CONNERA®

KOLOSAL SERIES

3" AND 4" SOLAR PUMPS.

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Abstract

Thank you for your preference when purchasing our KONNERA KOLOSAL series solar pump.

With the help of this instruction manual you can carry out a correct installation and operation of this product, so we recommend that you follow the instructions included here. Keep this manual in a safe place for future reference.

Table of Contents

1. INTRODUCTION

The KOLOSAL solar pump is a 3” and 4” high speed submersible pumping system for use in clean water applications, which consists of:

- Submersible multistage pump built in 304 stainless steel.
- Permanent magnet motor.
- Controller, which allows you to regulate and control the working regime of the motor pump with respect to the intensity of the sun.

The KOLOSAL system, thanks to its permanent magnet construction, can use what is generated in direct current by photovoltaic panels and deliver this charge to the controller to operate the motor pump in direct current, without any type of signal correction, allowing greater operating efficiency.

The KOLOSAL system has the following protections:

- Overload
- Dry work
- High and low voltage
- High temperature
- Low solar power
- Engine lock
- Phase loss

2. SAFETY WARNINGS

CONNERA recommends that you always read the installation manual carefully before starting the installation and operation of these products.

Failure to comply with the recommendations detailed in this manual may cause equipment damage, general material damage, and serious personal injury.

CAUTION

- Installation, maintenance and start-up must be carried out by qualified personnel.
- When you receive your system, check that it is complete, if not, immediately call your dealer.
- This appliance is not intended for use by persons (including children) whose physical, sensory or mental capacities are different or are reduced or lack experience or knowledge, unless such persons are supervised or trained to operate the appliance by a person responsible for their safety.
- Children should be supervised to ensure that they do not use the devices as toys.
- The maximum temperature of the liquid must not exceed 35°C.

WARNING

- Never start the motor pump without being completely submerged, as this would cause damage to the equipment.
- You should avoid exposing the KOLOSAL system to shocks (which could be caused during transport) or extreme weather conditions.
- The deterioration of the KOLOSAL system due to poor handling during transport; due to an inappropriate installation or use, automatically implies that the warranty is void.

DANGER

- Disconnect the KOLOSAL system from the power supply before each intervention.

3. STORAGE CONDITIONS

Store your KOLOSAL system in its original packaging, in a dry and well-ventilated place with an ambient temperature between -20°C and +50°C. If the motor pump is stored for more than a year, it is recommended to decouple the equipment and check that both the motor and the pump rotate freely.

If after using the KOLOSAL system you decide to store it for the winter, the minimum storage temperature will be 4°C. Eventually you will need to add antifreeze fluid.

4. SOLAR PANEL SELECTION

For the correct selection and sizing of photovoltaic panels for solar pumping, you must take into account the following aspects.

4.1. DESCRIPTION OF THE SOLAR PANEL

The solar panel can be divided into monocrystalline silicon solar cells, polycrystalline silicon solar cells and thin-film photocell.

The monocrystalline type is the most efficient, but the price is higher; the thin-film photocell is the most economical.

The open circuit voltage (Voc) marked on the solar panel signifies the maximum electromotive force before working. The voltage will decrease when it is working, this is called the working voltage (Vmp

The common open circuit voltage is 22.8 V, 37.8 V, 46.6 V, etc., it changes along with the change of area and temperature, the lower the temperature, the higher the voltage.

Another important index is power and is proportional to the area of the panel. A solar panel needs to be connected in series with another panel if the voltage is not enough, the total voltage equals the sum of each panel

The working voltage of each solar panel must be selected according to the operating voltage of the controller and then confirm the open circuit voltage of the solar panel.

Then, select the power of the solar panel according to the power of the pump after the voltage is confirmed. The power of the solar pump is the output power of the panel, and the generation efficiency of the solar panel is generally less than 70%. In order to guarantee the nominal working time of 4 or 5 hours a day, the power of the solar panel is equal to the input power multiplied by 1.5, which is also the minimum power

If the power of the solar panel is less than the power of the motor, the pump cannot reach its nominal flow rate and height, even the motor pump can operate. Using more panels for the pump is better if conditions permit, because that can ensure more time for the pump to work and reach the nominal flow and height

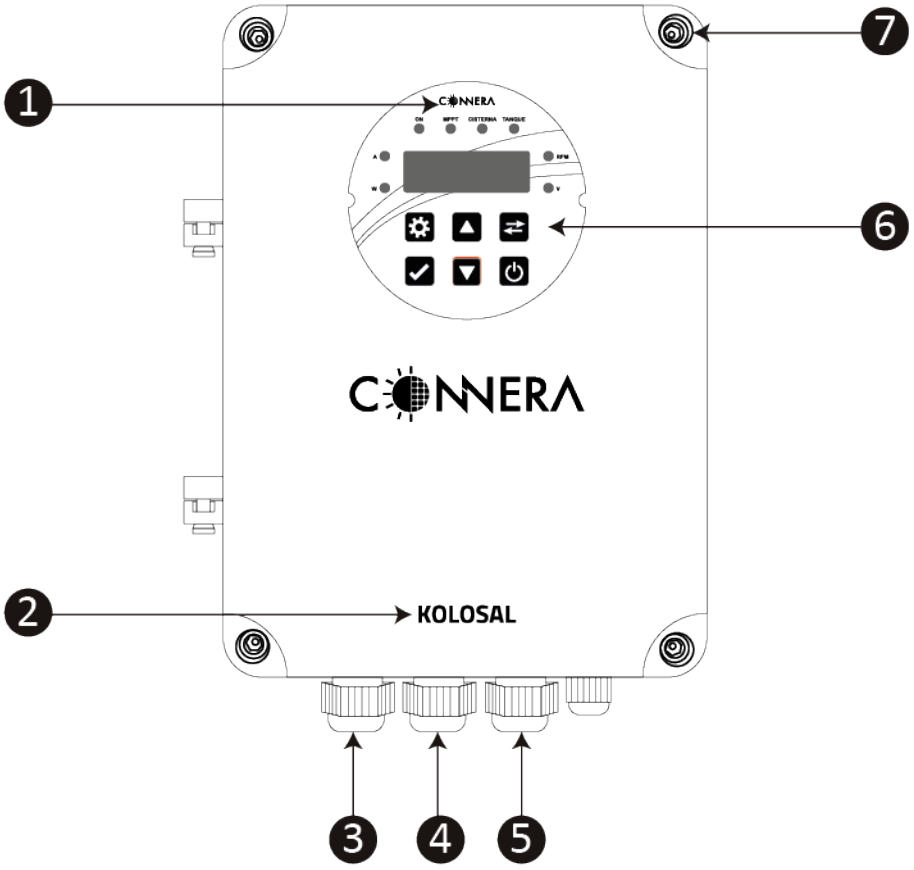
CAUTION

When it is a series connection, the voltage is increased but the current does not change, when it is a parallel connection, the voltage does not change but the current is increased.

5. CONTROLLER DESCRIPTION AND CONNECTIONS

5.1. PHYSICAL DESCRIPTION OF THE CONTROLLER

The controller regulates the hydraulic behavior with respect to the solar intensity presented at the time of operation of the equipment. Each of the physical parameters must be identified and recognized in order to interpret the operating behavior of the equipment.



1. CONNERA logo
2. Product Series
3. Input: cables, power panels
4. Motor pump power cable entry
5. Water sensor input
6. Reading display and buttons
7. Stainless steel screws

5.2. CONTROLLER CONNECTION DIAGRAM

This diagram will guide you on how to connect your solar pumping equipment to the controller, in tank-tank configuration.

P+, P-: Photovoltaic panel connection point

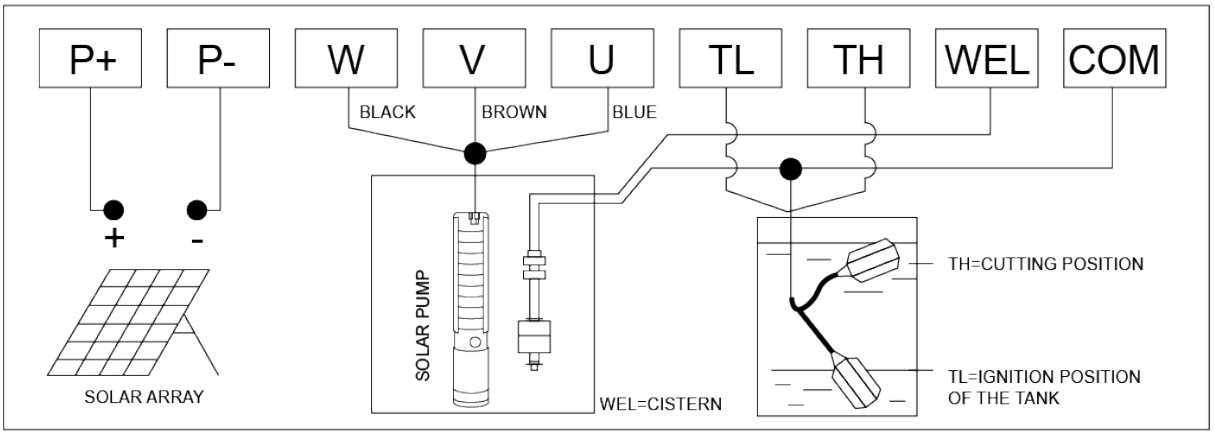
W, U, V: Motor pump connection points.

TL: Ignition position, low level.

TH: Cutting position, high level.

WEL: Cistern or well level.

COM: Common Point.



6. TECHNICAL AND WORKING CHARACTERISTICS

6.1. COMPONENTS OF THE KOLOSAL SYSTEM

Each KOLOSAL system consists of one:

- Submersible pump built in 304 stainless steel and bronze.
- Three-phase permanent magnet motor with two (2) meters of flat cable.
- Controller with aluminum body for greater heat transfer.
- Installation kit.

CAUTION

When you receive your KOLOSAL system, check for damage and/or missing parts, if this is the case, immediately notify your dealer.

6.2. ELECTRICAL AND TECHNICAL CHARACTERISTICS OF THE CONTROLLER

The controller is the device that allows the pump to be adjusted according to the current changes in solar irradiation. These regulations will allow the motor pump to make the most of all solar conditions and to be able to deliver the greatest

Controller Features

Controller models	Supply voltage to the controller (Vcd)	MPPT voltage range (Vcd)	Maximum input voltage (Vcd)	Working temperature (°C)
CTRL-24	24	18-42	50	60
CTRL-48	48	24-84	100	
CTRL-72	72	50-112	150	
CTRL-110	110	60-400	430	
CTRL-150	150	80-400	430	
CTRL-200	200	80-400	430	

CAUTION

Before turning on, you must use the multimeter to detect and verify the open circuit voltage (Voc) of the solar panels. The open circuit voltage (Voc) of the solar array must be lower than the maximum input voltage of the controller, otherwise it will cause irreversible damage

6.3. CHARACTERISTICS OF THE MOTOR PUMP

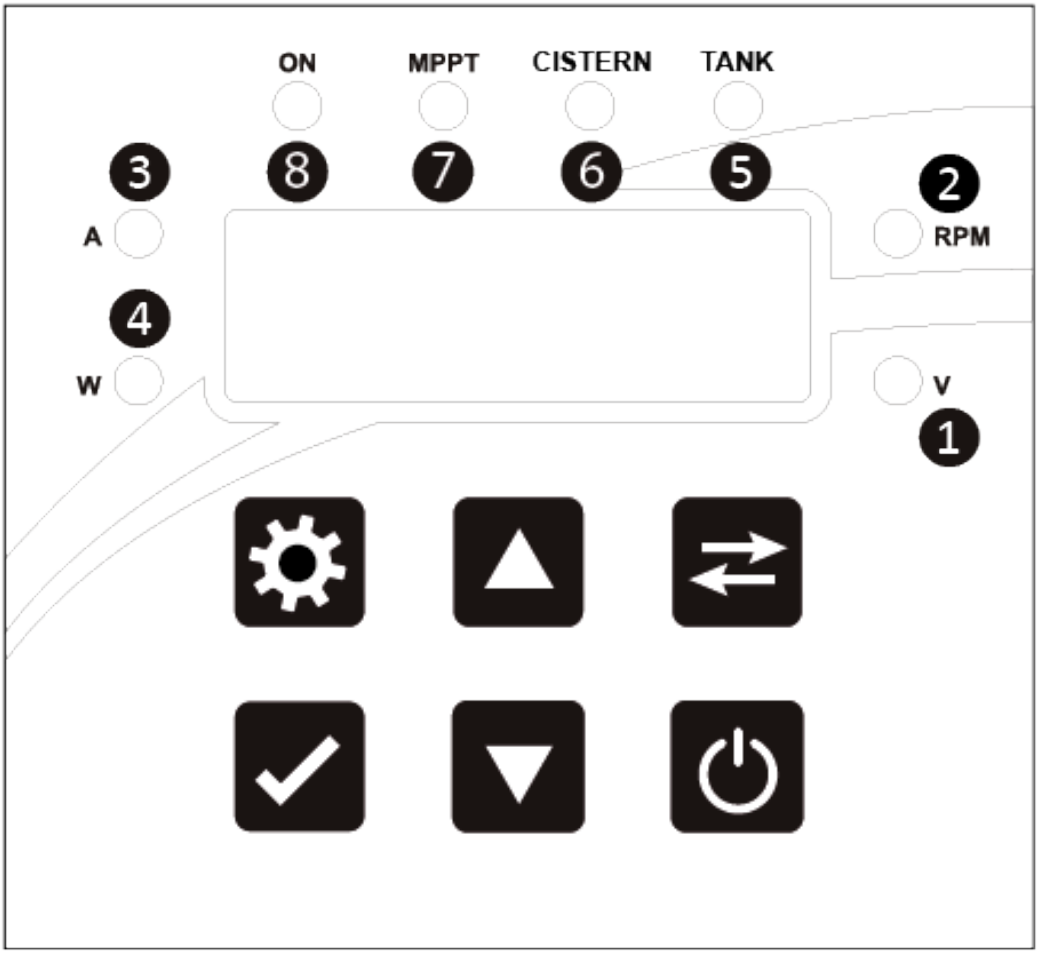
Maximum temperature of liquid to be pumped	35°C (92°F)
Minimum water flow rate for cooling	0.2 m/s
Characteristics of the liquid to be pumped	Clean, chemically non-aggressive water, free of particles and fibers
Construction materials	304 stainless steel, bronze and Noryl
Degree of protection	IP68
Cable connector	Flat cable

7. OPERATION DISPLAY

The operation display will allow you to view and modify internal parameters of the equipment, these values will help you to know the operating status of the equipment and to know instantaneous working values.

7.1. INDICATOR LIGHTS

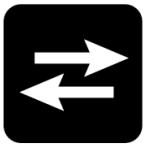
The display has LED lights that turn on automatically and according to the type of reading you want to view.



1. Voltage (V): Indicates the voltage supplied by the solar array
2. Speed (RPM): Indicates engine revolutions per minute
3. Current (A): Indicates the current consumed by the motor
4. Power (W): Indicates the output power
5. Tank: Indicates the level of the full tank
6. Well or cistern: indicates lack of water
7. MPPT: Light Indicates that it is operating on solar energy (Flicker)
8. On: The LED blinks during periods of inactivity and is constant during periods of operation.

7.2. DESCRIPTION OF NAVIGATION BUTTONS

The following table will tell you what each of the navigation buttons does.

BUTTON	FUNCTION
 SETUP	• Factory parameter settings, not open to user modification.
 ENTER	• Save factory settings, not open to user modification.
 ABOVE	• RPM configuration button. Each time you press, the RPM will increase from 100 by 100 • In a faulty state, turn on/off the fault screen
 DOWN	• RPM configuration button. Each time you press, the RPM will decrease from 100 by 100
 SWITCH	• With the equipment in operation, you can circularly change the display mode of voltage (V) -> speed (RPM) ->; current (A) ->; power (W) and back to Voltage (V)
 On/Off	• In the turned on state, you can turn off the unit. • In the off state, you can turn on the unit.

7.3. TESTS BEFORE STARTING

Follow the following verification steps before turning on your computer for the first time.

1. Before starting the equipment, you should check if the solar motor pump is in good condition, that there are no loose joints, oil impregnation in the pump body - motor or oil leaks and damaged cable. You must apply the Megger to check the insulation resistance, which must be greater than 2 Megaohms when the motor is
2. If the length of the cable must be lengthened, the diameter of the extension cable should be larger than the original cable.
3. Check if the pump can start, that it is not blocked, so that it can operate normally before using it.
4. Check that the direction of rotation of the pump is counterclockwise.
5. Do not operate the pump in the absence of water.
6. If the direction of rotation of the three-phase pump is incorrect, swap two wires at the input terminal on the power supply in the controller.

7. When the pump is installed, it must be hung on a rope or pipe and it is strictly forbidden to lift the pump through its cable. The pump should never reach the bottom of the well or tank as it can suck up sediment and cause irreversible damage to

8. MODE OF OPERATION AND INSTALLATION

This chapter describes the way in which the “KOLOSAL” solar pump is operated and where it will be explained step by step how to start and operate it. Please consider each parameter described here for proper operation and installation.

8.1. STARTING THE PUMP

- **Ignition of the motor pump**
  Every time the solar array is connected to the controller, the system starts by default and the pump starts operating immediately without detecting that there is water in the tank (always make sure that the tank or well has water to avoid damage due to dry work). It is recommended to use the float switch that is included in your pumping package to provide additional dry-work protection, since this fault is detected by the controller due to the variation of the current
- **Start button**
  From the off state, press the button to turn on the pump. Before turning on the equipment, always make sure that the tank or well has water to avoid damage from dry work
- **Low-level ignition of the water tank**
  If the system is turned on but the motor pump is stopped, it will turn on again when the level switch on the tank (TL) closes the contact when it reaches the lowest level point and will start filling the tank again.

8.2. BOMB STOP

- **Float strike (Tinaco)**
  In operation, when the float is closed in the highest position, the pump stops immediately. (The signal terminal (TH) of the main control card is connected to the terminal (COM), and the LED light on the tank or toilet stays on
  In operation, when the float in the tank or well reaches the low water level position, it is closed and the pump stops immediately. (The WEL signal terminal) of the main control card is connected to the terminal (COM), and the LED light on the tank or well is on
- **Strike for dry work**
  If the water pump runs continuously at a power lower than the set power at the current speed and continues for 20 seconds, the pump will stop immediately and the P50 fault will appear, which means dry work protection. After 5 minutes the fault will be erased and the motor pump is automatically reset. If the lack of water persists, the motor pump will continue

> **NOTE**
> For models of **KOLOS 3** the P48 fault (dry work protection) will appear, after 30 minutes the fault will disappear.

- **Stop button**
  From the power on state, press the button To stop the bomb

8.3. PUMP IN OPERATION

Each time the pump is started, it will recognize the PV (solar) power supply mode for three (3) seconds and then start operating.

The configuration speed of the pump is a maximum of 4000 effective RPM.

The operating speed of the pump is also determined by the current solar power. Maximum Power Point (MPPT)

When sunlight increases, the solar panel's output power increases, the pump speed increases, and vice versa.

The MPPT indicator blinks. If it is faster, it indicates that the current working point is closer to the maximum working point. If the blink rate is slower or not, it indicates that the maximum power point is being tracked

If solar energy is insufficient, the pump speed will continue to decrease, when the speed drops to 600 RPM, the pump stops and reports the P16 fault after 3 seconds (for models **KOLOS 3** will show the P46 fault).

When solar energy is insufficient to keep the current system starting or operating, the output voltage of the solar panels will drop rapidly.

When the voltage of the photovoltaic array falls below the controller's supply voltage and lasts 10 seconds, it will be alerted by a low supply voltage and the “P12” fault will appear on the display, the fault will be eliminated when the voltage has been restored.

NOTE

In the models of **KOLOS 3** the “PL” fault will be displayed, the system will try to rearm after 5 minutes, if after this time it is not rearmed, another attempt will be made after 30 minutes. You can do the reset manually by pressing the “on/off” button if you are sure that the panels are getting enough light, otherwise you will be alarmed

8.4. KOLOSAL PUMPING SYSTEM INSTALLATION

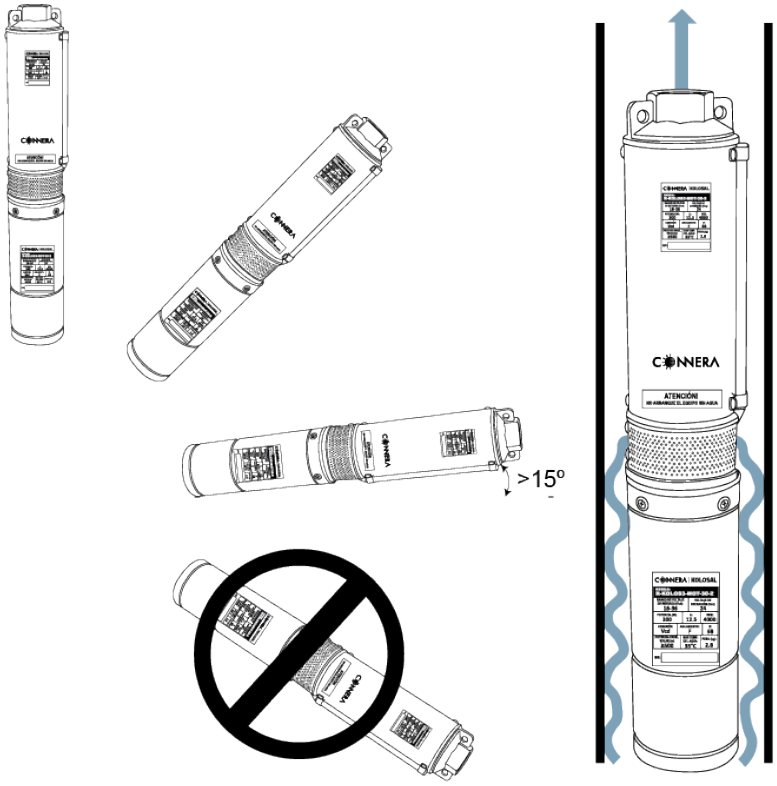
DANGER

The installation process must be carried out by qualified personnel and always ensuring that the power supply is interrupted.

CAUTION

If the KOLOSAL system is installed in a horizontal position, it must be ensured that during operation of the equipment there is always a minimum axial load of 15° above the horizontal axial load.

If the motor pump is not installed in a well, to ensure proper cooling, a cooling jacket must be placed; in doing so, the minimum speed of water circulation through the motor must be guaranteed.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8.4.1. INSTALLATION OF THE KOLOSAL SYSTEM IN POZO (ADEME)

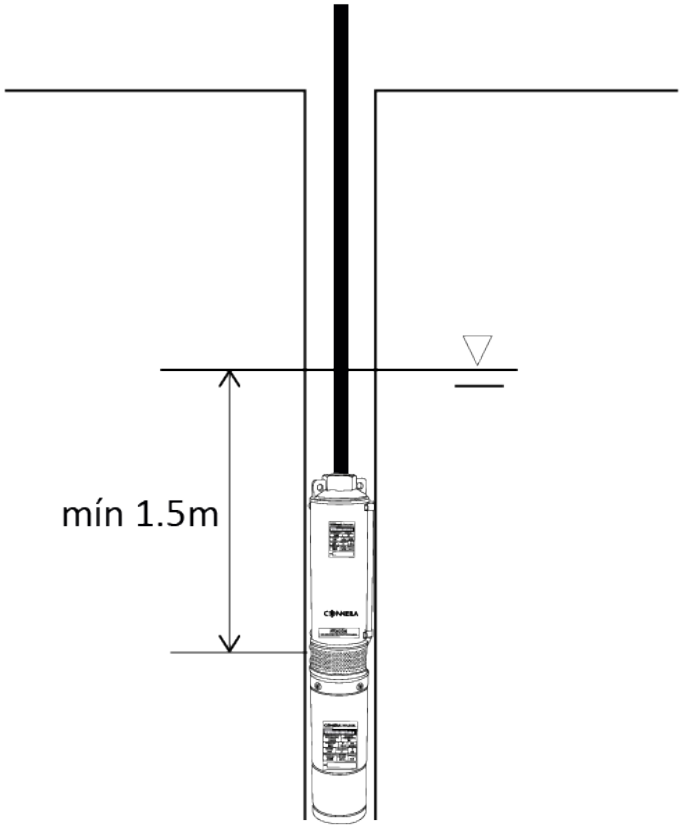
The motor pump must always be attached inside the well (ademe), this is achieved by means of a special rope attached to the ear of the pump discharge, this rope will be attached to the ademe cover of the well.

DANGER

It is forbidden to descend the motor pump into the well (ademe) using the power cable, its integrity must be preserved at all times. At this point, it is recommended to tie the power cable to the column pipe.

CAUTION

The suction should always be at least 1.5 meters below the dynamic water level.

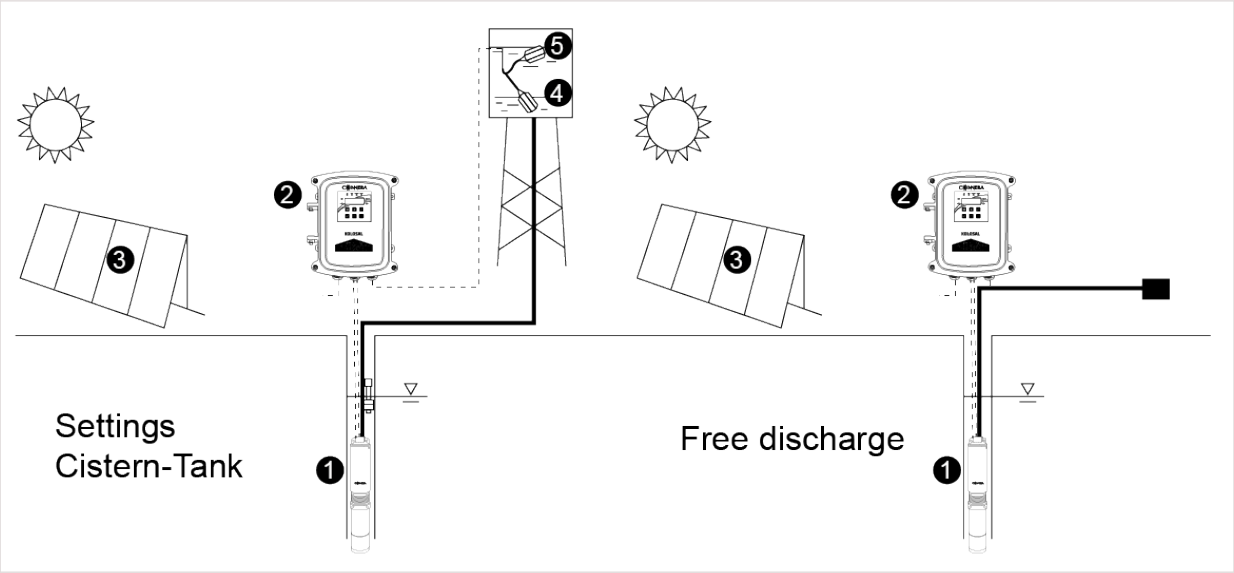


8.4.2. INSTALLING THE KOLOSAL SYSTEM TO A SOLAR-POWERED SYSTEM

All overload, overvoltage, dry-work protection and other protections are integrated into the controller.

If the power cables are connected to the controller, it is possible to:

- The rotational speed of the motor. By default, the speed is 4000 RPM maximum, which can be adjusted downwards to have a different speed regime and a different water delivery.

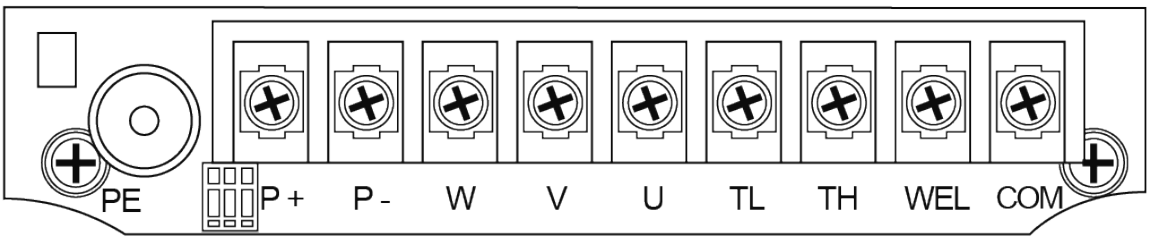


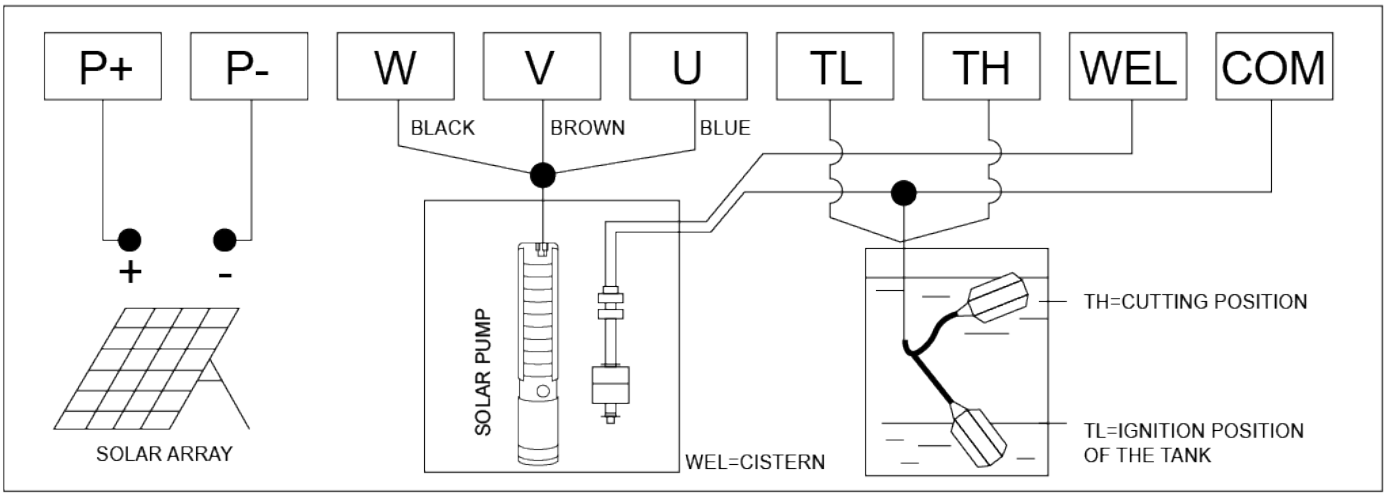
1. KOLOSAL pumping system
2. Controller
3. Photovoltaic panels
4. Tank or tinaco
5. Level switch (float)

1. KOLOSAL pumping system
2. Controller
3. Photovoltaic panels

8.4.3. CONNECTING CABLES TO THE CONTROLLER AND MOTOR

The controller has an electronic card, which has the following connection terminals. Connect the motor ground cable to the “PE” point on the controller card





9. ROUTINE MAINTENANCE

The influence of ambient temperature, humidity, dust and vibrations will cause the controller to deteriorate, which can cause potential failures or shorten the life of the controller. Therefore, it is necessary to carry out routine and periodic maintenance.

DANGER

- Do not service or repair the equipment when it is energized; otherwise, it may cause an electric shock.
- Before servicing or repairing the controller, make sure that the indicator lights on the controller are completely turned off; otherwise, it could cause an electric shock and damage the controller.
- People who are not trained to handle the controller cannot perform maintenance; otherwise, it could cause an electrical shock and damage the controller.

Routine maintenance involves verifying:

- If the engine sounds abnormally during operation.

- If the motor vibrates excessively during operation.
- If the location of the driver installation changes.
- If the controller's cooling fan is operating normally.
- If the controller overheats.
- Check if the wiring terminals show arc signs.
- Clean the pump and the inlet and outlet ducts regularly to remove any build-up.

10. USES AND PROHIBITIONS

USES

1. Water extraction from deep wells, rivers, or ponds, using solar energy as the primary power source.
2. Potable water supply in rural communities, isolated homes, or areas without access to the electrical grid.
3. Agricultural applications for drip, sprinkler, or gravity irrigation systems.
4. Water supply for livestock in remote areas.
5. Operation in conjunction with solar controllers and batteries, allowing for use on cloudy days or outside of solar hours (depending on the system).
6. Sustainable and ecological use, reducing fossil fuel consumption and operational costs.

PROHIBITIONS

1. Do not use to pump water containing solids, sand, mud, or abrasive materials, unless the model specifically allows it.
2. Prohibited for use with liquids other than clean or slightly cloudy water (such as oils, chemicals, or wastewater).
3. Do not operate without proper installation of the solar system, including electrical protections and a compatible controller.
4. Don't run the pump dry or in low-water conditions, as this can cause damage.
5. Do not connect directly to the conventional electrical grid, unless the equipment is specifically designed for hybrid operation.
6. Don't expose electronic components (like the controller) to the elements without adequate protection.
7. Avoid using in narrow wells or those with obstructions that prevent adequate heat dissipation or water flow.

11. PROTECTIONS, FAULTS AND SOLUTION METHODS

This chapter will indicate which are the most common methods of protecting the equipment and in the event of a fault it will guide you to resolve the problem.

11.1. REVERSE CONNECTION PROTECTION

If the positive and negative cables of the solar array were connected in reverse, the controller would enter P34 alarm mode until the error is corrected.

11.2. DRY-WORK OPERATION PROTECTION

This function means that the pump in the well or tank is in operation and the system can automatically detect when the pump runs out of water, it will stop working automatically.

The dry-work operation protection is effective in all working modes, in manual mode, float switch mode and solar mode. The pump will be on standby for 30 minutes to restart work (meeting the minimum

water level conditions). It will start to detect again if there is water or not, if there is no water, it will stop working automatically; if there is water, keep working, until the cycle is repeated

11.3. FAULTS AND TROUBLESHOOTING METHOD (KOLOS3)

The following table lists typical faults and their solutions related to the operation of the equipment.

Fault type			
Code	**Fault Description**	**Causes and solutions of the fault**	**Reset Procedure**
P0	Hardware overcurrent	• The controller model does not match the computer model, check the specifications. • Motor pump connection error. Check electrical connections.	The fault will be eliminated after 30 seconds.
P43	Phase loss	• Open circuit in UVW terminals. Rewire to ensure reliable contact	The fault will be eliminated after 30 seconds.
P46	Engine lock protection	• The motor model does not match the pump model, check the specifications. • The motor pump extension cable is too long, please reduce the extension cable. • The power is very low, increase the power supply. • The motor pump bearing is stuck, contact your dealer	The fault will be eliminated after 30 seconds.
P48	Dry work protection	• There may be no water in the tank or well. Check the water level in the well or tank and try again	It automatically restarts after 30 minutes or restarts manually by disconnecting and reconnecting the solar power.
P49	Overcurrent in the Software	• Motor pump locked, check that there are no obstructions in the suction. • UVW short circuit connection, check that the electrical connections are not in contact.	The fault will be eliminated after 30 seconds.
P50	Low voltage protection	• The input voltage is too low, see the electrical characteristics of the solar array.	The fault is eliminated when the voltage returns to normal.
P51	High voltage protection	• The input voltage is too high, see the electrical characteristics of the solar array.	The fault is eliminated when the voltage returns to normal.
P60	High temperature protection	• The temperature of the controller electronic card is greater than 90°C. Ensure that the controller temperature is kept within specifications and, if necessary, relocate the controller.	It is automatically restored when the temperature reaches normal operating values equal to or less than 60°C.
E8	Internal Fault	• De-energize and restart after 30 seconds	Restart the computer.
PL	Low input power	• Without sunlight, waiting for sunlight to restart the system. • Solar array error, see the recommendation for the maximum power of the solar array.	The first 5 times, the fault will be removed after 30 seconds, and then every 30 minutes until the fault is removed.

11.4. FAULTS AND TROUBLESHOOTING METHOD (KOLOS4)

The following table lists typical faults and their solutions related to the operation of the equipment.

Fault type			
Fault code	**Fault Description**	**Causes and solutions of the fault**	**Reset Procedure**
P04 P06 P08	Overcurrent in Software U Overcurrent in Software V Overcurrent in W Software	• Driver incompatibility. • U, V, W three-phase short circuit connection, please rewire to ensure the normal installation of the UVW	• Confirm that the connections are properly made. • Confirm that the controller, pump and motor are correct. • If the fault persists, contact your authorized dealer.
P10	High voltage protection	• The input voltage is too high, please distribute the power, see the electrical characteristics.	The fault will be eliminated after 30 seconds when the voltage returns to normal.
P12	Low voltage protection	• The input voltage is too low, please distribute the power, see the electrical characteristics.	The fault will be eliminated after 30 seconds when the voltage returns to normal.
P16	Engine lock protection	• The motor model does not match, please choose the appropriate pumps. • The pump extension cable is too long, please reduce the extension cable. • The power is very low, the power supply increases. • The pump bearing is stuck, clean the bearings.	The fault will be eliminated after 30 seconds.
P20	High temperature protection	• The temperature of the controller electronic card is more than 90°C	It is automatically restored when the temperature reaches normal operating values equal to or less than 60°C
P30	Hardware overcurrent	• Short circuit in three-phase UVW connection, please rewire to guarantee it	• Confirm that the connections are properly made. • Confirm that the controller, pump and motor are correct. • If the fault persists, contact your authorized dealer.
P34	Reverse connection and phase drop protection	• Replace the positive and negative terminals on the panels. • Correctly connect the cables to the connection terminals.	The fault will be eliminated after 30 seconds.
P40	Low power	• Without sunlight, waiting for sunlight to restart the system. • Solar panel match error, see the recommendation for a correct match.	The fault is eliminated after 1 minute.
P50	Dry work protection	• There may be no water in the tank or well. Check the water level in the well or tank and try again	It automatically restarts after 5 minutes or restarts manually by disconnecting and reconnecting the solar power.
P51	Full container protection	• Release water from the water tower	The fault is removed after 1 minute