

6 OPERATION

Prior to Operation

- Once again, check the nameplate of the pump to verify that its voltage and frequency are correct.

CAUTION Improper voltage and frequency of the power supply will prevent the pump from attaining its full potential, and may also damage the pump.

Note: Verify the specs on the pump's nameplate.

- Check the wiring, power supply voltage, the capacity of the ground leakage circuit breaker, and the insulation resistance of the motor.

■ Insulation resistance reference value = 20MΩ minimum

Note: The insulation resistance reference value of 20MΩ minimum is based on a new or repaired pump. For reference values of a pump that has already been put into operation, refer to "Maintenance and Inspection".

- Adjust the setting of the thermal relay (i.e. 3E relay) to the pump's rated current.

Note: Verify the rated current on the pump's nameplate.

- When using a generator, as much as possible avoid operating the pump in conjunction with other types of equipment.

6-1 NON-AUTOMATIC OPERATION

Trial Operation

WARNING Never start the pump while it is suspended, as the pump may jerk and cause a serious accident involving injury.

- Operate the pump for a short time (1 to 2 seconds) and verify the direction of the rotation of the impeller. Observe the pump unit from above, and if its recoil is in the counterclockwise direction, the direction of its rotation is correct.

CAUTION Make sure to check the pump's direction of rotation with the pump exposed to the atmosphere. Operating the pump in reverse while it is submerged in water will damage the pump, which may lead to current leakage and electrical shock.

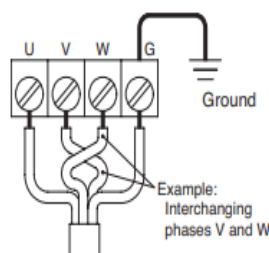
- To reverse the rotation, the following countermeasures must be taken.

WARNING Before changing the connections for reverse rotation, make sure that the power supply (i.e. circuit breaker) is properly disconnected and that the impeller has stopped completely. Failure to observe this may lead to electrical shock, short, or injury.

COUNTERMEASURE

Interchange any two of the three wires designated U, V, and W, respectively.

Note: (1) and (2) are applied to the three-phase pumps.



- Connect the pump to the pipe and submerge it in water.

- Operate the pump for a short time (3 to 10 minutes) and perform the following checks:

Using an AC ammeter (clamp), measure the operating current at the phases U, V, and W that are connected to the terminal board.

COUNTERMEASURE

Because an overload condition may be present at the pump motor if the operating current exceeds the rated current, follow the instructions in section "4. Installation" to operate the pump in the correct manner.

Using an AC voltmeter (tester), measure the voltage at the terminal board.

■ Power supply voltage variation = within $\pm 10\%$ of the rated voltage

COUNTERMEASURE

If the power supply voltage deviates from the variation value, the cause of the deviation may be the capacity of the power supply or the extension cable that is used. Refer to section "5. Electrical Wiring" to operate the pump in the correct manner.

CAUTION In case the pump exhibits an abnormal condition (such as a considerable amount of vibration, noise, or smell), disconnect the power supply immediately and contact the dealer where you purchased the equipment, or Tsurumi's sales office in your area. If the pump continues to be used in the abnormal state, it may cause current leakage, electrical shock, or fire.

- Proceed with the normal operation if no abnormal conditions are found during the trial operation.

Operation

WARNING The pump unit may be extremely hot during operation. To prevent burns, do not touch the pump unit with bare hands during or after the operation.

Pay attention to the water level during the pump operation. The pump may become damaged if it is allowed to operate dry.

Due to an overload operation or a pump malfunction, if the motor protector trips to stop the pump, make sure to eliminate the cause of the problem before restarting.

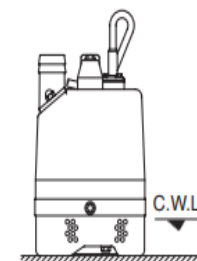
To operate a submersible pump (including automatic operation), set the water level so that the pump will operate about 10 times per hour.

Note: A large amount of amperage flows when a submersible pump is started, causing the temperature of its windings to rise rapidly. Beware that a frequent stop-and-go operation of the pump will accelerate the deterioration of the insulation of the motor windings and thus affect the use life of the motor.

Operating Water Level

CAUTION Do not operate the pump below the C.W.L. (Continuous Running Water Level) indicated below. Failure to observe this condition may result in damage to the pump, electrical leakage or electrical shock.

Pump Model	C.W.L. (mm)
LB-250	50
LBT-250	50
LB-480	50
LBT-480	50
LB-800	50
LBT-800	50



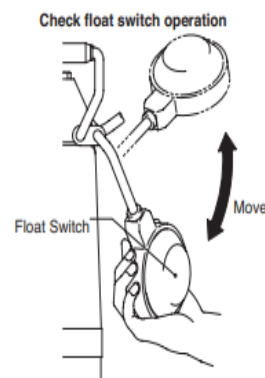
6-2 Automatic Operation (for float type)

Trial Operation

Equipped with floats to detect the water level the automatic type (LBZ) pump can perform an automatic drainage operation alone by merely connecting its cable to a power supply.

Connect the power and perform a trial operation as follows:

- (1) Direct all the floats downward.
- (2) Raise the (yellow) float. This will cause the pump to start.
- (3) Next, return the (yellow) float to their original positions. This will cause the pump to stop.
- (4) Perform steps (2) and (3) consecutively two or more times to verify the operation.



Note: The trial operation must be completed within 1 minute.

CAUTION In case the pump exhibits an abnormal condition (such as a considerable amount of vibration, noise, or smell), disconnect the power supply immediately and contact the dealer where you purchased the equipment, or Tsurumi's sales office in your area. If the pump continues to be used in the abnormal state, it may cause current leakage, electrical shock, or fire.

6-3 Automatic Operation (for electrode type)

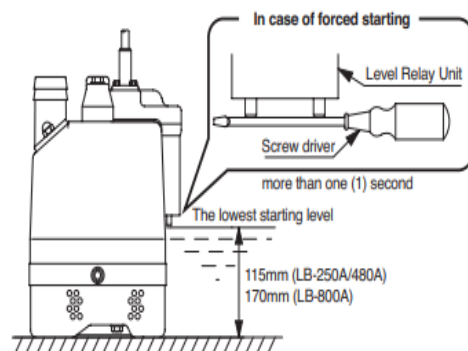
Operation Water Level

Start of the pump

The pump starts when the current continuously flows between the two electrodes for more than one (1) second.

Note: The electrode may not detect the water surface under conditions such as purified water or distilled water which the current does not flow cause of high specific resistance.

Note: The necessary water level to operate the pump is 115mm or 170mm from the bottom of a pump. In case of start by racing during the trial operation, please short-circuit for more than one (1) second with exciting items (screw driver etc.) between the electrodes, and start forcibly. Please keep away from those that may clog in a pump. (wire, nail, cord, etc.)



Trial Operation

WARNING Never start the pump while it is suspended, as the pump may jerk and cause a serious accident involving injury.

- (1) Operate the pump 3 to 10 minutes to verify the conditions listed below.

CAUTION In case the pump exhibits an abnormal condition (such as a considerable amount of vibration, noise, or smell), disconnect the power supply immediately and contact the dealer where you purchased the equipment, or Tsurumi's sales office in your area. If the pump continues to be used in the abnormal state, it may cause current leakage, electrical shock, or fire.

- (2) Proceed with the normal operation if no abnormal conditions are found during the trial operation.

Operation Flow Chart

To enable the user to bring the pumps ability into full play, this chart describes the various control modes that are made possible by the combinations of the electrode and timer functions.

Level Relay Unit	Pump	Water Level	Condition
The electrodes of the level relay unit are submerged, causing the current to operate the pump. (Detection Time : more than one (1) second)	Start Operation (Drainage)	Drop	[Switch on]
As the water level drops and the water surface recedes from the electrodes, the timer trips to drain water. (Electrodes open Trips the timer)	Operation (Drainage)	Drop	
The draining of water by the timer lasts approximately 1 minute. * If the water surface comes in contact for more than one (1) second with the electrodes within 1 minute, the pump will operate continuously even though the timer has tripped. 	Operation (Drainage)	Drop	
The pump will stop 1 minute later. * The pump will also stop after a continuous dry run, in some cases.	Stop	Rise	
When the water level rises and the water surface comes in contact for more than one (1) second with the electrodes, the pump will restart. (Detection Time : more than one (1) second)	Start Operation (Drainage)	Drop	