# Installation, Operation and Maintenance Instructions




NOV Solar Motor Controller
SUN SMC 550X

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# 1 Safety Instructions




SUN SMC 550X must be connected properly to ensure satisfactory and safe operation. Following these recommendations will ensure that the safety of personnel and satisfactory operation of the controller is achieved.

- Never operate the device beyond the nameplate conditions.
- Allow device to cool before handling.




- Avoid touching the outside of the case as it may reach temperatures (under extreme conditions) hot enough to cause burns. Do not install the unit where it could be accessed by children or animals.
- Do not disassemble the unit as there are lethal voltages inside.
- There are no user serviceable parts inside the unit.




- Avoid unplugging the motor from the SUN SMC 550X while the system is operating. Doing so could result in damage to the SUN SMC 550X or Power Supply.




- Always isolate and unplug the SUN SMC 550X from the array before working on any electrical wiring on the SUN SMC 550X or Motor Cables.
- All electrical connections in the solar water pumping system are made via plug and socket. The solar array must be fitted with an Isolation switched socket (if there is more than one PV panel) to accept the connectors from the SUN SMC 550X and to ensure that the system can be completely isolated from the power source when required

NOTE:

The installation, operation and maintenance of the Solar Array are not covered in this manual. Please refer to the Solar Arrays manual for information on this part of the solar water pumping system.

# 2 SUN Solar Motor Controller Description

The SUN Solar Motor Controller 550X is used to run and control NOV approved motors using solar power or an AC interface such as the NOV SUN ACI. **The high operating efficiency of the NOV motor/PC pump and SMC 550X ensures that the maximum amount of water can be pumped over the whole day.**

The SUN SMC 550X comprises a solar maximum power point tracker and brushless DC motor control electronics combined in the one enclosure. Suitable for use on SUN SRX700, SUN MOT1000, and SUN MOT2000 motors.

The MPPT converts and adjusts the voltage on the solar array to maximise power generation and increases or reduces this voltage to suit the demands of the pumping systems.

ELECTRICAL

Do not handle electrical connections when wet. Electric shock can occur.

ELECTRICAL

Solar arrays can deliver high DC voltage levels depending on the configuration. Always isolate and unplug the SUN SMC 550X from the array before working on any electrical wiring on the SUN SMC 550X or Motor Cables. If alterations are required to the array itself, it is essential to cover the front of the array with a blanket or other suitable material to completely stop electrical generation.

ELECTRICAL

The output voltage from the SUN SMC 550X to the Motor is maximum 180V DC. Always isolate and unplug the SUN SMC 550X from the array before working on any electrical wiring on the SUN SMC 550X or Motor Cables.

ELECTRICAL

The solar array must be fitted with an isolation switch to accept the plug from the SUN SMC 550X and to ensure that the system can be completely isolated from the power source when required.

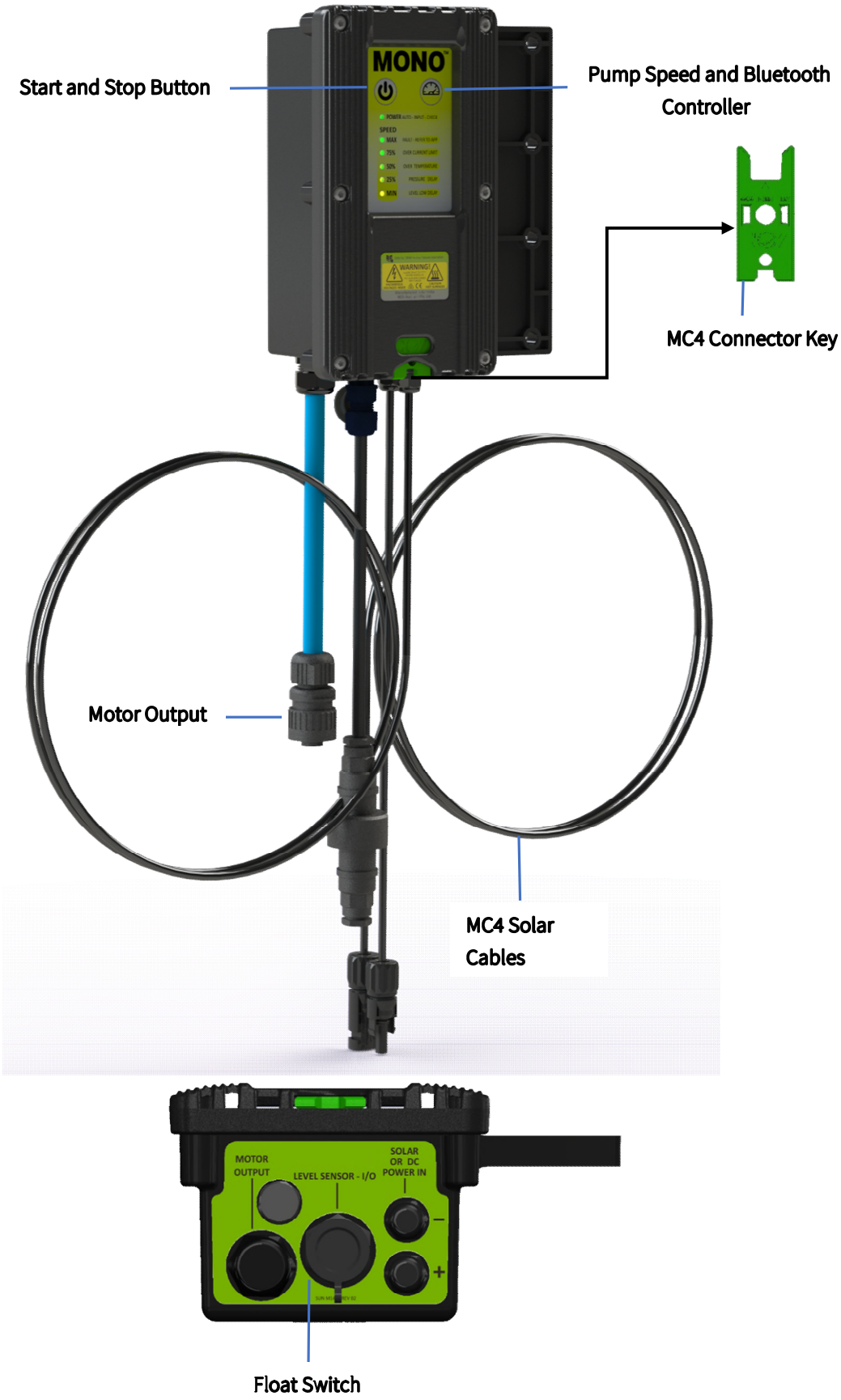





## 2.1 Features Include

- Input power ranges from 35-150VDC and 9A (250-1000W) (Refer to specifications for voltage, current, and power limits for SUN SMC550X model).
- Microprocessor controlled maximum power point tracking continuously changes the array voltage and monitors the input power level. This technology extracts the maximum available power from the solar modules.
- One Input providing multiple operating options such as measuring low water levels in the bore with a submersible probe and/or capturing full tank with a low voltage float switch. Float switch can be enabled or disabled via MonoVue smart phone App (Refer to MonoVue User Manual).
- IP66 water resistant enclosure and maximum thermal characteristics for extreme climatic conditions.
- Supports MonoVue smart phone app (Refer to MonoVue User Manual).
- Electronic current/pressure cut-off system.
- Variable motor speed control via front panel or the optional MonoVue smart phone App.
- Thermal overload protection.
- Output current overload protection stops the system if the discharge pressure from the pump is too high.
- If the power output from the array is too low to start the pump, the system will go into “standby” mode before attempting to restart the pump. This reduces load on the output circuit and unnecessary heating of DC motors.
- Status lights to indicate the operator what the system is doing.
- Telemetry (automatic measurement of data) output available.
- MC4 solar panel connector compatible
- RS485 MODBUS port
- DC brushless motor compatible

# 3 SUN SMC 550X Installation



## 3.1 Mounting of Unit

Attach the SUN SMC 550X to the bracket on the array frame using stainless steel 2 X M8 X 30 long bolts, nuts, and washers.

NOTE:

ATTENTION

Ensure that all mounting positions are resting on the mounting surface and shim if necessary, to ensure no torsion is applied to the unit when anchoring the baseplate.

ELECTRICAL

Ensure that all plugs are fitted correctly to the SUN SMC 550X. Failure to fit the plugs correctly will allow water to enter the SUN SMC 550X leading to failure. This is not covered by warranty.

*Typical NOV Array Post*



## 3.2 Solar or DC Power IN

Connect the MC4 cables between the SUN SMC 550X and Isolation switch located on the back of the solar array.

ATTENTION The Solar Motor controllers utilise 2 “MC4” connection cables to the SUN SMC 550X and Solar array.

ATTENTION If there is more than one solar panel, connect the MC4 cable connector to the **isolation switch**.

ATTENTION Isolate the solar array turning the isolation switch off (if fitted) or by covering the panels, blocking the sun.

WARNING Incorrectly connecting the positive and negative MC4 connector leads between solar array and the SUN SMC 550X will result in damage to the electronics inside the SUN SMC550X.

ATTENTION Switch solar array on using the isolation switch or uncover the panels.

Check that the SUN SMC550X has solar power by switching **“ON/OFF”** switch on the front panel. There is solar power, if the power light is violet, green, yellow, or red light.




ISOLATION SWITCH





## 3.1 Motor Output

ATTENTION

Plug the Motor Plug into the motor socket on the SUN SMC 550X.

ATTENTION

Ensure that the motor cable is adequately protected from damage by animals or livestock.

ATTENTION

The cable should be attached to the array post or support frame with electrical ties to prevent the motor plug from being accidentally pulled out of the SUN SMC 550X.

ELECTRICAL

The output voltage from the SUN SMC 550X to the Motor is 180V DC. Always isolate and unplug the SUN SMC 550X from the array before working on any electrical wiring on the SUN SMC 550X or Motor Cables. Always ensure all electrical connections are complete before turning it on.

ELECTRICAL

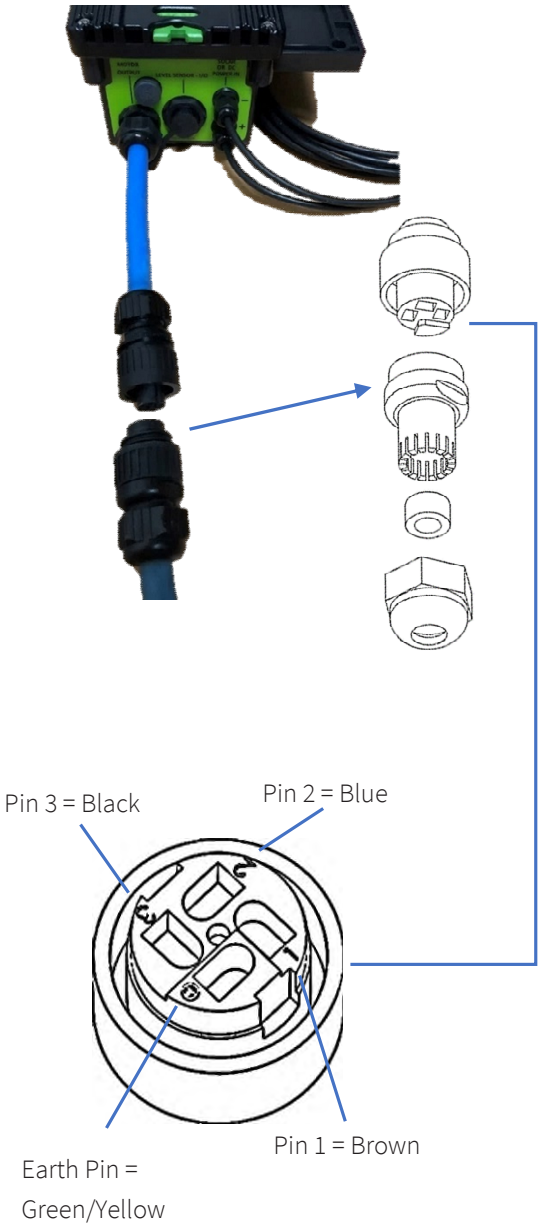
If the motor plug was removed from the cable during the installation process it is important that the wires are reconnected correctly to ensure that the pump runs in the correct direction.

ELECTRICAL

Ensure the SUN SMC550X is **OFF** using the **"ON/OFF"** switch on the front panel.

WARNING

Removing the motor plug from the SUN SMC 550X or shorting the wires together when the SUN SMC 550X is operation, could result in damage to the electronics in the SUN SMC 550X.



## 3.1 Level Sensor - I/O

The Level Sensor – I/O cable should be attached to the SUN SMC550X controller with the jumper plug.

Ensure that the Level Sensor – I/O plug is fitted correctly to the SUN SMC 550X controller. This connector is a bayonet type (half turn).

ELECTRICAL

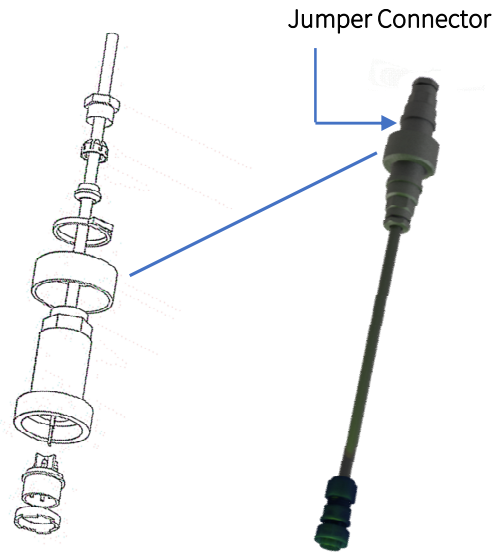
The SUN SMC 550X will not operate without the jumper plug or a correctly wired level sensor fitted unless float switch is disabled in the software settings (Refer to MonoVue User Manual to Enable/Disable Float Switch).

For the initial system test, it is recommended to use the jumper plug.

Other accessories such as the Water Level probe can be installed if necessary, after the operation of the SUN SMC 550X and motor is confirmed.

CAUTION

If float switch/level sensor adaptor cable isn't required, use the rubber cover to prevent dirt and moisture away (Refer to MonoVue User Manual to enable/disable float switch).



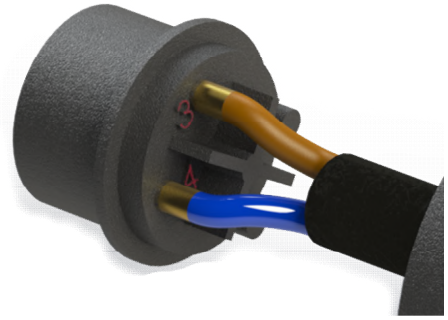

WIRING THE FLOAT SWITCH PLUG

The assembly of the float switch plug and wiring of the jumper plug are connected to pins 3 and 4 as shown below.

The SUN SMC 550X will only operate when pins 3 and 4 of the float switch are connected. The jumper plug contains a link wire to connect these two pins. External switches can be wired into the float switch to remotely start and stop the pump.

FLOAT SWITCH/LEVEL SENSOR CONNECTION





NOTE:

Level sensor/Float switch needs to be normally closed when submerged.

## 3.2 MC4 Connector Key

The Solar Motor controller is connected to the solar array using a 2 x 2m MC4 connector Key.

Place the MC4 connector as shown in the picture and pull the MC4 connectors apart to disconnect them.



WARNING

Incorrectly connecting the positive and negative MC4 connector leads between solar array and the SUN SMC550X will result in damage to the electronics inside the SUN SMC550X.



## 3.3 Operations of the SUN SMC 550X

### 3.3.1 RUN MODES

Press to **START** and **STOP** the SMC 550X Controller at any time.

AUTO START MODE

NOTE: By default, Auto Start is Enabled. Press and hold for 5 seconds to Enable/Disable Auto Start Mode.

- If Power Led lights up , Auto Start is Enabled.
- If Power Led lights up , Auto Start is Disabled.
- Option *13# via the MonoVue app can also be used to change this setting

NOTE: Auto Start mode will always try and start the pump if sufficient power is supplied to the controller.

MANUAL START MODE

**The pump is turned on and off via the button. It will not start the pump the next time power is cycled to the unit.**

### 3.3.2 SPEED MODES

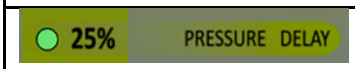
- Press to change the speed settings.
  - By default, MAX is selected. Press to increase or decrease the speed.
  - Speed options are Min, 25%, 50%, 75%, and Max.
- If you have multiple controllers in close proximity, you can disable Bluetooth on individual controllers **(Refer to MonoVue User Manual).**
  - Press and hold it for 5 seconds.
  - Purple light will be displayed indicating that Bluetooth in the controller is deactivated.

NOTE:

- Press not more than a second to check the speed settings.
- Only one phone can be connected to a controller at a time.



### 3.3.3 SUN SMC 550 Controller LED Display Functions

| Operations | Green | Yellow | Red | Blue | Purple |
|---|---|---|---|---|---|
|  | Solar Power is available | Solar power is available and Maximum Power Point Tracking is active | **Flashing** Insufficient Solar Power | NA | **Quick Flash** Insufficient Power for Bluetooth |
|  | Motor is running at maximum speed | Refer to the **MonoVue** App | NA | Bluetooth Connected | Insufficient Solar Power<br>**Flashing** Solar Power is available, connect to the Bluetooth after the flashing light goes off |
|  | Pump Speed Full/Med | Current limit exceeded | NA | NA | NA |
|  | Pump Speed Medium | NA | Maximum Temperature Reached | NA | NA |
|  | Pump Speed Low/Med | Pump over Pressure delay | NA | NA | NA |
|  | Motor is running at minimum speed | NA | Water Level low delay timer | NA | NA |

NOTE:

- If the power light flashes Red and one or more speed light flashes Green, it is in Self-test mode.
- In some solar lightening conditions, the self-test might cycle multiple times.

### 3.3.4 Pump Speed Control

The pump speed button is used to set the speed of pump. This is useful when the peak flow needs to be reduced as in a low yielding bore.

The SUN SMC 550X has two methods of setting the motor speed:

a) Front Panel Speed Button 

- Press to increase or decrease the speed.
- Pressing the Speed button will increase the maximum speed by 25% on each press.

b) MonoVue App

CAUTION

To reduce the maximum pump speed using the MonoVue app, (Refer to MonoVue User Manual) and follow these steps:

**Example: (Refer to MonoVue User Manual)**

Enter *16#, to set the speed from 1 to 5
Display: SET SPEED (1-5)
SPEED = MIN
Enter 3#
Display: SPEED = 50%

### 3.3.5 Over Current Limit

ATTENTION

By default, the SMC 550X is configured to a maximum output current of 5A. The SMC 550X will shut down and restart whenever the current limit has been exceeded. The controller will be restarted once the over current/pressure timer has reached the preset time.

**Scenario for Over Current/Pressure Limit:**

- If a float valve is fitted in the remote tank, once the tank is full the valve closes, this causes the pressure to build up in the system tripping the Current cut off system.
- Blockage in piping.

**Example: (Refer to MonoVue User Manual)**

Enter 12#, to check the maximum motor amps
Display: MAX M AMPS
Enter *12# to set the motor output current from the Controller. Press the desired Amps between 0 and 9.
Display: SET MAX MOTOR AMPS
Enter 350#
Display: MAX M AMPS = 3.50 A

### 3.3.6 Pressure Delay

The purpose of this system is to manage the filling of a remote water storage tank. The remote tank has a float valve that closes when the tank is full, causing pressure to build up in the system and tripping the Pressure/Current cut off mechanism. If the pump pressure climbs over the preset current limit, the pump will automatically stop for 30 minutes, after which the SUN SMC 550X will attempt to restart the pump. The pressure delay indication on the front panel indicates if the system has been turned off using the pressure cut-off technology. When the pressure limit is reached, the indicator will illuminate, and it will flash when the unit is counting down for 30 minutes.

ATTENTION

By default, the motor will restart after 30 minutes.

**Example: (Refer to MonoVue User Manual)**

Enter 18# to read the pressure delay time.
Display: FLOAT TIME = Value

### 3.3.7 Over Temperature

By default, the SMC 550X can operate between a minimum temperature of -10° C and maximum temperature of 50° C. If the temperature rises beyond 50° C, the SMC 550X will slow down and eventually shut down until the temperature returns to normal. The controller will restart after it has cooled down.

Example: (Refer to MonoVue User Manual)

Enter 9#, to read the internal temperature.
Display: TEMPERATURE = Value

### 3.3.8 Level Low Delay (Only if there is a Float Switch Installed)

A bore level switch/float switch is recommended if the flow of the bore is less than the pump's maximum flow rate. The level sensor/float switch will protect the pump from dry running if the water level in the bore drops below the level of the inlet to the pump.

If the water level in the bore/well falls below the water level sensor, the SUN SMC 550X controller will shut down. The system will allow the bore to recover and restart after 15 minutes (default value). After 15 minutes, if the water level is still below the water level sensor/float switch, the SUN SMC 550X will shut down and repeat the process until water is detected.

CAUTION

Dry running of the pump will damage the rubber stator in the pump. Damage resulting from dry running is not covered by the system warranty.

NOV Australia Pty Ltd can supply a separate level sensor/float switch for fitment into the bore or well. This probe connects into the adaptor cable on the SUN SMC 550X.



Bore Level Probe

### 3.3.9 Float Switch

The SUN SMC 550X's Float switch input is designed to operate on a single bore probe or a tank float switch. The SUN SMC 550X will attempt to start the motor if there is a closed electrical connection. If the circuit connection is opened via the bore/float switch, the motor will stop, and the Float Indicator will illuminate Red. Once the bore/float switch is re-closed, the low-level delay will become active. The Float indicator will illuminate Red as the timer counts down. After delay, the indicator will turn off and the SUN SMC 550X will attempt to restart the motor.

Pushing the On/Off button will cancel the time delay on the float switch input.

### 3.3.10 SUN-SUB TOTALISER OPERATION

The SUN-SUB controller has an inbuilt totaliser function. This function counts every revolution the pump has done since installation. This reading can be used as a method of totalising the flow from the time of installation.

Tip:

**If the flow rate is known, the totaliser can be used to determine how much water has been pumped per revolution.**

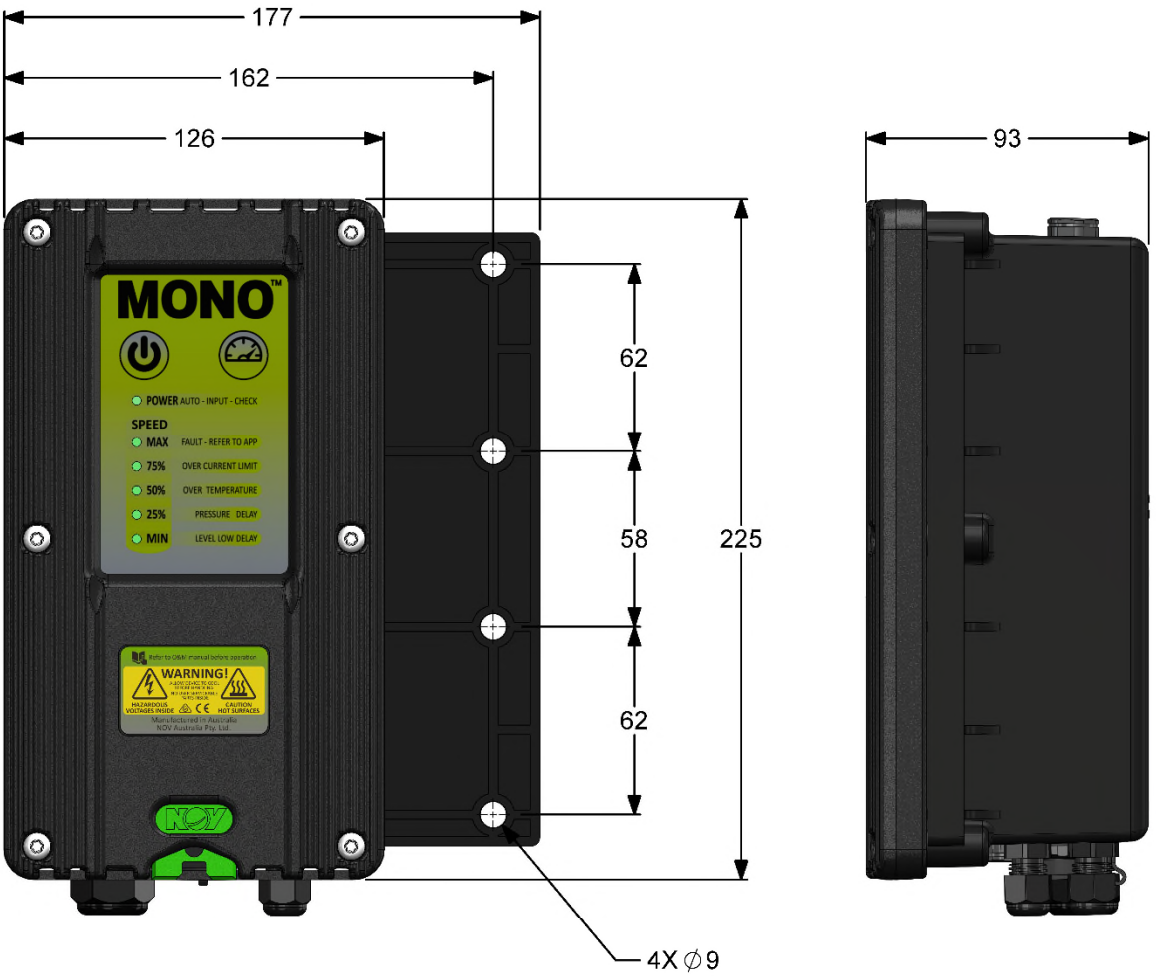
**Example: (Refer to MonoVue User Guide)**

1. Enter 21#, to recall number of Pump Revolutions from the SUN SMC 550X
2. Calculate the volume of water pumped versus the number of revolutions required to pump it.
   **Example:** Number of revolutions to fill 20 litres of water.
3. How many litres were pumped per revolution=Volume of water pumped /Number of Revolutions.

## 3.4 TROUBLE SHOOTING GUIDE

| STATUS LIGHT | STATE/COLOUR | PROBLEM | SOLUTION |
|---|---|---|---|
| **POWER** | Off | Loose array connection | Test array & rectify problem |
| | | Faulty array | Test array & rectify problem |
| | | Faulty SUN SMC 550X | Return to NOV for assessment |
| | | Not enough solar power | Check array position or wait for more sun light |
| | | Check Isolation Switch | Turn it ON |
| **FAULT REFER TO APP** | Yellow | Motor Stall | Check motor current settings (Refer to MonoVue app Manual) |
| | | | Check for obstructions and pipework |
| **CONNECTING WITH THE APP** | Not turning Blue | Unable to connect | • Ensure Bluetooth is Switched On<br>• Restart the APP (Try up to 5 times)<br>• Press  and hold it for 5 seconds until purple light is displayed (Bluetooth deactivated).<br>Press  until purple light disappears (Bluetooth activated – Try connecting now).<br>• Isolate and disconnect the controller for 10 seconds<br>Note: Bluetooth will not operate for 60 seconds after restarting |

## 3.5 Specifications and Dimensions







Weight in Carton – 1.5 Kg

### 3.5.1 SOLAR MOTOR CONTROLLER ELECTRICAL and SPECIFICATIONS

#### 3.5.1.1 ELECTRICAL

SUN SMC 550X

SOLAR ARRAY INPUT

| | |
|---|---|
| **VOLTAGE** | 35 to 150 VDC |
| **CURRENT** | Maximum 9A |
| **SOLAR ARRAY** | 1000W Max |

MOTOR OUTPUT BLDC

| | |
|---|---|
| **VOLTAGE** | 35 to 180 VDC |
| **CURRENT** | Maximum 9A |
| **OUTPUT POWER** | Maximum 650W |

ENVIRONMENTAL

| | |
|---|---|
| **STORAGE TEMPERATURE** | -10° to 60° |
| **OPERATING TEMPERATURE** | -10° to 50° |
| **IP RATING** | IP66 |
| **HUMIDITY** | 95% Max |

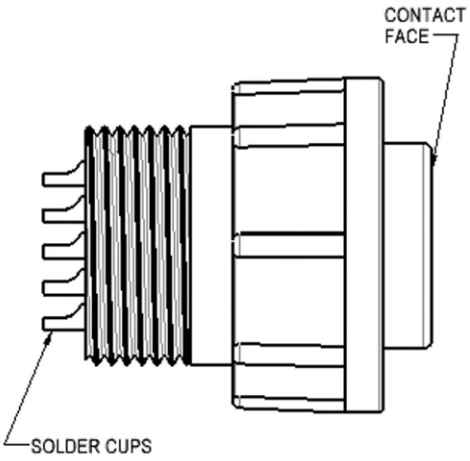
#### 3.5.1.2 CABLE SPECIFICATIONS

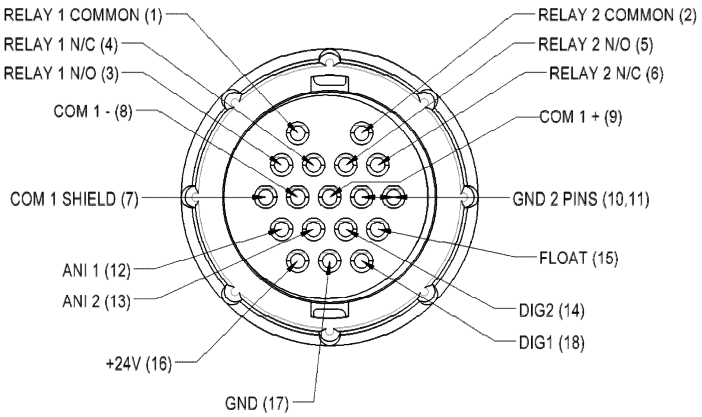
| | | |
|---|---|---|
| **MOTOR PLUG** | 230 V DC, 10A DC | |
| **CABLE** | Double Insulated | |
| | 250V | |
| | 4 Core | 1.5mm2 |

| | | |
|---|---|---|
| **ARRAY PLUG** | MC4 1KV, 30A | |
| **CABLE** | Double Insulated | |
| | 1000V | |
| | Single Core | 4mm2 |

#### 3.5.1.3 LEVEL SENSOR I/O CONNECTOR

NOTE: The 24 Volt power supply is not suitable for charging lead acid batteries




SOLDER CUP FACE VIEW
I/O CONNECTOR PINOUT

# 4 WARRANTY

## 4.1 Warranty Statement

1. SUN SMC550X manufactured by NOV is covered under warranty for a period of thirty-six months on the entire system and twelve months on spare parts from the date of purchase.
2. NOV FMS will make good on its warranty by repairing or, at their discretion, replacing damaged equipment if the following conditions are met:
   a) The equipment was correctly installed and properly used in accordance with NOV Installations and Operating instruction and accepted codes of good engineering practice.
   b) The claim for goods under warranty arises solely from faulty design, material, or workmanship.
   c) The repair is carried out in the NOV factory or by an authorised agent or distributor appointed by NOV Australia Pty Ltd.
   d) All freight costs to and from the factory or repair agent are to be paid by the purchaser.
3. In the case of equipment or components which are not of NOV manufacture, but supplied by them, the warranty is limited to that extended by the suppliers or manufacturers of such equipment.
4. NOV warranty does not cover any of the following:
   a) Claims for third party liability of damage caused by failure of any of the company's products.
   b) Damage caused by abnormal operating conditions, war, violence, storm cataclysm or any other force.
   c) Damage caused by the equipment being used for an application for which it is not recommended.
   d) Damage caused by sand or abrasive materials, corrosion due to salt water or electrolytic action.
   e) If the back plate of SUN SMC550X has been opened before returning to NOV.
5. The decision of NOV in relation to any claims or disputes over warranty is final.
6. The warranty is in lieu of all other warranties and conditions expressed or implied, written, or oral, statutory, or otherwise, which are hereby negated and excluded.
7. This express warranty does not exclude any conditions or warranty implied by the Trade Practices Act 1974 or separate State laws and in addition to any other right, that the original purchasers or any subsequent purchaser may have at law.

   In case of claim please contact your Authorised NOV or contact NOV Australia Pty Ltd.

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