COMMODORE
OFF GRID & SOLAR PUMPING SPECIALISTS

SOLAR PUMPING

User Manual

SOLAR PUMPING INVERTER

⚠ DANGER

TABLE OF CONTENTS

SAFETY DEFINITION

Danger: Serious injuries or even death are potential consequences as a result of unsafe operation.

Storeage Conditions:

Temperature	Humidity
Temperature –20 ℃ to +60 ℃	5% to 90%, no condensation
A great place to install the inverter is underneath the Solar panels ensuring that the inverter is in a position to stay dry, and free from dust. Do not store in the conditions with corrosive gas or liquid.	

Installation:

Danger
Do not connect a breaker between the inverter AC output and the pump.
Wiring by qualified electrician only.
All wires to the device must be wrapped with electrical tapes for safety.
Forbidden installation location: Direct sunlight, thick dust, corrosive gas or oil fumes, flammable gas, liquid.

Attention
To ensure efficient convection cooling effect, the device must be installed Vertically.
The installation height of the device should be over 1.1m. Please set up the risk identification beside the device.

SAFETY DEFINITION

Attention
The ambient temperature -20 -+60. If Over 45 °C, please make sure the unit is well ventilated and the inverter backplate is covered to ensure air can escape through the fan output at the TOP of the inverter.
Relative humidity 15%-+95%RH
The device used to control the three-phase AC asynchronous Pump, Resistor Heater, Aerator and Fan.
If the output flow is small, please exchange the U and V wires, or contact Commodore Australia support for assistance
The environmental temperature influences the durability and reliability of the device directly, please make sure the conditions meet the above requirements to extend the device service life.

Maintenance:

Danger
Under any conditions, without professional guidance, do not disassemble the device or touch the internal parts.
Do not conduct any maintenance when the device is Power-On.

DESCRIPTION

Naming Rules:
Example - *HPD1500LB or HPD5500H*
HPD = Manufacturer Product Code: Solar Pumping Inverter
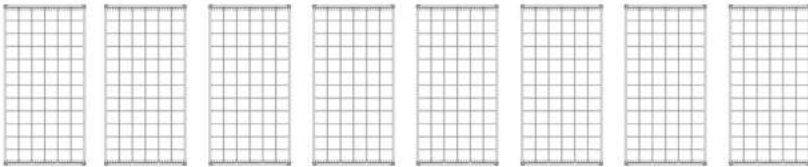**1500 or 5500** = Rated Power of Inverter: 2200W, or 5500W
L or H = AC Output Voltage: L:220v - 240v or H: 380v - 415v
B = Built in Booster

SOLAR PANEL CONFIGURATIONS

Low voltage single phase – 150Vmp (min) – 450Voc (max)

Typically we pair 6-8 x Solar panels in one string on this inverter

Typical 400w Solar Panel
VOC = approx 40v
8 x 400w 40v panels = 320v

Low voltage 3 phase / standard single phase – 200Vmp (min) – 450Voc (max)

For single phase, we typically pair 6 or 8 x Solar panels in one string
For 3 phase we typically pair 12 x Solar panels in two parallel strings

String 1 – 240v (6 x 40v panels)

Solar Isolator

String 2 – 240v (6 x 40v panels)
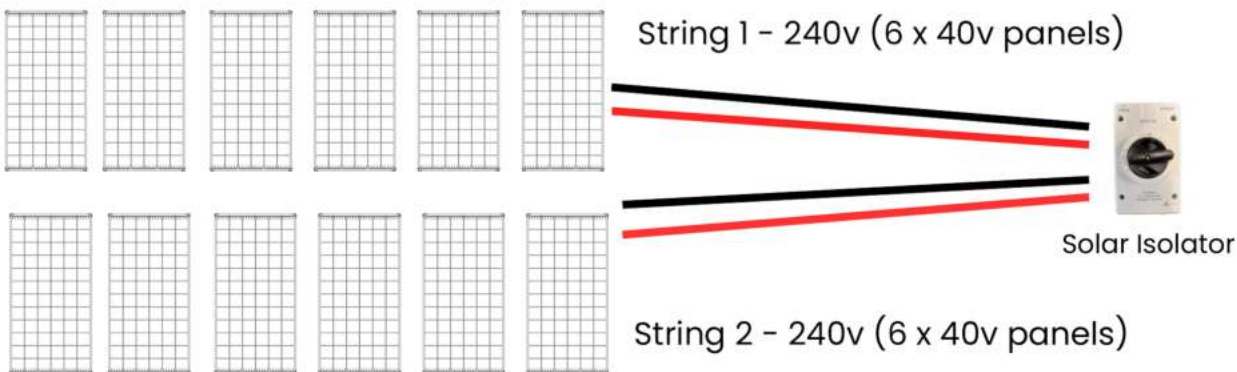
Standard 3 phase – 400Vmp (min) – 900Voc (max)

For 3 phase we often pair 28 x Solar panels in two strings
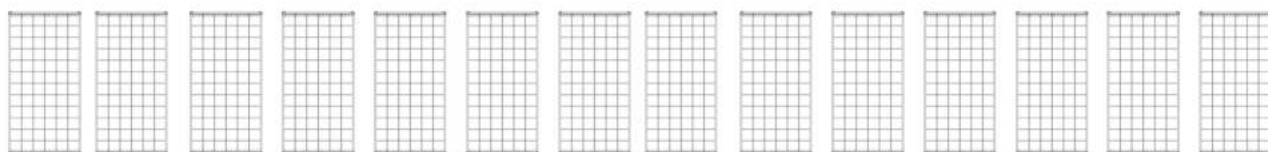
String 1 – 560v (14 x 400w 40v panels)
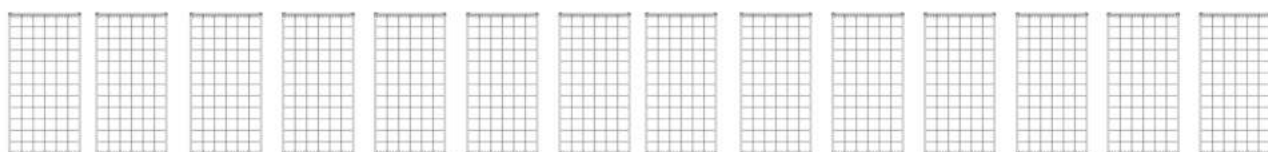
String 2 – 560v (14 x 400w 40v panels)

Note: For custom systems that are larger than the above mentioned PV String fusing must be used when more than 2 string of solar panels are to be connected in parallel.

COMMODORE
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DIAGRAMS - SINGLE PHASE & 230V 3 PHASE
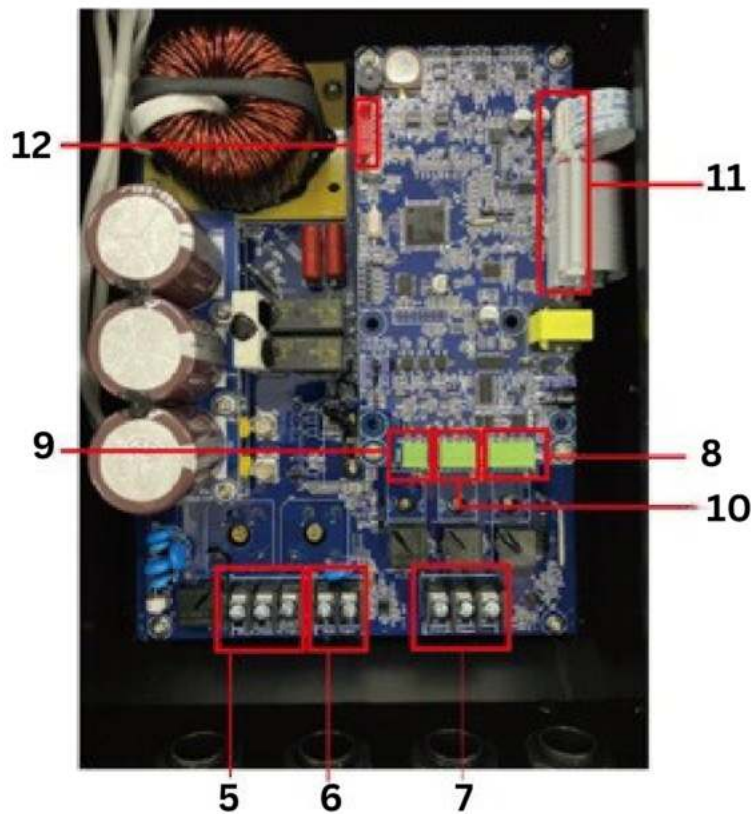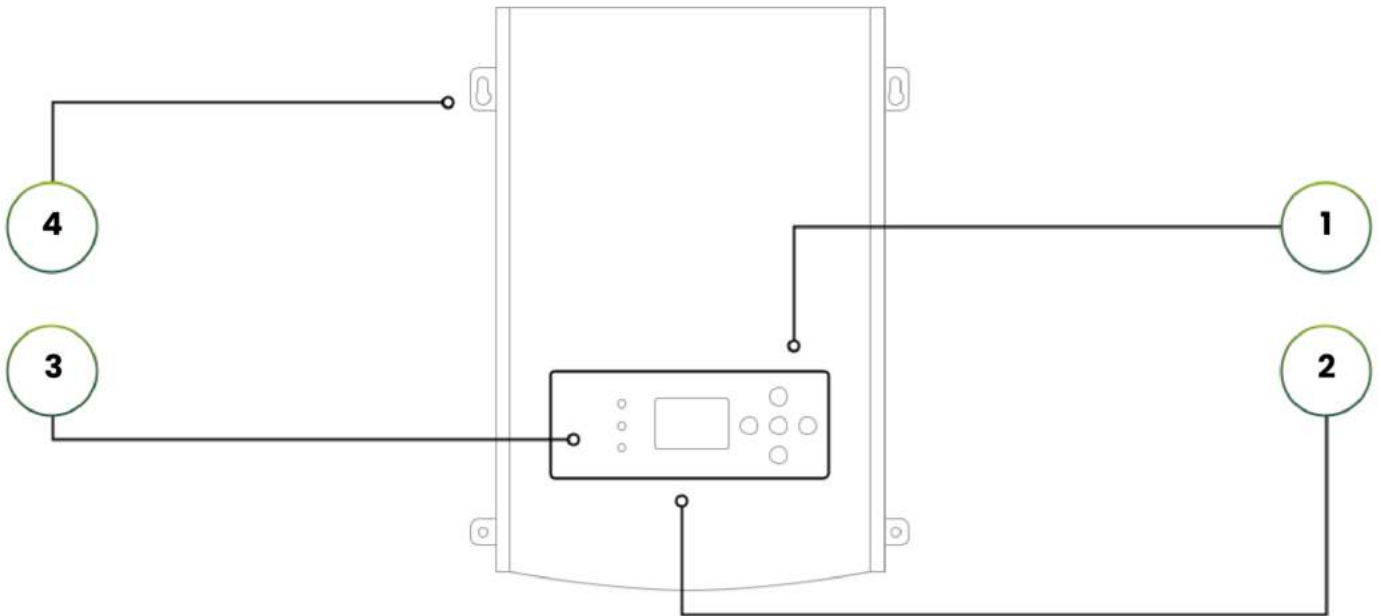
DIAGRAMS - SINGLE PHASE & 230V 3 PHASE

Number	Description	Parameters
1	Keyboard	Esc, Enter, Up, Down, On/Off
2	LCD Screen Display with Cover	128*64px 16*4 Characters
3	LED Indicator Light	Power, Run/Stop, Error Note: Run/Stop LED Indicator Light. Flashing: Inverter is working on. Off: Inverter stop by On/ff button. On: Inverter shutdown for other reasons.
4	Mounting holes	4 screws
5	AC Input	230v 1 Phase or 3 Phase Input: L+N+ Ground
6	Solar Input	Positive(+) and Negative(-) MC4/IP68
7	AC Output	U+V+W+Ground (ground is shared with AC input)
8	Communication	RS232
9	Well/Borehole Sensor	3 Pins
10	Tank Sensor	3 Pins
11	Socket for Motherboard	Connect to Motherboard
12	Socket for Displayboard	Connect to Displayboard

DIAGRAMS - SINGLE PHASE & 230V 3 PHASE
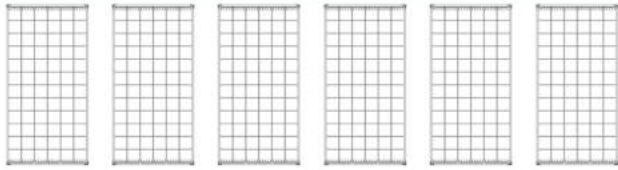
Solar panels should be setup as per information on page 3 unless otherwise recommended by Commodore Australia staff.

Note: PV String fusing must be used if more than 2 string of solar panels are to be connected in parallel.

PV Isolator

From Solar

To Inverter

Low Well Sensor Plug

L M H

Communication RS232

T R - +
X X

L M H

Tank Full / Pressure Switch Plug

U V W

AC INPUT

AC OUTPUT

AC input & AC output share an Earth terminal

PV INPUT

Junction Box wiring:
V/Run – Blue/Grey
U/Com – Black
W/Start – Brown
Earth – Green+Yellow

Fit the low water sensor at least 1 metre above the inlet of the pump. Use zip ties to secure the body of the sensor vertically to the delivery pipe. It can be secured to the pump body if the pipe is not possible. DO NOT leave the sensor to float freely as this can cause false signals that will stop the pump from operating.

Note: Sensor wire needs to be coming from the top of the water level sensor.

Pump Power Cable

Pump

Water inlet

CONNECT - SINGLE PHASE & 230V 3 PHASE

Single Phase & 230V 3 Phase Step by Step connection guide:

Step 1 - Connect the pump power cable into the AC output terminals of the inverter.

U/Com – Black wire | V/Run – Blue/Grey wire | W/Start – Brown wire | Earth – Green & Yellow
Note that the AC output and AC input share the earth terminal.

Note: *If you are unsure of the Run, Start and Common wiring, refer to Troubleshooting section later in the user manual.*

Step 2 - Wire the water level sensor to the 3-pin low well sensor plug. Place 1 wire in each of the L and H pins. Add a loop wire to the M and H pins. To confirm this is correct, compare the placement to the diagram on page 3, or to the location it is to be plugged into in the inverter. Once you have confirmed it is correct, plug it into the inverter.

If you only have a 2-pin plug, either wire can go in either pin.

Step 3 - If you are using a water level sensor or a pressure switch for automatic on/off functions, you will need to use the 3-pin Tank sensor plug. Place 1 wire in each of the L and H pins. Add a loop wire to the M and H pins. To confirm this is correct, compare the placement to the diagram on page 3, or to the location it is to be plugged into in the inverter. Once you have confirmed it is correct, plug it into the inverter.

Step 4 – Connect the solar to the isolator first and then connect the isolator to the P+ and P- terminals in the inverter. If you don't have an isolator, please contact our Commodore Australia support to organize one.

Step 5 - Once all setup, test run the pump before installing it in the water source. We have pre-programmed your pump drive inverter for you typically won't need to adjust any settings.

If you have a grid connection that you're connecting then you will want to reference the inverter settings that can be found in 'Adjusting the Inverter Settings' in this manual.

If you have a surface mount pump than you will need to adjust the Hertz to suit your pumping situation. With submersible pumps often the standard Hertz settings work just fine, however if you find that your pump is running in low light but not delivering much water this means that you need to set the minimum Hertz. Follow the procedure in 'Adjusting the Inverter Settings' under section 'Hybrid Stop - Setting Hertz'.

![Commodore - Off Grid & Solar Pumping Specialists logo]

DIAGRAMS - 3 PHASE 380V - 415V
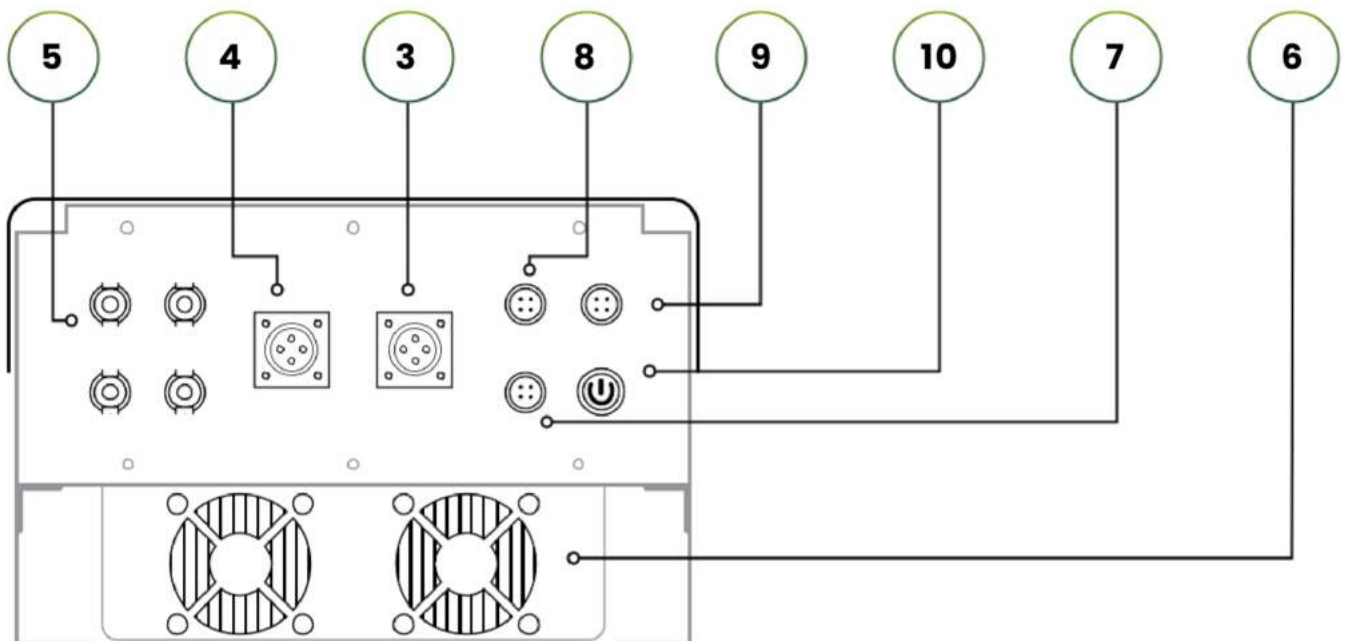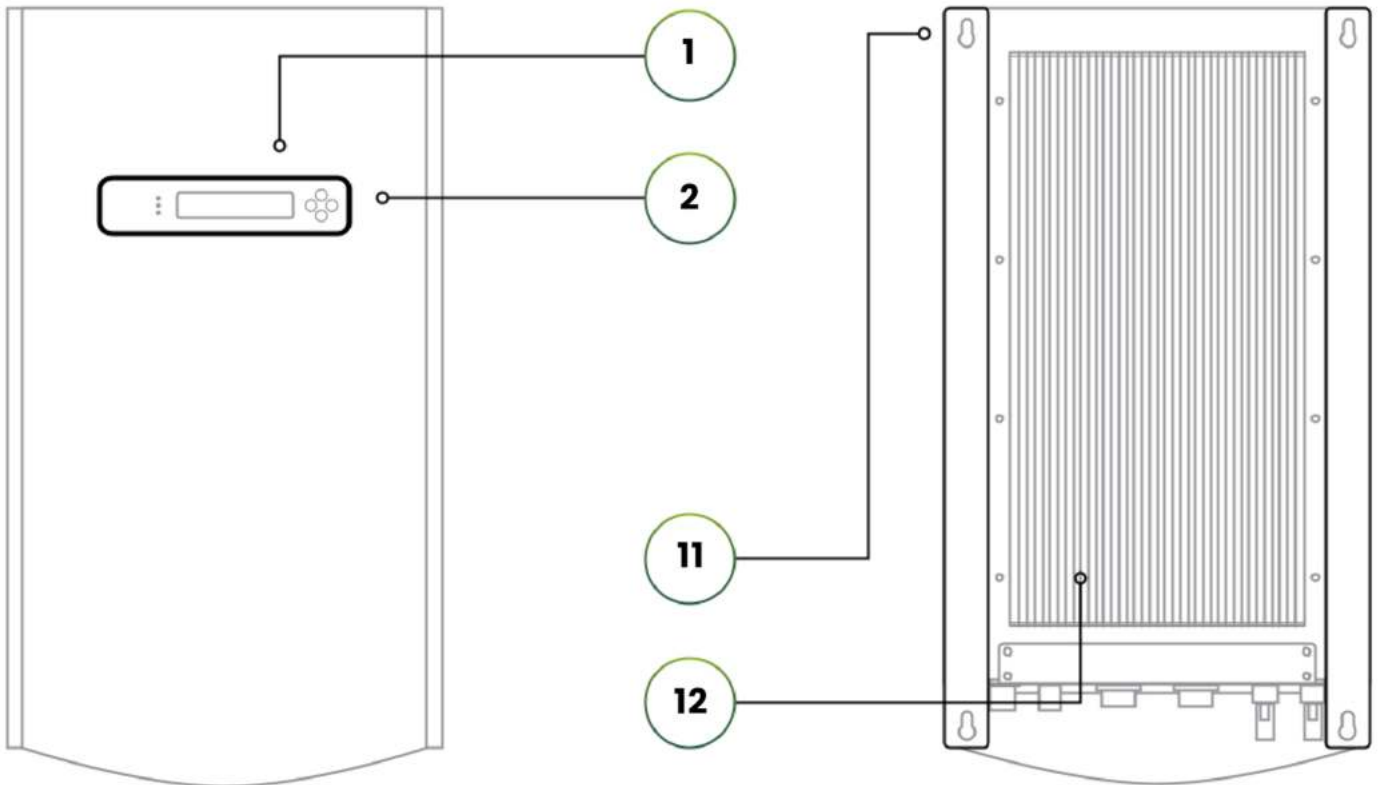
3 PHASE 380V - 415V

Number	Description	Parameters
1	LCD Screen Display with Cover	128*64px 16*4 Characters
2	Keyboard	Esc, Enter, Up, Down
3	AC Output	Four Lines (3 Phase and Ground Line) Red/Yellow/Blue/Green+Yellow Plug - IP65
4	AC Input	Four Lines (3 Phase and Ground Line) Red/Yellow/Blue/Green+Yellow Plug - IP65
5	Solar Input	Positive(+) and Negative(-) MC4/IP68
6	Cooling Fan	IP68
7	Communication	RS485/RS232 IP65
8	Well/Borehole Sensor	IP65
9	Tank Sensor	IP65
10	Power On / Off Control	Pump Running: LED on Pump Stopped: LED off IP65
11	Mounting holes	4 screws
12	Heat sync	Cooled by wind Mount vertically

3 PHASE 380V - 415V
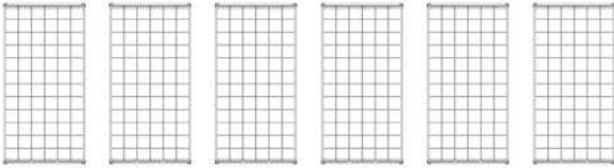
Solar panels should be setup as per information on page 3 unless otherwise recommended by Commodore Australia staff.

Note: PV String fusing must be used if more than 2 string of solar panels are to be connected in parallel.

Solar Input

AC Input

AC Output

Well

Tank

RS485

ON/OFF

PV INPUT

To 3 phase AC supply
380V - 415V

Tank Full / Pressure Switch Plug

From Solar

Pump Power Cable

Low Well Sensor

Fit the low water sensor at least 1 metre above the inlet of the pump. Use zip ties to secure the body of the sensor vertically to the delivery pipe. It can be secured to the pump body if the pipe is not possible. DO NOT leave the sensor to float freely as this can cause false signals that will stop the pump from operating.

Note: Sensor wire needs to be coming from the top of the water level sensor.
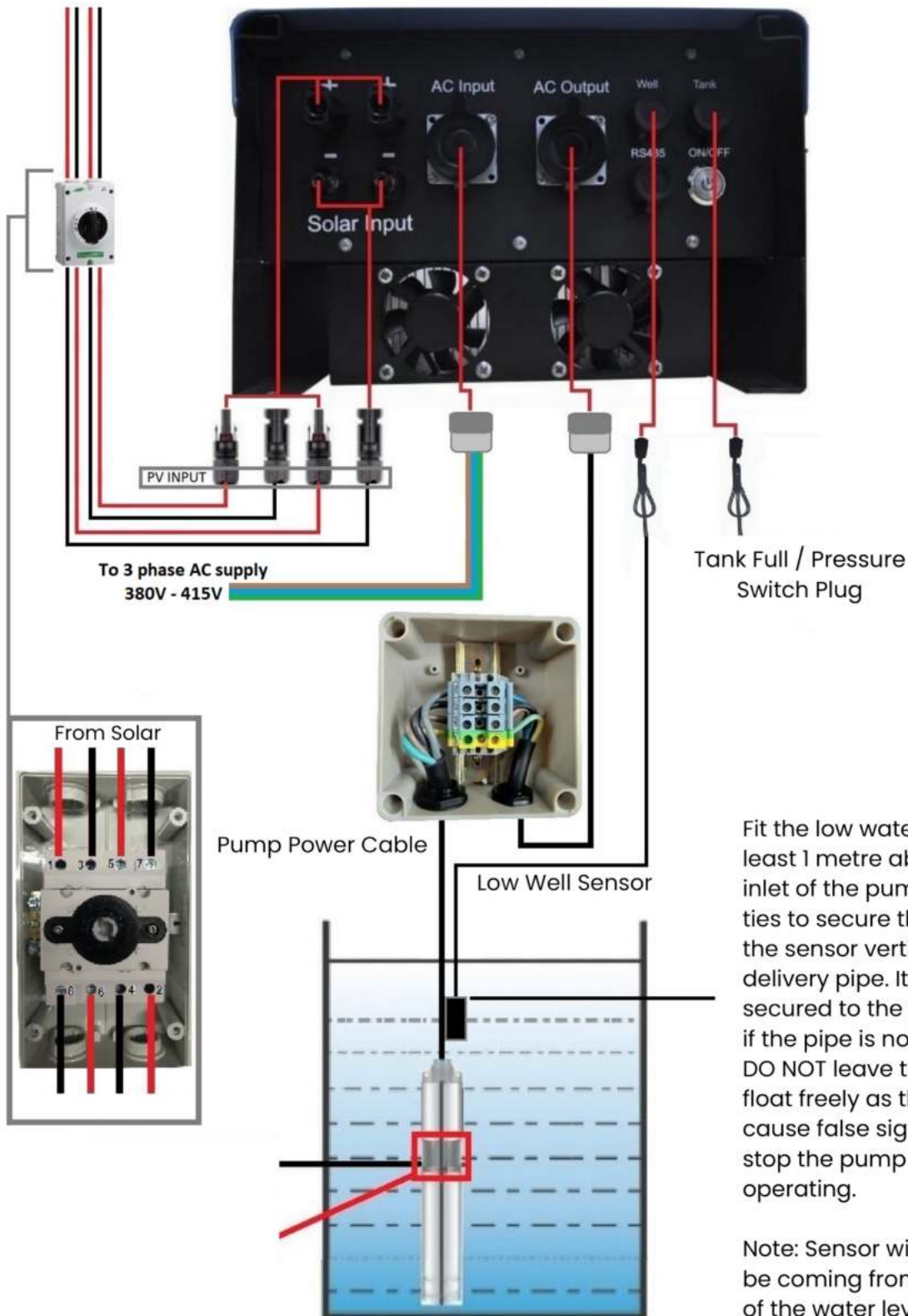
CONNECT - 3 PHASE 380V - 415V

3 Phase 380V - 450V Step by Step connection guide:

Step 1 - Connect the pump power cable into the AC output junction box, and then plug the junction box plug into the AC output port on the inverter.

U – Black wire | V – Blue/Grey wire | W – Brown wire | Earth – Green & Yellow

Step 2 - Plug the low water sensor cable labeled Well or Borehole into the Well port on the inverter.

If you are using your own sensor type, please contact Commodore Australia support for advice on how to connect it to the inverter.

Step 3 - If you are using a water level sensor or a pressure switch for automatic on/off functions, plug the cable labeled Tank into the Tank port on the inverter

If you are using your own sensor type, please contact Commodore Australia support for advice on how to connect it to the inverter.

Step 4 – Connect the solar to the isolator first and then connect the isolator to the P+ and P- terminals in the inverter. If you don't have an isolator, please contact Commodore Australia support to organize one.

*Note: PV String fusing must be used if more than 2 string of solar panels are to be connected in parallel.*

Step 5 - Once all setup, test run the pump before installing it in the water source. We have pre-programmed your pump drive inverter for you typically won't need to adjust any settings.

If you have a grid connection that you're connecting then you will want to reference the inverter settings that can be found in 'Adjusting the Inverter Settings' in this manual.

If you have a surface mount pump than you will need to adjust the Hertz to suit your pumping situation. With submersible pumps often the standard Hertz settings work just fine, however if you find that your pump is running in low light but not delivering much water this means that you need to set the minimum Hertz. Follow the procedure in 'Adjusting the Inverter Settings' under section 'Hybrid Stop - Setting Hertz'.

ISOLATOR WIRING

From String 1 **From String 2**
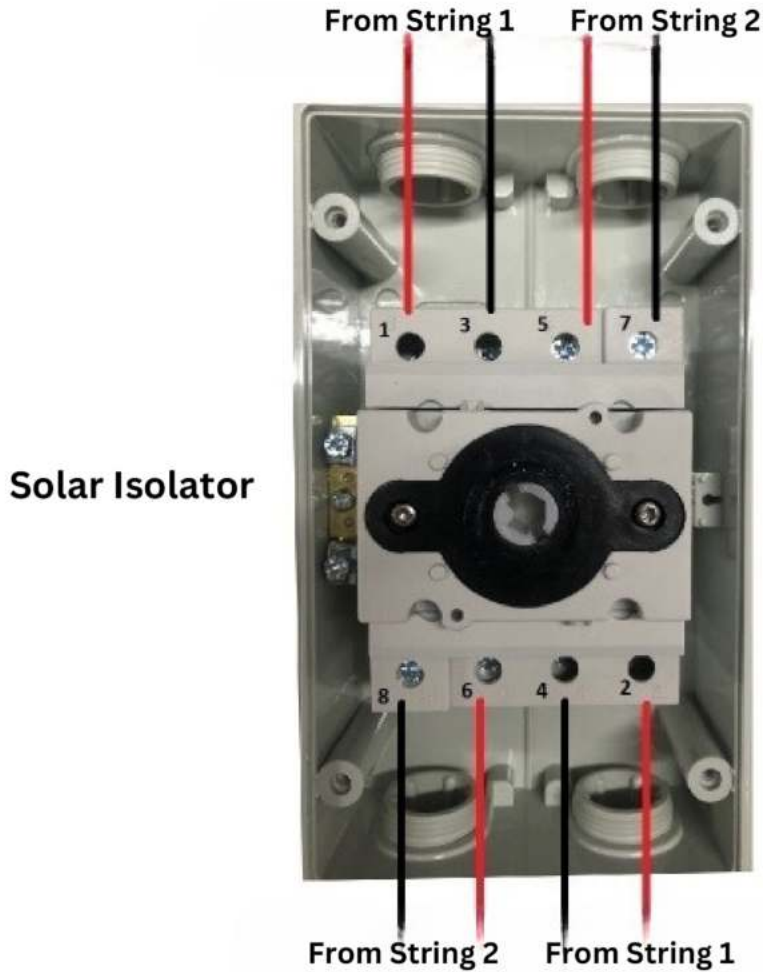
Terminal 1 connects to terminal 2
Terminal 3 connects to terminal 4
Terminal 5 connects to terminal 6
Terminal 7 connects to terminal 8

Solar Isolator

1 3 5 7

8 6 4 2

From String 2 **From String 1**

BENY
IP66NW

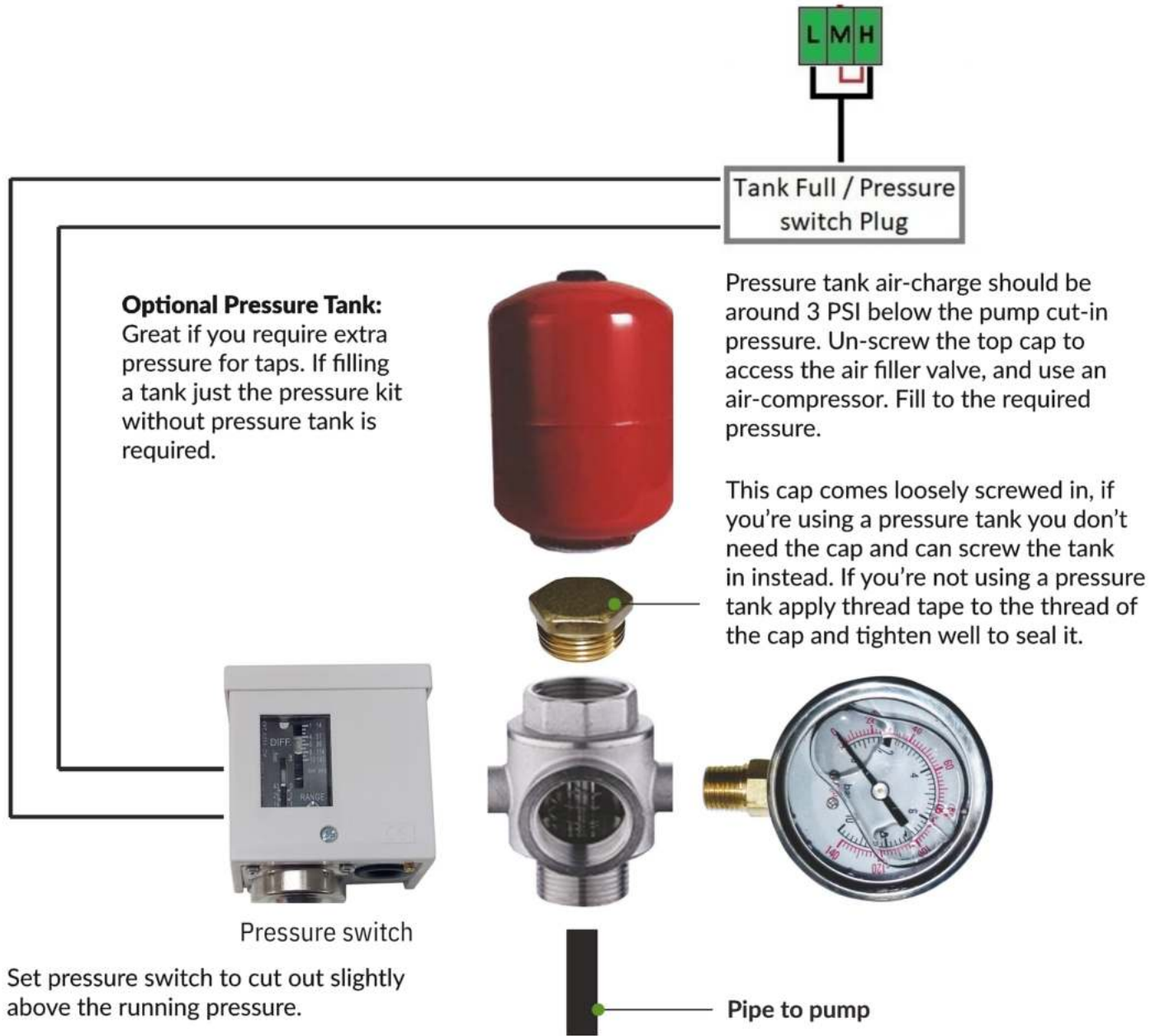BYH-32

ON

OFF

PV ARRAY
D.C. ISOLATOR
AS 60947.3 DC-PV2

Please note that any changes that are made while the pump is running will not be applied unless the power button located at the base of the pump drive has been turned off. Once the pump is turned off also turn off the isolator switch and wait for the screen to lose power. Count out 10 seconds and turn the isolator switch back on and then the pump on/off button once the unit has loaded the main screen.

Also note that the solar isolator switch should only be turned off after using the on/off button on the inverter to stop the pump. Switching off the solar isolator with the pump is running may cause damage to the inverter input power circuits. Excessive use of the isolator switch while the pump motor is running can cause the inverter to short out as well as other failures.
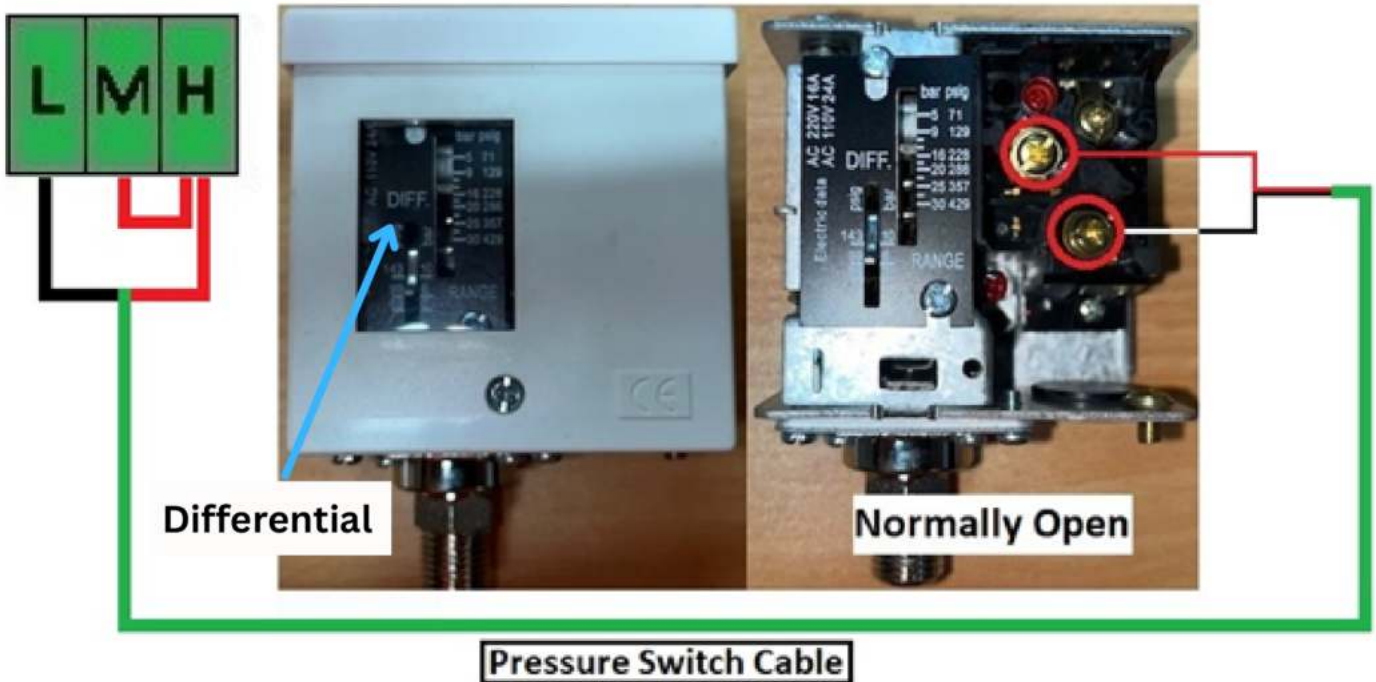
The solar isolator and any incoming power from a generator or mains power MUST be isolated and wait for the inverter screen to switch off before accessing any power cables for the solar panels, pump wiring or AC input wiring.

PRESSURE SWITCH SETUP

L M H

Tank Full / Pressure switch Plug

Optional Pressure Tank:
Great if you require extra pressure for taps. If filling a tank just the pressure kit without pressure tank is required.

Pressure tank air-charge should be around 3 PSI below the pump cut-in pressure. Un-screw the top cap to access the air filler valve, and use an air-compressor. Fill to the required pressure.

This cap comes loosely screwed in, if you're using a pressure tank you don't need the cap and can screw the tank in instead. If you're not using a pressure tank apply thread tape to the thread of the cap and tighten well to seal it.

Pressure switch

Set pressure switch to cut out slightly above the running pressure.

Pipe to pump

PRESSURE SWITCH SETUP

Differential

Normally Open

Pressure Switch Cable

Cut off pressure adjustment screw

YS−110

Cut in differential adjustment screw

Setting cut off - Run your pump with the line open and wait for the gauge to reach its maximum PSI or BAR. Take note of this pressure and then using the screw circled in red, adjust the cut off pressure 3 psi higher than the running pressure.

Setting cut in - The cut in pressure differential often doesn't need to be modified, the typical differential pressure is 15-20psi. If the pump is not starting at this differential, you can adjust the screw circled in green to increase the differential until your pump begins to run.

**Confirming correct operation:**

1. Start the pump and confirm there is flow to the tank, dam, etc.
2. Close the float valve at the tank, dam, or etc manually by holding the float in the up position. If you do not have a float valve, we recommend installing a gate valve.
3. Pressure will build in the pipe, and the message "OFF (Tank)" should appear on the display screen. The pump should begin to slow down after a few seconds. If the message does not come up on the display and the pump does not begin to slow, adjust the cut off pressure down to a lower setting and start again from step 1.
4. Once the message comes up on the screen and the pump has stopped, let the float valve go so the water flows as normal. This will release the pressure in the pipe and the message will clear from the screen. Once the pressure drops by the amount set on the differential, the pump will restart.

ADJUSTING THE INVERTER SETTINGS

Power Up
Make sure there is power going to the inverter (solar panels, generator or mains power) and the screen is on the main display. If the screen is not on the main display, press the "ESC" or "UP" button until it shows as below:

```
HSPH5500H
ID: 9792
On(Working)
14:24 07/16/19
```
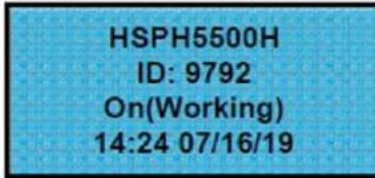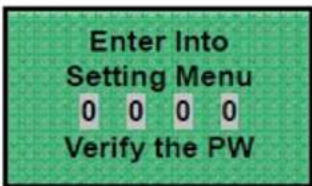
Passwords
Some versions of the inverter's software require a different password to access some settings.

If a password is required to access a particular setting in some software versions, the setting won't appear in the main System Setting Menu. The password will be listed with the title for each setting on the following pages.
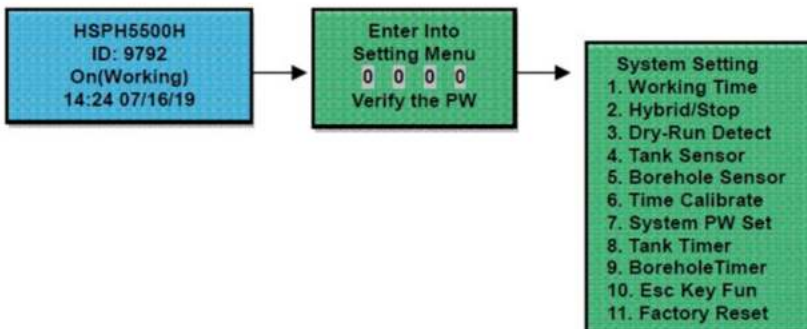
To access the Main Menu of settings:
- Press the Up button until the screen shows the page with the model number of the inverter.
- Press Enter, then input the password 0000:
  1. Use the up and down buttons to adjust the highlighted number, press enter to move to the next digit.
  2. Once all digits of the password are set, press Enter again to go ahead.

If the 0000 password does not work, the super password is 9590.

```
Enter Into
Setting Menu
0  0  0  0
Verify the PW
```

System Setting Menu (use password 0000)
This will bring you into the System Setting Menu. The settings listed here don't require a different access password. Use the Up and Down buttons to navigate through the list of settings, once a desired setting is highlighted press Enter to select the setting to adjust it.

```
HSPH5500H              Enter Into
ID: 9792      →        Setting Menu      →    System Setting
On(Working)            0  0  0  0             1. Working Time
14:24 07/16/19         Verify the PW          2. Hybrid/Stop
                                              3. Dry-Run Detect
                                              4. Tank Sensor
                                              5. Borehole Sensor
                                              6. Time Calibrate
                                              7. System PW Set
                                              8. Tank Timer
                                              9. BoreholeTimer
                                              10. Esc Key Fun
                                              11. Factory Reset
```

Note - *The pump must be stopped before changing any settings using the on/off button on the inverter.*

ADJUSTING THE INVERTER SETTINGS

Working Time

The Working Time option allows setting a window of time for the pump daily operating hours in 24-hour time. By default, the pump is allowed to operate at any time of the day or night with "0:00" and "23:59" set.

```
Working Time
Start – Stop (H:M)
Time: 0 :0 – 23:59
```
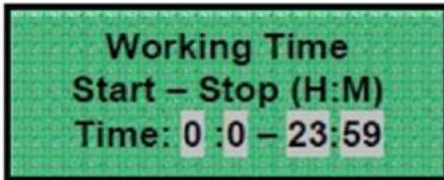
For a 'hybrid' solar pump where mains power is available, one might wish to set a window of time to match the sun hours – if there is no need for the pump to operate after dark. For example, to pump only between 8am to 6pm, set "8:00" and "18:00".

If you wish to set a time window, it is important to check the time is set correctly on the inverter. In the main settings menu, scroll down to Clock or Time Calibrate and press Enter. Using the directional buttons, change the time and date to your local time - press Enter for each section when complete.

Hybrid/Stop - Setting the Hertz

Using the directional buttons scroll down to Hybrid/Stop and press the Enter button.

```
PV Low Power
to Hybrid/Stop
LE: 25 Hz In 20 Sec
15 Min Restart
```
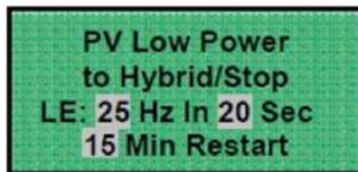
For initial pump commissioning, especially for surface mounted pumps without a positive suction head (where the water source is lower than the pump suction inlet), it is best to set the minimum Hz (pump speed) to the point where the pump can still deliver water to the tank or delivery point.

Below this speed – without setting an appropriate minimum speed – the pump will idle without delivering water and risk losing prime. Also, running the pump too slow to deliver water will cause wear without any benefit.

Procedure: During a good sunny day, or using mains/generator power temporarily, you can adjust the Maximum Hz (see 'Motor AC Frequency Limit' on the following pages) down incrementally to find the minimum pump speed that will just deliver water to the tank or delivery point at a minimal rate. Note this Hz down and be sure to put the Maximum Hz back to 50Hz or to the desired maximum pumping speed. Use the minimum Hz you found here as the **'LE Hz'** setting in the Hybrid/Stop section detailed below:

In the 'Hybrid/Stop' setting, Using the directional buttons change the **LE:30** Hz to the minimum Hz found during the above procedure. Press Enter leaving **IN 20 Sec** then press Enter again. You can also change the **15 M Restart** up to **30 M Restart** or to a time limit you prefer. This setting changes the length of time the pump will remain **'Off'** for. Once the time is up the inverter will attempt to run the pump again. Press Enter again to bring you back out to the System Setting menu.

ADJUSTING THE INVERTER SETTINGS

Dry-Run Detect
Scroll down to Dry-Run Detect and press Enter.

```
Dry-Run Setting
Enable/Disable
Parm Setting
Ref LE Curt: 10A
```
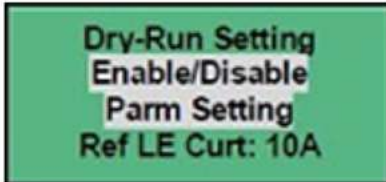
Select En/Disable and press Enter to go into the setting.

If you are using a low water sensor: Select Disable, then press Enter, then press the Escape (ESC) button to go back to the System Setting Menu.

If you are not using a low water sensor: Select Enable and press Enter, then select 'Parm Setting' and press Enter. In the 'LE Current' setting you will need to enter one third of the pump motor's rated current. This can be found on the pump motor's rating label, or you can ask Commodore Australia's support team. Once adjusted press Enter, then press Escape (ESC) to go back to the System Setting Menu.

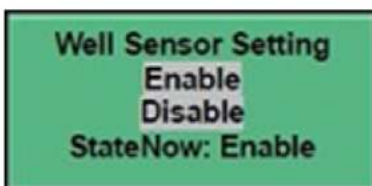## Tank Sensor Setting
Scroll down to Tank Sensor and press Enter.

```
Tank Sensor Setting
Enable
Disable
StateNow: Enable
```

If you are not using a Tank sensor or Pressure Switch - Select Disable and press Enter, then press Escape (ESC) to go back to the System Setting Menu.

If you are using a Tank Sensor or Pressure Switch – Select Enable and press Enter. Press Escape (ESC) to return to the System Setting Menu, then press Escape (ESC) to go back to the System Setting Menu.

Well or Bore Sensor Setting
Scroll down to Borehole Sensor and press Enter.

```
Well Sensor Setting
Enable
Disable
StateNow: Enable
```

If you are using a Low Water sensor - Select Enable and press Enter, then press Escape (ESC) to go back to the System Setting Menu.
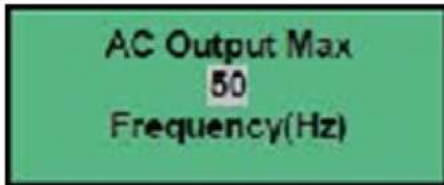
If you are not using a Low Water sensor - Select Disable and press Enter, then press Escape (ESC) to go back to the System Setting Menu.

ADJUSTING THE INVERTER SETTINGS

Motor AC Frequency Limit (use password 9582)
Scroll down to Freq Limit and press Enter.

> **AC Output Max**
> **50**
> **Frequency(Hz)**

This is the maximum pump speed setting where 50Hz is the full rated speed of the pump. For normal operation, the Frequency Limit is typically set to 50Hz. If it is set to 50Hz - press ESC and move on. If not, use the directional buttons to bring it up to 50Hz and then press Enter.

Note – *if the water source cannot keep up with the pump delivery rate, i.e. it's pumping more water than the bore can supply constantly, the maximum Hz can be reduced to match the pumping rate with the bore supply.*

Motor AC Voltage limit (use password 9581)
Scroll to Voltage Limit and press Enter.

> **AC Output**
> **Max Voltage**
> **220V   240V**
> **State Now: 220V**
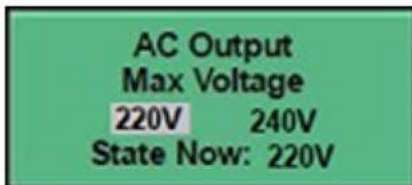
For single-phase or low voltage three-phase 230-240v pumps, select 240v and press Enter, or adjust the voltage to 240v and then press Enter.

For 380-415v three-phase pumps, select 415v and press Enter.

Motor AC Pump Phase Configuration (use password 9578)
Once back in the System Settings menu scroll down to AC Pump Phase.

> **AC Pump Phase**
> **Single**
> **Three**
> **State Now: Single**

For 230v single phase motors, select "Single" and press Enter.
For 230v three phase motors, select "Three" and press enter.

Note – *the 'low voltage' inverter models can be used to operate single phase 230v or three phase 230v motors. The 'high voltage' inverter models can be used for 380-415v three phase motors only. If you are unsure, the pump's motor rating label should specify either 1~ or 3~, otherwise please contact the Commodore Australia support team.*
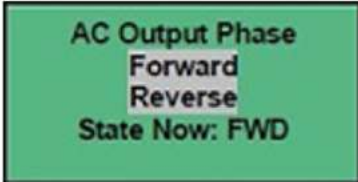
The Commodore 3.7kW 230v motor is an example of a three-phase 230v motor. If you have this motor, set the AC Pump Phase to 'Three' and press Enter.

ADJUSTING THE INVERTER SETTINGS

Motor AC Output Direction (use password 9580)
Scroll down to AC Output Dir and press Enter.

Select FWD and press Enter.
Once you are back in the System Setting Menu press the ESC button to return to the Main Screen.

Note – *not all models of the inverter have this setting. To reverse the direction of a three-phase pump, only two of the three phase wires need to be swapped:*

- Switch off the inverter using the on/off button underneath, or by holding the on/off button on the front panel.

- Switch off the solar isolator and switch off any incoming mains or generator power if present.

- Wait for the screen to switch off, this drains remaining power from the capacitors in the inverter.

- Open the junction box for the pump output power cable or the inverter casing if you do not have a junction box.

- Looking at the power cable going to the pump motor, swap the position of the U/COM (black) and V/RUN (blue/grey) wires as labelled on the wiring terminal strip.

- Replace the cover of the junction box or inverter.

- Switch on the solar isolator, or generator, and test the operation of the pump to confirm the correct rotation direction.

Surface Mounted Pumps – Set MPPT voltage (use password 9589)
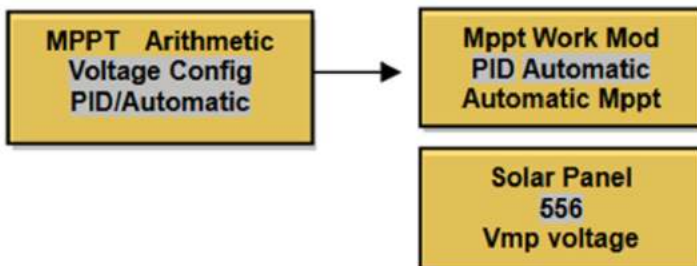
Normally, this can be left on 'Automatic MPPT'. In some scenarios with surface mounted pumps where water surging occurs, the 'PID Automatic' option can help. This allows us to set the 'Maximum Power Point Tracking' target voltage to match the solar array 'Voltage at maximum power' or 'Vmp' value. To work out your solar array 'Vmp' value:

ADJUSTING THE INVERTER SETTINGS

- Check the rating label sticker on the back of one of the solar panels in your solar array.

- Look for the 'Vmp' or 'Voltage max power' voltage rating, typically between 30v and 45v.

- Multiply the Vmp rating by the number of solar panels connected in series, for example:

  1. Solar panel Vmp rating is 34.5v, with 9 panels connected in series.
  2. The array Vmp is 34.5 x 9 = 310.5v

- If there are two sets of solar panels, connected in parallel, the array Vmp stays the same as one set.

To set the solar array Vmp in the pump drive:
- Select 'PID/Automatic' and press enter

- Select 'Voltage Config', press enter, then input the Vmp voltage as worked out using the above method.

Please note that any changes that are made while the pump is running will not be applied unless the power button located at the base of the pump drive has been turned off. Once the pump is turned off also turn off the isolator switch and wait for the screen to lose power. Count out 10 seconds and turn the isolator switch back on and then the pump on/off button once the unit has loaded the main screen.

Also note that the solar isolator switch should only be turned off after using the on/off button on the inverter to stop the pump. Switching off the solar isolator with the pump is running may cause damage to the inverter input power circuits. Excessive use of the isolator switch while the pump motor is running can cause the inverter to short out as well as other failures.

The solar isolator and any incoming power from a generator or mains power MUST be isolated and wait for the inverter screen to switch off before accessing any power cables for the solar panels, pump wiring or AC input wiring.

TROUBLESHOOTING

General Terms Table:

Display	Meaning
"ON(Working)"	Inverter is working and ac output normal
"OFF(On/Off)"	On/Off button release
"OFF (SPMCS)"	Remote SPMCS control to Stop
"OFF (Timer)"	Inverter is out of working time
"OFF (PV Low Pow)"	Solar production is too low to operate
"OFF (Hybrid)"	AC input Error, hybrid mode switch failed
"Off (Tank)"	Water level sensor or pressure sensor active – Tank is full
"OFF (Borehole)"	Water level sensor active – Bore/Well is dry
"OFF (DryRun Soft)"	Pump dry run detected by software – no water input to the pump
"OFF(AC Out S-C)"	AC over the max current IGBT
"OFF (Sensor Err)"	AC output current sensor error
"Off (Mft Drive)"	Software error
"OFF (AC Out O-A)"	AC output over load
"OFF (Over Load)"	Solar input power over maximum power of inverter
"OFF (DC Over Vol)"	Solar input over voltage
"OFF (Over Temp)"	Inverter over temperature

TROUBLESHOOTING

General Terms Table:

Display	Meaning
"OFF (Ic Voltage)"	Power supply error
"OFF (Phase Lost)"	Solar input low voltage
"OFF (Low Voltage)"	Solar input low voltage
"OFF (Locked)"	Remote SPMCS control locked the inverter
"OFF (AC P-G S-C)"	AC output phase to ground short circuit
"OFF (Capacitor)"	Lifetime of capacitor is out, requires a replacement
"AC-Out 3Ph FWD"	AC output 3phase forward
"AC-Out 3Ph REV"	AC output 3phase reverse
"AC-Out 1Ph FWD"	AC output 1phase forward
"AC-Out 1Ph REV"	AC output 1phase reverse
"W:System Time"	System time is not working warning

Warning Terms Table:

Display	Meaning
"W:System E2PROM"	Warning - E2prom is not working
"W:Hybrid Low Vol"	Warning - No AC input
"W:AC O Unbalance"	Warning - AC output3phase is unbalance

TROUBLESHOOTING

Warning Terms Table:

Display	Meaning
"W:AC Phase Lost"	Warning – AC 3phase input phase lost
"W:Solar C-Sensor"	Warning – Solar current sensor issue
"W:AC C-Sensor"	Warning – AC input current issue
"W:Capacitor Life"	Warning – Replace the capacitor
"W: U-Ph C-Sensor"	Warning – AC output U phase current sensor issue
"W:V-Ph C-Sensor"	Warning – AC output V phase current sensor issue
"W:W-Ph C-Sensor"	Warning – AC output W phase current sensor issue
"E:Over Voltage"	Solar input over voltage error
"E:AC Out O-A"	AC output over load error
"E:AC Out Short-C"	AC output over max current of IGBT or AC output phase short circuit error
"E: Over Temp"	Inverter over max temperature error
"E:Power Supply"	Hardware power supply error
"E:Over Load"	Solar input power over max power of inverter error
"E:Out Phase Lost"	AC output 3phase phase lost error
"E:AC Out P_G S-C"	AC output phase to ground short circuit

TROUBLESHOOTING

Error Codes Table:

Error Code	Beep Alarm Times	Reason
E1	1	Solar input power over max power of inverter error
E2	2	Solar input over voltage Error
E4	3	AC output over current of IGBT or AC output phase short circuit
E8	4	Error AC Output over load error
E16	5	Inverter over max temperature error
E32	6	Hardware power supply error
E64	7	AC output 3phase phase lost error
E128	8	Software error
E256	9	Voltage booster error
E512	X	X
ES1024	10	AC output phase to ground short circuit
E2048	11	AC output current sensor error
E4096	12	Capacitor over life time error

TROUBLESHOOTING

1. Message on the main page shows "OFF (AC Out S-C)". Inverter Status Page shows "E: AC Out Short-C". Alarm sounds 3 times, stops, then repeats. (Error Code: E4).

HSPH3700H
ID: 9115
OFF(AC Out S-C)
20:19   07/12/2019

1.1. Do not connect a breaker or switch of any kind between the inverter AC output and the pump motor. Remove any breaker or switch that has been installed. If there is no breaker or switch between the inverter AC output and pump motor, go to 1.2.

1.2. Measure the pump motor's resistance (Ohm) to check if the motor is normal.

Step 1: Confirm the On/Off Button is in the Off position and shut down the inverter by turning off the solar input isolator, the mains power switch or stopping the generator.

Step 2: Once the units screen has turned off, unplug the AC output plug from the inverter, or disconnect the pump power cable from the inverter at the UVW and earth terminals.

Step 3: Measure the pump motor's resistance (Ohm) by using a Multimeter.

1.2.1. Measurement method for Three-phase pump motors:
There should be 4 wires coming from the pump motor, Black (U Phase), Blue or Grey (V Phase), Brown (W Phase) and Yellow-Green (Ground).

Check and record the resistance (ohm) of U-V, V-W and U-W.

All 3 should have the same resistance (ohm) readings. If they do, move to 1.3.

If the difference between them is greater than 1 Ohm, there is likely a fault with the pump motor or power cable.

1.2.2. Measurement method for Single phase pump motors:
There should be 4 wires coming from the pump motor, Black (U Phase), Blue or Grey (V Phase), Brown (W Phase) and Yellow-Green (Ground).
Ohm measurements for U-V, V-W and U-W are not the same (not zero), for single phase pump motors. The Ohm readings of U-V should equal Ohm of V-W + Ohm of U-W or any other combination of U-V, V-W and U-W.

For example, if V-W is 3.2 and W-U is 5.3, then U-V should equal 8.5.

If the total resistance of 2 of them equals the resistance of one of them, the pump motor and power cable are ok, and you can move to 1.3.

If the difference between them is greater than 1 Ohm, there is likely a fault with the pump motor or power cable.

TROUBLESHOOTING

Single phase pump measurement method as below(R1=R2+R3):

1.3. Test the inverter is operating without load.

Step 1: Confirm the On/Off Button is in the Off position and shut down the inverter by turning off the solar input isolator, the mains power switch or stopping the generator.

Step 2: Once the units screen has turned off, unplug the AC output plug from the inverter, or disconnect the pump power cable from the inverter at the UVW and earth terminals.

Step 3: Turn the inverter back on by turning on the solar input isolator, the mains power switch or restarting the generator and checking the AC OUTPUT STATUS.

Step 4: Check the output frequency, if the output frequency is 0Hz, the inverter has failed. If the output frequency is at the maximum set in the settings, the inverter is working.

1.4 Check the AC out plug. While the plug is disconnected from the inverter, check both the male and female parts of the plug. If there are black marks the connection has been shorting, and both should be replaced. If there are no signs of shorting contact Commodore Australia support for assistance.

2. Message on the main page shows "OFF (AC Out O-A)". Alarm sounds 4 times, stops, then repeats. (Error Code: E8).

HSPH3700H
ID: 9115
OFF(AC Out O-A)
20 : 21   07/12/2019

TROUBLESHOOTING

2.1. Check that the inverter's rated power is equal to or greater than the pumps rated power. Otherwise goes to 2.2.
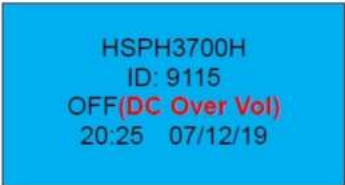
2.2. Check the pump motors resistance to confirm it is normal or not, as details in 1.2.

NOTE: *Do not run a pump with a higher rated power than the inverter's rated power.*

If the problem persists contact Commodore Australia support for assistance.

3. Message on the main page shows "OFF (Over Load)". Alarm sounds 1 time, stops, then repeats. (Error Code: E1).

```
        HSPH3700H
         ID: 9115
      OFF (Over Load)
     20:28  07/12/2019
```

3.1. Check that the inverter's rated power is equal to or greater than the pumps rated power. Otherwise goes to 3.2.

3.2. Check the pump motors resistance to confirm it is normal or not, as details in 1.2.

NOTE: *Do not run a pump with a higher rated power than the inverters rated power.*

If the problem persists contact Commodore Australia support for assistance.

4. Message on the main page shows "OFF (DC Over Vol)". Alarm sounds 2 times, stops, then repeats. (Error Code: E2).

The DC input voltage is greater than the inverters maximum VOC input voltage.

```
        HSPH3700H
         ID: 9115
      OFF(DC Over Vol)
     20:25  07/12/19
```

NOTE: *For 220V inverter, max VOC DC input is 450v. For 380v inverter max VOC DC input is 780v or 900v. Confirm by checking specification sticker on the right-hand side of the inverter.*

Disconnect the solar input and check the DC input voltage using a multimeter.
230v pump: If the DC voltage is over 450v VOC, reduce the number of solar panels.
380v pump: If the DC voltage is over 900v VOC, reduce the number of solar panels.

If the problem persists contact Commodore Australia support for assistance.

TROUBLESHOOTING

5. Message on the main page shows "OFF (Over Temp)". Alarm sounds 5 times, stops, then repeats. (Error Code: E16).

```
    HSPH3700H
     ID: 9115
   OFF(Over Temp)
  20:17   07/12/2019
```
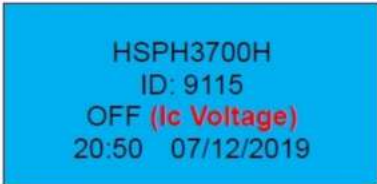
Over temperature. Inverter Fan working condition:
If the temperature is 70°C in 10s, the inverter will stop working, and the LCD screen will show 'OFF(Over Temp)'.

5.1. If the temperature is greater than 45°C, the fan will run. Check installation conditions to reduce the inverters internal temperature. For example, if the inverter is in direct sunlight, relocate to a shaded area or shade the unit as best as possible.

5.2. If some fans are running and other have stopped, check them for foreign objects such as spider webs or other debris. If found, clean the fans to get them running. If they continue not to run, they will need to be replaced.

5.3. Check the Temperature ("Temp: ? Degree") on the inverter status screen. If the temperature is greater than 65°C, take photos and contact Commodore Australia support for assistance.
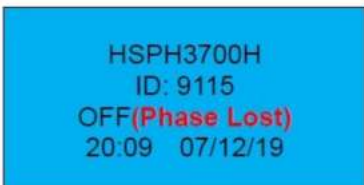
6. Message on the main page shows "OFF (Ic Voltage)". Alarm sounds 7 times, stops, then repeats. (Error Code: E32).

```
    HSPH3700H
     ID: 9115
   OFF (Ic Voltage)
  20:50   07/12/2019
```

Hardware circuit failure. Replacement PCB need. Take photos and contact Commodore Australia support.

7. Message on the main page shows "OFF (Phase Lost)". Alarm sounds 7 times, stops, then repeats. (Error Code: E64).

```
    HSPH3700H
     ID: 9115
   OFF(Phase Lost)
  20:09   07/12/19
```

Check the inverter output phase matches the pump phase. For example, both the pump motor and inverter should be single phase.

Note: *DO NOT connect a Single phase pump motor to a Three phase inverter.*

TROUBLESHOOTING

Step 1. Checking and record pump's resistance (Ohm of U-V, U-W, V-W) as detailed in 1.2.

Step 2. After confirming the pump is normal, power off and restart the inverter and run the inverter without load as detailed in 1.3.

If the problem continues without load the inverter has failed. Take photos and contact Commodore Australia support for assistance.

8.The screen stays in the boot LOGO interface and cannot enter the main page with no Error code and no alarm.

```
      Hybrid Solar
        Pumping
        Inverter
    Version: XXXX
```

Solar power input voltage lower than Minimum DC input voltage. Check the DC input voltage is above the minimum shown on the specification sticker on the right-hand side of the inverter.

9. Message on the main page shows "OFF (Time Con)". No alarm. No error code.

There is a problem with the working time settings or time calibrate settings.
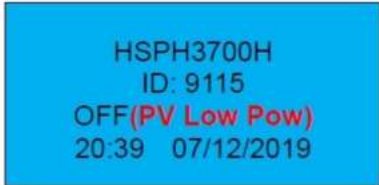
```
      HSPH3700H
       ID: 9115
     OFF(Time Con)
    20:28   07/12/2019
```

9.1. Check the Working Time Setting is set correctly. Note that this setting is in 24-hour time.

9.2. Calibrating the system timer to your local time.

If the problem persists contact Commodore Australia support for assistance.

10. Message on the main page shows "OFF (PV Low Pow)". No alarm. No error code.

```
      HSPH3700H
       ID: 9115
     OFF(PV Low Pow)
    20:39   07/12/2019
```
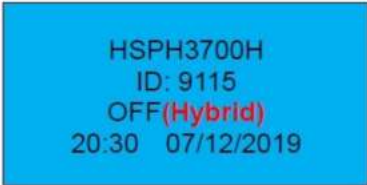
Check the Hybrid/Stop settings.

TROUBLESHOOTING

NOTE: *DO NOT set the minimum frequency below 25Hz without consulting Commodore Australia support.*

10.1. Set the hybrid frequency to 25Hz and restart the inverter when sunlight is good enough to test it again. If there is still a problem, check if the pump motor is normal.

Step 1. Checking and record pump's resistance (Ohm of U-V, U-W, V-W) as detailed in 1.2.

Step 2. After confirming the pump is normal, power off and restart the inverter and run the inverter without load as detailed in 1.3.

11. Message on the main page shows "OFF (Hybrid)". No alarm. No error code.

```
      HSPH3700H
       ID: 9115
      OFF(Hybrid)
   20:30   07/12/2019
```

Hybrid On/Off switch is not changing over automatically. AC input voltage is to low. Possible phase lost.
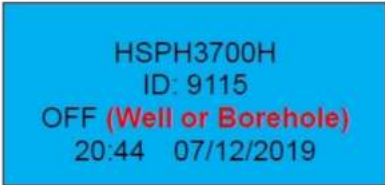
Restart inverter by pressing the On/Off button, waiting 10 seconds and pressing the On/Off button again.

11.1. Check the AC input voltage is above the minimum shown on the specification sticker on the right-hand side of the inverter.

11.2. Check the AC input wiring is correct.

If the problem persists, take photos and contact Commodore Australia support for assistance.

12. Message on the main page shows "OFF (Well)". No alarm. No error code.

```
      HSPH3700H
       ID: 9115
   OFF (Well or Borehole)
    20:44   07/12/2019
```

The pump has been stopped to prevent it from running dry because there is no water detected by the water level sensor or water flow by flow sensor.

Wait for water levels to rise and the pump to restart automatically.

If there is water in the bore, dam, river, etc, adjust the water level sensor position and restart the inverter.

TROUBLESHOOTING

If a flow switch is being used on a surface mount pump, reprime the pump and restart the inverter.

If adjusting the sensor or repriming the pump does not work, it is possible that the water level sensor, flow switch or cable is faulty. Test by unplug the cable from the Borehole plug socket and restarting the inverter.

If the problem persists, take photos and contact Commodore Australia support for assistance.

13. Message on the main page shows "OFF (Dry Run)". No alarm. No error code.

```
HSPH3700H
ID: 9115
OFF (Dry Run)
20:37   07/12/2019
```

The pump has been stopped to prevent it running dry because software detected a drop in the amp draw by the pump.

Wait for water levels to rise and the pump to restart automatically at the end of restart delay.

If the pump does not restart, adjust the dry run setting, and restart the inverter.

If the pump is a surface mount pump, reprime the pump and restart the inverter.

If adjusting the setting does not work, it is possible the programming is faulty. Take photos and contact Commodore Australia support for assistance.

14. Message on the main page shows "OFF (MFT Drive)". No alarm. No error code.

```
HSPH3700H
ID: 9115
OFF(Mft Drive)
20:50   07/12/2019
```

Software error. Perform a factory reset, readjust the system settings and restart the inverter.

15. Power input to the inverter is correct, but it cannot drive the pump.
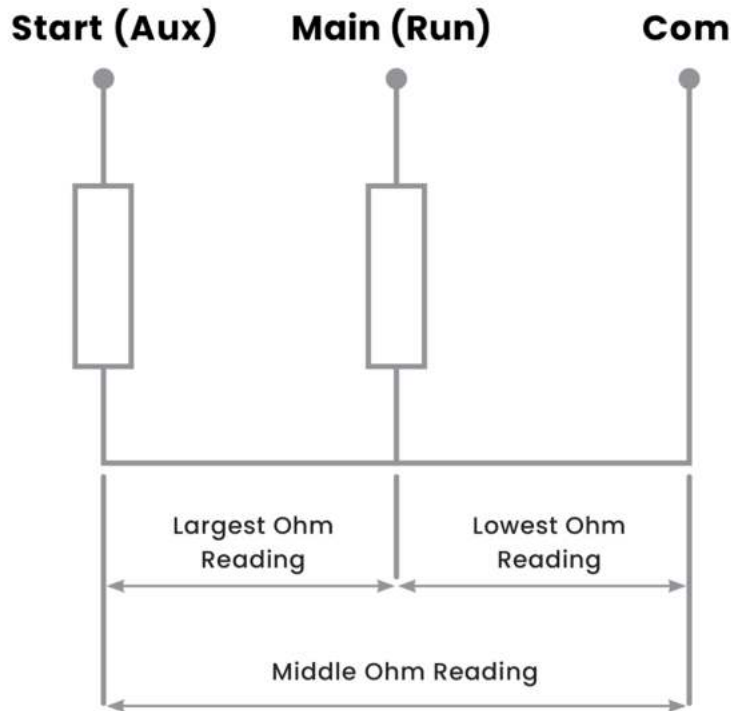
There is electrical leakage because the pump motor wiring is incorrect. Change the wire or replace the pump motor.

If the problem persists, take photos and contact Commodore Australia support for assistance.

TROUBLESHOOTING

3 Wire Motor Guide

Using a multimeter, we can work out the wire colours for the Common, Start and Run wires with this method:

The Largest ohm reading is between start (aux) wire and main (run) wire

The middle ohm reading is between start (aux) wire and common wire

The Lowest ohm reading is between main (run) wire and common wire

Measure between the motor wires with a multimeter set to measure resistance (ohms), and note down the wire colours and the resistance readings here:

Largest Resistance wire colours:_ _

Middle Resistance wire colours:_ _

Lowest Resistance wire colours:_ _

TROUBLESHOOTING

3 Wire Motor Guide

The Common wire is not part of the pair of wires with the largest Ohm reading.

Common wire colour: _____

The Main wire is from the pair of wires with the lowest ohm reading (the other wire in this pair is the Common wire).

Main wire colour: _____

The remaining wire is the Start wire, from the pair of wires with the middle ohm reading: (the other wire in this pair is also the Common wire).

Start wire colour: _____

Commodore Solar Pump Inverter—Motor connection Terminals:
U = Common(C) | V = Run (Main) | W = Start (Aux)

Workhorse Single Phase motor wire colours:
Common = Black (U) | Run/Main = Blue (V) | Start/Aux = Brown (W)

Note: *If you need assistance, contact Commodore Australia support.*

WARRANTY

1. Damage to the pump or motor caused by abrasive or corrosive water is not covered by warranty. It is suggested that an analysis of bore water be carried out prior to installation to ensure pump suitability.

2. Pumps must be used with clean water. A submersible pump must not be used to bail a new bore. Guarantee does not cover failure or wear due to abrasives in the water.

3. Do not allow pumps to run dry, low water sensors must be installed to avoid dry running.

4. Know the depth of the bore and ensure that the pump does not rest in sand. Ensure 1.5 metres (5 feet) clear between the bottom of the pump and the bottom of the bore.

5. Never support the weight of the pump by the power cable, ensure it is held with appropriate steel hanging cable.

6. If a non-return valve (or check valve) is fitted at the top of the bore in a submersible pump installation, such as when using a pressure switch with non-return valve fitted into the T piece, it is also necessary to fit an additional non-return valve at no more than 7.5m above the pumping draw down water level in the bore. This helps to protect the pump from a less than zero head (vacuum) start up in the event of a leak in the pumps built-in non return valve.

Generally speaking it is typically best to have just one non-return valve in a submersible pump installation. For multistage submersible pumps a valve is built into the pump head after the final impeller stage, a pressure switch system will require an additional check valve.

Commodore Pumps (motor and pump head) come with a 2 year warranty. Inverters and controllers come with a 1 year warranty. If your item is found to be defective within the warranty period we will replace the defective part free of charge. You are welcome to send any faulty goods back and our factory trained staff will carry out the repair for you free of charge within the warranty period. Repairs outside of the warranty period are available at a reasonable cost. Shipping is cost of buyer. Consumables (such as helical rotor pump impellers), cables, leads, etc are not covered by warranty. Negligence or misuse is a warranty exclusion. Commodore is not responsible for any direct or indirect expenses or losses related to warranty or non warranty.

For more information on returns, warranty and repairs you can view our terms and conditions online here - www.commodoreaustralia.com.au/terms-conditions/