

# 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 the 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 20 mega 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

- Under no circumstances should the 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 in 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. (See Fig. 1)
- 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.

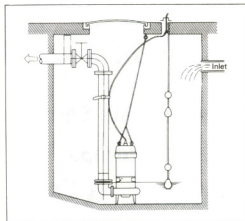


Fig. 1

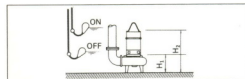


Fig. 2

H<sub>1</sub> Operating water level  
This must be above the top of the motor.  
H<sub>2</sub> Lowest water level (motor flange)

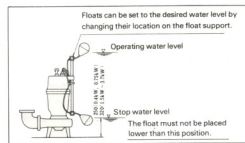


Fig. 3

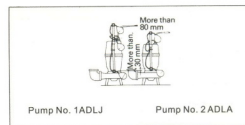
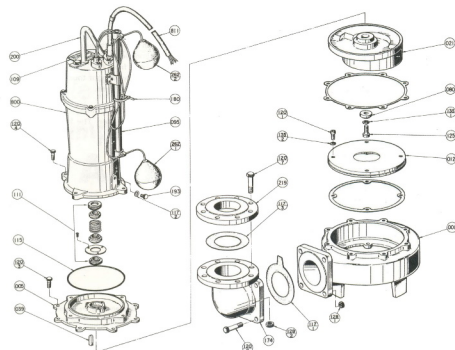


Fig. 4

# Construction

## 1. Model ADL sectional drawing



PART NO.	PART NAME	NO. FOR 1 UNIT
001	CASING	1
005	INTERMEDIATE CASING	1
012	SUCTION COVER	1
021	IMPELLER	1
039	KEY	1
070-1	FIXED PLATE	1
070-2	FIXED PLATE	1
080	BUSHING	1
095	FLOAT STAY	1
111-1	MECHANICAL SEAL	1 SET
111-2	MECHANICAL SEAL	1 SET
115-1	"O" RING	1
115-2	"O" RING	1
115-3	"O" RING	1
115-4	"O" RING	1
117-1	GASKET	1
117-2	GASKET	1
120-1	BOLT	1/4
120-2	BOLT	2
120-3	BOLT	4
120-4	BOLT	1/4
120-5	BOLT	4
120-6	BOLT	4
120-7	BOLT	3

PART NO.	PART NAME	NO. FOR 1 UNIT
120-8	BOLT	1 SET
125	BOLT	1 SET
130	SCREW	1
135-1	WASHER	1
135-2	WASHER	1
174	DISCHARGE BEND	1
193	OIL PLUG	1
200	LIFTING HANGER	1
262-1	FLOAT SWITCH	1
262-2	FLOAT SWITCH	1
319	SPRING PIN	1
801	ROTOR	1
802	STATOR	1
811	SUBMISSIBLE CABLE	1
814	MOTOR FRAME	1
816	BRACKET	1
817	BRACKET	1
830	SHAFT	1
832	MOTOR COVER	1
848	MOTOR PROTECTOR	1
849-1	BALL BEARING	1/4
849-2	BALL BEARING	3
870	CONTROL DEVICE	1
871	SWITCH	4

## 2. Standard accessories

Capture cable ..... 10 m  
Companion flange ..... 1 set

## Operation

### 1. Before starting the pump

- After completing installation, measure the insulation resistance again as described in **Installation**.
- 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 (less than 7.5kW) or the thermal detector (more than 11kW) 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 (ADL) Auto matic pump (ADLA)

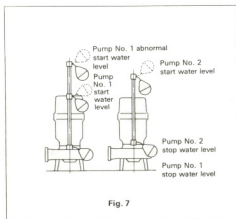
- Turn the operating switch on and off a couple of times to check for normal pump start.  
For the ADLA switch must be raised for the pump to start.
- Next, check direction of rotation. If discharge volume is low or unusual sounds are heard when the pump is operating, rotation has been reversed. When this happens, reverse two of the three wires.

### 3. Test operation....

#### Automatic alternate pumps Auto matic pump (ADLJ)

Check automatic alternate operation of pump No. 1 (ADLJ) and pump No.2 (ADLA) as follows (see Fig.7).

- When the water level reaches pump No. 1 start level, pump No. 1 will start and water will be pumped until pump No. 1 stop water level is reached.  
At this point the automatic alternate operation circuit built into pump No. 1 will stop the pump.  
The water level will now be at pump No. 2 start level. Pump No. 2 will start and pump water until its stop water level is reached. The process is repeated when the water level is again at pump No. 1 start level.
- If the water flowing into the water tank exceeds the amount being pumped by pump No. 2 (abnormal water increase) and the water level rises to pump No. 1 abnormal start water level, pump No. 1 will start to operate. The two pumps will then be operating simultaneously in parallel operation.



## Maintenance

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

### 1. Daily inspections

- 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 amount of liquid discharged falls suddenly, foreign matter may be blocking the suction inlet.

### 2. Regular inspections

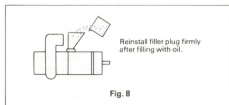
- Monthly inspections  
Measure the insulation resistance. The value should be more than 1M ohm. If resistance starts to fall rapidly even with an initial indication of over 1M ohm, this may be an indication of trouble and repair work is required.
- Annual inspections  
The service life of the mechanical seal can be prolonged by replacing the oil in the mechanical seal chamber once a year. Water mixed with the oil or a cloudy texture are indications of a defective mechanical seal requiring replacement. When replacing the oil, lay the pump on its side with filler plug on top as shown in **Fig. 8**.  
  
For over 5.5kW motors, inject turbine oil No. 32 (ISO VG-32) until it overflows. For motors of less than 3.7kW motor inject the amount specified in **Table 1**.
- Inspections at 3-5 year intervals  
Conduct an overhaul of the pump. These intervals will preclude the possibility of future trouble.

### 3. Precautions when operation is suspended

- If operation is to be suspended for a prolonged period of time with the pump immersed in water, measure the insulation resistance of the motor occasionally. If resistance is normal, operate pump to prevent rust from developing on moving parts. Follow the instructions under **Operation** when pump operation is to be resumed.
- For dry storage, clean out pump and store in a dry place. Follow the instructions under **Installation** and **Operation** when pump operation is to be resumed.

kW	Oil
0.75	650cc.c.
1.5	920cc.c.
2.2	1230cc.c.
3.7	1380cc.c.

Table 1



### 4. 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

Above replacement schedule is based on normal operating conditions.

Part	Motor output						
	0.4kW	0.75kW	1.5kW	2.2kW	3.7kW	5.5kW	7.5kW
Mechanical seal	20ø	25ø	30ø	30ø	30ø	40ø	45ø
Oil filler plug gasket	Inner diameter × outer diameter × thickness = 10ø × 18ø × 0.8 or 13ø × 23ø × 0.8						
Lubricating oil (turbine oil # 32)	650cc	920cc	1230cc	1380cc	2500cc	2500cc	6200cc
O-ring	G130	3ø × 150ø	3ø × 170ø	3ø × 170ø	3ø × 180ø	3ø × 180ø	3ø × 220ø

### 3. Electrical wiring

- (1) Wiring
  - a) Wire as indicated for the appropriate start system as shown in Fig. 5.
  - b) Loose connections will stop the pump. Make sure all electrical connections are secure.
- (2) Cable
  - a) Never let the end of the cable contact water.
  - b) If the cable is extended, do not immerse the splice in water.
  - c) Fasten the cable to the discharge piping with tape or vinyl strips.
  - d) Install the cable so that it will not overheat. Overheating is caused by coiling the cable and exposing it to direct sunlight.
- (3) Grounding
 

As shown in Fig. 6 ground the green wire (label E). Under no circumstances should the green wire be connected to the power supply.

  - (4) Use short circuit breakers to prevent danger of electrical shock.

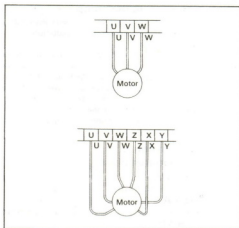


Fig. 5

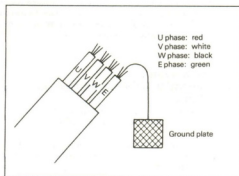


Fig. 6

## Troubleshooting

Trouble	Cause	Remedy
Does not start. Starts, but immediately stops.	<ol style="list-style-type: none"> <li>(1) Power failure</li> <li>(2) Large discrepancy between power source and voltage</li> <li>(3) Significant drop in voltage</li> <li>(4) Motor phase malfunction</li> <li>(5) Electric circuit connection faulty</li> <li>(6) Faulty connection of control circuit</li> <li>(7) Fuse blown</li> <li>(8) Faulty magnetic switch</li> <li>(9) Water is not at level indicated by Float</li> <li>(10) Float is not in appropriate level</li> <li>(11) Float defective</li> <li>(12) Short circuit breaker is functioning</li> <li>(13) Foreign matter clogging pump</li> <li>(14) Motor burned out</li> <li>(15) Motor bearing broken</li> </ol>	<ol style="list-style-type: none"> <li>(1) - (3) Contact electric power company and devise counter-measures</li> <li>(4) Inspect connections and magnetic switch</li> <li>(5) Inspect electric circuit</li> <li>(6) Correct wiring</li> <li>(7) Replace with correct type of fuse</li> <li>(8) Replace with correct type of magnetic</li> <li>(9) Raise water level</li> <li>(10) Move float to an appropriate starting level</li> <li>(11) Repair or replace</li> <li>(12) Repair location of short circuit</li> <li>(13) Remove foreign matter</li> <li>(14) Repair or replace</li> <li>(15) Repair or replace</li> </ol>
Operates, but stops after a while.	<ol style="list-style-type: none"> <li>(1) Prolonged dry operation has activated motor protector and caused pump to stop</li> <li>(2) High liquid temperature has activated motor protector and caused pump to stop</li> </ol>	<ol style="list-style-type: none"> <li>(1) Raise stop water level</li> <li>(2) Lower liquid temperature</li> </ol>
Does not pump. Inadequate volume.	<ol style="list-style-type: none"> <li>(1) Reverse rotation</li> <li>(2) Significant drop in voltage</li> <li>(3) Operating a 60Hz pump on 50Hz</li> <li>(4) Discharge head is high</li> <li>(5) Large piping loss</li> <li>(6) Low operating waterlevel causes air suction</li> <li>(7) Leaking from discharge piping</li> <li>(8) Clogging of discharge piping</li> <li>(9) Foreign matter in suction inlet</li> <li>(10) Foreign matter clogging pump</li> <li>(11) Worm impeller</li> </ol>	<ol style="list-style-type: none"> <li>(1) Correct rotation (see Operation 2, (3))</li> <li>(2) Contact electric power company and devise counter-measures</li> <li>(3) Check nameplate</li> <li>(4) Recalculate and adjust</li> <li>(5) Recalculate and adjust</li> <li>(6) Raise water level or lower pump</li> <li>(7) Inspect, repair</li> <li>(8) Remove foreign matter</li> <li>(9) Remove foreign matter</li> <li>(10) Disassemble and remove foreign matter</li> <li>(11) Replace impeller</li> </ol>
Over current	<ol style="list-style-type: none"> <li>(1) Unbalanced current and voltage</li> <li>(2) Significant voltage drop</li> <li>(3) Motor phase malfunction</li> <li>(4) Operating 50Hz pump on 60Hz</li> <li>(5) Reverse rotation</li> <li>(6) Low head. Excessive volume of water</li> <li>(7) Foreign matter clogging pump</li> <li>(8) Low head. Excessive volume of water</li> <li>(9) Foreign matter clogging pump</li> <li>(10) Motor bearing is worn or damaged</li> </ol>	<ol style="list-style-type: none"> <li>(1) Contact electric power company and devise counter-measure</li> <li>(2) Contact electric power company and devise counter-measure</li> <li>(3) Inspect connections and magnetic switch</li> <li>(4) Check nameplate</li> <li>(5) Correct rotation (see Operation 2, (3))</li> <li>(6) Replace pump with low head pump</li> <li>(7) Disassemble and remove foreign matter</li> <li>(8) Replace pump with low head pump</li> <li>(9) Disassemble and remove foreign matter</li> <li>(10) Replace bearing</li> </ol>
Pump vibrates; excessive operating noise.	<ol style="list-style-type: none"> <li>(1) Reverse rotation</li> <li>(2) Pump clogged with foreign matter</li> <li>(3) Piping resonates</li> <li>(4) Gate valve is closed too far</li> </ol>	<ol style="list-style-type: none"> <li>(1) Correct rotation</li> <li>(2) Disassemble and remove foreign matter</li> <li>(3) Improve piping</li> <li>(4) Open gate valve</li> </ol>

## Disassembly and Assembly

### 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 can not be used again once they are removed. Have replacement parts ready.

Disassemble in the following order, referring to the sectional view.

**Be sure to cut off power source before beginning disassembly.**

- (1) Remove casing bolts (120-3), raise the motor section (800) and remove pump casing (001).
- (2) Remove shaft head bolt (125) and impeller (021).
- (3) Remove oil filler plug (193) and drain lubricating oil.
- (4) Remove intermediate casing bolts (120-4) and intermediate casing (005).  
(Remember that any lubricating oil remaining in the mechanical seal chamber will flow out.)
- (5) Carefully remove mechanical seal (111), 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 inlet and check that it rotates smoothly without touching the suction cover before operating the pump.

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

All specifications subject to change without notice in this catalog, the particulars in are in accordance with the International System of Units (SI) and given for reference only.

DISTRIBUTED BY

## Instruction Manual

### Submersible Semi-vortex Sewage Pumps MODEL ADL



### Introduction

Check the following points upon receipt of your pump:

- (1) Is the pump exactly what you ordered? Check the nameplate. It is especially important that you check whether the pump is to be used with 50 or 60 Hz.
- (2) Has any damage occurred during shipment? Are any bolts or nuts loose?

- (3) 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 safe 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	ADL, ADLA	0.4 ~ 22kW	0 ~ 40°C (32 ~ 104° F)
		ADLJ	0.4 ~ 3.7kW	0 ~ 32°C (0 ~ 90° F)
Materials	Casing	Cast iron		
	Impeller	Cast iron or Graphite Cast iron	Bronze, 18-8 stainless steel (optional)	
	Shaft	403 stainless steel		
Motor type	Dry type submersible motor			
Shaft seal lubrication oil	Turbine No.32 ISO VG-32			
Maximum water depth	8m (26ft)			
Installation	Up right (floor model)			