

SHIBAURA

OWNER'S MANUAL

SHIBAURA FIREFIGHTING PUMP

FT450-A

FT500-A



Please read this operation manual carefully in order to operate the Shibaura 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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- **For safe operation**

The operation manual is a part of 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 those marked descriptions and observe such instructions.

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

- 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

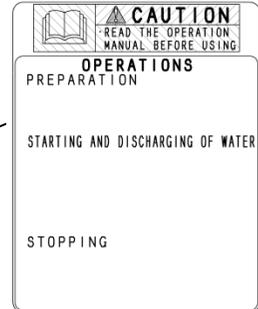
1. Warning label locations

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.

Operation side



Part No.290192390



Part No.290192490



Part No.290192380



Part No.290192430

Non-operation side



Part No.290192410



Part No.290192400

1. Matters to be attended to for safety

2. Caution marks

(1) General instructions



Warning

The firefighting pump should be operated only by such a man among fire officers, fireman, volunteer disaster prevention expedition team member, maintenance/inspection service men that has been specifically trained for safely operation.

⟨If you do not observe the instruction⟩

Serious accident including death may result due to incorrect operation.



Caution

Be sure to carry out periodical maintenance inspections.

⟨If you do not observe the instruction⟩

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 is prohibited. Wear a helmet, shoes with creepers, and clothes without looseness.

⟨If you do not observe the instruction⟩

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 observe the instruction⟩

Serious accident may result.



Caution

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

⟨If you do not observe the instruction⟩

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, liquid such as chemical.

⟨If you do not observe the instruction⟩

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 observe the instruction⟩

Fire may break out, you may be burned, or environment may be polluted.

1. Items to be observed for safety



Warning

Use only genuine parts and designated attachments.

⟨If you do not observe the instruction⟩

Accident, injury, or machine failure may result.

(2) Caution before operation



Warning

Install the pump more than 3m apart from combustibles.

⟨If you do not observe the instruction⟩

Fire may be caused 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 fire close when supplying fuel.

⟨If you do not observe the instruction⟩

The fuel may catch fire and explode.



Danger

When supplying fuel, do not allow the fuel level to exceed the “F” mark.

If fuel spills, wipe away immediately and do not bring that cloth close to fire.

⟨If you do not observe the instruction⟩

The spilled fuel and the cloth may catch fire and explode.



Caution

After supplying fuel, close the fuel tank cap securely.

⟨If you do not observe the instruction⟩

The fuel may catch fire and explode.



Warning

Do not leave the pump indoors or in the tunnel or the like where is badly ventilated.

⟨If you do not observe the instruction⟩

You may get poisoned by exhaust gas.



Caution

The firefighting pump should be carried, loaded or unloaded by 4 persons.

⟨If you do not observe the instruction⟩

The pump may drop on your foot and injure, or you may 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



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 for your clothes or gloves not to be caught in.

⟨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⟩

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



Warning

Be sure to tighten 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 cools down enough.

⟨If you do not observe the instruction⟩

The fuel may catch fire and explode.



Caution

Open and close the water discharge valve always after returning the engine speed to low speed.

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

⟨If you do not observe the instruction⟩

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

1. Matters to be attended to for safety



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 operation since they become very hot.

⟨If you do not observe the instruction⟩

You may be burnt.



Caution

Wipe away spilt oil immediately.

⟨If you do not observe the instruction⟩

You may slip and fall, and be injured.

(4) Caution for inspections and services



Warning

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

⟨If you do not observe the instruction⟩

The electrolyte in the battery may catch fire and explode.



Warning

The electrolyte of battery is strong acid. Do not allow it to touch your body or clothes.

If the electrolyte remains, dilute it with water to more than 10 times and then discard.

⟨If you do not observe the instruction⟩

You may get burnt or clothes or assets may be damaged.



Caution

Before starting inspections or service, stop the engine and wait until it cools down sufficiently.

⟨If you do not observe the instruction⟩

You may be hurt or burnt and fire may occur.



Caution

When disconnecting the battery cord, remove the (-) cord first and when installing, install the (+) cord first.

⟨If you do not observe the instruction⟩

Short circuit may occur and burn you.

1. Matters to be attended to for safety



Warning

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

⟨If you do not observe the instruction⟩

Fire may break out.



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

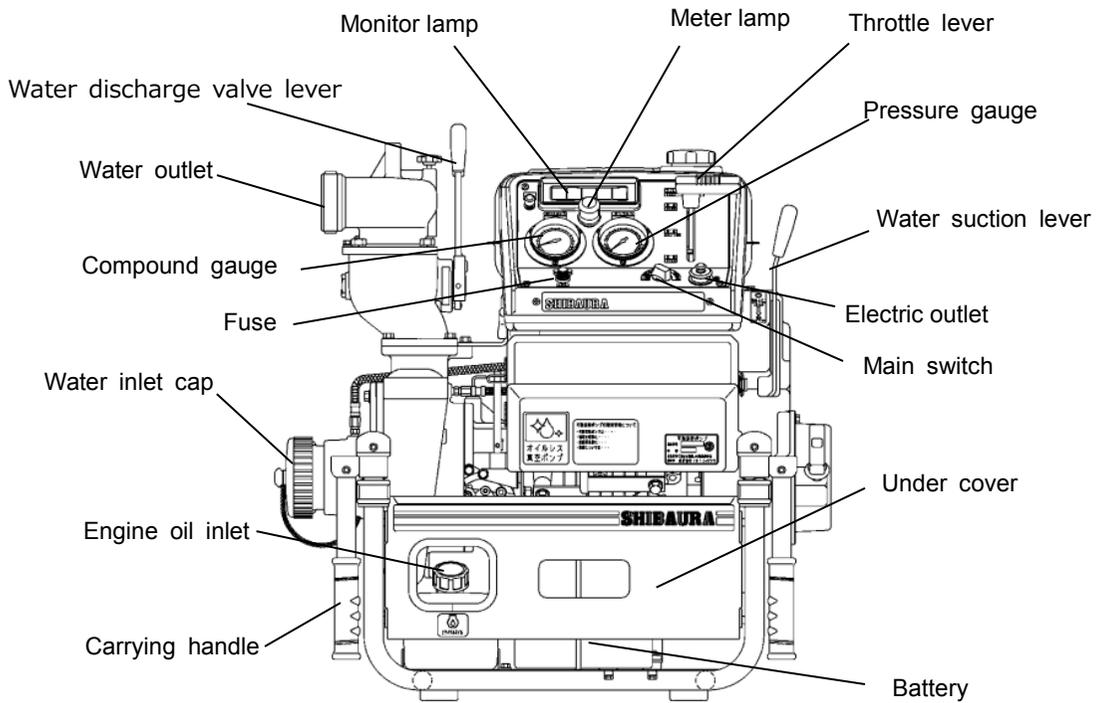
Only use a designated charger.

⟨If you do not observe the instruction⟩

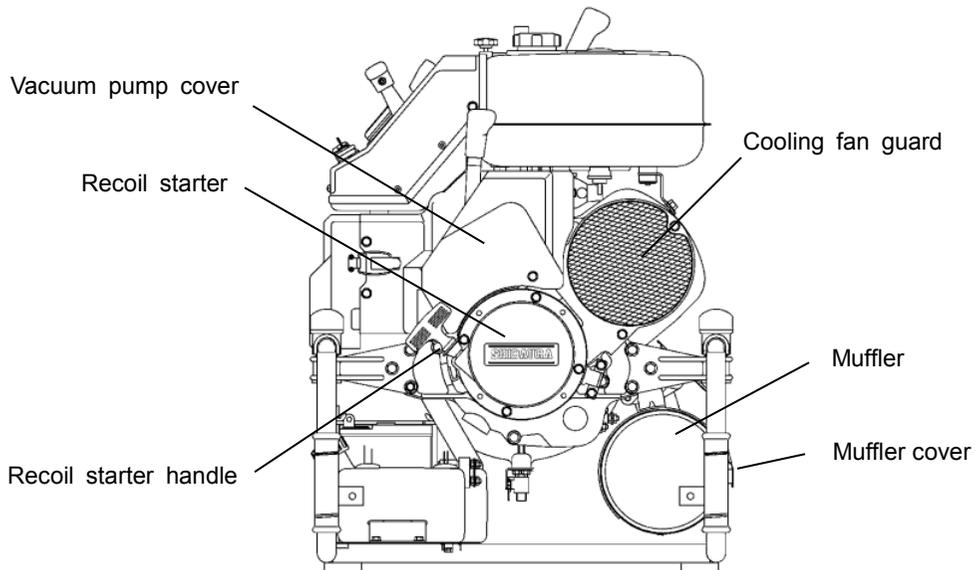
Fire may occur due to overheat or damage of the wiring by fire.

2. Name of components

Operation side

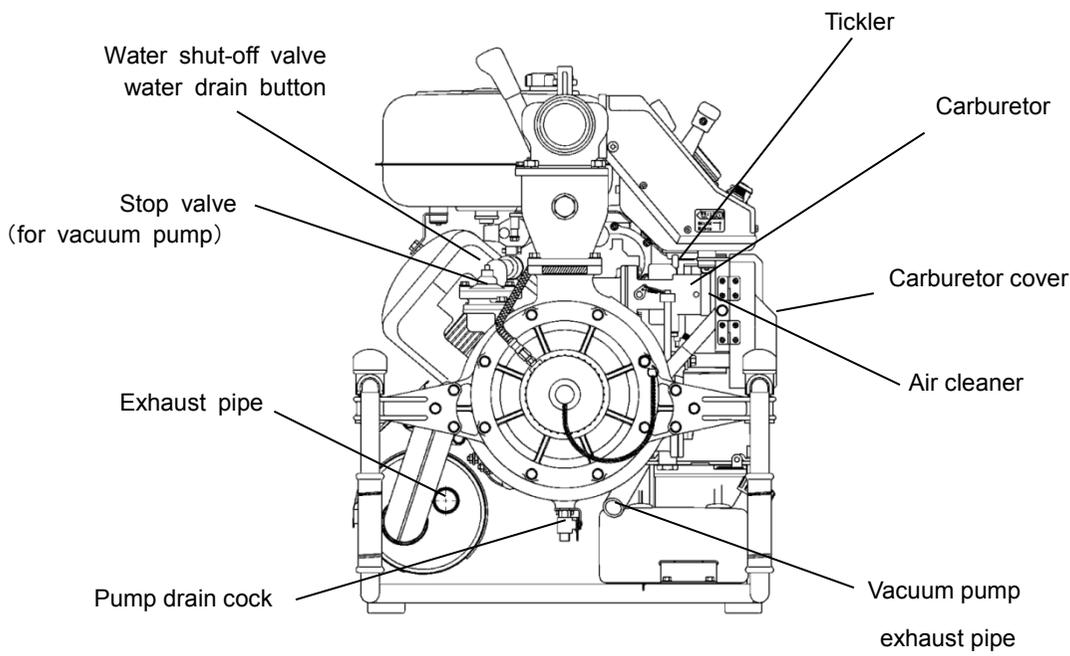


Recoil starter side

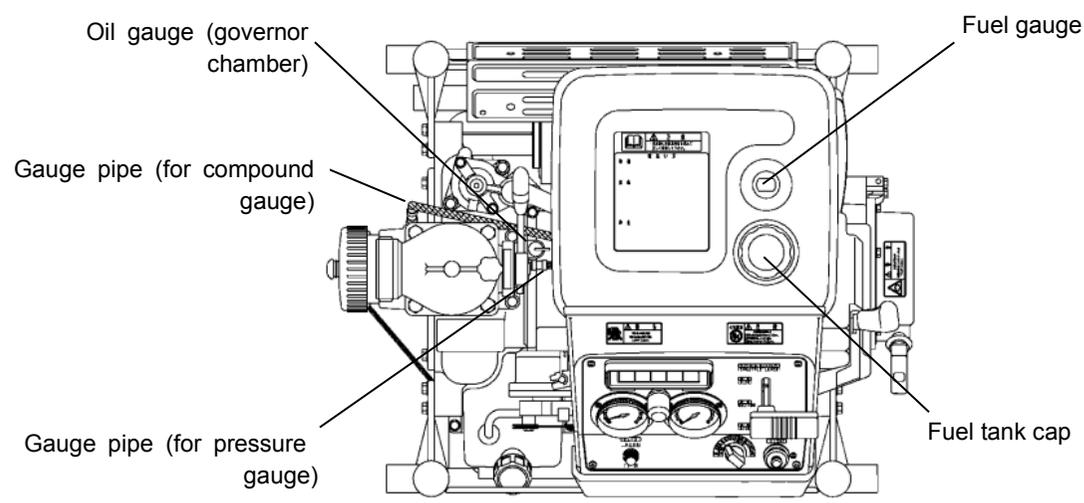


2. Name of components

Pump side



Top surface side



3. Functions of monitor lamps

It operates by setting the main switch to "Run 2". Turning on lights all of 3 lamps. If not, the battery voltage is poor or the circuit is faulty and, therefore, a repair work is required. In several seconds, all extinguish.

During discharge, all are extinguished except that they light when operating the starting motor because the battery voltage drops.

An item for which the lamp is lights during running or discharging is faulty.

| Indication | Meaning | Condition | Remedy |
|---------------------------------------------------------------------------------------------------------|---------------------------------------------|-------------------------------------------------------------------------|----------------------------|
|  Fuel | Indicates the fuel must be added. | Lights when the fuel tank level is too low. | Pour regular fuel. |
|  2 cycle engine oil | Indicates 2 cycle engine oil must be added. | Lights when the oil tank level is too low, thereby stopping the engine. | Add 2 cycle engine oil. |
|  Drain valve | Indicates the pump drain valve is open. | Lights when the pump drain valve is open. | Close the pump drain cock. |

4. Handling of pump (Before starting operation)

1. Unpacking

- (1) Make sure the model indicated on the front of case is an ordered one.
- (2) Cut the bands which bundle the case.
- (3) By pulling up the case, the main unit and accessories appear.
- (4) Check the contents.

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

A thin PVC cover is put on the machine. Be sure to remove it before running.

2. Mounting the battery

- (1) While pulling up the under cover of the main unit, pull it off this side.
- (2) Using 2 rods and 1 holder contained in the package, mount the battery on the bed.
- (3) Connect the (+) battery cord (red PVC tape wound on) and then (-) cord (black PVC tape wound on) in this order on the battery using 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.

- (4) Mount the under cover.
- (5) Carry out charging for 2-3 hours.

3. Replenishing the fuel

- (1) Supply the fuel into the tank (tank capacity 14.5L)
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 and Bio-gasoline.



4. Handling of pump (Before starting operation)



Danger

- While supplying the fuel, keep away fire.
- Do not pour the fuel beyond "F" on the fuel gauge.
- If fuel spilt, immediately wipe it off. Do not get the rag used for wiping near fire.
- There is a fear of inflammation or explosion.



Caution

- After filling the tank with fuel, securely tighten the fuel tank cap.
- There is a fear of inflammation or explosion.

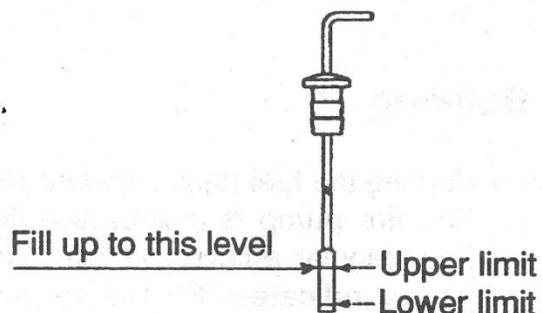
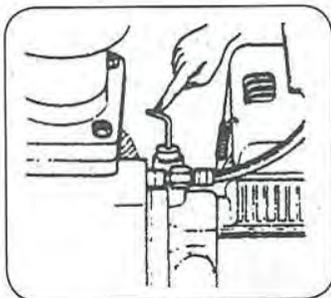
(2) Supply 2-cycle engine oil (tank capacity 1.4L)

The fire pump is a separate filling type. Supply the 2-cycle engine oil to the engine oil tank provided on the lower part of the pump.



(3) Checking the oil level in governor chamber

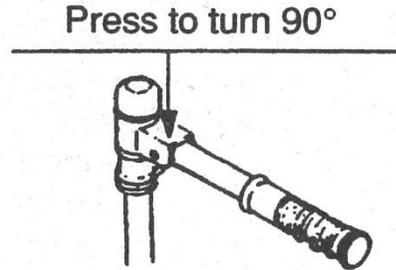
- For check, read the oil gauge.
- If necessary, pour motor oil (10W30 equivalent).



4. Handling of pump (Before starting operation)

4. Carrying

The angle of carrying grip can be changed by 90 degrees. Turn it so as to be easy to carry.



Caution

- When holding the carrying grip, do not touch the bend.
- A finger may be pinched and wounded.



Caution

- The fire pump must be carried or unloaded by 4 persons.
- There is a fear of injury by dropping on foot, or suffering from lumbago.

5. Installation

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



Warning

- Install the pump more than 3 m 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 30 cm 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 3 m 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.

4. Handling of pump (Before starting operation)



Caution

- Connect the fire hose securely, and make sure it does not come off.
- If it is separated while discharging water, injuries may be caused.



Caution

- The fire hose must not be folded, twisted or abruptly bent.
- The fire hose may jump up, thereby causing injuries.

6. Fireman

- (1) The fire pump is small but is a high performance machine which produces powerful force. Wrong use may cause serious accidents including death.



Warning

- Only official fire brigade, fire band, autonomous calamity prevention crew, self-defense fire band, maintenance and checkup group, etc. which have received education and training concerning the safety are allowed to operate the fire pump.

- (2) Wear clothes suited for the operation.



Warning

- Headband, neckerchief, necktie, waist towel, etc. are inhibited. Wear helmet and anti-skid shoes. The clothing must not be too ample.
- There is a fear of being caught by machine, slipping or tipping, thereby causing injuries.

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



Warning

- 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.

4. Handling of pump (Operating method)

1. Starting the engine

- Before starting the engine, close the water discharge valve and pump drain cock.



Water discharge valve

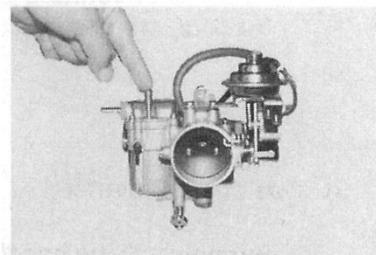


Pump drain cock

- (1) Open the fuel cock (1).
 - Throw the fuel cock lever directly downward to “Open” to open the fuel cock.
- (2) When it is cold, use the carburetor tickler.
 - If it is hard to start with the auto choke only when it is cold, press the carburetor tickler for 2-3 seconds
 - Do not use it while the engine is still warm after the end of running. If used, excessive fuel will make starting hard.
 - If the engine is hard to start on account of an abused tickler, close the fuel cock and discharge fuel through the carburetor drain cock.



Fuel cock lever



Carburetor



Tickler



Caution

- Wipe off spilt fuel immediately after the tickler is operated or fuel is discharged from the carburetor.
- There is a fear of inflammation or fire.

4. Handling of pump (Operating method)

- (3) Position of throttle lever.
Set the throttle lever (2) to “START”.



- (4) Turn the main switch (3) clockwise all the way to starting motor, thereby starts the engine.
- After starting, select “RUNNING 2”.
 - Running at “RUNNING 2” charges the battery via the charger circuit built in the fire pump.
 - ※ In case of running without the battery.
 - Select “RUNNING 1”.
 - In case of running at “RUNNING 2”, meter lamp burnout, etc. may occur.



- (5) Use of recoil starter.
- Strongly pull the recoil starter handle.



⚠ Caution

- When starting by the recoil starter rope, take care so that clothing or glove will not be caught.
- There is a fear of injury.

⚠ Caution

- Before starting by the recoil starter rope, keep persons at least 2 m away.
- There is a fear of injury by hitting via elbow or rope.

⚠ Warning

- During the run, the recoil starter must be closed.
- There is a fear of being caught by the pulley or belt or suffering from a trauma.

4. Handling of pump (Operating method)

2. Sucking up the water

- (1) Set the throttle lever (2) to “SUCTION”.
- (2) Pull the water suction lever (5) this side, and operate the vacuum pump for water suction.
 - Immediately after the pressure gauge has swung, return the water suction lever.



3. Discharging the water

- (1) Gradually open the water discharge valve lever (6) toward “→Open” until held back.
 - While communicating with the forward man according to the side circumstance of fire, adjust the pressure by throttle lever (2).
 - The pressure gauge and compound gauge must be within the green zone.
- (2) 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.
- (3) If long time discharge has caused an overcharge or before running with the battery detached, set the main switch to “Run 1”. If the main switch is set at “Run 1”, the monitor lamp and meter lamps are not lit but the search light is lit.



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.

4. Handling of pump (Operating method)



Caution

- Do not discharge water to persons, nor peep in the nozzle.
- There is a fear of injury by sway via pressurized water.



Caution

- While running, do not touch the spark plugs nor high voltage cord.
- There is a fear of electric shock.



Caution

- During and immediately after the running, the muffler and exhaust pipe are hot. Never touch them.
- There is a fear of burn.

4. Stopping the engine

- (1) Set the throttle lever (2) to "SLOW".
 - If the engine is hot, idle it for about 1 minute to allow it to cool down.
- (2) Set the water discharge valve lever (6) to "→S" to close it.
- (3) Set the main switch (3) to "STOP".



5. Draining the water

If water remaining in the fire pump is left as it is, rust may be produced or cracks by freezing may occur when cold. Be sure to drain the fire pump before storing it.

- (1) After sea water or contaminated water was used, be sure to discharge pure water for at least 5 minutes.
- (2) Open and close the water discharge valve lever.
- (3) Open the pump drain cock.
- (4) Press the drain button of the stop valve.
- (5) Close the drain cock of pump.
- (6) Screw in the water suction port cap.
- (7) Start the engine, and pull the water suction lever for about 5 seconds.
- (8) Stop the engine.
- (9) Open the pump drain cock, vent it to atmosphere, and close it again,
※Unless it is vented, the rubber of each valve may be deformed, thereby shortening the life.



4. Handling of pump (Operating method)

6. Storing the pump

The fire pump is stored by far longer than operated. Unless it is correctly stored, it will not function when using next time or its life will be shortened.

- (1) Environment
Store the pump in a dry place which is not hot and is not exposed to dust or direct sunshine,
- (2) Fill it with fuel, lubricating oil, cooling water, etc. up to specified levels.
- (3) Drain the fuel from the carburetor through the drain cock located on the bottom.

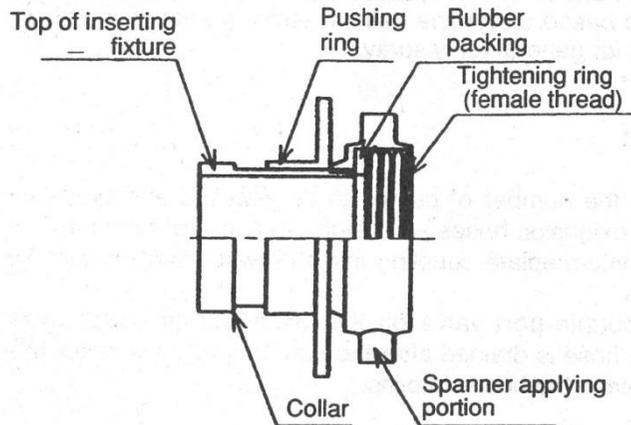


Caution

- Wipe off spilt fuel immediately after the tickler is operated or fuel is discharged from the carburetor.
- There is a fear of inflammation or fire.

- (4) Put the pump cover.

7. Connecting a hose



Warning

- Engage the fixture until a click sound is heard. Holding the receiving fixture, pull the put-on fixture to make sure the claws are engaged with the flange.
- Securely tighten the threaded fixture until the packing of receiving fixture (internal threads) will completely be in touch with the put-on fixture (external threads).
- While in use (discharge), never touch the pushing ring of the put-on fixture. If the pushing ring is pushed in while feeding, the fixture will leave, thereby causing a human accident.

4. Handling of pump (Discharging with multiple pumps)

In the mountains and forests or in urban areas which are inconvenient for water transportation, multiple pumps will be required in order for the water to reach the fire by relaying the pumps. In this case, pumps are separated far from each other and firemen are required judgment based on the existing state and systematic activities based on training. General method of relay operation is described below.

1. Installation

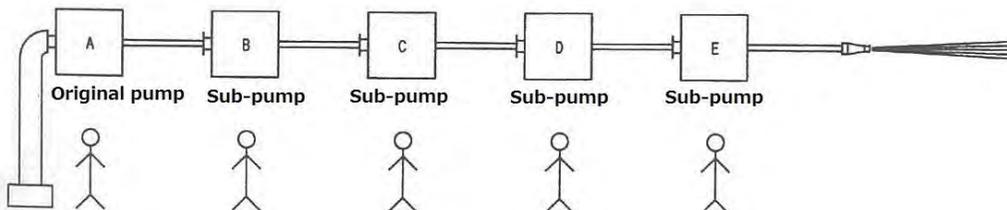
- (1) Determine the number of pumps and places of their installation depending on the number of extension hoses and height from the water source.
- (2) Screw in the coupler to the water suction port to connect the fire hose.
- (3) Fit a two-way valve to the coupler of the delivery valve beforehand.
The hose coupler may not be removed until the water in the hose is drained after the water is discharged.

2. Operation (Necessary an operator for all of pump each)

- (1) Open the water discharge valve or all sub-pump in advance.
- (2) Send water to the original pump first and then to others sequentially.
- (3) Check the pressure scale in the sub pumps and increase the engine speed regulate the discharging water.
The sub pump: Should be more than 0.05MPa in a scale of compound gauge pressure, be less than 1.2MPa in a scale of power.
- (4) If there is not enough the power of water discharge at the tip of hose, increase the engine speed of the original pump, then the second of one which is closer from the original, sequentially.
- (5) When stopping water discharging, decrease the engine speed of the last pump first and stop gradually.

 **Caution**

○ If the nozzle at the end of the hose or delivery valve is closed while water is being discharged, the pressure in the pump may increase extraordinarily, and the pump or hose may be broken.



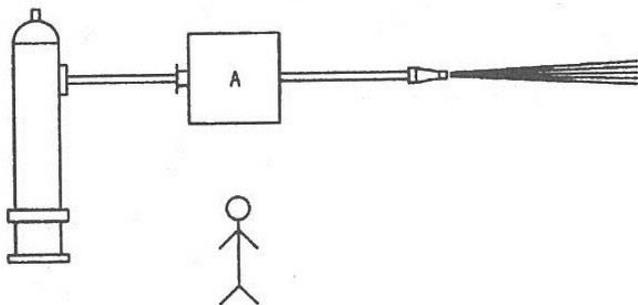
4. Handling of pump (Suction and discharge of water from Fire hydrant)

1. Suction and discharging of water from Fire hydrant

- (1) Capacity for supply water of the fire hydrant
It is necessary to check an enough volume for discharging water from the fire hydrant in advance.
It would be impacted by some factors, diameter of the hydrant, the condition of piping, an initial water pressure and so on.
The capacity of supply water would be less if the diameter was so small although the initial water pressure is high.
In the other hand, it can be high capacity for water supply with wider diameter in spite of low water pressure.
- (2) Method of water supply
 - ① Avoiding from any damage of the suction hose with the higher water pressure, choose a fire hose only with a coupler for hose connected.
 - ② Before connection with the hose, discharge some water from the hydrant for removing contamination.
 - ③ Basically, the discharge valve of the hydrant should open completely, except too much high water pressure.

2. Discharge

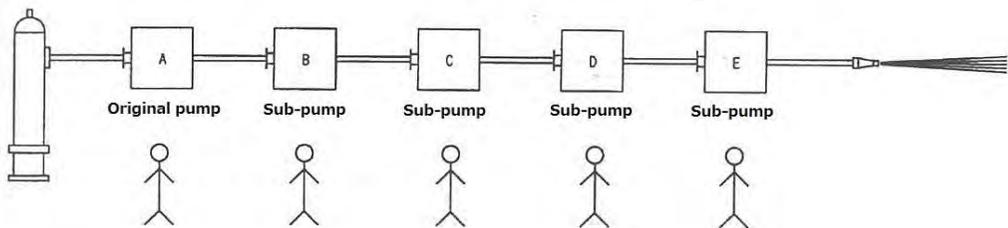
- (1) One pump
 - ① Open the water discharge valve of the pump, including a nozzle of installed.
 - ② Open the valve of the hydrant before an engine start, and check the pressure scale of the pump.
 - ③ Start the engine and discharge water.
 - ④ Adjust the engine speed for enough pressure of water at the discharge.
 - ⑤ In case of less water pressure, change the number of hose.
 - ⑥ When stopping water discharging, close the valve of the hydrant at first, and then decrease the engine speed. Finally stop the engine.



4. Handling of pump (suction and discharge of water from Fire hydrant)

(2) Plural pumps

- ① Open the water discharge valve for ALL of pumps at first.
- ② Open the valve of the hydrant before an engine start, check the pressure scale of the original pump.
- ③ Start the engine for the original pump at first, then it can send water sucked from the hydrant to the next pump.
- ④ Start the engines for the next following pumps.
- ⑤ Check the pressure scale of the last pump and increase the engine speed for the proper pressure and discharge of water.
- ⑥ In case of less water pressure at the nozzle, change the pump location and the number of the pump.
- ⑦ When the water discharge stop, decrease the engine speed for the pump which is closer from the nozzle for water discharge, then the engine stop. Finally the valve of the hydrant may close.



4. Handling of pump (Operation in cold districts in winter)

1. Before starting the engine

- (1) When cold, the battery capacity drops considerably. Make it a rule to charge it periodically.
- (2) Slowly pull the rope of recoil starter to see whether the pump rotates or not.
 - If it does not rotate, pour warm water through the water suction inlet of pump or thaw it in a warm room.
- (3) Turn the vacuum pump belt by hand to see whether the vacuum pump rotates or not.
 - If it does not rotate, blow warm air on the vacuum pump exterior or thaw it in a warm room.



Danger

- Never use a fire for thawing.
- There is a fear of inflammation or explosion.

2. Starting the engine

- (1) When cold, press the tickler for several seconds.
- (2) Immediately after starting, the running may be poor. Idle the engine for 1-2 minutes until it warms up.

3. Treatment after discharging water

- (1) Drain the pump. (See 4. Handling (operation method), 5. Draining.)
- (2) Close the water suction inlet cap.
- (3) Start the engine.
- (4) Interconnect the pump drain cock and anti-freeze mixture vessel by a hose. Pulling the water suction handle, open the drain cock of pump to aspire the anti-freeze mixture.
- (5) When anti-freeze mixture has come out from the exhaust pipe of the vacuum pump, return the water suction handle and close the drain cock of pump.
- (6) Fill the hoses, fixtures, etc. also with anti-freeze mixture.



Caution

- Do not use alcohol or the like because it deteriorates the rubber seals.



5. Periodical inspections

1. Periodical inspection schedule

| Item | Every running | Every month | Every 6 months | Every year |
|-------------------------------------|---------------|-------------|----------------|------------|
| Replenishment of fuel | ● | | | |
| Replenishment of 2 cycle engine oil | ● | | | |
| Cleaning of dust, etc. from outside | ● | | | |
| Battery charging | | ● | | |
| Cleaning of fuel filter | | | ● | |
| Changing fuel in tank | | | ● | |
| 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 inspections

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) Checking and charging the 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, starting 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.



Warning

- 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 charger

- 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

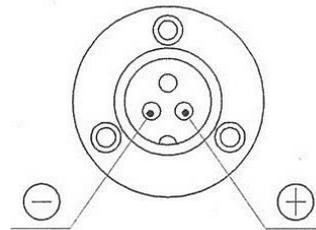


Caution

- 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.



5. Periodical inspections

| | POWER LED (RED) | CHARGE UP LED (GREEN) |
|--------------|-----------------|-----------------------|
| POWER OFF | - | - |
| CHARGING | ON | - |
| 80% CHAEGED | ON | ON |
| FULL CHAEGED | - | ON |



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 (LED) will not turn on | Improper connection of power connector | Connect the plug firmly |
| CHARGE UP LED (GREEN) will not turn on | Improper connection of Battery Charger cord | Connect the cord firmly |
| | Breaker trip | Get rid of the cause of the breaker trip, and then press the knob to recover battery. |
| | Over discharged battery | Recharge the battery. Replace the battery if you cannot recharge. |
| POWER LED (GREEN) turn on too soon | Battery wear out | Replace the battery with a new one. |

(3) Cleaning the fuel cock filter

- A) Close the fuel cock
- B) Loosen the ring nut by pliers, etc.
- C) Wipe off dust from the cup by rag, etc.
- D) Remove the filter from the fuel cock, and wash it with gasoline.
- E) Remount it securely. Be sure to open the fuel cock, and carefully check whether it leaks or not.
- F) Close the fuel cock.



5. Periodical inspections

(4) Changing the fuel in fuel tank

If fuel is kept for a long time, its quality may deteriorate, its starting ability may degrade, the carburetor may be clogged with solids, or corrosion may occur. There is no such inconvenience in case of refilling upon consumption of more than half the fuel. If refilling is small, change the fuel with new one every 6 months.



Caution

- While adding fuel, do not get a fire near it.
- There is a fear of inflammation or explosion.

(5) Cleaning the ignition plug

Use the ignition plug specified for a particular model.

| Model | Spark plug |
|---------|------------|
| FT450-A | NGK B8HVX |
| FT500-A | |

Clean the ignition plugs contaminated with exhaust gas or carbon.

- A) Stop the engine and wait until it has cooled down sufficiently before starting any work.
- B) Remove the plug cap and remove the ignition plug using a box spanner for the ignition plug.



Caution

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

- 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.

Gap of electrodes of ignition plug



(6) Inspecting the V belt

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

- A) Open the recoil starter.
- B) Remove the plastic cover from the vacuum pump side.
- C) Take out the belt from the pulley groove.
- D) Put a new belt into the pulley groove.
- E) Remount the cover.



5. Periodical inspections

(7) Vacuum test

Even at the time of routine checkup by which the following water discharge test is unavailable, be sure to carry out a vacuum test. If the vacuum performance is poor or if there is a vacuum leakage, the water suction may be impossible or water may lose its force while discharging water at a discharging site.

- A) Make sure a rubber packing is located in the water suction inlet cap, and tighten it securely.
- B) Close the drain cock of pump.
- C) Start the engine, pull the water suction lever this side, and operate the vacuum pump.
- D) When the vacuum reading on the compound gauge is between -0.06 and -0.08 MPa, return the water suction lever and stop the engine.
- E) Leave this status for 1 minute. If the reading remains unchanged, the result is normal.
* If there is a change, ask a local sales agent for repair.
- F) Open the drain cock of pump, vent it to atmosphere, and then close the drain cock.
- G) Check whether the consumption of vacuum pump oil during vacuum pump operation or cooling fluid is normal.

(8) 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

For preventing the fire pump from troubles, routine checkup and maintenance are important. Let us locate any trouble at an early stage and remedy it immediately. For a trouble which is not easy to remove or not mentioned below, contact the sales agent specifying the model and serial number.

1. Engine area

| Symptom | | Cause | Remedy |
|---------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hard to start | Fuel does not flow to carburetor | <ol style="list-style-type: none"> 1. Fuel filter or pipe is clogged 2. Needle valve sticks 3. Short of fuel | <ol style="list-style-type: none"> 1. Clean 2. Ditto 3. Refill |
| | Fuel does not flow to combustion chamber (check upon removing spark plug) | <ol style="list-style-type: none"> 1. Choke does not close (auto choke) 2. Cranking speed is low (battery provided) 3. Carburetor (needle valve, jet) is clogged | <ol style="list-style-type: none"> 1. Repair or adjust 2. Recharge battery 3. Clean |
| | Fuel flows to combustion chamber but engine does not start | <ol style="list-style-type: none"> 1. Overflow (excessive fuel) 2. Tickler is abused (excessive fuel) 3. Choke is closed all the way (auto choke) 4. Fuel is not volatile (old) 5. Fuel is mixed with moisture 6. Lubricating oil is excessive | <ol style="list-style-type: none"> 1. Check and adjust carburetor 2. Discharge oil upon removing crankcase seal plug 3. Replace diaphragm or clean pipe 4. Replace 5. Eliminate moisture 6. Adjust properly |
| | Fuel system is abnormal | <ol style="list-style-type: none"> 1. Fuel filter is clogged 2. Carburetor valve seat is clogged 3. Improperly adjusted or clogged carburetor slow system 4. Carburetor is not tightened securely | <ol style="list-style-type: none"> 1. Clean 2. Ditto 3. Adjust or clean 4. Retighten |
| | Sparks are poor | <ol style="list-style-type: none"> 1. Ignition plug is broken or contaminated, or gap is improper 2. Leakage from high voltage cord 3. Leakage from plug cap 4. Ignition coil is faulty 5. CDI unit is faulty 6. Starting motor does not rotate properly | <ol style="list-style-type: none"> 1. Replace plug or adjust its gap 2. Replace 3. Ditto 4. Ditto 5. Ditto 6. Recharge battery |

6. Troubleshooting

| Symptom | | Cause | Remedy |
|---------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hard to start | No sparks are produced | <ol style="list-style-type: none"> 1. Ground wire is short-circuited 2. Ignition plug is broken or contaminated 3. Ignition plug gap is improper 4. Ignition coil is faulty 5. CDI unit is faulty 6. Wiring is not connected properly or is open-circuited 7. Main switch is faulty | <ol style="list-style-type: none"> 1. Repair short-circuited part 2. Replace 3. Replace plug or adjust its gap 4. Replace 5. Ditto 6. Review and adjust connections 7. Replace |
| | Compression is poor | <ol style="list-style-type: none"> 1. Piston is worn or seized 2. Piston ring is seized or broken 3. Oil seal is worn or broken 4. Lubricating oil falls short 5. Cylinder head gasket is broken | <ol style="list-style-type: none"> 1. Replace or correct 2. Replace 3. Ditto 4. Refill properly 5. Replace |
| Running malfunction | Unusual sound | Mechanical sound | <ol style="list-style-type: none"> 1. Retighten 2. Replace piston 3. Reassemble 4. Eliminate foreign matter 5. Eliminate foreign matter or correctly reassemble 6. Retighten |
| | | Knock sound (fuel system anomaly) | <ol style="list-style-type: none"> 1. Fuel falls short (main jet clogged or wrong diameter part used) 2. Overload 3. Speed too low or high 4. Ignition plug is wrong |
| | Unsmooth rotation | Fuel system anomaly (misfire, hunting) | <ol style="list-style-type: none"> 1. Carburetor main jet clogged or maladjusted 2. Fuel filter clogged 3. Overflow 4. Carburetor mounted improperly |

6. Troubleshooting

| Symptom | | Cause | Remedy |
|---------------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Running malfunction | Unsmooth rotation | <ol style="list-style-type: none"> Governor maladjusted Governor actuating part worn Fly weight caulked poorly Governor arm tightened poorly Governor spring tension poor Governor lever link hole is worn or there is too much play | <ol style="list-style-type: none"> Adjust Replace Correct or replace Readjust and retighten Replace Replace or correct |
| | Cooling system anomaly | <ol style="list-style-type: none"> Shutoff operation is excessive Strainer is clogged Cooling air is poor | <ol style="list-style-type: none"> Discharge water from time to time Clean Ensure ventilation |

2. Pump area

| Symptom | | Cause | Remedy |
|------------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water suction improper | Vacuum not obtained | <ol style="list-style-type: none"> Air is sucked because suction pipe is not tightened properly Air is sucked from top end of suction pipe Drain cock is left open Mechanical seal is faulty Water discharge valve is clogged with contaminants or its sealing is faulty Casing rubber packing is faulty Casing is not tightened properly | <ol style="list-style-type: none"> Tighten securely Plunge completely in water Close securely Replace Eliminate contaminants or replace seal Replace Tighten securely |
| | Vacuum pump abnormal | <ol style="list-style-type: none"> Vacuum pump is broken Locked by foreign matter or frozen inside V belt slipping or broken | <ol style="list-style-type: none"> Replace Eliminate or thaw Replace |
| | Rotates | <ol style="list-style-type: none"> Vacuum pipe clogged or not tightened properly Vacuum pump worn | <ol style="list-style-type: none"> Clean or retighten Repair |

6. Troubleshooting

| Symptom | | Cause | Remedy | |
|------------------------|-------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water suction improper | Deterioration of suction function | Vacuum leakage (water flow discontinues at engine stop) | <ol style="list-style-type: none"> 1. Tighten securely 2. Replace 3. Replace 4. Check and repair 5. Replace 6. Replace or clean rubber 7. Replace or retighten 8. Return lever to stop position | |
| | | No vacuum leakage | <ol style="list-style-type: none"> 1. Vacuum pump inside is damaged or worn 2. Vacuum pump operation time is short 3. Engine speed is low 4. V belt slips 5. Vacuum pipe or strainer is clogged 6. Suction strainer is clogged 7. Suction head is large | <ol style="list-style-type: none"> 1. Check and repair 2. Prolong operation time 3. Adjust to standard speed 4. Adjust or replace 5. Clean 6. Ditto 7. Reduce to within 8 m |
| Poor discharge | Dose not rise to specified pressure | Engine is abnormal | <ol style="list-style-type: none"> 1. Output is poor 2. Throttle is maladjusted 3. Overload 4. Overheat | <ol style="list-style-type: none"> 1. Repair engine 2. Adjust 3. Change nozzle diameter 4. Decrease load or adjust engine |
| | | Pump proper is abnormal | <ol style="list-style-type: none"> 1. Suction pipe strainer is clogged with contaminants 2. Impeller or casing is clogged with foreign matters 3. Suction head is large 4. Pressure gauge is faulty 5. Air is sucked from suction pipe 6. Inducer or impeller is loose 7. Frozen inside 8. Foreign matters are in casing | <ol style="list-style-type: none"> 1. Eliminate 2. Eliminate foreign matters 3. Reduce to within 8 m 4. Replace 5. Retighten 6. Retighten 7. Thaw 8. Eliminate |

6. Troubleshooting

3. Electric

| Symptom | | Cause | Remedy |
|-------------------|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Starting poor | Starting motor dose not rotate | <ol style="list-style-type: none"> 1. Battery capacity is poor 2. Magnet switch malfunctions 3. Main switch is faulty 4. Grounding is faulty 5. Fuse is blown | <ol style="list-style-type: none"> 1. Recharge 2. Ditto 3. Check or replace wiring 4. Correct 5. Replace |
| Battery faulty | Battery is discharged soon | <ol style="list-style-type: none"> 1. Battery is deteriorated 2. Wiring is short-circuited 3. Charging is poor 4. Switch operation is wrong | <ol style="list-style-type: none"> 1. Replace 2. Repair short-circuited part 3. Recharge 4. Operate properly |
| Wiring faulty | Wiring is burnt | <ol style="list-style-type: none"> 1. Battery is connected reversely 2. Connected is short-circuited 3. Fuse is blown | <ol style="list-style-type: none"> 1. Connect correctly 2. Correct 3. Replace |
| | Lamp dose not light | <ol style="list-style-type: none"> 1. Grounding is faulty 2. Connection is faulty 3. Lamp is burnt out | <ol style="list-style-type: none"> 1. Correct 2. Ditto 3. Replace |
| Lamp faulty | Lamp burns out | <ol style="list-style-type: none"> 1. Operation is improper 2. Rectifier is faulty | <ol style="list-style-type: none"> 1. Tum off and then correct 2. Replace |
| OK monitor faulty | Fuel indicator lamp is faulty | <ol style="list-style-type: none"> 1. Monitor substrate is broken 2. Fuel sensor is faulty 3. Wiring is faulty or open-circuited 4. Grounding is faulty | <ol style="list-style-type: none"> 1. Replace 2. Replace 3. Correct or replace 4. Correct ground wire |
| | 2 cycle engine oil refill indicator lamp is faulty | <ol style="list-style-type: none"> 1. Switch is faulty 2. Wiring is faulty or open-circuited 3. Grounding is faulty | <ol style="list-style-type: none"> 1. Replace 2. Correct or replace 3. Correct ground wire |

7. Specifications

| 1. Firefighting pump | | |
|-----------------------------|---------------------------------------------------------------------------|----------------------------------------|
| Model | FT500-A | FT450-A |
| Class | B-2 | B-3 |
| Long × wide × high | 737 mm×572 mm×765 mm | |
| Mass | 90 kg | |
| 2. Pump | | |
| Method | High-pressure 1-stage turbine pump (with inducer) | |
| Discharge water volume | Normal 1.01 m ³ /min | Normal 1.23 m ³ /min |
| | High pressure 0.64 m ³ /min | High pressure 0.91 m ³ /min |
| Pump pressure | Normal 0.70 MPa | Normal 0.55 MPa |
| | High pressure 1.00 MPa | High pressure 0.80 MPa |
| Nozzle diameter | Normal 24.0 mm | Normal 28.0 mm |
| | High pressure 17.5 mm | High pressure 22.0 mm |
| Speed or revolution | 5800 rpm | |
| Water inlet | Nominal 75 mm, fire engine threads | |
| Water outlet | Nominal 65 mm, fire engine threads (with Machino intermediate fixture) | |
| 3. Vacuum pump | | |
| Method | Oil-less vacuum pump : 4-vane eccentric-rotary type | |
| Maximum suction height | Approx. 9m (-0.085 MPa) | |
| Drive method | V belt clutch type | |

7. Specifications

| 4. Engine | | |
|--------------------------|------------------------------------------------------|------|
| Method | Tilted air-cooled 2-cycle 2-cylinder type | |
| Model name | E440C | |
| Bore×stroke×number | 68 mm × 60 mm × 2 | |
| Displacement | 436mL | |
| Authorized output | 22.8 kW/5800rpm | |
| Cooling method | Forced air cooling | |
| Lubrication method | Separate lubrication | |
| Lubricating oil | For 2 cycle engine | |
| Starting method | Starting motor, recoil starter | |
| Fuel | Regular automotive gasoline | |
| Ignition method | No-contact magneto (CD ignition type) | |
| Ignition plug | NGK B8HVX | |
| Fuel consumption | Approx. 14L/ h | |
| Fuel tank capacity | 14.5L | |
| 5. Accessories | | |
| Battery | 12V-18.0Ah/10h | 1 pc |
| Charger | AC220V – DC12V | 1 pc |
| Tool bag | Tool kit, 1 instruction manual, battery mounting kit | |
| Pump cover | 1 | |
| 6. Optional parts | | |
| Search light lamp | 12V-35W | 1 pc |
| Search light stand | 1 tripod | |

8. Wiring diagram

