

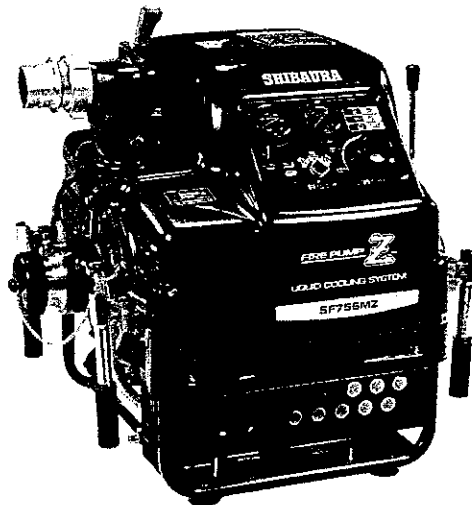
# SHIBAURA

## OWNER'S MANUAL

SF756MZ(SZ)

SF656MZ(SZ)

SF651MZ(SZ)



Please read this operation manual carefully in order to operate the Shibaaura Firefighting Pump in safe and in correct manner. If the pump is operated incorrectly, any accident may result. If this manual is missing or damaged, give an order for new one to us or our agent promptly.

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## CONTENTS


|   |           |
|---|-----------|
| • For safe operation . . . . .                    | 1         |
| <b>1. Matters to be attended to for safety</b>    |           |
| 1. Warning label locations . . . . .              | 2         |
| 2. Caution marks . . . . .                        | 3         |
| <b>2. Name of components . . . . .</b>            | <b>8</b>  |
| <b>3. Functions of monitor lamps . . . . .</b>    | <b>10</b> |
| <b>4. Handling of pump</b>                        |           |
| (Before starting operation) . . . . .             | 11        |
| (Operating method) . . . . .                      | 16        |
| (When intermediating water discharge) . . . . .   | 23        |
| (When overheated) . . . . .                       | 24        |
| (Operation in cold districts in winter) . . . . . | 25        |
| <b>5. Periodical inspections</b>                  |           |
| 1. Periodical inspection schedule . . . . .       | 27        |
| 2. Inspection method . . . . .                    | 28        |
| <b>6. Troubleshooting . . . . .</b>               | <b>34</b> |
| <b>7. Specifications . . . . .</b>                | <b>38</b> |
| <b>8. Wiring diagram . . . . .</b>                | <b>40</b> |




## For safe operation

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**The operation manual is a part of the machine.**

**Keep this manual carefully with the firefighting pump.**

- In this manual,  mark indicates particularly important instructions for safe operation. You should pay attention specifically to descriptions with this mark and observe those instructions.

|  |  |
|--|--|
|  <b>Danger</b>  | <b>If the machine is operated incorrectly, there is high possibility of death or serious injury.</b> |
|  <b>Warning</b> | <b>If the machine is operated incorrectly, death or serious injury may result</b>                    |
|  <b>Caution</b> | <b>If the machine is operated incorrectly, minor injury or damage of assets may result.</b>          |

- Quality or performance of the machine may be improved or its components may be modified for the purpose of safety. For this reason, contents of the text in this manual or photographs or illustrations may be different from actual ones.

# 1. Matters to be attended to for safety

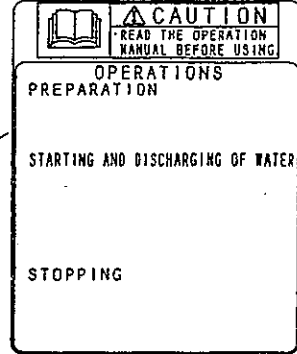
## 1. Warning label locations

Warning labels are attached to the positions of the firefighting pump as shown below. If the labels are peeled off or damaged, please order new ones telling the part No. as shown for each label.

### Operating side



Part No. 290192390



Part No. 290192490



Part No. 290192380

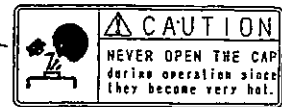


Part No. 290192430

### Non-operating side



Part No. 290192410



Part No. 290192510



Part No. 290192400

# 1. Matters to be attended to for safety

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## 2. Caution marks

### 1) General instructions

#### **⚠ Warning**

The firefighting pump should be operated only by such a man among fire officers, firemen, volunteer disaster prevention expedition team members, self-defense firefighting team members or maintenance/inspection service men that has been specifically trained for safe operation.

**<If you do not follow the instruction>**

Serious accident including death may result due to incorrect operation.

#### **⚠ Caution**

Be sure to carry out periodical inspections.

**<If you do not follow the instructions>**

Accident due to damage of the machine or components may result or firefighting activities may be interfered.

#### **⚠ Warning**

Headband, towel around neck, necktie, or towel carrying at the waist are prohibited. Wear a helmet, shoes with creepers, and clothes without looseness.

**<If you do not follow the instructions>**

You may be caught by the machine, or slip and fall and injured.

#### **⚠ Warning**

Do not operate the firefighting pump if you cannot concentrate your attention on operation as you are drunken, fatigued, sick or under influence of drug.

**<If you do not follow the instructions>**

Serious accident may result.

#### **⚠ Caution**

Do not use the firefighting pump for activities other than firefighting such as civil engineering work, irrigation, water sprinkling, etc.

**<If you do not follow the instructions>**

You may flip some objects to injure people or damage assets around you.

#### **⚠ Danger**

Do not suck in or discharge substances other than water such as combustibles, chemical or other liquid.

**<If you do not follow the instructions>**

Explosion, fire, burning or poisoning may result.

#### **⚠ Caution**

When throwing away the battery, oil or grease, entrust a professional industrial waste disposal dealer with their disposal.

**<If you do not follow the instructions>**

Fire may break out, you may get burnt, or environment may polluted.

# 1. Matters to be attended to for safety

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## **⚠ Warning**

Use only genuine parts and designated attachments. Do not remodel them.

**<If you do not follow the instructions>**

Accident, injury, or machine failure may result.

## **2) Cautions before starting operation**

### **⚠ Warning**

Install the pump more than 3m apart from combustibles.

**<If you do not observe the instruction>**

Fire may break out because of high temperature exhaust gas.

### **⚠ Warning**

Remove dried grass and other objects which may catch fire easily before installing the pump.

**<If you do not observe the instruction>**

Fire may be caused by the heated muffler.

### **⚠ Danger**

Do not bring a fire close to the pump when replenishing the fuel.

**<If you do not observe the instruction>**

The fuel may catch fire and explode.

### **⚠ Danger**

When supplying the fuel, do not allow the fuel to exceed the mark "F" on the fuel gauge.

If the fuel spills, wipe it away immediately with cloth. Do not bring that cloth close to fire.

**<If you do not observe the instruction>**

The fuel may catch fire and explode.

### **⚠ Caution**

After supplying fuel, close the fuel tank cap securely.

**<If you do not follow the instructions>**

The fuel may catch fire and explode.

### **⚠ Warning**

Do not install the pump indoors or in the tunnel or the like ventilated badly.

**<If you do not observe the instruction>**

You may get poisoned by exhaust gas.

### **⚠ Caution**

When holding the carrying handle, do not touch the folded portion.

**<If you do not observe the instruction>**

Your fingers may be caught and injured.

### **⚠ Caution**

Carry or unload the firefighting pump by 4 people.

**<If you do not observe the instruction>**

You may drop the pump on your foot and injured, or get a crick in the back.

# 1. Matters to be attended to for safety

---

## **⚠ Caution**

Connect the water discharge hose securely and make sure that it does not fall out.

**<If you do not observe the instruction>**

If the hose falls out while water is being discharged, it may injure people around it.

## **⚠ Caution**

Avoid bending, twisting or sharp turn of the hose when installing.

**<If you do not observe the instruction>**

The hose may leap up and injure people around it.

## **3) Caution during operation**

### **⚠ Warning**

Be sure to install the front and rear covers when operating the firefighting pump.

**<If you do not observe the instruction>**

You may be injured or burnt.

### **⚠ Caution**

After operating the tickler or draining the fuel from the carburetor, wipe away the spilt fuel immediately.

**<If you do not observe the instruction>**

The spilt fuel may catch the fire.

### **⚠ Caution**

When starting the engine using a rope, be careful to prevent your clothes or gloves from being entangled.

**<If you do not observe the instruction>**

You may be injured.

### **⚠ Caution**

When starting the engine using a rope, do not allow people to be within 2m around the pump.

**<If you do not observe the instruction>**

They may be beaten by your elbow or the rope and injured.

### **⚠ Warning**

Be sure to close the recoil starter securely during operation.

**<If you do not observe the instruction>**

You may be caught by the pulley or belt and get wound.

### **⚠ Danger**

Before replenishing the fuel during operation, wait until the engine has cooled down enough.

**<If you do not observe the instruction>**

The fuel may catch fire and explode.

# 1. Matters to be attended to for safety

---

## **⚠ Caution**

Open or close the water charge valve always after returning the engine to a low speed.

Hold the nozzle at the end positively and wear the back band before discharging the water.

**<If you do not observe the instruction>**

You may lose control of the nozzle at the end and be injured when water discharging is started.

## **⚠ Caution**

Do not direct the nozzle to other people or do not peep into it.

**<If you do not observe the instruction>**

You may be sent flying by high pressure and injured.

## **⚠ Caution**

Do not touch the ignition plug or high-tension cord during operation.

**<If you do not observe the instruction>**

You may receive an electric shock.

## **⚠ Caution**

Never touch the muffler and exhaust pipe during and after operation since they become very hot.

**<If you do not observe the instruction>**

You may get burnt.

## **⚠ Caution**

During operation, do not approach the drain pipe of the cylinder head.

**<If you do not observe the instruction>**

Hot water may spout and you may get burnt.

## **⚠ Caution**

Do not open the radiator while it is too hot to touch with empty hands.

**<If you do not observe the instruction>**

Hot water may spout and you may get burnt.

## 4) **Caution for inspections and services**

### **⚠ Warning**

When the battery cap is removed, do not bring a fire close to it.

**<If you do not observe the instruction>**

The electrolyte in the battery may catch fire and explode.

### **⚠ Caution**

Before starting inspections or services, stop the engine and wait until it has cooled down sufficiently.

**<If you do not observe the instruction>**

You may get hurt or burnt and fire may break out.



## 1. Matters to be attended to for safety

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### **⚠ Caution**

When disconnecting the battery cord, remove the (-) cord first and when connecting, connect the (+) cord first.

**<If you do not observe the instruction>**

Short circuit may occur and cause a fire or burn you.

### **⚠ Warning**

Remove the packing materials from the charger when changing with it.

**<If you do not observe the instruction>**

Fire may result.

### **⚠ Caution**

Install the charger at a dry and well-ventilated place where it does not get wet.

**<If you do not observe the instruction>**

Electric shock or fire may result.

### **⚠ Caution**

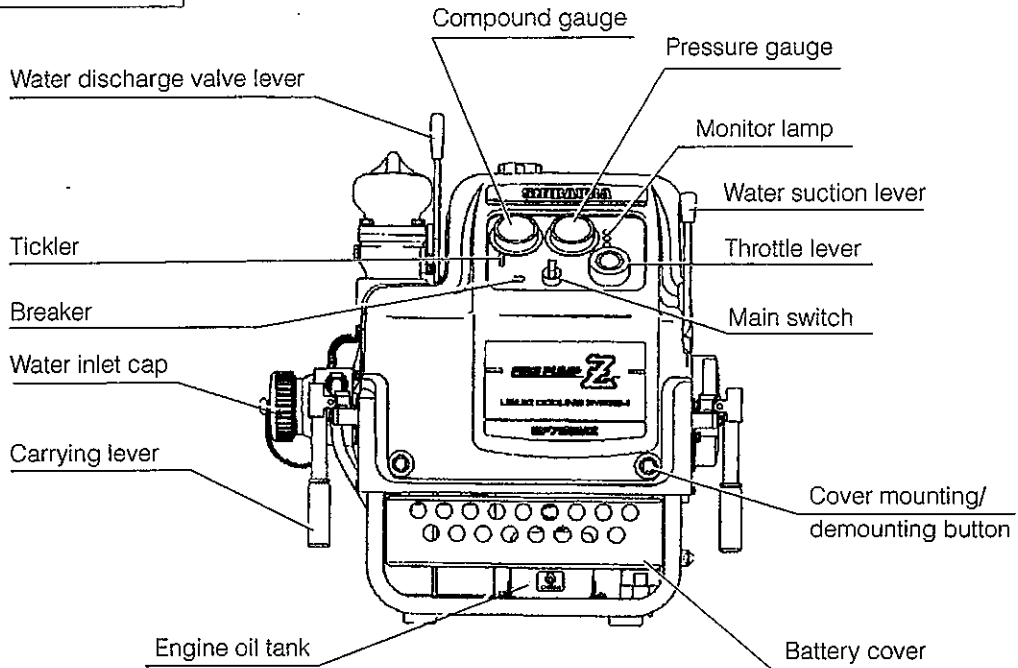
Oil use a designated charger.

**<If you do not observe the instruction>**

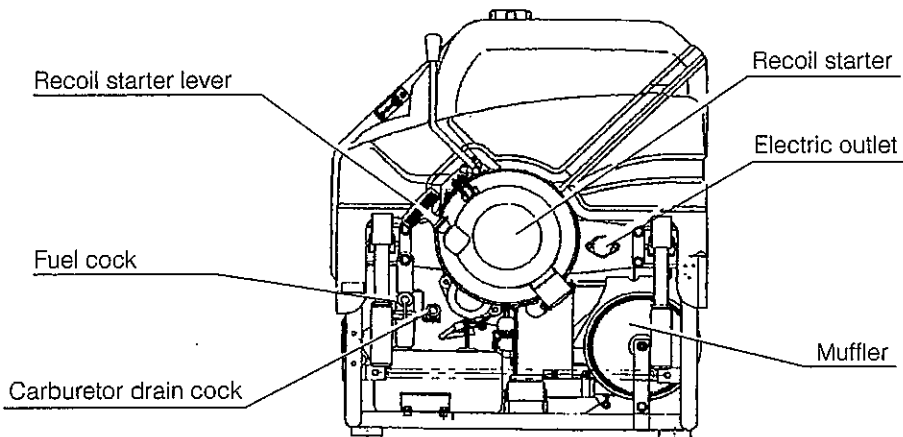
Fire may break out due to overheat or damage of the wiring by a fire.

## 2. Name of components

### Operating side

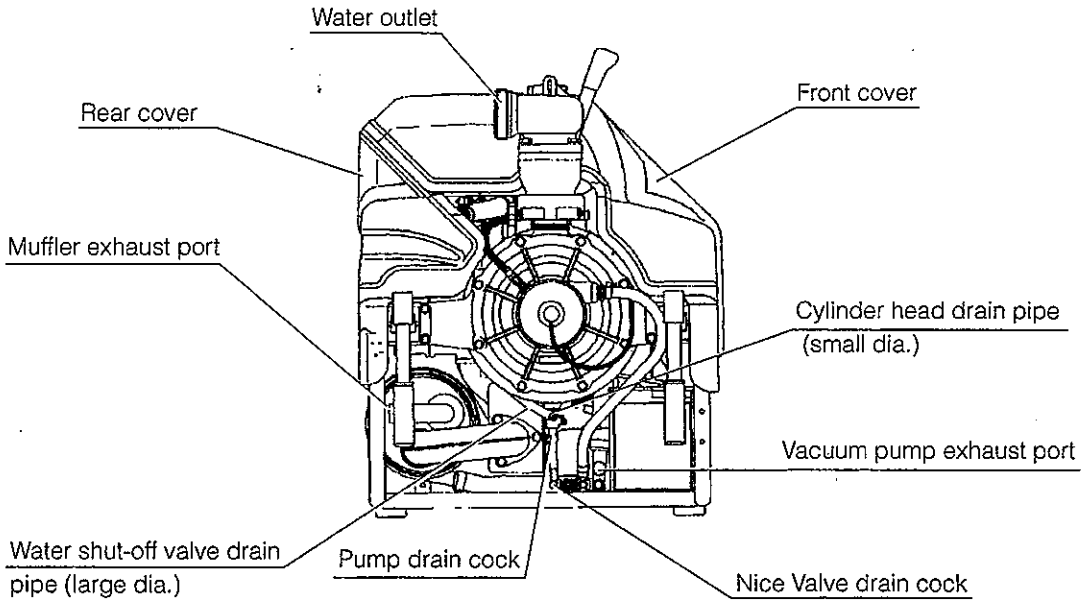


### Recoil starter side

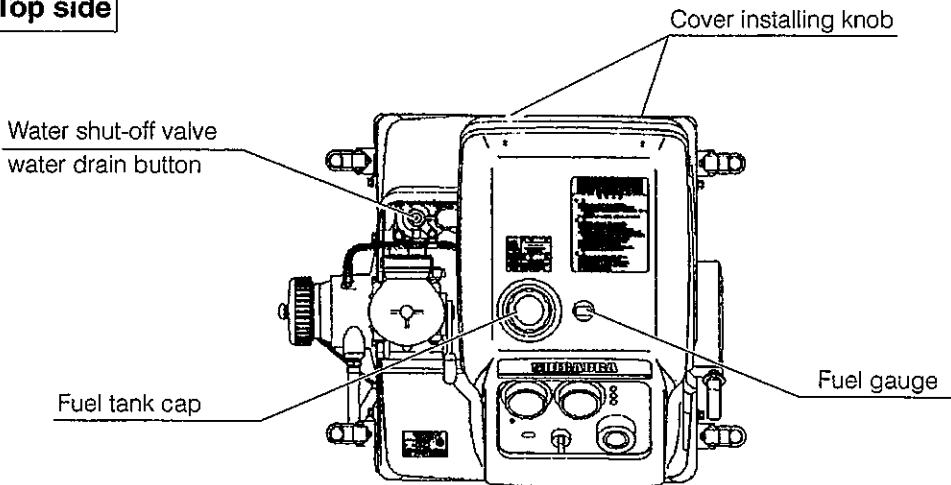


## 2. Name of components

### Pump side



### Top side






### 3. Functions of monitor lamps

In firefighting pumps with a self starter motor, the pump is started by setting the main switch to the "Operation" position. When the power switch is turned ON, all of the 3 lamps light up. If any one of the lamps does not light up, the battery voltage is low or circuit has failed. Repair as required in such a case. All of the lamps go out several minutes later.

Pumps without a self-starter motor has no monitor check function.

At normal condition, all of the lamps are OFF while water is being discharged. However, the lamps may light up when the self-starter motor is activated since the battery voltage drops.

Monitor lamps keeping ON during pump operation or water discharge indicate some trouble. Check and correct referring to the table below.

| Indication  | Meaning   | Condition   | Remedy  |
|---|---|---|---|
| <br>Fuel               | Fuel Indicates timing to replenish the fuel.          | Lights up when the remaining fuel in the fuel tank decreases.                                   | Replenish the regular gasoline.   |
| <br>2-cycle engine oil | Indicates timing to replenish the 2-cycle engine oil. | Lights up when the remaining 2-cycle engine oil in the oil tank decreases and stops the engine. | Replenish the 2-cycle engine oil (oil tank capacity is about 1.4 liters). |
| <br>Radiator         | Indicates timing to replenish the engine coolant.     | Lights up when the residual coolant in the cylinder head decreases and stops the engine.        | Replenish the coolant (about 600 ml).                                     |

## 4. Handling of pump (before starting operation)

### 1. Unpacking

- (1) Check the name of the machine shown on the box surface to see whether it is what you ordered.
- (2) Cut the band bound on the box.
- (3) Pull up the box; the main unit of the machine and accessories will come out.
- (4) Check that the following components are included.

|   |   |
|---|---|
| A. Main machine unit (One as ordered? Not damaged?) | 1 |
| B. Battery (MZ)                                     | 1 |
| C. Charger (MZ)                                     | 1 |
| D. Tool bag   | 1 |
| E. Pump cover                                       | 1 |

The main unit is covered with a thin vinyl cover. Be sure to remove it before operating the machine.

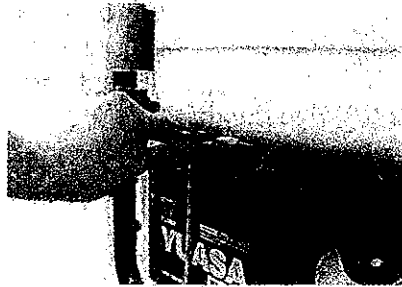
### 2. Mounting the components delivered separately

#### Mounting the battery (MZ)

**⚠ Caution**

- Read the warning on the battery to use the battery correctly.

- a. Pulling up the under cover of the main unit, pull it toward you to remove.
- b. Install the battery to the bed with the 2 rods and 1 holder in the tool box.
- c. Connect the two (+) battery cords (one wound with red vinyl tape and red cord) and then (-) cord (wound with black vinyl tape) with the attached hexagon bolts and nuts.



**⚠ Caution**

- When disconnecting the battery cords, disconnect the (-) cord first and connecting, connect the (+) cord first.
- If not, short circuit may result leading to a fire or you may get burnt.

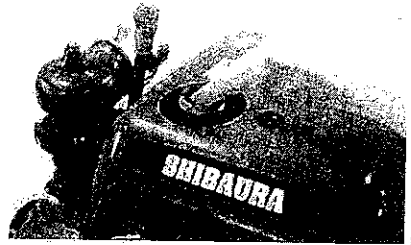
- d. Insert the sensor plug wire into the wiring harness. Connect the flat terminals with each other.
  - e. Install the under cover.
  - f. Charge the battery for 2 to 3 hours.
- \* This battery is sealed type requiring no water replenishment. See the operation manual for the battery for details.

## 4. Handling of pump (before starting operation)

### 3. Replenishing the fuel

- 1) Supply the fuel into the tank (tank capacity 1.3 L).

The engine of this firefighting pump is fueled independently of the lubricating tank. Supply automobile regular gasoline up to the "F" mark of the fuel gauge. Do not use mixed gasoline.



#### ⚠ Danger

- Do not bring a fire close to the engine when supplying fuel.
- Do not allow the fuel to exceed the "F" mark of the fuel gauge.
- If the fuel spills, wipe it away immediately with cloth. Do not bring that cloth to a fire.
- It may catch fire and explode.

#### ⚠ Caution

- After supplying the fuel, tighten the fuel tank cap positively.
- If not, the fuel may catch fire and explode.

- 2) Supply 2-cycle engine oil.

With this firefighting pump, lubrication oil is supplied independently of the fuel. Supply the genuine Shibaura 2-cycle oil, "Carrier Green" to the engine oil tank provided on the lower part of the pump.



- 3) Check the engine coolant level.

This firefighting pump is equipped with the radiator type water-cooled engine. At the time of shipment, anti-freezing solution (long-life coolant) made up to -30°C is filled in. At normal condition, engine coolant about 1/2 of the reserve tank capacity is contained.

- \* No oil is required for the governor chamber. Oil is automatically supplied to this firefighting pump with the oil pump. You are not required to supply oil to the governor chamber.



## 4. Handling of pump (before starting operation)

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### 4. Installation

- 1) Install the pump on a flat place close to a water source.

**▲ Warning**

- Install the pump more than 3m from combustibles.
- Remove dried grass and other objects which may catch fire easily before installing the pump.
- If not, fire may break out by the heated muffler

**▲ Warning**

- Do not install the pump indoors or in the tunnel or the like where is badly ventilated.
- If not, you may get poisoned by exhaust gas.

- 2) Be sure to attach a strainer and a rattan basket to the water inlet of the water suction pipe and position it more than 30cm below the water level.  
If it is positioned above the specified level, air may be sucked in preventing water discharging.
- 3) Arrange so that the water suction height is more than 3m below the water level as far as possible. When it is too high, the pumping capacity may deteriorate or water may fall.
- 4) Arrange the water suction pipe to go up toward the pump and tighten it positively to the water inlet of the pump. If the pipe goes up or down unevenly, water may not be discharged smoothly.

**▲ Caution**

- Connect the water discharge hose securely and make sure it does not fall out.
- If the hose falls out while water is being discharged, it may injure people around it.

**▲ Warning**

- Avoid bending, twisting or sharp turn of the hose when installing.
- The hose may leap up and injure people around it.

## 4. Handling of pump (before starting operation)

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### 5. Operator

- 1) Though the firefighting pump is small-sized, it is a high performance machine generating strong power. If it is operated in a wrong way, serious accident including death may be caused.

**⚠ Warning**

- The firefighting pump should be operated only by such a man among fire officers, firemen, volunteer disaster prevention expedition team members, self-defense firefighting team members or maintenance/inspection service men that has been specifically trained for safe operation.

- 2) Clothing should be suited to work.

**⚠ Warning**

- Headband, towel around neck, necktie, or towel carrying at the waist are prohibited. Wear a helmet, shoes with creepers, and clothes without looseness.
- If not, you may be caught in the machine, slip and fall, and get hurt.

- 3) Do not operate the pump when you feel unwell.

**⚠ Caution**

- Do not operate the firefighting pump if you cannot concentrate your attention on operation when you are drunken, fatigued, sick or under influence of drugs.
- If you do, serious accident may result.

### 6. Transportation

The carrying handle can be turned by 90 degrees. Set it to a position easy to carry the pump.

**⚠ Caution**

- When holding the carrying handle, do not touch the folded point
- Your finger may be pinched and hurt.

**⚠ Caution**

- The firefighting pump should be carried, loaded or unloaded by four persons.
- The pump may drop on your foot and injure, or you may get a crick in the back.



## 4. Handling of pump (before starting operation)

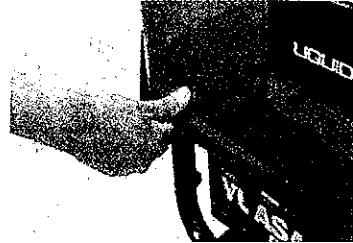
### 7. Removing/installing the cover

The cover should be removed when replenishing the coolant or for other maintenance services.

#### 1) Removal

##### <Front cover>

- a. Press the front cover mounting/demounting button, turn it 90 degrees and leave your hand. Then the button comes out and the cover is unlocked.
- b. Remove the fasteners (at 2 positions) on the side.
- c. Holding the upper and lower ends of the front cover, pull it up gently toward you and remove.



##### <Rear cover>

- a. Turn the cover installing knob counterclockwise and remove the knob from the fuel tank.
  - b. Pull up the rear cover and remove.
- \* When removing the cover, be sure to remove the front cover first.



#### 2) Installation

##### <Rear cover>

- a. Fit the hook on the lower side on the rear cover onto the pin of the frame.
- b. Turn the cover installing knob clockwise and fix to the fuel tank.



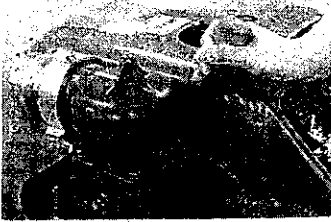
##### <Front cover>

- a. Place the front cover so that the fixture on the fuel tank side is positioned between the front cover and front cover side fixture.
  - b. Press the front cover mounting/demounting button and lock.
  - c. Hitch the fasteners (at 2 positions) on the side and lock.
- \* When installing the cover, be sure to install the rear cover first.

## 4. Handling of pump (operating method)

### 1. Starting the engine

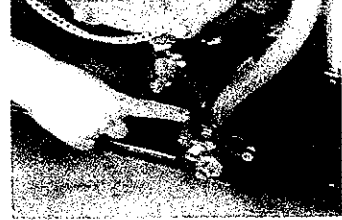
- Before starting the engine, close the water discharge valve and pump drain cock, and in the model of waterless valve specifications, close the drain cock also.



Water discharge valve

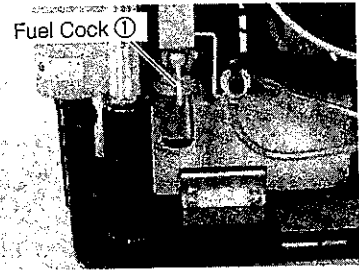


Pump drain cock

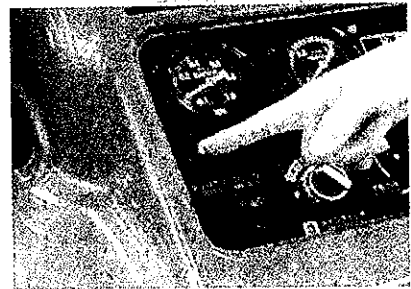


Waterless valve drain cock

- 1) Open the fuel cock (1).  
Pull down the fuel cock lever to the lowest point to open the fuel cock.
  - 2) In a cold season, use the tickler of the carburetor.
    - When starting the engine is difficult only by using the auto choke, push the tickler of the carburetor for several seconds.
    - Do not use the tickler when the engine is still warm after operation. If the ticker is used at such a condition, too much fuel is supplied preventing the engine from starting.
    - If the engine does not start because the tickler is excessively used, close the fuel cock, drain the fuel from the drain cock of the carburetor and then start the engine again.
- \* Discharge the fuel accumulated in the fuel drain tank each time of operation.



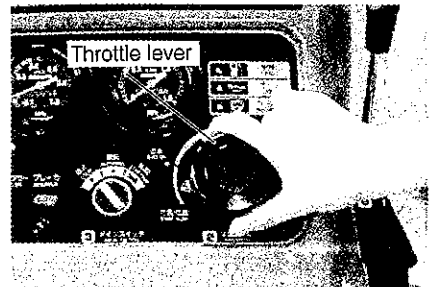
Fuel Cock ①



#### ⚠ Caution

- After operating the ticker or discharging the fuel from the carburetor, wipe away the spilt fuel immediately.
- If not, the fuel may catch the fire.

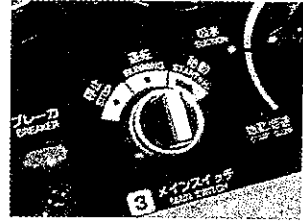
- 3) Position of throttle lever  
When starting the engine initially while the engine is cold, set the throttle lever (2) to the "Start" position.



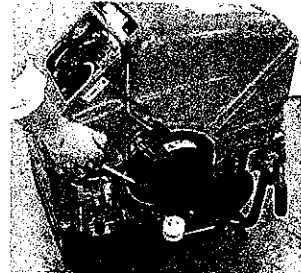
Throttle lever

## 4. Handling of pump (operating method)

- 4) Turn the main switch (3) fully clockwise to start the self starter motor and start the engine. (MZ)
  - After the engine is started, set the switch to "Operation" position.
  - When the engine is operating at the "Operation" position, the battery is charged by the charging circuit incorporated in the firefighting pump.



- 5) When operating the firefighting pump without the battery.
  - Pull the recoil starter handle until it is felt a little heavy as shown in the right Photo and then pull it forcibly.



### ⚠ Caution

- With a model with a self-starter(MZ), be sure to operate with the battery connected even when starting the engine manually.
- If the engine is operated with the battery disconnected, the monitor lamp may function incorrectly or fail.

### ⚠ Caution

- When starting the engine with the rope, be careful not to allow the clothes or gloves to be entangled.
- You may get injured.

### ⚠ Caution

- When starting the engine using a rope, do not allow people to be within 2m around the pump.
- They may be beaten by your elbow or the rope and injured.

### ⚠ Warning

- When operating the pump, be sure to install the front cover and rear cover.
- You may be hurt or get burnt.

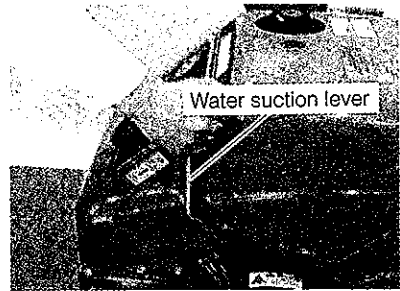
### ⚠ Warning

- Be sure to close the recoil starter securely during operation.
- You may be caught by the pulley or belt and get wound.

## 4. Handling of pump (operating method)

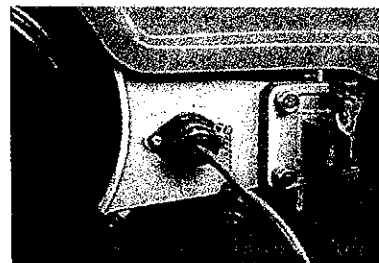
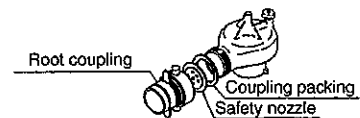
### 2. Sucking up the water

- 1) Set the throttle lever (2) to the "Water Suction" position.
- 2) Pull the water suction handle (5) toward you and operate the vacuum pump to suck up the water.
  - When the pointer on the pressure gauge starts to move, return the water suction lever promptly.



### 3. Discharging the water

- 1) Open the water discharge valve handle gradually in the "→Open" direction until it stops.
  - Communicate with the person at the snout and discharge water adjusting the pressure with the throttle lever (2) depending on the situation of the fire site.
  - Keep the pointer on the pressure gauge and compound gauge in the blue range when discharging the water.
- 2) When waiting water discharge  
When waiting for the next water discharge after closing the water discharge valve during the operation, be sure to set the engine to a low speed (idling).
- 3) Use of safety nozzle
  - If water is discharged without attaching the nozzle to the hose when putting out remaining fire or changing the water in the tank, for instance, cavitation may be generated so that the engine or pump may be broken down.
  - Be sure to attach the supplied safety nozzle to the intermediate coupling when discharging the water.
- 4) To light up the search light, insert the plug of the search light to the outlet of the operation panel.



## 4. Handling of pump (operating method)

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### **⚠ Caution**

- Be sure to open or close the water discharge valve only after returning the engine to a slow speed.
- Hold the nozzle at the end positively and wear the back band before discharging the water.
- If not, you may lose control of the nozzle at the end and be injured when water discharging is started.

### **⚠ Caution**

- Operate the water discharge lever gently.
- If not, your hand may be caught or hit and injured.

### **⚠ Caution**

- Do not direct the nozzle to other people or do not peep into it.
- You may be sent flying by high pressure and injured.

### **⚠ Caution**

- Do not touch the ignition plug or high-tension cord during operation.
- You may receive electric shock.

### **⚠ Caution**

- Never touch the muffler and exhaust pipe during operation since they become very hot.
- You may get burnt.

### **⚠ Caution**

- Do not approach the cylinder head drain pipe during operation.
- Hot water may spout and you may get burnt.

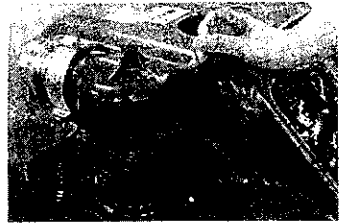
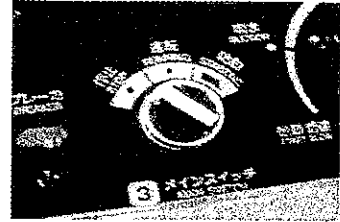
### **⚠ Caution**

- Do not open the radiator cap while it is too hot to touch with empty hands.
- Hot water may spout and you may get burnt.

## 4. Handling of pump (operating method)

### 4. Stopping the engine

- 1) Set the throttle lever (2) to the "Low Speed" position.
  - If the engine is hot, cool it down by continuing low speed operation for about 1 minute.
- 2) Set the main switch (3) to the "Stop" position.
  - In the case of a model without a self-starter, push the stop switch (3) until the engine stops.
- 3) Turn the water discharge valve handle (8) in the "→ Close" direction and close the water discharge valve.



### 5. Draining the water

- After the firefighting pump was operated, much water remains inside. If the water is left in the pump, rust may be generated or the pump may be damaged due to frozen water in the cold season. Be sure to drain water before storing the firefighting pump.
- 1) After sea water or dirty water is used, be sure to keep clear water discharged for more than 5 minutes.
  - 2) Open and close the water discharge valve lever.
  - 3) Open the pump drain cock and Nice Valve drain cock.
  - 4) Push the water drain button of the water shut-off valve.
  - 5) Close the pump drain cock and Nice Valve drain cock.
  - 6) Screw in the cap of the water inlet.
  - 7) Start the engine and pull the water suction handle for about 5 seconds.
  - 8) Stop the engine.
  - 9) Open the drain cock of the pump, release the vacuum and close the drain cock again.
- \* If the vacuum is not released, rubber of valves may be deformed shortening its service life.



## 4. Handling of pump (operating method)

### 6. Storing the pump

The firefighting pump is such a machine that is usually out of operation after being operated for a short time. Therefore, storing it under proper condition is essential in order that the pump operates satisfactorily when required next time or to secure its long life.



- 1) Environment  
Place the pump at a dry and cool place avoiding dust or direct sun beams.
- 2) Supply fuel, lubricating oil and cooling water respectively to the specified levels.
- 3) Drain the fuel in the carburetor from the carburetor drain cock on the recoil starter side.

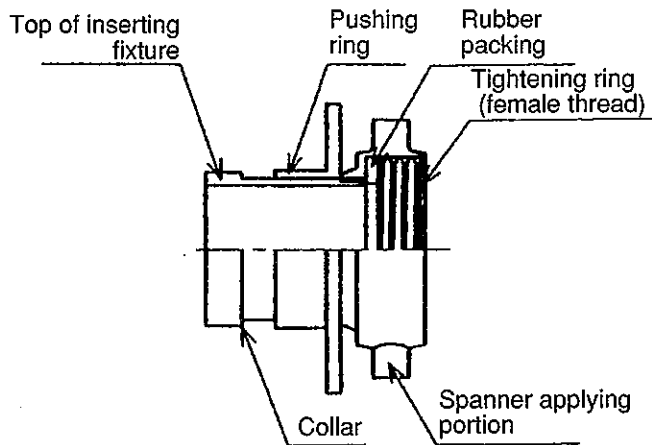
**⚠ Caution**

- After operating the tickler or discharging the fuel from the carburetor, wipe off the spilt fuel immediately.
- If not, the fuel may catch fire.

- 4) Cover the pump with the pump cover.

## 4. Handling of pump (operating method)

### 7. When connecting a hose



#### **▲ Warning**

- Insert the plug-in intermediate fixture until clicking. Hold the receiving fixture and pull the plug-in fixture to check that the claw is hitched on the collar and joined firmly.
- In case of a screw type intermediate fixture, tighten positively until the packing of the receiving fixture (female screw) touches the plug-in fixture (male screw).
- While the plug-in type intermediate fixture is used (while water is being discharged), never touch the pushing ring. If the pushing ring is pushed in while the water is being sent, the fixture may be disconnected, causing an accident resulting in injury or death.



## **4. Handling of pump (when intermediating water discharge)**

When the water source is at a distance in the mountainous or urban district, more than two pumps may have to be connected to discharge water by intermediating them. Such a water discharging operation requires strict judgment of situation based on technical knowledge and organized force supported by daily training. General operation method of intermediated water discharging is described below.

### **1. Installation**

- a) Determine the number of pumps and places of installation depending on the available number of extension hoses and height of the water source.
- b) Screw in the intermediating coupler to be connected with the water discharge hose into the water inlet.
- c) Fit a 2-way valve to the intermediating coupler of the water discharge valve in advance. Once water is discharged, the hose coupler may not be disconnected without draining the water in the hose due to water pressure.

### **2. Operation**

- a) When feeding water, operate the pumps from the primary one.
- b) Keep the water discharge valve handle open in pumps after the second one.
- c) Keep the pointer of the compound gauge and pressure gauge in the blue or yellow range while discharging the water (the pointer on the compound gauge in pumps other than the primary pump should not under 0.05MPa).
- d) When stopping to discharge water, be sure to decrease the engine speed of the farthest pump first.

**▲ Caution**

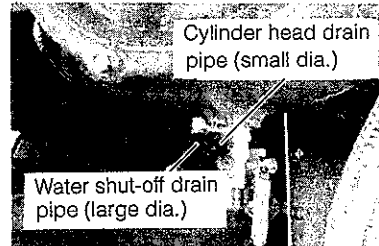
If the nozzle or water outlet valve is closed while the water is being discharged, the pump pressure increases extraordinarily and break down the pump or hose.

## 4. Handling of pump (when overheated)

If the engine is overheated, coolant flows out from the cylinder head drain pipe. Meanwhile a large quantity of steam gushes out of the cylinder head drain pipe. If operation is continued, the safety device is activated and the engine stops.

### How to cope with:

- 1) When the pump is operated for 15 minutes before sucking in water, steam gushes out of the cylinder head drain pipe.
  - The steam stops when water discharge is started.
- 2) When water discharge is suspended, steam gushes out of the cylinder head drain pipe. Open the Nice Valve drain cock and discharge the cooling water.
- 3) While water is being discharged, steam gushes out of the cylinder head drain pipe.
  - If the pump is operated without attaching the nozzle, the cooling water is not circulated causing overheat. If the water is discharged without attaching the nozzle, be sure to connect the safety nozzle to the intermediate coupler. For the installing method, refer to "4) Handling of pump (operation), 3) Discharging the water, and 2) Use of safety nozzle".
- 4) Steam gushes out of the cylinder head drain pipe for a reason other than 1) to 3).
  - Concentration of the cooling solution may have increased to more than 70% (water accounting for 30%). Adjust the concentration. For the concentration adjusting method, see "d. Freezing concentration" of "5. Periodical inspections".



After the steam gushes out of the cylinder head drain pipe for above reason, open the radiator cap and supply cooling solution into the cylinder head. At an emergency, operation can be continued by supplying clear water. In such a case, change the clear water with anti-freezing solution later.

#### **⚠ Caution**

- Do not open the radiator while it is too hot to touch with empty hands.
- Do not approach the cylinder head drain pipe during operation.
- Hot water may spout and you may get burnt.

## 4. Handling of pump (operation in cold districts in winter)

### 1. Before starting the engine

- 1) In the cold season, battery capacity is remarkably deteriorated. Charge the battery periodically as far as possible.
- 2) At the time of shipment from the factory, cooling solution of freezing temperature adjusted to  $-30^{\circ}$  is supplied to the engine. When replenishing the cooling solution, take care about the freezing temperature. (For the concentration, refer to “d. Freezing concentration”, of “5. Periodical inspections”.)
- 3) Pull the rope of the recoil starter gently to check that the pump is operated.
  - If the pump does not operate, supply warm water from the water inlet of the pump or melt the water in a warm room.
- 4) Turn the belt of the vacuum pump by hand to check if the vacuum pump operates.
  - If not, blow warm air to the outside of the vacuum pump or melt the water in a warm room.

#### **⚠ Caution**

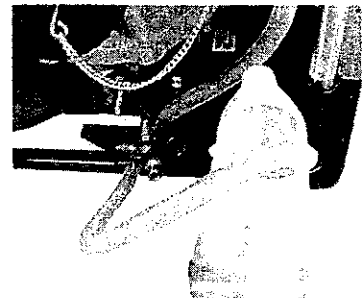
- Do not use fire to melt the frozen water.
- The fuel may catch the fire and explode.

### 2. Starting the engine

- 1) When starting the engine in the cold season, push the tickler for several seconds
- 2) Immediately after the engine is started, the operation may not be smooth. Idle the engine for several minutes at a low speed until the cooling solution is warmed.

### 3. Treatment after discharging water (anti-freezing): Required only in the season when the open air temperature is below $0^{\circ}\text{C}$ .

- 1) Anti-freezing of pump
  - a. Drain water from the pump (see “5. Draining the water” of “4. Handling of pump (operating method)”.)
  - b. Close the water inlet cap.
  - c. Connect the Nice Valve drain cock and vessel of the anti-freezing solution with a hose.
  - d. Start the engine.



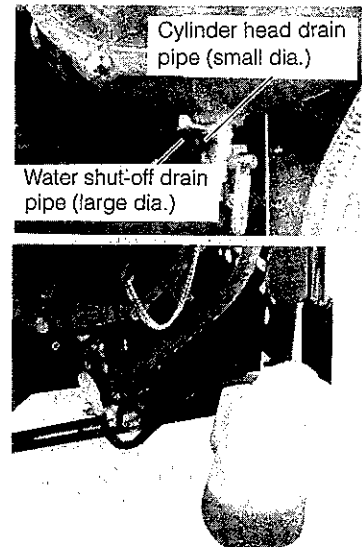
## 4. Handling of pump (operation in cold districts in winter)

- e. Pull the water suction lever to evacuate the pump.
- f. Open the Nice Valve drain cock and suck in the anti-freezing solution.
- g. Pull the water suction lever again, and stop the engine when the anti-freezing solution begins to come out of the vacuum pump discharge port.
- h. Close the Nice Valve drain cock, open the pump drain cock a little and release the vacuum. Then close the pump drain cock.

### 2) Anti-freezing of vacuum pump

- a. Connect the hose to the water shut-off drain pipe with the connector and place the hose into the vessel of the anti-freezing solution.
  - b. Start the engine.
  - c. Pull the water suction lever and suck in the anti-freezing solution.
  - d. Stop the engine when the anti-freezing solution begins to come out of the exhaust port of the vacuum pump.
- 3) Coat the hose fixtures with the anti-freezing solution.

**Caution:** Do not use alcohol since it damages the rubber parts.



## 5. Periodical inspections

### 1. Periodical inspection schedule

| Item  | Each operation | Every 1 month | Every 6 months | Every 1 year |
|---|----------------|---------------|----------------|--------------|
| Replenishment of fuel                             | ●              |               |                |              |
| Replenishment of 2-cycle oil                      | ●              |               |                |              |
| Replenishment of engine cooling solution          | ●              |               |                |              |
| Cleaning of dust, etc. from outside               | ●              |               |                |              |
| Inspection of electrolyte and charging of battery |                | ●             |                |              |
| Cleaning of fuel filter                           |                |               | ●              |              |
| Change of fuel in tank                            |                |               | ●              |              |
| Change of engine cooling solution                 |                |               |                | ●            |
| Cleaning of ignition plug                         |                |               | ●              |              |
| Inspection of V belt                              |                |               | ●              |              |
| Starting and vacuum test                          |                | ●             |                |              |
| Water suction and discharge test                  |                | ●             |                |              |

**Caution:** Above table indicates inspection timing under general operating condition. If the pump is operated under special condition, inspect it without regard to the above schedule.

**⚠ Caution**

- Be sure to carry out the periodical inspections.
- If not, accidents due to failure may occur or the firefighting activities may be interfered.

## 5. Periodical inspection

### 2. Inspection method

To keep the safety of the firefighting pump and make use of every possible function, periodical inspections are essential. Inspect the firefighting pump correctly and in safe following the procedure below.

**⚠ Caution**

- Start the inspections and services after the engine is stopped and has cooled down sufficiently.
- If not, injury, burnt, or fire may result.

1) Check and charging of battery

a. Installation and removal of battery.

**⚠ Caution**

- When disconnecting the battery cord, remove the (-) cord first and when connecting, connect the (+) cord first.
- If not, short circuit may occur and cause a fire or burn you.

b. Auxiliary charge

- Battery charging level decreases day by day due to self-discharge even if the battery is not used. Consumption by the self-charge, self starter motor, lamps, etc. should be supplemented by charging.

**⚠ Caution**

- Be sure to use the specified charger.
- If not, fire may arise due to overheat, burning of wiring, etc.

**⚠ Caution**

- When the battery cap is removed, do not bring a fire close to the battery.
- The electrolyte may catch the fire and explode.

c. Replacing timing

- Battery performance is rapidly deteriorated in about 2 years even if the battery is correctly handled. It is recommendable to replace the battery earlier.

**⚠ Caution**

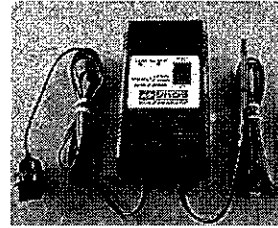
- Entrust a professional industrial waste disposal dealer with disposal of the battery, oil, grease, etc.
- If not, fire, burnt or environmental pollution may result

## 5. Periodical inspections

### 2) Handling of Shibaura full-automatic charge

#### a. Unpacking

Take out the charger from the box



**Warning**

- Remove packaging materials from the charger when charging with it.
- If not, a fire may be caused.

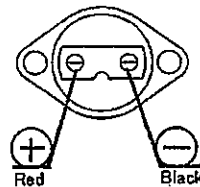
#### b. Place of installation

**Caution**

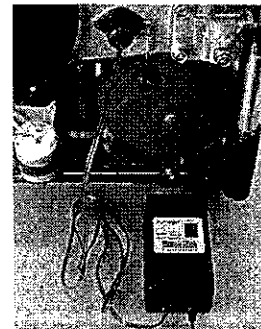
- Install the charger at a dry and well ventilated place where the battery does not get well.
- If not, electric shock or fire may result.

#### c. Battery Charger Operating Manual

- ① Turn off every current consumer which is connected to the Battery and Pump.
- ② Make sure power switch on the Battery Charger is OFF.
- ③ Plug the connector of Battery Charger into AC 220V outlet.
- ④ Plug the Battery Charger cord into the pump socket.
- ⑤ Turn on the power of the Battery Charger.  
POWER LED (RED) will turn on, and will start charging automatically.
- ⑥ CHARGE UP LED (GREEN) will turn on if the battery has reached more than 80 percent charge level.  
Once the battery has reached full charge, it will maintain the battery at full charge (GREEN LED).
- ⑦ To stop charging battery, turn off the power before unplugging the connector and cord.



|              | POWER LED (RED) | POWER LED (GREEN) |
|--------------|-----------------|-------------------|
| POWER OFF    | —               | —                 |
| CHARGING     | ON              | —                 |
| 80% CHARGED  | ON              | ON                |
| FULL CHARGED | —               | ON                |



## 5. Periodical inspections

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d. Battery Charger safety function

Safety Function shutdown the circuit when the Battery Charger detects the unusual power current.

e. Troubleshooting

| CASE                                  | CAUSE  | SOLUTION  |
|---------------------------------------|--|---|
| POWER LED (RED)<br>will not turn on   | Improper connection of<br>power connector      | Connect the plug firmly   |
| POWER LED (GREEN)<br>will not turn on | Improper connection of<br>Battery Charger cord | Connect the cord firmly   |
|                                       | Breaker trip                                   | Get rid of the cause of the breaker<br>trip, then press the knob to recover<br>battery. |
|                                       | Over discharged battery                        | Recharge the battery. Replace the<br>battery if you can not recharge.                   |
| POWER LED (GREEN)<br>turn on too soon | Battery wear out                               | Replace the battery with a new one  |

3) Handling of engine cooling solution

Shibaura SF series firefighting pumps are equipped with an indirectly cooled engine with a water-cooled radiator. It is filled with long-life coolant as the cooling solution. Handle the cooling solution in the following procedure.

a. Caution for handling

The cooling solution contains substances which are harmful to human body. Do not drink or allow it to enter your eyes. Particularly, keep it away from children.



## 5. Periodical inspections

b. When replenishing

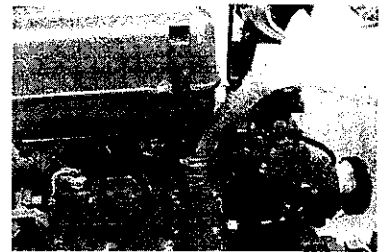
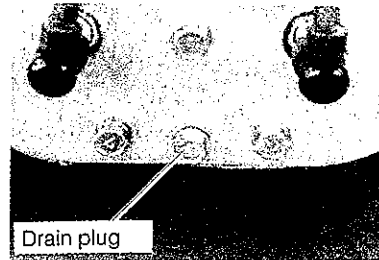
While the engine is cold, open the radiator cap and replenish the cooling water into the cylinder head.

c. When changing

Cooling solution is deteriorated in one to two years and may corrode the cylinder. Change the cooling solution periodically. Remove the drain plug at the bottom of the cylinder and loosen the radiator cap, and then the cooling solution is discharged.

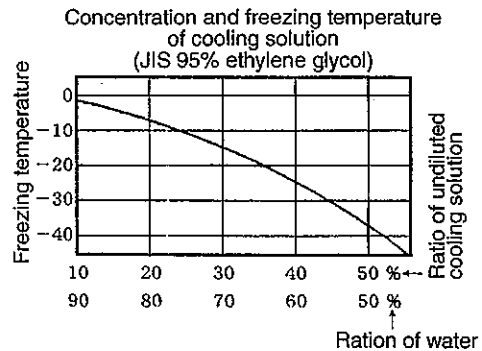
Wash the engine inside in water, untighten the drain plug and supply the cooling solution.

About 1.7 liters of cooling solution can be supplied.



d. Freezing concentration

Freezing temperature of cooling solution varies depending on the mixing ratio with water. Adjust the concentration based on the lowest temperature in the district where the pump is used. At the time of shipment from the factory, the solution filled is adjusted to  $-30^{\circ}$ (45%).



4) Cleaning of fuel cock filter

a. Close the fuel cock.

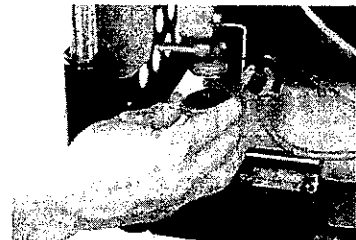
b. Untighten and remove the ring nut with pliers or the like.

c. wipe away the fuel in the cup with cloth or the like.

d. Remove the filter from the fuel cock main unit and wash it in gasoline.

e. Install the filter to the original position. Be sure to open the fuel cock and check that no fuel leaks.

f. After checking, close the fuel cock.



## 5. Periodical inspections

### 5) Change of fuel in tank

After the fuel is stored for a long time, it may deteriorate and not start the engine smoothly. Sediment may attach to the carburetor and generate rust. When the fuel has decreased down to the middle point of the specified fuel level, replenish the fuel to prevent such troubles. Changing the fuel with new one every 6 months is recommendable if the fuel decreases below that level.

#### ⚠ Caution

- Do not bring a fire close to the fuel when replenishing it.
- The fuel may catch the fire and explode.

### 6) Cleaning the ignition plug

Use the ignition plug, NGKB7HS.

Clean the ignition plug when it is stained by exhaust gas or carbon.

- a. Stop the engine and wait until it has cooled down sufficiently before starting any work.

#### ⚠ Caution

- Do not touch the ignition plug or high-tension cord during operation.
- You may get electrical shock.

- b. Remove the plug cap and remove the ignition plug using a box spanner for the ignition plug.

- c. Clean the outside, inside and electrodes of the ignition plug.

- d. Adjust the gap of electrodes as shown in the right figure.

- e. Tighten the plug to the cylinder head and push in the ignition plug cap.

Electrode gap of ignition plug



### 7) Inspecting the vacuum pump belt

If the belt of the vacuum pump has elongated, worn away or cracked, replace it with a new one.

- a. Open the recoil starter.

- b. Remove the plastic cover on the vacuum pump side.

- c. Remove the belt from the groove of the pulley.

- d. Install a new belt into the groove of the pulley.

- e. Install the cover to the original position.



## 5. Periodical inspections

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### 8) Vacuum test

Even if the following water discharge test cannot be performed in daily inspections, be sure to carry out the vacuum test. If the vacuum performance is not enough or vacuum leaks, water may not be sucked up when water should be discharged actually or water may fall while being discharged.

- a. Check the presence of the rubber packing in the water suction port cap and tighten the cap firmly.
- b. Close the pump drain cock.
- c. Start the engine, pull the water suction lever toward you and start the vacuum pump.
- d. When the pointer of the compound gauge indicates vacuum of  $-0.06\sim 0.08\text{MPa}$ , return the water suction lever and stop the engine.
- e. Leave the pump at that condition for 1 minute. If the indication on the compound gauge does not change, the vacuum performance is satisfactory.
  - \* If the value indicated on the compound gauge changes, ask the sales agent to repair.
- f. Open the pump drain cock to release vacuum and close the drain cock.
- g. Check that the consumption rate of the vacuum pump oil or cooling solution when the vacuum pump is operating is proper or not.

### 9) Water discharge test

Discharge water actually and check for any trouble.

- a. Noise
- b. Water fall
- c. Slow down of water suction
- d. Water leakage
- e. Starting response
- f. Looseness of tightening points
- g. Fuel leakage
- h. Others

If any trouble is noticed, repair according to "6. Troubleshooting".

## 6. Troubleshooting

Daily inspections and services are essential to prevent troubles of the firefighting pump. Find out troubles as earlier as possible and repair them quickly. If some trouble cannot be easily repaired or not covered in the list below, contact the sales agent where you bought the pump telling the model name and manufacturing number of your machine.

### 1. Engine-related troubles

|                                | Condition   | Cause   | Correction   |
|--------------------------------|---|---|--|
| Engine does not start smoothly | No fuel flows to the carburetor.  | <ol style="list-style-type: none"> <li>1. Clogged strainer or fuel piping.</li> <li>2. Stuck needle valve</li> <li>3. Fuel shortage</li> </ol>  | <ol style="list-style-type: none"> <li>1. Clean.</li> <li>2. Ditto</li> <li>3. Replenish.</li> </ol>   |
|                                | Fuel is not fed into the combustion chamber (remove the ignition plug and check). | <ol style="list-style-type: none"> <li>1. Choke is not closed (auto choke).</li> <li>2. Low starting rpm (with a storage battery)</li> <li>3. Clogged carburetor (needle valve, jet)</li> </ol>   | <ol style="list-style-type: none"> <li>1. Repair and adjust.</li> <li>2. Auxiliary charge of storage battery</li> <li>3. Clean.</li> </ol>   |
|                                | Though the fuel is fed to the combustion chamber, the engine is not started.      | <ol style="list-style-type: none"> <li>1. Overflow (excessive fuel)</li> <li>2. Tickler operated too often (excessive fuel)</li> <li>3. Chalk completely closed and not opened (auto choke)</li> <li>4. Fuel not volatile (old)</li> <li>5. Water mixed in fuel</li> <li>6. Excessive lubricating oil</li> </ol>                            | <ol style="list-style-type: none"> <li>1. Check and adjust the carburetor.</li> <li>2. Discharge oil from the crankcase</li> <li>3. Replace the diaphragm, clean the pipe</li> <li>4. Replace.</li> <li>5. Drain water.</li> <li>6. Adjust to proper level.</li> </ol> |
|                                | Trouble in fuel system  | <ol style="list-style-type: none"> <li>1. Clogged filtering net of fuel strainer</li> <li>2. Clogged carburetor valve seat</li> <li>3. Poor adjustment or clogged carburetor slow system</li> <li>4. Improper tightening of carburetor</li> </ol>   | <ol style="list-style-type: none"> <li>1. Clean.</li> <li>2. Ditto</li> <li>3. Adjust or clean.</li> <li>4. Retighten.</li> </ol>  |
|                                | Weak spark  | <ol style="list-style-type: none"> <li>1. Breakdown, improper gap or stain of ignition plug</li> <li>2. Electric leak from high-tension cord</li> <li>3. Electric leak from plug cap</li> <li>4. Defective ignition coil</li> <li>5. Defective CDI unit</li> <li>6. Unsmooth rotation of self-starter motor</li> </ol>                      | <ol style="list-style-type: none"> <li>1. Replace the plug or adjust the gap.</li> <li>2. Replace.</li> <li>3. Ditto</li> <li>4. Ditto</li> <li>5. Ditto</li> <li>6. Auxiliary charge of storage battery</li> </ol>  |
|                                | No spark generated  | <ol style="list-style-type: none"> <li>1. Short circuit of earth wire</li> <li>2. Breakdown or stain of ignition plug</li> <li>3. Improper gap of ignition plug</li> <li>4. Defective ignition coil</li> <li>5. Defective CDI unit</li> <li>6. Incorrect connection or disconnection of wiring</li> <li>7. Defective main switch</li> </ol> | <ol style="list-style-type: none"> <li>1. Repair the short circuit.</li> <li>2. Replace.</li> <li>3. Replace or adjust the gap.</li> <li>4. Replace.</li> <li>5. Ditto</li> <li>6. Check the connections and adjust as required.</li> <li>7. Replace.</li> </ol>       |

## 6. Troubleshooting

| Condition   |                           | Cause  | Correction  |   |
|---|---------------------------|--|---|---|
| Hard to start   | Poor compression          | <ol style="list-style-type: none"> <li>1. Wear or seizure of piston</li> <li>2. Seizure or breakdown of piston ring</li> <li>3. Wear or breakdown of oil seal</li> <li>4. Lubricating oil shortage</li> <li>5. Breakdown of cylinder head gaske</li> </ol> | <ol style="list-style-type: none"> <li>1. Replace or correct.</li> <li>2. Replace.</li> <li>3. Ditto</li> <li>4. Replenish to proper level.</li> <li>5. Replace.</li> </ol>   |   |
|   | Operation trouble         | Noise  | <ol style="list-style-type: none"> <li>1. Loosened flywheel</li> <li>2. Rattle noise at the skirt due to wear of piston</li> <li>3. Armature plate in contact with the inside</li> <li>4. Foreign substance entering the crankcase</li> <li>5. Foreign substance in impeller or contact with the casing</li> <li>6. Loosened parts</li> </ol> | <ol style="list-style-type: none"> <li>1. Retighten.</li> <li>2. Replace the piston.</li> <li>3. Reinstall.</li> <li>4. Remove the foreign substance.</li> <li>5. Remove the foreign substance or reinstall and correct.</li> <li>6. Retighten.</li> </ol>            |
| <ol style="list-style-type: none"> <li>1. Fuel shortage (clogged main jet or parts of different diameter)</li> <li>2. Overload</li> <li>3. Low or too high rpm</li> <li>4. Incorrect ignition plug</li> </ol> |                           |  | <ol style="list-style-type: none"> <li>1. Clean or replace.</li> <li>2. Change the nozzle diameter or use a safety nozzle.</li> <li>3. Adjust the rpm to a proper value.</li> <li>4. Replace with proper ignition plug.</li> </ol>  |   |
| Rotating trouble  |                           | Trouble in combustion system (miss, hunting)   | <ol style="list-style-type: none"> <li>1. Clogging or poor adjustment of carburetor main jet</li> <li>2. Clogged carburetor strainer</li> <li>3. Overflow</li> <li>4. Improper installation of carburetor</li> <li>5. Icing</li> </ol>  | <ol style="list-style-type: none"> <li>1. Clean or replace.</li> <li>2. Clean.</li> <li>3. Check and adjust the carburetor.</li> <li>4. Correct the mating surfaces or replace.</li> <li>5. Remove the ice and add water removal agent into the fuel tank.</li> </ol> |
|   |                           | Trouble in governor system   | <ol style="list-style-type: none"> <li>1. Poor adjustment of governor</li> <li>2. Wear of governor working parts</li> <li>3. Improper caulking of fly weight</li> <li>4. Improper tightening of governor arm</li> <li>5. Insufficient tension of governor spring</li> <li>6. Wear or excessive play of governor lever link hole</li> </ol>    | <ol style="list-style-type: none"> <li>1. Adjust.</li> <li>2. Replace.</li> <li>3. Correct or replace.</li> <li>4. Readjust and retighten.</li> <li>5. Replace.</li> <li>6. Replace or correct.</li> </ol>  |
|   | Trouble in cooling system | <ol style="list-style-type: none"> <li>1. Cooling water shortage</li> <li>2. Cooling solution shortage</li> <li>3. Excessive operation without discharging water</li> </ol>  | <ol style="list-style-type: none"> <li>1. Clean and adjust.</li> <li>2. Replenish.</li> <li>3. Discharge water sometimes..</li> </ol>   |   |

## 6. Troubleshooting

### 2. Pump related troubles

|                           |                                     | Condition                                      | Cause   | Correction  |   |
|---------------------------|-------------------------------------|--|---|---|---|
| Suction of water          | Vacuum not obtained                 | Trouble in the pump main unit                  | <ol style="list-style-type: none"> <li>1. Air sucked due to improper tightening of suction pipe</li> <li>2. Air sucked up from suction pipe end</li> <li>3. Drain cock not closed</li> <li>4. Defective mechanical seal</li> <li>5. Dust attached to water discharge valve or defective seal</li> <li>6. Defective casing rubber packing</li> <li>7. Improper tightening of casing</li> </ol>   | <ol style="list-style-type: none"> <li>1. Tighten positively.</li> <li>2. Immerse fully in water.</li> <li>3. Close positively.</li> <li>4. Replace.</li> <li>5. Remove the dust or replace the seal.</li> <li>6. Replace.</li> <li>7. Tighten positively.</li> </ol>                                 |   |
|                           |                                     | Trouble in the vacuum pump side                | Not rotating  | <ol style="list-style-type: none"> <li>1. Breakdown of vacuum pump</li> <li>2. Foreign substance sucked in or freezing</li> <li>3. Slippery or broken V belt</li> </ol>   | <ol style="list-style-type: none"> <li>1. Replace.</li> <li>2. Remove or melt.</li> <li>3. Replace.</li> </ol>  |
|                           |                                     |  | Rotating  | <ol style="list-style-type: none"> <li>1. Clogged or improper tightening of vacuum pipe</li> <li>2. Wear of vacuum pump</li> </ol>  | <ol style="list-style-type: none"> <li>1. Clean or retighten.</li> <li>2. Repair.</li> </ol>  |
|                           | Deteriorated water suction function | Vacuum leakage (water fall when engine stops)  | <ol style="list-style-type: none"> <li>1. Air sucked up due to improper tightening of suction pipe</li> <li>2. Defective mechanical seal</li> <li>3. Defective oil seal</li> <li>4. Leak from vacuum pump cock</li> <li>5. Defective casing rubber packing</li> <li>6. Wear of water discharge valve rubber or clogging with dust</li> <li>7. Breakdown or improper tightening of pressure gauge or compound gauge</li> <li>8. Improper position of vacuum pump handle</li> </ol> | <ol style="list-style-type: none"> <li>1. Tighten positively.</li> <li>2. Replace.</li> <li>3. Replace.</li> <li>4. Inspect and repair.</li> <li>5. Replace.</li> <li>6. Replace or remove the dust.</li> <li>7. Replace or retighten.</li> <li>8. Return the handle to the stop position.</li> </ol> |   |
|                           |                                     | No vacuum leaking                              | <ol style="list-style-type: none"> <li>1. Breakdown or wear of vacuum pump inside</li> <li>2. Too short operating time of vacuum pump</li> <li>3. Low engine rpm</li> <li>4. Slippery V belt</li> <li>5. Clogged vacuum pipe and strainer</li> <li>6. Clogged suction pipe strainer</li> <li>7. Too large head of sucked water</li> </ol>   | <ol style="list-style-type: none"> <li>1. Inspect and repair.</li> <li>2. Operate for longer time.</li> <li>3. Adjust to standard rpm.</li> <li>4. Adjust or replace.</li> <li>5. Clean.</li> <li>6. Ditto</li> <li>7. Adjust to 8m or less.</li> </ol>   |   |
|                           | Improper water discharge            | Pressure does not increase to specified value. | Trouble in engine   | <ol style="list-style-type: none"> <li>1. Insufficient output</li> <li>2. Poor adjustment of throttle</li> <li>3. Overload</li> <li>4. Overheat</li> </ol>  | <ol style="list-style-type: none"> <li>1. Repair the engine.</li> <li>2. Adjust.</li> <li>3. Change the nozzle diameter.</li> <li>4. Decrease the load or adjust the engine.</li> </ol> |
| Trouble in pump main unit |                                     |  | <ol style="list-style-type: none"> <li>1. Clogged suction pipe strainer with dust</li> <li>2. Clogged impeller and casing with foreign substance</li> <li>3. Too large head of suction water</li> <li>4. Defective pressure gauge</li> <li>5. Air sucked up from suction pipe</li> <li>6. Loosened tightening of inducer or impeller</li> <li>7. Freezing inside</li> <li>8. Foreign substance mixed in casing</li> </ol>   | <ol style="list-style-type: none"> <li>1. Remove.</li> <li>2. Remove the foreign substance.</li> <li>3. Adjust to 8m or less.</li> <li>4. Replace.</li> <li>5. Retighten.</li> <li>6. Retighten.</li> <li>7. Melt and remove.</li> <li>8. Remove.</li> </ol>  |   |

## 6. Troubleshooting

### 3. Electrical

| Condition                   |  | Cause  | Correction  |
|-----------------------------|--|--|---|
| Unsmooth start              | Self starter motor not rotating                                | 1. Insufficient capacity of storage battery<br>2. Improper operation of magnet switch<br>3. Defective start switch                   | 1. Auxiliary charge<br>2. Ditto<br>3. Check the connection or replace.<br>4. Correct.<br>5. Press the breaker button. |
|                             |  | 4. Defective earth<br>5. Breaker operation   |   |
| Defective storage battery   | Storage battery died early                                     | 1. Deteriorated storage battery<br>2. Short circuit of wiring system<br>3. Insufficient charging<br>4. Incorrect operation of switch | 1. Replace.<br>2. Repair the short-circuited parts<br>3. Supplementary charging<br>4. Operate properly.               |
|                             |  |  |   |
| Trouble in connecting point | Burning of wiring  | 1. Conversely connected storage battery<br>2. Short circuit of wire connecting point<br>3. Defective breaker                         | 1. Correct the connection.<br>2. Correct.<br>3. Replace.  |
|                             | Improper lighting of lamp                                      | 1. Defective earth<br>2. Improper connection<br>3. Lamp burnt out  | 1. Correct.<br>2. Ditto<br>3. Replace.  |
| Defective lamp              | Lamp burnt out often.  | 1. Improper operation  | 1. Correct after the lamp going out.  |
|                             |  | 2. Defective wiring  | 2. Correct or replace.  |
| Improper OK monitor         | Improper fuel indicating lamp                                  | 1. Failed monitor panel<br>2. Defective fuel sensor<br>3. Trouble or disconnection of wiring<br>4. Defective earth                   | 1. Replace.<br>2. Replace.<br>3. Correct or replace.<br>4. Correct the earth wire.                                    |
|                             | Defective 2-cycle oil replenishment indicator lamp             | 1. Defective switch<br>2. Incorrect or disconnected wiring<br>3. Defective earth   | 1. Replace.<br>2. Correct or replace.<br>3. Correct the earth wire.   |
|                             | Defective engine cooling solution replenishment indicator lamp | 1. Defective switch<br>2. Incorrect or disconnected wiring<br>3. Defective earth   | 1. Replace.<br>2. Correct or replace.<br>3. Correct the earth wire.   |

## 7. Specifications

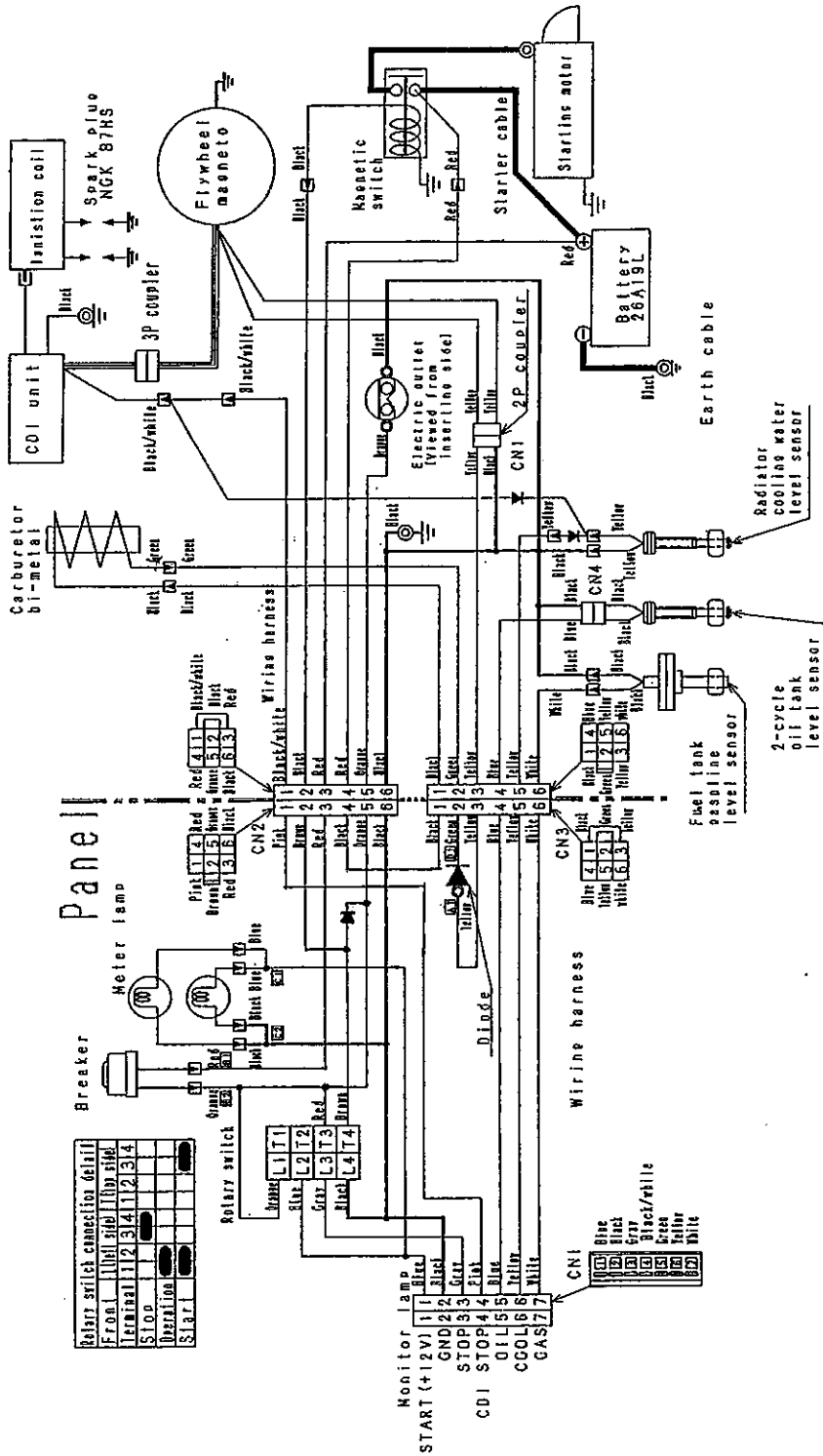
| <b>1. Firefighting pump</b>                  |  |                    |                    |
|--|--|--------------------|--------------------|
| Model  | SF756MZ  | SF656MZ            | SF651MZ            |
|  | SF756SZ  | SF656SZ            | SF651SZ            |
| Class  | Class B-2  | Class B-3          |                    |
| L x W x H (mm)                               | 701×590×766  |                    |                    |
| Weight (kg)                                  | 85   | 85                 |                    |
|  | 75   | 75                 |                    |
| Cooling water system                         | Internally circulated cooling water  |                    |                    |
| <b>2. Pump</b>                               |  |                    |                    |
| Type   | High-pressure 1-step turbine pump (with inducer)                               |                    |                    |
| Discharge water volume (m <sup>3</sup> /min) | Standard 1.29  | Standard 1.42      | Standard 1.21      |
|  | High pressure 0.88   | High pressure 1.13 | High pressure 0.90 |
| Pump pressure (MPa)                          | Standard 0.70  | Standard 0.55      |                    |
|  | High pressure 1.00   | High pressure 0.80 |                    |
| Nozzle diameter (mm)                         | Standard 27.0  | Standard 30.0      | Standard 28.0      |
|  | High pressure 20.5   | High pressure 24.5 | High pressure 22.0 |
| Rotating speed (rpm)                         | Approx. 4700   | Approx. 4600       | Approx. 4400       |
| Water inlet                                  | Nominal 75mm, firefighting screw type  |                    |                    |
| Water outlet                                 | Nominal 65mm, firefighting screw type (with Machino type intermediate fixture) |                    |                    |
| <b>3. Vacuum pump</b>                        |  |                    |                    |
| Type   | Oil-less vacuum pump: 4-blade eccentric rotary type                            |                    |                    |
| Max. water suction height (m)                | Approx. 9 (-0.085 MPa)   |                    |                    |
| Drive system                                 | V-belt clutch type   |                    |                    |



## 7. Specifications

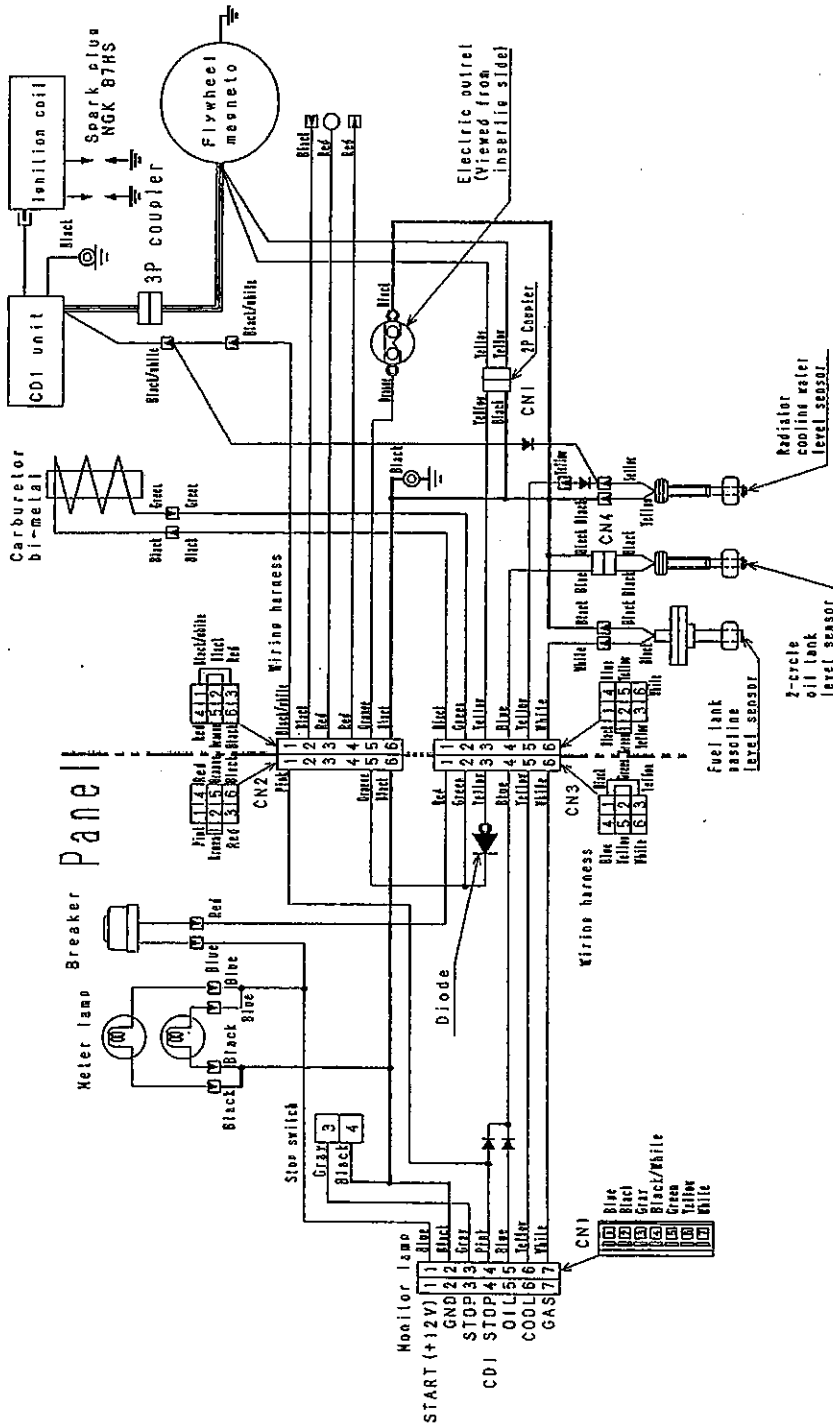
| <b>4. Engine</b>                 |   |              |             |
|----------------------------------|---|--------------|-------------|
| Firefighting pump model          | SF756   | SF656        | SF651       |
| Type                             | Horizontal 2-cycle 2-cylinder water-cooled radiator                                 |              |             |
| Model                            | L618Z   |              |             |
| Bore x stroke x No. of cylinders | 75mm×70mm×2   |              |             |
| Displacement (mL)                | 618   |              |             |
| Output (permissible output) (kW) | 45.6 (33.1)   | 42.7 (33.1)  | 33.8 (33.1) |
| Cooling system                   | Indirect cooling type (with water-cooled radiator)                                  |              |             |
| Lubricating system               | Separated oil supply type   |              |             |
| Lubricating oil                  | For 2-cycle use   |              |             |
| Starting system                  | Self-starter motor type (with self-starter), recoil starter type                    |              |             |
| Fuel                             | Automobile regular gasoline   |              |             |
| Ignition system                  | No-contact magneto (CD ignition type)   |              |             |
| Spark plug                       | NGK B7H S   |              |             |
| Charging capacity (V/W)          | 12/48   |              |             |
| Fuel consumption (L/h)           | Approx. 14  | Approx. 13.5 | Approx. 12  |
| Fuel tank capacity (L)           | 14.5  |              |             |
| <b>5. Accessories</b>            |   |              |             |
| Battery                          | 12V – 19AH,   |              | 1           |
| Charger                          | Charger for 12V   |              | 1           |
| Tool bag                         | 1 set of tools, 1 volume of operation manual,<br>installing tools, 1 set of battery |              |             |
| Pump cover                       |   |              | 1           |
| <b>6. Optional parts</b>         |   |              |             |
| Search light lamp                | 12V - 35W,  |              | 1           |
| Search light stand               | Tripod 1  |              | 1           |

# 8. Wiring diagram (with self-starter)



Note: Each coupler is viewed from the connection side and the rotary switch from the panel surface

## 8. Wiring diagram (without self-starter)



Note: Each coupler is viewed from the connection side and the rotary switch from the panel surface.



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