THC THS THSC Range

Installation and Maintenance instructions for the Solar Pump

Tuhorse

THS, THC THSC SERIOUS SOLAR PUMP AND CONTROLLER BOX USER MANUAL.

Tuhorse Solar Pump System Instruction Manual

Thank you for purchasing Tuhorse Solar Pump. To achieve the maximum level of service from your pump, please carefully read the contents of this Instruction Manual

The Tuhorse solar pump system comprises of four components: Solar Panels, Solar Pump Controller, Solar Pump and Electronic Water Level Sensor. It is an effective water supply system in areas with water shortage

The Tuhorse motor was designed to be compact and lightweight, while also can be operated with ease. The brushless DC motor is attached to a screw (helical rotor) pump body or a centrifugal pump body, whish is controlled by an electronic controller. The oil-filled motor can be submerged up to 40m below water level.

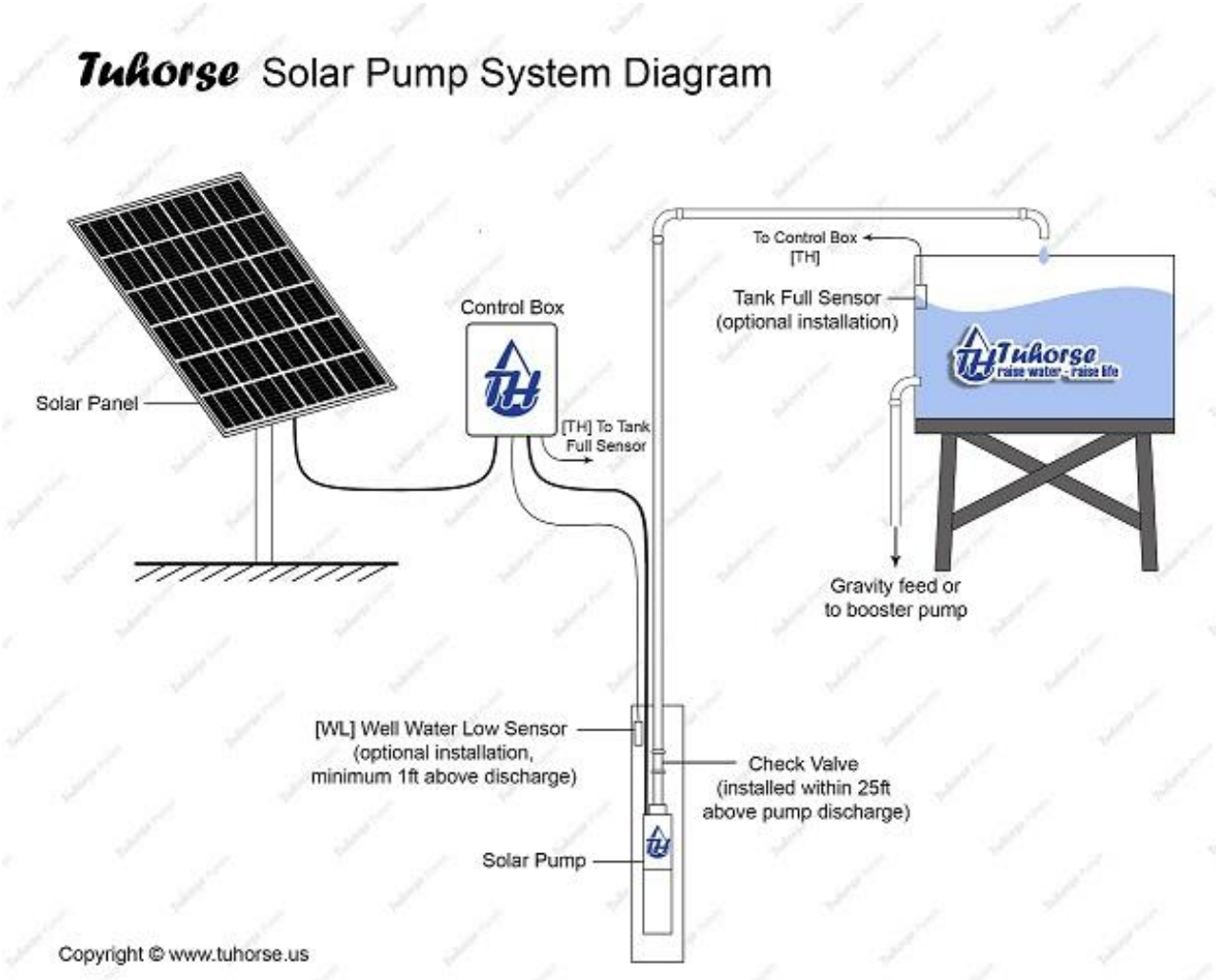
Tuhorse Solar Pumps quick Installation Guide

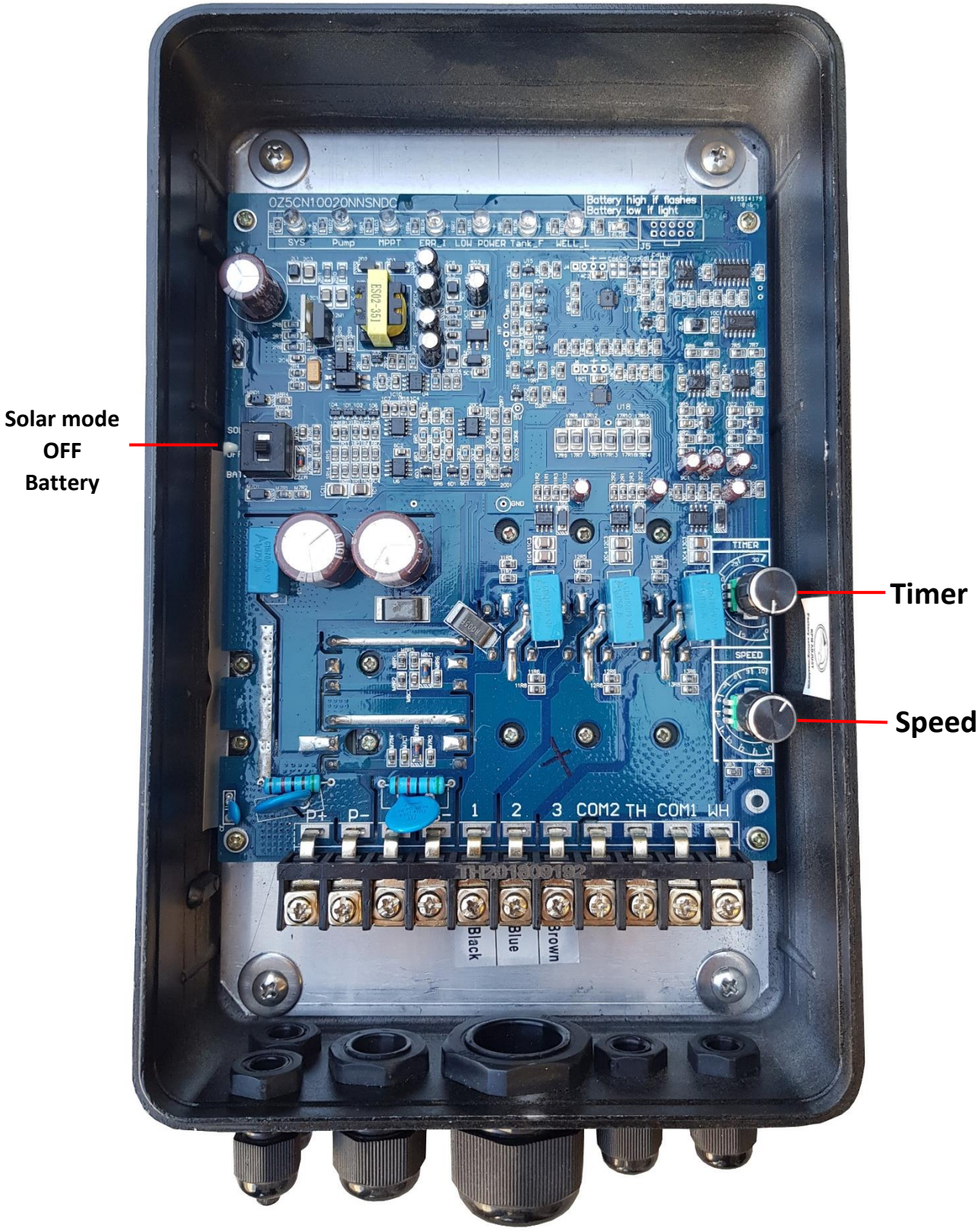
Important: before attempting to connect solar panels please see the included panel connection diagram for visual illustration of the correct connection.

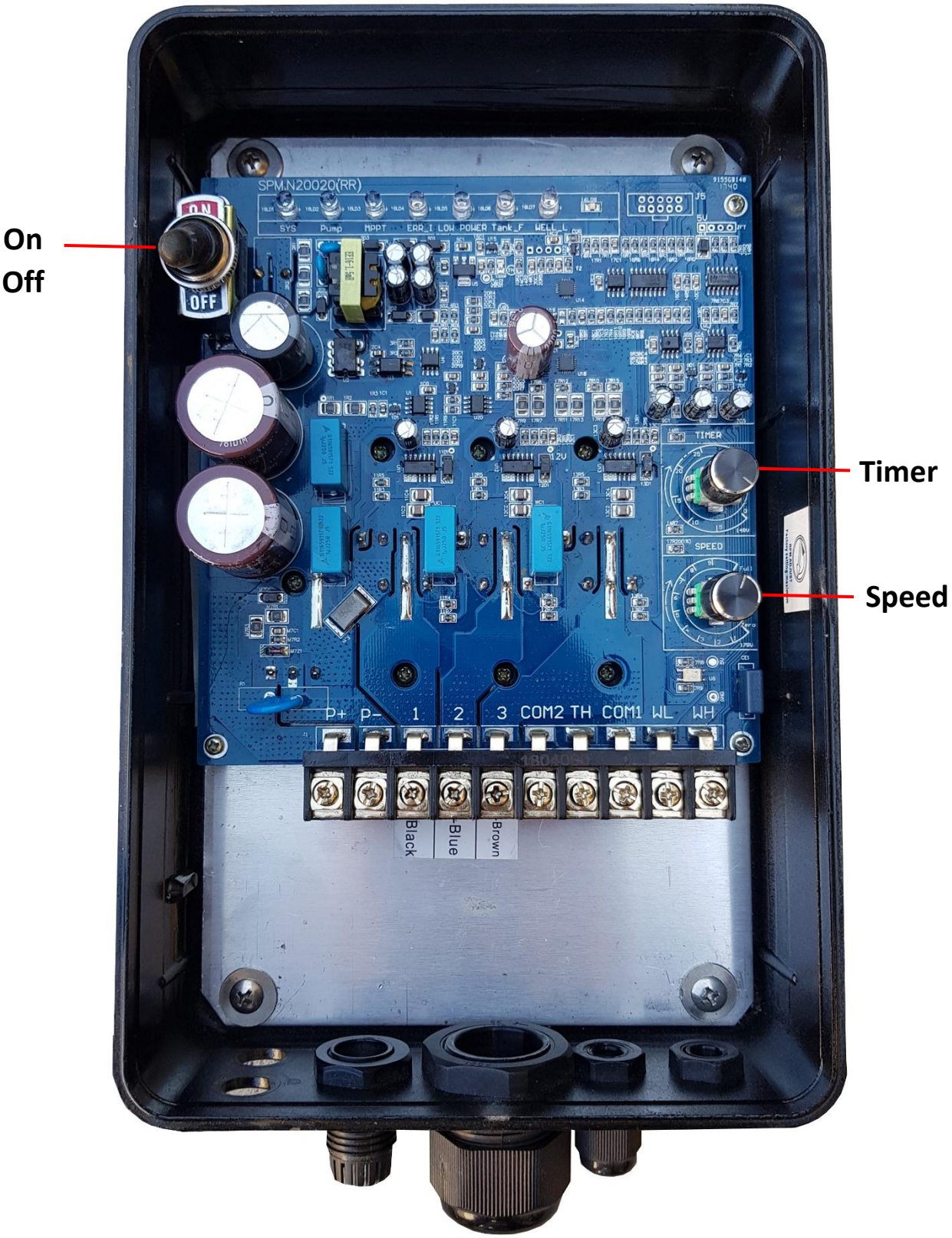
1. Control board factory default setting has a wire bridge on “COM1” and “WH”. If a well sensor needs to be installed, remove the wire bridge off from “COM1” and “WH” and connect the well sensor to “COM1” and “WH”. It does not matter which colour wire is connected to “COM1” or “WH”.
2. The water sensor needs to be installed vertically standing upright. You can either attach it to the pipe or put a weight on the sensor so that it will stand upright.
3. You should test sensors at this point to ensure that it works properly.
4. The “speed” knob factory setting is set at maximum speed. You can decrease the head or volume by turning this motor “speed” knob anti-clockwise.
5. There is also a “timer” knob above the “speed” knob. The factory default setting on the “timer” knob is set at 0 minutes. This timer cycle will be triggered where the power is low, or water is low or ERR_I LED is on. The timer is essentially the length of the time cycle before it checks the power, bore water level settings again. If the power, bore water levels are at the requisite levels, the pump will restart. However, where one of these conditions remains unsatisfied, the timer cycle will restart. You can set the cycle from 5 minutes to 30 minutes.
6. There are three wires coming from motor which black, blue and brown. Please connect these three wires to the control box using corresponding connection points: 1-Black, 2-Blue and 3-Brown.

7. After you turn the power switch to the “solar” setting, the power LED will turn on and then “Pump” LED will also turn on. This is when the motor will start to spin. After about 10 seconds, the “MPPT” LED will start to flash. This means the solar pump is working in good condition.
8. Once you have the solar pump working, please install the control box under the panels or in shaded area. This is to avoid direct sunlight on the control box during the day and prevent overheating of the control box. Also, please seal all holes to avoid insects from getting inside the box.

These are not full installation instructions and Tuhorse takes no liability or responsibility for any problems encountered during installation. Where you are in doubt, please consult a licensed professional or give us a call on 02-80052823 or 041423336.




Solar mode
OFF
Battery
Timer
Speed
0Z5CN10020NNSNDC
Battery high if flashes
Battery low if light
SYS
Pump
MPPT
ERR_I
LOW POWER
Tank_F
WELL_L
TIMER
SPEED
P+
P-
1
2
3
COM2
TH
COM1
WH
Black
Blue
Brown


On
Off
Timer
Speed
SPM.N20020(RR)
ON
OFF
TIMER
SPEED
P+ P- 1 2 3 COM2 TH COM1 WL WH
Black
Blue
Brown

Tuhorse Controller Technical Performance Index

Table: 12V Controller

Rated Voltage	12VDC
Rated Current	8A
Open Circuit Voltage	30VDC
Rated Power	100W
Ambient Temperature	-20°C ~ + 60°C

Table: 24V Controller

Rated Voltage	24VDC
Rated Current	10A
Open Circuit Voltage	50VDC
Rated Power	200W
Ambient Temperature -20	-20°C ~+ 60°C

Table: 36V Controller

Rated Voltage	36 VDC
Rated Current	10A
Open Circuit Voltage	88VDC
Rated Power	300W
Ambient Temperature	-20°C ~+ 60°C

Table: 48V Controller

Rated Voltage	48VDC
Rated Current	10A
Open Circuit Voltage	100VDC
Rated Power	500W
Ambient Temperature	-20°C ~+ 60°C

Table: 110V Controller Table

Rated Voltage	110VDC
Rated Current	1.5A
Open Circuit Voltage	200VDC
Rated Power	1200W
Ambient Temperature	-20°C ~+ 60°C

Reverse Polarity Protection Table

Protection	Function
Battery reverse polarity protection	Correcting the "+" and "-" of the reverse polarity battery, the controller able to continue operation.
Solar array reverse polarity protection	Correcting the "+" and the "-" of the reverse polarity solar array, the controller able to continue operation.
Overload current and short circuit protection	Once the load current is more than 25A, the controller will enter the protection mode with limited outputs;

Tuhorse Controller Introduction

- Please do NOT put the controller in water (electronic components must be kept away from water)
- The input terminals can be connected to sensing equipment such as a water level probe (idling protection), pressure switch, etc.
- Start-up time of motor: ≤ 10 seconds. The motor has start up time of up to10 seconds
- The optional upgrade to Auto Switchover Switch allows transition between battery mode and solar array mode without changing wiring connection.
- Controller operating mode:
    - Solar array simultaneously powers the pump & charges the battery.
    - Solar array and the battery power the operating pump together
    - Solar array charging the battery only and not powering the pump, where there is insufficient sunlight.
    - Solar array to power the pump for operation.

- The system continuously monitor the power level of the pump and detects low power when the actual power is lower than 10% rated power of pump. If the pump operate under low power for a duration longer than 5 seconds, the "LOW POWER" indicator will lights up and the pump stops running.
- When the water level of the bore/well is less than the low water level probe, the "WELL L" indicator lights up and the controller will stop the pump from running.
- When the water level of bore/well rises past the probe, the "WELL L" light will start blinking and activate the delay timer. The pump will start running again once the delay timer expired.

- The delay time can be adjusted with the potentiometer delay timer knob on the controller circuit board. The maximum delay time is 30 minutes and minimum is no minute.
- When the system is powered on for the first time and detects the water level to be higher than the water level probe in bore/well, the pump will start running immediately.

Power Limitation:

- The controller's minimum working voltage is 24V. If the current is less than 0.5 A, the controller will go into automatic protection mode.

- For the 36V/48V controller, the controller will go into automatic protection mode if the current is less than 1 A.
- For the 72V/110V controller, the maximum working current is 12A. The controller will go into automatic protection mode if the current reaches 15A.

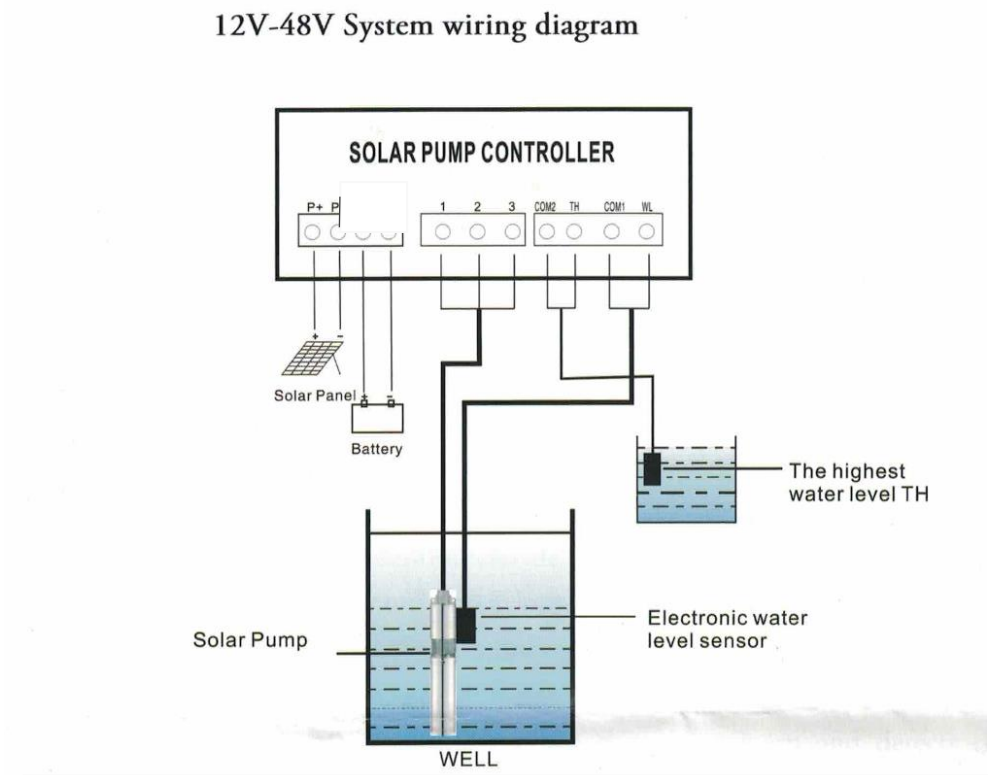
Characteristics

- Reverse Polarity Protection
- Overcurrent protection and High-liit
- When the solar array voltage is too low, the system will automatically disconnect the power. It will connect the power again once he solar array voltage return to the normal voltage.
- The maximum conversion efficiency is 83% (motor and controller).
- Protection grade: I{54 (Sealed and waterproof).
- Under insufficient sunlight condition, the controller will protect the pump and prolong its useful life by preventing the pump from start then stop abruptly.

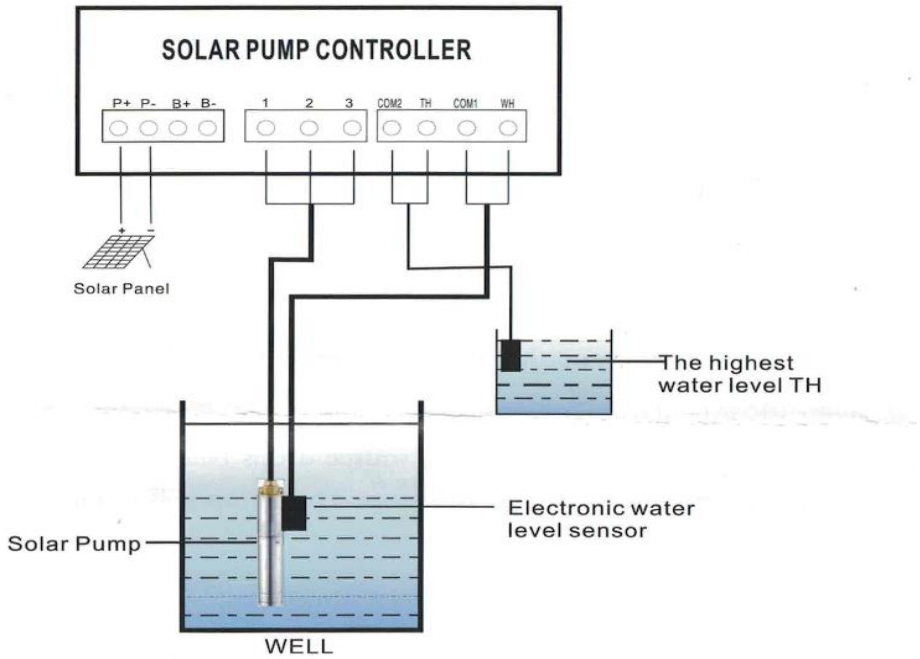
Troubleshooting

Type of defect	**Main Causes**	Correction
Power light SYS not on	1. Not switched on 2. No power in control box	1. Turn on the power switch located in top left corner. Switch to Solar Mode. 2. Check solar panels connection. Make sure right voltage is at P+/P-
SYS and pump LED on but no water from pump.	1. Motor not turning 2. Motor turning in reverse. 3. Motor in low speed	1. Check motor 3 wires connect to: 1-Black, 2-Blue and 3-Brown 2. Swap Black and Brown wires. 3. Turn motor speed knob clockwise to maximum.
Smoke from the round blue protecting resistor	1. Panel connection is wrong. Input voltage over maximum voltage	1. Unplug panels from the control box. Contact Tuhorse service to get recovery solution.
Low power LED on	1. Not enough power 2. Rotor jammed or broken 3. Motor speed set too low 4. Power cable too long	1. Not enough panels' power or voltage to control box. Increase Power. 2. Check rotor and joiner, replace new rotor if broken. 3. Turn motor speed clockwise to maximum. 4. Change cable size.
ERR_I light on	1. Over current	1. Power cable may be broken
Well_L LED low flash	1. Normal. Well water over the sensor, wait for timer cycle finish.	1. Tune power off, then switch on. Or reset timer.

36V - 48V System Wiring Diagram



96V - 110V System Wiring Diagram



For safety reason, there is no battery function for 96V -110V controller.

Water level sensor in the tank:

- The purpose of the water level sensor in the tank is to check the water level in tank. If the water level is too high, the pump will stop. The sensor is installed near the top of the tank.
- The water level sensor detects the water level once the water level reaches the height of sensor. This allows the controller to stop the pump from running once there is enough water in the tank. The sensor should be installed near the top of the tank.

Water level sensor in the water source:

- The water level sensor in the water source is to monitor and ensure there is enough water for the pump to operate properly. The sensor must be installed at least 0.5 meter above the pump. If the water level drops below the height of the sensor, the controlled would stop the pump from running. This protects the pump from running without water.
- Once the water level rises past the sensor, the pump will start running once the delay timer expired.

Indicator Lights and Terminal Instruction

The indicator lights located in the upper half of the controller display the status of the pump system. Below is an explanation of each indicator light and its function.

Label	Meaning	Explanation
SYS	System Power	Green: power is available to the controller
Pump	Pump Running	Green: this indicator will come on 20 seconds after the system is switched on.
MPPT	Maximum Power Point Tracking	Flashing Green: the system is monitoring the power input from the solar panels and adjusting the voltage and current to achieve the highest performance of the pump
ERR_I	Over Current	Red: The current is higher than the limit
Low Power	Low Power	Red: the power is insufficient
Tank F	Tank level alarm	Red: when the water level is above the water sensor (given sensor is connected) in the tank.
Well L	Water source level alarm	Red: when the water level is below the sensor level (given sensor is connected) in the water source.

Terminal Operating Instruction

Terminal	72V-110V Controller	12V – 48V Controller
P+	Connect with the anode (+) of solar panels	Connect with the anode (+) of solar panels
P-	Connect with the cathode (-) of solar panels	Connect with the cathode (-) of solar panels
B+	N/A	Connect with the anode (+) of the battery
B-	N/A	Connect with the cathode (-) of the battery
U	Connect with the black wire (marked 1) of the Tuhorse Pump	Connect with the black wire (marked 1) of the Tuhorse Pump`
V	Connect with the blue wire (marked 2) of the Tuhorse Pump	Connect with the blue wire (marked 2) of the Tuhorse Pump
W	Connect with the brown wire (marked 3) of the Tuhorse Pump	Connect with the brown wire (marked 3) of the Tuhorse Pump
WH	Connect with the water level sensor of well (does not matter which colour wire)	Connect with the water level sensor of well (does not matter which colour wire)
COM1	Connect with the water level sensor of bore (does not matter which colour)	Connect with the water level sensor of bore (does not matter which colour wire)
TH	Connect with the water level sensor of tank (does not matter which colour wire)	Connect with the water level sensor of tank (does not matter which colour wire)
COM2	Connect with the water level sensor of tank (does not matter which colour wire)	Connect with the water level sensor of tank (does not matter which colour wire)

If there is no need for the water level sensor to be active temporarily, please connect the terminal “COM1” with terminal “WH” by wire bridge. (Factory default setting).

Once the system has been connected and turned on for the first time, all indicator lights will start blinking. Then the system will star self-checking with “SYS” indicator lights up. Upon completing self-checking process, the indicator light “MPPT” will start flashing which shows the system is entering the maximum performance.

You can limit the maximum output revolving speed by the potentiometer at the bottom right corner of controller main board. Clockwise rotation of the potentiometer makes the motor speed faster, and contra rotation makes the motor speed slower.

Important:

- Check the wiring connection is correct before operating to avoid damage to the system.
- Please make sure the voltage between terminal “P+” and terminal “P-“ as well as the voltage between terminal “B+” and terminal “B-“ is no more than 100V for a 36/48V controller, otherwise it will damage the controller beyond repairable.
- Similarly, the 72V/110V controller terminals should not exceed 200V.
- These controllers are suitable only with our recommended solar pump models. Please do NOT use other models without consulting us at Tuhorse Pump.
- After the pump starts running, please check that the water is flowing in the correct direction (water should flow out through the correct outlet of the pump). If the pump runs in the wrong direction, long-term faulty operation may cause the pump to be damaged mechanically.