the single Solar ACDC pump, doing away with your second solar pump. Increasing the savings, noise, space and maintenance cost, associated with running 2 pool pumps.

# Front Panel

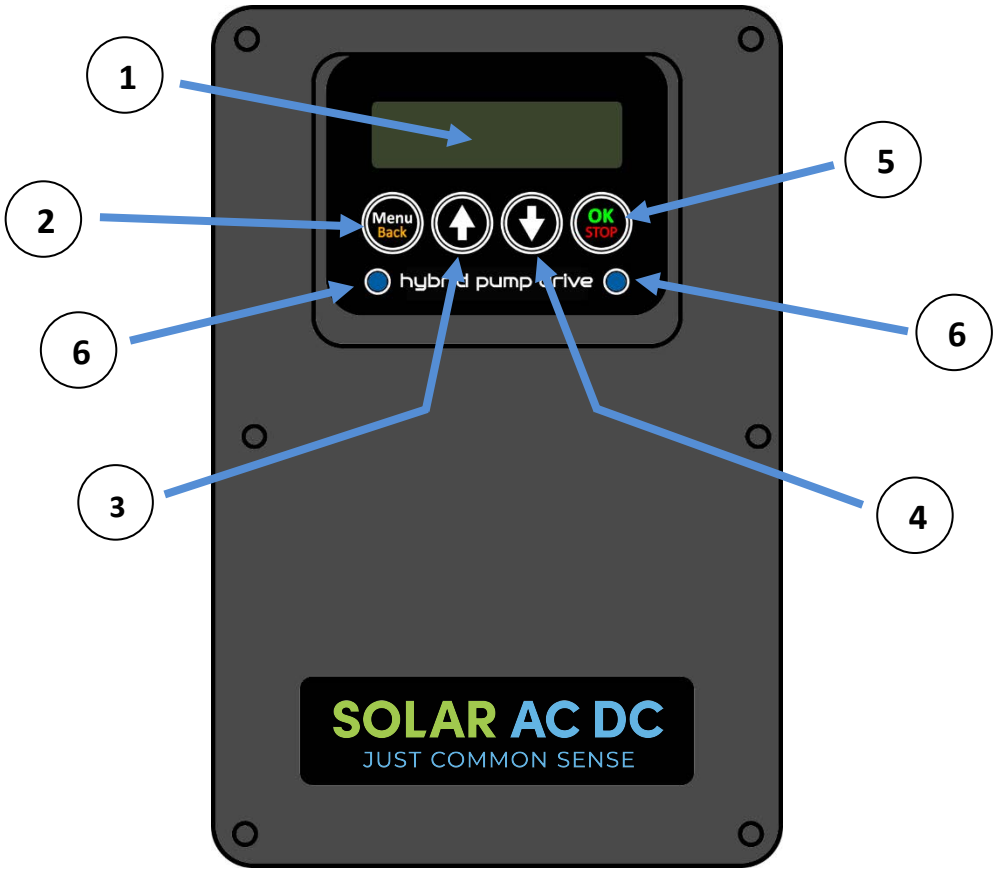
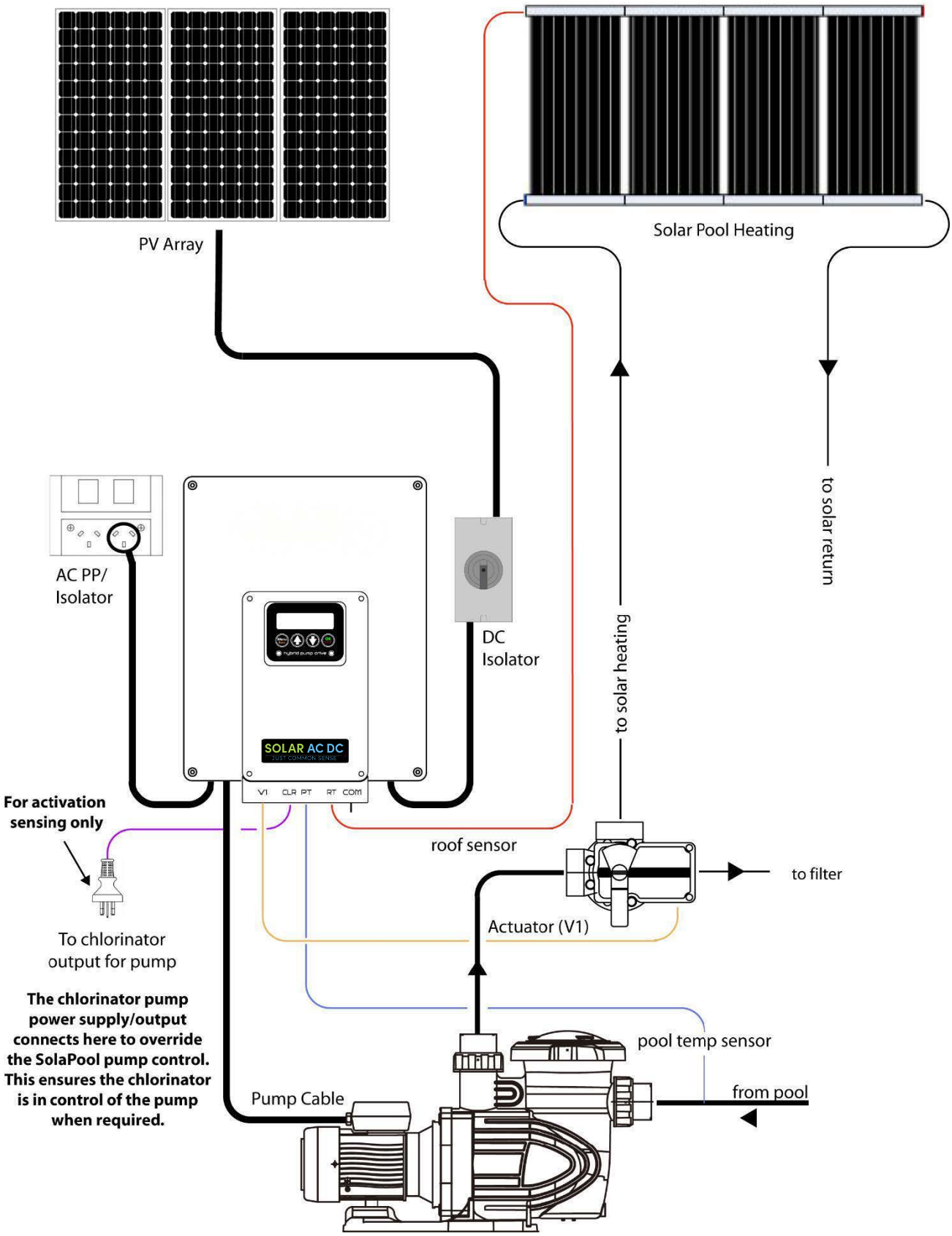



Figure 1.

**Solar ACDC Control Units are hybrid powered with a mains grid connection and direct solar PV array option.**

| | | |
|---|---|---|
| 1 | Display | Visual indication of current status of system operation and guidance throughout the fully adjustable menu system |
| 2 | Menu / Back | **Menu** is the start point to navigate into the main menu to then scroll & select **Back** key will return to the home screen loop. |
| 3 | UP Arrow | Use to scroll **UP** through the Menu options & make input adjustments |
| 4 | DOWN Arrow | Use to scroll **Down** through the menu options & make input adjustments |
| 5 | OK / STOP | **OK** is the confirm /save /enter Key.<br>Touch *STOP* in home loop screen will STOP the pump & press again to restart |
| 6 | Blue LED(s) | Both **BLUE** LEDs will illuminate to give the user a visual indication that a touch key has been selected and a key entry registered. Finger must be removed to make next entry. |

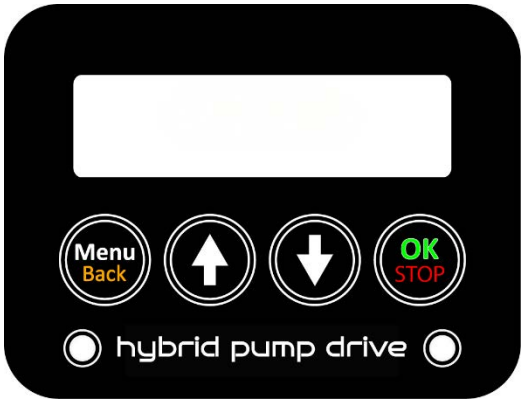
# System Layout



# OLED Display

**O-LED HOME Display menu:**

Home display is a cycling loop displaying the following information every **4** seconds.




**The second display line will toggle through;**

**Power State** -> **Total Power** -> **Solar Power** (DC) -> **Mains Power** (AC) -> **Operation Mode** ->

**Time** -> **Current Pool Temperature** ->

- **Power State**: Hybrid, Solar only, Mains.
- **Total Power**: Total consumption AC & DC.
- **Solar Power**: Proportion of total power being supplied by Solar Power
- **Mains Power**: Proportion of total power being supplied by Mains Power
- **Operation Mode**: Summer-Winter-Heat (Heat is selected for actuator use)
- **Current time:** Displayed in 24hour format.
- **Current Pool Temp**: (If no sensor connected the unit will display 0°C)

**IMPORTANT NOTE:**

**SENSOR TOUCH KEY OPERATION.**

Sensor touch keys are activated by sensing the contact between the finger and key sensor pad, they are NOT activated by pressing with pressure like a toggle / click press button.

When an input command on the key is received the two BLUE LED, s will aluminate giving the user a visual indication that the input command has been received. Remove finger and clearly separate at least 10mm from the screen prior to entering the next command.

**Sensor Touch Keys & Menu**

a. **OK/STOP**
    i. Touching the **OK/STOP** key will immediately stop pump operation in the home display.
b. **Touch key operation**
    i. Touch and hold **momentarily** until the blue indicator lights flash then remove finger for operations. The blue lights represent a received input.
c. **Menu Operation**
    i. Touch **Menu** key. To enter the **main menu**. (maybe a slight delay on first touch)
    ii. Scroll though the available options using the **Down** arrow. Touch once for each menu step.

# Menu

The control unit is programmed with default settings which are suitable for most pools. Make changes as required.

**Press MENU to see the available menu options**

**Turn Pump On* -> Boost Pump -> Clean -> Backwash Function -> Operation Mode -> Pool Target Temperature -> Set Pump Speeds -> Run Times -> Clock Set -> Service Menu -> Restore -> Test Mode -> Live info Mode**

***Turn pump on** will only show as the first menu option when the system is out of the set run times (out of the set operating hours).

1. **Turn Pump on: Select -> OK** (only shows when outside the set run times)
    a. Turn pump on -> OK
    b. Press OK/STOP button to exit this mode at any time.

    Turning the system on with this function will operate the system in the current operation mode using the current AC operation limits for 4 hours and will display the current pool temperature.

2. **Boost Pump: Select-> OK**
    a. This mode will run the pump at the set boost speed for 90 minutes.
    b. The speed is adjustable using the up and down arrows when **⇅<ADJ** is displayed.
    c. The control unit retains the previous set speed.
    d. This function can be used for operation systems features such are spa & swim jets, waterslide, quick surface skim etc.

2. **Clean: Select-> OK**
    a. This mode will run the pump at 2500 RPM (default) and is used for a quick preset for vacuuming or auto/robotic style pool cleaners.
    b. The function has a 4-hour operation countdown but can be manually cancelled anytime by touching the OK/Exit key.
    c. The cleaning speed can only be altered in the **service menu** if required to increase / decrease RPM. (This prevents accidental changes in the main menu).

3. **Backwash Function: Select-> OK (Stops pump and waits for further input)**
    a. The backwash function is used for sand and glass media style filters. It runs a set 5 stage flush run and stop sequence to help dislodge debris from the filer media.
    b. **Operation; Follow the command steps indicated on the display.**
        i. Pump should be stopped
        ii. Turn valve on filter to the backwash position.
        iii. Start Back wash **-> Select OK**
        iv. The control unit will run the 3-step backwash sequence. The display will show the flush stages. At the end of the sequence the display will show **"Rinse"**
            1. If you wish to repeat the cycle: press OK /STOP Twice the restart a new backwash sequence (Follow the prompts to backwash to repeat the sequence)
        v. Turn the valve to **Rinse,** then touch OK.
        vi. Pump will start after 10 – 15 seconds and the display will show **Rinsing…..wait**
        vii. Once the pump stops (Stopped) the display will return to the backwash home menu (the pump will remain off, until manually restarted to prevent accidentally emptying the pool through the waste discharge).
    c. If complete: Return the valve to the filter position.
        i. Touch **Back/Menu to return to the home screen**
        ii. Press **OK/STOP** to see the pump status (Stopped). Press the **OK/STOP** key again to restart the pump. The unit will return to normal operation in the current set mode.

4. **Operation Mode: Select-> OK**
    a. Operation modes available are Summer, Winter & Heat mode.
        i. **Summer Mode** – (Normal Operation)
        ii. **Heat Mode** – Used with actuator valve for combination of filtration and solar for pools using one pump or heat pump operation.
        iii. **Winter Mode** - Minimum circulation and filtration for winter.
        iv. **Select-> OK**
    b. On exit system will reboot and restart.

5. **Pool Target Temperature: Select-> OK**
    a. The pool target temperature is available when the system is operation in Heat Mode.
    b. Use the up and down arrows to adjust the target temperature when **⇅<ADJ** is displayed. The unit is set to 28 degrees by default.
    c. Menu/Back to exit or let time out to return to the Home Display screen.

**6. SET Pump Speeds:**

## PUMP MUST BE RUNNING to set pump speeds.
## It cannot be set when out of operating hours or if the pump is stopped.

**Function:** The pump speeds are adjustable minimum and maximum power and RPM/speed adjustments for each mode. Chlorinator (CHLR) over ride, Summer, Winter mode. For **AC mains only** operation use the minimum set point to set the desired power/Speed/RPM to achieve the suitable flow rate required for each mode.
Systems powered with both AC & DC set the minimum power/speed/RPM to achieve the minimum flow rate required for each mode and set the PV maximum set point to the desired maximum PV power/Speed/RPM set point. Systems running in Hybrid mode are designed to prioritise using ALL Solar DC over AC to minimize mains AC power consumption.

**SET PUMP SPEEDS Select-> OK**

i. Use the **Down arrow** to scroll through the menu selections and **Select-> OK** at the Set Pump Speed option to be adjusted.
ii. When this image is displayed ⇅**<ADJ** the pump speeds are ready to be adjusted. Touching the up/down arrow keys will adjust the pump speed by 50 RPM per touch. It is important to wait for the pump speed to adjust and stabilise after each key entry, before adjusting again.

a. **CHLR (Chlorinator)**

**SET CHLR Min RPM Select-> OK**

**This function requires Mains to be connected at all times when the chlorinator is connected and in operation**.

iii. The pump speed will adjust to the current minimum set speed for chlorination
iv. Adjust pump speed using the arrows then when ⇅**<ADJ** is displayed. **Select-> OK to set.**
v. This is the minimum speed for operation for the chlorinator. **Mains must be connected and ensure the cell is flooded in all conditions** (including partially blocked filter, and operation of other circulation requirements.

**SET PV CHLR MAX RPM Select-> OK**

vi. This is the maximum pump speed allowed when there is enough solar available to operate the pump at this speed.
vii. The pump speed will adjust to the current set speed for chlorination.
viii. Adjust pump speed using the arrows when ⇅**<ADJ** is displayed. **Select-> OK**

b. **SUM (Summer) (normal operation)**

**SET SUM MIN RPM Select-> OK to set**

ix. This is the minimum pump speed for filtration.
x. The pump speed will adjust to the current set speed.
xi. Adjust pump speed using the arrows when ⇅**<ADJ** is displayed.
xii. **Select-> OK to save**

c. **<u>SET PV SUM MAX RPM</u> Select-> OK**

xiii. This is the maximum set pump speed when there is enough solar available to operate the pump at this speed.

xiv. The pump speed will adjust to the current set speed.

xv. Adjust pump speed using the arrows when **⇅<ADJ** is displayed.

xvi. **Select-> OK to save**

**WIN (Winter) (out of season)**

**<u>SET WIN MIN RPM Select-> OK</u>**

xvii. This is the minimum pump speed when in Winter Mode.

xviii. The pump speed will adjust to the current set speed.

xix. Adjust pump speed using the arrows when **⇅<ADJ** is displayed.

xx. **Select-> OK to save**

d. **<u>SET PV WIN MAX RPM Select-> OK</u>**

xxi. This is the set pump speed when there is enough solar available to operate the pump at this speed in Winter mode.

xxii. The pump speed will adjust to the current set speed.

xxiii. Adjust pump speed using the arrows when **⇅<ADJ** is displayed.

xxiv. **Select-> OK to save**

xxv. **Use down arrow to select Exit & Reboot.**
**A full stop reboot will occur.**

**7. Run Times 24hr: Select-> OK**

Setting an appropriate start and finish Run Time on your system can maximise the advantages of available solar input & reduce the mains power consumption.

a. Set **Start** of day: **Select-> OK**

i. Set the time for the time of day to begin pump operation when **⇅<ADJ** is displayed.

1. Set hour -> **OK**
2. Set minutes (00,15,30,45) -> **OK**
3. **Down** arrow to move to **End of Day**

ii. Set **End** of day: **Select->OK**

1. Set the time for the time of day to end pump operation.
    a. Set hour -> **OK**
    b. Set minutes (00,15,30,45) -> **OK**
    c. **Down** arrow

iii. Save and Reboot -> **OK**

**The system will automatically complete a full stop & reboot.**

8. **Clock Set: Select-> OK**

**<u>Important Note:</u> Program will NOT allow to go back whilst setting the clock, you can only progress forward, if an incorrect entry is made, proceed through to reboot and reboot and start again.** (Holding the arrow keys will rapidly advance 21 entries, then stop so release finger and proceed with entries again).

a. Set the current time when ⇅**<ADJ** is displayed **24Hour Clock.**
   i. Set the Hour (up/down arrow to correct hour) Select-> **OK**
   ii. Set Minutes (up/down arrow to correct minute) Select-> **OK**
   iii. Set Date (up/down arrow to correct date) Select-> **OK**
   iv. Set Month (up/down arrow to correct month) Select-> **OK**
   v. Set year (up/down arrow to correct day) Select-> **OK**
   vi. Set day (up/down arrow to correct year) Select-> **OK**
   vii. **The system will automatically complete a full stop & reboot.**

# Programming

**Via the Service menu.**

This menu is for system adjustments during initial system commissioning of individual pools.

**<u>Note:</u> Each parameter change will require a system reboot.**

**<u>Time saver: When setting up after each reboot</u>*<u>:</u>***

When the wording "**starting pump"** is displayed, you can touch and hold the **Down** arrow to **bypass the pump priming** function. **Hold** down Key until the display shows **prime bypass, then release**.

**Service Menu Select-> OK (password Required)**

If an incorrect entry is made proceed through the access code menu and press **OK** and start again, **No Back** function feature is available.

viii. Use the down arrow to enter the access code: 9
   1. Down arrow 9 -> **OK** (9)
   2. Enter Service Menu & scroll through functions using arrow keys.

Default pump speeds – Set for approximately 25,000 – 45,000 L pools

| | | |
|---|---|---|
| Summer Mode | Min | 2100 RPM |
| | Max (When PV available) | 2300 RPM |
| Winter Mode | Min | 1630 RPM |
| | Max (When PV available) | 1850 RPM |
| Chlor (Chlorinator) | Min | 2200 RPM |
| | Max (When PV available) | 2400 RPM |
| Solar Circuit | Solar Heating | 2400 RPM |

1. **Heat Mode.**

**Function:** Adjustment to the pump speed and actuator valve angle for flow control (proportion) for solar pool heating using roof panels, matting. The actuator valve may also be used Auxiliary functions e.g.: heat pump flow management or spa or water feature control. The valve controls the volume of water diverted from the filtering flow to the roof based on the system temperature sensors. The pump increases the speed (200 RPM) to help prime and purge for 30 seconds after the valve opens allowing water to circulate to the roof collector. The RPM will then revert to the set heat circulation speed.

Supplementary instructions are supplied with the heating actuator unit and valve. See these for instruction for initial valve set up and installation.

a. **Set Valve: Select-> OK**
   i. The valve will cycle to its current set position (default is 75%), the pump speed will auto adjust to the current reference speed (default 2400RPM).
   ii. Wait until prompted then use the **Down** arrow to select the required option to adjust. (RPM or Valve angle)
   iii. Pump RPM **Select-> OK**
   iv. Use the arrows to adjust when **⇅<ADJ** is displayed to adjust the pump speed up or down for desired heating flow rate. Each touch key input is 50 RPM.

The roof temperature is displayed while in the adjustment menus. To refresh the current roof temperature, touch the up arrow then touch the down arrow to return to the desired setting. **Select-> OK to set RPM**

Use Down arrow to move to adjust/set valve angle.

b. **Valve Angle: Select-> OK**
   i. Use the arrows to adjust the valve % of flow diverted through the 3-way valve, each adjustment is 2.5% of the available range. to **Select-> OK to set.**
   ii. The control unit is default set at angle 75% water flow through the diverted outlet to the roof or auxiliary circuit. **It is critical** that an adequate flow rate is maintained filter and chlorination circuit. The **chlorinator cell must be continually flooded at all times in operation.**

iii. The % diverted should be the minimum required to return warmed water to the pool.
iv. The roof temperature is displayed while in the adjustment menus. To refresh the current roof temperature, touch the up arrow then touch the down arrow to return to the desired setting. Repeat as required. Then **Select-> OK to set.**
v. Touch down arrow.
vi. Save & Reboot **Select-> OK** to save the desired settings.
vii. On reboot the valve will return to the filter position before re-adjusting to the new settings.

c. **Set Clean RPM** This allows for the specific pump RPM to suit the required pool cleaner to be locked and not accidentally adjusted by users of the pool cleaner mode via the main menu.

Enter the Service Menu, use the Down arrow to scroll through the menu selection and at **SET CLEAN RPM Select-> OK**

i. This is the set pump speed when clean mode is selected in the main menu.
ii. The pump speed will adjust to the current set speed.
iii. Adjust pump speed using the arrows when ⇅**<ADJ** is displayed then **Select-> OK to save**
iv. Using down arrow scroll to save and reboot. **Select-> OK**

**2. Restore**

Restore **Select-> OK** Returns system to factory default setting or can be used to reset a system where a persistent error may have been lodged. If an incorrect entry is made proceed through the access code menu and press **OK** and start again, **No Back** function feature is available.

i. Use the down arrow to enter the access code: 9
ii. Down arrow 9 -> Ok (9)
iii. Restore -> OK
iv. The system will restore to the default settings, stop the pump and restart.

**3. Test Mode: Select -> OK**

a. Additional Visual display of system information on a set rotation every second loop.
b. Use the up/down arrows to toggle this more ON OFF (stop)

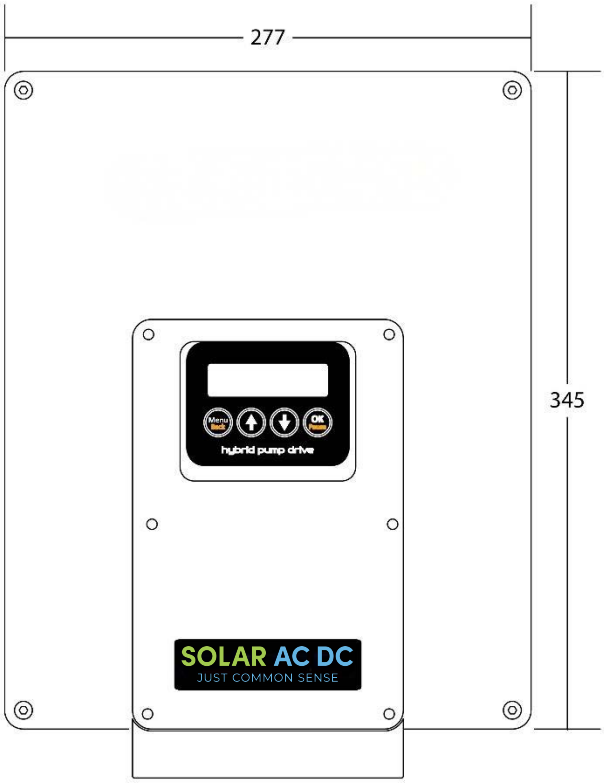
**4. Live Info: Select -> OK**

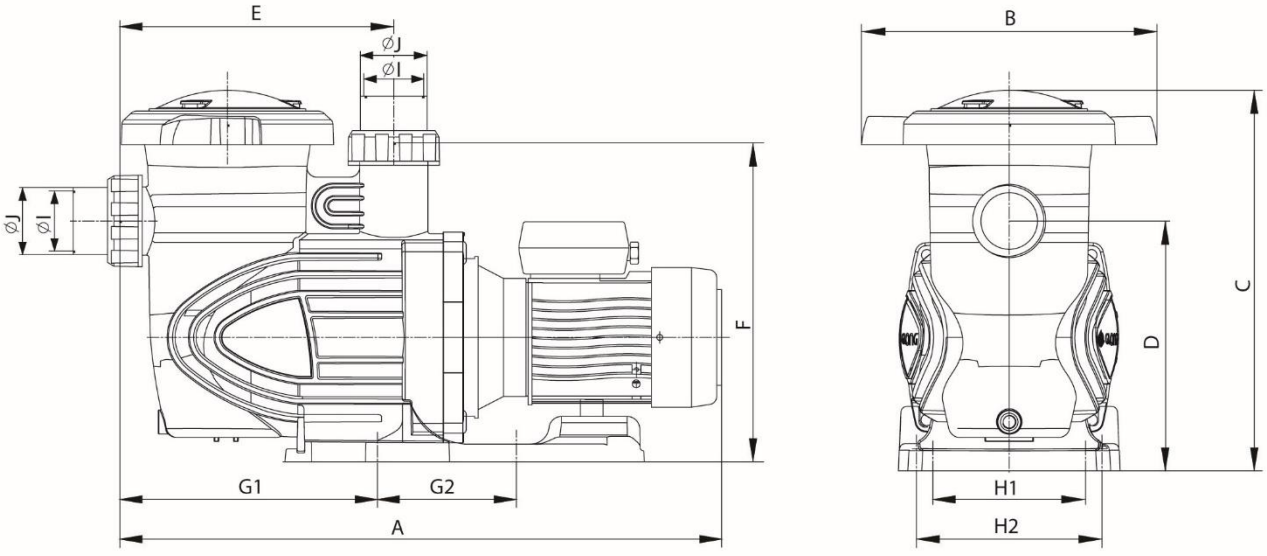
a. This mode is a quick live system information mode. The fixed display runs for 45 minutes showing the live system information before returning to the home screen. Touching menu will exit this mode at any time.

**5. Turn Pump On (when out of hours)**

a. This mode turns the pump on for 240 minutes (countdown, 4 hours) at the minimum set Summer or Winter speed. Manually exiting the mode will turn the function off.

# Dimensions




DIMENSIONAL

| Model | A | B | C | D | E | F | G1 | G2 | H1 | H2 | I | J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SP-100 | 650 | 298 | 380 | 243 | 281 | 323 | 275 | 134 | 190 | 154 | ⌀50 | ⌀63 |
| SP-150 | 650 | 298 | 380 | 243 | 281 | 323 | 275 | 134 | 190 | 154 | ⌀50 | ⌀63 |
| SP-300 | 685 | 298 | 380 | 243 | 281 | 323 | 275 | 134 | 190 | 154 | ⌀50 | ⌀63 |

Figure 2.

# Start-up Procedure

**NOTE: ENSURE THE PUMP AND PIPEWORK ARE CONNECTED AND THE POOL IS FULL OF WATER BEFORE COMENCING START UP PROCEDURE.**

1. Ensure system can draw water from the pool.
2. Turn on AC Isolator/power point. The LCD will illuminate and start to indicate incoming power. The controller should show start up information as it runs through a power up test sequence. When test is complete LCD will display system voltage etc.
3. Turn on DC Isolator.
4. After the start up sequence is complete the pump will start and the system will operate on the default programming.

# System Shutdown

1. Turn off main array isolator (lock switch if required)
2. Turn off 240V AC isolator/power point.
3. Controller should now be off and LCD display should be off.
4. **Wait 3-5 minutes for Capacitors to fully discharge before commencing any work.**
5. System should now be electrically isolated.

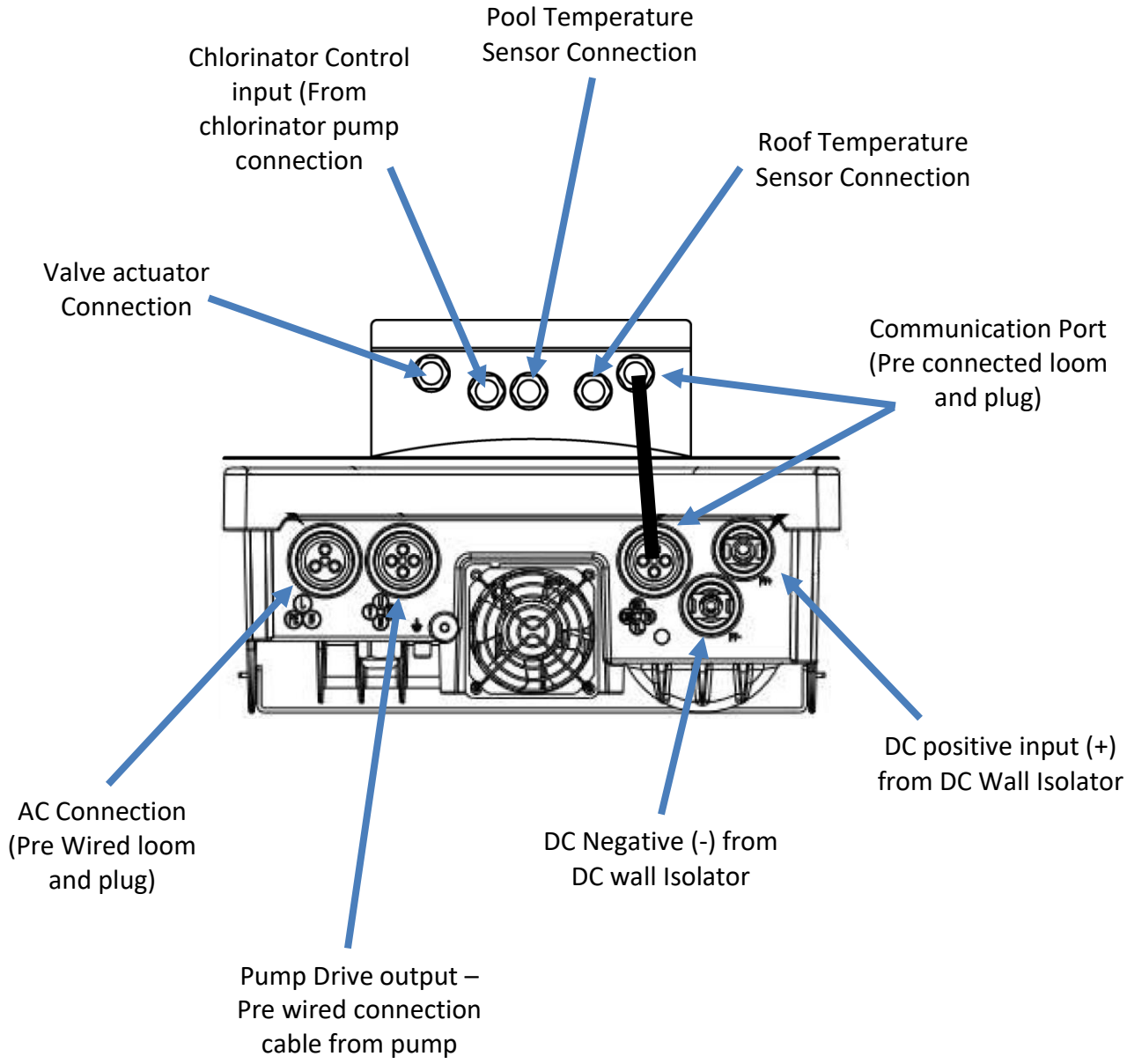
# Maintenance

1. There are no serviceable components.
2. There is no preventative maintenance required.
3. There are no replaceable parts in the controller.
4. Controller can be wiped with a damp cloth if required.

# Installation

## Controller Connections

**WARNING CHECK DC POLARITY PRIOR TO CONNECTION TO CONTROL UNIT**



# Wall Mounting

Choose a suitable location, giving consideration to the following:

1. Vertical height given the position of the control unit and the pump
   Note: The pump connection cable is pre wired and 2 metres in length
2. PV main array isolator location and the AC power point location.
3. It is important to mount the controller out of the direct sunlight as it can make visual reading of the display difficult.

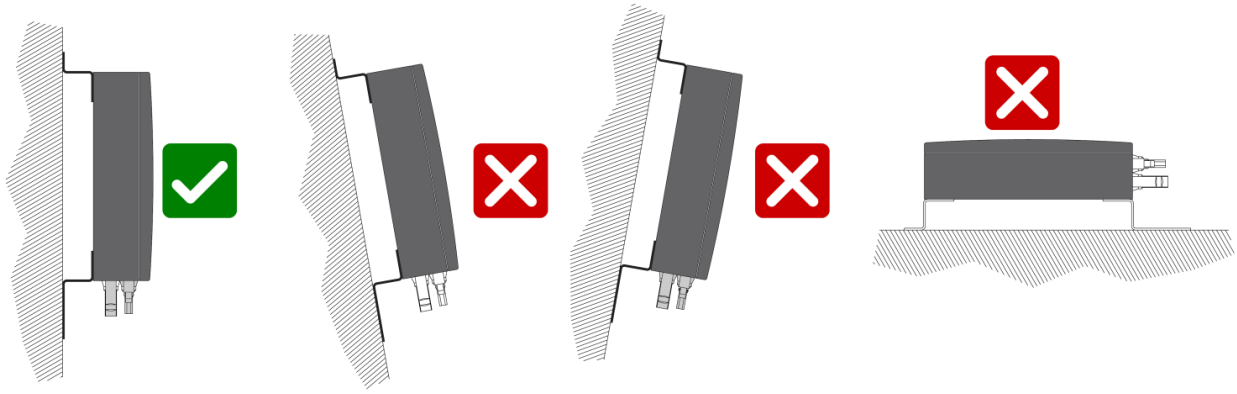


Figure 4

# Connection - Main Array Input

1. An isolating switch in accordance with clause 4.8.2.3 AS/NZS 3000:2018 shall be installed for the connection to the control unit.
2. Connect an appropriate PV rated cable from the wall mounted isolator to the connectors per PV installation regulations. The cable must be suitable for the array the system the control unit is connected to, this is usually 4mm2 twin.
3. The positive wire from the array isolator (array positive) is connected to the input positive connector.
4. The negative wire from the isolator (array negative) is connected to the input negative connector.
5. Ensure Polarity on the connections is correct before connection to the control unit.
6. Turn Isolator off before connecting. (Ensure no DC Power at controller)

7. Energise system only once the pump and connection pipework is installed and ready to be commissioned

# ON THE ROOF

The main array must be installed to Australian standards and all relevant local authority requirements by an authorised installer. Consideration must given to the position of the isolator in relation to the final controller position. The main array must be earthed with the earth cable into the isolator. An isolating switch in accordance with clause 4.8.2.3 AS/NZS 3000:2018 shall be installed.

# Panel Configuration

The controller is designed to operate with a hybrid supply, using both PV panels and blended AC as required. The PV array can be strung as a single string or a parallel string of 3-6 panels. The supply from the array must be tested and identified to be strung correctly with the correct voltage window prior to connection to the control unit. Terminate main array into isolator testing and ensuring **TERMINATED POLARITY IS CORRECT**.

**CROSSED CONNECTION MAY RESULT IN FAILURE OF THE CONTROLLER!**

Single String

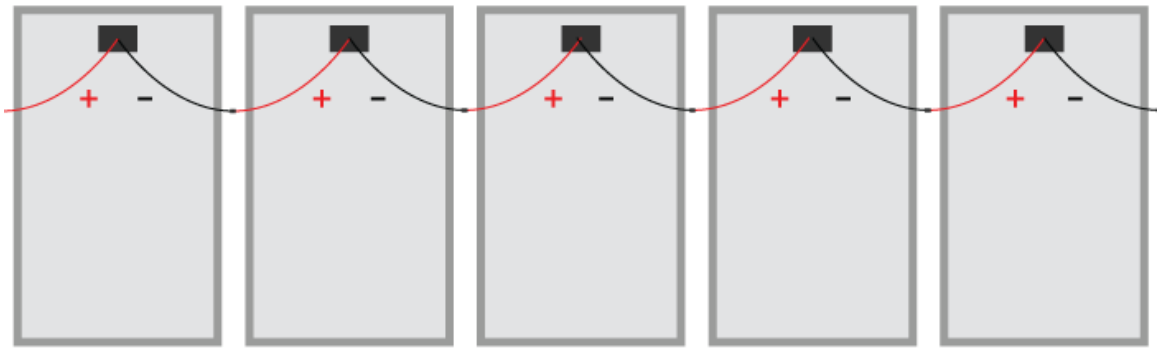



Figure 10

Parallel String

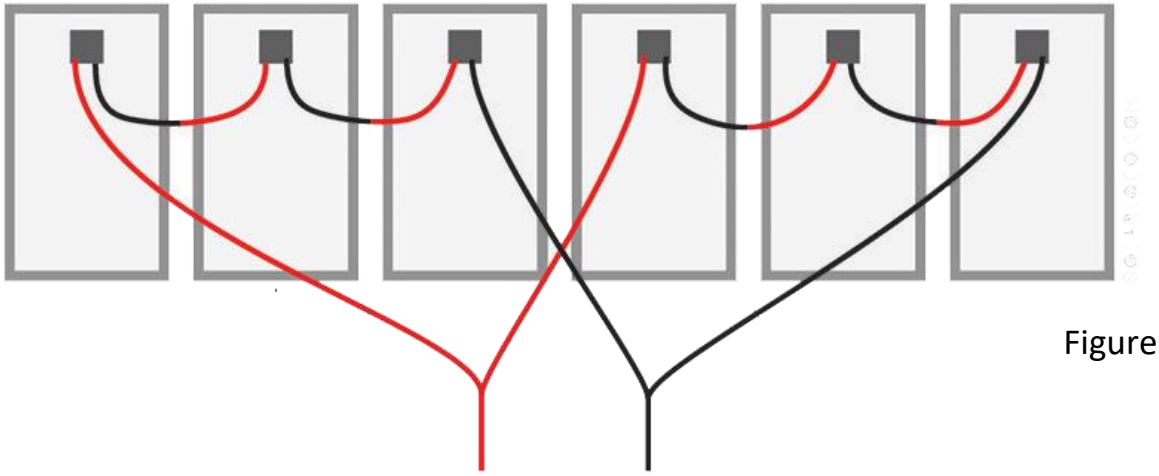


Figure 11

# Commissioning Start Up

1. **Ensure polarity on the output of the isolator is correct before proceeding further.**
2. Test voltage from array.
3. If correct, turn off isolator.
4. Connect DC Cables.
5. Plug in AC cable
6. Turn on AC switch.
7. LCD Screen should be lit. The controller should show start up information as it runs through a power up test sequence. When test is complete LCD will display a scrolling status screen.
8. The pump will start.
9. Turn on DC isolator.
10. The pump with operate using the default program settings.

# Default Pump Speeds

Default pump speeds – Set for approximately 25,000 – 45,000 L pools

| | | |
|---|---|---|
| Summer Mode | Min | 2100 RPM |
| | Max (When PV available) | 2300 RPM |
| Winter Mode | Min | 1630 RPM |
| | Max (When PV available) | 1850 RPM |
| Chlor (Chlorinator) | Min | 2200 RPM |
| | Max (When PV available) | 2400 RPM |
| Solar Circuit | Solar Heating | 2400 RPM |

# Technical Data

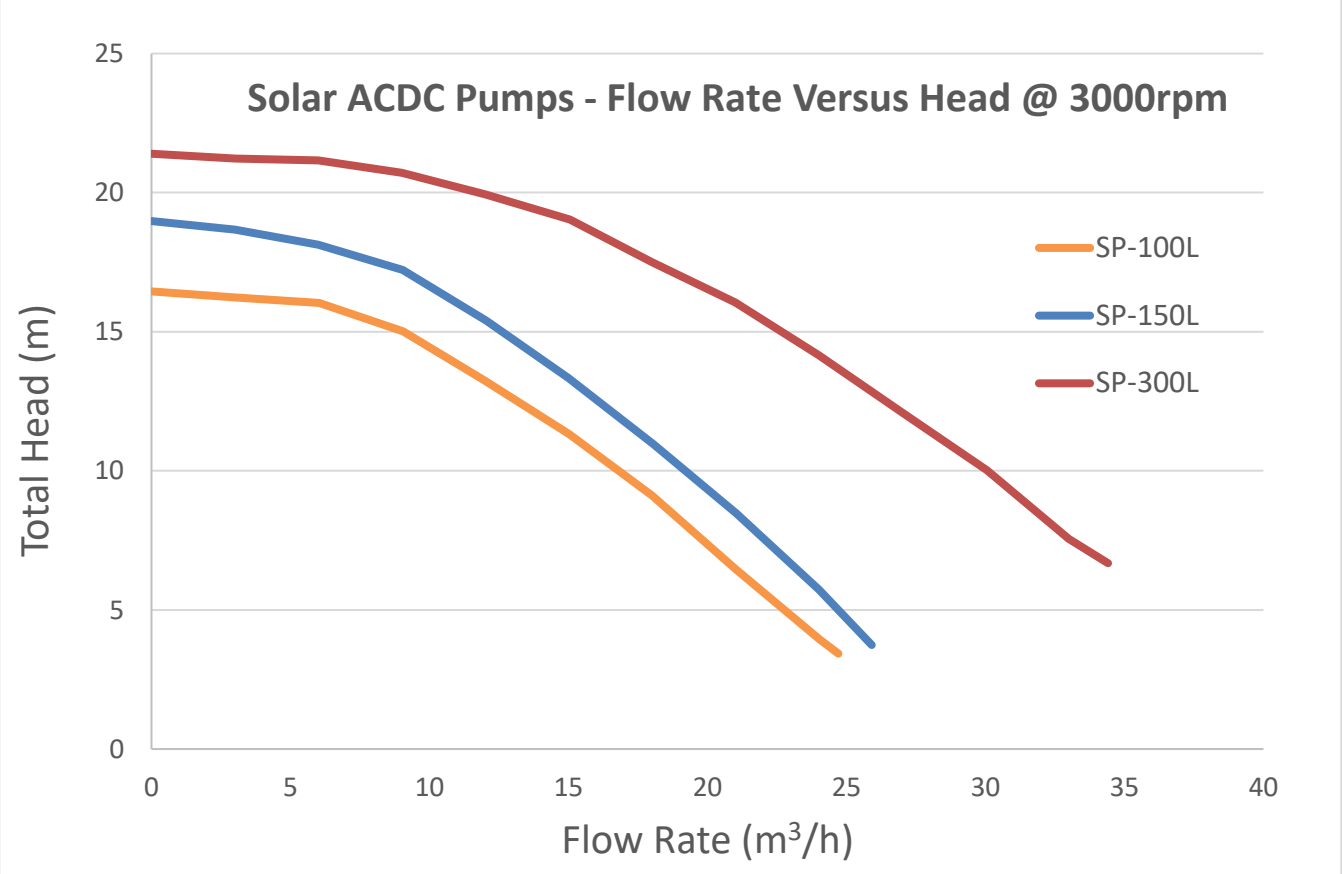
| **PV String Input Data** | | | |
|---|---|---|---|
| Max. DC Input Power | 5.7 kW | Array Strings | 1 or 2 |
| Max. DC Input Voltage | 410 VDC | String Configuration | Single or Parallel |
| Max. Input Current | 14 A | Max. Output Current | 10 A |
| Max. Output | 3.2 kW | MPPT Range | 80-400 VDC |

| **AC Input** | | | |
|---|---|---|---|
| Voltage | 230 VAC | AC Max | 10 A |
| Frequency | 50-60 Hz | AC Max Power | 2300 W |

| **DC Pump** | | | | |
|---|---|---|---|---|
| Model | Voltage | Nominal Power | Flow rate | Head |
| SP-150 | 120 VDC | 1.1 kW / 1.5 HP | 24 $m^3/h$ | 16.2 m |
| SP-100 | 108 VDC | 0.75 kW / 1.0 HP | 21 $m^3/h$ | 14.8 m |
| SP-300 | 260 VDC | 2.2 kW / 3.0 HP | 33 $m^3/h$ | 19.6 m |

| **General Data** | | | |
|---|---|---|---|
| Operating Temp. Range | -20$^0$C to + 50$^0$C | Dimensions (H*W*D) | 220x145x70 mm |
| Relative Humidity | 0-100% | Protection Degree | IP65 |
| Operating Altitude | < 4000m | Safety Regulation | IEC |
| Cooling | Natural Convection + Fan | Pollution Degree | PD3 |
| Weight | 8.3 kg | Overvoltage Category | OVC II |
| Environment | Outdoor | Location Classification | Not Suitable for Wet areas |
| Environment | Outdoor | | |
| Start-up Voltage | 80V | Factory Set Shut temp | 65$^0$C |
| User Interface | LCD & LED Indication | Country of Manufacture | Australia + China |

# Pump Flow Curve



# Guide times to turn over pool volume (hours)

**Pump Model** **SP-150L**

| Pump RPM | Unrestricted Flow | Time (hours) to turn Pool Volume | | | |
|---|---|---|---|---|---|
| | | 20000 | 30000 | 40000 | 50000 |
| 1000 | 120 | 2.8 | 4.2 | 5.6 | 6.9 |
| 1100 | 130 | 2.6 | 3.8 | 5.1 | 6.4 |
| 1200 | 150 | 2.2 | 3.3 | 4.4 | 5.6 |
| 1300 | 160 | 2.1 | 3.1 | 4.2 | 5.2 |
| 1400 | 170 | 2.0 | 2.9 | 3.9 | 4.9 |
| 1500 | 180 | 1.9 | 2.8 | 3.7 | 4.6 |
| 1600 | 185 | 1.8 | 2.7 | 3.6 | 4.5 |
| 1700 | 195 | 1.7 | 2.6 | 3.4 | 4.3 |
| 1800 | 200 | 1.7 | 2.5 | 3.3 | 4.2 |
| 1900 | 210 | 1.6 | 2.4 | 3.2 | 4.0 |
| 2000 | 220 | 1.5 | 2.3 | 3.0 | 3.8 |
| 2100 | 230 | 1.4 | 2.2 | 2.9 | 3.6 |
| 2200 | 240 | 1.4 | 2.1 | 2.8 | 3.5 |
| 2300 | 250 | 1.3 | 2.0 | 2.7 | 3.3 |
| 2400 | 250 | 1.3 | 2.0 | 2.7 | 3.3 |
| 2500 | 260 | 1.3 | 1.9 | 2.6 | 3.2 |
| 2600 | 260 | 1.3 | 1.9 | 2.6 | 3.2 |
| 2700 | 270 | 1.2 | 1.9 | 2.5 | 3.1 |
| 2800 | 280 | 1.2 | 1.8 | 2.4 | 3.0 |
| 2900 | 290 | 1.1 | 1.7 | 2.3 | 2.9 |
| 3000 | 300 | 1.1 | 1.7 | 2.2 | 2.8 |

| Pump RPM | 7m head 25m DN50 | Time (hours) to turn Pool Volume | | | |
|---|---|---|---|---|---|
| | | 20000 | 30000 | 40000 | 50000 |
| 1000 | 105 | 3.2 | 4.8 | 6.3 | 7.9 |
| 1100 | 110 | 3.0 | 4.5 | 6.1 | 7.6 |
| 1200 | 110 | 3.0 | 4.5 | 6.1 | 7.6 |
| 1300 | 120 | 2.8 | 4.2 | 5.6 | 6.9 |
| 1400 | 125 | 2.7 | 4.0 | 5.3 | 6.7 |
| 1500 | 130 | 2.6 | 3.8 | 5.1 | 6.4 |
| 1600 | 140 | 2.4 | 3.6 | 4.8 | 6.0 |
| 1700 | 150 | 2.2 | 3.3 | 4.4 | 5.6 |
| 1800 | 150 | 2.2 | 3.3 | 4.4 | 5.6 |
| 1900 | 160 | 2.1 | 3.1 | 4.2 | 5.2 |
| 2000 | 180 | 1.9 | 2.8 | 3.7 | 4.6 |
| 2100 | 195 | 1.7 | 2.6 | 3.4 | 4.3 |
| 2200 | 195 | 1.7 | 2.6 | 3.4 | 4.3 |
| 2300 | 200 | 1.7 | 2.5 | 3.3 | 4.2 |
| 2400 | 200 | 1.7 | 2.5 | 3.3 | 4.2 |
| 2500 | 220 | 1.5 | 2.3 | 3.0 | 3.8 |
| 2600 | 230 | 1.4 | 2.2 | 2.9 | 3.6 |
| 2700 | 240 | 1.4 | 2.1 | 2.8 | 3.5 |
| 2800 | 240 | 1.4 | 2.1 | 2.8 | 3.5 |
| 2900 | 240 | 1.4 | 2.1 | 2.8 | 3.5 |
| 3000 | 250 | 1.3 | 2.0 | 2.7 | 3.3 |