

Mikasa

Submersible Pump

WP-2L,3LB

INSTRUCTION MANUAL

en



<http://www.mikasas.com>

702-00203



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1. Preface

- This operation manual describes the proper operation, basic inspection and maintenance procedures of the Submersible Pump. Please read this operation manual before use in order to maximize the excellent performance of this machine and make your work more efficient and effective.
- After reading the manual, please keep it in a handy location for easy reference.
- For the handling the engine, please refer to the separate engine operation manual.
- For inquiries about repair parts, parts lists, service manuals, and repairs, please contact the store where you purchased the product, our sales office, or the Mikasa Parts Service Center. For parts lists, please visit our homepage at: <http://www.mikasas.com/> where you can access Mikasa WEB parts lists.

The illustrations in this manual might slightly differ in part from the machine you actually purchased due to design changes.

2. Applications, Warnings, Structure and Power Transmission

Applications

- Used for pumping of mud water, filthy water, and clean water.

Warning for incorrect application and use

- Do not use this machine for liquid other than water.
- Do not use this machine for water that contains hot spring water and chemical substances. Also do not use for water that contains materials that corrode or quickly deteriorate the machine.
- Do not use this machine for hot water, such as hot spring water and heated water that is above 50°C.
- Do not use this machine for water in which flammable material or volatile flammable material is mixed, because risks such as fire or explosion might occur.

Structure

- The engine mount is composed of a base that fixes the engine, guards to protect the engine and a coupling flange with a hexagon joint that is attached to the engine output shaft. The coupling flange is used to join the flexible hose and the flexible shaft, and it is removable without a tool.

The pump part consists of a flexible hose that sends the power from the engine to the pump, the shaft set part and the pump itself.

Power transmission

- As a motor, an air cooled gasoline or diesel engine is used.
To the engine output shaft, a hexagon coupling joint is attached. At the pump part, via the flexible shaft, rotation of the hexagon joint at the engine side makes the pump impeller shaft rotate. The impeller fixed to the impeller shaft rotates to start pumping water.

3. Warning Symbols

The triangle marks () used in this manual and on the decals on the machine are warning symbols. Please follow these precautions.

	Warning symbols indicating personnel hazards
	Extremely hazardous. If the warning is not followed, it is likely to result in serious injury or death.
	Hazardous. If the warning is not followed, it is likely to result in serious injury or death.
	Potential hazard. If the warning is not followed, it may result in injury.
Precautions (without  mark) If the warning is not followed, it may result in property damage.	

4. Safety Precautions

4.1 General precautions

	<ul style="list-style-type: none"> ● Do not operate the machine, <ul style="list-style-type: none"> ○ If you do not feel well due to overwork or illness. ○ If you are taking any medicine. ○ If you are under the influence of alcohol. ● Read the operation manual. Incorrect handling, inspection and maintenance of the machine will result in machine damage and accident involving injuries. Before using the machine, read the operation manual carefully to make yourself familiar with the machine for safe work. When letting others use the machine, do not forget to provide the operation manual together with the machine. ● Follow instructions and warnings. If instructions and warnings necessary for safe machine operation are not followed, serious accident might happen. Read well the instructions and warnings shown in the operation manual and the labels on the machine, and follow such instructions and warnings. In case if you have lost the operation manual or label, or the information shown has become illegible by soiling, please contact us and order a new manual or label. ● Wear safe work clothes. When working, wear work clothes appropriate for your work, and use proper safety gear such as a helmet, protective goggles, vibration absorbing gloves, safety boots, dust prevention mask, etc. ● Please wear noise suppressing device. When doing work that generates high level of noise, wear noise suppressing devices such as plugs or ear muffs. ● Entry to work site is prohibited Put "No Entry" sign at the entrance of the work site and work area to prevent children or unrelated people enter the work site. ● Mikasa does not accept any responsibility for accident caused by remodeling or rework done on the machine. 	    
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4.2 Location and Ventilation precautions

	<p>▲Always keep the work area clean.</p> <ul style="list-style-type: none"> * Unorganized littered work site is likely to cause accident. * When work is done, remove unnecessary machines, iron frames, sheets, and wood pieces that interfere with the work. Try to organize and tidy up the work site. People might trip over or hose might be caught by unnecessary objects, resulting in accidents. * When working in an unstable area such as on reinforcing bars, always put a running board to secure good footing. 	
	<p>▲Before working, carefully make sure that there is no buried pipe such as electric wire tubes, water pipes or gas pipes in the area work is to be done.</p> <ul style="list-style-type: none"> * If there are buried objects, the tool might touch them, causing an accident of electrification or electric leak, or gas leakage. <p>Also, position the exhaust opening away from building and equipment by more than 1 meter. If ventilation is not sufficiently done, exhaust gas poisoning may occur, which might result in fatal accident.</p>	

4.3 Precautions before starting

	<p>■Inspection before use</p> <p>Before using the machine, inspect each part of the machine (fuel, engine oil, etc.) to make sure there is no loosening of bolts and abnormal part.</p>	
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4.4 Precautions when adding fuel

	<ul style="list-style-type: none"> ● When refueling, stop the engine, and wait until the engine gets completely cool. There is a danger of the fuel catching fire, which might result in serious accidents such as burns and explosions. ● When refueling, select a location where there is no flammable material around. Be careful not to spill the fuel. If spill occurred, wipe it off completely. ● While refueling, never make any open fire come close to the machine. (Smoking is prohibited.) ● Supply a specified amount of fuel. If the fuel is excessively filled, it may spill from the tank, which is very dangerous. ● After refueled, close the fuel tank cap securely. If the tank cap is loose, the fuel might spill, leading to fire hazard. ● When the fuel has splashed on your skin or clothes, immediately wash off the fuel with soap and water. Change clothes if contaminated with the fuel because it catches fire easily. 	
	<ul style="list-style-type: none"> ● If the fuel is ingested, or if it gets in the eye, immediately seek help from the doctor. 	

4.5 Precautions during work

	<ul style="list-style-type: none"> ● Prevention of fire Do not put dangerous objects (oils and greases, Celluloids, explosives, etc.) and flammable materials (paper, wood scraps, and other flammables) around the machine. Eliminate flammable sources that might trigger fire hazard. 	
	<ul style="list-style-type: none"> ● Prevention of burns The engine itself and the muffler are very hot while the machine is running or immediately after it is stopped. Do not touch the engine and muffler when still hot. Be careful not to get burned. ● Stop your work when abnormality was detected. If the machine started to run abnormally, or when you have noticed any abnormality, stop your work immediately to inspect the machine, and do necessary repair work. Fire and other accident might occur if not inspected/repared. ● Stopping the engine When you move away from the machine, or when you move the machine, stop the engine before doing so. 	

4.6 Transportation and storage precautions

	<ul style="list-style-type: none"> ● Stop the engine when transporting the machine. ● When transporting the machine, tighten the fuel tank cap and engine oil plug to prevent them from coming off, then shut the fuel cock. Also, drain the fuel before transporting. ● Stabilize the machine so that it will not move or fall. (When transporting, do not let the machine lie on its side.) 	
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4.7 Maintenance precautions

	<ul style="list-style-type: none"> ● Read the operation manual and service manual. Before doing inspection and maintenance, read the operation manual and service manual well to make yourself familiar with the maintenance method. Do inspection and maintenance by paying attention to safety. ● Regular inspection Do regular inspection/maintenance according to the instruction of the manufacturer to keep each part in good condition. If the manufacturer's instruction is not followed, the machine will not be maintained properly, resulting in accident and machine damage. ● Stop the engine during inspection and maintenance Stop the engine when inspection and maintenance works are done. Do not touch the hot part. There is a risk of burn. When oil temperature is high, you might get burned. ● Disposal of wastes Do not dispose of the engine waste oil carelessly because careless disposal will destroy the environment. When disposing the waste oil, follow the applicable regulation for waste disposal. 	  
	<ul style="list-style-type: none"> ● Washing of parts To prevent fire hazard, use nonflammable wash oil for washing of parts. Organic oils such as gasoline are dangerous because they are flammable. ● Pay attention to ventilation There is a risk of gas poisoning for indoor work and for works at poorly ventilated location. Do ventilation well especially when there is engine exhaust gas or if fuel, wash oil and paints are used. Exhaust gas poisoning may become fatal. 	

5. Specifications

5.1 Machine Specifications

MODEL	WP-2L	WP-3LB
Discharging port dia.	50mm (2 inch)	76mm (3 inch)
Max. discharged height	13m	23m
Capacity	500L/min.	1,200L/min.
Number of revolutions	3,000~3,400min ⁻¹	3,000~3,400min ⁻¹
Pump head weight	4.0kg	7.0kg
Flexible shaft diameter	10mm	13mm
Flexible hose diameter	29mm	32.5mm
Flexible hose length	5m or 7m	5m or 7m
Total weight	16.1kg (5m)、20.0kg (7m)	22.1kg (5m)、26.2kg (7m)

5.2 Feature

Mikasa's submersible pump is a compact and light-weight high performance flexible type submersible pump. It can pump water, whether it is mud water, filthy water or clean water.

The overall structure of this submersible pump is a pump that is driven by a flexible shaft that connects a spiral pump serving as pumping device and a motor.

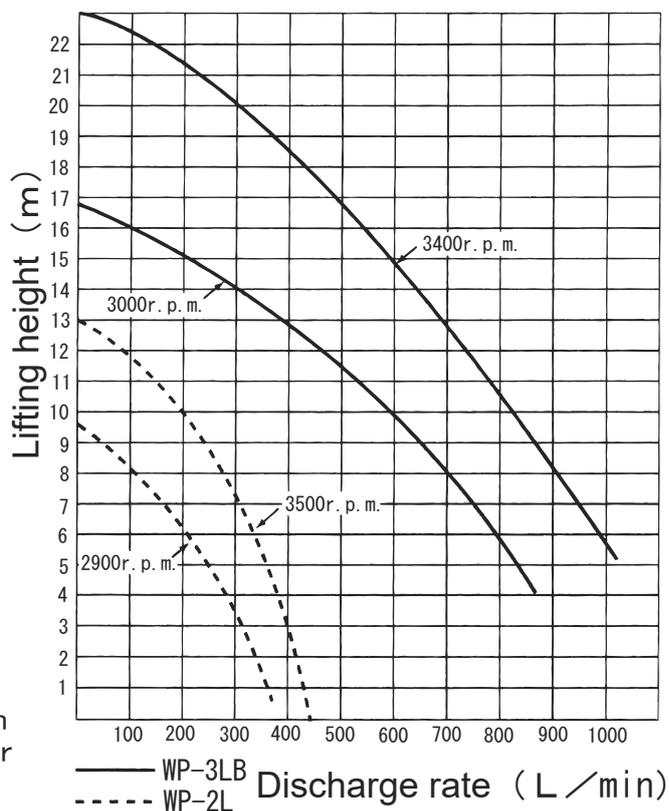
For the motor that runs the pump, please use an engine (GE type engine mount).

For the engine, please see the attached engine operation manual.

< Units used in the performance curve (table on the right)>

※Unit of revolution : min⁻¹ (SI unit) is shown in r.p.m. (conventional way) due to the letter size constraint. 1min⁻¹ = 1r.p.m.

Performance curve

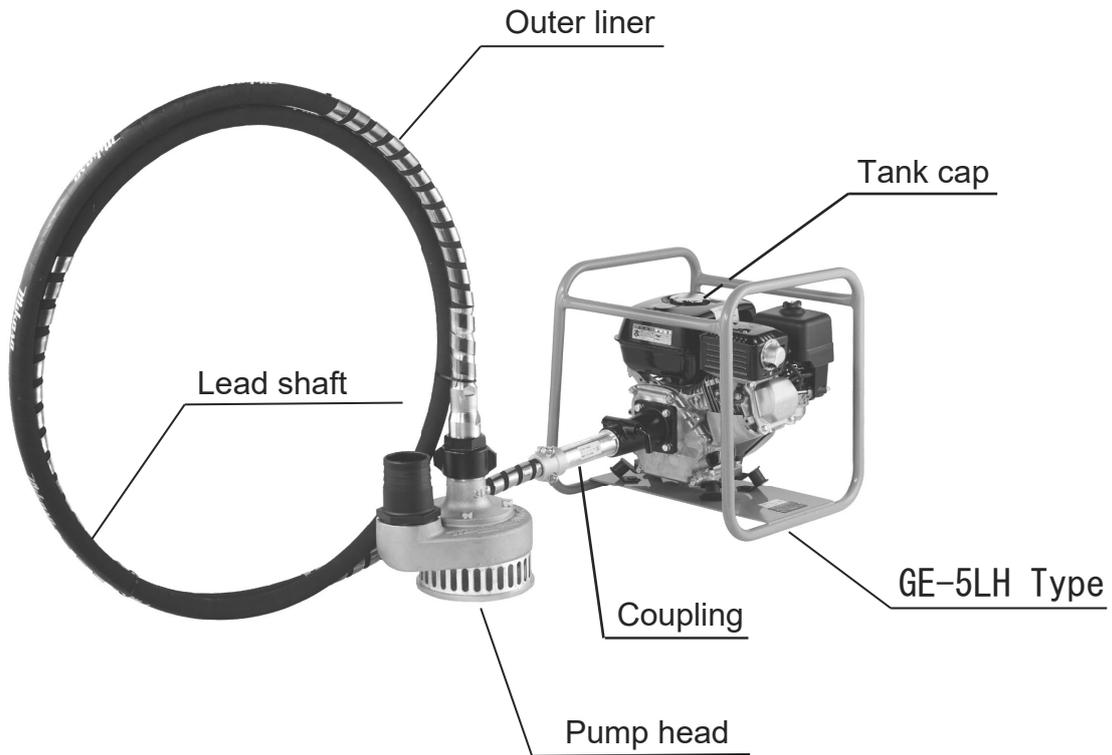


5.3 Power Drive Units Specifications

Model	GE-5LH	GE-5LDY
Engine type	Honda GX160	Yanmar L48N
Maximum output power	3.6kW (4.9PS)	3.5kW (4.7PS)
Weight(kg)	28.0	44.0
Set number of revolutions(min ⁻¹)	3,200	←

6. Appearance

6.1 Appearance and part names



A pump head and a lead shaft as a set is called pump set.
A pump set does not include an engine mount.

※The engine unit is sold separately.

7. Inspection before Operation

7.1 Appearance check

CAUTION Check tightening bolts used at each part to make sure they are not loose. Vibration causes bolt loosening, which results in unexpected serious machine trouble.

7.2 Engine oil

Set the engine horizontal, then check the oil level with the oil gauge. If the oil level is low, supply the oil. Oil capacity is 580cc (GX160) or 800cc (L48N). (Figure 1)

- Use automotive engine oil with viscosity appropriate for the outside temperature.
- Lowering of the quality and level of engine oil leads to engine burning problem. Use high quality oil such as the one with quality grade higher than SC.
- When the outside temperature is below -20°C or above 40°C , use the oil with viscosity and quality suitable for such unique temperature.
- When multi-grade oil is used, the consumption of oil tends to increase when the outside temperature gets high.

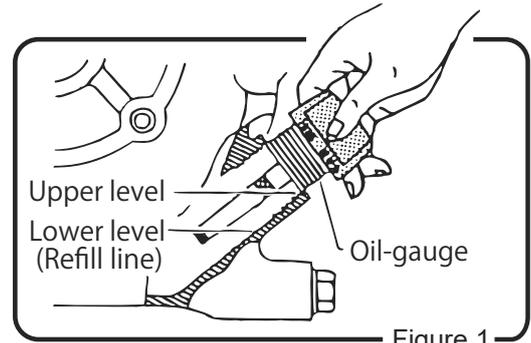


Figure 1

Criteria for oil viscosity selection

Single grade	5W	10W	20W	#20	#30	#40
Multi-grade	10W-30					
Outside temperature	-20	-10	0	10	20	30 40 $^{\circ}\text{C}$

7.3 Fuel

WARNING In case if a spill occurred, wipe off the spill completely before starting the machine. When refueling, stop the engine. Otherwise, there arises a risk of fire.

The fuel is unleaded gasoline for automobiles. When supplying the fuel, let the fuel run through a filter. The fuel capacity of the machine is 3.1L (GX160) or 1.9L (L48N).

7.4 Work site

7.4.1 Condition of work area surface

CAUTION The engine mount should not be tilted more than 10 degrees in any direction. Select a level area with little surface irregularities so that the engine can be stabilized. If the engine mount is tipped over, accident such as fire might occur.

7.4.2 Environment for work

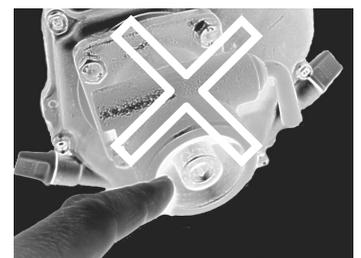
DANGER Exhaust gas from the engine contains carbon monoxide that is toxic to humans. Do not run the engine in a poorly ventilated location such as indoor or inside a tunnel. Also, when the engine is running, make sure that not only the machine operator but also the people and animals nearby will not be exposed to exhaust gas. Exhaust gas poisoning may lead to fatal accident.

CAUTION Do not run the engine in a location where the engine might get wet with rain or water because there is a risk of fire by sparks.

7.5 Warm up

Before connecting the pump set to the engine mount, start the engine mount and do warm up at low speed for about five minutes. This is especially necessary when the environment temperature is low.

DANGER When running the machine without attaching the flexible shaft, do not go near the coupling part. Serious accident and injury might occur if fingers or clothes get caught by the coupling part. When attaching the flexible shaft to the engine mount, make sure the engine is stopped. If you try to attach the flexible shaft to the engine mount without stopping the engine, you might be injured seriously.



8 Operation

8.1 Starting and Operation

8.1.1 Connect the shaft to the engine. To connect, turn the lever on the side surface of the engine's coupling part, then insert the hexagon joint of the flexible shaft and adjust coupling in the hexagon socket of the engine mount. Put the lever back to its original position. (Figure 2)

⚠ WARNING When attaching the flexible shaft to the engine mount, make sure the engine is stopped. You might be injured seriously if you work without stopping the engine.

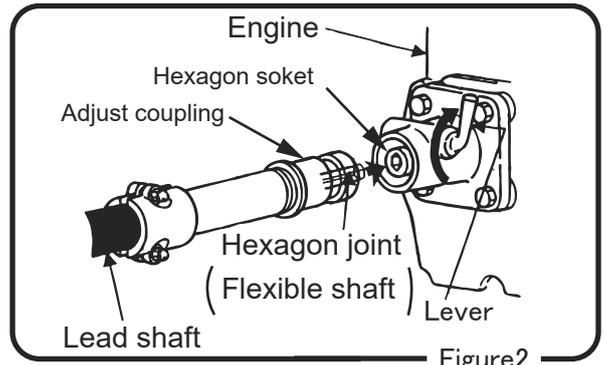


Figure2

8.1.2 Start the engine and immerse the pump slowly in water. (While doing so, reduce the engine revolution to the lowest level without stopping it.) Gradually increase the engine revolution to do pumping at 3,200r.p.m.

8.1.3 When you stop pumping work and pull up the pump, lower the engine revolution first before pulling up the pump to the ground. Then, run the engine at low speed for 2 to 3 minutes before stopping the engine.

- ⚠ CAUTION**
- The engine revolution is adjusted to 3,200r.p.m. (3,200min-1).
 - Do not turn the bolt of the speed control lever to try to raise the revolution above this level.
 - Do not pull Flexible shaft set only when it is necessary to move the prime mover connected with Flexible shaft set, as Joint shaft is likely to be taken off from socket of prime mover.
 - If Flexible shaft set is bent extremely or pulled in looped shape while operating, heat and stress are caused by friction and Inner shaft will happen to be cut.
 - Flexible shaft set should not be bent less than 750 mm in radius at operation. (Figure 3)

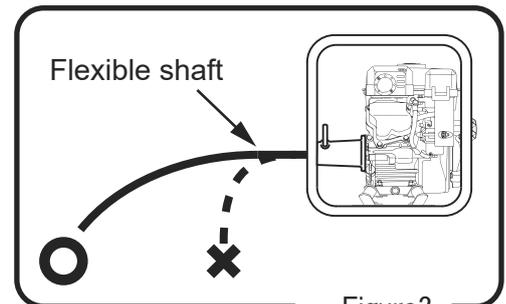


Figure3

9 Maintenance and storing

9.1 Inspection and Maintenance Schedule Table

Check frequency	Check parts	Check items	Oils
Daily (before starting)	Appearance	Flaw, deformation	
	Fuel tank	Leakage	
	Fuel system	Leakage	
	Engine oil	Leakage, oil level, dirt	Engine oil
	Bolts and nuts	Looseness, missing	
Every 20 hours	Engine oil	Replace only after the first 20 hours	Engine oil
Every 200 hours	Pump set	Wear	High temperature grease
Every 2 years	Fuel pipes	Change	
As necessary in time	Air cleaner element	Change	

For details about the check and maintenance of the engine, please refer to the attached engine operation manual.

9 Maintenance and storing

9.2 Daily maintenance

Remove all the mortar, mud, dust, oil, etc. well from each part of the machine. Check the air cleaner. If the air cleaner is very dirty, clean it, too. Check the lubrication oil level, and check tightening bolts at each part for looseness.

If the lock nut is removed, the pump itself can be separated from the flexible shaft set, but do not separate them unless necessary to do so for maintenance and inspection purpose. If the pump and the flexible shaft set are left separated, dust and foreign matter might enter inside the pump and the lead shaft from the connection points.

9.3 Weekly maintenance (every 50 hours)

- ① Take out the element from the air cleaner, and wash it with wash oil (kerosene). Immerse the element in an oil mixture containing gasoline and engine oil in the ratio of 3:1, then tightly ring out the outside primary element (sponge), and swish off the wash oil from the secondary element before setting it in the air cleaner.
- ② Remove the igniter plug. Clean it and adjust the spark interval to 0.6 to 0.7mm.
- ③ Completely drain all the old oil from the crank case before the engine gets cool, then supply new oil of good grade.

* When the engine is new, the first oil change should be done after 20 hours.

9.4. Maintenance for every 200 hours

- ① Remove the bolt that fixes the pump casing. Check inside of the pump. If extensive wear is found on the impeller and the seal, replace them. Impeller comes off if turned to the left (counter-clockwise).
- ② Disconnect the shaft set hose coupling of the pump side from the joint coupling (right screw). After completely wiping off the old grease on the flexible shaft, apply new grease evenly on the entire shaft.

Use heat resistant grease that will not degrade by temperature change.

9.5 Fuel pipe

Inspect the fuel pipe without fail to check for damage and looseness of the attaching points. Change it every two years even if abnormality is not detected by inspection.

9.6 Correct storing method

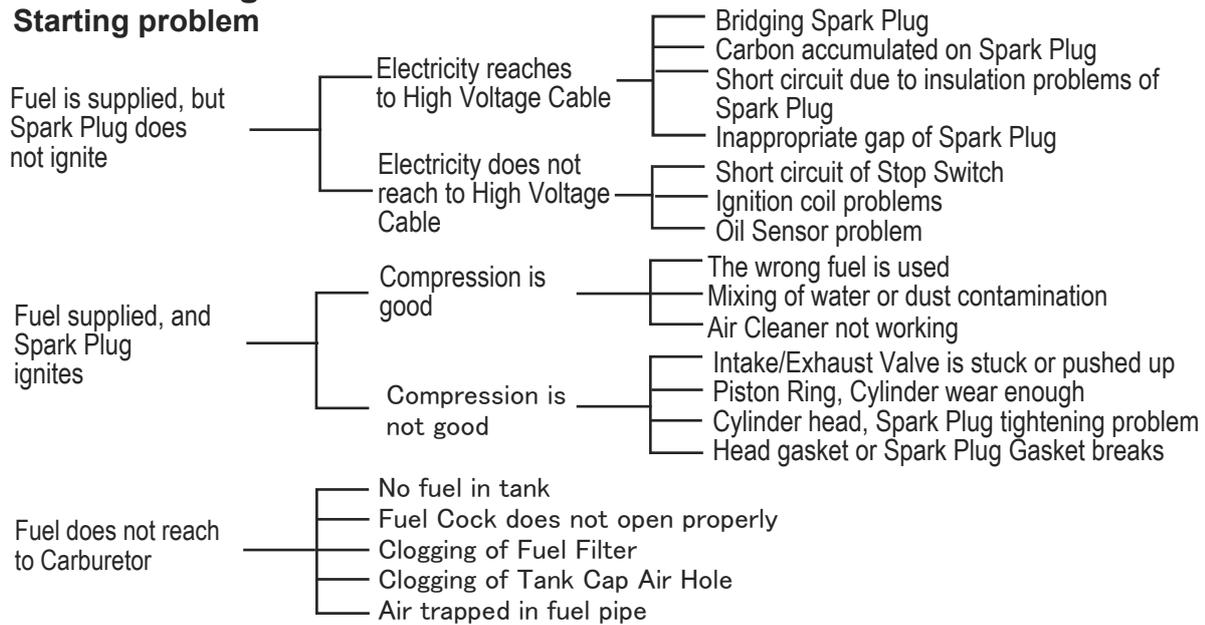
When the machine is to be stored for a long period of time after your use, do the followings.

- ① Completely wipe off the fuel from the fuel tank, fuel pipe and carburetor.
- ② Clean the igniter plug with oil soaked cloth, and keep it covered in an area away from direct sunshine and free of humidity and dust.

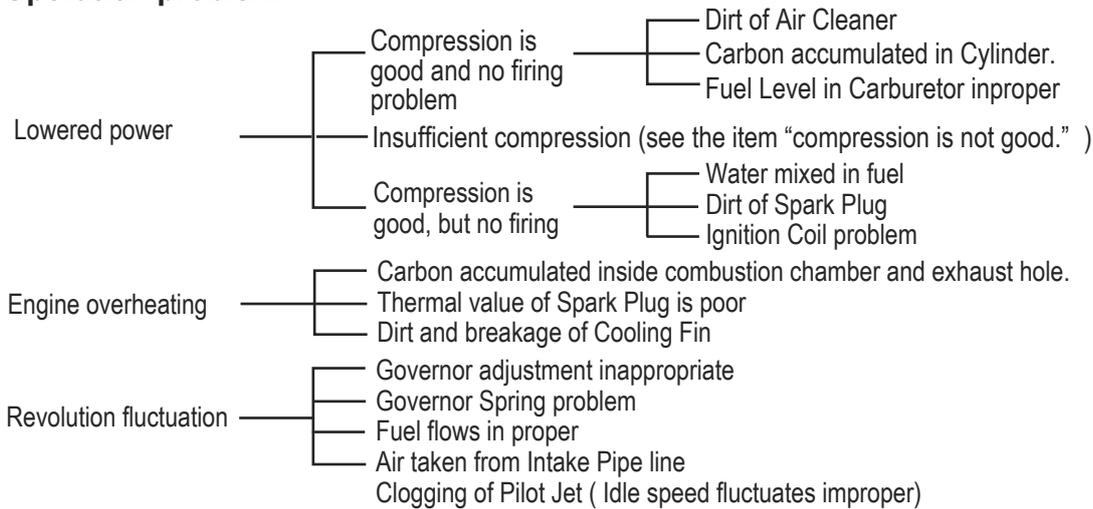
10. Troubleshooting

10.1 Gasoline engine

(1) Starting problem



(2) Operation problem



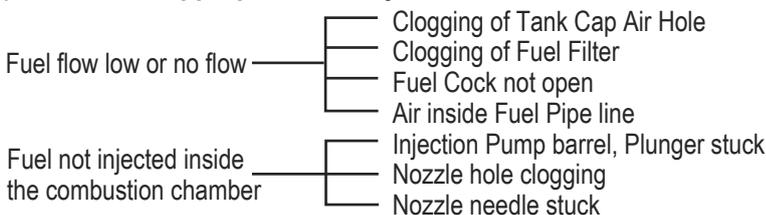
10.2 Diesel engine

(1) Starting problem

(A) In case of compression problem



(B) In case of inappropriate fuel injection inside the combustion chamber



No fuel in Fuel Tank
 Mixing of water or dust

(C) Fuel and compression pressure appropriate, but engine does not start

Does not reach to starting revolution. ——— Inappropriate starting operations
 Engine oil viscosity high, engine oil is very dirty
 Air trapped inside Fuel Pipe

Insufficient compression ——— See the comment for insufficient compression

(2) Insufficient output and operation problems

Engine overheating with black smoke ——— Dirt and breakage of Cooling Fin
 Mixing of water inside Fuel Filter
 Carbon accumulated in the combustion chamber or exhaust hole
 Smoke set inappropriate
 Overload
 Inappropriate injecting timing
 Nozzle clogging

Revolution fluctuation ——— Governor fork and sleeve mating surface problem
 Governor Spring problem
 Fly wheel and sliding part wear or operation problem

Engine revolution does not increase ——— Valve open/close timing inappropriate
 Clogged exhaust hole, muffler
 Overload

Firing problem with white smoke (when unloaded) ——— Piston, Cylinder Ring wear
 Nozzle hole clogging
 Piston Ring stuck
 Wrong assembly (upside down) of Piston Ring
 Inappropriate injection timing
 Inappropriate Valve open/close timing
 Looseness of Injection Pump joint

Fuel consumption too high (black smoke) ——— Leakage from fuel passage
 Clogging of the Air Cleaner Element
 Inappropriate fuel due to mixing of impurities
 Overload

Extensive wear on sliding parts or stuck piston rings ——— Use of wrong oil
 Failure to change oil
 Breakage of the Air Cleaner Element or failure to clean Air Cleaner

Stopped suddenly with abnormal noise ——— Searing or damage of Piston, Rod, etc

Lubrication oil diluted and increased ——— Wear on the Injection Pump barrel or Plunger

Engine does not stop even though the fuel supply is cut (or over-running) ——— Too much oil
 Wrong assembly of the governor system
 Detached injection pump rack

10.3 Pump set (when engine mount operates normally)

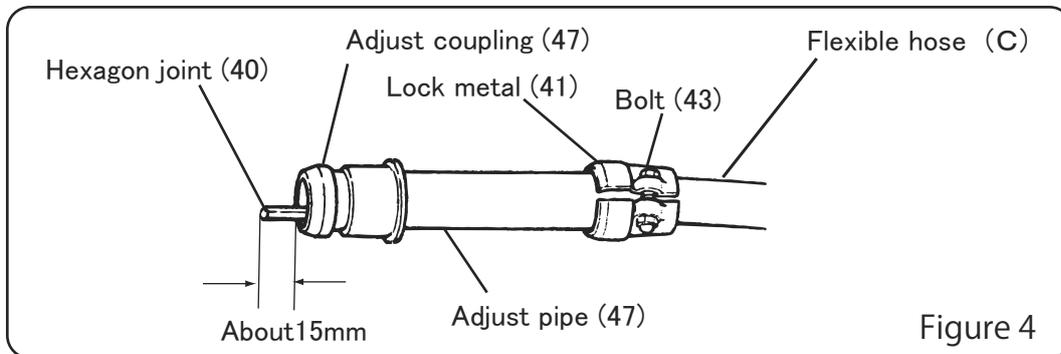
- 10.3.1 Connection problem of engine mount and pump set
 - Model incompatibility/flexible shaft length adjustment
- 10.3.2 Heat generation from lead shaft --- Greasing of flexible shaft in the lead shaft
- 10.3.3 Impeller of the pump does not rotate.
 - Lock of impeller, etc., inspect and change flexible shaft.
- 10.3.4 Extensive breakage of flexible shaft -----Change lead shaft (including flexible shaft).
- 10.3.5 Abnormal noise from pump ---- Check and change bearing.
- 10.3.6 Water rising above engine mount --- Change oil seal and bearing.
- 10.3.7 Pumped water amount dropped. --- Check/change impeller, etc.

11 Maintenance

11.1 Length adjustment of the flexible shaft

The end of the hexagon joint that is assembled to the flexible shaft should extend from the end of the adjust coupling of the lead shaft by about 1.5mm.

If the length of this extended hexagon joint end is more or less than this recommended length, loosen the bolt that is fixing the lock metal, then by moving the adjust pipe to adjust the end length.



11.2 Greasing of flexible shaft

- Use heat resistant grease that will not degrade by temperature change.
- After each operation of about 200 hours, completely wipe off the old grease on the flexible shaft and the bearing, then apply a new grease evenly on the entire shaft.
- With WP-2L/3LB type, if the lock nut is loosened and removed, the flexible shaft assembly (A) in the lead shaft can be pulled out with the pump connected. To prevent collection of foreign matter and dust on the assembly, apply grease with a brush in a very thin layer.

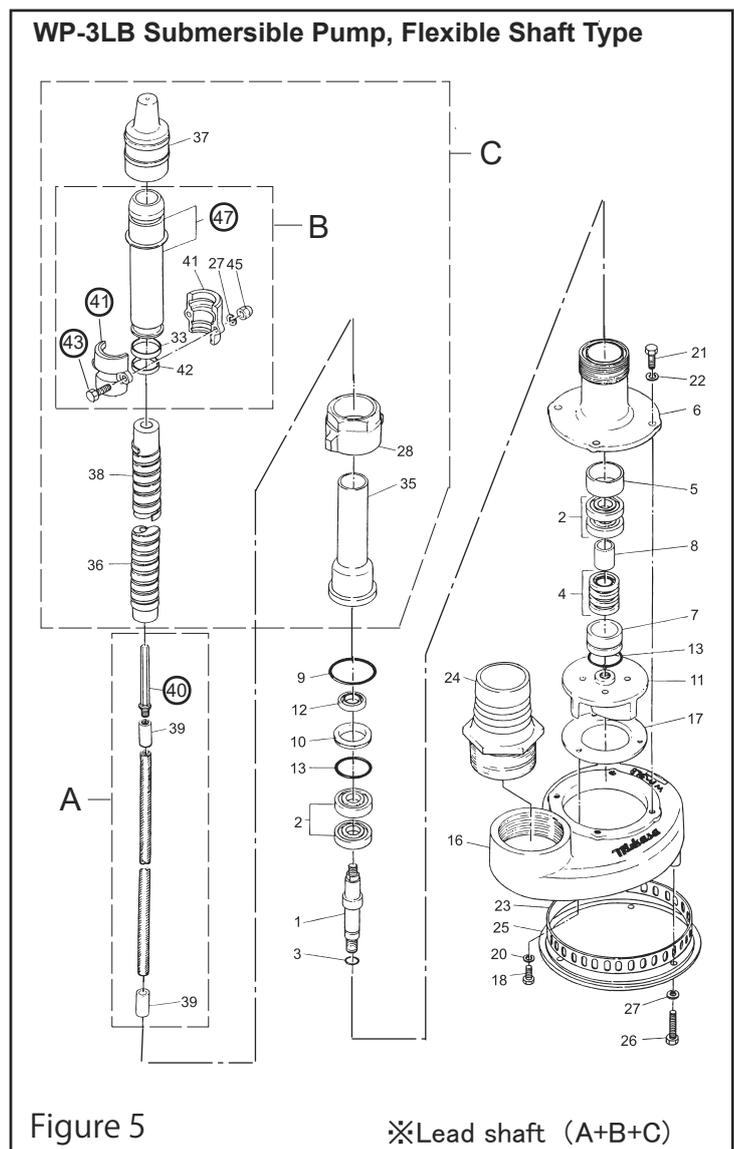


Figure 5

※Lead shaft (A+B+C)

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