Installation Manual – Off Grid Pool Pump

IMPROPER INSTALLATION WILL DAMAGE THE PUMP AND VOID THE WARRANTY
PLEASE READ AND SAVE THIS MANUAL
RECORD MODEL #_____ - _____ SERIAL #_____

This manual covers the Wright Morgan Off Grid Pool Pump WM-97296.

Wright Morgan Off Grid Pool Pump WM-97296

Contents

1. WARNINGS

Please review the following warnings. These are listed for both personal safety and the safety of the products. Disregarding or ignoring these warnings can result in SERIOUS INJURY and/or VOID THE WARRANTY. If this system is being installed without a licensed pump installer, an electrician or knowledge of electrical circuits is HIGHLY recommended.

If any questions or concerns regarding these warnings should arise, please contact Wright Morgan directly at sales@wrightmorgan.com. Wright Morgan pumps and/or its parent company, Solar Power & Pump Co, is NOT LIABLE for any DAMAGE or INJURY.

- The system should be installed and serviced by qualified personnel only. All electrical codes should be observed. Make ABSOLUTELY CERTAIN all power sources are disconnected prior to wiring.
- Extreme heat can damage the pump. Protect the pump from sunlight or other heat sources.
- Install proper system grounding for safety and lightning protection. Proper grounding can significantly reduce the chance of extreme damage.
- Do not run the pump dry.

2. INSTALLATION REQUIREMENTS

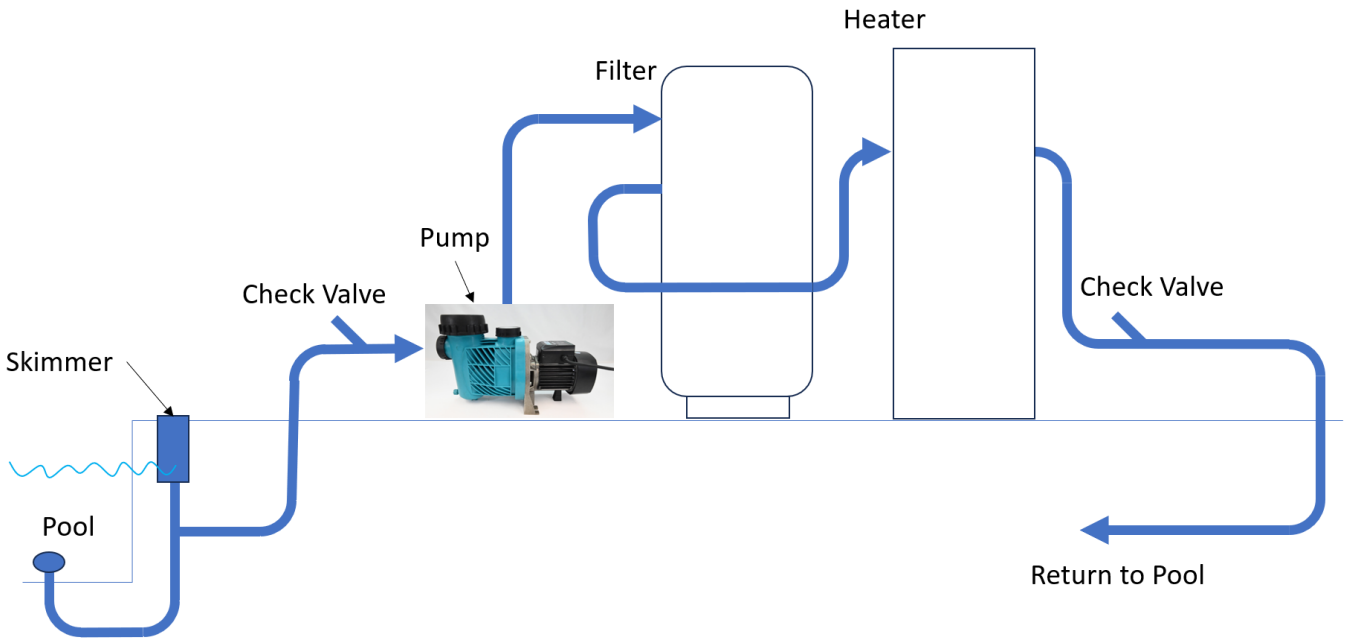
Non-submersible pumps - Do not submerge pump or motor in water. Do not allow water to drip on the motor. Protect the pump and motor from sunshine. If the pump is installed outdoors, supply weather protection, such as a sheet-metal shield, shed or well house.

Filtration requirements – The Off Grid Pool Pump comes with an integrated basket strainer to filter large debris. The clear cover allows for easy inspection and the included spanner wrench makes removing the basket simple and easy. Depending on the conditions around your pool, it is recommended that the strainer be checked 2-3 times weekly if there are leaves and debris in the area. Else, a weekly inspection should suffice.

It is important that the clear cover be re-installed completely air tight. In most cases the right amount of torque cannot be applied by hand, which is why the wrench is included. Do not overtighten with the wrench. Simply tighten the nut with greater force than you could by hand.

Pump must not run dry - Water is the lubricant for the pump. If the pump runs completely dry, it will overheat and fail.

3. PLUMBING SYSTEM DESIGN



Reference System Diagram

Minimize Suction Lift – Suction lift refers to the pressure (negative pressure) on the suction (inlet) side of the pump. As the vertical distance from the pump inlet to water increases, the suction lift pressure also increases. The practical suction/intake pipe limit for any pump is 20 vertical feet to water at sea level (subtract 1 ft. for every 1000 ft. of elevation). Limiting the pipe length to 2 to 3 feet and avoid any 90* fittings when possible will allow the pump to run quietly and more efficiently. Placing the pump downhill or level from the water source also helps to minimize suction lift.

Intake Pipe – Keep the intake pipe distances as short as possible. Do not use thin-wall hose or soft tubing on the pump's intake. It may collapse under suction and restrict the flow. Polyethylene pipe (black flexible Polypipe) can be prone to slight leakage at the fittings, ensure all connections are watertight.

Increase pipe size as the distance from the water source increases. Use pipe reducer fittings to adapt the pump's inlet or outlet to a larger pipe size where necessary.

The intake pipe must not be obstructed or restricted by undersized pipe, excessive suction lift, or a clogged filter.

Avoid humps in the intake line that can trap air pockets and block the flow. Ensure the intake pipe is free of leaks.

Priming the Pump – The Wright Morgan Off Grid Pool Pump self-priming, so long as the pump body is filled with water before first use. In most instances the pump should be installed at a level such that the water naturally flows to the pump. If this is not the case, simply unscrew the strainer cover and fill the pump with water.

Pipe Unions are required and supplied with this pump. Unions make pump replacement easy, without the need to cut and re-solder or re-glue the pipe.

Mounting the Pump – The pump must be mounted horizontally on a solid, rigid surface, using the attached mounting feet. Pool Pump will vibrate slightly under normal operation so it is important that the pump is rigidly mounted to avoid loosening the piping connections. If the vibration causes excess noise but the pump is operating normally (without cavitation), it is recommended to isolate the pump mount from the pump house with a layer of rubber dampening material.

Freeze Protection – Take every precaution to prevent the pump from freezing. The pump head will survive most light freezes, but a hard freeze may damage it. If the pump is insulated for freeze protection, keep the motor exposed to prevent overheating.

4. ELECTRICAL WIRING

There are several parts that make up the electrical system basics of an Off Grid (solar powered) Pump. They are:

- Solar Panel(s), aka Photovoltaic Panels, generate DC electricity. Panels come in various sizes and output types, so it is important to follow the recommendations herein when selecting your solar panels, which are not included in the purchase of Wright Morgan solar products.
- The Controller takes the DC electricity generated by the solar panels and makes sure it is regulated for use by the pump. Additionally, the controller allows other devices to interact with the pump, like switches to turn the pump on/off based on different needs, or the use of voltage sensing equipment to automatically switch between solar and grid power. This is discussed later in this manual. The Controller is included in the purchase of Wright Morgan solar products.
- The Pump is connected to and takes direction from the Controller, including when to start/stop due to sunlight, regulate speed of motor based on water output requirements, or behave according to switches/inputs connected to the Controller. The Controller and Pump come from the factory ready to run after installation with very little adjustment.

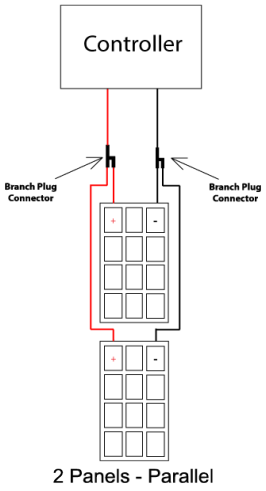
There are some system designs that can also include the integration of:

- Voltage Power Pack, which is an additional electrical device that allows the automatic integration of grid power alongside solar power generation. When the Power Pack senses that the solar panels are no longer generating enough voltage to turn the pump it automatically switches to grid power to continue running the pump.
- Battery Power Pack, which is a device that is inserted between the solar panels and the controller, allows the system to run on a battery bank full time, using the solar panels to recharge the batteries during daylight hours and the pump to circulate at night using the stored battery energy. Though the Battery Power Pack itself is not cost prohibitive, the installation of a battery bank and on-going required maintenance for batteries changes the relationship between the system owner and the solar installation from passive to active. Batteries require regular maintenance and monitoring that cannot be forgotten. Poorly maintained and monitored battery systems can be a safety hazard and Wright Morgan recommends sizing the pump to get the required daily output during daylight hours rather than using external stored energy devices.

4.1 Solar Panels

There are many solar panel manufacturers and sizes available, so it is important to understand two key aspects of selecting your solar panels: Output Voltage; and Panel Mounting.

1. Wattage and Output Voltage
    a. The Wright Morgan Off Grid Jet Pump Controller can accept a MAX of 100 VOC (open circuit voltage) from the solar panel array. Though solar panel wattages can vary greatly, the maximum output voltage is the key indicator and must not be exceeded.
    b. Wright Morgan recommends wiring (2) 380-405 Watt, 72 cell *24V nominal* solar panels in PARALLEL to maximize the output and efficiency of the WM-94829.



General Wiring Example – Solar Panels in Parallel

2. Panel Mounting

There are many options for mounting solar panels in a residential setting: Top Pole Mount, Roof Mount, and Cantilever. It is very important that the solar panel array is tilted at the proper angle for the time of year to maximize the daylight energy. Shadows CANNOT be cast on the array at any time of the day. The table below outlines the recommended tilt angles:

Location	*Latitude*	*Summer Tilt (-15°)*	*Winter Tilt (+15°)*	*Year-Round Tilt*
Southern Canada	**50°**	**35°**	**65°**	**50°**
Upper Third of US	**45°**	**30°**	**60°**	**45°**
Middle Third of US	**40°**	**25°**	**55°**	**40°**
Lower Third of US	**35°**	**20°**	**50°**	**35°**
Central Mexico	**20°**	**5°**	**35°**	**20°**

Beyond the proper tilt angle, how arrays should be mounted is largely personal preference of the owner, so long as the panels are mounted to a professionally constructed rack system capable of withstanding substantial wind bursts. Improperly mounted panels caught by wind are extremely dangerous due to their weight and size. Do not engineer the racking system yourself.

Wright Morgan recommends a top pole mounting system. These top pole mounts allow for flexibility of placement on site, away from obstructions and people. They can be mounted high enough to prevent accidental interference with people and pets but can still be installed from a 6' ladder without fear of falling from a height. Top pole mounted racks are easily tilted in place depending on the time of year and can still be accessed by a water hose to clean off dusty panels to improve performance. Wright Morgan carries an engineered top pole mount racking system by Solar Power and Pump, Co that is easily installed by handy homeowners.

4.2 Wiring the Controller to the Solar Panels and Pump

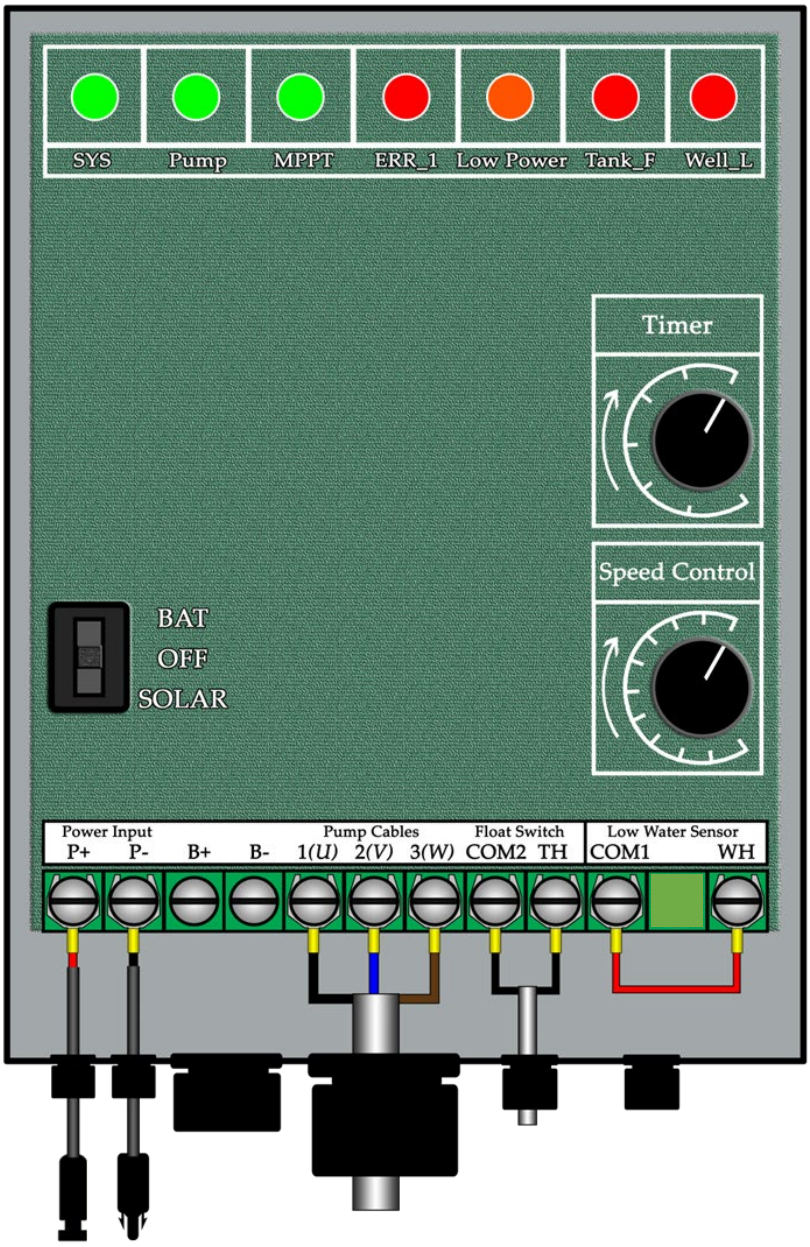
Warning!! - Before any wiring is completed it is recommended that the panels be covered by a tarp or cloth. If there is any sunlight then the panels are producing electricity!

Wright Morgan has designed the system to be as installation friendly directly from the package as possible. Included in the package are a pair of standard solar MC-4 cables intended to bridge the MC-4 connectors protruding from the controller to the solar panels directly. In the off chance that you elect to mount the panels further away, MC-4 cables are a readily available item that can be purchased from a solar supplier in a variety of lengths.

Plan on mounting the Controller in the pump house with the pump. This way any adjustments made on the controller can be observed directly at the pump.

The following diagram illustrates how to wire the pump to the controller directly, labeled 'Pump Cables'. Float switches and Low Water sensors can be used for Jet applications as an optional accessory. The battery terminals (B+/B-) on the controller are disabled and do not function. The Com1 & WH terminals for the low well sensor come from the factory bridged together. If no low water sensor is used *leave this bridge in place*.

After all the wiring is landed it is recommended that a small amount of silicon sealant be applied to any openings in the controller box where unused wires may pass. Small bugs love the warmth of controllers, crawl inside, and short things out. Keep them out of the controller by sealing it well before use.



Controller Wiring Diagram. Note: seal the unused ports to prevent insect entry.

5. TROUBLESHOOTING

Most problems are caused by wrong connections (in a new installation) or failed connections, especially when a wire is not secure and falls out of the terminal. The SYSTEM light will indicate that the system is switched on and connected to the controller. It indicates that VOLTAGE is present, but there may not be sufficient power to start the pump.

System appears dead, no lights showing on the controller:

1. Is there a disconnect switch or circuit breaker installed on the solar array circuit? Is it off?
2. Look for disconnected or damaged wires.
3. Controller has reverse-polarity protection. If no lights are emitting it possible that the input wires are installed in reverse.

Pump attempts to start every 60-90 seconds but doesn't run:

1. There may be insufficient power reaching the controller. A solar-direct system should start if there is enough sun to cast a slight shadow.
2. If the pump was recently connected (or reconnected) to the controller, it may be running in the opposite direction due to a wiring error.
3. If the motor shaft only vibrates and will not turn on, it may be getting power only to two of the three motor wires. This will happen if there is a broken connection or if wire splices are not properly seated.
4. The pump or pipe may be packed with mud, sediment, or debris, causing the motor to draw more power than the solar panels will provide.

Many problems can be located by a simple inspection. No electrical experience is required for this:

Inspect the Solar Array

1. Are solar panels facing the sun?
2. Is there a partial shadow on the array? Shadows significantly decrease the efficiency of solar panels and can potentially stop the pump.

Inspect All Wires and Connections

1. Look carefully for improper wiring (especially in a new installation).
2. Make a visual inspection of the condition of the wires and connections. Wires are often chewed by animals if they are not enclosed in conduit/electrical pipe.
3. Pull wires with your hands to check for failed connections.

Inspect the Controller and/or Disconnect Box (if used)

1. Open the clear hinged door to have an unobstructed view of your terminal strip and circuit board.
2. First, check for a burnt smell. This will indicate a failure of the electronics. Look for burnt wires, bits of black debris, and any other signs of lightning or other electrical damage.
3. Open the disconnect box (if one is required by local regulations and used). Is the Power In switch turned ON? Pull on the wires to see if any of them have come loose.
4. Inspect the grounding wires and connections. Most controller failures are caused by an induced surge from nearby lightning where the system is NOT effectively grounded. Grounded connections must be properly made, tight, and free of corrosion

Check the Low Water Sensor input on the controller – be sure the factory installed bridge is in place across the terminal, as shown in the diagram above.

Force a Quick Start
If you restore a connection or bypass the low water sensor or float switch, there is no need to wait the normal time delay. Power down Controller by moving on/off switch to off, wait 5 seconds, then move switch back to the ON position. Pump should start immediately if sufficient power is present.

Pump Spins But Does Not Pump Water

1. Check direction of rotation - If not clockwise (viewed from front-end) reverse the inlet and outlet hoses.
2. Check Prime - Open priming plug or valve and re-prime the pump. Check all the fittings, a pinhole leak in the suction pipe will cause loss of prime. Inspect, pressure-test, clean or replace the foot valve. Ensure no debris is trapped in foot valve.
3. Polyethylene Pipe Fittings – Ensure fittings are tight. Gently heat with torch or hot water and retighten hose clamp with a wrench. Replace stripped clamps. Use stainless steel clamps.

Pump Spinning, No output Pressure – Indicates loss of prime. Check for any or a combination of the following:

1. High suction lift - mount pump as close to reservoir as possible.
2. Undersized suction pipe.
3. Clogged filter - Fiber filter cartridges may be clogged and look clean (fine silt is in the fibers).
4. Soft, flexible hose on intake line may be crushed or kinked by suction - replace with rigid pipe material.
5. Check for bubbles in inline (transparent) filter or air in outlet water.
6. Check prime. Open priming plug or valve and re-prime the pump. Check all fittings, a pinhole leak in the suction pipe will cause loss of prime. Inspect, pressure-test, clean or replace the foot valve. Ensure no debris is trapped in foot valve.
7. Some inline filters may have a red push-button valve to release pressure for maintenance. If the filter is incorrectly installed (too high above the water source) the suction may pull the valve open and introduce air. To prevent this, seal the push-button with silicone sealant or epoxy, or replace the button with a bolt and nut, sealed with silicon and tightened down.
8. If no source of air leakage is present, water may have high concentrations of dissolved gases which release as bubbles in the suction pipe. Reduce suction lift if possible. Install an air chamber in intake line, with a valve on top. Pour water in to replace air when problem reappears.
9. Turning filter to a horizontal position will move the bubbles out of the flow path of the water. Do not turn the filter upside down, as this could induce dirt into the pump during filter change.
10. Impeller damaged/worn out – replace impeller.

Low Flow Rate / Pump Turns Fast and Draws Low Current – Pump is worn out from dirt, rust or other abrasive particles in water, or from cavitation, from running dry or age.

Low Flow Rate / Pump Turns Slowly and Draws High Current (may run hot and/or blow fuses) /Pump is Difficult to Turn

1. Excessive vertical lift, beyond the system's capacity
2. Mineral Deposits - Turn shaft with two fingers. If difficult to turn, use vinegar to dissolve the mineral deposits in the plumbing. Remove pipes from the pump and allow solution to circulate through the pump by turning it backwards. Replace or rebuild the pump if deposits cannot be removed.

Low Flow Rate / Pump turns Slow, Motor Cool

1. Voltage at motor measures lower than voltage at source. Power wire is undersized. Consult wire size chart.

Pump Emits Crunching Sounds, Black Material in Outlet – Internal parts are broken, either by debris in pump, severe freezing or external shock.

Pump Frozen by Low Temperature / Blown fuse or circuit breaker tripped – Allow the pump to thaw. Observe performance. If the motor is damaged, replace or rebuild. Check all plumbing for damage and leaks and protect from future freezing.

6. MAINTENANCE

Strainer Basket – When a Strainer Basket is becoming clogged the pump will emit an increasingly loud buzzing noise (cavitation). Using the supplied spanner wrench, unscrew the Lid Lock Ring, remove the basket and clean it thoroughly, and reinstall. Tighten the Lid Lock Ring by hand, and then use the spanner wrench to tighten the ring less than an additional quarter turn. DO NOT OVERTIGHTEN! The included spanner wrench is designed without a long handle specifically to prevent overtightening the Lid Lock Ring, which should be slightly tighter than hand tight when properly seated.

7. PUMP REPAIRS

FAILURES
Pump Head – The pump head is user repairable with the proper maintenance kit and tools. Visit www.wrightmorgan.com for available kits and instructional videos on maintenance and repair.

WARRANTY CLAIMS must include receipt to prove date of purchase.

TO SHIP PUMP TO WRIGHT MORGAN FOR REPAIR:
Please contact Wright Morgan to set up a repair and receive an RMA number

Email: sales@wrightmorgan.com

Have the MODEL & SERIAL NUMBERS available before initiating a return for repair.

WARRANTY

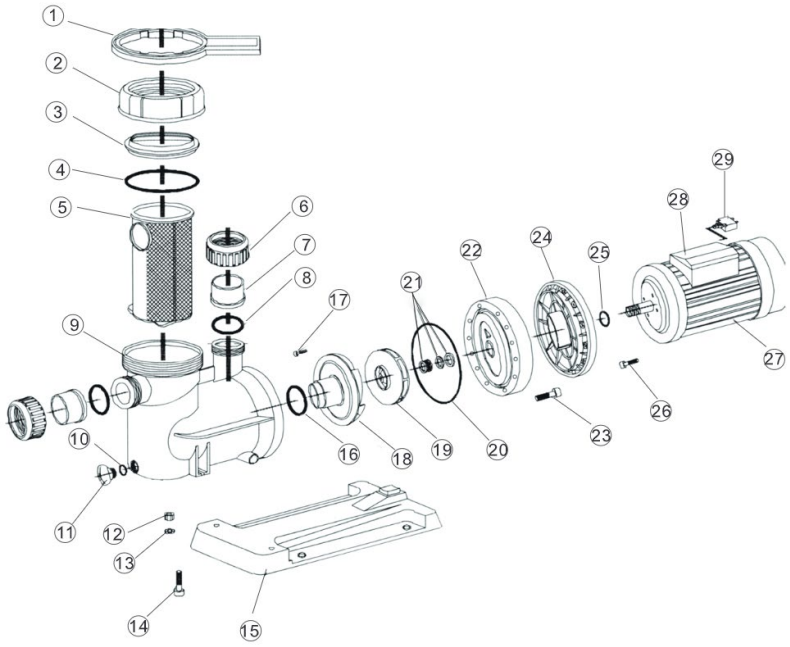
Wright Morgan products are warranted to be free from defects in material and workmanship for ONE (1) YEAR from date of purchase.

Failure to provide correct installation, operation, or care for the product, in accordance with instructions, will void the warranty.

Product liability, except where mandated by law, is limited to repair or replacement, at the manufacturer's discretion. No specific claim of merchantability shall be assumed or implied beyond what is printed on the manufacturer's printed literature. No liability shall exist from circumstances arising from the inability to use the product, or its inappropriateness for any specific purpose. It is the user's responsibility to determine the suitability of the product for any particular use.

In all cases, it shall be the responsibility of the customer to insure a safe installation in compliance with local, state and national electrical codes.

8. PARTS DIAGRAM



#	Component	#	Component	#	Component
1	Plastic Spanner	14	Screw (8x30mm)	27	Motor
2	Lid Lock Ring	15	Base	28	Junction Box
3	Lid	16	o-ring	29	Current Safeguard
4	o-ring	17	Screw		
5	Basket	18	Diffuser		
6	Union Nut	19	Impeller		
7	Union Bushing	20	o-ring		
8	o-ring	21	Shaft Seal		
9	Pump Body	22	Flange		
10	o-ring	23	Screw		
11	Drain Plug	24	Flange		
12	Nut	25	Water Reject Ring		
13	Gasket	26	Screw		