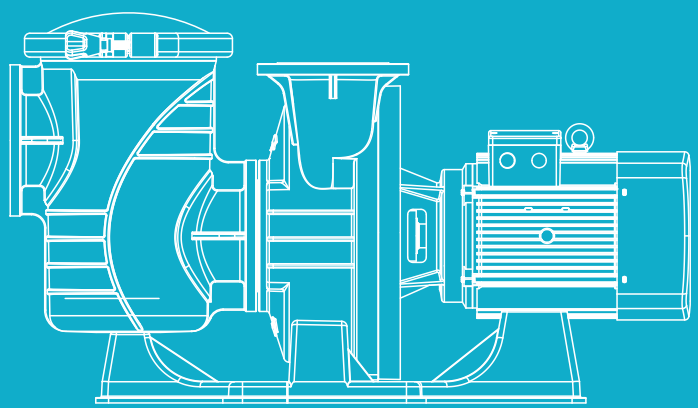
Emaux

HYDRAU-POWER PLASTIC PUMP

APS SERIES OWNER'S MANUAL

Installation and Operation



USER MANUAL

Model: APS Series

EMPU22121601

APS SERIES

HIGH PREFORMANCE & HEAVY DUTY

TABLE OF **CONTENT**

WARNINGS AND SAFETY INSTRUCTIONS
GENERAL WARNING

This instruction contain general caution information for use in Pool and SPA pump installation application. Specified Pump model function should be refer to particular manual. Components such as the filtration system, pumps and heater must be positioned so as to prevent their being used as means of access to the pool by young children.

RISK OF ELECTRICAL SHOCK

This appliance should be installed by qualified electrical personnel in accordance with National Electrical Code and all applicable local codes and ordinances.Hazardous voltage can shock, burn, and cause death or serious property damage. DO NOT use an extension cord to connect unit to electric supply to reduce the risk of electric shock.

1. The pump should be permanently connected to an individual circuit breaker.
2. Pump must be connected to a residual current device (RCD) having a rated residual operating current notexceeding 30 mA or receptacle with ground fault circuit interrupt (GCFI).
3. Electrical grounding must be connected before connecting to electrical power. Failure to ground all electrical equipment can cause serious or fatal electrical shock hazard.
4. Bonding: Use at least #8 AWG (#6 AWG for Canada) a solid copper conductor, run a continuous wire from external bonding lug (if available) to the pressure wire connector provided on the electrical equipment and to all metal parts of swimming pool, spa, or hot tub, and metal piping (except gas piping), and conduit within 1.5 m (5 ft) of inside walls of swimming pool, spa, or hot tub.
5. Never open the inside of the drive motor enclosure. There is a capacitor bank that holds a mains supply voltage charge even when there is no power to the unit. The voltage should be referred to the individual pump operation voltage.
6. The pump is capable of high flow rates; use caution when installing and programming to limit pumps performance only.
7. Switch OFF pump power before servicing and disconnecting the main circuit to the pump.
8. Never change the filter control valve position while the pump is running.

COMPRESS AIR HAZARDOUS

This system enclosed pre-filter / filter and become pressurized. Pressurized air can cause the Lid to separate which can result in serious injury or death.

STAND CLEAR OF PUMP DURING START-UP

Pool and spa circulation systems operate under high pressure. When any part of the circulating system (i.e. lock ring, pump, filter, valves, etc.) is serviced, air can enter the system and become pressurized. Filter tank Lid and pre-filter cover must be properly secured to prevent violent separation. Place pre-filter / filter air relief valve in the open position and wait for all pressure in the system to be relieved before remove the lib to access the basket for cleaning.

HYPERTHERMIA

SPA water temperature excess 38°C (104°F) may be injurious to health. Measure water temperature before entering SPA.
Hyperthermia occurs when the internal temperature of the body reaches a level several degrees above the normal body temperature of 98.6 °F (37 °C). The symptoms of hyperthermia include drowsiness, lethargy, and an increase in the internal temperature of the body.

SUCTION ENTRAPMENT HAZARD

This pump produces high levels of suction and creates a strong vacuum at the main drain at the bottom of your pool and spa. This suction is so strong that it can trap adults or children under water if they come in close proximity to a pool or spa drain or a loose or broken drain cover or grate.

The Virginia Graeme Baker (VGB) Pool and Spa Safety Act creates new requirements for owners and operators of commercial swimming Pools and spas.

Commercial pools or spas constructed on or after December 19, 2008, shall utilize:

1. A multiple main drain system without isolation capability with suction outlet covers that meet ASME/ANSI A112.19.8a Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs and either:
   - 1.1 A safety vacuum release system (SVRS) meeting ASME/ANSI A112.19.17 Manufactured Safety Vacuum Release systems (SVRS)
     For Residential and Commercial Swimming Pool, Spa, Hot Tub, and Wading Pool Suction Systems and/or ASTM F2387 Standard
     Specification for Manufactured Safety Vacuum Release Systems (SVRS) for Swimming pools, Spas and Hot Tubs or
   - 1.2 A properly designed and tested suction-limiting vent system or
   - 1.3 An automatic pump shut-off system.

Commercial pools and spas constructed prior to December 19, 2008, with a single submerged suction outlet shall use a suction outlet cover that meets ASME/ANSI A112.19.8a and either:

1. A SVRS meeting ASME/ANSI A112.19.17 and/or ASTM F2387, or
2. A properly designed and tested suction-limiting vent system, or
3. An automatic pump shut-off system, or
4. Disabled submerged outlets, or
5. Suction outlets shall be reconfigured into return inlets.

There are five types of suction entrapment according to The Virginia Graeme Baker (VGB) Pool and Spa Safety Act

1. **Body Entrapment** a section of the torso becomes entrapped
2. **Limb Entrapment** an arm or leg is caught by or pulled into an open drainpipe
3. **Hair Entrapment** or entanglement hair is pulled into and/or wrapped around the grate of the drain cover
4. **Mechanical Entrapment** the bather's jewelry or clothing gets caught in the drain or the grate
5. **Evisceration** the victim's buttocks come into contact with the pool suction outlet and he or she is disemboweled

TO REDUCE ENTRAPMENT HAZARD RISK

WARNING:

Two function suctions outlets per pump must be installed to prevent entrapment. The minimum separate of suction on the same plate must be at least point to point measurement 1 meter (3ft) apart. It is used to avoid “dual blockage” by bather.

If suction is found damage, broken, cracked, missing or not securely attached during regular checking, shunt down the pool and replace it immediately.

A vacuum release or vent system is recommended to install for suction entrapment release.

CAUTION!

WARNING:

1. A protective device is to be installed in the fixed wiring.
2. This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.
3. The appliance shall be installed in accordance with national wiring regulations means for disconnection must be incorporated in the fixed wiring in accordance with the wiring rules. A disconnected incorporated in the fixed wiring is to be provided.
4. The pump is to be supplied through a residual current device (RCD) or Ground Fault Circuit Interrupt (GFCI) having a rated residual operation current not exceeding 30mA.
5. The pump is to be supplied by an isolating transformer or supplied through a residual current device (RCD) having a rated residual operating current not exceeding 30mA.

	Correct disposal of this product
	This symbol on the product, or in its packaging, indicates that this product may not be treated as household waste. Instead, it should be taken to the appropriate waste collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by the inappropriate waste handling of this product. For more detailed information about the recycling of this product, please contact your local council, your household waste disposal service, or the shop where you purchased the product.

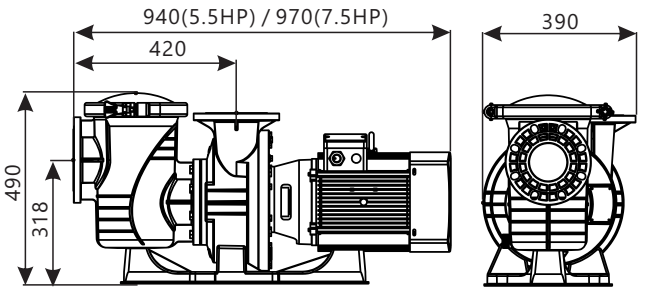
1. APS SERIES PLASTIC PUMP OVERVIEW

1. Hydrau-Power APS series pump delivery Emaux latest technology in pump design.
2. It is constructed in reinforced plastic pump body in lightweight and corrosion-resistant that suitable for marine applications.
3. Motor design in IE3 class premium efficiency standard provide incredibly efficient and low noise level.
4. High water flow impeller design by computational fluid dynamics (CFD) analysis optimize the pump performance than comparable pumps.
5. Large volume Detachable pre-filter with basket design provide high flow rate application and flexible installation.
6. ANSI Class 150 and DIN PN10 compatible flange standard design to fit into different piping system environments.
7. It is three phase electrical high power driving motor that is good for swimming pool and Sea Water applications.

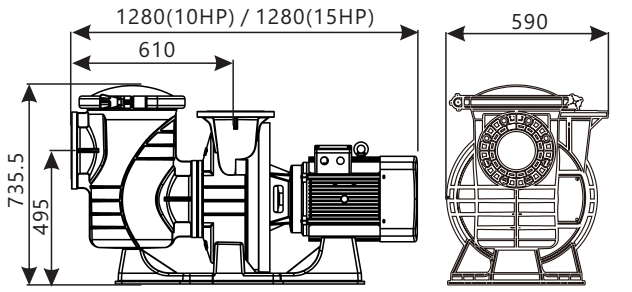
2. PRODUCT INFORMATION

Code 380V/50Hz	Model No	Donnection Size ANSI/DIN	Horsepower (Hp)	Strainer (L)	RPM
9023901	APS550P	4" / DN 100	5.5	13	2850
9023902	APS750P	4" / DN 100	7.5	13	2850
9023903	APS1000P	6" / DN 150	10	30	1450
9023904	APS1500P	6" / DN 150	15	30	1450

Dimension (mm)



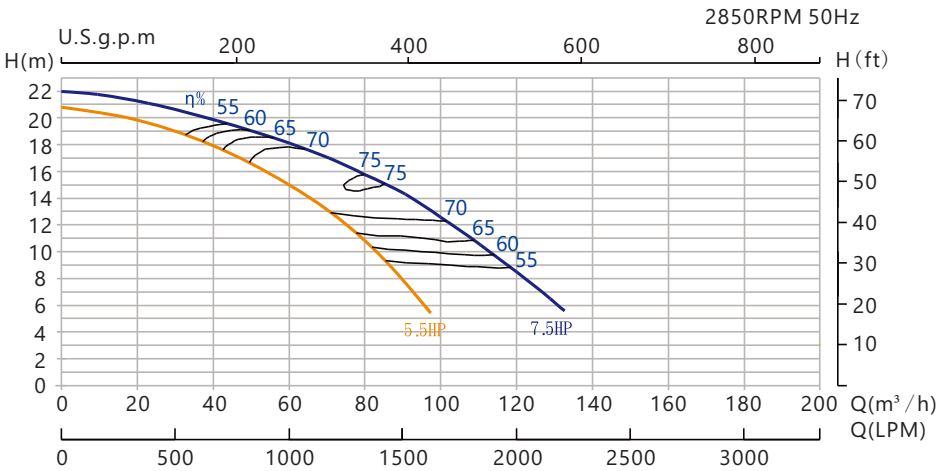
APS550P / APS750P

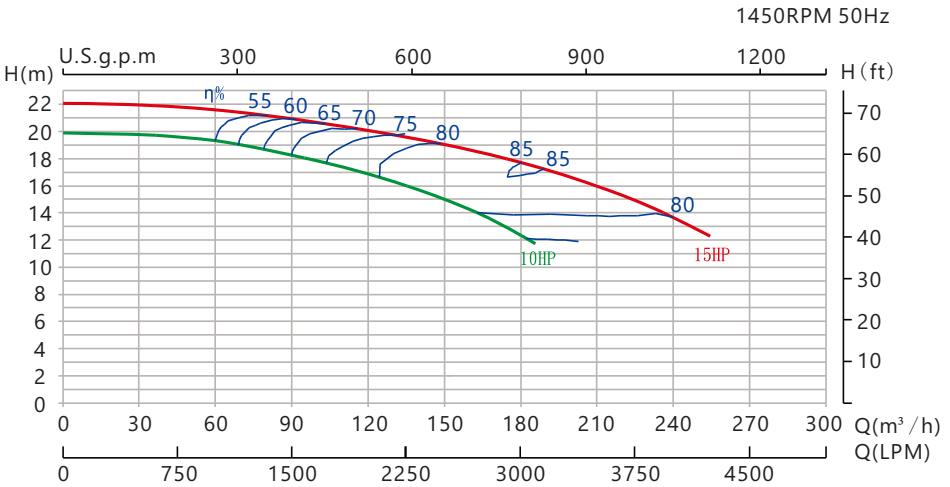


APS1000P / APS1500P

Model	Power (KW)	Noise (dB)	Head(m)					
			6	8	10	12	14	16
			FlowRate(m^3/h)					
APS550P	4	72	95	90	82	75	65	50
APS750P	5.5	72	130	120	110	105	90	80
APS1000P	7.5	68	-	210	185	180	160	135
APS1500P	11	68	-	270	260	250	240	210

PERFORMANCE CURVE





3. IMPORTANT SAFETY INSTRUCTIONS

WARNING:

The user guide you are holding includes essential information on the safety measures to be implemented for installation and start-up. Therefore, the installer as well as the user must read the instructions before beginning installation and start-up. Keep this manual for future reference.

The pump should be installed according to your local electrical installation ordinances and regulations. Only qualified, licensed personnel should install the pump and the wiring.

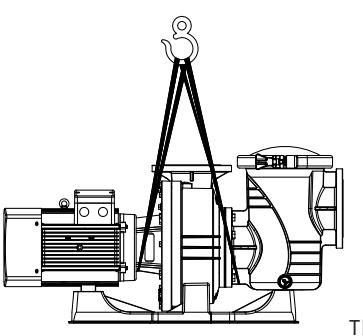
This appliance cannot be used by persons (including children) with reduced physical, sensory or mental capabilities or lack of experience and knowledge unless they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children must not play with the appliance.

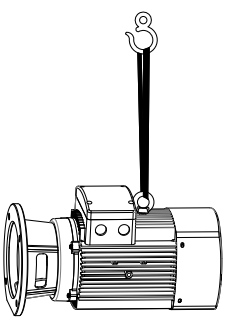
This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.

4. TRANSPORT AND STORAGE

The pump is fastened securely a wooden box for shipment. It should be stored in a dry area.

The center of the pump locate at the middle of the pump. It is recommended to place the lifting strap under between Motor to Body and Body to pre - filter body to lift the pump in the following way:





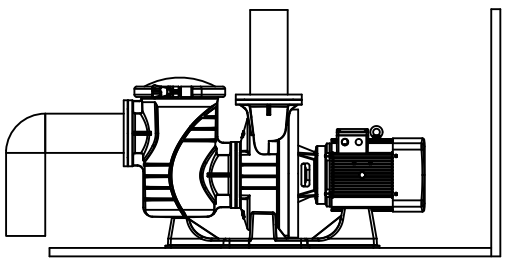
The Eye bolt is only to use for motor lifting.

5. INSTALLATION

5. 1 LOCATION

The pump should be located nearby as close as possible the pool or spa to reduce friction loss and improve efficiency. It is recommended at least 1.5 meter from pool water and 3 meters according to Canadian code.

1. It is suggested that **APS550P and APS 750P** with self-priming capacity for In Ground Pool application. **APS1000P and APS1500P should be installed Below Ground Level.**
2. The pump should be placed on a solid foundation that will not vibrate. It must be bolted down to reduce noise from vibration. The area should be well drained to prevent flooding damage the motor.
3. Install the pump in a well thermal ventilated environment and to protect from excessive moisture.
   Ensure there is enough clearance for pre-filter basket & Lid open and motor ventilation.



5. 2 PIPING

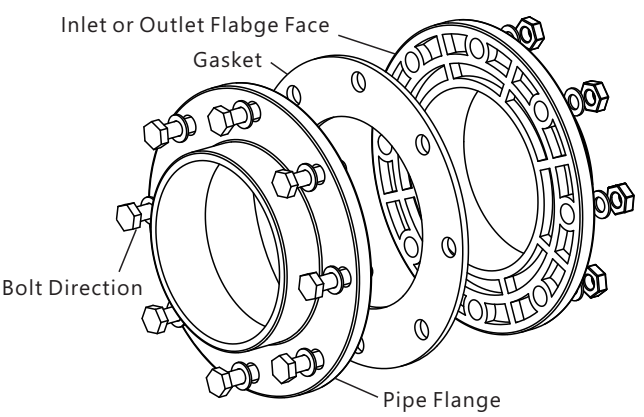
Incorrect suction design is one of the main causes for problems appearing during the pump installations. The suction tube is one of the installation's main components, and it should meet the following conditions in order to avoid future problems.

1. It should be as short and straight as possible.
2. The Diameter of the tube should not be smaller than the diameter of the pumps inlet.
3. The suction tube should be fully airtight, if not the entry of air can cause de-priming of the pump
4. The suction tube should have its own means of support and should not cause tensions or strains to the pump's flange.
5. Minimize the use of elbows, valves, narrowing or choking sections etc. which dangerously increase head losses and can cause air pockets as well as entry of air into the piping.
6. Each pump should have its own dedicated suction tube. If for unavoidable reasons it is necessary to connect two or more pumps to a single collector, the collector should have the same diameter from the first to the last outlet and should be sufficiently sized to supply the same flow rate to all pumps.

5. 3 FLANGE INSTALLATION

The Pre-Filter inlet and pump body discharge outlet are in flange type, both ANSI (Class 150) and DIN (PN10) standards are supported to share the same face and hole.

1. Place the 8 large bolts from the pipe flange side to the pump.
2. Put a 3.2mm thickness gasket in between.
3. Push the bolts to the pre-filter flange hole.
4. Keep the bolt straight and lightly snug each bolt with a wrench one by one until a squealing sound is heard to indicate that the bolts are being excessively tightened.



6. ELECTRICAL WIRING-3 PHASE

This power pump demand licensed or certified electrician or qualified pool installer to ensure there is adequate protection between the pump motor and mains power supply according to individual countries safety code.

The pump has power cord with plug attached on the plug, plug it to a power socket with circuit breaker to isolate the motor from the mains power for over load protection. The circuit breaker rating should refer to the electrical specification of individual pump working voltage and power.

The power has to be with a Residual Current Device (RCD) or Ground Fault Circuit Interrupt (GFCI) having a rated residual operating current not exceeding 30mA.

WARNING:

If the RCD / GFCI device trips, it means there is fault on the power line or motor. Do not use this pump. Disconnect the pump and have the problem corrected by a qualified service representative before using. Press the reset button to reset the RDC / GFCI devices after fixed. It will keeps the circuit shut off and will not reset if the power line problem is not fixed. It is recommend to test the RCD / GFCI at least once a month.

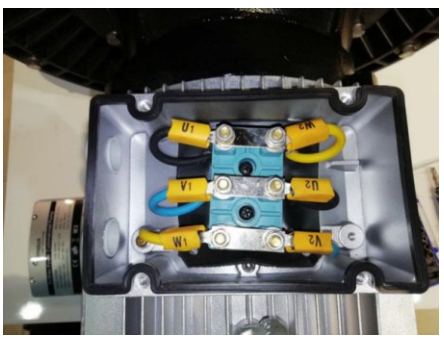
APS PLASTIC pump operate at 3 phase power line to drive the motor. The latest cable color code is Brown for L1, Black for L2, Grey for L3, Blue for Neutral and Green & Yellow for Earth.

For old code it is Red for L1, Yellow for L2, Blue for L3, Black for Neutral and Green & Yellow for Earth.

Open the terminal box on the top of the motor, there are six terminals and Ground.

It can be connected in Delta or WYE/STAR connection. The default connection is Delta type.

380VAC 50Hz +10% and -6% electric power is three phase power source voltage range.



3 phase Cable New Wire Color Code		3 phase Cable Old Wire Color Code	
L/L1	Brown	L/L1	Red
L2	Black	L2	Yellow
L3	Grey	L3	Blue
N	Blue	N	Black
Earth	Green & Yellow	Earth	Green & Yellow

WARNING:

Note: This high power pump demand licensed or certified electrician or qualified pool installer to ensure there is adequate protection between the pump motor and mains power supply according to individual countries safety code.

6. 1 DIRECT ON LINE

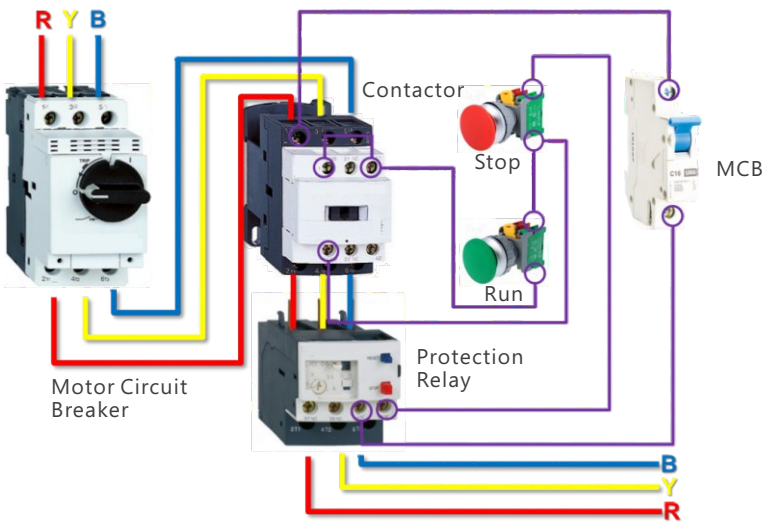
Direct On Line (DOL) starting is the simplest, cheapest and most common starting method. It actually gives the lowest temperature rise within the motor during startup of all the starting methods. But the drawback is starting current can be 3-8 time of full load current. Therefore, it is not recommend for pump power higher than 5.5KW in public low voltage mains 400V.

The typical common 3 phase pump Run / Stop starter is Direct-On-Line Starter that include:

1. Motor Circuit Breaker is a short circuit magnetic protection devices.
2. Control unit for Run and Stop operation and status monitoring.
3. Protection relay is an overload thermal protection device.
4. Single phase MCB for secondary protection.

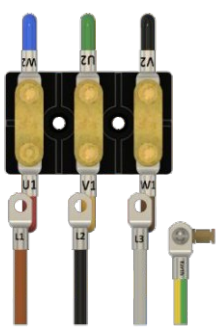
WARNING:

It is a typical wiring diagram without ground wire for reference only. All electrical rating of individual device has to match with pump's current rating specification.

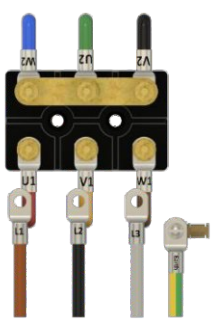


Direct-On-Line (DOL) Starter typical wiring.
DOL Starter can be applied to motor connect in Delta or WYE/Star connection.

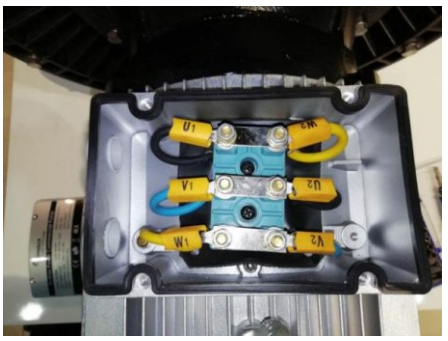
Low Voltage Delta Connection



High Voltage WYE/STAR Connection



The factory connection is a Dealta conneciton



3 phase power 4 wires power line connection

Terminal Box

Motor Roation Arrow

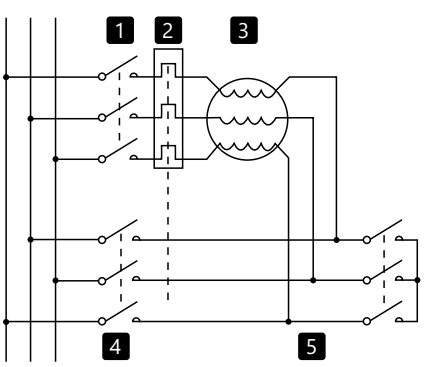
Green& yellow Groudn wire location

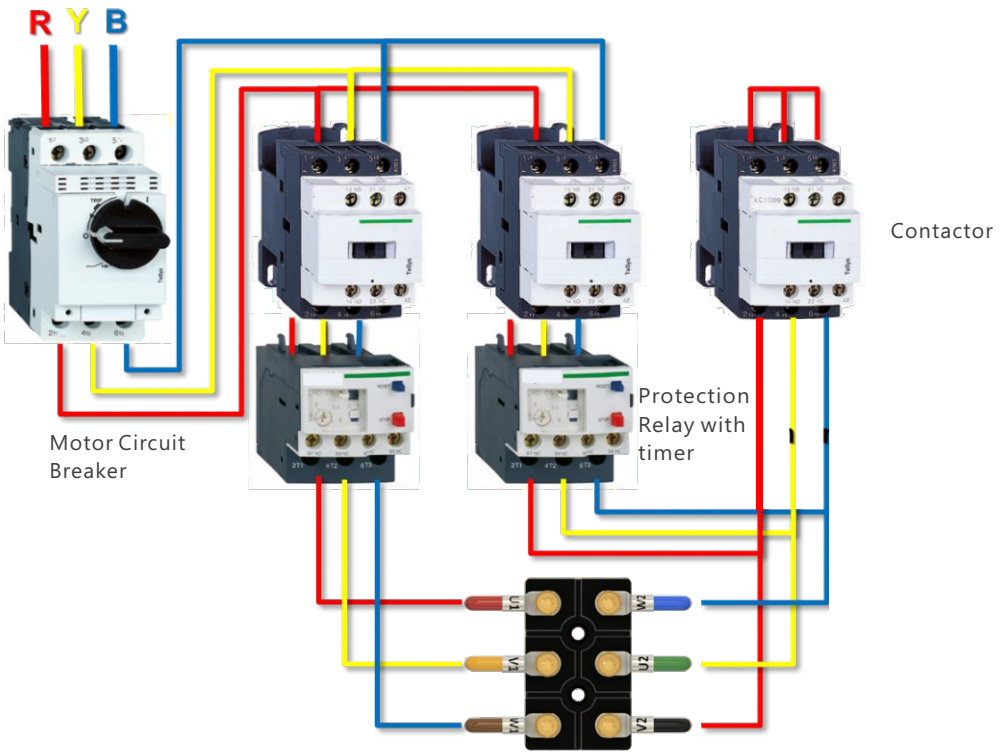
1. Every power lines have to be protected by circuit breaker for over load to isolated the motor from the mains power and provide protection to motor.
2. Three Phase starter switch or magnetic switch has to been applied to switch the pump on or off.
3. The motor run in counter clockwise when it is viewed from the front side of the motor. There is a rotation arrow on the pump body to show the right direction. Turn on the pump in one second and check the motor rotation direction is correct or not. The motor will rotate in Clock wise direction if any two cables are interchange. Fixed the cable location when rotation direction is wrong.
4. For insulation countries regulated by International Electrotechnical Commission (IEC) standards, the power lines must supply through a residual current device (RCD) having a rated tripping current not exceeding 30mA has to been installed.

6. 2 STAR/DELTA STARTER

It has to be used for high power rating pump. It is used for large motor size with high starting current surge.
The starter include

1. Man Contactor
2. Thermal overload
3. Motor (3 phase)
4. Delta contactor
5. Star Contactor





The contact plate on the six terminals has to be removed.

6. 3 VARIABLE FREQUENCY DRIVE(VFD)

The pump is possible to drive by variable frequency driver for better starting and energy saving purpose. The connection is simple, it is just connect the 3 phase output of the variable frequency drive to the pump in Delta or Star configuration according to the motor plate on the motor.

WARNING: Besides current and power rating of the VFD is the key parameter to drive the motor, the EMC filter between VFD and motor is the most critical device to prevent the motor bearing, shaft and insulation system from being damage by VFD inverter high frequency bearing current noise. It is necessary to consult your VFD supplier to optimize the EMC filter. Some of the VFD supplier has EMC filter build in. If not it is necessary to consult VFD supplier to add EMC filter module between VFD and Motor.
For heavy power version, it should need a large current EMC filter which typical name du/dt filters.

6. 4 SOFT STARTER

Another low voltage starter is soft starter, it can be 1 phase, 2 phase or 3 phase power input and connect direct to the motor terminals. It can setup initiate voltage and ramp up to full power smoothly to prevent current surge; and stop the pump slowly. Soft stop (which helps eliminate water hammer)

The Key Benefits Of Soft Start

1. Smooth acceleration without the torque transients associated with electro-mechanical reduced voltage starters.
2. Voltage or current is applied gradually, without the voltage and current transients associated with electro-mechanical reduced voltage starters.
3. Lower start currents and/or shorter start times because constant current control gives higher torque as motor speed increases.
4. Easy adjustment of start performance to suit the specific motor and load.
5. Precise control over the current limit.
6. Consistent performance even with frequent starts.
7. Reliable performance even if load characteristics vary between starts (eg loaded or unloaded starts).

It is necessary to refer to the soft starter manufacturer for detail starting conduction setting.
Table of Motor current rating for reference if there is no current rating on the motor plate.

Motor Power		Current rating at different voltages					
KW	HP	220-230 V	380-400 V	440 V	460 V	500 V	660-690 V
7.5	10	27	16	14	13	12	9
11	15	39	22	20	18	18	14
15	20	52	30	27	25	23	17
18.5	25	64	37	33	30	29	21
22	30	75	44	39	35	33	25
25	35	85	52	45	38	39	30
30	40	103	60	52	48	45	35
37	50	126	72	64	59	55	42
45	60	150	85	76	73	65	49

7. START UP

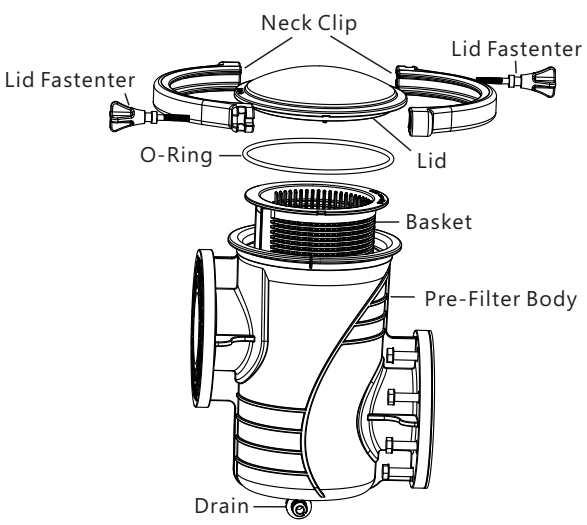
WARNING:

1. Verify the pump shaft turn freely.
2. Check the mains voltage, current and frequency are accordingly to the name plate.
3. Never run pump dry! Running pump dry may cause damage to the mechanical seal causing leakage and flooding. Fill the pre-filter with water before starting motor.
4. Before removing the pre-filter Lid, STOP PUMP, CLOSE GATE VALVES in suction and discharge pipes.
5. Always STOP THE PUMP before when RELEASE ALL PRESSURE from the pump and the piping system before proceeding.
6. Never tighten or loosen screw while the pump is in operation.
7. The suction pipe and the suction inlet in the pool must be free from obstruction.

Before start-up, the alignment of the pump should be checked. The tubing should be inspected to ensure that they are properly fitted and tightened and that they do not exert pressure or tension on the pump's suction or discharge connection. The pump should never be operated.

1. Clear all piping of construction debris and verify that the piping has passed a proper pressure test.
2. Check the filter and other equipment for proper installation, verifying all clamps and connections are properly installed as per the manufacturer's instructions.
3. Open any shut off valves on the suction and discharge lines.
4. Open the filter pressure relief valve and release all pressure from the system.
5. If the pump is located below the water level of the pool, opening the pressure relief valve will fill the pump with water.
6. If the pump is located above the pool water level, remove the lid from the pre-filter and fill with water before starting the pump.
7. Check to see that the lid O-ring and seat areas are clean and lubricated. Debris in the sealing area can cause air to leak into the system and make it difficult to prime the pump.
8. Close/tighten the lid to make an airtight seal.
9. Turn on the pump.
10. If the pump does not prime and all instructions to this point have been followed, check for suction leaks and repeat steps (1) through (8).

8. PRE-FILTER BASKET MAINTIANCE



1. The pump mechanical seal requires no lubrication and service.
2. To avoid drops in pressure and pre-filter Basket damage. The pre-filter basket of the pump should be visually inspected at least once a week. Remove the clear lid and the basket and clean debris from basket. Inspect the lid O-ring; if damaged replace.
3. Turn off the pump at the breaker.
4. Close the inlet and discharge valves.
5. Discharge the water by drain on the pre-filter bottom.
6. Release the two Lid fastener of the neck clip slowly to release the pressurized air inside the pre-filter.
7. Remove the clips and Lid to take out the basket and remove the debris and rinse out the basket.
8. Reinstall the Lid by placing the lid back onto the Pre-Filter body with Lid O-ring is properly placed around the entire sealing surface of the Pre-filter body.
9. Open the inlet and discharge valves.
10. Turn the power "ON" at the circuit breaker
11. Open the manual air relief valve on top of the filter.
12. Stand clear of the filter. Start the pump.
13. Bleed air from the filter until a steady stream of water comes out. Close the manual air relief valve.

8.1 ROUNTINE MAINTENANCE SCHEDULE

Besides regular strainer cleaning, it is necessary to do regular control on the following;
1. Check that the mechanical parts are tightly secured and check the condition of the screws supporting the machine.
2. Depending on the level of cleanliness of the water, the pump should be checked regular in every 100 hours of operation or less.
3. Check the temperature of the machine and the electric motor for over heat caused by overloading.
4. Check for machine vibrations due to loss of screw or other reason. Assistance Service.
5. When there is a fault, stop the machine immediately and contact the nearest Technical Serviceman.
6. Should the pump stop, call technical service to check that consumption of the running motor in amperes is equal to or below that indicated on the name plate.
7. Empty the pump for winterize when it is to remain at a standstill for a certain length of time, especially in cold countries where there is a risk of freezing.
8. Pump components that, due to their normal use, suffer wear and/or tear must be regularly replaced to ensure good pump performance. The following table shows the perishables and/or consumables used in the pump and their estimated Lifespan.

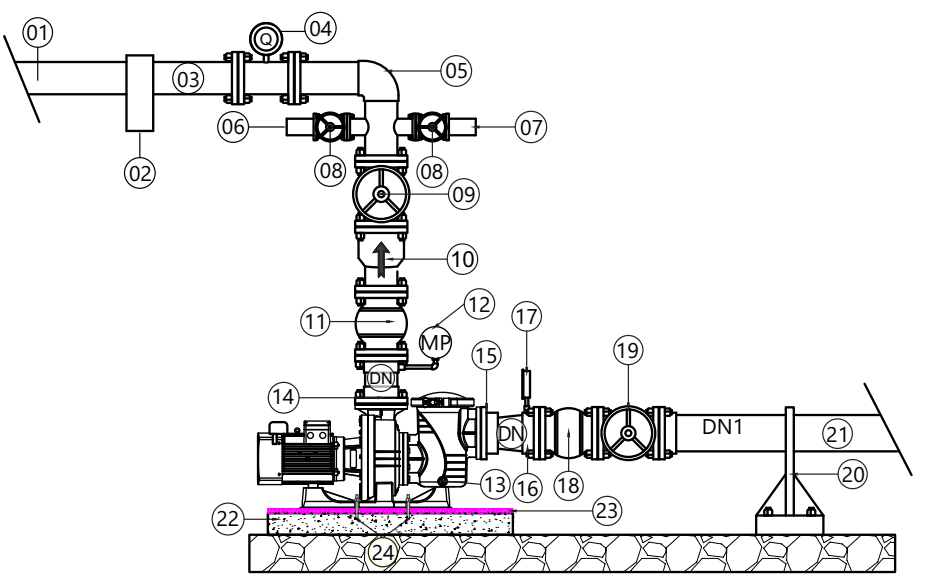
9. WINTERIZING

If the air temperature drops below 0°C (35°F), the water in the system can freeze and cause damage. Freezing damage is not warrantable. To prevent freezing damage follow the procedures listed below:
1. Shut off electrical power for the pump at the house circuit breaker.
2. Drain the water out of the pump case by removing the two drain plugs from the case.
3. Store the plugs in the pump basket.
4. Cover the motor to protect it from severe rain, snow and ice.
5. If it is possible, store the pump in a dry location during this time.
6. Do not wrap the motor in plastic. It will cause condensation and rust on the inside of the motor.
7. Where possible, have a qualified service technician or electrician disconnect the electrical wiring at the switch or junction box and store the pump indoors.
8. When the pump is reactivated, ensure all seals and O-rings are in operational condition. If they are not, re-greasing or replacing may be necessary.

10. TROUBLE SHOOTING

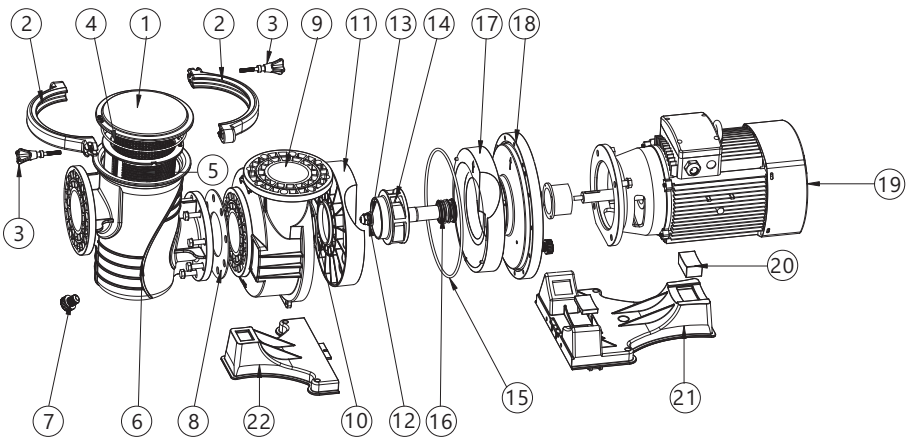
Problem	Corrective Action
Pump Will Not Prime	1. No water in Pre-filter Lid is not tight Damaged lid O-Ring 2. Water level below Skimmer 3. Pre-filter or Skimmer Basket clogged Closed Valve in Piping System 4. Air leak in Suction Line 5. Pump installed more than 10 ft. (3 m.) above Water Level or otherwise too high for Hydraulic Conditions of Pool Plumbing System 6. Pump Shaft rotating in wrong direction
Low Flow- High Filter Pressure	1. Filter is dirty 2. Restriction in Filter Line
Low Flow- Low Filter Pressure	1. Pre-filter or Skimmer Basket clogged 2. Clogged Impeller 3. Air leak in Suction Line Restriction in Suction Line
Motor Does Not Turn	1. Power Switch is off 2. Circuit Breaker has tripped Thermal Protector has tripped Pump is in OFF mode of Timer 3. Motor Shaft is locked by bad Bearing Impeller is jammed
Motor Over Heating	1. Electrical Supply Connections are incorrect Wiring to Pump is undersized 2. Inadequate Voltage supplied to Site Ventilation is inadequate for Motor 3. Voltage differential between legs of 3 Phase Circuit >5% 4. Pump Shaft rotating in wrong direction
High Pitch OR Growling Noise Coming from WET END of Pump	1. Air Leak in Suction Line 2. A Valve, Elbow or Tee is located too close to the Suction Inlet of the Pump 3. Pump Shaft rotating in wrong direction

11. TYPICAL INSTALLATION EXAMPLE



No.	Descriptions
DN	Diameter of inlet and outlet of the pump
DN1	Diameter of the Pipe
1	Air-bleed hole should be installed at the highest point
2	Holding the pipes with racks so as to prevent too much load on the branch of the pump, and the racks should be coated with corrosion resisting material.
3	The water outlet pipe delivers the pumped liquid to a liquid storage layer, and the current velocity shouldn't exceed 5m/s
4	Flow meter checks the amount of pumped liquid
5	Comparing with tight bending radius, the pressure loss of the loose bending radium is relatively low, which can prevent the forming of cavitation.
6	The water outlet entrance is the terminal of the water outlet pipe; before starting the water pump, the water pump and water inlet pipe should be firstly filled with water
7	The bypass ensures the minimum flow of the pump and delivers liquid to liquid storage container or water inlet pipe.
8	Sluice valve departs the pump from the pipes
9	Sluice valve allows the adjustment of the flow of the pump
10	Check valve can protect the water hammer that formed in the process of operation of the pump so as to prevent the draining-off of the water outlet pipe after the pump is stopped
11	The soft connection can prevent the forming of cavitation
12	Pressure gauge can check the working pressure
13	Drain plug for drainage and air-out
14	The water outlet entrance is the terminal of the pump and connects with the water outlet entrance
15	The water inlet entrance is the terminal of the pump and connects the water inlet pipe
16	The transition pipe should be flexible so as to prevent the forming of cavitation
17	Vacuum Gauge is to measure the suction pressure
18	The soft connection can prevent the forming of cavitation
19	Sluice valve departs the pump from the pipes
20	Holding the pipes with racks so as to prevent too much load on the branch of the pump, and the racks should be coated with corrosion resisting material.
21	The aim of the water inlet is to deliver the liquid to the pump, so when installing it, try to make it short and straight.
22	Steel reinforced concrete bottom ensures the stability of the pump
23	The plastic cushion is used to cushion the force between the reinforced concrete base and the pump base.
24	Explosive screw used to stabilize water pump

12. REPLACEMENT PARTS



Key NO	Part NO	Product Description	QTY
1	420386559	Transparent Lid(APS5.5HP-7.5HP)	1
	420386556	Transparent Lid(APS10HP-15HP)	1
2	420556559	Neck Clip(APS5.5-APS7.5HP)	2
	420556556	Neck Clip(APS10HP-15HP)	2
3	420566559	Lid Fastener(APS5.5HP-7.5HP)	2
	420566556	Lid Fastener(APS10HP-15HP)	2
4	111010040	Transparent Lid O-Ring(APS5.5HP-7.5HP)	1
	111010037	Transparent Lid O-Ring(APS10HP-15HP)	1
5	420236559	Basket(APS5.5HP-7.5HP)	1
	420236556	Basket(APS10HP-15HP)	1
6	420246559	Pre-Filter Body(APS5.5HP-7.5HP)	1
	420246556	Pre-Filter Body(APS10HP-15HP)	1
7	4100110754	Drain Plug	2
	111002530	Ding-Qing O-ring	2
8	111322402	O-ring(APS5.5HP-7.5HP)	1
	111042408	O-ring(APS10HP-15HP)	1
9	420336559	Pump Body(APS5.5HP-7.5HP)	1
	420336556	Pump Body(APS10HP-15HP)	1
10	111010041	O-ring(APS5.5HP-7.5HP)	1
	111010038	O-ring(APS10HP-15HP)	1
11	420576571	Volute foreside(APS5.5HP-7.5HP)	1
	420576569	Volute foreside(APS10HP-15HP)	1
12	420586559	Impeller Nut(APS5.5HP-7.5HP)	1
	204146175	Impeller Nut(APS10HP-15HP)	1
13	111042406	O-ring(APS5.5HP-7.5HP)	1
	111030009	O-ring(APS10HP-15HP)	1
14	420366716	Impeller APS5.5HP	1
	420366560	Impeller APS7.5HP	1
	E024002	Impeller APS10HP	1
	E024001	Impeller APS15HP	1

Key NO	Part NO	Product Description	QTY
15	111010042	O-ring for flange(APS5.5HP-7.5HP)	1
	111010039	O-ring for flange(APS10HP-15HP)	1
16	113006715	Mechanical Seal(APS5.5HP-7.5HP)	1
	113006710	Mechanical Seal(APS10HP-15HP)	1
17	420576572	Volute hind side(APS5.5HP-7.5HP)	1
	420576570	Volute hind side(APS10HP-15HP)	1
18	420206559	Flange(APS5.5HP-7.5HP)	1
	420206556	Flange(APS5.5HP-7.5HP)	1
19	104036713	Motor(APS5.5HP)	1
	104036714	Motor(APS7.5HP)	1
	104036711	Motor(APS10HP)	1
	104036712	Motor(APS15HP)	1
20	111000028	Arch Cushion (APS5.5HP-7.5HP)	1
	111000027	Arch Cushion APS(15HP)	1
	111000026	Arch Cushion APS(10HP)	1
21	420126568	Rear of Base(APS5.5HP-7.5HP)	1
	420126564	Rear of Base(APS10HP-15HP)	1
22	420126567	Front part of Base(APS5.5HP-7.5HP)	1
	420126563	Front part of Base(APS10HP-15HP)	1

13. TERMS OF THE WARRANTY

As original purchaser of this equipment have purchased from Emaux Water Technology Co Ltd, through Authorized International Distributor or Dealer, warrants its products free from defects in materials and workmanship under normal use during warranty period. The warranty period begins on the day of purchase and extends only to the original purchaser. It is not transferable to anyone who subsequently purchases the product from you. It excludes all expendable parts.
During the warranty period, Emaux authorized reseller will repair or replace defective parts with new parts or, at the option of Emaux, serviceable used parts that are equivalent or superior to new parts in performance.

This Limited Warranty extends only to products purchased from Emaux authorized reseller. This Limited Warranty does not extend to any product that has been damaged or rendered defective
(a) as a result of accident, misuse or abuse;
(b) as a result of an act of God;
(c) by operation outside the usage parameters stated herein;
(d) by the use of parts not manufactured or sold by Emaux;
(e) by modification of the product;
(f) as a result of war or terrorist attack; or
(g) as a result of service by anyone other than Emaux authorized reseller or authorized agent.

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