

1. Disassembly-

When disassembling pump, have a piece of cardboard or wooden board ready to place the different parts on as you work. Do not pile parts on top of each other. They should be laid out neatly in rows. The "O" ring and gasket cannot be used again once they are removed. Have replacement parts ready. Disassemble in the following order, referring to the sectional view.

! WARNING : Be sure to cut off power source beginning disassembly.

- (1) Remove pump casing bolts, raise the motor section and remove pump casing.
- (2) Remove shaft head bolt and impeller.
- (3) Remove oil filler plug and drain lubricating oil.
- (4) Remove intermediate casing bolts and intermediate oil chamber.
(Remember that any lubricating oil remaining in the mechanical seal chamber will flow out.)
- (5) Carefully remove mechanical seal, taking care not to scratch sliding surface or motor shaft.

2. Assembly-

Re-assemble in reverse order of disassembly.

Be careful of the following points.

- (1) During re-assembly, rotate the impeller by hand and check for smooth rotation. If rotation is not smooth, perform steps-(3) through -(5) again.
- (2) Upon completion of re-assembly step -(1) rotate the impeller by hand from the suction the suction inlet and check that it rotates smoothly without touching the suction cover before operating the pump.

Please obtain "O" rings, shaft seals and other parts from, pump dealer. The table of dimensions is given in "Maintenance".



INSTRUCTION MANUAL Submersible Sewage & Sump Pump



EA series
Sump Pump



EF-series
Sewage Pump



EFD-series
Dredging Sewage Pump



EFS series
Stainless Steel
Sewage Pump
(SUS316)



EFK series
Sewage Pump
with cutter impeller



EF -A series
Sewage Pump
with float switch

Introduction

Check the following points upon receipt of your pump:

- Is the pump exactly what you ordered? **Check nameplate.** It is especially important that you check whether the pump is to be used with **50 or 60 Hz.**
- Has any damage occurred during shipment? Are any bolts or nuts loose?
- Have all necessary accessories been supplied? (For a list of standard accessories see **Construction.**)

We recommend that you keep a spare pump on hand in case of emergencies. Keep this instruction manual in a place for future reference.

Specifications

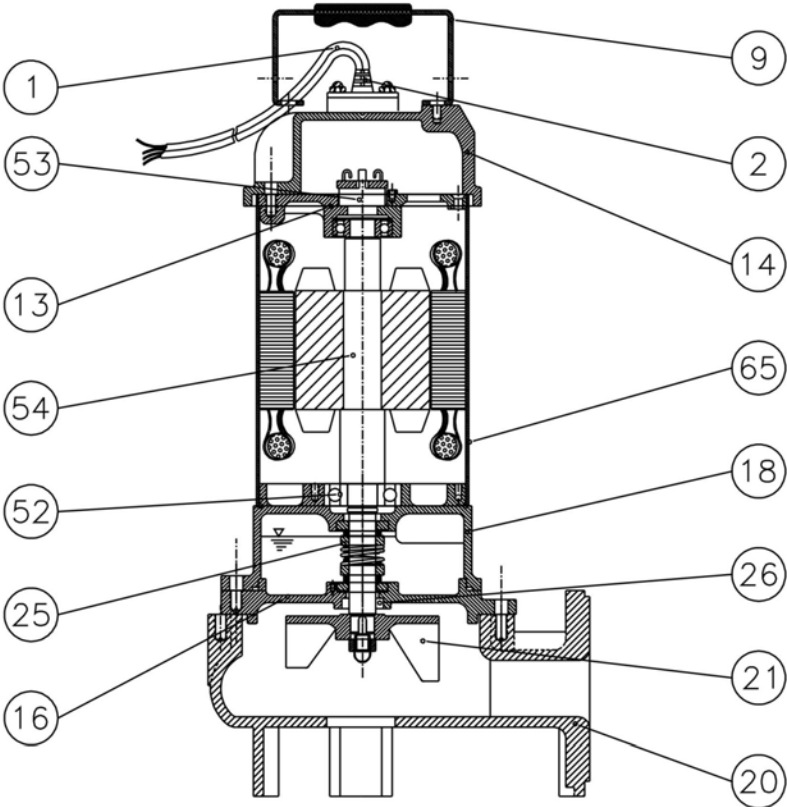
Check the nameplate for your pump's head (HEAD), discharge volume (CAPACITY), speed (SPEED), motor voltage and current.

Other specifications are noted in the chart below.

Item		Specifications		
Liquid handled	Type	Sewage, waste water, miscellaneous drain water		
	Temperature	EFC, EF ,EA, EFK	0.4~5.5 kW	0~40℃ (32~104F)
		EF-(A)	0.4~1.5 kW	0~40℃ (32~104F)
Materials	Casing	Cast iron		
	Impeller	Cast iron	SUS316 stainless steel (optional)	
	Shaft	SUS410 stainless steel		
Motor type		Dry type submersible motor		
Shaft seal lubrication oil		Turbine No.32 ISO VG-32		
Maximum water depth		10m (33ft)		

Construction

Sectional drawing



Constructions & Materials

NO	PART	MTRL	NO	PART	MTRL
1	Cable	S(J)TOW_UL	21	Impeller	FC 200
2	Cable Hood	PVC	25	Mech. Seal	CA/CE
9	Handle	SS41	26	Oil Seal	NBR
14	Motor Cover	FC 200	52	Bearing	
16	Seal Housing	FC 200	53	Protector	
13	Bracket	FC 200	54	Shaft	SUS 410
18	Oil Chamber	FC 200	65	Motor Housing	SUS 304
20	Pump Casing	FC 200			

Troubleshooting

Trouble	Cause	Remedy
Does not start. Starts, but immediately stops.	(1) Power failure (2) Large discrepancy between power source and voltage (3) Significant drop in voltage (4) Motor phase malfunction (5) Electric circuit connection faulty (6) Faulty connection of control circuit (7) Fuse blown (8) Faulty magnetic switch (9) Water is not at level indicated by Float (10) Float is not in appropriate level (11) Float effective (12) Short circuit breaker is functioning (13) Foreign matter clogging pump (14) Motor burned out (15) Motor bearing broken	(1)~(3) Contact electric power company and devise counter-measures (4) Inspect electric circuit (5) Correct wiring (6) Inspect connections and magnetic switch (7) Replace with correct type of fuse (8) Replace with correct one (9) Raise water level (10) Adjust the position of float (11) Repair or replace (12) Repair location of short circuit (13) Remove foreign matter (14) Repair or replace (15) Repair or replace
Operates, but stops after a while.	(1) Prolonged dry operation has activated motor protector and caused pump to stop (2) High liquid temperature has activated motor protector and caused pump to stop (3) Reverse rotation ! WARNING :	(1) Raise stop water level (2) Lower liquid temperature (3) Correct rotation
Does not pump. Inadequate volume.	(1) Reverse rotation (2) Significant drop in voltage (3) Operating a 60Hz pump on 50Hz (4) Discharge head is high (5) Large piping loss (6) Low operating water level causes air suction (7) Leaking from discharge piping (8) Clogging of discharge piping (9) Foreign matter in suction inlet (10) Foreign matter clogging pump (11) Worn impeller	(1) Correct rotation(see Operation) (2) Contact electric power company and devise counter-measures (3) Check nameplate (4) Recalculate and adjust (5) Recalculate and adjust (6) Raise water level or lower pump (7) Inspect, repair (8) Remove foreign matter (9) Remove foreign matter (10) Remove foreign matter (11) Replace impeller
Over current	(1) Unbalanced current and voltage (2) Significant voltage drop (3) Motor phase malfunction (4) Operating 50Hz pump on 60Hz (5) Reverse rotation ! WARNING : (6) Low head. Excessive volume of water (7) Foreign matter clogging pump (8) Motor bearing is worn or damaged	(1) Contact electric power company and devise counter-measure (2) Contact electric power company and devise counter-measure (3) Inspect connections and magnetic switch (4) Check nameplate (5) Correct rotation (see Operation2) (6) Replace pump with low head pump (7) Remove foreign matter (8) Replace bearing
Pump vibrates; excessive operating noise.	(1) Reverse rotation (2) Pump clogged with foreign matter (3) Piping resonates (4) Gate valve is closed too far	(1) Correct rotation (2) Disassemble and remove foreign matter (3) Improve piping (4) Open gate valve

Installation

1. Check the following before beginning installation.

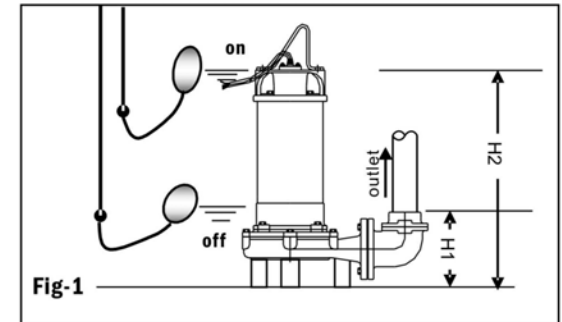
Insulation resistance measurement:

With the motor and cable (excluding the power supply cable) immersed in water, use a Megger to measure the insulation resistance between ground and each phase of the motor, and again between each phase of the motor. The Megger should indicate an insulation resistance of **not less than 20mega ohms**. While making the measurement, keep the power supply cable off the ground.

We recommend that an auxiliary pump be kept on hand in case of emergency.

2. Installation-

- ! WARNING :** Under no circumstances should cable be pulled while the pump is being transported or installed. Attach a chain or rope to the grip and install the pump.
- This pump must not be installed on its side or operated a dry condition. Ensure that it is installed upright on a secure base.
- Install the pump at a location in the tank where there is the least turbulence.
- If there is a flow of liquid inside the tank, support the piping where appropriate. Install piping so that air will not be entrapped. If piping must be installed in such a way that air pockets are unavoidable, install an air release valve wherever such air pockets are most likely to develop.
- Do not permit end of discharge piping to be submerged, as backflow will result when the pump is shut down.
- ! WARNING :** Non-automatic pumps (models **EF,EA**), have an automatic operating system bump operating water level near the minimum operating level as the automatic cut-off switch incorporated inside the motor will be activated. To avoid dry operation, install an automatic operating system, as shown in **Fig-1** and maintain a safe operating water level.
- For automatic pumps (models **EF-A**), install the floats as shown in **Fig-2**. The pump may not start if a floats switch touches the wall of the water tank or the piping. Install the floats so that this will not happen.



H1: Lowest water level (Motor flange)
H2: Operating water level
 This must be above the top of the motor

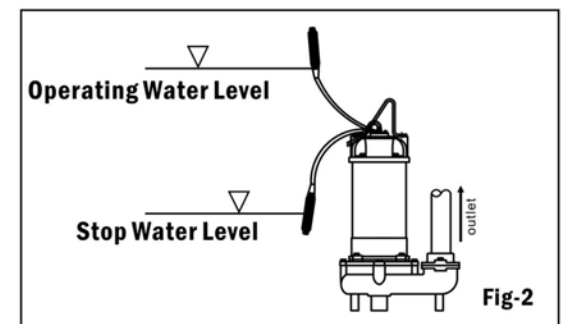
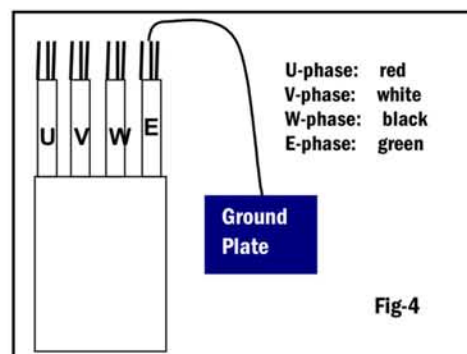
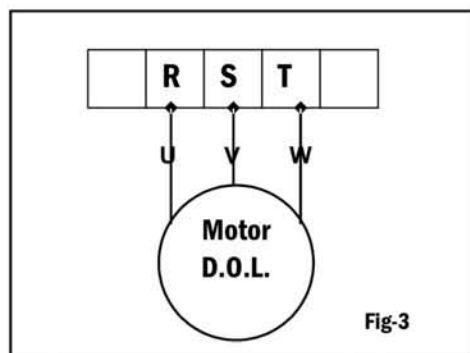


Fig-2

Electrical wiring

- (1) Wiring
 - a) Wire as indicated for the appropriate start system as shown in **Fig-3**.
 - b) Loose connections will stop the pump. Make sure all electrical connections secure.
- (2) Cable
 - c) **! WARNING :** Never let the end of the cable contact water.
 - d) If the cable is extended, do not immerse the splice in water.
 - e) Fasten the cable to the discharge piping with tape or vinyl strips.
 - f) Install the cable so that it will not overheat. Overheating caused by coiling the cable and exposing it to direct sunlight.
- (3) Grounding

As shown in **Fig-4** ground the green wire (label E). Under no circumstances should the green wire be connected to the power supply.
- (4) **! WARNING :** Use short circuit breakers to prevent danger of electrical shock.



Operation

1. Before starting the pump

- (1) After completing installation, measure the insulation resistance again as described in Installation.
- (2) Check water level.

If the pump is operated continuously for an extended period of time in a dry condition or at the lowest water level, the motor protector will be activated. Constant repetition of this action will shorten pump service life. Do not start the pump again in such a situation until after the motor has completely cooled.

2. Test operation....

Non-automatic pump (EF,EA)

Automatic pump (EF-A)

- (1) Turn the operating switch on and off a couple of times to check for normal pump start.

For the EF-A

Floating switch must be raised for the pump to start.

- (2) Next, check direction of rotation. If discharge volume is low or unusual sounds are heard when the pump is operating, rotation has been reversed. When this happens, reverse two of the wires.

Maintenance

Check pressure, output, voltage, current and other specifications. Unusual readings may indicate. Refer to Troubleshooting and correct as soon as possible.

1. Daily inspections

- (1) Check current and ammeter fluctuation daily. If ammeter fluctuation is great, even though within the limits of pump rating, foreign matter may be clogging the pump. If the quantity of liquid discharged falls suddenly, foreign matter may be blocking the suction inlet.

2. Regular inspections

(2) Monthly inspections

Measure the insulation resistance. The value should be more than 1M ohm. If resistance starts to fall rapidly even with an initial indication of over 1M ohm, this may be an indication of trouble and repair work is required.

(3) Annual inspections

To prolong the service life of the mechanical seal by replacing the oil in the mechanical seal chamber once a year. Water mixed the oil or cloudy textures are indications of a defective mechanical seal requiring replacement. When replacing the oil, lay the pump on its side with filler plug on top. Inject suitable amount turbine oil No.32 (ISO VG-32)

(4) Inspections at 3-5year intervals

Conduct an overhaul of the pump. These intervals will preclude the possibility of future trouble.

3. Parts that will need to be replaced

Replace the appropriate part when the following conditions are apparent.

Replaceable part	Mechanical seal	Oil filler plug gasket	Lubricating oil	O-ring
Replacement guide	Whenever oil in mechanical seal chamber is clouded	Whenever oil is replaced or inspected	Whenever clouded or dirty	Whenever pump is overhauled
Frequency	Annually	A half yearly	A half yearly	Annually

Note: above replacement schedule is based on normal operating conditions.

Motor output Part	0.4kw	0.75kw	1.5kw	2.2kw	3.7kw	5.5kw
Mechanical seal	12 ϕ		19.875(3/4") ϕ		25 ϕ	
Oil seal	16 ϕ x 26 ϕ x 5 t		18 ϕ x 28 ϕ x 6 t		25 ϕ x 44 ϕ x 7 t	
Oil filler plug gasket	(Inner diameter) x (outer diameter) x (thickness) =8.5 ϕ x 13 ϕ x 0.8 t PE washer					
Lubricating oil (turbine oil #32)	100 cc	150 cc	425 cc		550 cc	