SHIBAURA FIRE FIGHTING PUMP

FF500-A

INSTRUCTION MANUAL

WARNING

BE SURE TO READ THIS MANUAL BEFORE OPERATION.

Shibaura Fire Pump Corporation

PREFACE

We wish to express our great thanks for your purchase of SHIBAURA PORTABLE FIRE FIGHTING PUMP.
For safe operation of SHIBAURA PORTABLE FIRE FIGHTING PUMP, please pay attention to the following.

☆ The operation of this pump is limited to fire fighting.

☆ Only those qualified persons, who have received a special training for safe operation, from among official fire-fighting staff, voluntary disaster-preventing personnel, voluntary fire-fighting personnel and maintenance personnel qualified for handling portable fire-fighting pumps are allowed to use this pump.

For inspection and maintenance of the pump, please contact a maintenance shop or our special dealership qualified for maintenance of the portable fire-fighting pumps.
This instruction manual is intended to offer the information necessary for safe and effective operation of SHIBAURA PORTABLE FIRE FIGHTING PUMP. It is mandatory to thoroughly read this manual for the best and safest use of SHIBAURA PORTABLE FIRE FIGHTING PUMP.
If you have any questions or inquiries concerning the descriptions contained in this manual or how to use the pump, please contact us directly or our authorized agents.

CONTENTS

FOR SAFE OPERATION

The classification and meanings of the warning signs are as follows:

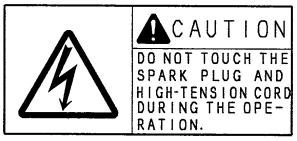
"DANGER" : Any mistakes in operation may lead to an imminent risk of death or serious injury.

"WARNING" : Any mistakes in operation may lead to a possible risk of death or serious injury.

"ATTENTION" : Any mistakes in operation may lead to slight injury or material damages.

The following attention labels are affixed to SHIBAURA PORTABLE FIRE FIGHTING PUMP. Please fully understand the meanings of those labels before starting to use the pump and use it safely by observing the instructions and messages of those signs.

L82900900



L82900910

For possible dangerous matters and points, never fail to observe the following:

Type of danger	Rank	Dangerous points	Points of attention
Fire	Danger	Fuel tank (In refill of gasoline)	(1) Never place near fire. (2) After stopping the engine, be sure to confirm the engine is cooled down prior to refilling the gasoline tank. (3) Be careful not to spill the gasoline.
	Warning	Muffler (exhaust gas) Muffler (dry grass) Battery (get fire)	(1) Perform operation at a place 3 m or more off any inflammables. (2) Never perform operation on dry grass. If it is inevitable, remove dry grass under the muffler. (3) When you pour in the battery fluid, keep good ventilation. (4) When you pour in the battery fluid, do not put the battery close to flame.
	Attention	Fuel tank (In refill of gasoline)	(1) Pay full attention to waste cloth which has been used to wipe out spilt fuel. (2) Be sure to confirm that the fuel tank cap is securely tightened. (3) When you supply fuel, keep good ventilation.
Burn	Attention	Muffler Exhaust pipe Exhaust port Battery (electrolyte solution)	(1) Never touch while it is still hot. (2) Be careful not to let your skin come into contact with the electrolyte solution.
Rotating parts	Attention	Recoil pulley	(1) When starting by using the rope, be careful not to let your clothing, gloves, etc. get caught. (2) When starting by using the rope, confirm that there are not any persons or any things within a radius of 2 m.
Toxicity	Warning	Muffler (exhaust gas)	(1) Never operate the pump in a place where ventilation is not enough. (For example, in a pump house, a tunnel, etc.)

High-pressure water	Attention 	Nozzle, discharge port	(1) Never direct the nozzle to any people as they may get injured. (2) Never peep into the discharge port or nozzle during the preparation for water discharge. (3) Set the engine at low speed when opening or closing the discharge valve. (4) Never start the engine while the discharge valve is still open (except during the relayed water conveyance).
Electric shock	Warning 	Ignition plug High-pressure cord Battery	(1) Never touch during operation. (2) When replacing the battery, remove the (-) terminal side first and attach the (+) terminal side first.
Injury (A risk of getting a cut or caught)	Attention 	Carrying handle Discharge valve (ball cock)	(1) Do not touch hinge parts when you are manipulating the handle. (2) Never put your hand or finger in the discharge port when you are manipulating the discharge valve.
Scattering of stones and explosion, etc.	Attention 		(1) Use the pump very carefully because stones or other foreign matter may fly suddenly to cause physical injuries. (2) Never suck or discharge inflammable fluids, chemicals, etc. as they may cause a fire or explosion incident.
Disposal	Attention 		(1) When disposing of a battery, oil, etc., contact an agent specialized in industrial waste disposal.
Slip	Attention 		(1) Be careful not to spill oil. Be sure to wipe up spilt oil.

UNIT CONVERSION TABLE

Designation	Old	New	
Rotation speed	Number of rotations (rpm)	Rotating speed	rpm
Pressure	kgf/cm^2	MPa	Megapascal
Mass	Weight (kgf)	Mass kg	Kilogram
Volume	ℓ	l	Liter
Consumption	cc/min	ml/min	Milliliter per minute
Vacuum	mmHg	-MPa	Megapascal
Displacement	cc	ml	Milliliter
Output	PS	kW	Kilowatt

- 1kgf/cm^2 ≒ 0.098MPa
- 760mmHg ≒ -0.1013MPa
- 1PS ≒ 0.735kW
- 1cc = 1ml

Pay attention to the unit of pressure in which new unit is about 1/10 as compared with the existing one.

SPECIFICATIONS

FF500-A

ENGINE

Model	EP556
Classification	S
Type	Water-cooled, 2-cycle, Horizontal 2-cylinder gasoline engine
No of cylinders – bore x stroke mm	2-76x70
Total displacement ml(cc)	635
Rated output kW/rpm (PS/rpm)	32 (43.5) / 5100
Cooling system	Forced water cooling
Ignition system	Non-contact (CDI) magneto ignition
Ignition plug	NGK B7HS
Fuel supply method	Electronically-controlled fuel injection method
Fuel	Automobile gasoline
Fuel tank capacity l	11
Lubrication method	Separate lubricating method
Lubricating oil	2-cycle engine oil
Oil tank capacity l	1.2
Startup system	Starter motor type, recoil type
Charging capacity V-A	13-17.5
Speed regulating system	Centrifugal weight, electronic over-speed prevention mechanism
Rotation direction	Left (viewed from the output side)
Lighting V-W	12-3 x 2 (Meter lamp) 12-180 (Search light)
Battery	12V15Ah (sealed)

PUMP

Model		P556
Classification		S
Type		High-pressure one-stage turbine pump
Suction port dia. mm		Nominal 75 (fire-fighting screw-type fitting JIS-B-9912)
Discharge port dia. mm		Nominal 65 (fire-fighting screw-type fitting JIS-B-9912)
Performance	Rated pressure MPa(kg/cm^2)	0.70 (7.0)
	Rated discharge m^3/min	1.32
	Rated discharge nozzle mm	ϕ 27.5
	High pressure MPa(kg/cm^2)	1.0 (10.0)
	High-pressure discharge m^3/min	0.92
	High-pressure nozzle mm	ϕ 21.0
	Rated rpm rpm	5100 (Governor set)
Pump chamber sealing		Mechanical unit seal
Vacuum pump		4-blade eccentric rotary type with strainer
Vacuum MPa		Suction head Approx. 9 m (–0.085 or more)
Lubrication		Oilless system
Dimension (overall L x W x H) mm		681 x 635 x 708
Dry weight kg		Approx. 92

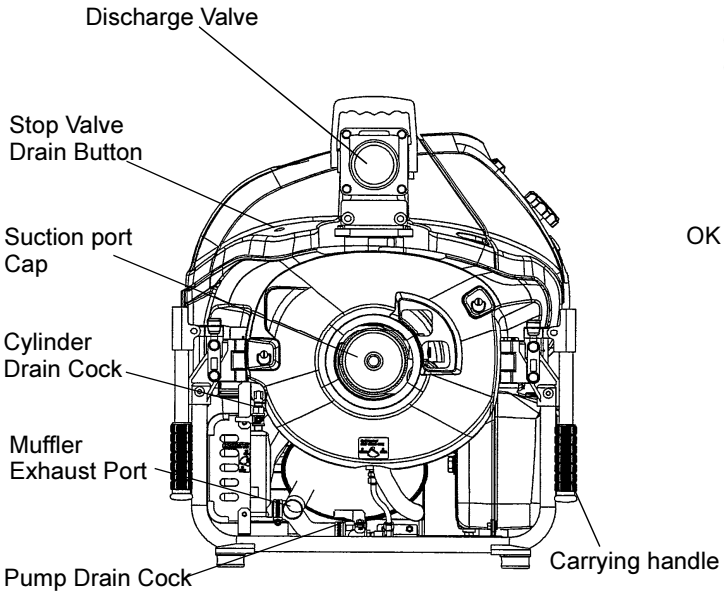
STANDARD UNITS

Designation	No. of units	Designation	No. of units	Designation	No. of units
Root joint	1	Battery	1	Suction port strainer	1

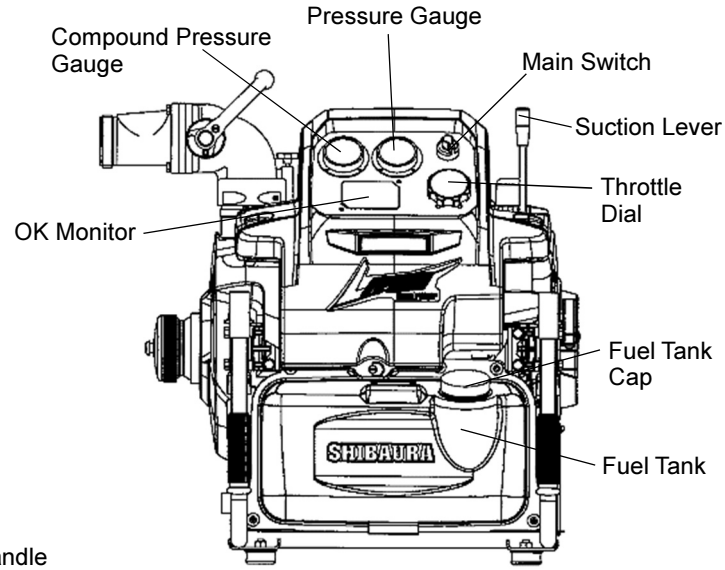
ACCESSORIES

Designation	No. of units	Designation	No. of units	Designation	No. of units	Designation	No. of units
Disassembly tool set	1	Automatic battery charger	1	Safety nozzle	1	Instruction manual	1
Pump cover	1	Ignition plug	1	Fuse	1	Tool box	1
Search light	1						

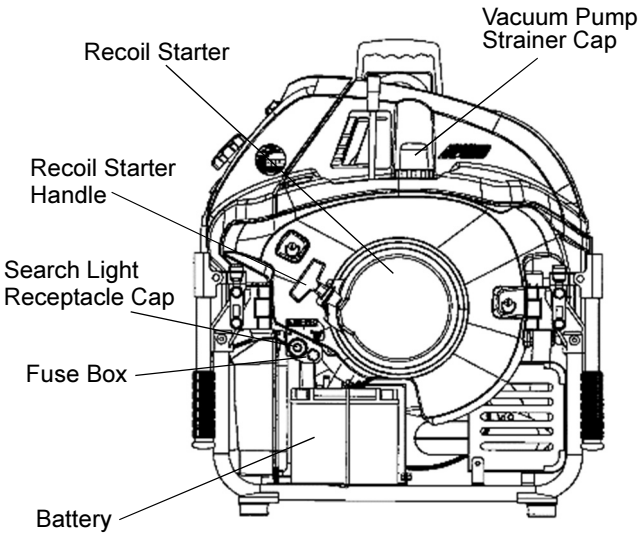
DESIGNATION OF PARTS



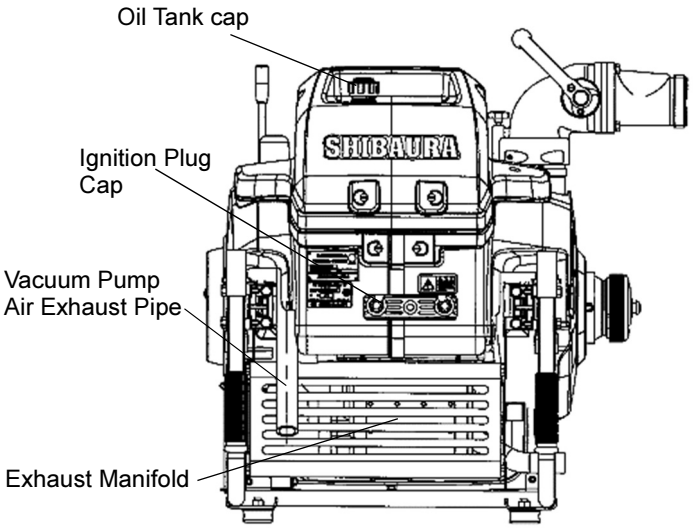
PUMP SIDE



OPERATING SIDE



RECOIL STARTER SIDE



BACK SIDE

BEFORE OPERATION

(1) Confirm that a complete set of the standard equipment and accessories are contained in the package. (Refer to "SPECIFICAIONS" on page 5.)

Warning

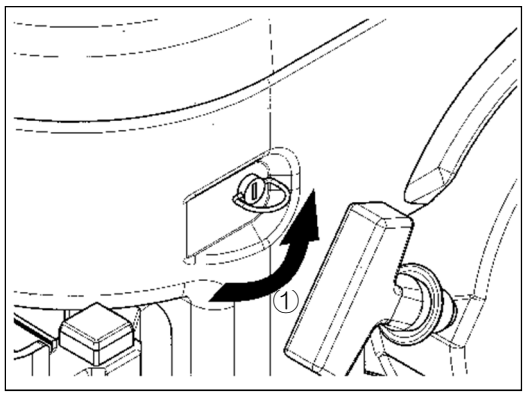
(2) Connect the (+) terminal of the battery first and then its (-) terminal. Then, fasten them with the attached clamps.

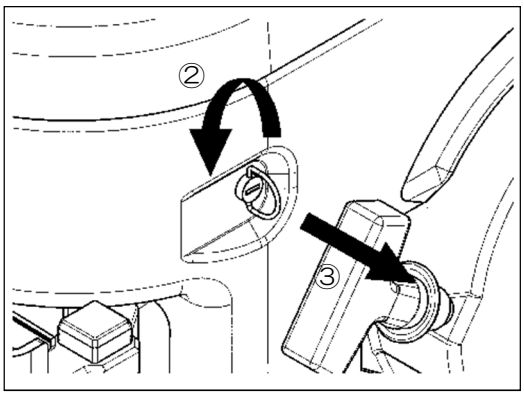
(3) If necessary, follow the steps below to remove the cover.

1. Raise the fastener ring.
2. Turn it counterclockwise 1/4 times.
3. Remove the cover by checking that it has been released.

   Each cover has 3 or 4 fasteners. Follow the same procedure to release all the fasteners to remove the cover.

   * To attach the cover, follow the steps inversely.





PREPARATIONS BEFORE OPERATION

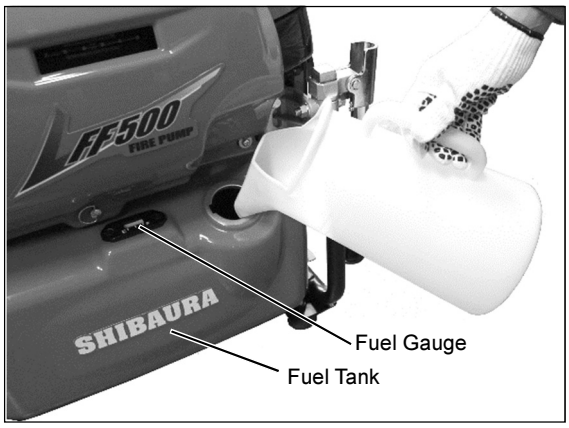
1. Fill the fuel.

DANGER

Fill the fuel tank with automobile gasoline. (As the separate lubricating method is used: It is not necessary to mix it with the 2-cycle engine oil.)

Tank capacity: 11 liters

The level of the fuel in the tank can be checked by taking a look at the fuel gauge on the tank top.



Notes:
1. Never feed fuel full up to the tank feeding port.
2. If the fuel stored for a long time emits irritating odor or appears turbid, replace it immediately.

FLAMMABLE **DANGER**

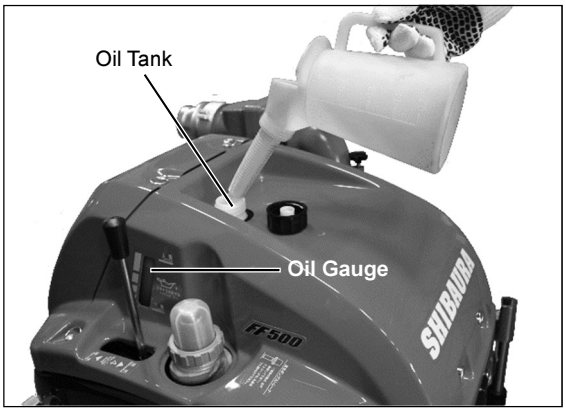
INFLAMMABLE
*Don't close flame.
*Stop engine when supply fuel
*Don't split fuel.

2. Fill the oil.

ATTENTION

Fill the oil tank with 2-cycle engine oil.

Tank capacity: 1.2 liter



Note: Never feed oil fully up to the tank fill port.

3. Set the pump

Pay attention to the following.

ATTENTION

(1) When carrying the pump, be sure to hold correctly its carrying handle.

(2) As the muffler is mounted at the bottom part, never place it on dry grass.

WARNING

(3) Set the pump as close as possible to the water suction level so as to minimize the suction height. Also, place the pump as level as possible.

(4) To prevent air bubbles from forming in the suction pipe, place its pump side above.

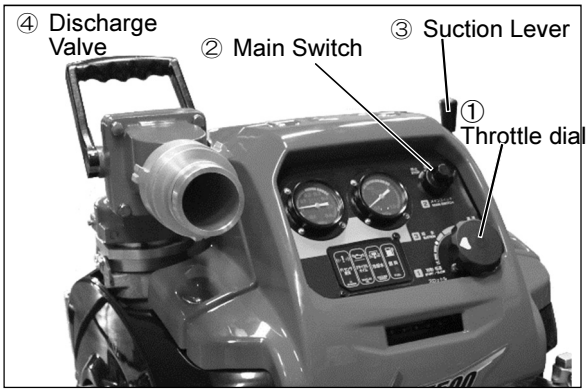
(5) Attach a strainer or a rattan basket to the port of the suction pipe. If there is a risk of sand or dirt suction, place a mat under the rattan basket.

(6) Set the rattan basket at a level about 30 cm under water so that the air will not be introduced.

(7) Place the water discharge hose so that it will not be bent halfway.

4. Shut the pump and cylinder drain cock.

OPERATION

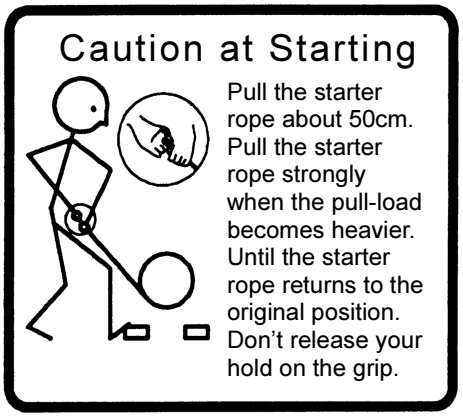


1. Start

(1) Set the throttle dial ① to "START/SLOW."
(2) Turn the main switch ② to "RUN." In case of self-starting, turn it further to "START." In case of recoil-starting, pull the recoil starter handle as shown on the right figure.
(3) The engine starts.

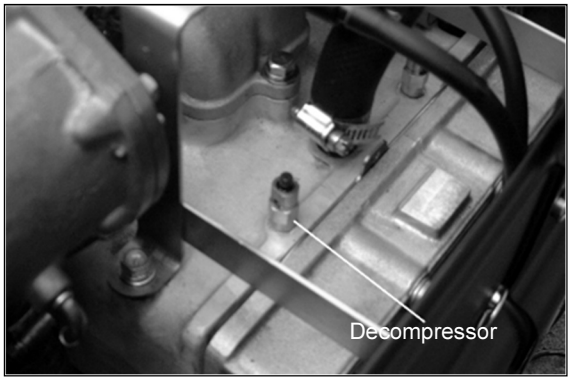
Notes:

1. If the quantity of fuel is excessive, the engine may not readily start. In such a case, refer to the countermeasures described on page 17.
2. This fire-fighting pump is equipped with a decompressor to reduce pulling force of the recoil starter handle. The decompressor runs regularly if a leak noise can be heard by pulling the recoil starter handle lightly. Otherwise, press the clear button on the top of the decompressor.
3. Be careful not to pull the recoil starter rope excessively to the full.
4. Never start and stop the engine repeatedly without water suction. The air-fuel mixture remaining unburnt may cause explosion (after-fire).



WARNING

Exhaust gas is poisonous.
*Don't operate in bad ventilation room.



ATTENTION

ELECTRIC SHOCK
*Don't touch the ignition plug or the electric wires during operation.

.

2. Water suction and discharge

(1) After engine startup, set the throttle dial ① to "SUCTION" and pull the suction lever ③ in the "SUCTION" direction to start the vacuum pump.

(2) When the water is discharged continuously from the exhaust pipe of the vacuum pump, return the water suction lever swiftly in the "DISCHARGE" direction. If there is any bend halfway on the water suction pipe, the air may be remaining there. To prevent this phenomenon, keep the water suction lever running 1 to 2 seconds longer than actually required.

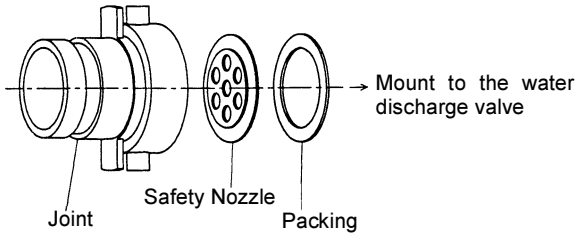
(3) After confirming safety of the pipe end, slowly open the water discharge valve ④ by keeping the throttle dial set to "START/SUCTION." After starting the water discharge, adjust the throttle dial to attain the adequate discharge pressure.

Notes:

1. If the suction level is high, never open the water discharge valve abruptly. The water being sucked halfway may drop and the water cannot be discharged sometimes. If cavitation occurs because the water suction level is too high, set the throttle dial to the lowest possible speed.
2. To run the vacuum pump by manipulating the water suction lever, set the operation time at 30 seconds or less.
3. The engine is cooled down by the water introduced. To operate the engine without water suction (no-load operation), set the throttle to a low speed and never operate the engine more than 2 minutes. This fire-fighting pump is equipped with a safety device designed to stop the engine by detecting a temperature rise in cooling water. This safety device sometimes may not function correctly if the throttle is set to a medium or high speed during the no-load operation without cooling water. Be sure to observe the instruction above. (Refer to "For Longer No-load Operation" on page 10.)
4. The pump pressure required depends on the number of extended hoses, the nozzle tip diameter, the water feeding height, the two-line water discharge, etc. Set the pump pressure in response to the water discharge pressure at the nozzle tip.

ATTENTION

5. Be careful about a sudden swing of the nozzle, which may occur if the water discharge pressure is too high or if the water discharge valve is opened or closed abruptly.
6. In relayed water discharge, start the master pump first, and stop the slave pump first.
   Set the water feeding pressure of the master pump so that the compound pressure gauge of the slave pump in operation will read 0.05 to 0.1 MPa (max. 0.6 MPa). The slave pump will not run if the compound pressure gauge read 0 or below.
   The water discharge pressure of the slave pump must be 1.5 MPa or less. If this limit is surpassed, the pressure gauge or pump unit may be damaged.
7. To operate the pump without using the nozzle tip, for example, for the purpose of taking the water from the tank or feeding the water to the relay tank, fit the safety nozzle between the joint and the water discharge valve as illustrated in the figure on the right.



3. Temporary stop of water discharge

(1) If it is necessary to stop the pump temporary for replacing of a nozzle during the water discharge or replacing hoses, turn the throttle to "SLOW" and then set the water discharge valve to "CLOSE" to stop the water discharge.

(2) To stop the operation provisionally while keeping the water suction pipe in the current status, set the throttle to "SLOW", and stop the engine by keeping the water suction lever at the water discharge position. In this case, the water will not drop because of the check valve. Therefore, start up the engine and open the water discharge valve to discharge the water. (Note that the engine must be restarted within 3 minutes.)

4. Stop

(1) Turn the throttle fully in the "SLOW" direction and set the water discharge valve to "CLOSE."

(2) By setting the main switch to "STOP," the engine will stop.

Note: Never stop the engine when it is operating at a medium or high speed without setting the throttle to "SLOW." There is a risk of after--fire.

5. For longer no-load operation

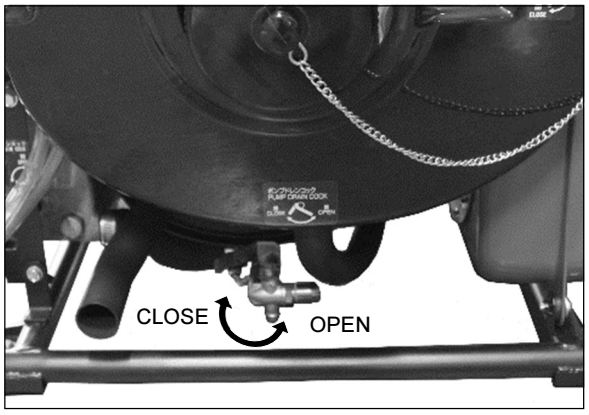
By keeping the cooling water in the cylinder, the no-load operation may be performed at idling for about 10 minutes. To operate the engine in this method, keep the cylinder drain cock closed when the water is drained after the operation to allow the water to remain. Also, to operate the engine in cold weather, put anti-freezing solution in the cylinder. (Refer to "CAUTIONS FOR COLD WEATHER" on page 15.)

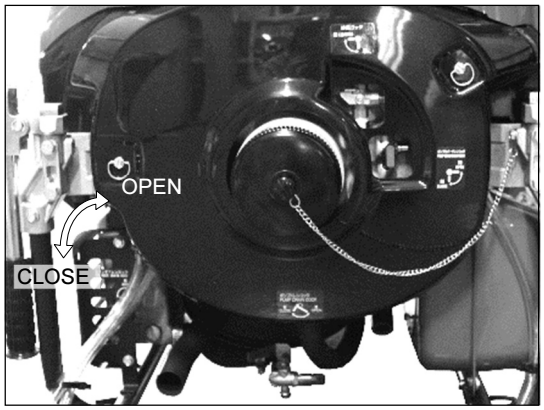
STORAGE

(1) Open the water discharge valve and then open the pump and cylinder drain cock. Press the water stop valve drain button to drain the water completely. After the water is drained, be sure to close each drain cock.

(2) After detaching the water suction pipe, re-start the engine. Run the vacuum pump for 2 to 3 seconds. After discharging the water from the vacuum pump, stop the engine again.

(3) Attach the suction port cap and cover the pump before storage.





Notes:

1. If the water is drained incompletely, there is a risk of damage due to freezing or corrosion.
2. After using muddy water or sea water, clean the pump with fresh water. After that, never fail to drain the remaining water from every part.
3. Keep the pump storage house dry.
4. Perform the water discharge operation once a month by spending 5 to 10 minutes with the throttle dial set at a high speed.
5. During storage, recharge the battery by using the accessory automatic battery charger. (Refer to " HANDLING OF BATTERY AND CHARGER " on page 14.)
6. Before storage, confirm that the water is completely drained. In case of cold weather, put an antifreeze mixture in the pump. (Refer to "CAUTIONS FOR COLD WEATHER" on page 15.)

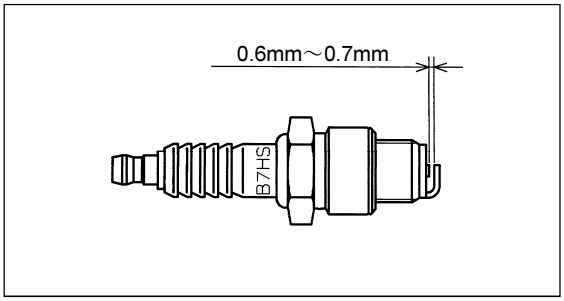
MAINTENANCE

ENGINE

1. Ignition Plug

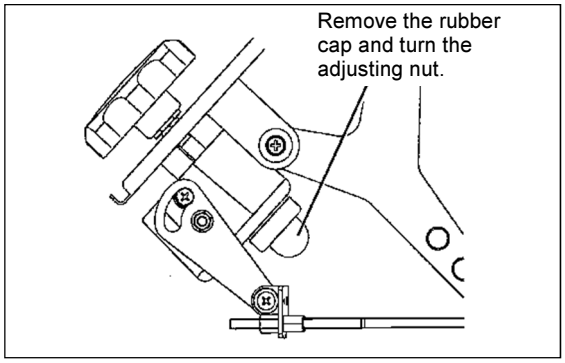
Clean the electrode contaminated with exhaust gas or carbon.

Ignition plug used: NGK B7HS
Gap: 0.6-0.7 mm



2. Throttle dial

The operating force of the throttle dial can be finely tuned by turning the adjusting nut located on the throttle dial body side.



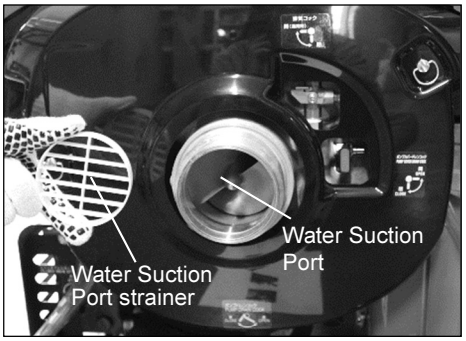
3. Air Cleaner

Take the element out of the air cleaner box and check whether it is dirty. If it is dirty, blow the dust and dirt or replace the element itself.

PUMP

1. Water Suction Port Strainer

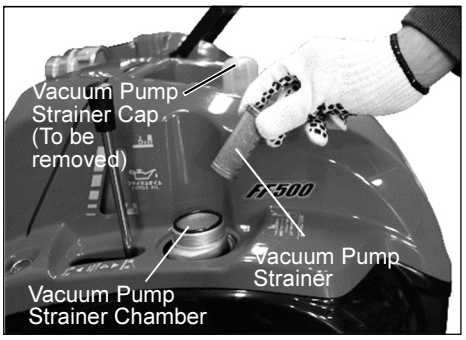
After using the pump in a place with alga, remove the alga caught in the water suction strainer.



2. Vacuum Pump Strainer

After using the pump in a place with earth and sand or alga, detach the strainer cap and clean the strainer.

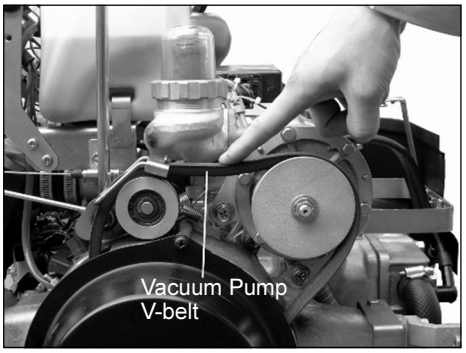
Note: Mount the vacuum pump strainer with its opening side turned downward.



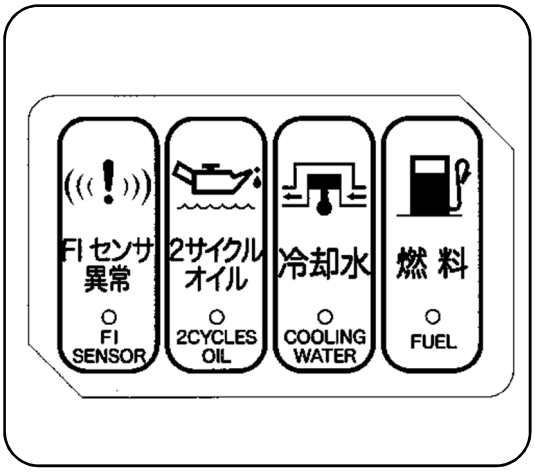
3. Adjustment and Replacement of Vacuum Pump Driving V-belt

(1) If the belt does not run normally, adjust the belt retainer.

(2) If the belt is extended, the belt tension can be adjusted to some extent by shifting the tension pulley. If the belt tension cannot be adjusted or the belt is damaged, replace it with a new one. (Belt used: A-28 V-belt)



OK MONITOR



The pump's operating conditions can be controlled intensively on the OK Monitor located on the operation panel. The monitor displays an alarm in case of abnormality or stops the engine in case of emergency, enabling the safe operation of the pump.

1. Monitor's Operation Check

Set the main switch to "RUN," and all the LEDs other than the "FI SENSOR" LED will be turned on for about 3 seconds.
If those LEDs are not turned on, there may be some abnormality. In such cases, contact a maintenance shop or our dealership.

2. Monitor Indication and Remedy

Indication		Monitor Operation	Remedy
	Fuel	If fuel becomes in small quantity, the LED is turned on.	Refill the tank with gasoline.
	2-cycle oil	If the oil level become low enough, the engine stops to prevent seizure and the LED starts to blink.	Set main switch to "STOP," refill the oil tank with oil and re-start the engine.
	Cooling water	If the cooling water temperature becomes too high, the engine stops to prevent the engine from overheating and the LED starts to blink. (Note 1)	The cooling water temperature rises. Check up the cause and remove it. The engine can be restarted. However, if the cause has not been removed, the engine will be stopped again in approx. 15 seconds after being restarted. (Note 2)
	FI sensor	If the TPS, WTS, ATS or APS detects an abnormal status, it starts to blink. It blinks also if the connector is disconnected from the injector, ignition coil. It blinks as described in List 1.	In cases other than emergency, stop the engine and ask a maintenance shop or our dealership for inspection.

List 1.

Sensor	Blinking condition
TPS (Throttle position sensor)	Blinks 7 times in a row.
WTS (Water temperature sensor)	Blinks 6 times in a row.
ATS (Admission temperature sensor)	Blinks 5 times in a row.
APS (Atmospheric pressure sensor)	Blinks 4 times in a row.
Injector wiring connector disconnected	Blinks 2 times in a row.
Ignition coil wiring connector disconnected	Blinks one time and two times alternately.

Notes:

(1) In case of the no-load operation without cooling water, it may not function normally. Be sure to observe the instructions described in this document when implementing the no-load operation (Refer to Note 3. on page 10).

(2) Do not try to restart it repeatedly without removing the causing factor.

(3) Do not carry out the inspection by relying only on the OK monitor but be sure to inspect every component as part of the periodical inspection.

3. Automatic Power-off Function

In order to prevent the battery from being wasted, this device is equipped with the automatic power-off function.
If this devices is left unattended with its main switch turned to "RUN" for 30 minutes, it automatically enters the "STOP" status.
To start operating this device from this status, return the main switch to the "STOP" status once and then start it. (Refer to Operation on page 9.)

HANDLING OF BATTERY AND CHARGER

1. Battery

The batteries recommend for this device are as indicated below.

- YTX20-BS (GS Yuasa Battery Ltd.)
- NBC20L-BS (Nihon Blade Company Ltd.)

Any battery other than those recommended may not be mounted correctly.

For details about the battery, refer to the manual attached to it.

Notes : 1. Be sure to make correct connection with the battery terminals (⊕ red and ⊖ black).

2. To connect the battery, connect the ⊕ terminal first. To disconnect it, disconnect the ⊖ terminal first.

2. Battery Care

WARNING

(1) The battery electrolyte is diluted sulfuric acid and very harmful to the skin. To fill the electrolyte, be sure to contact the dealer.

(2) The battery needs to be charged as it is consumed by the starter motor and self-discharges continuously even when it is not being used.

(3) The attached charger is an automatic charger, which can automatically switch from the normal charging mode to the supplementary charging mode (charging to cover the self-discharged electricity) and vice versa.

WARNING

(4) Due to the structure of this battery, the electrolyte surface cannot be inspected and the water cannot be refilled. Never try to refill the water by removing the sealing plug. Otherwise, the battery may break down.

3. Battery Charging

WARNING

(1) Clean the battery terminals by removing dust and dirt.

(2) Connect the output plug of the battery charger to the socket of this fire-fighting pump. If the power switch is tuned on, the power lamp (red) is lit and the charging starts.

(3) The charging process is complete when the completion lamp (green) is lit and the power lamp (red) is unlit. The charger goes into the supplementary battery charging mode.

Charge status ○ : Lit

		Power lamp (Red)	Completion lamp (Green)
Not charged			
Normal charging	＜ 80%	○	
	≧ 80%	○	○
Supplementary battery charging			○

Notes: 1. The breaker is activated if excessive current is supplied because of a reversely connected battery. Also, the breaker may be activated if the starter motor is activated while the charging process is in progress. Eliminate the causes of the problem, and reset the breaker to the normal position.

2. The life span of the battery is about 2 years.

CAUTIONS FOR COLD WEATHER

1. Cautions for Storage

(1) Use high-grade fuel. (The higher the gasoline quality is, the more gasoline becomes volatile and the easier the startup is.)

(2) Prevent the pump main unit, water discharge valve, vacuum pump and muffler from freezing. After the pump operation is over, discharge the water and use the anti-freezing solution or alcohol. In some cases, it is advisable to keep the parts warm.

(3) Always keep a required amount of anti-freezing solution.

(4) Confirm that the vacuum pump rotates normally. If it is frozen and cannot run, heat it with hot water.

(5) Keep the battery always well maintained.

Anti-freezing solution

Mixture ratio		Freezing temperature (℃)
Anti-freezing solution (%)	Water (%)	
10	90	-4
20	80	-10
30	70	-17
40	60	-27
50	50	-39

2. Feeding of Anti-freezing Solution

(1) After draining water completely from the drain cock of each component, tighten the suction port cap, and close the pump, cylinder drain cock and water discharge valve. Attach a tube to the port of the pump drain cock, and place the other end of the tube in the anti-freezing solution.

(2) After the engine starts up, set the water suction lever to the suction position, and operate the vacuum pump for about 5 seconds. After confirming that the compound pressure gauge indicates a sufficient negative pressure, return the water suction lever to the water discharge position and stop the engine. If the pressure does not become negative, confirm that the pump cover cap, drain cock, etc. are tightly closed and repeat Step (2).

(3) If the pump drain cock is opened, the anti-freezing solution will be sucked in. If the quantity of the solution sucked reaches about 5.0 liters it is not sucked anymore, close the drain cock.

(4) Re-start the engine, keep it in operation for about 5 seconds so the solution will spread sufficiently. Set the water suction lever to the water suction position, return it to the water discharge position when the anti-freezing solution comes out from the vacuum pump exhaust pipe, and then stop the engine.

(5) Open each drain cock to drain the anti-freezing solution. (For longer no-load operation, never discharge the anti-freezing solution from the cylinder drain cock. Refer to “For longer no-load operation” on page 10.

Notes:

1. In cold weather, the vacuum pump may freeze even in operation. In such a case, detach the vacuum pump strainer cap, and pour 10 ml of the anti-freezing solution. Start the engine, pull the water suction lever, and spread the anti-freezing solution well also in the vacuum pump.

3. Cautions for Handling of Accessories

(1) Be sure to dry up a cloth hose and metal pieces.

(2) Pour hot water if the cloth hose is frozen.

PERIODICAL INSPCECTION

Some of the parts of portable fire-fighting pumps, etc. have their functions deteriorated with age even if they seem to be normal superficially.
At the time of the periodical inspection, such parts must be replaced with new ones by referring to the table below.

◇ Periodic replacement parts

Parts	Replacement frequencies
Ignition plug	Every 1 year
Fuel pipe	Every 2 years
Battery	Every 2 years
Oil pipe	Every 3 years
Oil filter	Every 3 years
Vacuum pump driving V-belt	Every 3 years
Other rubber parts	Every 2 years

◇ Materials to be replaced periodically

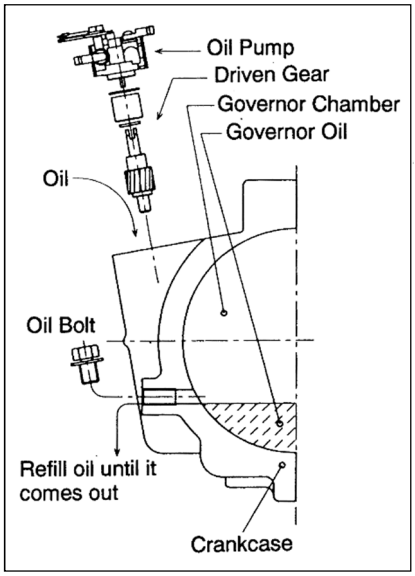
Materials	Replacement frequencies
Fuel	Every 6 months
Governor oil	Operation period: 50 hours/every year

《How to replace the governor oil》

Detach the oil pump, and continue to refill oil until oil comes out from the bolt hole, as illustrated on the right (once a year).

Automobile Mobil Oil: SAE#30, #20 (in winter)
Specified level 50 ml

Note: Under cold weather in winter, it is recommended to use SAE5W30 or SAE10W30 or other types of lubricating oil adapted for operation under cold weather.



TROUBLESHOOTING

Note: Request a maintenance shop or our special dealership qualified for servicing portable fire-fighting pumps for those services of inspection and maintenance relating to the items indicated in brackets in the "Cause / Remedy" column.

ENGINE

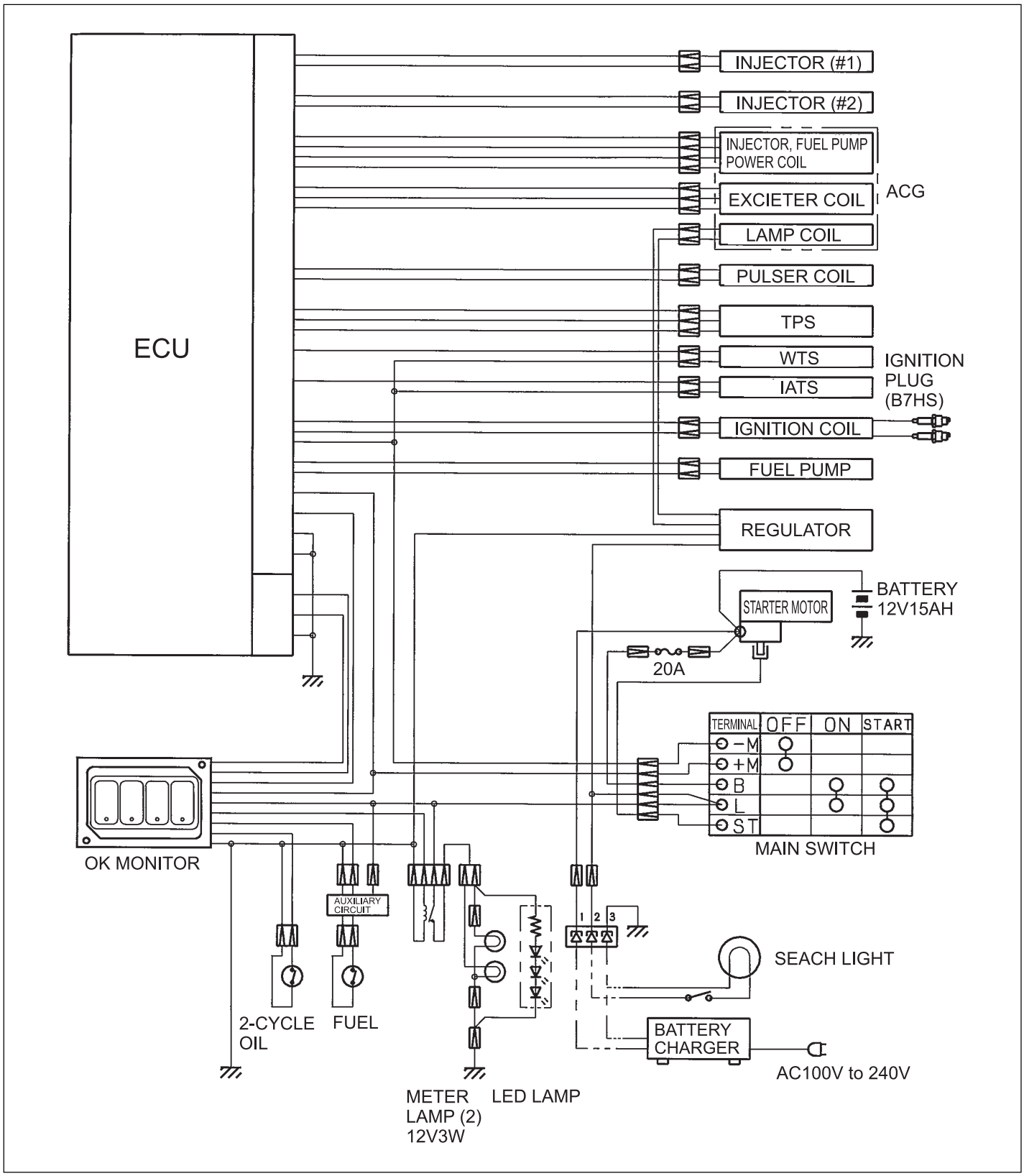
Condition			Cause / Remedy
Difficult startup	Fuel system	Excessive suction of fuel	《Start with the throttle body valve fully open.》 * If the engine starts, the speed of the operation may be high.
		Bad fuel	• If the fuel is old and has an unusual odor, replace it with a new one. • If the fuel is mixed with the water, remove the water or replace the fuel with a new one. • If the tank is not sufficiently filled with the fuel, top it up.
		Defective components	• 《If foreign matter is stuck in the injector, replace it.》 • 《If foreign matter is stuck in the fuel pump, replace it.》 • 《If the fuel pump fails to operate properly, replace it.》 • 《If the fuel system is connected incompletely, connect it completely.》 • 《If the fuel pipe is twisted or pinched by something, fix it up.》
	Electric system	Ignition plug	• If the ignition plug is loose, retighten it properly. • If the electrodes are dirty, clean and then retighten it properly. • If the gap between electrodes is over 0.7 mm, adjust or replace them. • If there are any damaged or broken parts, replace them.
		Defective magneto	• 《If the flywheel magneto is abnormal, replace it.》 • 《If the ignition coil is abnormal, replace it.》 • 《If the ECU is abnormal, replace it.》
		Wiring and others	• If the cables are loosely connected or disconnected, connect them properly. • If any fuse has blown, replace it. • If the battery voltage is low, recharge or replace it. • If any battery terminal is lose, retighten it properly. • If the overheat prevention device is activated, eliminate the factor causing it before starting the operation.
	Decompressor		• If the decompressor is loose, retighten it properly. • If the recoil is heavy and cannot be pulled, try to push the decompressor.
Irregular rotation	Excessive or abnormal fuel		Refer to "Difficult startup, Fuel system."
	Insufficient fuel suction		If the fuel tank cap air vent or the fuel passage is clogged, clean or replace it.
	Electric system	Sensors	《If the “Fi sensor” LED is blinking on the OK monitor, eliminate the factor causing it.》 (Refer to “OK Monitor” on page 13.)
		Ignition plug	Refer to "Difficult startup, Electric system".
Abnormal noise	Worn-out parts		《If the cylinder, piston, piston ring or the like is worn out, repair or replace it.》
	Knocking		《If the cylinder is heated and knocking is caused due to a defect in the cooling system, eliminate the factor causing this phenomenon.》
	Partial operation		Refer to "Difficult startup, Fuel system, Electric system."
Abnormal overheating of cylinder head			《If an excessive amount of carbon is accumulated on the cylinder head or piston head, clean it off.》
			《If the inside of the muffler or the exhaust port is clogged, unclog or replace it.》
			《If foreign matter is stuck in the cooling water passage, clean it off or replace the cooling water passage.》
			《If the fuel is not proper, rectify it or replace the relevant parts.》 Refer to "Difficult startup, Fuel system."
			《If the ignition timing is not proper, rectify it or replace the relevant parts.》 Refer to "Difficult startup, Electric system."

PUMP

Condition		Cause/Remedy
Water is not sucked.	Compound pressure gauge indicates negative pressure.	If the difference in height between pump and suction level exceeds 9 m, minimize it as much as possible.
		If the water suction pipe strainer, the rattan basket, the inside of the water suction pipe or the water suction port strainer is clogged, remove the foreign matter.
		If an air pocket is formed in the water suction pipe, confirm that the water suction pipe is arranged correctly.
	Compound pressure gauge does not indicate negative pressure.	If the pump, cylinder or drain cock is open, close it.
		If the vacuum pump strainer cap is loose, retighten it properly.
		If the vacuum pump strainer is clogged by foreign matter, remove the foreign matter and retighten the vacuum pump strainer cap properly.
		If the V-belt is extend, adjust it. If it is broken, replace it with a new one. Refer to “MAINTENANCE, Adjustment and Replacement of Vacuum Pump Driving V-belt” on page 12.
		If the suction pipe is loose, retighten it properly.
		If the water suction component is not submerged, submerge it properly.
		《If there is any leakage in the pump sealing or piping, repair it.》
		《If the vacuum pump is broken, repair or replace it.》
Insufficient water discharge pressure	Pump	If the nozzle diameter is too large, reduce it.
		If the water suction pipe strainer, the rattan basket, the inside of the water suction pipe or the water suction port strainer is clogged, remove the foreign matter. Refer to "Impossibility of water suction."
	Engine	《If the condition of the engine is not good, adjust or repair it.》 Refer to "Abnormal rotation."
Pump does not rotate.	Pump	《If foreign matter is stuck in the labyrinth, remove the foreign mater.》
		If the pump is frozen, unfreeze it before starting the operation. Refer to "Cautions for Cold Weather" on page 15.
	Engine	《If the engine is seized, repair it.》

WIRING DIAGRAM

Notes: 1. This pump is equipped fuses. However, be carefully not to connect the (+) and (-) terminals of the battery wrongly.
2. When mounting the battery, start with the (+) terminal. When removing it, start with the (-) terminal.



Shibaura Fire Pump Corporation

200812490 2018.03