

SHIBAURA

OPERATION MANUAL

SHIBAURA FIRE-FIGHTING PUMP FT510-A



Please read this operation manual carefully to operate the Shibaaura Fire-fighting Pump safely and correctly. Incorrect operation of the pump may result in an accident. If this manual is missing or damaged, please order a new one from us or our agent promptly.

Shibaaura Fire Pump Co., Ltd.

- For safe use

Keep it in a safe place with the fire-fighting pump.

- Items marked with  in this instruction manual are particularly important for safe use and must be observed.

 Danger	The case when there is an imminent risk of death, serious injury, or the product is mishandled.
 Warning	The case when there is a risk of death or serious injury, or the product is mishandled.
 Caution	In cases when the product is mishandled, minor injuries or property damage may occur.

- Product specifications and appearance are subject to change without notice for improvement. Therefore, please note that the contents of this document and some of the photographs and illustrations may not correspond to the product.
- If you have any questions or difficulties after reading this manual, please contact the dealer where you purchased the product or our company.
- For inspection and maintenance, please contact a maintenance business or dealer that is qualified to service portable fire-fighting pumps.

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1 Things you must follow for your safety

1. Warning Label Locations



Part No.L82900900



Part No.290192430



Part No.290192770



Part No.290192410



Part No.290192400



Part No.290192400

- If the contents of the label become difficult to see or the label is about to come off, replace it immediately.

1 Things you must follow for your safety

2. Caution Marks



- Do not suck in or discharge the substances other than water, such as flammable materials, drugs, or chemical liquid.
- There is a risk of explosion, fire, burns, poisoning, etc.

- Keep fire away when refueling.
- Do not overfill fuel into the tank.
- If the fuel is spilled, wipe it up immediately. Keep the wiping cloth away from fire.
- Refill the fuel after the engine has cooled down.
- Do not use fire to defrost the pump.
- There is a risk of ignition and explosion.



- Fire-fighting pumps should be operated by firefighters, voluntary disaster prevention team members, maintenance and inspection personnel, and others who have been trained specifically for safe operation.
- Misuse or mishandling may result in serious accidents, including death.

- No neck wraps, ties, waist towels, etc., are allowed. Wear helmets, non-slip shoes, and no loose-fitting clothing.
- There is a risk of getting caught in the machine or slipping and falling, resulting in injury.

- Do not operate a fire-fighting pump if you are unable to concentrate on your work due to alcohol consumption, tiredness, illness, or the effects of drugs.
- This could lead to a serious accident.

- Use only genuine parts or specified attachments. No modifications are allowed.
- Failure to do so may result in accidents, injuries, or machine malfunctions.

- Install at least 3 m away from combustible materials.
- Remove flammable materials, such as dry grass, before installation.
- Exhaust fumes and heat from the muffler may cause a fire.

- Do not install indoors or in tunnels with poor ventilation.
- There is a risk of exhaust gas poisoning.

- Be sure to install the cover when operating.
- There is a risk of injury or burns.

- Be sure to close the recoil starter during operation.
- There is a risk of getting caught in pulleys or belts, or of getting cut yourself.

- Keep fire away from the battery.
- There is a risk of fire and explosion.

- Remove packing materials from the battery charger before charging.
- There is a risk of fire.

- Be sure to carry out periodic inspections. Operate and discharge the water at least once a month to check for any abnormalities.
- Accidents may occur due to damage, etc., and fire-fighting activities may be hindered.

1 Things you must follow for your safety

Caution

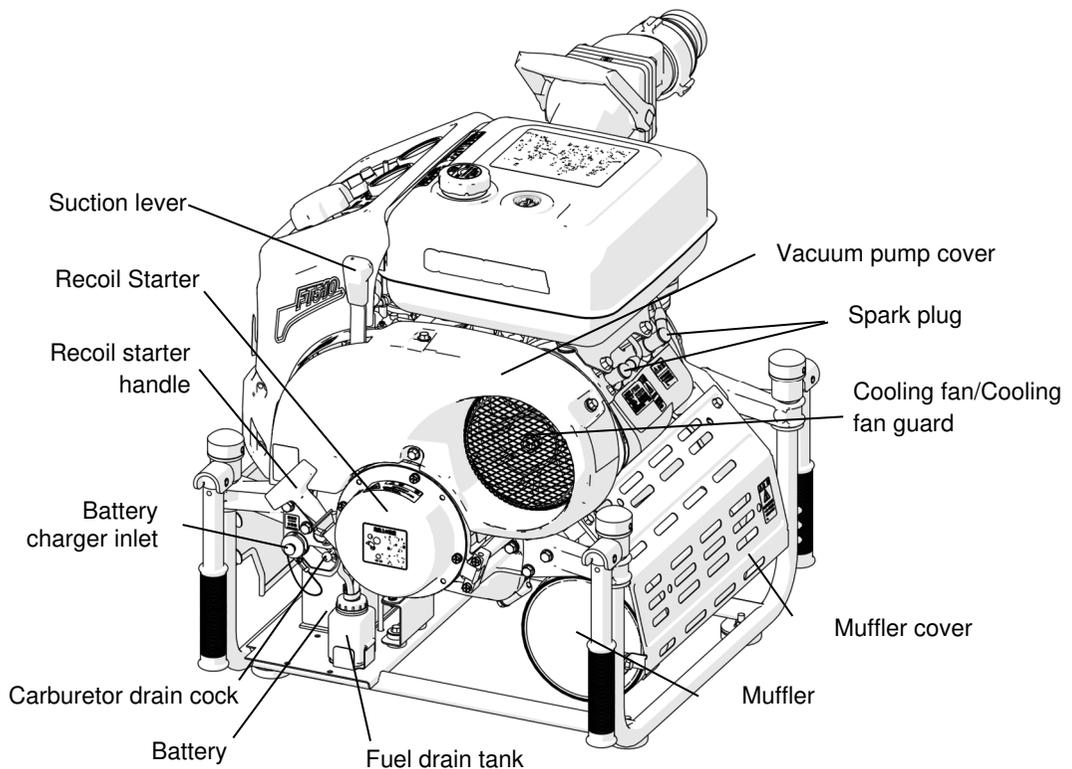
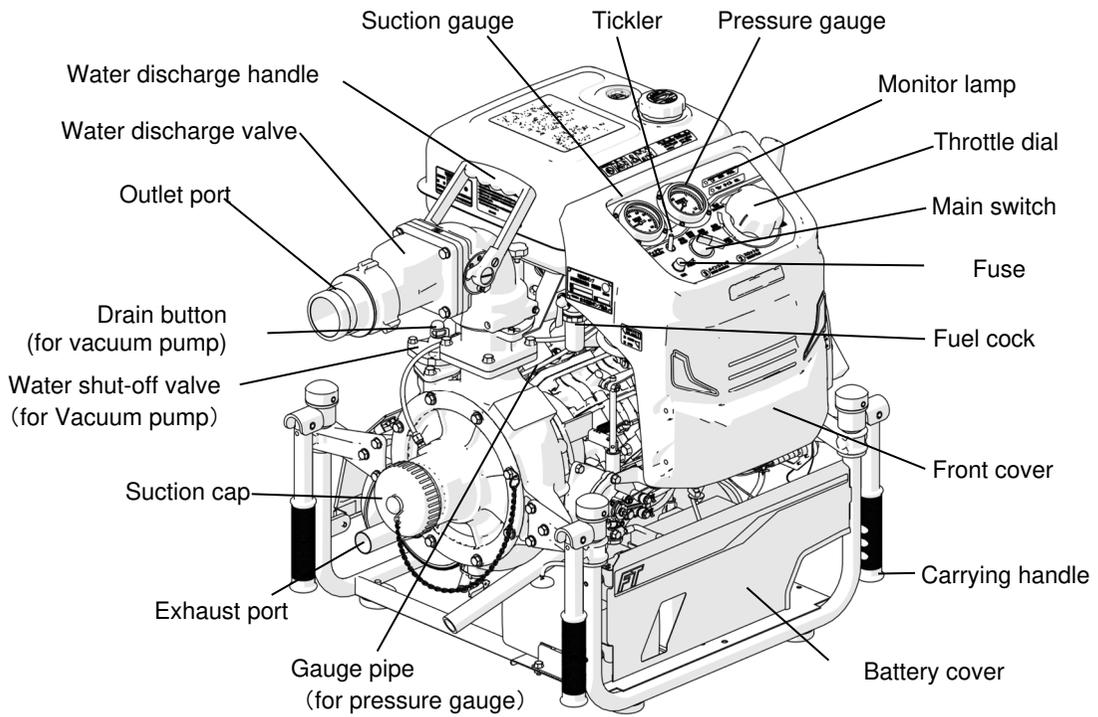
- Do not use fire-fighting pumps for activities other than fire-fighting, such as civil engineering, irrigation, water sprinkling, etc.
- There is a risk of hitting some objects and injuring people or damaging property around you.
- When disposing of batteries, oils, etc., please entrust disposal to a specialized industrial waste disposal contractor.
- It may cause fire, burns, or pollute the environment.
- Do not put fingers or hands in the water discharge valve.
- There is a risk of injury.
- After refueling, tighten the fuel tank cap securely.
- There is a risk of ignition and explosion.
- Check the fuel once a month, and if the fuel has a pungent odor or is cloudy, replace it with new fuel immediately.
- This may cause engine malfunction or equipment failure.
- When adding two-cycle oil, always use the same brand and grade of oil.
- Avoid entering water or debris when refilling the two-cycle oil.
- This may cause engine malfunction or equipment failure.
- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.
- When replenishing the governor oil, add the same brand and grade of oil.
- Avoid entering water or debris when refilling the governor oil.
- This may cause engine malfunction or equipment failure.
- When holding the carrying handle, do not touch the joint parts.
- Failure to do so may result in injury from pinching fingers.
- When carrying or loading/unloading the fire-fighting pump, four people should do so.
- Dropping it on your foot may cause injury or back pain.
- Connect the fire hose securely and always ensure it cannot be disconnected.
- If it is pulled out during water discharge, there is a risk of injury.
- Lay out the fire hoses without folds, twists, or sharp turns.
- There is a risk of the water hose springing up and causing injury.
- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.
- When starting with a recoil starter, avoid getting clothing or gloves caught.
- There is a risk of injury.
- When starting with the recoil starter, keep people at least two meters away from the starter.
- There is a risk of injury to elbows from being knocked by recoil ropes.

1 Things you must follow for your safety

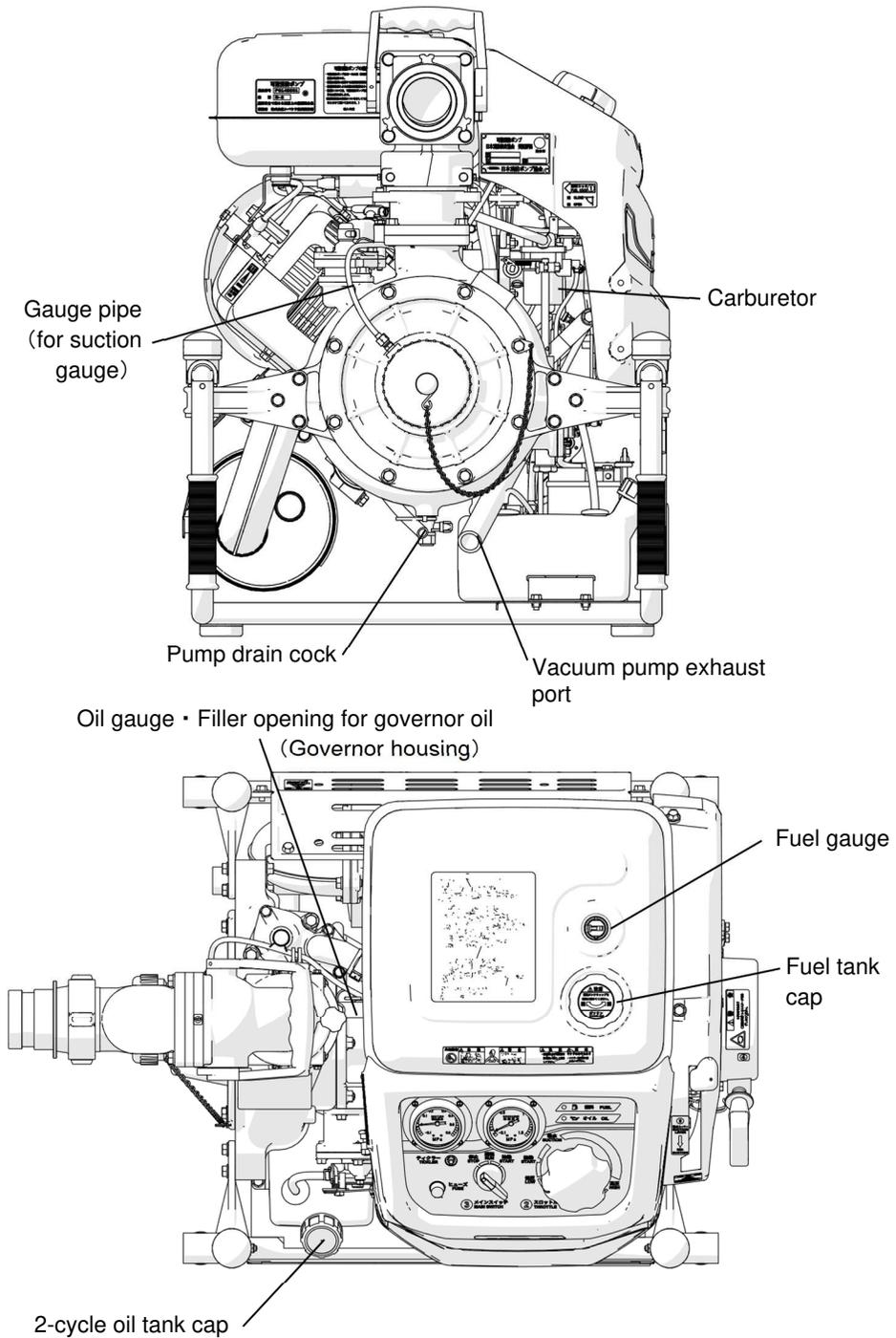
Caution

- Always return the throttle to the "LOW" position before opening and closing the water discharge valve.
- Hold the fire nozzle firmly and discharge water.
- There is a risk of injury because the fire nozzle runs away.
- Operate the water discharge valve slowly.
- There is a risk of injury from pinching or bumping hands.
- Do not aim the water at people or peer into the nozzle.
- High water pressure may cause them to be blown away, resulting in injury.
- Do not touch the spark spark plug or high-voltage cord during operation.
- There is a risk of electric shock.
- Never touch the muffler and exhaust pipe during and after operation since they become very hot.
- There is a risk of burns.
- While operating, be careful not to have the suction pipe or hose stepped on by vehicles or other objects.
- Accidents may occur due to damage, etc., and fire-fighting activities may be hindered.
- Do not start the engine with the water discharge valve handle open.
- When discharging water, the engine operator should communicate with the operator at the nozzle. Do not open the water discharge valve without notice or accelerate the throttle rapidly.
- There is a risk of injury from being blown away by the high-pressure water.
- Inspection and maintenance should be performed after the engine has been stopped and cooled down sufficiently.
- Failure to do so may result in injury, burns, or fire.
- Read the instruction manual that comes with the battery and the information on the battery itself carefully to ensure that the battery is used correctly.
- When disconnecting the battery cord, remove the (-) cord first, and when installing the battery cord, connect the (+) cord first.
- Short-circuiting may cause fire or burns.
- Do not use the charger in high-temperature places such as under direct sunlight or near heating elements, in extremely humid places, or wet areas such as rain or snow.
- There is a risk of overheating, burnout, or damage to the charger, or leakage of electricity or electric shock.
- The charger should be installed in a dry, well-ventilated location that is not wet.
- Failure to do so may cause electric shock or fire.
- Do not charge the battery with a charger other than the specified one.
- There is a risk of fire due to heating or burnout of the wiring.
- When operating without attaching the suction pipe (e.g., to check the vacuum level), attach the suction cap.
- There is a risk of getting caught in the machine or injured.
- Do not close the nozzle or water discharge valve while multiple pumps are relayed and the water is discharged.
- Abnormally high pressure may result in damage to the pump and hoses.

2 Name of each component



2 Name of each component



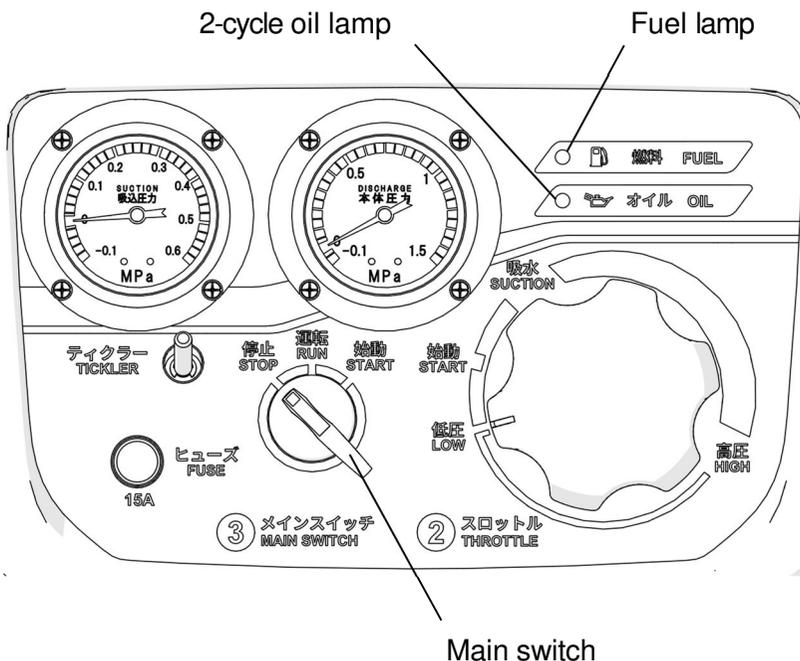
3 Monitor lamp

The pump with a starting motor activates when the main switch is turned into the "Run" position. When the power is turned on, two lights illuminate at the same time. If they do not light up, the battery voltage is insufficient, or there is a faulty circuit, the pump needs to be repaired. All lights are turned off after a few seconds.

All lights are turned off during water discharge, but the lights are turned on when operating the starting motor. It is because the battery voltage drops. Be sure to inspect or maintain when the following items are lit up.

Display	Feature	How it works	Measures
 fuel	Indicates that the fuel must be added	Lights up when the remaining fuel in the tank is low.	Refill the regular gasoline.
 2-cycle oil	Indication of when to refill 2-cycle oil	Lights up when the remaining oil in the tank is low, then stop the engine.	Refill the 2-cycle oil.

If the monitor lamp still illuminates or blinks after following the measures above, consult your dealer.



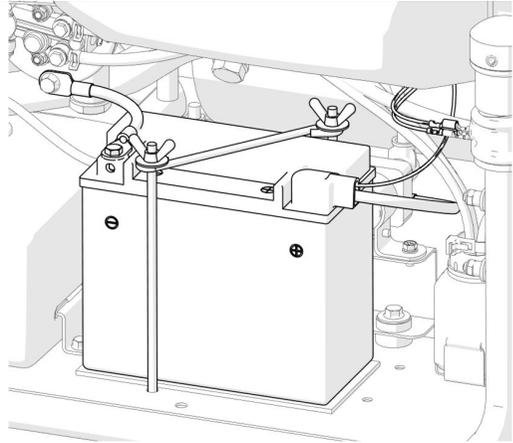
4 Handling method (Before)

Installing Battery

Caution

- Read the instruction manual that comes with the battery and the information on the battery itself carefully to ensure that the battery is used correctly.

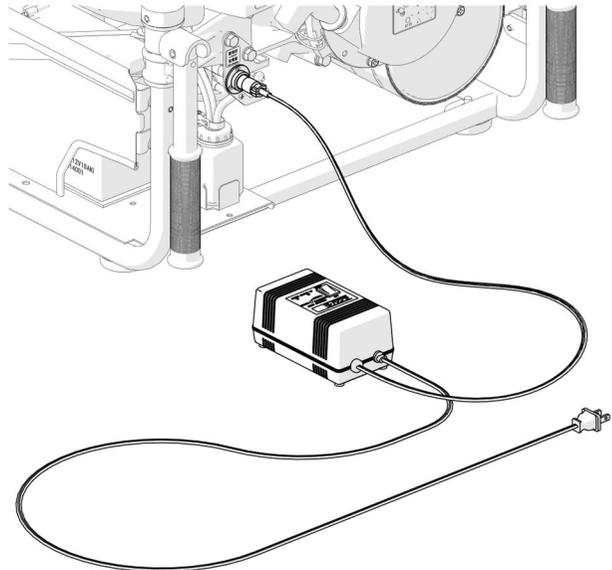
- (1) For handling, be sure to follow the battery instruction manual.
- (2) Fix the battery to the bed with two rods and one holder.
- (3) Firstly, connect two battery (+) cables (red), then connect one (-) cable (black) . Be sure to keep the connecting order.



Caution

- When disconnecting the battery cable, remove the (-) cord first, and when installing, connect the (+) cable first.
- Short-circuiting may cause fire or burns.

- (4) Connect the supplied charger to a charger inlet to charge the battery. (See "5 Periodic Inspection 2. Inspection Method (2) Handling of Fully Automatic Charger" on p. 29.)



4 Handling Method (Preparation for Operation)

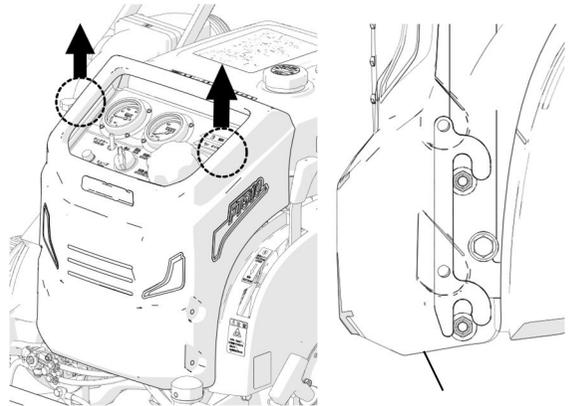
1. Removing and attaching covers

When removing the cover, follow the procedure below.

(1) Removing/attaching front cover

Hold the circled places on the illustration on the right. Shift it upward first, and then remove it toward you.

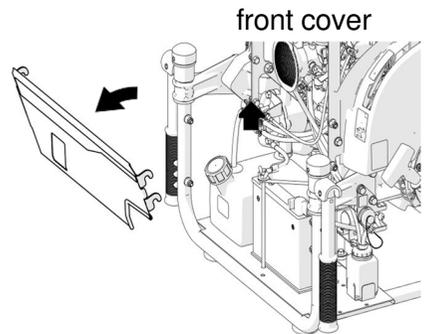
Installation is the reverse procedure.



(2) Removing and attaching the battery cover

Slide the battery cover upward first, and then remove it toward you.

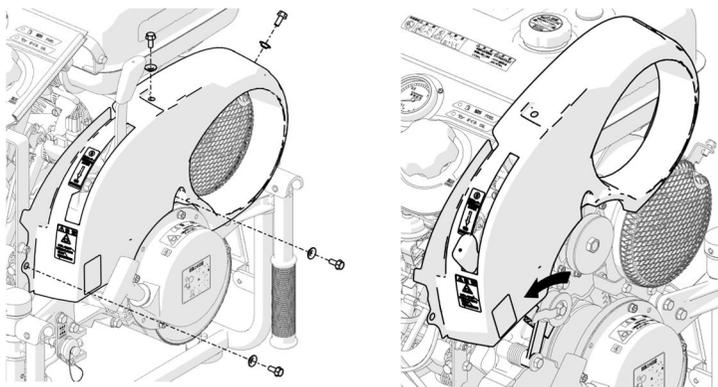
Installation is the reverse procedure.



(3) Removing and attaching vacuum pump cover

Remove the four bolts and collars. Pull the water suction lever toward you and remove it through the lever opening of the vacuum pump cover.

Installation is the reverse procedure.



Warning

○ Be sure to attach the cover when driving.

● There is a risk of injury or burns.

4 Handling Method (Preparation for Operation)

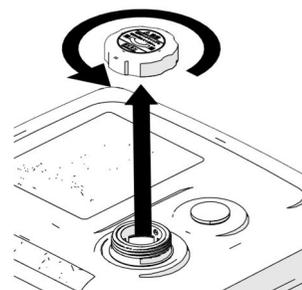
1. Replenishment

(1) Fuel

(Fuel tank capacity: approx. 14.5L)

Fill the tank with regular gasoline until the fuel gauge indicates "F".

Do not add gasoline mixed with two-cycle oil or bio-gasoline.



Danger

- Keep fire away when refueling.
- Do not overfill fuel into the tank.
- If the fuel is spilled, wipe it up immediately. Keep the cloth away from fire.
- Refill the fuel after the engine has cooled down.
- There is a risk of ignition and explosion.
- Hold the nozzle firmly and discharge water.
- There is a risk of injury due to swinging of the discharge nozzle.

Caution

- Tighten the fuel tank cap securely after refueling.
- There is a risk of ignition and explosion.

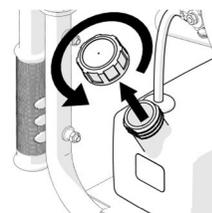
Caution

- Check the fuel once a month, and if the fuel has a pungent odor or is cloudy, replace it with new fuel immediately.
- This may cause engine malfunction or equipment failure.

(2) Engine oil

(Oil tank capacity: Approx. 2L).

Fill the 2-cycle oil into the oil tank at the bottom of the fire-fighting pump.



Caution

- When refilling the 2-cycle oil, use the same brand and grade of oil.
- Do not allow water or debris to enter when refilling.
- This may cause engine malfunction or equipment failure.

Caution

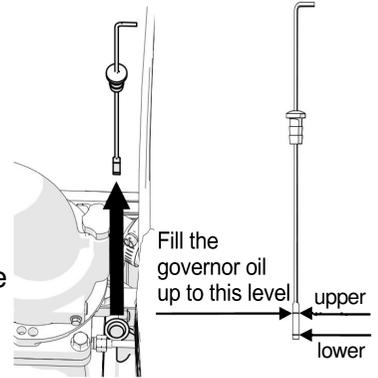
- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.

4 Handling Method (Preparation for Operation)

(3) Governor oil

(1) Place the pump on the level place and check the governor oil level with an oil gauge.

- Remove the governor oil level gauge and check the oil level. Refill the oil to the original level when the oil level has become in the middle or lower. Put back the oil gauge after refilling. Do not replenish more than the upper limit.
- If the oil is very dirty or cloudy, consult your dealer.
- Recommended oil (Automotive engine oil) SAE:10W-30(API:SJ)



Caution

- When replenishing governor oil, add the same brand and grade of oil.
- Do not allow water or debris to enter the oil inlet when refilling.
- This may cause engine malfunction or equipment failure.

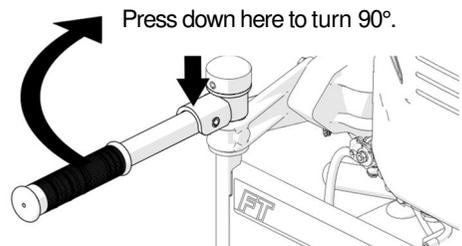


Caution

- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.

2. Carrying the pump

Hold the transport handle correctly when moving and loading/unloading the fire-fighting pump.
The carrying handle can be turned 90 deg.



Caution

- When holding the carrying handle, do not touch the bend.
- Fingers may be pinched, resulting in injury.

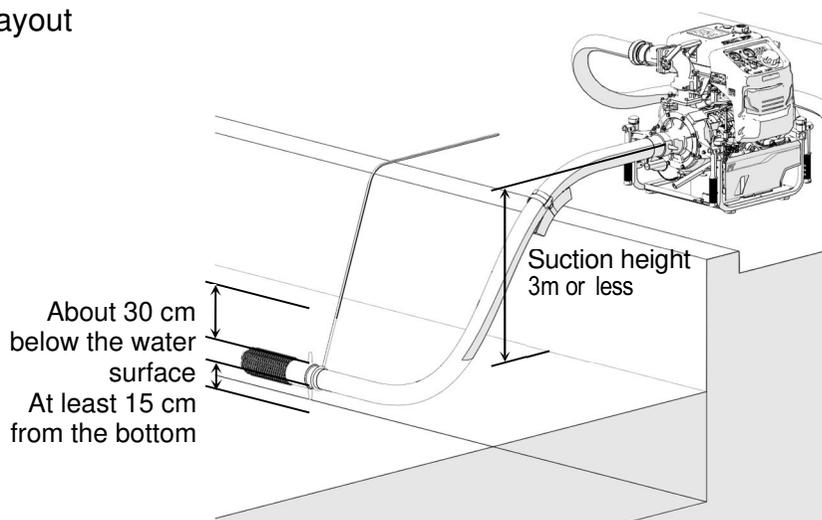


Caution

- 4 people is necessary to carry the pump.
- Dropping it on your foot may cause injury or back pain.

4 Handling Method (Preparation for Operation)

3. Pump layout



- (1) Check the water source. Make sure that there will be no problems with use, such as no decay, floating matter, or sediment.
- (2) Place the pump close to the water source and on a level surface.



Warning

- Avoid installation in places with poor ventilation, such as indoor, in a vehicle, tunnel. There is a risk of exhaust gas poisoning.



Warning

- Place at least 3 m away from combustible materials.
- Remove dead grass and other flammable materials before setting.
- Exhaust fumes and heat from the muffler may cause a fire.

- (3) Keep the suction height below 3m as much as possible to avoid falling water because of the reduction of the pump capacity.
- (4) Lay out the suction hose with no bends or bumps and fasten it tightly to the suction inlet port. Ensure the level of the inlet port side is higher than the suction hose tip at the water source side.
- (5) Always attach a strainer and basket to the suction port of the suction hose and keep it below the water surface to prevent air sucking in. Place the tip about 30 cm above the bottom. If the tip of the device is 15 cm or more away from the bottom. Place a straw mat to prevent sediment from being sucked into the device. If the water source has algae, watergrass, etc., remove them around the water inlet.
- (6) Connect the fire hoses securely and lay them out. Be sure not to fold.

4 Handling Method (Preparation for Operation)



Caution

- Connect the fire hose securely and always ensure it cannot be disconnected.
- If it is pulled out during water discharge, there is a risk of injury.



Caution

- Lay out the fire hoses without folds, twists, or sharp turns.
- There is a risk of the water hose springing up and causing injury.

4. Pump user

- (1) Fire-fighting pumps are small but high-performance machines with strong power. Improper use may cause serious accidents, including death.



Warning

- Fire-fighting pumps should be operated by firefighters, voluntary disaster prevention team members, maintenance and inspection personnel, and others who have been trained specifically for safe operation.
- Misuse or mishandling may result in serious accidents, including death.

- (2) Wear clothing appropriate for the operation.



Warning

- No headbands, neck wraps, ties, waist towels, etc., are allowed. Wear helmets, non-slip shoes, and no loose-fitting clothing.
- There is a risk of getting caught in the machine or slipping and falling, resulting in injury.

- (3) Do not operate if you are not feeling well.



Warning

- Do not operate fire-fighting pump if you are unable to concentrate on your work due to alcohol consumption, tiredness, illness, or the effects of drugs.
- This could lead to a serious accident.

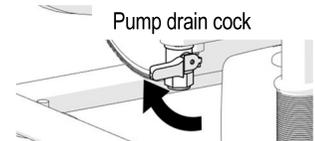
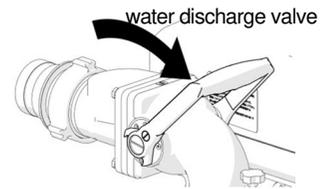
4 Handling method (Operation)

1. Starting the engine

Close the ⑥ water discharge valve and pump drain cock before starting the engine.

Please be sure to check the following

Follow the operating instructions in the order of ❶ to ❹ numbers on the unit.



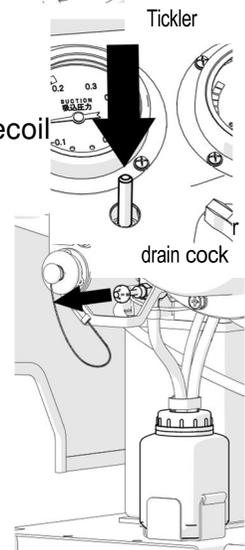
(1) Open the ❶ fuel cock.

Move the fuel cock lever straight down to "Open" ❶ to open the fuel cock.



(2) In cold weather, use the tickler in the carburetor.

- If it is difficult to start the engine with auto-choke alone in cold weather, press the tickler for 2 to 3 seconds.
- Press the tickler for 2 to 3 seconds when starting with the recoil starter and the engine is cold.
- If you use tickler for multiple times and the engine does not start, close the ❶ fuel cock, drain fuel from the carburetor drain cock, then start the engine.
- If the engine does not start properly due to excessive fuel, such as when restarting after warm-up, close the fuel cock, open the carburetor drain cock, and drain the gasoline from the carburetor before starting the engine. After starting, turn the fuel cock "open". If the car stops, start the car again.



*Remove and dispose of the fuel in the drain tank every time.

Fuel drain tank

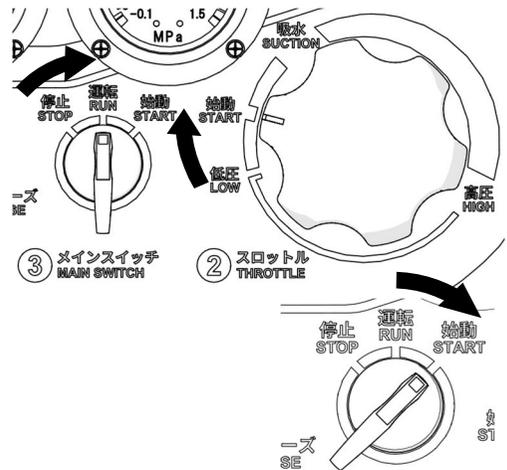


Caution

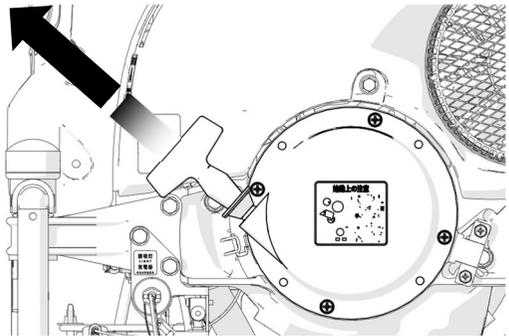
- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.

4 Handling method (Operation)

- (3) Turn the ② throttle to the "start" position.
 (4) Turn the main switch to the "run" position.
 When starting the starter motor, turn it to the "START" position. The starter motor works, and the engine starts.
- Once the engine is started, set the ③ main switch to the "operation" position.
 - Stop the starter motor for at least 5 seconds after running it for 3 seconds. Continuous operation will cause deterioration of the battery and the starter motor.



- (5) For recoil starting, pull the ④ recoil starter handle out to the point where it is slightly heavy, then pull quickly and sharply.



Caution

- When starting with a recoil starter, avoid getting clothing or gloves caught.
- There is a risk of injury.



Caution

- When starting with the recoil starter, keep people at least two meters away.
- There is a risk of injury to the elbows from being knocked by recoil ropes.



Warning

- Be sure to close the recoil starter during operation.
- There is a risk of getting caught in pulleys or belts, or of cutting yourself.

4 Handling method (Operation)

2. Suction

- (1) Turn the ② throttle to the "suction" position after starting the engine.
- (2) Pull the ⑤ suction lever toward you to activate the vacuum pump and suction water.
 - Promptly return the ⑤ suction lever when the pressure gauge needle swings and the pressure increases and stabilizes.
 - Keep the vacuum operation time less than 30 seconds.

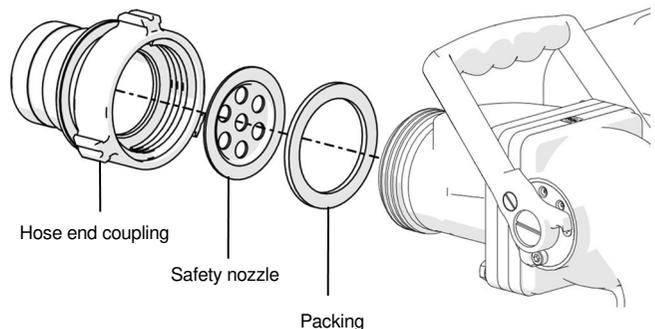


3. Water discharge

Before discharging water, check the safety of the nozzle. Give a signal to the person at the nozzle to start discharging water.

- (1) ⑥ Operate the water discharge handle gradually in the "→Open" direction until it stops.
 - Turn the throttle to the desired water pressure level.
 - Adjust the pressure with the ② throttle according to the water discharge conditions.
 - Be careful not to use too high a water discharge pressure or to open or close the ⑥ water discharge valve handle too rapidly, which may cause the water discharge hose to swing.
- (2) Standby for water discharge
 - To close the ⑥ water discharge valve and put the machine in standby mode during water discharge, ② turn the throttle to the "low pressure" position and stop the engine. In this case, the check valve will operate and water will not fall, so restart the engine and open the ⑥ water release valve to re-discharge water. (However, restarting must be done within 3 minutes.)
 - If it is necessary to stand by without stopping the engine, be sure to put the ② throttle in the "low pressure" position.
- (3) The case when discharging water without using a nozzle

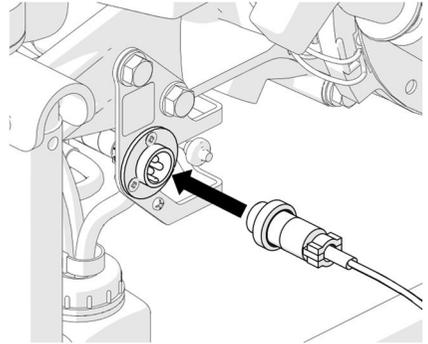
- When operating without using the nozzle, such as pumping water from a water tank or pumping water to a relay tank, be sure to set the attached safety nozzle between the hose end coupling and the water discharge valve, as shown in the figure.



4 Handling method (Operation)

(4) To turn on the searchlight

- To turn on the searchlight, plug the searchlight into the charger inlet on the recoil side.



Caution

- Always return the throttle to the "LOW" position before opening and closing the water discharge valve.
- Hold the nozzle firmly and discharge water.
- There is a risk of injury due to swinging of the discharge nozzle.

Caution

- Operate the water discharge valve slowly.
- There is a risk of injury from pinching or bumping hands.

Caution

- Do not aim the water at people or peer into the nozzle.
- High water pressure may cause them to be blown away, resulting in injury.

Caution

- Do not touch the spark plug or high-voltage cord during operation.
- There is a risk of electric shock.

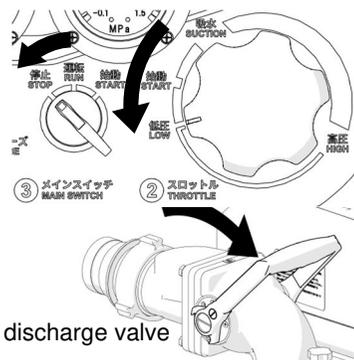
Caution

- Never touch the muffler and exhaust pipe during and after operation since they become very hot.
- There is a risk of burns.

4 Handling method (Operation)

4. Stopping the engine

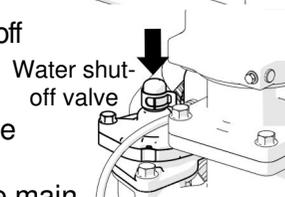
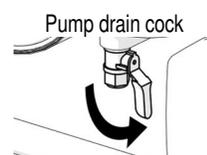
- (1) ② Turn the throttle to the "LOW" position.
 - If the engine is hot, run the engine at low speed for about 1 minute to cool it down.
- (2) Close the ⑥ water discharge valve handle by operating it in the "→ close" direction.
- (3) ③ Turn the main switch to the "STOP" position. The engine will stop.



5. Draining water

After the operation, a large amount of water remains inside the pump. This remaining water may cause corrosion and freezing cracks during cold weather. Be sure to drain water before storing.

- (1) Open the pump drain cock.
- (2) Open and close the ⑥ water release valve, press the water shut-off valve drain button, and drain completely.
- (3) Close the pump drain cock and install the water inlet cap.
- (4) Start the engine and pull the ⑤ suction lever to activate the vacuum pump for approximately 5 seconds.
- (5) ② Turn the throttle to the "low pressure" position, ③ Turn the main switch to the "stop" position and stop the engine.
- (6) Open the pump drain cock and remove the water inlet cap to confirm that it is completely drained. If drainage is insufficient, repeat steps (3) to (5).
- (7) Close the pump drain cock and install the water inlet cap.



Treatment after using seawater or muddy water

If seawater or muddy water is used, be sure to operate the pump by discharging water with clean water for at least 5 minutes to clean the inside of the pump. Also, to clean the inside of the vacuum pump, operate the vacuum pump for about 5 seconds by pulling the ⑤ suction lever while discharging water at low pressure, and drain clean water from the vacuum pump exhaust hose. After cleaning is complete, be sure to drain the water using the operation described in the previous section "5".

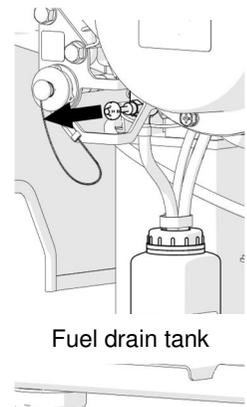
4 Handling method (Operation)

6. Storing the pump

- (1) Store in a dry, temperature-controlled area, away from dust and direct sunlight.
- (2) Wipe off oil, dust, and dirt and keep clean.
- (3) Fill the fuel up to the "F" level when storing. ●Close the fuel cock.
- (4) Fill the specified amount of 2-cycle oil.
- (5) Drain the fuel in the carburetor from the carburetor drain cock, on the recoil starter side.
*Make sure to remove the fuel inside the fuel drain tank every time.
- (6) Please charge the battery with the supplied charger while in storage.
(See "5 Periodic Inspection 2. Inspection Method (2) Handling of Automatic Charger" on p. 29)
- (7) Cover the pump with the attached pump cover.



Carburetor drain cock



Fuel drain tank

- Before storing the pump, be sure to check that the water inside is completely drained. Also, fill the pump with antifreeze to prevent freezing when storing the pump in cold weather (see "4 Handling Methods" Operation in Winter and Cold Weather, on P. 20)
- Operate and discharge water for 5 to 10 minutes at "HIGH" throttle position every month.
- Check the fuel in the fuel tank once a month, and if there is a pungent odor or cloudiness, replace the fuel with new fuel. The recommended replacement time is 6 months after refueling.
- If the vehicle has been in storage for a long period of time without a monthly periodic inspection, operate the pump for 1 minute at "LOW" position to warm up the engine. Be sure to inspect visually to see if there are any abnormalities.



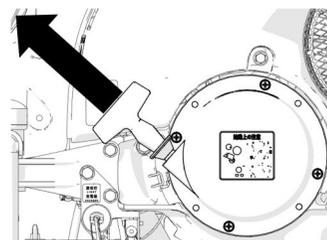
Caution

- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.

4 Handling Method (Operation in Winter and

1. Before starting the engine

- (1) In cold weather, battery capacity is significantly reduced. Please be sure to charge regularly.
- (2) ● Gently pull the recoil starter handle and check that the pump turns.
 - If it does not turn, the pump may be frozen. Pour the warm water into the pump from the suction port or defrost it in a warm room.



Recoil starter handle

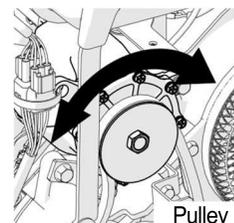
- (3) Remove the vacuum pump cover.

(See "4 Handling Methods (Preparation for Operation)"

1. Removing and attaching the covers, on page 9 .)

- Turn the vacuum pump pulley by hand and check if the vacuum pump turns.
- If it does not turn, the vacuum pump may be frozen.

Blow warm air outside the vacuum pump or defrost in a warm room.



Pulley



Danger

- Do not use fire to defrost the pump.
- There is a risk of ignition and explosion.

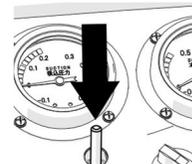


Caution

- Inspection and maintenance should be performed after the engine has been stopped and cooled down sufficiently.

2. Starting the engine

- (1) In cold weather, press the tickler for 2 to 3 seconds.
- (2) Immediately after the engine starts, operation may be unstable; run the machine idle at low speed for 1 to 2 minutes.



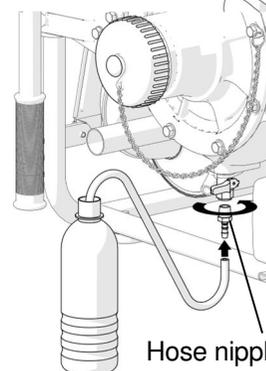
3. Treatment after water discharge (freeze prevention)

- (1) Preventing pumps from freezing (how to add antifreeze)

- ① Drain the water.

(Refer to "4 Handling Method (Operation) 5. Draining water)

- ② Close the water suction cap.
- ③ Attach the hose nipple and hose to the pump drain cock and place the hose in a bottle filled with antifreeze



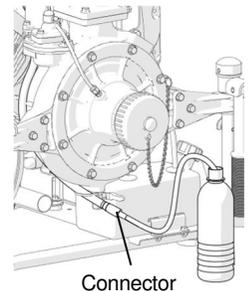
Hose nipple

4 Handling Method (Operation in Winter and

- ④ Start the engine.
- ⑤ ② Turn the throttle to the "SUCTION" position.
- ⑥ ⑤ Pull the suction lever to create a vacuum state inside the pump.
- ⑦ Open the pump drain cock to suck in antifreeze.
- ⑧ Pull the ⑤ suction lever again, and when antifreeze comes out of the vacuum pump exhaust port, return the ⑤ suction lever.
- ⑨ Remove the hose and hose nipple from the pump drain cock.
- ⑩ Pull the ⑤ suction lever and stop the engine when the antifreeze stops coming out of the vacuum pump exhaust port.
- ⑪ After collecting antifreeze from the pump drain cock, close the drain cock.

(2) Preventing the vacuum pump from freezing (how to fill the vacuum pump with antifreeze)

- ① Connect the connector and hose to the water shut-off valve drainpipe and place it in a container of antifreeze.
- ② Start the engine.
- ③ Set the ② throttle to the "SUCTION" position.
- ④ Pull the ⑤ suction lever and suck in the antifreeze.
- ⑤ If antifreeze comes out of the vacuum pump exhaust port, return the water suction lever.
- ⑥ Remove the connector and open the pump drain cock.
- ⑦ Pull the ⑤ suction lever, and when the antifreeze stops coming out of the vacuum pump exhaust port, return the ② throttle to the "LOW" position and stop the engine.
- ⑧ Close the pump drain cock.



(3) Antifreeze should also be injected into water discharge valves and hose couplings.

CAUTION: Do not use alcohol to prevent freezing, since it will damage the rubber seals. Collect drained antifreeze in a liquid container.

4. Precautions for storage

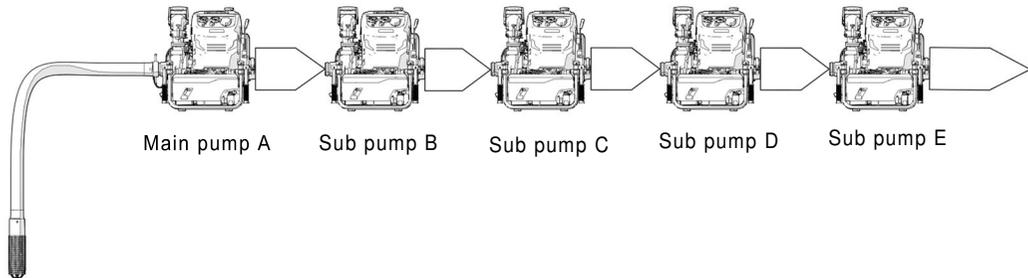
Choose the fuel with good quality. (The better quality of gasoline is highly volatile, and has better starting performance.)

- (1) Be sure to always have antifreeze on hand.
- (2) Batteries may freeze when the relative density of electrolyte becomes low. Be sure the battery is always recharged. If battery performance deteriorates, replace the battery as soon as possible.

4 Handling method (Relaying water with multiple pumps)

In the case of forest fires or urban fires where the water supply is far away, two or more pumps may be connected in series to relay water. The relay water requires different operations and special attention compared to normal operation because each pump is located far from the others. Daily training is also necessary to enable judgment and activities based on the state the pump's operators are facing. See the general method of relay operation below.

Figure 1.



1. Setting Locations

- (1) The number of units and their locations should be determined based on the number of hoses and the height of the water source.
- (2) Install a relay coupling to the suction port of sub-pumps (B to E in Figure 1), to connect the fire hose.
In this case, the automatic relay valve, "Direct Valve" can prevent accidents caused by sudden pressure fluctuations and high-pressure water.
- (3) The wye-valve is also recommended to be attached to the discharge port.

(The hose couplings that connect each pump may not be removed even after the discharge operation, because of the water pressure inside the fire hose.)

2. Operation Method (*An operator is required for every pump.)

- (1) Open the water discharge valves of the sub-pumps (B to E) beforehand.
Be sure to open the variable nozzle when it is attached to the fire hose.
- (2) Operate the main pump (A) and discharge water as usual.
- (3) Send water to the original pump first and then to others sequentially.
- (4) Check the pressure scale in the sub pump (E) and increase the engine speed to regulate the discharging water by controlling the throttle of the sub-pumps (B to E)
The sub pump (B to E): Should be more than 0.05MPa in a scale of suction gauge pressure, be less than 1.2MPa in a scale of power.
- (5) If there is not enough power of water discharge at the nozzle, turn the throttle dial of the original pump (A) to "HIGH" position gradually, then the turn the throttle dial of sub-pump, from the one closer to the original (from B to E), sequentially.
- (6) When stopping water discharge, turn the throttle dial of the last pump, the one close to the nozzle (E), to "LOW" position first and stop gradually (from E to B).
Stop the water supply from the main pump. When the supply of water from the main pump has been stopped, close the water discharge valve of each pump.

4 Handling method (Relaying water with multiple pumps)



Caution

- Do not close the nozzle or water discharge valve while multiple pumps are relayed and the water is discharged.
- Abnormally high pump pressure may result in damage to the pump and hoses.

1. Suction and discharge from water hydrant

The capacity of water supply from the fire hydrant

It is necessary to check the sufficient volume of water for discharging from the fire hydrant in advance.

It would depend on several factors, such as the diameter of the hydrant, the condition of the piping, the initial water pressure, and others.

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 could have high capacity for water supply with wider diameter despite low water pressure.

Water supply method

- (1) Be sure to open and close the hydrant's valve and release water to remove the foreign objects, such as sand, before connecting the hose to the hydrant.
- (2) Connect the water hydrant and pump. Use a suction hose that can endure the water supply pressure. The supply pressure limit for the suction hose with a nominal diameter of 65mm is 0.9 MPa. The suction hose for connection to the hydrant should be inspected periodically to avoid any damage.

How to check and adjust water supply pressure

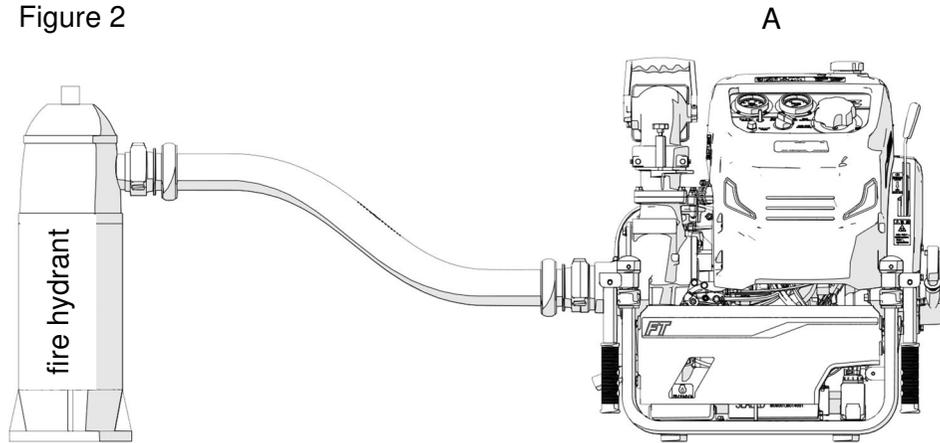
- (1) Open the open/close valves of the fire hydrant and the water discharge valve of the pump to full open.
- (2) Gradually close the pump's water discharge valve while checking the water supply pressure with a suction gauge.
- (3) If the water supply pressure is high, adjust the water supply pressure with the hydrant's open/close valve.

4 Handling Method (Suction, discharge, and relay the water from the fire hydrant)

2. Water discharge and delivery

When a single pump receives and discharges water (Figure 2)

Figure 2



- (1) Open the water discharge valve of pump (A) in advance.
If the fire hose has a variable nozzle at the end, be sure to leave it open.
- (2) Before starting the engine, open the hydrant and check the pressure on the compound (suction) gauge of the pump (A).
- (3) After confirming that water has been sent from the fire hydrant, start the engine of the pump (A) and begin discharging water.

- (4) Adjust the pressure by operating the throttle of the pump (A) to achieve the required pressure and flow rate.

The throttle should be operated gradually, and the compound (suction) gauge should be kept above 0.05 MPa.

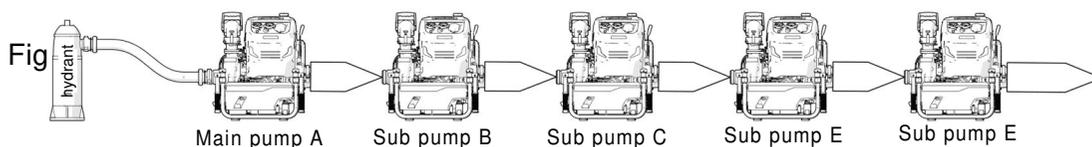
Adjust the hydrant open/close valve to adjust the pressure gauge to not exceed 1.2 MPa. At this time, the compound (suction) gauge of the pump (A) should be less than 0.6 MPa

- (5) To stop water discharge, turn the throttle of pump (A) to the "LOW" position, stop the engine, and close the hydrant.

Do not close the water discharge valve of pump (A) until the water supply from the hydrant stops.

4 Handling Method (Suction, discharge, and relay the water from the fire hydrant)

When discharging water by relaying with multiple pumps
(An operator is required for all pumps: Fig. 3)



- (1) Open the water discharge valves of all pumps (A to E) in advance. If a variable nozzle is attached to the fire hose-end at the water discharge side, be sure to open it.
- (2) Before starting the engine, open the hydrant and check the pressure of the compound (suction) gauge of the main pump (A).
- (3) After confirming that water has been delivered from the fire hydrant, start the engine of the main pump (A) to deliver water to the next pump.
- (4) Start and supply water to the second and sub-pumps (B to E) in the same manner as for the original pump (2) and (3).
- (5) Read the pressure gauge on the sub-pump (E) and adjust the pressure by operating the throttles on all pumps (A to E) to achieve the required pressure and flow rate at the nozzle. Operate the throttles gradually and make sure that each pump keeps above 0.05MPa on the compound (pressure) gauge and above 1.2MPa on the pressure gauge.

Adjust the hydrant opening to make the compound (pressure) gauge of each pump is not less than 0.6MPa.

- (6) To stop the water discharge, shut down the engine by turning the throttle to the "LOW" position, starting with the pump (E) closest to the end of nozzle, and finally close the fire hydrant. Do not close the water discharge valves of each pump until the water supply from the hydrant has stopped.

5 Periodical Inspections

1. Periodical inspections

Be sure to perform periodic inspections according to the following items.

Item	Duration or operating time							Inspection details	treatment		
	Period										
	Before use	after use	1 month	6 months	1 year	2 years	3 years				Operation time (Hour)
fuel	●	●						Quantity/ Deterioration (ie color, smell)	Refill or replace		
				●				-	Replace		
2-cycle oil	●							Quantity	Refill		
					●			-	Replace		
Battery		●						-	Recharge		
			●					Deterioration	Replace		
						●		-	Replace		
Spark plug					○		100	-	Replace	○	
Appearance		●						Dirt, etc.	Clean		
Starter rope			●					Wear, breakage	exchange	○	
Vacuum pump belt				●			50	Become loose/Wear	Adjust or replace	○	
Fan belt				●			50	Become loose/Wear	Adjust or replace	○	
Fuel pipes				●			50	Leakage/damage	Replace	○	
Water discharge valve					●		100	Valve feels heavy, vacuum leakage	Adjust or replace the parts if necessary	○	
Fuel filter				●			○	200	Foreign material stuck	Clean or replace	○
Engine start and vacuum			●					Operation/Perfor mance	Replace parts if necessary	○	
Prime and discharge			●					Operation/Perfor mance	Replace parts if necessary	○	
All parts							○	300		Replace parts if necessary	○

Note:

- For items marked with "●" in the period column, please practice the inspection by yourself. Please ask your dealer to inspect the items marked with "○" in the period column and to handle the items marked "○" in the column of treatment.
- Measure the inspection timing by either comes earlier, "period" or "operation time". For example, consider replacing spark plug when the operation time reaches to 100 hours, even if the operation period is less than a year.
- This inspection table shows the period and time under general operating conditions. Make sure to perform inspections earlier when the pump is used under tough conditions.

5 Periodical Inspections

Recommended replacement parts and period

Part Name	Recommended Replacement Period	Example of Defects
Spark plug	Every Year	Bad to start due to wear and tear
Fuel Pipes	Every 2 years	Fuel leakage due to deterioration
Battery	Every 2 years	Deterioration
2 Cycle Oil Pipe	Every 2 years	Oil leakage due to deterioration
Vacuum Pump Belt	Every 3 years	Slippage due to wear
Fan Belt	Every 3 years	Slippage due to wear
Other Rubbers	Every 2 years	Deterioration
Starter Rope	Every 3 years	Breakage due to wear
Fuel Filter	Every 3 years	Clogging and Bad start due to the water drip
2-cycle Oil Filter	Every 3 years	Clogging, and Poor lubrication due to the moisture.
Discharge Valve Water shut-off valve (rubber)	Every 3 years	Deterioration of the check valve
Mechanical Seal	Every 3 years	Poor suction due to deterioration
Oilless Vacuum Pump Blades	Every 3 years	Poor suction due to deterioration
Carburetor	10 years	Corrosion inside the tank
Fuel Tank	10 years	Corrosion inside the tank

Parts recommend replacing when disassembling

- Gaskets • Push nuts
- O-rings • Spring pins
- Lock washers • E-rings



Caution

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

5 Periodical Inspections

2. Inspection method

Periodic inspections are essential to ensure the fire-fighting pump's safety and use every possible function. Inspect the pump correctly and safely 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, 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.



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 recommended to replace the battery earlier.

Recommended battery : GS YUASA YTX20L-BS

For handling the battery, please follow the instruction manual that comes with the battery.

5 Periodical Inspections



Caution

- When disposing of batteries, oils, etc., please entrust disposal to a specialized industrial waste disposal contractor.
- It may cause fire, burns, or pollute the environment.

(2) Handling of Shibaura full-automatic charger



Caution

- To use the charger safely and correctly, be sure to read the instruction manual that comes with the charger. Improper use may cause an accident. After reading the charger instruction manual, be sure to keep it close to the product.

A) Unpacking



Caution

- Remove packing materials from the battery charger before charging.
- There is a risk

B) Location to place



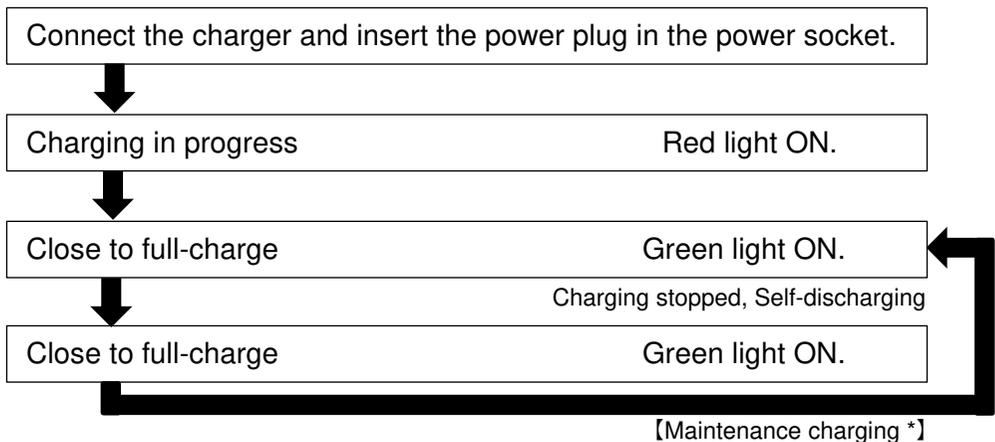
Warning

- Do not use the charger in high-temperature places such as under direct sunlight or near heating elements, in extremely humid places, or wet areas such as rain or snow.
- There is a risk of overheating, burnout, or damage to the charger, or leakage of electricity or electric shock.

C) Make sure before use

- Remove the power plug from the socket (Be sure the charger is turned off).
- Connect the output of the charger cable firmly to the fire-fighting pump.
- After connecting the cable to the charger unit(AC inlet), plug in the socket.

D) Battery charger Operating Manual



5 Periodical Inspections

* Maintenance charge mode

This function automatically recharges the battery when the capacity has declined. It always monitors the decline of the battery capacity by self-discharge.

After starting the charging (Red Light ON), when the battery is close to full charging, the indicator will change to Green Light ON, and the status will automatically change to the maintenance charging mode (Green Light ON). After that, the Red Light and the Green Light will light up alternately to reduce the deterioration of the battery.

Note:

Remove the power plug to stop the main unit from charging. Then, remove the output terminal.

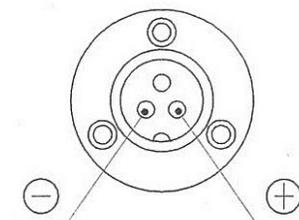
LED indication and charge status

CHARGE STATUS	CHARGE LED (RED)	FULL LED (GREEN)
No Charging	OFF	OFF
Charging	ON	OFF
Close to full-charge	OFF	ON
Error (⚠)	ON	ON

⚠ Refer to "5. Periodical inspections" when an error has occurred.

Note:

When starting the engine using a fully charged battery, if the starter does not rotate sufficiently, this may be due to battery deterioration. Please inspect or replace the battery.



E) Protective operations

- Input (primary side)
Protected from circuit errors by current fuse.
- Output (secondary side)
Protected from battery reverse connection and output short-circuiting by electronic circuit and circuit breaker.

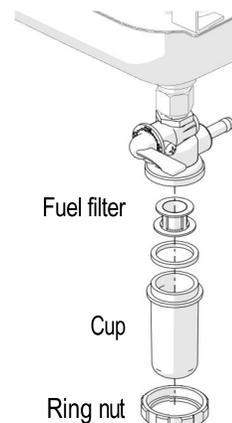
F) Inspection method when an error has occurred

Symptom	Cause	Measure *
Both red and green LEDs come on	Power cable is not connected correctly.	Check the connection status.
	The circuit breaker is open.	Pull out the power plug. After the body of the charger stops, remove the error cause, and close the circuit breaker after 60 seconds.
	The output connector is loose.	Insert the output connector all the way, and lock it securely.
The battery is obviously in discharged state, but the tickle charge mode starts immediately.	Battery is in the deteriorated state.	Replace the battery with a new one.
LED does not come on (both red and green)	Protective operation is activated.	Turn off the power and wait for 60 seconds. After that, charging the battery again.

5 Periodical Inspections

(3) Cleaning the fuel cock filter

- ① Close the fuel cock.
- ② Loosen and remove the ring nut with pliers.
- ③ Wipe off any debris in the cup with a cloth or the like.
- ④ Remove the filter attached to the ④❶ fuel cock main unit and wash it with gasoline.
- ⑤ Install the fuel cock securely to the original position. Be sure to open the ❶ fuel cock and inspect if there are no leaks.
- ⑥ After inspection, close the ❶ fuel cock.



(4) Replacement of the fuel in the tank

Storing fuel for a long period of time may result in poor starting performance and rust.
Replace with new fuel every 6 months.



Danger

- Keep fire away when refueling.
- There is a risk of ignition and explosion.

(5) Spark plug cleaning

Use [NGK BR8HIX] spark plugs.

Clean the spark plugs that are contaminated with exhaust gases and carbon.

- (1) Stop the engine to cool down sufficiently before working on it.
- (2) Remove the spark plug cap and spark plug using the spark plug box wrench.
- (3) Clean the outside, inside, and electrode of the spark plug.
- (4) Tighten the spark plug to the cylinder head and keep the spark spark plug cap pressed in.



Caution

- Do not touch the ignition plug or high-voltage cord during operation.
- There is a risk of electric shock.

(6) Check the governor oil level

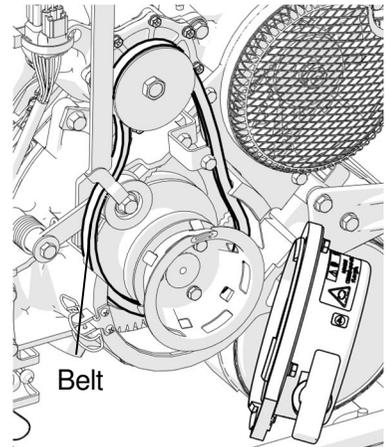
(See "4 Handling Methods (Preparation for Operation) 1.

5 Periodical Inspections

(7) Vacuum pump belt inspection

Replacement of the vacuum pump belt is required if it is stretched, worn, or cracked.

- ① Open the recoil starter.
Do not start the engine during the inspection. Also, the belt may be hot immediately after operation, so wait until the engine has cooled down before inspecting
- ② Remove the front cover and vacuum pump cover.
(See "4 Handling Methods (Preparation for Operation) 1.")
- ③ Remove the belt from the pulley groove.
- ④ Install a new belt.
- ⑤ Install the cover as before.

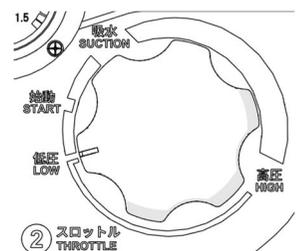
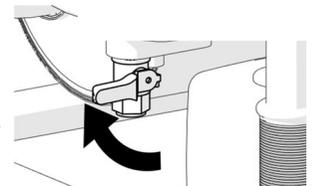
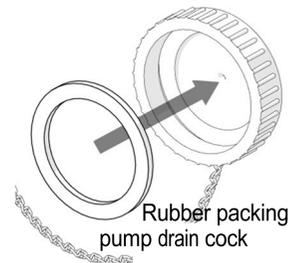


(8) Starting and vacuum inspection

Vacuum inspections must be performed even if the suction and discharge tests (which are described in the next page) are difficult to carry out.

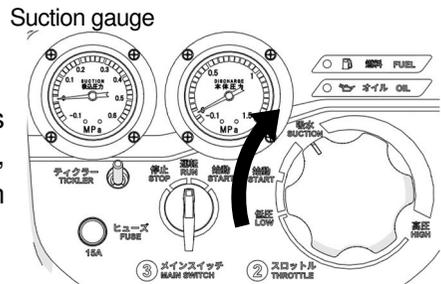
Defects such as engine not starting, poor vacuum performance, or vacuum leakage can cause accidents, such as not being able to operate the water discharge at the actual site, or falling water during the discharge.

- ① Check that the rubber packing is in the water suction cap, and attach the inlet cap to the water inlet.
- ② Close the pump drain cock.
- ③ Start the engine.
- ④ ② Warm up the engine with the throttle dial in the "low pressure" position for about 1 minute, and visually check for any abnormalities in the various parts.



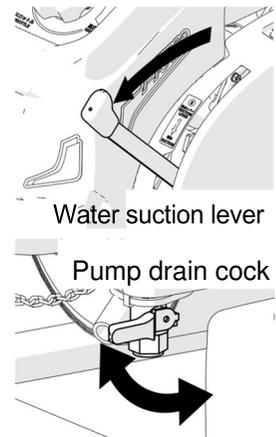
5 Periodical Inspections

- ⑤② Turn the throttle to the "suction" position and pull the ⑤ suction lever toward you to activate the vacuum pump. When the pointer of the ⑥ suction gauge reads -0.06 to -0.08 MPa, return the ⑤ suction lever, ② throttle to the "low pressure" position, and then stop the engine.
- ⑦ If there is no change in the indicated value of the suction gauge after leaving it for 1 minute, the vacuum performance is good.



- ⑧ Open the pump drain cock to release the vacuum and close the pump drain cock.

* If any abnormality is found, please consult your dealer.



(9) Water suction and discharge inspection

Suck and Discharge the water to inspect if there is no abnormalities found in each part of your pump

- (1) Are there any abnormal sounds?
- (2) Is there any water fall?
- (3) Is the water suction slow?
- (4) Are there any water leaks?
- (5) Is the startability good?
- (6) Are there any looseness in each part?
- (7) Are there any fuel leaks?
- (8) Other

*If any abnormality is found, refer to the "6 Troubleshooting" in the next section for appropriate treatments.

6 Troubleshooting

Daily inspection and maintenance are important to prevent fire-fighting pump malfunctions. Detect malfunctions at an early stage and perform maintenance immediately. If the trouble is not easily solved, or if the malfunction is not listed below, please consult the dealer where you purchased the pump, giving the model name and serial number.

1. Engine area

	Symptom	Cause	Action
Hard to Start	No fuel flow to carburetor.	1 Fuel cock filter or fuel line is clogging 2 Needle valve is sticking 3 There's no fuel.	1 Clean 2 Clean 3 Fill
	Fuel does not flow to combustion chamber (remove spark plugs to see)	1 Choke does not close (auto choke) 2 Rotational speed is low when starting. 3 Carburetor (needle valve, jet) is clogging	1 Repair and adjust 2 Replenish the battery 3 Clean
	Fuel goes to combustion chamber but does not start	1 Overflow (excessive fuel) 2 Tickler is overused (excessive fuel) 3 Choke does not open fully closed (auto choke) 4 Fuel is deteriorated 5 Water is mixed in the fuel. 6 Excessive lubricating oil	1 Inspect and adjust the carburetor 2 Drain the fuel from the seal at the crankcase. 3 Replace diaphragms and clean pipes. 4 Exchange. 5 Drain water 6 Adjust to the proper amount
	Abnormality of combustion system	1 Fuel cock filter is clogged 2 Carburetor valve seat is clogged 3 Carburetor is poorly adjusted, or there is a clog on the carburetor 4 Carburetor is poorly tightened.	1 Clean 2 Clean 3 Adjust or clean 4 Retighten
	Sparks are poor	1 Spark plug cap has damages, electrode gap is improper, or the spark plug is defective. 2 Leakage from high voltage cord 3 Leakage from spark plug cap 4 Defective ignition coil 5 Defective CDI unit 6 Poor rotation of the starting motor	1 Exchange 2 Exchange 3 Exchange 4 Exchange 5 Exchange 6 Replenish the battery

6 Troubleshooting

Symptom		Cause	Action	
Hard to Start	No sparks	<ol style="list-style-type: none"> 1 Short circuit of the ground wire 2 Spark plugs are damaged or stained. 3 Spark plug has gap failure 4 Ignition coil is defective 5 CDI unit is defective 6 Wiring connection is poor or disconnected 7 Main switch is defective 	<ol style="list-style-type: none"> 1 Repair the point short circuited 2 Exchange. 3 Exchange 4 Exchange 5 Exchange 6 Adjust the connection 7 Exchange. 	
	Poor compression	<ol style="list-style-type: none"> 1 Piston wear or seizure 2 Piston rings 3 Worn or damaged oil seals 4 Lack of lubricant 5 Damaged cylinder head gasket 	<ol style="list-style-type: none"> 1 Repair or replace 2 Exchange. 3 Exchange 4 Refill to the proper amount 5 Exchange 	
Poor running	Insufficient rotation	Combustion system error (mis-hunting)	<ol style="list-style-type: none"> 1 Carburetor main jet is clogged or misadjusted 2 Fuel cock filter clogged 3 Overflow 4 Poor installation of the carburetor 5 Icing 	<ol style="list-style-type: none"> 1 Clean or replace 2 Cleaning 3 Check and adjust the carburetor 4 Correct the place or replace. 5 Remove and add fuel tank drainage agent
		Abnormalities in the governor system	<ol style="list-style-type: none"> 1 Governor maladjustment 2 Governor operating parts wear 3 Defective caulking of flyweight 4 Poorly tightened governor arm 5 Governor spring tension failure 6 Governor lever ring hole worn or rattling large 	<ol style="list-style-type: none"> 1 Adjust 2 Exchange. 3 Correct or exchange 4 Readjust and retighten. 5 Exchange. 6 Replace or correct
		Cooling system abnormalities	<ol style="list-style-type: none"> 1 Cooling air is weak 	<ol style="list-style-type: none"> 1 Pay attention to the ventilation
		Other	<ol style="list-style-type: none"> 1 Overload 2 Muffler and exhaust port clogging 3 Inlet clogging 4 Defective spark plug 	<ol style="list-style-type: none"> 1 Change nozzle diameter or use safety nozzle 2 Remove the clog 3 Remove the clog 4 Exchange

6 Troubleshooting

		Symptom	Cause	Action
Poor running	Abnormal noise	Mechanical sound	<ol style="list-style-type: none"> 1 Flywheel is fixed loosely 2 Piston is worn, and tapping sounds come out from the piston skirt 3 Armature plate is contacting the other parts. 4 Foreign material is caught inside the crankcase and fan cover 5 Foreign material is caught inside the pump or impeller is touching the pump casing 6 Each part becomes loose 	<ol style="list-style-type: none"> 1 Retighten 2 Replace the piston 3 Reassemble 4 Remove the foreign material 5 Remove the foreign material or reassemble the pump 6 Retighten
		Knocking sound (combustion system abnormalities)	<ol style="list-style-type: none"> 1 Insufficient fuel (main jet or use of different diameter parts) 2 Overload 3 Rotation speed too low or too high 4 Different spark plug is used 	<ol style="list-style-type: none"> 1 Clean or replace 2 Open water discharge valve 3 Adjust to proper rotation speed 4 Replace with proper spark plugs

6 Troubleshooting

2. Pump

		Symptom	Cause	Action	
Water suction failure	A suction gauge does not have negative pressure	Abnormality on water pump side	<ol style="list-style-type: none"> 1 Poorly tightened suction pipe 2 Air suction from the tip of the suction pipe 3 Forgot to close the drain cock 4 Defective suction pipe packing 5 suction pipe fissure 6 Foreign matter caught in water discharge valve 	<ol style="list-style-type: none"> 1 Tighten securely 2 Put it completely underwater 3 Close securely 4 Exchange. 5 Exchange. 6 Remove foreign objects 	
		Abnormality on the vacuum pump side	No Rotation	<ol style="list-style-type: none"> 1 Internal freeze 2 Foreign object inhalation 3 Vacuum pump damaged 4 V Belt slip or breakage 	<ol style="list-style-type: none"> 1 Defrost 2 Remove foreign objects 3 Exchange. 4 Exchange.
			Rotating	<ol style="list-style-type: none"> 1 Clogged or poorly tightened vacuum passage 2 Strainer at the water shut-off valve is clogged 	<ol style="list-style-type: none"> 1 Clean or retighten 2 Clean
	The coupled meter becomes negative pressure	Vacuum leak (engine) Falling water when stopped)	Refer to "Water suction failure - compound meter does not become negative pressure - Water pump side abnormality"		
		No vacuum leakage	<ol style="list-style-type: none"> 1 Clogged suction pipe strainer or inside suction pipe 2 Air pocket in the suction pipe. 3 Suction height is too high, or the suction pipe is too long 4 Air suction from the tip of the suction pipe 5 Low engine speed at water suction 6 Short water suction operation time 7 Clogged or poorly tightened vacuum passage 8 Strainer at the water shut-off valve is clogged 	<ol style="list-style-type: none"> 1 Clean 2 Correct the layout 3 Keep the height within 8m 4 Put the tip completely underwater 5 Adjust to water suction rotation speed 6 Lengthen operation time 7 Clean or retighten 8 Cleaning 	

6 Troubleshooting

Symptom		Cause	Action	
Water Discharge Failure	Pressure does not increase	Abnormality on water pump side	<ol style="list-style-type: none"> 1 Clog in the suction pipe strainer or suction pipe 2 Air pocket in suction pipe 3 Suction height is too high, or the suction pipe is too long. 4 Air suction from the tip of the suction pipe 5 Poorly tightened suction pipe 6 Discharge valve half-open 7 Forgot to remove the safety nozzle (not necessary when the nozzle is attached) 8 Foreign matter in the nozzle 9 Frozen inside the pump 	<ol style="list-style-type: none"> 1 Clean 2 Correct the layout of the suction pipe. 3 Keep the height within 8m 4 Put the tip completely underwater. 5 Tighten securely 6 Open the valve completely 7 Remove 8 Remove foreign objects 9 Defrost and remove the ice
		Engine malfunction	Refer to 1. Engine – Hard to start and poor running	
	Other Abnormalities	<ol style="list-style-type: none"> 1 Muffler and exhaust port clogging 2 Air Inlet of the carburetor clogging 	<ol style="list-style-type: none"> 1 Remove the clog 2 Remove the clog 	

3. Electrical

Symptom		Cause	Action
Bad start	Starting motor does not rotate	<ol style="list-style-type: none"> 1 Insufficient battery capacity 2 Deterioration of the battery 3 Fuse burnout 4 The cable connection is loose or Disconnected 	<ol style="list-style-type: none"> 1 Recharge 2 Replace 3 Replace. 4 Check the cable connection and plug-in surely. Replace parts if necessary.
Battery failure	Batteries run out too quickly.	<ol style="list-style-type: none"> 1 Deterioration of the battery 2 Mistake in main switch operation. 3 Mistake in charge operation 	<ol style="list-style-type: none"> 1 Exchange. 2 Operate properly 3 Operate properly
Connection failure	Wiring burnout	<ol style="list-style-type: none"> 1 Battery reverse connection 2 Poor connection or short-circuit at the outlet terminal 3 Poor wiring connection or disconnection 4 Fuse burnout 	<ol style="list-style-type: none"> 1 Connect correctly 2 Connect correctly, or Repair or replace the short-circuited parts. 3 Correct the wiring or repair, or replace 4 Replace

6 Troubleshooting

Symptom		cause	treatment	
Defective wiring	Lamp does not light	1 Lamp blew out 2 Wiring is loose or disconnected	1 Replace 2 Correct the circuit, repair, or replacement	
Defective monitor lamp	All monitor lamps do not light up immediately after turning the main switch to operate	1 Battery capacity is not enough, or the battery is deteriorated. 2 Fuse burnout 3 Wiring is loose or disconnected	1 Recharge or replace 2 Replace 3 Correct the circuit, repair, or replacement.	
	The lamps do not light even if they should have lit up	Common & typical matters to be noticed	1 Loose or disconnected wiring of each sensor and switch	1 Correct the circuit, repair, or replacement
		Fuel	1 Switch is broken	1 Replace
		2-cycle oil	1 Switch is broken	1 Replace
Monitor lamp light up	Please refer to Section No. 3 – Monitor Lamp (P. 7) and cope with each matter displayed			

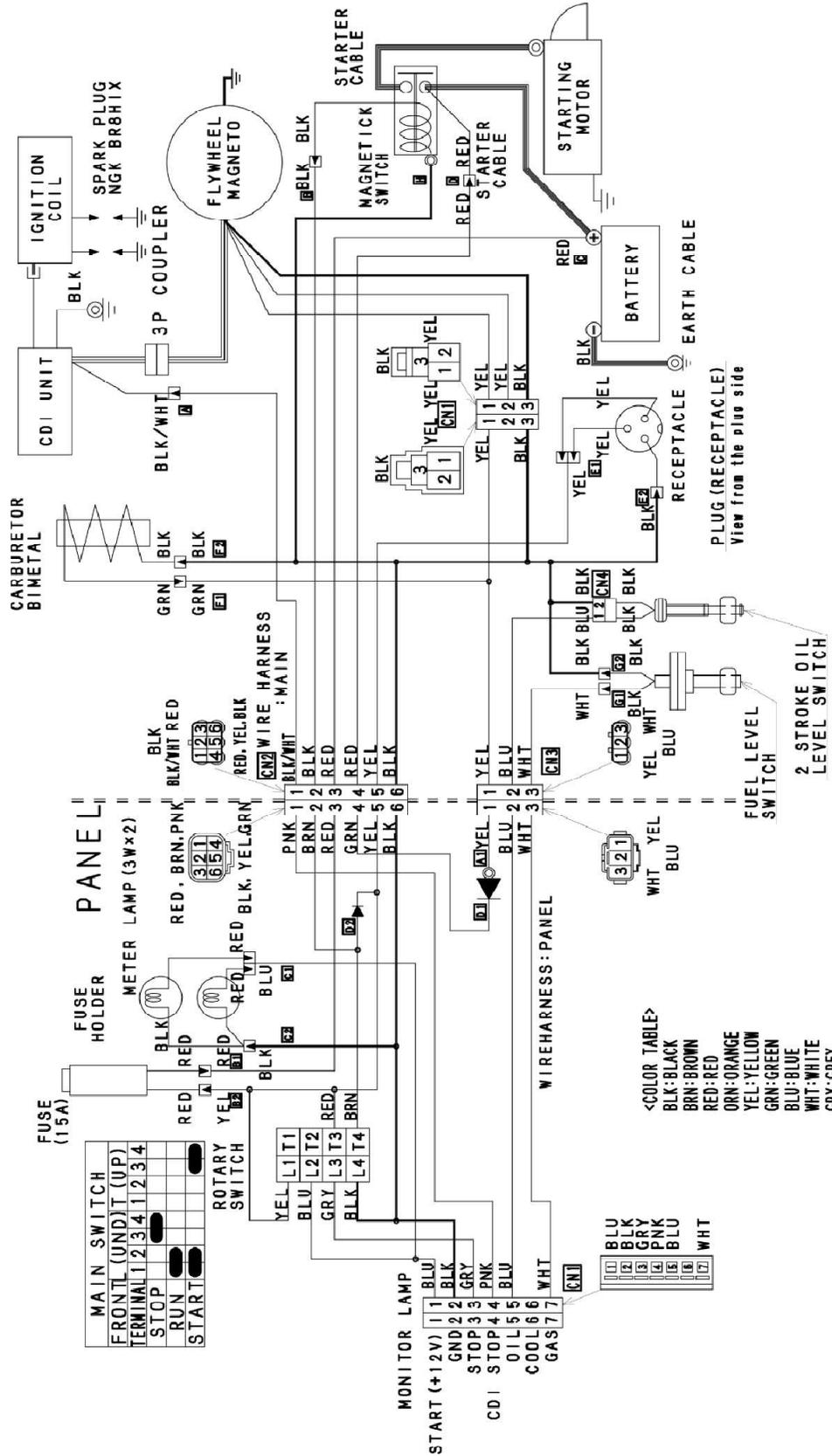
7 Specifications

1. Fire-fighting pump	
Model	FT510-A
Classification (JPN)	(B-2)
Notification No. (JPN)	(P0145001)
Dimension (L x W x H)	737mm x 572mm x 740mm
Dry Weight	90 kg
2. Pump	
Type	High-pressure 1-stage turbine pump (with inducer)
Discharge water volume	Normal 1.01 m ³ /min
	High pressure 0.64 m ³ /min
Pump pressure	Normal 0.70 MPa
	High pressure 1.00 MPa
Nozzle diameter	Standard 24.0 mm
	High pressure 17.5 mm
Rated rotation speed	5800 rpm
Water inlet	Nominal 75mm, Fire engine thread (JIS B 9912)
Water outlet	Nominal 65mm, Fire engine Thread (JIS B 9912)
3. Engine	
Type	Air-cooled, 2-cycle, inclined, 2-cylinder gasoline engine
Model name	E440C
Displacement	436mL
Authorized output	22.8 kW / 5800rpm
Fuel feeding system	Carburetor
Fuel type and tank capacity	Regular gasoline for automobiles - 14.5L
Lubrication system and tank capacity	Separate lubrication system (2-cycle oil) - 2L
Fuel consumption	Approx. 14L/h
Cooling system	Forced air-cooled
Ignition system	CDI ignition system
Starting system	Starting motor & recoil
Lighting	12V-35W (searchlight), 12V-3W (instrument panel light)
Spark plug	NGK BR8HIX

7 Specifications

4. Vacuum pump	
Type	Oilless type: 4-vane eccentric rotary type
Maximum Suction Height	Approx. 9 m
Drive system	V Belt clutch type
5. Accessories	
Battery	12V15Ah/5h
Charger	AC100V~AC240V – DC12V charger
Tools, etc.	1 x Tool kit, 1 x instruction manual 1 x Spark plug, 1 x safety nozzle
Pump cover	1 pc.
6. Optional parts	
Searchlight lamp	1 pc.
Searchlight stand	1 pc.

8 Wiring Diagram





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SHIBAURA

OPERATION MANUAL

SHIBAURA FIRE-FIGHTING PUMP FT510-A



Please read this operation manual carefully to operate the Shibaaura Fire-fighting Pump safely and correctly. Incorrect operation of the pump may result in an accident. If this manual is missing or damaged, please order a new one from us or our agent promptly.

Shibaaura Fire Pump Co., Ltd.

- For safe use

Keep it in a safe place with the fire-fighting pump.

- Items marked with  in this instruction manual are particularly important for safe use and must be observed.

 Danger	The case when there is an imminent risk of death, serious injury, or the product is mishandled.
 Warning	The case when there is a risk of death or serious injury, or the product is mishandled.
 Caution	In cases when the product is mishandled, minor injuries or property damage may occur.

- Product specifications and appearance are subject to change without notice for improvement. Therefore, please note that the contents of this document and some of the photographs and illustrations may not correspond to the product.
- If you have any questions or difficulties after reading this manual, please contact the dealer where you purchased the product or our company.
- For inspection and maintenance, please contact a maintenance business or dealer that is qualified to service portable fire-fighting pumps.

○ Contents

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1 Things you must follow for your safety

1. Warning Label Locations



Part No.L82900900



Part No.290192430



Part No.290192770



Part No.290192410



Part No.290192400



Part No.290192400

- If the contents of the label become difficult to see or the label is about to come off, replace it immediately.

1 Things you must follow for your safety

2. Caution Marks



- Do not suck in or discharge the substances other than water, such as flammable materials, drugs, or chemical liquid.
- There is a risk of explosion, fire, burns, poisoning, etc.

- Keep fire away when refueling.
- Do not overfill fuel into the tank.
- If the fuel is spilled, wipe it up immediately. Keep the wiping cloth away from fire.
- Refill the fuel after the engine has cooled down.
- Do not use fire to defrost the pump.
- There is a risk of ignition and explosion.



- Fire-fighting pumps should be operated by firefighters, voluntary disaster prevention team members, maintenance and inspection personnel, and others who have been trained specifically for safe operation.
- Misuse or mishandling may result in serious accidents, including death.

- No neck wraps, ties, waist towels, etc., are allowed. Wear helmets, non-slip shoes, and no loose-fitting clothing.
- There is a risk of getting caught in the machine or slipping and falling, resulting in injury.

- Do not operate a fire-fighting pump if you are unable to concentrate on your work due to alcohol consumption, tiredness, illness, or the effects of drugs.
- This could lead to a serious accident.

- Use only genuine parts or specified attachments. No modifications are allowed.
- Failure to do so may result in accidents, injuries, or machine malfunctions.

- Install at least 3 m away from combustible materials.
- Remove flammable materials, such as dry grass, before installation.
- Exhaust fumes and heat from the muffler may cause a fire.

- Do not install indoors or in tunnels with poor ventilation.
- There is a risk of exhaust gas poisoning.

- Be sure to install the cover when operating.
- There is a risk of injury or burns.

- Be sure to close the recoil starter during operation.
- There is a risk of getting caught in pulleys or belts, or of getting cut yourself.

- Keep fire away from the battery.
- There is a risk of fire and explosion.

- Remove packing materials from the battery charger before charging.
- There is a risk of fire.

- Be sure to carry out periodic inspections. Operate and discharge the water at least once a month to check for any abnormalities.
- Accidents may occur due to damage, etc., and fire-fighting activities may be hindered.

1 Things you must follow for your safety

Caution

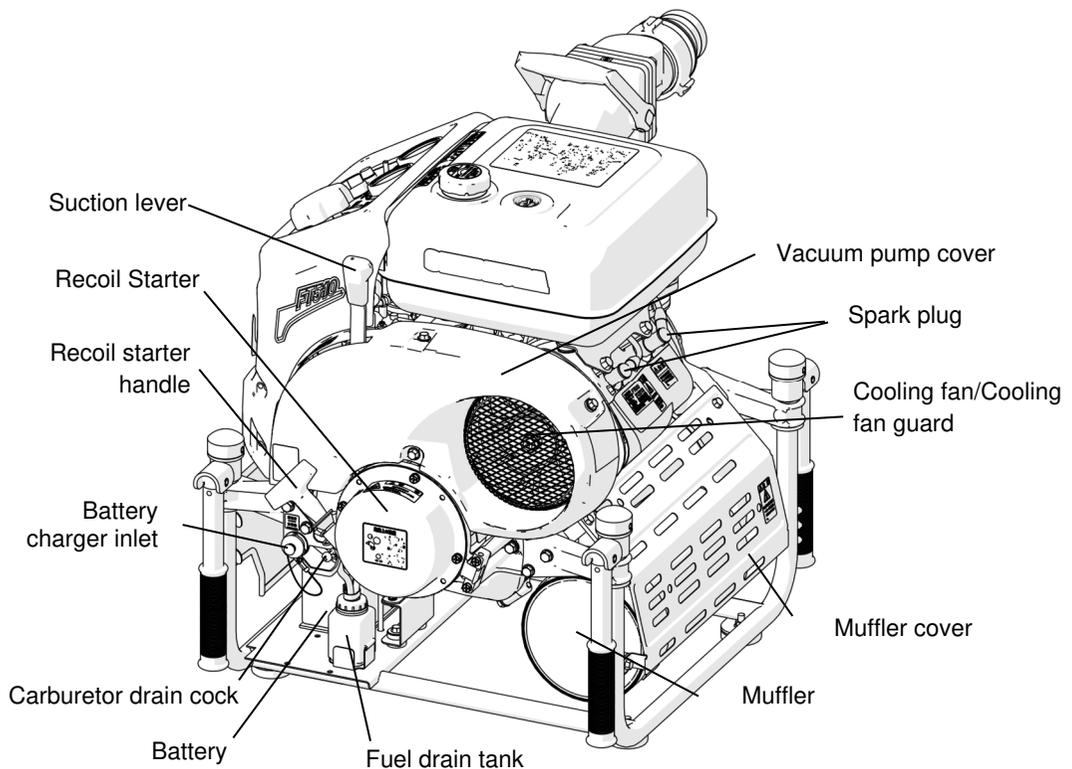
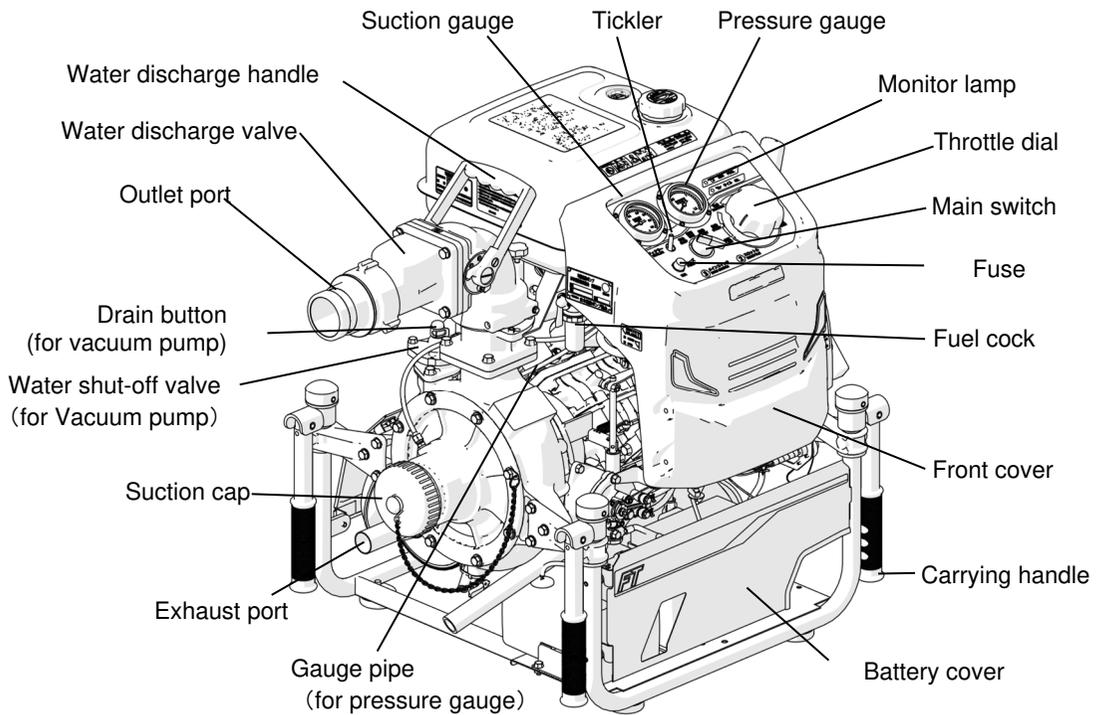
- Do not use fire-fighting pumps for activities other than fire-fighting, such as civil engineering, irrigation, water sprinkling, etc.
- There is a risk of hitting some objects and injuring people or damaging property around you.
- When disposing of batteries, oils, etc., please entrust disposal to a specialized industrial waste disposal contractor.
- It may cause fire, burns, or pollute the environment.
- Do not put fingers or hands in the water discharge valve.
- There is a risk of injury.
- After refueling, tighten the fuel tank cap securely.
- There is a risk of ignition and explosion.
- Check the fuel once a month, and if the fuel has a pungent odor or is cloudy, replace it with new fuel immediately.
- This may cause engine malfunction or equipment failure.
- When adding two-cycle oil, always use the same brand and grade of oil.
- Avoid entering water or debris when refilling the two-cycle oil.
- This may cause engine malfunction or equipment failure.
- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.
- When replenishing the governor oil, add the same brand and grade of oil.
- Avoid entering water or debris when refilling the governor oil.
- This may cause engine malfunction or equipment failure.
- When holding the carrying handle, do not touch the joint parts.
- Failure to do so may result in injury from pinching fingers.
- When carrying or loading/unloading the fire-fighting pump, four people should do so.
- Dropping it on your foot may cause injury or back pain.
- Connect the fire hose securely and always ensure it cannot be disconnected.
- If it is pulled out during water discharge, there is a risk of injury.
- Lay out the fire hoses without folds, twists, or sharp turns.
- There is a risk of the water hose springing up and causing injury.
- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.
- When starting with a recoil starter, avoid getting clothing or gloves caught.
- There is a risk of injury.
- When starting with the recoil starter, keep people at least two meters away from the starter.
- There is a risk of injury to elbows from being knocked by recoil ropes.

1 Things you must follow for your safety

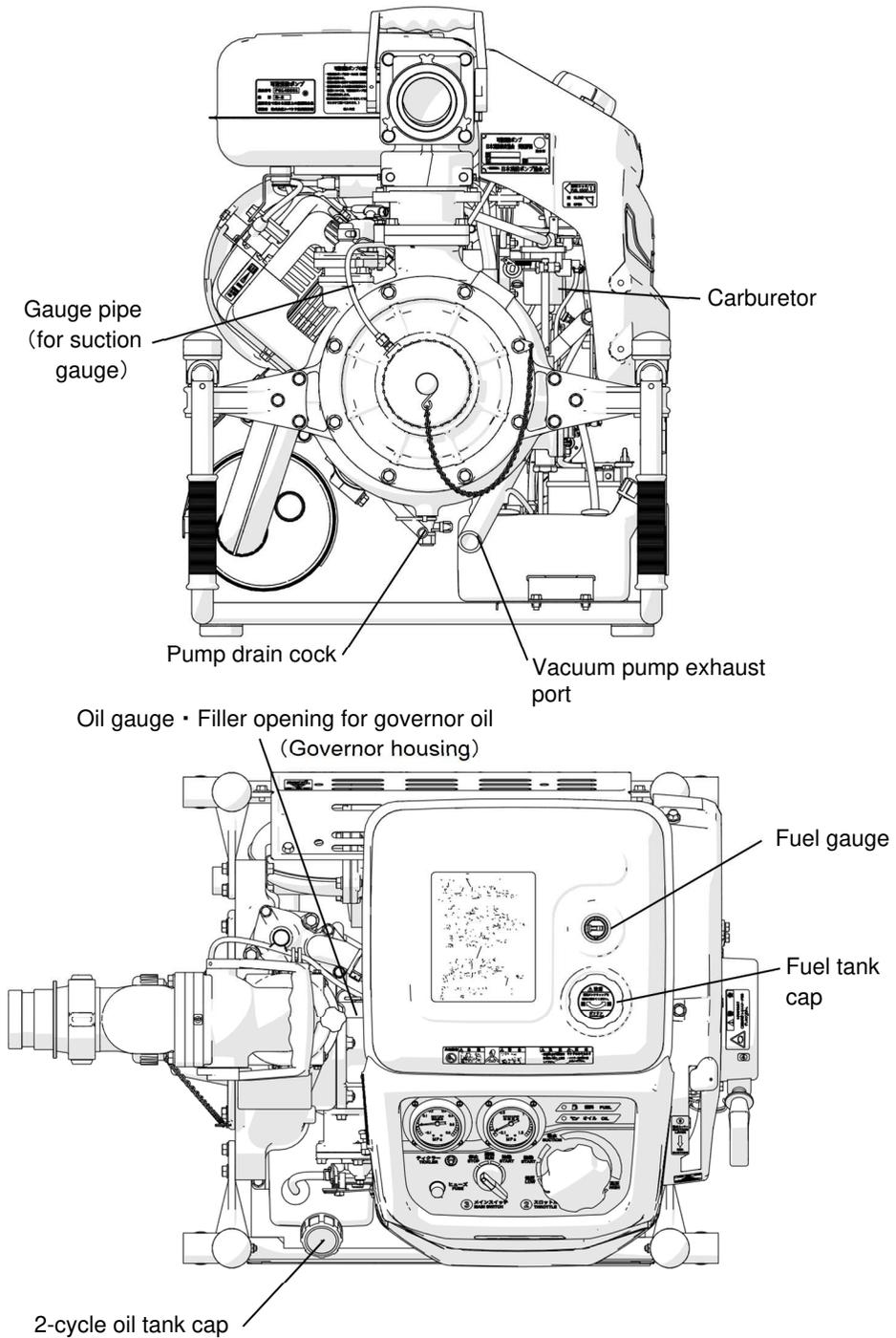
Caution

- Always return the throttle to the "LOW" position before opening and closing the water discharge valve.
- Hold the fire nozzle firmly and discharge water.
- There is a risk of injury because the fire nozzle runs away.
- Operate the water discharge valve slowly.
- There is a risk of injury from pinching or bumping hands.
- Do not aim the water at people or peer into the nozzle.
- High water pressure may cause them to be blown away, resulting in injury.
- Do not touch the spark spark plug or high-voltage cord during operation.
- There is a risk of electric shock.
- Never touch the muffler and exhaust pipe during and after operation since they become very hot.
- There is a risk of burns.
- While operating, be careful not to have the suction pipe or hose stepped on by vehicles or other objects.
- Accidents may occur due to damage, etc., and fire-fighting activities may be hindered.
- Do not start the engine with the water discharge valve handle open.
- When discharging water, the engine operator should communicate with the operator at the nozzle. Do not open the water discharge valve without notice or accelerate the throttle rapidly.
- There is a risk of injury from being blown away by the high-pressure water.
- Inspection and maintenance should be performed after the engine has been stopped and cooled down sufficiently.
- Failure to do so may result in injury, burns, or fire.
- Read the instruction manual that comes with the battery and the information on the battery itself carefully to ensure that the battery is used correctly.
- When disconnecting the battery cord, remove the (-) cord first, and when installing the battery cord, connect the (+) cord first.
- Short-circuiting may cause fire or burns.
- Do not use the charger in high-temperature places such as under direct sunlight or near heating elements, in extremely humid places, or wet areas such as rain or snow.
- There is a risk of overheating, burnout, or damage to the charger, or leakage of electricity or electric shock.
- The charger should be installed in a dry, well-ventilated location that is not wet.
- Failure to do so may cause electric shock or fire.
- Do not charge the battery with a charger other than the specified one.
- There is a risk of fire due to heating or burnout of the wiring.
- When operating without attaching the suction pipe (e.g., to check the vacuum level), attach the suction cap.
- There is a risk of getting caught in the machine or injured.
- Do not close the nozzle or water discharge valve while multiple pumps are relayed and the water is discharged.
- Abnormally high pressure may result in damage to the pump and hoses.

2 Name of each component



2 Name of each component



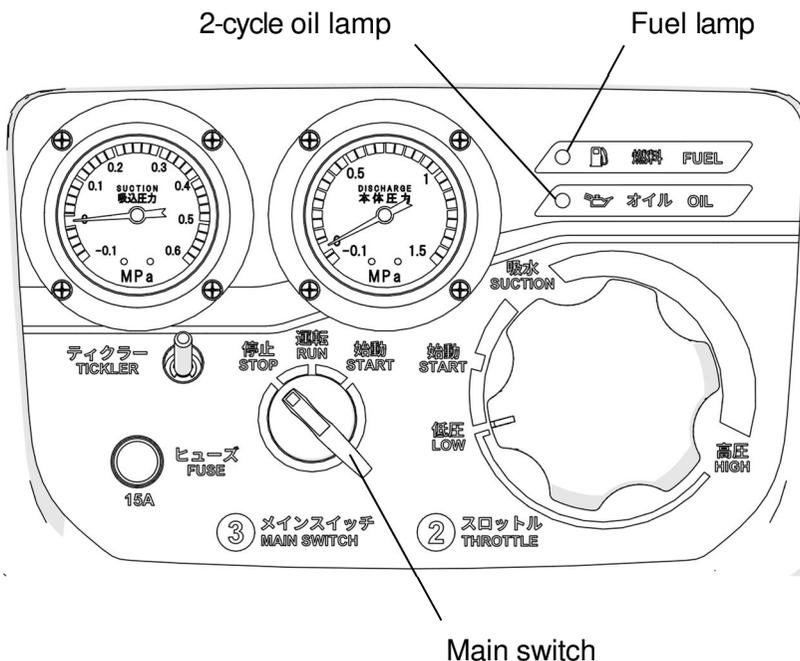
3 Monitor lamp

The pump with a starting motor activates when the main switch is turned into the "Run" position. When the power is turned on, two lights illuminate at the same time. If they do not light up, the battery voltage is insufficient, or there is a faulty circuit, the pump needs to be repaired. All lights are turned off after a few seconds.

All lights are turned off during water discharge, but the lights are turned on when operating the starting motor. It is because the battery voltage drops. Be sure to inspect or maintain when the following items are lit up.

Display	Feature	How it works	Measures
 fuel	Indicates that the fuel must be added	Lights up when the remaining fuel in the tank is low.	Refill the regular gasoline.
 2-cycle oil	Indication of when to refill 2-cycle oil	Lights up when the remaining oil in the tank is low, then stop the engine.	Refill the 2-cycle oil.

If the monitor lamp still illuminates or blinks after following the measures above, consult your dealer.



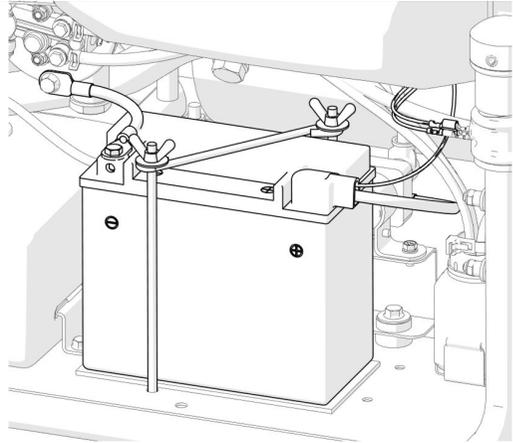
4 Handling method (Before)

Installing Battery

Caution

- Read the instruction manual that comes with the battery and the information on the battery itself carefully to ensure that the battery is used correctly.

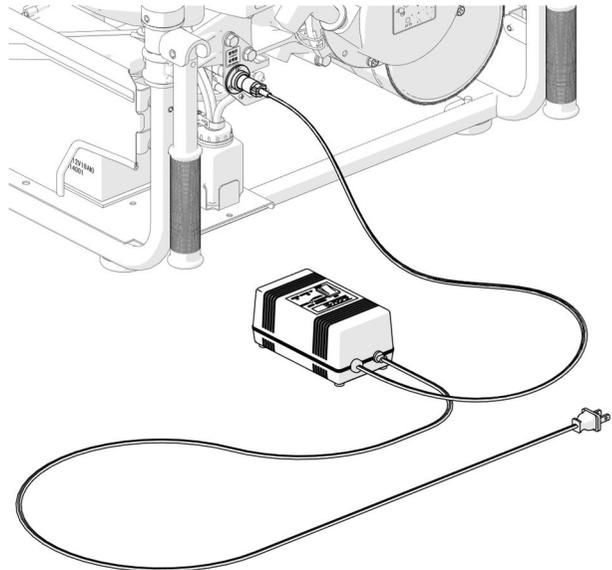
- (1) For handling, be sure to follow the battery instruction manual.
- (2) Fix the battery to the bed with two rods and one holder.
- (3) Firstly, connect two battery (+) cables (red), then connect one (-) cable (black) . Be sure to keep the connecting order.



Caution

- When disconnecting the battery cable, remove the (-) cord first, and when installing, connect the (+) cable first.
- Short-circuiting may cause fire or burns.

- (4) Connect the supplied charger to a charger inlet to charge the battery. (See "5 Periodic Inspection 2. Inspection Method (2) Handling of Fully Automatic Charger" on p. 29.)



4 Handling Method (Preparation for Operation)

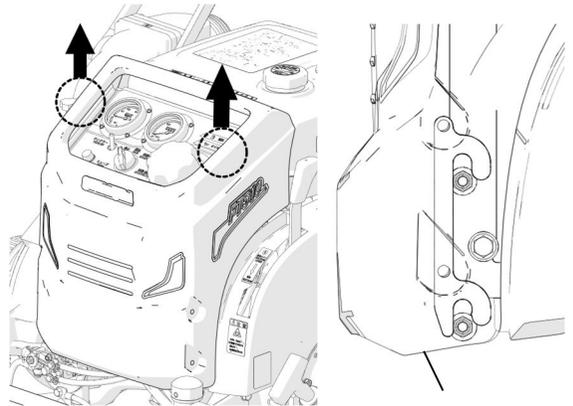
1. Removing and attaching covers

When removing the cover, follow the procedure below.

(1) Removing/attaching front cover

Hold the circled places on the illustration on the right. Shift it upward first, and then remove it toward you.

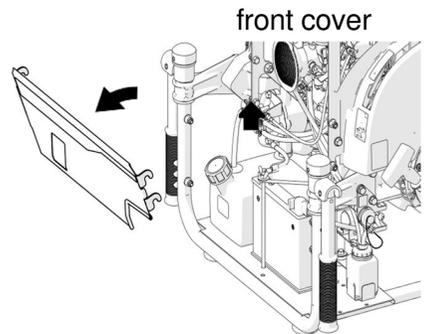
Installation is the reverse procedure.



(2) Removing and attaching the battery cover

Slide the battery cover upward first, and then remove it toward you.

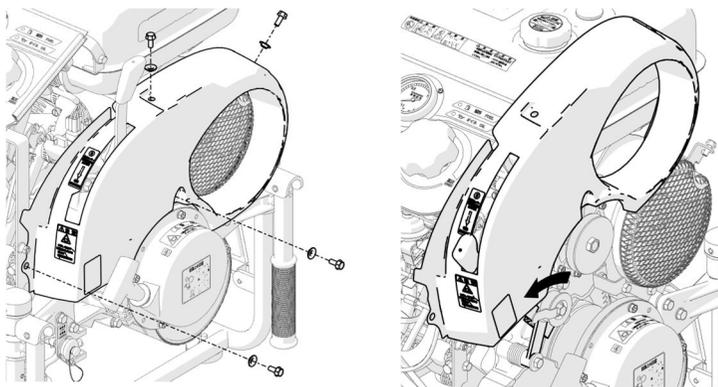
Installation is the reverse procedure.



(3) Removing and attaching vacuum pump cover

Remove the four bolts and collars. Pull the water suction lever toward you and remove it through the lever opening of the vacuum pump cover.

Installation is the reverse procedure.



Warning

○ Be sure to attach the cover when driving.

● There is a risk of injury or burns.

4 Handling Method (Preparation for Operation)

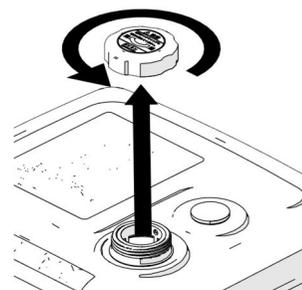
1. Replenishment

(1) Fuel

(Fuel tank capacity: approx. 14.5L)

Fill the tank with regular gasoline until the fuel gauge indicates "F".

Do not add gasoline mixed with two-cycle oil or bio-gasoline.



Danger

- Keep fire away when refueling.
- Do not overfill fuel into the tank.
- If the fuel is spilled, wipe it up immediately. Keep the cloth away from fire.
- Refill the fuel after the engine has cooled down.
- There is a risk of ignition and explosion.
- Hold the nozzle firmly and discharge water.
- There is a risk of injury due to swinging of the discharge nozzle.

Caution

- Tighten the fuel tank cap securely after refueling.
- There is a risk of ignition and explosion.

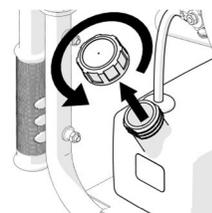
Caution

- Check the fuel once a month, and if the fuel has a pungent odor or is cloudy, replace it with new fuel immediately.
- This may cause engine malfunction or equipment failure.

(2) Engine oil

(Oil tank capacity: Approx. 2L).

Fill the 2-cycle oil into the oil tank at the bottom of the fire-fighting pump.



Caution

- When refilling the 2-cycle oil, use the same brand and grade of oil.
- Do not allow water or debris to enter when refilling.
- This may cause engine malfunction or equipment failure.

Caution

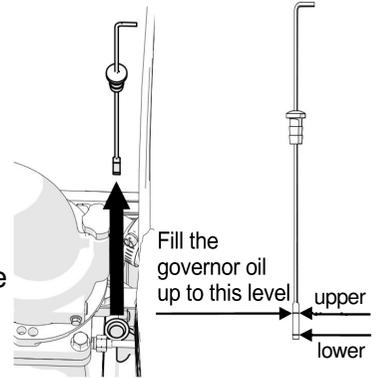
- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.

4 Handling Method (Preparation for Operation)

(3) Governor oil

(1) Place the pump on the level place and check the governor oil level with an oil gauge.

- Remove the governor oil level gauge and check the oil level. Refill the oil to the original level when the oil level has become in the middle or lower. Put back the oil gauge after refilling. Do not replenish more than the upper limit.
- If the oil is very dirty or cloudy, consult your dealer.
- Recommended oil (Automotive engine oil) SAE:10W-30(API:SJ)



Caution

- When replenishing governor oil, add the same brand and grade of oil.
- Do not allow water or debris to enter the oil inlet when refilling.
- This may cause engine malfunction or equipment failure.

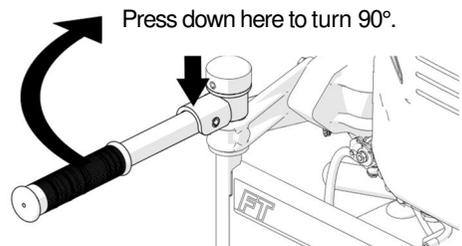


Caution

- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.

2. Carrying the pump

Hold the transport handle correctly when moving and loading/unloading the fire-fighting pump.
The carrying handle can be turned 90 deg.



Caution

- When holding the carrying handle, do not touch the bend.
- Fingers may be pinched, resulting in injury.

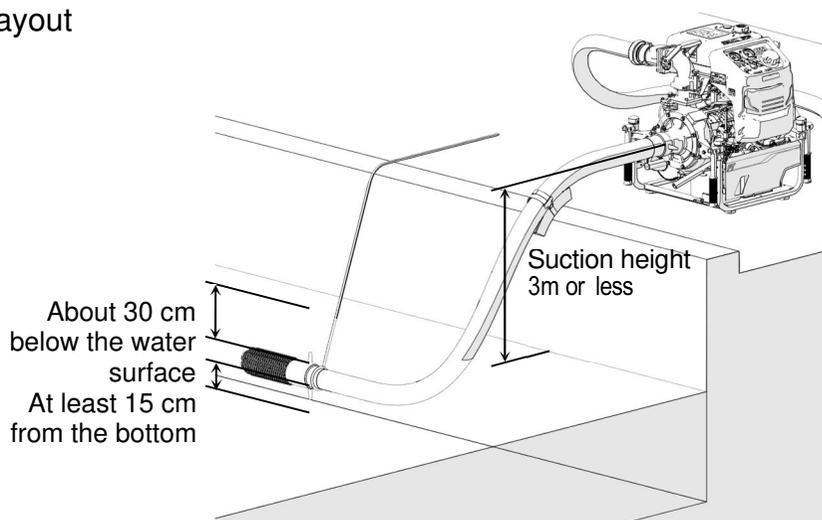


Caution

- 4 people is necessary to carry the pump.
- Dropping it on your foot may cause injury or back pain.

4 Handling Method (Preparation for Operation)

3. Pump layout



- (1) Check the water source. Make sure that there will be no problems with use, such as no decay, floating matter, or sediment.
- (2) Place the pump close to the water source and on a level surface.



Warning

- Avoid installation in places with poor ventilation, such as indoor, in a vehicle, tunnel. There is a risk of exhaust gas poisoning.



Warning

- Place at least 3 m away from combustible materials.
- Remove dead grass and other flammable materials before setting.
- Exhaust fumes and heat from the muffler may cause a fire.

- (3) Keep the suction height below 3m as much as possible to avoid falling water because of the reduction of the pump capacity.
- (4) Lay out the suction hose with no bends or bumps and fasten it tightly to the suction inlet port. Ensure the level of the inlet port side is higher than the suction hose tip at the water source side.
- (5) Always attach a strainer and basket to the suction port of the suction hose and keep it below the water surface to prevent air sucking in. Place the tip about 30 cm above the bottom. If the tip of the device is 15 cm or more away from the bottom. Place a straw mat to prevent sediment from being sucked into the device. If the water source has algae, watergrass, etc., remove them around the water inlet.
- (6) Connect the fire hoses securely and lay them out. Be sure not to fold.

4 Handling Method (Preparation for Operation)



Caution

- Connect the fire hose securely and always ensure it cannot be disconnected.
- If it is pulled out during water discharge, there is a risk of injury.



Caution

- Lay out the fire hoses without folds, twists, or sharp turns.
- There is a risk of the water hose springing up and causing injury.

4. Pump user

- (1) Fire-fighting pumps are small but high-performance machines with strong power. Improper use may cause serious accidents, including death.



Warning

- Fire-fighting pumps should be operated by firefighters, voluntary disaster prevention team members, maintenance and inspection personnel, and others who have been trained specifically for safe operation.
- Misuse or mishandling may result in serious accidents, including death.

- (2) Wear clothing appropriate for the operation.



Warning

- No headbands, neck wraps, ties, waist towels, etc., are allowed. Wear helmets, non-slip shoes, and no loose-fitting clothing.
- There is a risk of getting caught in the machine or slipping and falling, resulting in injury.

- (3) Do not operate if you are not feeling well.



Warning

- Do not operate fire-fighting pump if you are unable to concentrate on your work due to alcohol consumption, tiredness, illness, or the effects of drugs.
- This could lead to a serious accident.

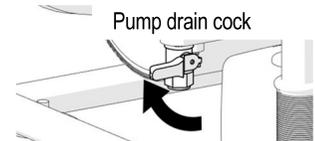
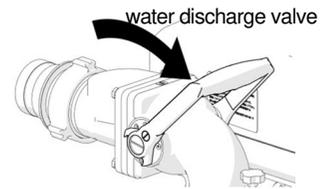
4 Handling method (Operation)

1. Starting the engine

Close the ⑥ water discharge valve and pump drain cock before starting the engine.

Please be sure to check the following

Follow the operating instructions in the order of ❶ to ❹ numbers on the unit.



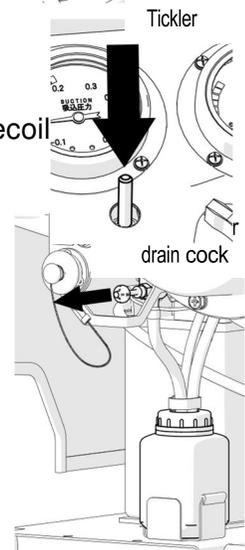
(1) Open the ❶ fuel cock.

Move the fuel cock lever straight down to "Open" ❶ to open the fuel cock.



(2) In cold weather, use the tickler in the carburetor.

- If it is difficult to start the engine with auto-choke alone in cold weather, press the tickler for 2 to 3 seconds.
- Press the tickler for 2 to 3 seconds when starting with the recoil starter and the engine is cold.
- If you use tickler for multiple times and the engine does not start, close the ❶ fuel cock, drain fuel from the carburetor drain cock, then start the engine.
- If the engine does not start properly due to excessive fuel, such as when restarting after warm-up, close the fuel cock, open the carburetor drain cock, and drain the gasoline from the carburetor before starting the engine. After starting, turn the fuel cock "open". If the car stops, start the car again.



*Remove and dispose of the fuel in the drain tank every time.

Fuel drain tank

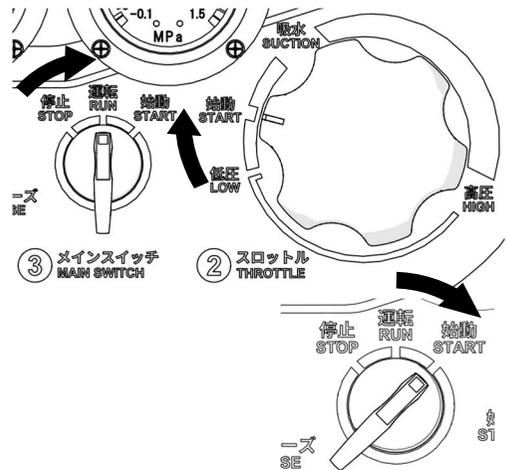


Caution

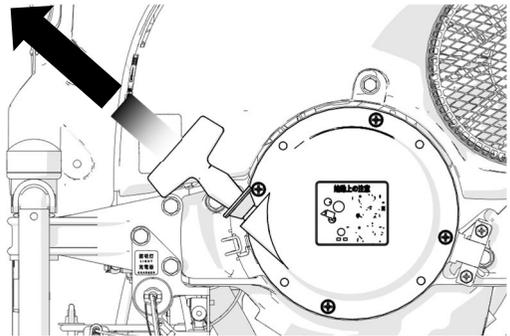
- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.

4 Handling method (Operation)

- (3) Turn the ② throttle to the "start" position.
- (4) Turn the main switch to the "run" position. When starting the starter motor, turn it to the "START" position. The starter motor works, and the engine starts.
- Once the engine is started, set the ③ main switch to the "operation" position.
 - Stop the starter motor for at least 5 seconds after running it for 3 seconds. Continuous operation will cause deterioration of the battery and the starter motor.



- (5) For recoil starting, pull the ④ recoil starter handle out to the point where it is slightly heavy, then pull quickly and sharply.



Caution

- When starting with a recoil starter, avoid getting clothing or gloves caught.
- There is a risk of injury.



Caution

- When starting with the recoil starter, keep people at least two meters away.
- There is a risk of injury to the elbows from being knocked by recoil ropes.



Warning

- Be sure to close the recoil starter during operation.
- There is a risk of getting caught in pulleys or belts, or of cutting yourself.

4 Handling method (Operation)

2. Suction

- (1) Turn the ② throttle to the "suction" position after starting the engine.
- (2) Pull the ⑤ suction lever toward you to activate the vacuum pump and suction water.
 - Promptly return the ⑤ suction lever when the pressure gauge needle swings and the pressure increases and stabilizes.
 - Keep the vacuum operation time less than 30 seconds.

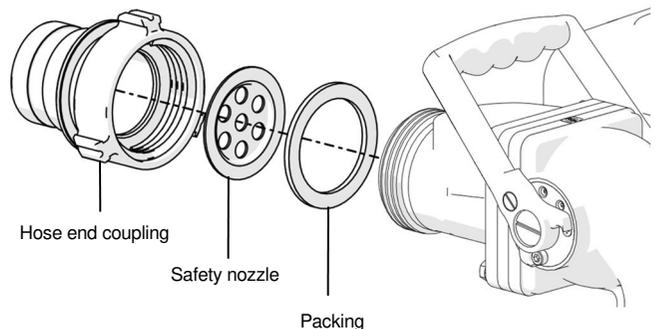


3. Water discharge

Before discharging water, check the safety of the nozzle. Give a signal to the person at the nozzle to start discharging water.

- (1) ⑥ Operate the water discharge handle gradually in the "→Open" direction until it stops.
 - Turn the throttle to the desired water pressure level.
 - Adjust the pressure with the ② throttle according to the water discharge conditions.
 - Be careful not to use too high a water discharge pressure or to open or close the ⑥ water discharge valve handle too rapidly, which may cause the water discharge hose to swing.
- (2) Standby for water discharge
 - To close the ⑥ water discharge valve and put the machine in standby mode during water discharge, ② turn the throttle to the "low pressure" position and stop the engine. In this case, the check valve will operate and water will not fall, so restart the engine and open the ⑥ water release valve to re-discharge water. (However, restarting must be done within 3 minutes.)
 - If it is necessary to stand by without stopping the engine, be sure to put the ② throttle in the "low pressure" position.
- (3) The case when discharging water without using a nozzle

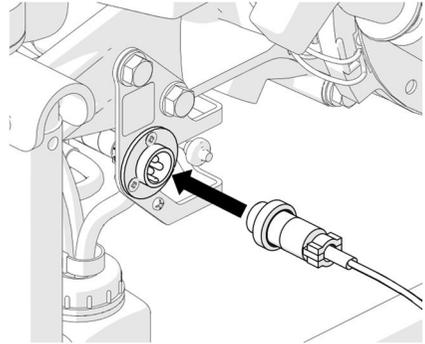
- When operating without using the nozzle, such as pumping water from a water tank or pumping water to a relay tank, be sure to set the attached safety nozzle between the hose end coupling and the water discharge valve, as shown in the figure.



4 Handling method (Operation)

(4) To turn on the searchlight

- To turn on the searchlight, plug the searchlight into the charger inlet on the recoil side.



Caution

- Always return the throttle to the "LOW" position before opening and closing the water discharge valve.
- Hold the nozzle firmly and discharge water.
- There is a risk of injury due to swinging of the discharge nozzle.

Caution

- Operate the water discharge valve slowly.
- There is a risk of injury from pinching or bumping hands.

Caution

- Do not aim the water at people or peer into the nozzle.
- High water pressure may cause them to be blown away, resulting in injury.

Caution

- Do not touch the spark plug or high-voltage cord during operation.
- There is a risk of electric shock.

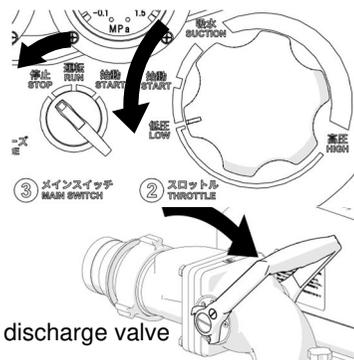
Caution

- Never touch the muffler and exhaust pipe during and after operation since they become very hot.
- There is a risk of burns.

4 Handling method (Operation)

4. Stopping the engine

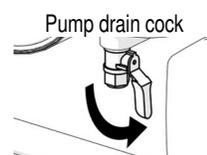
- (1) ② Turn the throttle to the "LOW" position.
 - If the engine is hot, run the engine at low speed for about 1 minute to cool it down.
- (2) Close the ⑥ water discharge valve handle by operating it in the "→ close" direction.
- (3) ③ Turn the main switch to the "STOP" position. The engine will stop.



5. Draining water

After the operation, a large amount of water remains inside the pump. This remaining water may cause corrosion and freezing cracks during cold weather. Be sure to drain water before storing.

- (1) Open the pump drain cock.
- (2) Open and close the ⑥ water release valve, press the water shut-off valve drain button, and drain completely.
- (3) Close the pump drain cock and install the water inlet cap.
- (4) Start the engine and pull the ⑤ suction lever to activate the vacuum pump for approximately 5 seconds.
- (5) ② Turn the throttle to the "low pressure" position, ③ Turn the main switch to the "stop" position and stop the engine.
- (6) Open the pump drain cock and remove the water inlet cap to confirm that it is completely drained. If drainage is insufficient, repeat steps (3) to (5).
- (7) Close the pump drain cock and install the water inlet cap.



Water suction lever



Treatment after using seawater or muddy water

If seawater or muddy water is used, be sure to operate the pump by discharging water with clean water for at least 5 minutes to clean the inside of the pump. Also, to clean the inside of the vacuum pump, operate the vacuum pump for about 5 seconds by pulling the ⑤ suction lever while discharging water at low pressure, and drain clean water from the vacuum pump exhaust hose. After cleaning is complete, be sure to drain the water using the operation described in the previous section "5".

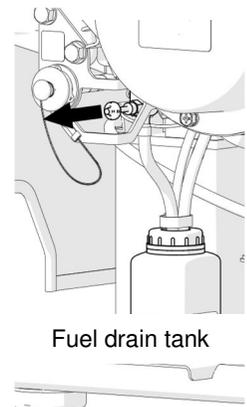
4 Handling method (Operation)

6. Storing the pump

- (1) Store in a dry, temperature-controlled area, away from dust and direct sunlight.
- (2) Wipe off oil, dust, and dirt and keep clean.
- (3) Fill the fuel up to the "F" level when storing. ●Close the fuel cock.
- (4) Fill the specified amount of 2-cycle oil.
- (5) Drain the fuel in the carburetor from the carburetor drain cock, on the recoil starter side.
*Make sure to remove the fuel inside the fuel drain tank every time.
- (6) Please charge the battery with the supplied charger while in storage.
(See "5 Periodic Inspection 2. Inspection Method (2) Handling of Automatic Charger" on p. 29)
- (7) Cover the pump with the attached pump cover.



Carburetor drain cock



Fuel drain tank

- Before storing the pump, be sure to check that the water inside is completely drained. Also, fill the pump with antifreeze to prevent freezing when storing the pump in cold weather (see "4 Handling Methods" Operation in Winter and Cold Weather, on P. 20)
- Operate and discharge water for 5 to 10 minutes at "HIGH" throttle position every month.
- Check the fuel in the fuel tank once a month, and if there is a pungent odor or cloudiness, replace the fuel with new fuel. The recommended replacement time is 6 months after refueling.
- If the vehicle has been in storage for a long period of time without a monthly periodic inspection, operate the pump for 1 minute at "LOW" position to warm up the engine. Be sure to inspect visually to see if there are any abnormalities.



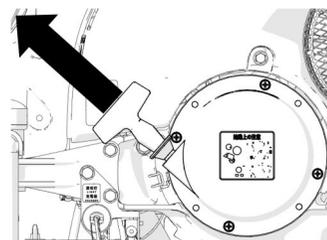
Caution

- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.

4 Handling Method (Operation in Winter and

1. Before starting the engine

- (1) In cold weather, battery capacity is significantly reduced. Please be sure to charge regularly.
- (2) ● Gently pull the recoil starter handle and check that the pump turns.
 - If it does not turn, the pump may be frozen. Pour the warm water into the pump from the suction port or defrost it in a warm room.



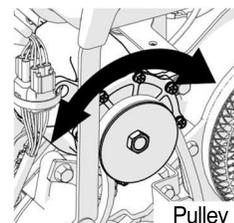
Recoil starter handle

- (3) Remove the vacuum pump cover.

(See "4 Handling Methods (Preparation for Operation)"

1. Removing and attaching the covers, on page 9 .)

- Turn the vacuum pump pulley by hand and check if the vacuum pump turns.
- If it does not turn, the vacuum pump may be frozen.
Blow warm air outside the vacuum pump or defrost in a warm room.



Pulley



Danger

- Do not use fire to defrost the pump.
- There is a risk of ignition and explosion.

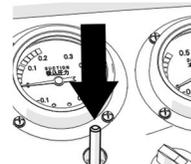


Caution

- Inspection and maintenance should be performed after the engine has been stopped and cooled down sufficiently.

2. Starting the engine

- (1) In cold weather, press the tickler for 2 to 3 seconds.
- (2) Immediately after the engine starts, operation may be unstable; run the machine idle at low speed for 1 to 2 minutes.



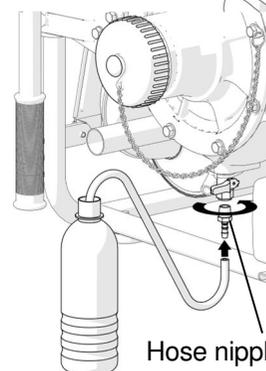
3. Treatment after water discharge (freeze prevention)

- (1) Preventing pumps from freezing (how to add antifreeze)

- ① Drain the water.

(Refer to "4 Handling Method (Operation) 5. Draining water)

- ② Close the water suction cap.
- ③ Attach the hose nipple and hose to the pump drain cock and place the hose in a bottle filled with antifreeze



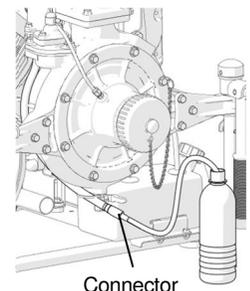
Hose nipple

4 Handling Method (Operation in Winter and

- ④ Start the engine.
- ⑤ ② Turn the throttle to the "SUCTION" position.
- ⑥ ⑤ Pull the suction lever to create a vacuum state inside the pump.
- ⑦ Open the pump drain cock to suck in antifreeze.
- ⑧ Pull the ⑤ suction lever again, and when antifreeze comes out of the vacuum pump exhaust port, return the ⑤ suction lever.
- ⑨ Remove the hose and hose nipple from the pump drain cock.
- ⑩ Pull the ⑤ suction lever and stop the engine when the antifreeze stops coming out of the vacuum pump exhaust port.
- ⑪ After collecting antifreeze from the pump drain cock, close the drain cock.

(2) Preventing the vacuum pump from freezing (how to fill the vacuum pump with antifreeze)

- ① Connect the connector and hose to the water shut-off valve drainpipe and place it in a container of antifreeze.
- ② Start the engine.
- ③ Set the ② throttle to the "SUCTION" position.
- ④ Pull the ⑤ suction lever and suck in the antifreeze.
- ⑤ If antifreeze comes out of the vacuum pump exhaust port, return the water suction lever.
- ⑥ Remove the connector and open the pump drain cock.
- ⑦ Pull the ⑤ suction lever, and when the antifreeze stops coming out of the vacuum pump exhaust port, return the ② throttle to the "LOW" position and stop the engine.
- ⑧ Close the pump drain cock.



(3) Antifreeze should also be injected into water discharge valves and hose couplings.

CAUTION: Do not use alcohol to prevent freezing, since it will damage the rubber seals. Collect drained antifreeze in a liquid container.

4. Precautions for storage

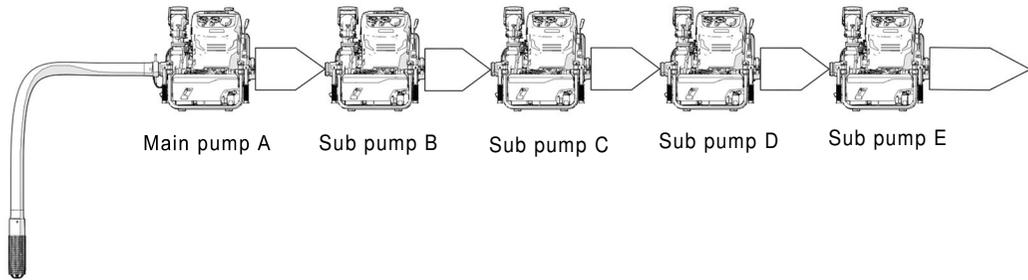
Choose the fuel with good quality. (The better quality of gasoline is highly volatile, and has better starting performance.)

- (1) Be sure to always have antifreeze on hand.
- (2) Batteries may freeze when the relative density of electrolyte becomes low. Be sure the battery is always recharged. If battery performance deteriorates, replace the battery as soon as possible.

4 Handling method (Relaying water with multiple pumps)

In the case of forest fires or urban fires where the water supply is far away, two or more pumps may be connected in series to relay water. The relay water requires different operations and special attention compared to normal operation because each pump is located far from the others. Daily training is also necessary to enable judgment and activities based on the state the pump's operators are facing. See the general method of relay operation below.

Figure 1.



1. Setting Locations

- (1) The number of units and their locations should be determined based on the number of hoses and the height of the water source.
- (2) Install a relay coupling to the suction port of sub-pumps (B to E in Figure 1), to connect the fire hose.
In this case, the automatic relay valve, "Direct Valve" can prevent accidents caused by sudden pressure fluctuations and high-pressure water.
- (3) The wye-valve is also recommended to be attached to the discharge port.
(The hose couplings that connect each pump may not be removed even after the discharge operation, because of the water pressure inside the fire hose.)

2. Operation Method (*An operator is required for every pump.)

- (1) Open the water discharge valves of the sub-pumps (B to E) beforehand.
Be sure to open the variable nozzle when it is attached to the fire hose.
- (2) Operate the main pump (A) and discharge water as usual.
- (3) Send water to the original pump first and then to others sequentially.
- (4) Check the pressure scale in the sub pump (E) and increase the engine speed to regulate the discharging water by controlling the throttle of the sub-pumps (B to E)
The sub pump (B to E): Should be more than 0.05MPa in a scale of suction gauge pressure, be less than 1.2MPa in a scale of power.
- (5) If there is not enough power of water discharge at the nozzle, turn the throttle dial of the original pump (A) to "HIGH" position gradually, then the turn the throttle dial of sub-pump, from the one closer to the original (from B to E), sequentially.
- (6) When stopping water discharge, turn the throttle dial of the last pump, the one close to the nozzle (E), to "LOW" position first and stop gradually (from E to B).
Stop the water supply from the main pump. When the supply of water from the main pump has been stopped, close the water discharge valve of each pump.

4 Handling method (Relaying water with multiple pumps)



Caution

- Do not close the nozzle or water discharge valve while multiple pumps are relayed and the water is discharged.
- Abnormally high pump pressure may result in damage to the pump and hoses.

1. Suction and discharge from water hydrant

The capacity of water supply from the fire hydrant

It is necessary to check the sufficient volume of water for discharging from the fire hydrant in advance.

It would depend on several factors, such as the diameter of the hydrant, the condition of the piping, the initial water pressure, and others.

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 could have high capacity for water supply with wider diameter despite low water pressure.

Water supply method

- (1) Be sure to open and close the hydrant's valve and release water to remove the foreign objects, such as sand, before connecting the hose to the hydrant.
- (2) Connect the water hydrant and pump. Use a suction hose that can endure the water supply pressure. The supply pressure limit for the suction hose with a nominal diameter of 65mm is 0.9 MPa. The suction hose for connection to the hydrant should be inspected periodically to avoid any damage.

How to check and adjust water supply pressure

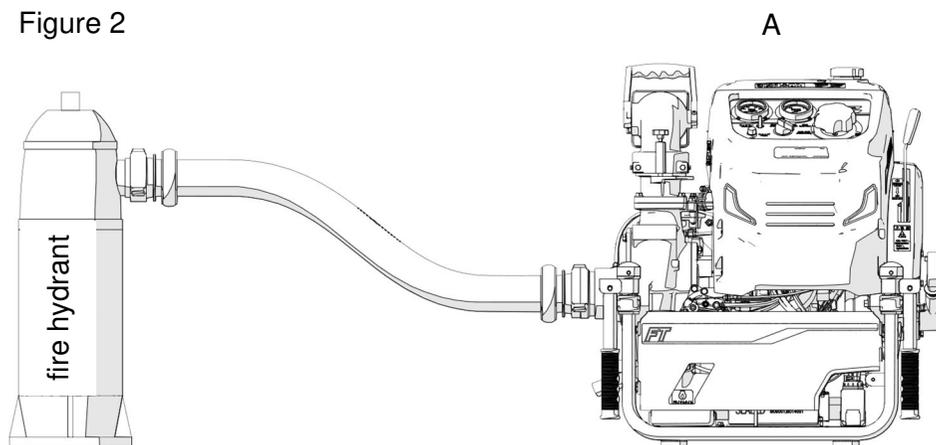
- (1) Open the open/close valves of the fire hydrant and the water discharge valve of the pump to full open.
- (2) Gradually close the pump's water discharge valve while checking the water supply pressure with a suction gauge.
- (3) If the water supply pressure is high, adjust the water supply pressure with the hydrant's open/close valve.

4 Handling Method (Suction, discharge, and relay the water from the fire hydrant)

2. Water discharge and delivery

When a single pump receives and discharges water (Figure 2)

Figure 2



- (1) Open the water discharge valve of pump (A) in advance.
If the fire hose has a variable nozzle at the end, be sure to leave it open.
- (2) Before starting the engine, open the hydrant and check the pressure on the compound (suction) gauge of the pump (A).
- (3) After confirming that water has been sent from the fire hydrant, start the engine of the pump (A) and begin discharging water.

- (4) Adjust the pressure by operating the throttle of the pump (A) to achieve the required pressure and flow rate.

The throttle should be operated gradually, and the compound (suction) gauge should be kept above 0.05 MPa.

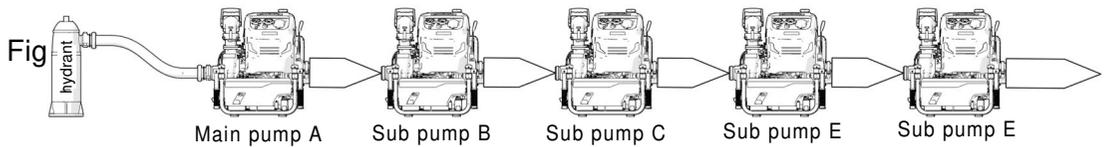
Adjust the hydrant open/close valve to adjust the pressure gauge to not exceed 1.2 MPa. At this time, the compound (suction) gauge of the pump (A) should be less than 0.6 MPa

- (5) To stop water discharge, turn the throttle of pump (A) to the "LOW" position, stop the engine, and close the hydrant.

Do not close the water discharge valve of pump (A) until the water supply from the hydrant stops.

4 Handling Method (Suction, discharge, and relay the water from the fire hydrant)

When discharging water by relaying with multiple pumps
(An operator is required for all pumps: Fig. 3)



- (1) Open the water discharge valves of all pumps (A to E) in advance. If a variable nozzle is attached to the fire hose-end at the water discharge side, be sure to open it.
- (2) Before starting the engine, open the hydrant and check the pressure of the compound (suction) gauge of the main pump (A).
- (3) After confirming that water has been delivered from the fire hydrant, start the engine of the main pump (A) to deliver water to the next pump.
- (4) Start and supply water to the second and sub-pumps (B to E) in the same manner as for the original pump (2) and (3).
- (5) Read the pressure gauge on the sub-pump (E) and adjust the pressure by operating the throttles on all pumps (A to E) to achieve the required pressure and flow rate at the nozzle. Operate the throttles gradually and make sure that each pump keeps above 0.05MPa on the compound (pressure) gauge and above 1.2MPa on the pressure gauge.
Adjust the hydrant opening to make the compound (pressure) gauge of each pump is not less than 0.6MPa.

- (6) To stop the water discharge, shut down the engine by turning the throttle to the "LOW" position, starting with the pump (E) closest to the end of nozzle, and finally close the fire hydrant. Do not close the water discharge valves of each pump until the water supply from the hydrant has stopped.

5 Periodical Inspections

1. Periodical inspections

Be sure to perform periodic inspections according to the following items.

Item	Duration or operating time							Inspection details	treatment		
	Period										
	Before use	after use	1 month	6 months	1 year	2 years	3 years				Operation time (Hour)
fuel	●	●							Quantity/ Deterioration (ie color, smell)	Refill or replace	
				●					-	Replace	
2-cycle oil	●								Quantity	Refill	
					●				-	Replace	
Battery		●							-	Recharge	
			●						Deterioration	Replace	
						●			-	Replace	
Spark plug					○			100	-	Replace	○
Appearance		●							Dirt, etc.	Clean	
Starter rope			●						Wear, breakage	exchange	○
Vacuum pump belt				●				50	Become loose/Wear	Adjust or replace	○
Fan belt				●				50	Become loose/Wear	Adjust or replace	○
Fuel pipes				●				50	Leakage/damage	Replace	○
Water discharge valve					●			100	Valve feels heavy, vacuum leakage	Adjust or replace the parts if necessary	○
Fuel filter				●			○	200	Foreign material stuck	Clean or replace	○
Engine start and vacuum			●						Operation/Performance	Replace parts if necessary	○
Prime and discharge			●						Operation/Performance	Replace parts if necessary	○
All parts							○	300		Replace parts if necessary	○

Note:

- For items marked with "●" in the period column, please practice the inspection by yourself. Please ask your dealer to inspect the items marked with "○" in the period column and to handle the items marked "○" in the column of treatment.
- Measure the inspection timing by either comes earlier, "period" or "operation time". For example, consider replacing spark plug when the operation time reaches to 100 hours, even if the operation period is less than a year.
- This inspection table shows the period and time under general operating conditions. Make sure to perform inspections earlier when the pump is used under tough conditions.

5 Periodical Inspections

Recommended replacement parts and period

Part Name	Recommended Replacement Period	Example of Defects
Spark plug	Every Year	Bad to start due to wear and tear
Fuel Pipes	Every 2 years	Fuel leakage due to deterioration
Battery	Every 2 years	Deterioration
2 Cycle Oil Pipe	Every 2 years	Oil leakage due to deterioration
Vacuum Pump Belt	Every 3 years	Slippage due to wear
Fan Belt	Every 3 years	Slippage due to wear
Other Rubbers	Every 2 years	Deterioration
Starter Rope	Every 3 years	Breakage due to wear
Fuel Filter	Every 3 years	Clogging and Bad start due to the water drip
2-cycle Oil Filter	Every 3 years	Clogging, and Poor lubrication due to the moisture.
Discharge Valve Water shut-off valve (rubber)	Every 3 years	Deterioration of the check valve
Mechanical Seal	Every 3 years	Poor suction due to deterioration
Oilless Vacuum Pump Blades	Every 3 years	Poor suction due to deterioration
Carburetor	10 years	Corrosion inside the tank
Fuel Tank	10 years	Corrosion inside the tank

Parts recommend replacing when disassembling

- Gaskets • Push nuts
- O-rings • Spring pins
- Lock washers • E-rings



Caution

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

5 Periodical Inspections

2. Inspection method

Periodic inspections are essential to ensure the fire-fighting pump's safety and use every possible function. Inspect the pump correctly and safely 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, 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.



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 recommended to replace the battery earlier.

Recommended battery : GS YUASA YTX20L-BS

For handling the battery, please follow the instruction manual that comes with the battery.

5 Periodical Inspections



Caution

- When disposing of batteries, oils, etc., please entrust disposal to a specialized industrial waste disposal contractor.
- It may cause fire, burns, or pollute the environment.

(2) Handling of Shibaura full-automatic charger



Caution

- To use the charger safely and correctly, be sure to read the instruction manual that comes with the charger. Improper use may cause an accident. After reading the charger instruction manual, be sure to keep it close to the product.

A) Unpacking



Caution

- Remove packing materials from the battery charger before charging.
- There is a risk

B) Location to place



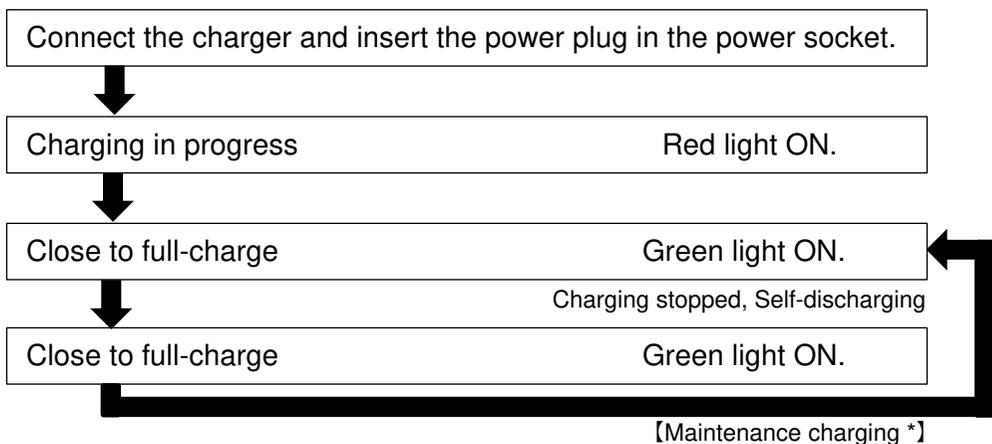
Warning

- Do not use the charger in high-temperature places such as under direct sunlight or near heating elements, in extremely humid places, or wet areas such as rain or snow.
- There is a risk of overheating, burnout, or damage to the charger, or leakage of electricity or electric shock.

C) Make sure before use

- Remove the power plug from the socket (Be sure the charger is turned off).
- Connect the output of the charger cable firmly to the fire-fighting pump.
- After connecting the cable to the charger unit(AC inlet), plug in the socket.

D) Battery charger Operating Manual



5 Periodical Inspections

* Maintenance charge mode

This function automatically recharges the battery when the capacity has declined. It always monitors the decline of the battery capacity by self-discharge.

After starting the charging (Red Light ON), when the battery is close to full charging, the indicator will change to Green Light ON, and the status will automatically change to the maintenance charging mode (Green Light ON). After that, the Red Light and the Green Light will light up alternately to reduce the deterioration of the battery.

Note:

Remove the power plug to stop the main unit from charging. Then, remove the output terminal.

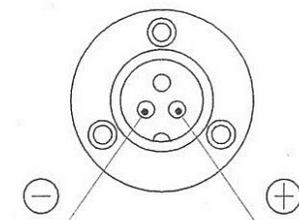
LED indication and charge status

CHARGE STATUS	CHARGE LED (RED)	FULL LED (GREEN)
No Charging	OFF	OFF
Charging	ON	OFF
Close to full-charge	OFF	ON
Error (⚠)	ON	ON

⚠ Refer to "5. Periodical inspections" when an error has occurred.

Note:

When starting the engine using a fully charged battery, if the starter does not rotate sufficiently, this may be due to battery deterioration. Please inspect or replace the battery.



E) Protective operations

- Input (primary side)
Protected from circuit errors by current fuse.
- Output (secondary side)
Protected from battery reverse connection and output short-circuiting by electronic circuit and circuit breaker.

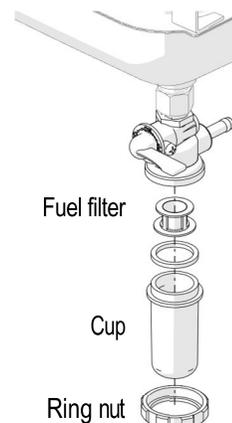
F) Inspection method when an error has occurred

Symptom	Cause	Measure *
Both red and green LEDs come on	Power cable is not connected correctly.	Check the connection status.
	The circuit breaker is open.	Pull out the power plug. After the body of the charger stops, remove the error cause, and close the circuit breaker after 60 seconds.
	The output connector is loose.	Insert the output connector all the way, and lock it securely.
The battery is obviously in discharged state, but the tickle charge mode starts immediately.	Battery is in the deteriorated state.	Replace the battery with a new one.
LED does not come on (both red and green)	Protective operation is activated.	Turn off the power and wait for 60 seconds. After that, charging the battery again.

5 Periodical Inspections

(3) Cleaning the fuel cock filter

- ① Close the fuel cock.
- ② Loosen and remove the ring nut with pliers.
- ③ Wipe off any debris in the cup with a cloth or the like.
- ④ Remove the filter attached to the ④❶ fuel cock main unit and wash it with gasoline.
- ⑤ Install the fuel cock securely to the original position. Be sure to open the ❶ fuel cock and inspect if there are no leaks.
- ⑥ After inspection, close the ❶ fuel cock.



(4) Replacement of the fuel in the tank

Storing fuel for a long period of time may result in poor starting performance and rust.
Replace with new fuel every 6 months.



Danger

- Keep fire away when refueling.
- There is a risk of ignition and explosion.

(5) Spark plug cleaning

Use [NGK BR8HIX] spark plugs.

Clean the spark plugs that are contaminated with exhaust gases and carbon.

- (1) Stop the engine to cool down sufficiently before working on it.
- (2) Remove the spark plug cap and spark plug using the spark plug box wrench.
- (3) Clean the outside, inside, and electrode of the spark plug.
- (4) Tighten the spark plug to the cylinder head and keep the spark spark plug cap pressed in.



Caution

- Do not touch the ignition plug or high-voltage cord during operation.
- There is a risk of electric shock.

(6) Check the governor oil level

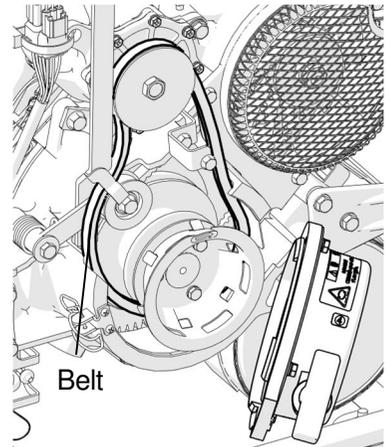
(See "4 Handling Methods (Preparation for Operation) 1.

5 Periodical Inspections

(7) Vacuum pump belt inspection

Replacement of the vacuum pump belt is required if it is stretched, worn, or cracked.

- ① Open the recoil starter.
Do not start the engine during the inspection.
Also, the belt may be hot immediately after operation, so wait until the engine has cooled down before inspecting
- ② Remove the front cover and vacuum pump cover.
(See "4 Handling Methods (Preparation for Operation) 1.")
- ③ Remove the belt from the pulley groove.
- ④ Install a new belt.
- ⑤ Install the cover as before.

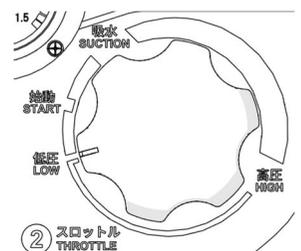
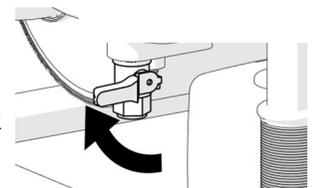
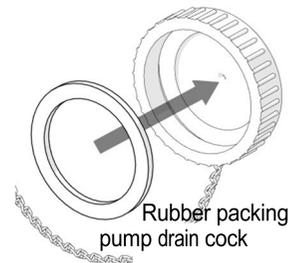


(8) Starting and vacuum inspection

Vacuum inspections must be performed even if the suction and discharge tests (which are described in the next page) are difficult to carry out.

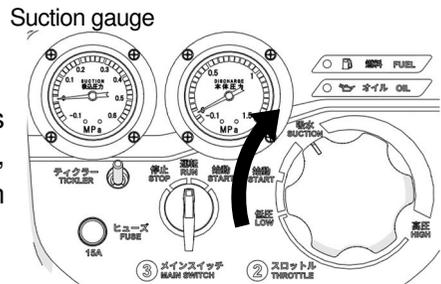
Defects such as engine not starting, poor vacuum performance, or vacuum leakage can cause accidents, such as not being able to operate the water discharge at the actual site, or falling water during the discharge.

- ① Check that the rubber packing is in the water suction cap, and attach the inlet cap to the water inlet.
- ② Close the pump drain cock.
- ③ Start the engine.
- ④ ② Warm up the engine with the throttle dial in the "low pressure" position for about 1 minute, and visually check for any abnormalities in the various parts.



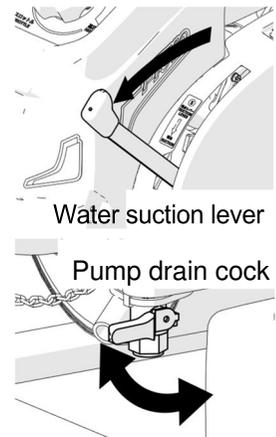
5 Periodical Inspections

- ⑤② Turn the throttle to the "suction" position and pull the ⑤ suction lever toward you to activate the vacuum pump. When the pointer of the ⑥ suction gauge reads -0.06 to -0.08 MPa, return the ⑤ suction lever, ② throttle to the "low pressure" position, and then stop the engine.
- ⑦ If there is no change in the indicated value of the suction gauge after leaving it for 1 minute, the vacuum performance is good.



- ⑧ Open the pump drain cock to release the vacuum and close the pump drain cock.

* If any abnormality is found, please consult your dealer.



(9) Water suction and discharge inspection

Suck and Discharge the water to inspect if there is no abnormalities found in each part of your pump

- (1) Are there any abnormal sounds?
- (2) Is there any water fall?
- (3) Is the water suction slow?
- (4) Are there any water leaks?
- (5) Is the startability good?
- (6) Are there any looseness in each part?
- (7) Are there any fuel leaks?
- (8) Other

*If any abnormality is found, refer to the "6 Troubleshooting" in the next section for appropriate treatments.

6 Troubleshooting

Daily inspection and maintenance are important to prevent fire-fighting pump malfunctions. Detect malfunctions at an early stage and perform maintenance immediately. If the trouble is not easily solved, or if the malfunction is not listed below, please consult the dealer where you purchased the pump, giving the model name and serial number.

1. Engine area

	Symptom	Cause	Action
Hard to Start	No fuel flow to carburetor.	1 Fuel cock filter or fuel line is clogging 2 Needle valve is sticking 3 There's no fuel.	1 Clean 2 Clean 3 Fill
	Fuel does not flow to combustion chamber (remove spark plugs to see)	1 Choke does not close (auto choke) 2 Rotational speed is low when starting. 3 Carburetor (needle valve, jet) is clogging	1 Repair and adjust 2 Replenish the battery 3 Clean
	Fuel goes to combustion chamber but does not start	1 Overflow (excessive fuel) 2 Tickler is overused (excessive fuel) 3 Choke does not open fully closed (auto choke) 4 Fuel is deteriorated 5 Water is mixed in the fuel. 6 Excessive lubricating oil	1 Inspect and adjust the carburetor 2 Drain the fuel from the seal at the crankcase. 3 Replace diaphragms and clean pipes. 4 Exchange. 5 Drain water 6 Adjust to the proper amount
	Abnormality of combustion system	1 Fuel cock filter is clogged 2 Carburetor valve seat is clogged 3 Carburetor is poorly adjusted, or there is a clog on the carburetor 4 Carburetor is poorly tightened.	1 Clean 2 Clean 3 Adjust or clean 4 Retighten
	Sparks are poor	1 Spark plug cap has damages, electrode gap is improper, or the spark plug is defective. 2 Leakage from high voltage cord 3 Leakage from spark plug cap 4 Defective ignition coil 5 Defective CDI unit 6 Poor rotation of the starting motor	1 Exchange 2 Exchange 3 Exchange 4 Exchange 5 Exchange 6 Replenish the battery

6 Troubleshooting

Symptom		Cause	Action	
Hard to Start	No sparks	<ol style="list-style-type: none"> 1 Short circuit of the ground wire 2 Spark plugs are damaged or stained. 3 Spark plug has gap failure 4 Ignition coil is defective 5 CDI unit is defective 6 Wiring connection is poor or disconnected 7 Main switch is defective 	<ol style="list-style-type: none"> 1 Repair the point short circuited 2 Exchange. 3 Exchange 4 Exchange 5 Exchange 6 Adjust the connection 7 Exchange. 	
	Poor compression	<ol style="list-style-type: none"> 1 Piston wear or seizure 2 Piston rings 3 Worn or damaged oil seals 4 Lack of lubricant 5 Damaged cylinder head gasket 	<ol style="list-style-type: none"> 1 Repair or replace 2 Exchange. 3 Exchange 4 Refill to the proper amount 5 Exchange 	
Poor running	Insufficient rotation	Combustion system error (mis-hunting)	<ol style="list-style-type: none"> 1 Carburetor main jet is clogged or misadjusted 2 Fuel cock filter clogged 3 Overflow 4 Poor installation of the carburetor 5 Icing 	<ol style="list-style-type: none"> 1 Clean or replace 2 Cleaning 3 Check and adjust the carburetor 4 Correct the place or replace. 5 Remove and add fuel tank drainage agent
		Abnormalities in the governor system	<ol style="list-style-type: none"> 1 Governor maladjustment 2 Governor operating parts wear 3 Defective caulking of flyweight 4 Poorly tightened governor arm 5 Governor spring tension failure 6 Governor lever ring hole worn or rattling large 	<ol style="list-style-type: none"> 1 Adjust 2 Exchange. 3 Correct or exchange 4 Readjust and retighten. 5 Exchange. 6 Replace or correct
		Cooling system abnormalities	<ol style="list-style-type: none"> 1 Cooling air is weak 	<ol style="list-style-type: none"> 1 Pay attention to the ventilation
		Other	<ol style="list-style-type: none"> 1 Overload 2 Muffler and exhaust port clogging 3 Inlet clogging 4 Defective spark plug 	<ol style="list-style-type: none"> 1 Change nozzle diameter or use safety nozzle 2 Remove the clog 3 Remove the clog 4 Exchange

6 Troubleshooting

		Symptom	Cause	Action
Poor running	Abnormal noise	Mechanical sound	<ol style="list-style-type: none"> 1 Flywheel is fixed loosely 2 Piston is worn, and tapping sounds come out from the piston skirt 3 Armature plate is contacting the other parts. 4 Foreign material is caught inside the crankcase and fan cover 5 Foreign material is caught inside the pump or impeller is touching the pump casing 6 Each part becomes loose 	<ol style="list-style-type: none"> 1 Retighten 2 Replace the piston 3 Reassemble 4 Remove the foreign material 5 Remove the foreign material or reassemble the pump 6 Retighten
		Knocking sound (combustion system abnormalities)	<ol style="list-style-type: none"> 1 Insufficient fuel (main jet or use of different diameter parts) 2 Overload 3 Rotation speed too low or too high 4 Different spark plug is used 	<ol style="list-style-type: none"> 1 Clean or replace 2 Open water discharge valve 3 Adjust to proper rotation speed 4 Replace with proper spark plugs

6 Troubleshooting

2. Pump

		Symptom	Cause	Action	
Water suction failure	A suction gauge does not have negative pressure	Abnormality on water pump side	<ol style="list-style-type: none"> 1 Poorly tightened suction pipe 2 Air suction from the tip of the suction pipe 3 Forgot to close the drain cock 4 Defective suction pipe packing 5 suction pipe fissure 6 Foreign matter caught in water discharge valve 	<ol style="list-style-type: none"> 1 Tighten securely 2 Put it completely underwater 3 Close securely 4 Exchange. 5 Exchange. 6 Remove foreign objects 	
		Abnormality on the vacuum pump side	No Rotation	<ol style="list-style-type: none"> 1 Internal freeze 2 Foreign object inhalation 3 Vacuum pump damaged 4 V Belt slip or breakage 	<ol style="list-style-type: none"> 1 Defrost 2 Remove foreign objects 3 Exchange. 4 Exchange.
			Rotating	<ol style="list-style-type: none"> 1 Clogged or poorly tightened vacuum passage 2 Strainer at the water shut-off valve is clogged 	<ol style="list-style-type: none"> 1 Clean or retighten 2 Clean
	The coupled meter becomes negative pressure	Vacuum leak (engine) Falling water when stopped)	Refer to "Water suction failure - compound meter does not become negative pressure - Water pump side abnormality"		
		No vacuum leakage	<ol style="list-style-type: none"> 1 Clogged suction pipe strainer or inside suction pipe 2 Air pocket in the suction pipe. 3 Suction height is too high, or the suction pipe is too long 4 Air suction from the tip of the suction pipe 5 Low engine speed at water suction 6 Short water suction operation time 7 Clogged or poorly tightened vacuum passage 8 Strainer at the water shut-off valve is clogged 	<ol style="list-style-type: none"> 1 Clean 2 Correct the layout 3 Keep the height within 8m 4 Put the tip completely underwater 5 Adjust to water suction rotation speed 6 Lengthen operation time 7 Clean or retighten 8 Cleaning 	

6 Troubleshooting

Symptom		Cause	Action	
Water Discharge Failure	Pressure does not increase	Abnormality on water pump side	<ol style="list-style-type: none"> 1 Clog in the suction pipe strainer or suction pipe 2 Air pocket in suction pipe 3 Suction height is too high, or the suction pipe is too long. 4 Air suction from the tip of the suction pipe 5 Poorly tightened suction pipe 6 Discharge valve half-open 7 Forgot to remove the safety nozzle (not necessary when the nozzle is attached) 8 Foreign matter in the nozzle 9 Frozen inside the pump 	<ol style="list-style-type: none"> 1 Clean 2 Correct the layout of the suction pipe. 3 Keep the height within 8m 4 Put the tip completely underwater. 5 Tighten securely 6 Open the valve completely 7 Remove 8 Remove foreign objects 9 Defrost and remove the ice
		Engine malfunction	Refer to 1. Engine – Hard to start and poor running	
	Other Abnormalities	<ol style="list-style-type: none"> 1 Muffler and exhaust port clogging 2 Air Inlet of the carburetor clogging 	<ol style="list-style-type: none"> 1 Remove the clog 2 Remove the clog 	

3. Electrical

Symptom		Cause	Action
Bad start	Starting motor does not rotate	<ol style="list-style-type: none"> 1 Insufficient battery capacity 2 Deterioration of the battery 3 Fuse burnout 4 The cable connection is loose or Disconnected 	<ol style="list-style-type: none"> 1 Recharge 2 Replace 3 Replace. 4 Check the cable connection and plug-in surely. Replace parts if necessary.
Battery failure	Batteries run out too quickly.	<ol style="list-style-type: none"> 1 Deterioration of the battery 2 Mistake in main switch operation. 3 Mistake in charge operation 	<ol style="list-style-type: none"> 1 Exchange. 2 Operate properly 3 Operate properly
Connection failure	Wiring burnout	<ol style="list-style-type: none"> 1 Battery reverse connection 2 Poor connection or short-circuit at the outlet terminal 3 Poor wiring connection or disconnection 4 Fuse burnout 	<ol style="list-style-type: none"> 1 Connect correctly 2 Connect correctly, or Repair or replace the short-circuited parts. 3 Correct the wiring or repair, or replace 4 Replace

6 Troubleshooting

Symptom		cause	treatment	
Defective wiring	Lamp does not light	1 Lamp blew out 2 Wiring is loose or disconnected	1 Replace 2 Correct the circuit, repair, or replacement	
Defective monitor lamp	All monitor lamps do not light up immediately after turning the main switch to operate	1 Battery capacity is not enough, or the battery is deteriorated. 2 Fuse burnout 3 Wiring is loose or disconnected	1 Recharge or replace 2 Replace 3 Correct the circuit, repair, or replacement.	
	The lamps do not light even if they should have lit up	Common & typical matters to be noticed	1 Loose or disconnected wiring of each sensor and switch	1 Correct the circuit, repair, or replacement
		Fuel	1 Switch is broken	1 Replace
		2-cycle oil	1 Switch is broken	1 Replace
Monitor lamp light up	Please refer to Section No. 3 – Monitor Lamp (P. 7) and cope with each matter displayed			

7 Specifications

1. Fire-fighting pump	
Model	FT510-A
Classification (JPN)	(B-2)
Notification No. (JPN)	(P0145001)
Dimension (L x W x H)	737mm x 572mm x 740mm
Dry Weight	90 kg
2. Pump	
Type	High-pressure 1-stage turbine pump (with inducer)
Discharge water volume	Normal 1.01 m ³ /min
	High pressure 0.64 m ³ /min
Pump pressure	Normal 0.70 MPa
	High pressure 1.00 MPa
Nozzle diameter	Standard 24.0 mm
	High pressure 17.5 mm
Rated rotation speed	5800 rpm
Water inlet	Nominal 75mm, Fire engine thread (JIS B 9912)
Water outlet	Nominal 65mm, Fire engine Thread (JIS B 9912)
3. Engine	
Type	Air-cooled, 2-cycle, inclined, 2-cylinder gasoline engine
Model name	E440C
Displacement	436mL
Authorized output	22.8 kW / 5800rpm
Fuel feeding system	Carburetor
Fuel type and tank capacity	Regular gasoline for automobiles - 14.5L
Lubrication system and tank capacity	Separate lubrication system (2-cycle oil) - 2L
Fuel consumption	Approx. 14L/h
Cooling system	Forced air-cooled
Ignition system	CDI ignition system
Starting system	Starting motor & recoil
Lighting	12V-35W (searchlight), 12V-3W (instrument panel light)
Spark plug	NGK BR8HIX

7 Specifications

4. Vacuum pump	
Type	Oilless type: 4-vane eccentric rotary type
Maximum Suction Height	Approx. 9 m
Drive system	V Belt clutch type
5. Accessories	
Battery	12V15Ah/5h
Charger	AC100V~AC240V – DC12V charger
Tools, etc.	1 x Tool kit, 1 x instruction manual 1 x Spark plug, 1 x safety nozzle
Pump cover	1 pc.
6. Optional parts	
Searchlight lamp	1 pc.
Searchlight stand	1 pc.



Shibaura Fire Pump Co., Ltd.

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SHIBAURA

OPERATION MANUAL

SHIBAURA FIRE-FIGHTING PUMP FT510-A



Please read this operation manual carefully to operate the Shibaaura Fire-fighting Pump safely and correctly. Incorrect operation of the pump may result in an accident. If this manual is missing or damaged, please order a new one from us or our agent promptly.

Shibaaura Fire Pump Co., Ltd.

- For safe use

Keep it in a safe place with the fire-fighting pump.

- Items marked with  in this instruction manual are particularly important for safe use and must be observed.

 Danger	The case when there is an imminent risk of death, serious injury, or the product is mishandled.
 Warning	The case when there is a risk of death or serious injury, or the product is mishandled.
 Caution	In cases when the product is mishandled, minor injuries or property damage may occur.

- Product specifications and appearance are subject to change without notice for improvement. Therefore, please note that the contents of this document and some of the photographs and illustrations may not correspond to the product.
- If you have any questions or difficulties after reading this manual, please contact the dealer where you purchased the product or our company.
- For inspection and maintenance, please contact a maintenance business or dealer that is qualified to service portable fire-fighting pumps.

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1 Things you must follow for your safety

1. Warning Label Locations



Part No.L82900900



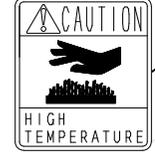
Part No.290192430



Part No.290192770



Part No.290192410



Part No.290192400



Part No.290192400

- If the contents of the label become difficult to see or the label is about to come off, replace it immediately.

1 Things you must follow for your safety

2. Caution Marks



- Do not suck in or discharge the substances other than water, such as flammable materials, drugs, or chemical liquid.
- There is a risk of explosion, fire, burns, poisoning, etc.

- Keep fire away when refueling.
- Do not overfill fuel into the tank.
- If the fuel is spilled, wipe it up immediately. Keep the wiping cloth away from fire.
- Refill the fuel after the engine has cooled down.
- Do not use fire to defrost the pump.
- There is a risk of ignition and explosion.



- Fire-fighting pumps should be operated by firefighters, voluntary disaster prevention team members, maintenance and inspection personnel, and others who have been trained specifically for safe operation.
- Misuse or mishandling may result in serious accidents, including death.

- No neck wraps, ties, waist towels, etc., are allowed. Wear helmets, non-slip shoes, and no loose-fitting clothing.
- There is a risk of getting caught in the machine or slipping and falling, resulting in injury.

- Do not operate a fire-fighting pump if you are unable to concentrate on your work due to alcohol consumption, tiredness, illness, or the effects of drugs.
- This could lead to a serious accident.

- Use only genuine parts or specified attachments. No modifications are allowed.
- Failure to do so may result in accidents, injuries, or machine malfunctions.

- Install at least 3 m away from combustible materials.
- Remove flammable materials, such as dry grass, before installation.
- Exhaust fumes and heat from the muffler may cause a fire.

- Do not install indoors or in tunnels with poor ventilation.
- There is a risk of exhaust gas poisoning.

- Be sure to install the cover when operating.
- There is a risk of injury or burns.

- Be sure to close the recoil starter during operation.
- There is a risk of getting caught in pulleys or belts, or of getting cut yourself.

- Keep fire away from the battery.
- There is a risk of fire and explosion.

- Remove packing materials from the battery charger before charging.
- There is a risk of fire.

- Be sure to carry out periodic inspections. Operate and discharge the water at least once a month to check for any abnormalities.
- Accidents may occur due to damage, etc., and fire-fighting activities may be hindered.

1 Things you must follow for your safety

Caution

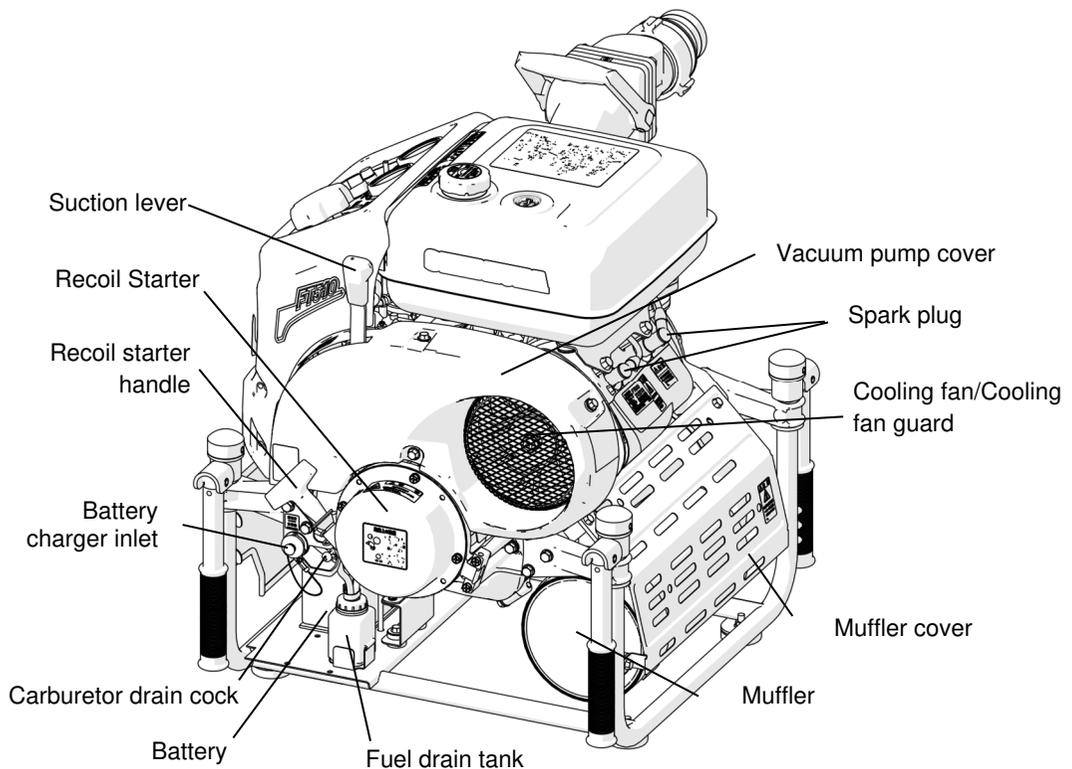
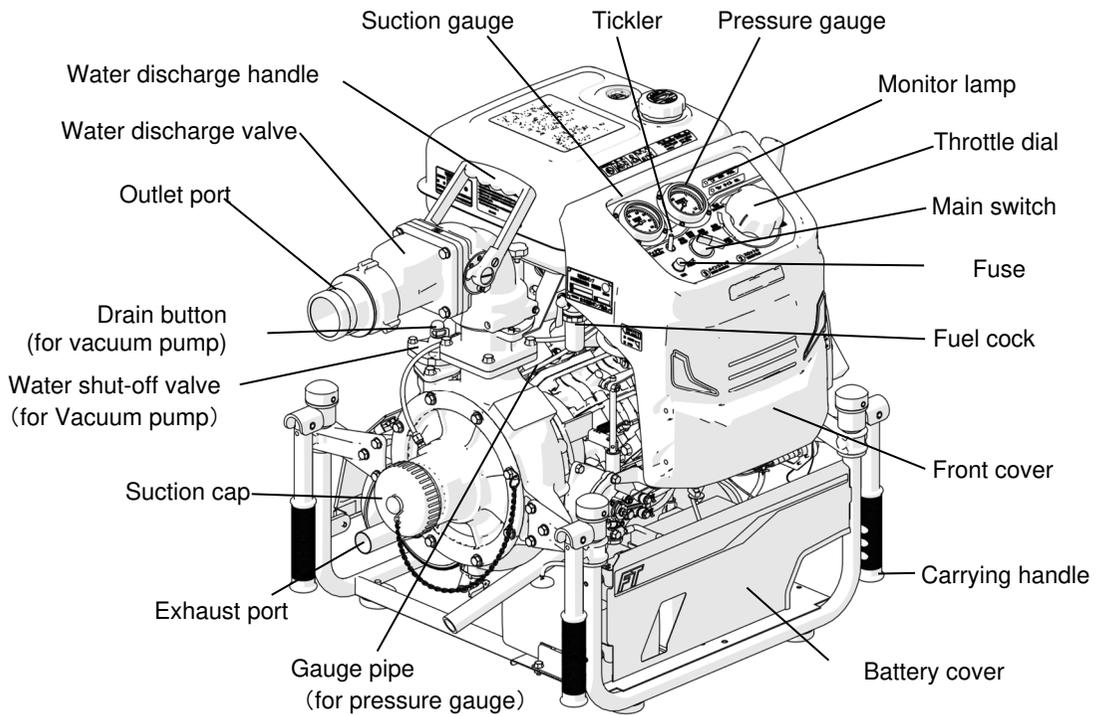
- Do not use fire-fighting pumps for activities other than fire-fighting, such as civil engineering, irrigation, water sprinkling, etc.
- There is a risk of hitting some objects and injuring people or damaging property around you.
- When disposing of batteries, oils, etc., please entrust disposal to a specialized industrial waste disposal contractor.
- It may cause fire, burns, or pollute the environment.
- Do not put fingers or hands in the water discharge valve.
- There is a risk of injury.
- After refueling, tighten the fuel tank cap securely.
- There is a risk of ignition and explosion.
- Check the fuel once a month, and if the fuel has a pungent odor or is cloudy, replace it with new fuel immediately.
- This may cause engine malfunction or equipment failure.
- When adding two-cycle oil, always use the same brand and grade of oil.
- Avoid entering water or debris when refilling the two-cycle oil.
- This may cause engine malfunction or equipment failure.
- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.
- When replenishing the governor oil, add the same brand and grade of oil.
- Avoid entering water or debris when refilling the governor oil.
- This may cause engine malfunction or equipment failure.
- When holding the carrying handle, do not touch the joint parts.
- Failure to do so may result in injury from pinching fingers.
- When carrying or loading/unloading the fire-fighting pump, four people should do so.
- Dropping it on your foot may cause injury or back pain.
- Connect the fire hose securely and always ensure it cannot be disconnected.
- If it is pulled out during water discharge, there is a risk of injury.
- Lay out the fire hoses without folds, twists, or sharp turns.
- There is a risk of the water hose springing up and causing injury.
- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.
- When starting with a recoil starter, avoid getting clothing or gloves caught.
- There is a risk of injury.
- When starting with the recoil starter, keep people at least two meters away from the starter.
- There is a risk of injury to elbows from being knocked by recoil ropes.

1 Things you must follow for your safety

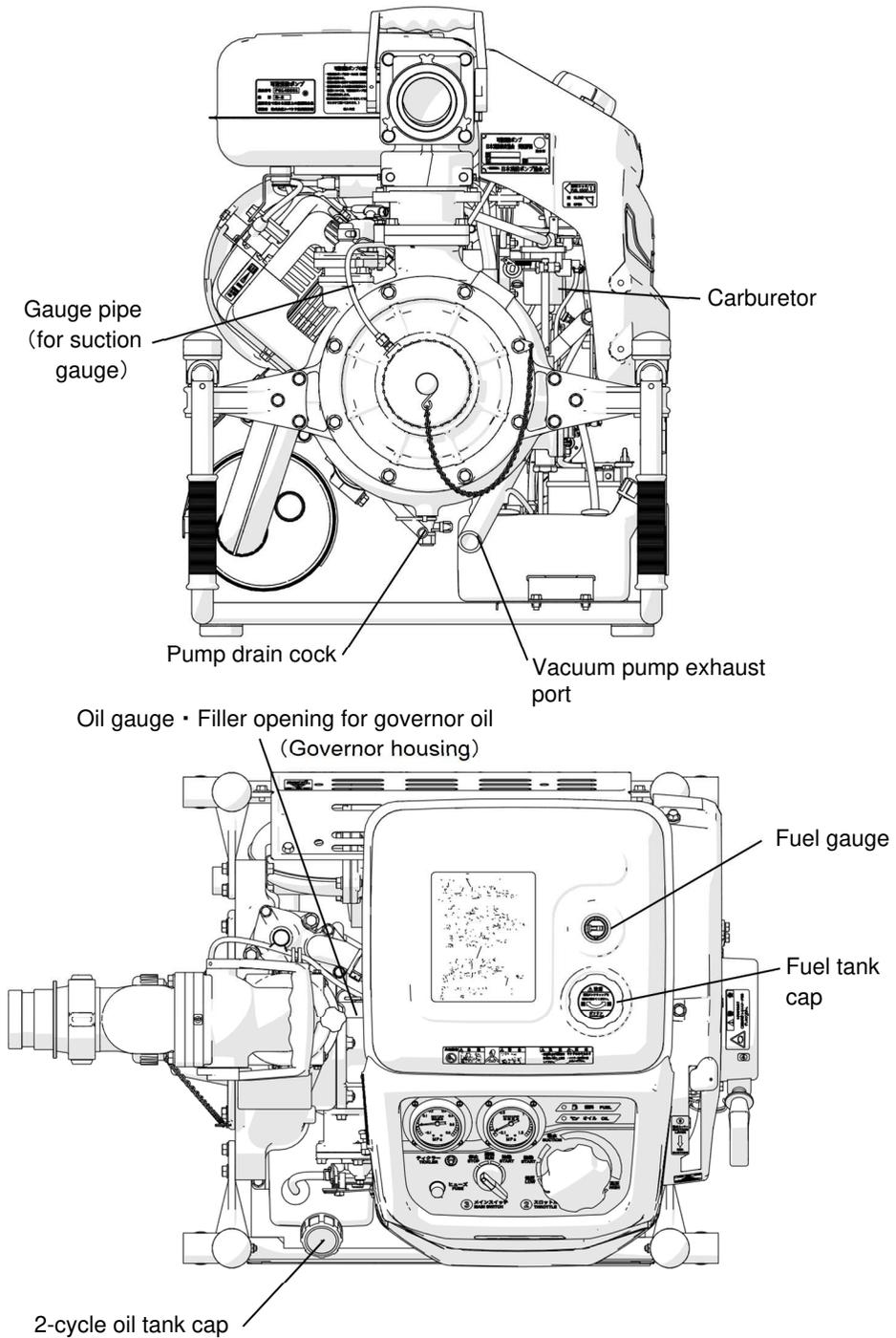
Caution

- Always return the throttle to the "LOW" position before opening and closing the water discharge valve.
- Hold the fire nozzle firmly and discharge water.
- There is a risk of injury because the fire nozzle runs away.
- Operate the water discharge valve slowly.
- There is a risk of injury from pinching or bumping hands.
- Do not aim the water at people or peer into the nozzle.
- High water pressure may cause them to be blown away, resulting in injury.
- Do not touch the spark spark plug or high-voltage cord during operation.
- There is a risk of electric shock.
- Never touch the muffler and exhaust pipe during and after operation since they become very hot.
- There is a risk of burns.
- While operating, be careful not to have the suction pipe or hose stepped on by vehicles or other objects.
- Accidents may occur due to damage, etc., and fire-fighting activities may be hindered.
- Do not start the engine with the water discharge valve handle open.
- When discharging water, the engine operator should communicate with the operator at the nozzle. Do not open the water discharge valve without notice or accelerate the throttle rapidly.
- There is a risk of injury from being blown away by the high-pressure water.
- Inspection and maintenance should be performed after the engine has been stopped and cooled down sufficiently.
- Failure to do so may result in injury, burns, or fire.
- Read the instruction manual that comes with the battery and the information on the battery itself carefully to ensure that the battery is used correctly.
- When disconnecting the battery cord, remove the (-) cord first, and when installing the battery cord, connect the (+) cord first.
- Short-circuiting may cause fire or burns.
- Do not use the charger in high-temperature places such as under direct sunlight or near heating elements, in extremely humid places, or wet areas such as rain or snow.
- There is a risk of overheating, burnout, or damage to the charger, or leakage of electricity or electric shock.
- The charger should be installed in a dry, well-ventilated location that is not wet.
- Failure to do so may cause electric shock or fire.
- Do not charge the battery with a charger other than the specified one.
- There is a risk of fire due to heating or burnout of the wiring.
- When operating without attaching the suction pipe (e.g., to check the vacuum level), attach the suction cap.
- There is a risk of getting caught in the machine or injured.
- Do not close the nozzle or water discharge valve while multiple pumps are relayed and the water is discharged.
- Abnormally high pressure may result in damage to the pump and hoses.

2 Name of each component



2 Name of each component



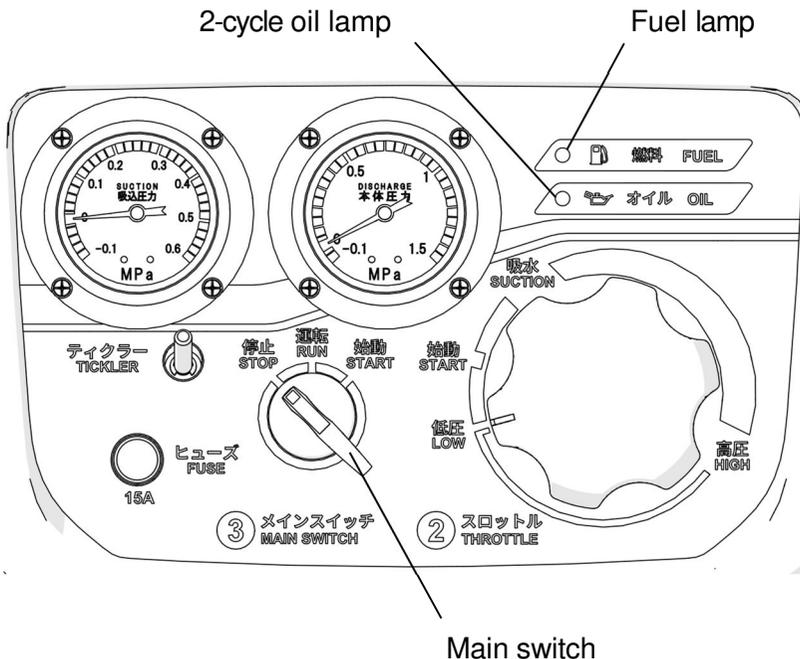
3 Monitor lamp

The pump with a starting motor activates when the main switch is turned into the "Run" position. When the power is turned on, two lights illuminate at the same time. If they do not light up, the battery voltage is insufficient, or there is a faulty circuit, the pump needs to be repaired. All lights are turned off after a few seconds.

All lights are turned off during water discharge, but the lights are turned on when operating the starting motor. It is because the battery voltage drops. Be sure to inspect or maintain when the following items are lit up.

Display	Feature	How it works	Measures
 fuel	Indicates that the fuel must be added	Lights up when the remaining fuel in the tank is low.	Refill the regular gasoline.
 2-cycle oil	Indication of when to refill 2-cycle oil	Lights up when the remaining oil in the tank is low, then stop the engine.	Refill the 2-cycle oil.

If the monitor lamp still illuminates or blinks after following the measures above, consult your dealer.



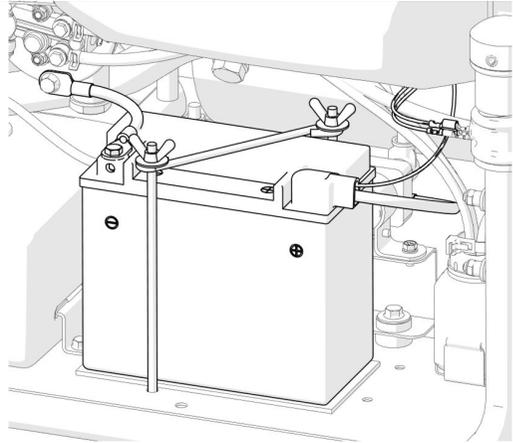
4 Handling method (Before)

Installing Battery

Caution

- Read the instruction manual that comes with the battery and the information on the battery itself carefully to ensure that the battery is used correctly.

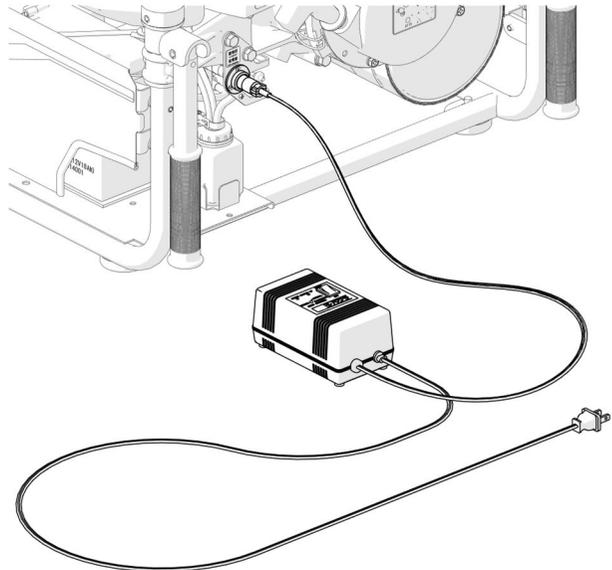
- (1) For handling, be sure to follow the battery instruction manual.
- (2) Fix the battery to the bed with two rods and one holder.
- (3) Firstly, connect two battery (+) cables (red), then connect one (-) cable (black) . Be sure to keep the connecting order.



Caution

- When disconnecting the battery cable, remove the (-) cord first, and when installing, connect the (+) cable first.
- Short-circuiting may cause fire or burns.

- (4) Connect the supplied charger to a charger inlet to charge the battery. (See "5 Periodic Inspection 2. Inspection Method (2) Handling of Fully Automatic Charger" on p. 29.)



4 Handling Method (Preparation for Operation)

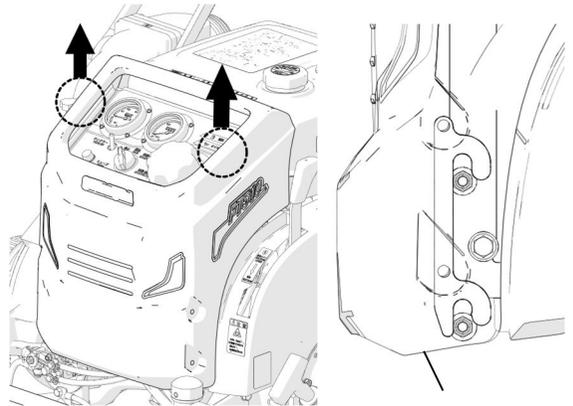
1. Removing and attaching covers

When removing the cover, follow the procedure below.

(1) Removing/attaching front cover

Hold the circled places on the illustration on the right. Shift it upward first, and then remove it toward you.

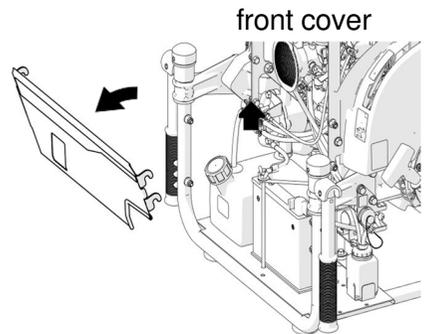
Installation is the reverse procedure.



(2) Removing and attaching the battery cover

Slide the battery cover upward first, and then remove it toward you.

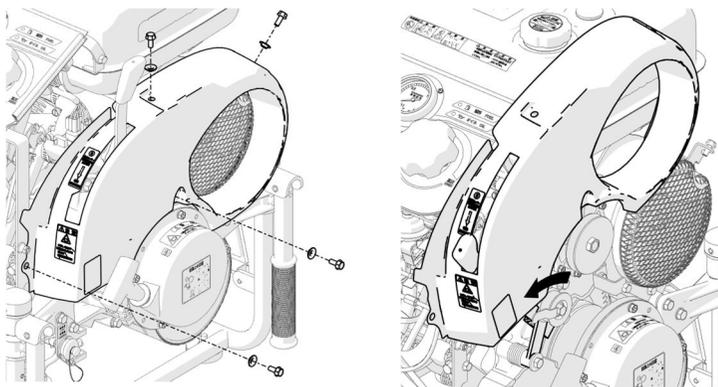
Installation is the reverse procedure.



(3) Removing and attaching vacuum pump cover

Remove the four bolts and collars. Pull the water suction lever toward you and remove it through the lever opening of the vacuum pump cover.

Installation is the reverse procedure.



Warning

○ Be sure to attach the cover when driving.

● There is a risk of injury or burns.

4 Handling Method (Preparation for Operation)

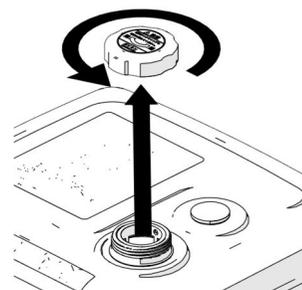
1. Replenishment

(1) Fuel

(Fuel tank capacity: approx. 14.5L)

Fill the tank with regular gasoline until the fuel gauge indicates "F".

Do not add gasoline mixed with two-cycle oil or bio-gasoline.



Danger

- Keep fire away when refueling.
- Do not overfill fuel into the tank.
- If the fuel is spilled, wipe it up immediately. Keep the cloth away from fire.
- Refill the fuel after the engine has cooled down.
- There is a risk of ignition and explosion.
- Hold the nozzle firmly and discharge water.
- There is a risk of injury due to swinging of the discharge nozzle.

Caution

- Tighten the fuel tank cap securely after refueling.
- There is a risk of ignition and explosion.

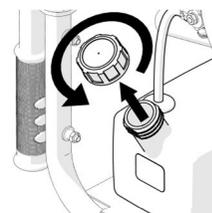
Caution

- Check the fuel once a month, and if the fuel has a pungent odor or is cloudy, replace it with new fuel immediately.
- This may cause engine malfunction or equipment failure.

(2) Engine oil

(Oil tank capacity: Approx. 2L).

Fill the 2-cycle oil into the oil tank at the bottom of the fire-fighting pump.



Caution

- When refilling the 2-cycle oil, use the same brand and grade of oil.
- Do not allow water or debris to enter when refilling.
- This may cause engine malfunction or equipment failure.

Caution

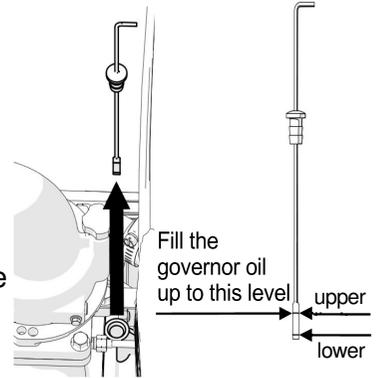
- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.

4 Handling Method (Preparation for Operation)

(3) Governor oil

(1) Place the pump on the level place and check the governor oil level with an oil gauge.

- Remove the governor oil level gauge and check the oil level. Refill the oil to the original level when the oil level has become in the middle or lower. Put back the oil gauge after refilling. Do not replenish more than the upper limit.
- If the oil is very dirty or cloudy, consult your dealer.
- Recommended oil (Automotive engine oil) SAE:10W-30(API:SJ)



Caution

- When replenishing governor oil, add the same brand and grade of oil.
- Do not allow water or debris to enter the oil inlet when refilling.
- This may cause engine malfunction or equipment failure.

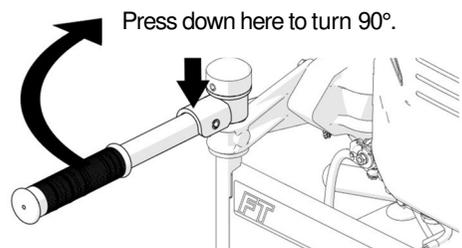


Caution

- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.

2. Carrying the pump

Hold the transport handle correctly when moving and loading/unloading the fire-fighting pump.
The carrying handle can be turned 90 deg.



Caution

- When holding the carrying handle, do not touch the bend.
- Fingers may be pinched, resulting in injury.

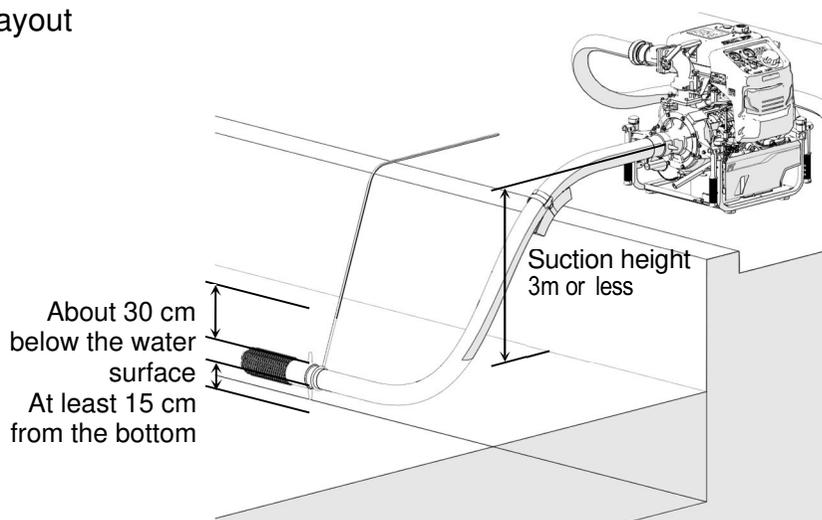


Caution

- 4 people is necessary to carry the pump.
- Dropping it on your foot may cause injury or back pain.

4 Handling Method (Preparation for Operation)

3. Pump layout



- (1) Check the water source. Make sure that there will be no problems with use, such as no decay, floating matter, or sediment.
- (2) Place the pump close to the water source and on a level surface.



Warning

- Avoid installation in places with poor ventilation, such as indoor, in a vehicle, tunnel. There is a risk of exhaust gas poisoning.



Warning

- Place at least 3 m away from combustible materials.
- Remove dead grass and other flammable materials before setting.
- Exhaust fumes and heat from the muffler may cause a fire.

- (3) Keep the suction height below 3m as much as possible to avoid falling water because of the reduction of the pump capacity.
- (4) Lay out the suction hose with no bends or bumps and fasten it tightly to the suction inlet port. Ensure the level of the inlet port side is higher than the suction hose tip at the water source side.
- (5) Always attach a strainer and basket to the suction port of the suction hose and keep it below the water surface to prevent air sucking in. Place the tip about 30 cm above the bottom. If the tip of the device is 15 cm or more away from the bottom. Place a straw mat to prevent sediment from being sucked into the device. If the water source has algae, watergrass, etc., remove them around the water inlet.
- (6) Connect the fire hoses securely and lay them out. Be sure not to fold.

4 Handling Method (Preparation for Operation)



Caution

- Connect the fire hose securely and always ensure it cannot be disconnected.
- If it is pulled out during water discharge, there is a risk of injury.



Caution

- Lay out the fire hoses without folds, twists, or sharp turns.
- There is a risk of the water hose springing up and causing injury.

4. Pump user

- (1) Fire-fighting pumps are small but high-performance machines with strong power. Improper use may cause serious accidents, including death.



Warning

- Fire-fighting pumps should be operated by firefighters, voluntary disaster prevention team members, maintenance and inspection personnel, and others who have been trained specifically for safe operation.
- Misuse or mishandling may result in serious accidents, including death.

- (2) Wear clothing appropriate for the operation.



Warning

- No headbands, neck wraps, ties, waist towels, etc., are allowed. Wear helmets, non-slip shoes, and no loose-fitting clothing.
- There is a risk of getting caught in the machine or slipping and falling, resulting in injury.

- (3) Do not operate if you are not feeling well.



Warning

- Do not operate fire-fighting pump if you are unable to concentrate on your work due to alcohol consumption, tiredness, illness, or the effects of drugs.
- This could lead to a serious accident.

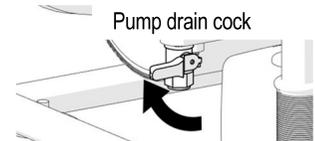
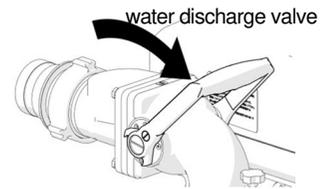
4 Handling method (Operation)

1. Starting the engine

Close the ⑥ water discharge valve and pump drain cock before starting the engine.

Please be sure to check the following

Follow the operating instructions in the order of ❶ to ❹ numbers on the unit.



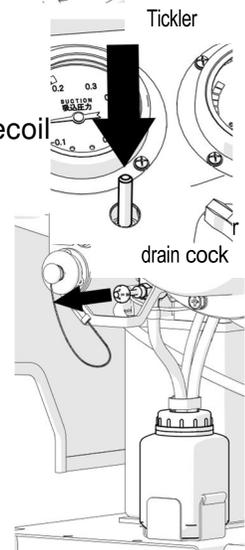
(1) Open the ❶ fuel cock.

Move the fuel cock lever straight down to "Open" ❶ to open the fuel cock.



(2) In cold weather, use the tickler in the carburetor.

- If it is difficult to start the engine with auto-choke alone in cold weather, press the tickler for 2 to 3 seconds.
- Press the tickler for 2 to 3 seconds when starting with the recoil starter and the engine is cold.
- If you use tickler for multiple times and the engine does not start, close the ❶ fuel cock, drain fuel from the carburetor drain cock, then start the engine.
- If the engine does not start properly due to excessive fuel, such as when restarting after warm-up, close the fuel cock, open the carburetor drain cock, and drain the gasoline from the carburetor before starting the engine. After starting, turn the fuel cock "open". If the car stops, start the car again.



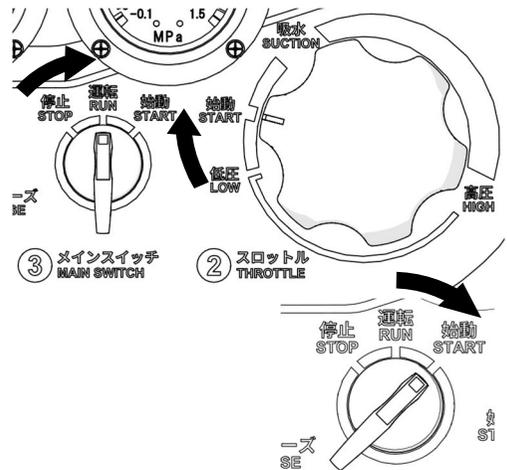
Fuel drain tank

Caution

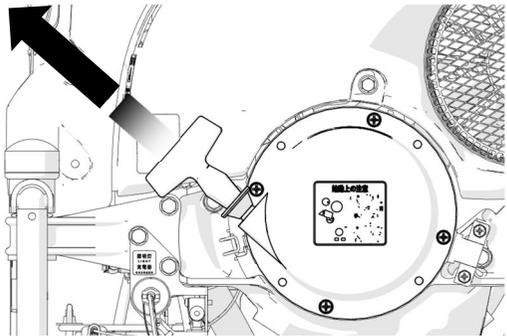
- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.

4 Handling method (Operation)

- (3) Turn the ② throttle to the "start" position.
 (4) Turn the main switch to the "run" position.
 When starting the starter motor, turn it to the "START" position. The starter motor works, and the engine starts.
- Once the engine is started, set the ③ main switch to the "operation" position.
 - Stop the starter motor for at least 5 seconds after running it for 3 seconds. Continuous operation will cause deterioration of the battery and the starter motor.



- (5) For recoil starting, pull the ④ recoil starter handle out to the point where it is slightly heavy, then pull quickly and sharply.



Caution

- When starting with a recoil starter, avoid getting clothing or gloves caught.
- There is a risk of injury.



Caution

- When starting with the recoil starter, keep people at least two meters away.
- There is a risk of injury to the elbows from being knocked by recoil ropes.



Warning

- Be sure to close the recoil starter during operation.
- There is a risk of getting caught in pulleys or belts, or of cutting yourself.

4 Handling method (Operation)

2. Suction

- (1) Turn the ② throttle to the "suction" position after starting the engine.
- (2) Pull the ⑤ suction lever toward you to activate the vacuum pump and suction water.
 - Promptly return the ⑤ suction lever when the pressure gauge needle swings and the pressure increases and stabilizes.
 - Keep the vacuum operation time less than 30 seconds.

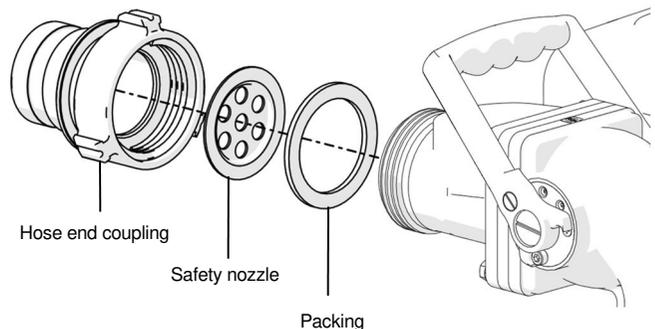


3. Water discharge

Before discharging water, check the safety of the nozzle. Give a signal to the person at the nozzle to start discharging water.

- (1) ⑥ Operate the water discharge handle gradually in the "→Open" direction until it stops. Turn the throttle to the desired water pressure level. Adjust the pressure with the ② throttle according to the water discharge conditions.
 - Be careful not to use too high a water discharge pressure or to open or close the ⑥ water discharge valve handle too rapidly, which may cause the water discharge hose to swing.
- (2) Standby for water discharge
 - To close the ⑥ water discharge valve and put the machine in standby mode during water discharge, ② turn the throttle to the "low pressure" position and stop the engine. In this case, the check valve will operate and water will not fall, so restart the engine and open the ⑥ water release valve to re-discharge water. (However, restarting must be done within 3 minutes.)
 - If it is necessary to stand by without stopping the engine, be sure to put the ② throttle in the "low pressure" position.
- (3) The case when discharging water without using a nozzle

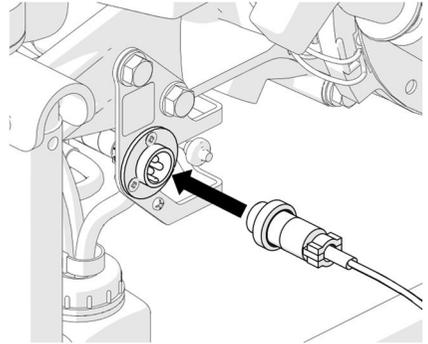
- When operating without using the nozzle, such as pumping water from a water tank or pumping water to a relay tank, be sure to set the attached safety nozzle between the hose end coupling and the water discharge valve, as shown in the figure.



4 Handling method (Operation)

(4) To turn on the searchlight

- To turn on the searchlight, plug the searchlight into the charger inlet on the recoil side.



Caution

- Always return the throttle to the "LOW" position before opening and closing the water discharge valve.
- Hold the nozzle firmly and discharge water.
- There is a risk of injury due to swinging of the discharge nozzle.

Caution

- Operate the water discharge valve slowly.
- There is a risk of injury from pinching or bumping hands.

Caution

- Do not aim the water at people or peer into the nozzle.
- High water pressure may cause them to be blown away, resulting in injury.

Caution

- Do not touch the spark plug or high-voltage cord during operation.
- There is a risk of electric shock.

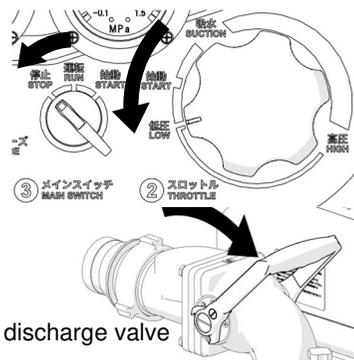
Caution

- Never touch the muffler and exhaust pipe during and after operation since they become very hot.
- There is a risk of burns.

4 Handling method (Operation)

4. Stopping the engine

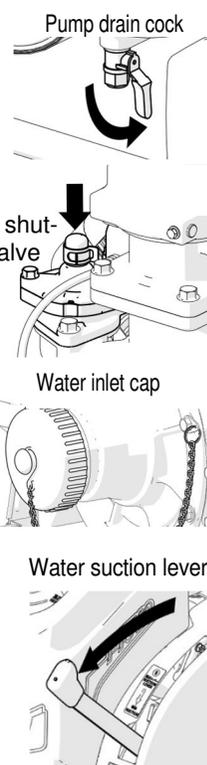
- (1) ② Turn the throttle to the "LOW" position.
 - If the engine is hot, run the engine at low speed for about 1 minute to cool it down.
- (2) Close the ⑥ water discharge valve handle by operating it in the "→ close" direction.
- (3) ③ Turn the main switch to the "STOP" position. The engine will stop.



5. Draining water

After the operation, a large amount of water remains inside the pump. This remaining water may cause corrosion and freezing cracks during cold weather. Be sure to drain water before storing.

- (1) Open the pump drain cock.
- (2) Open and close the ⑥ water release valve, press the water shut-off valve drain button, and drain completely.
- (3) Close the pump drain cock and install the water inlet cap.
- (4) Start the engine and pull the ⑤ suction lever to activate the vacuum pump for approximately 5 seconds.
- (5) ② Turn the throttle to the "low pressure" position, ③ Turn the main switch to the "stop" position and stop the engine.
- (6) Open the pump drain cock and remove the water inlet cap to confirm that it is completely drained. If drainage is insufficient, repeat steps (3) to (5).
- (7) Close the pump drain cock and install the water inlet cap.



Treatment after using seawater or muddy water

If seawater or muddy water is used, be sure to operate the pump by discharging water with clean water for at least 5 minutes to clean the inside of the pump. Also, to clean the inside of the vacuum pump, operate the vacuum pump for about 5 seconds by pulling the ⑤ suction lever while discharging water at low pressure, and drain clean water from the vacuum pump exhaust hose. After cleaning is complete, be sure to drain the water using the operation described in the previous section "5".

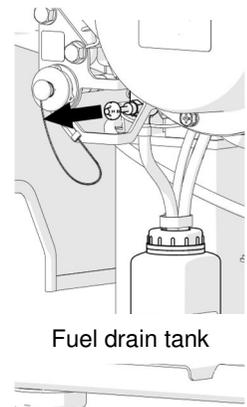
4 Handling method (Operation)

6. Storing the pump

- (1) Store in a dry, temperature-controlled area, away from dust and direct sunlight.
- (2) Wipe off oil, dust, and dirt and keep clean.
- (3) Fill the fuel up to the "F" level when storing. ●Close the fuel cock.
- (4) Fill the specified amount of 2-cycle oil.
- (5) Drain the fuel in the carburetor from the carburetor drain cock, on the recoil starter side.
*Make sure to remove the fuel inside the fuel drain tank every time.
- (6) Please charge the battery with the supplied charger while in storage.
(See "5 Periodic Inspection 2. Inspection Method (2) Handling of Automatic Charger" on p. 29)
- (7) Cover the pump with the attached pump cover.



Carburetor drain cock



Fuel drain tank

- Before storing the pump, be sure to check that the water inside is completely drained. Also, fill the pump with antifreeze to prevent freezing when storing the pump in cold weather (see "4 Handling Methods" Operation in Winter and Cold Weather, on P. 20)
- Operate and discharge water for 5 to 10 minutes at "HIGH" throttle position every month.
- Check the fuel in the fuel tank once a month, and if there is a pungent odor or cloudiness, replace the fuel with new fuel. The recommended replacement time is 6 months after refueling.
- If the vehicle has been in storage for a long period of time without a monthly periodic inspection, operate the pump for 1 minute at "LOW" position to warm up the engine. Be sure to inspect visually to see if there are any abnormalities.



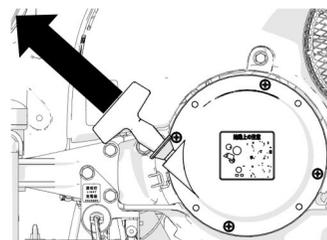
Caution

- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.

4 Handling Method (Operation in Winter and

1. Before starting the engine

- (1) In cold weather, battery capacity is significantly reduced. Please be sure to charge regularly.
- (2) ● Gently pull the recoil starter handle and check that the pump turns.
 - If it does not turn, the pump may be frozen. Pour the warm water into the pump from the suction port or defrost it in a warm room.



Recoil starter handle

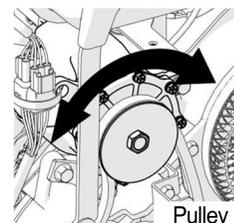
- (3) Remove the vacuum pump cover.

(See "4 Handling Methods (Preparation for Operation)"

1. Removing and attaching the covers, on page 9 .)

- Turn the vacuum pump pulley by hand and check if the vacuum pump turns.
- If it does not turn, the vacuum pump may be frozen.

Blow warm air outside the vacuum pump or defrost in a warm room.



Pulley



Danger

- Do not use fire to defrost the pump.
- There is a risk of ignition and explosion.



Caution

- Inspection and maintenance should be performed after the engine has been stopped and cooled down sufficiently.

2. Starting the engine

- (1) In cold weather, press the tickler for 2 to 3 seconds.
- (2) Immediately after the engine starts, operation may be unstable; run the machine idle at low speed for 1 to 2 minutes.

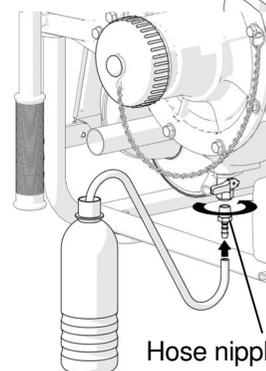
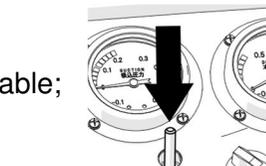
3. Treatment after water discharge (freeze prevention)

- (1) Preventing pumps from freezing (how to add antifreeze)

- ① Drain the water.

(Refer to "4 Handling Method (Operation) 5. Draining water)

- ② Close the water suction cap.
- ③ Attach the hose nipple and hose to the pump drain cock and place the hose in a bottle filled with antifreeze



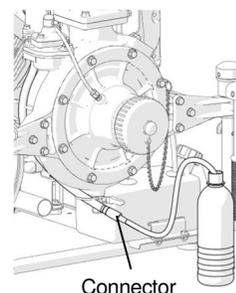
Hose nipple

4 Handling Method (Operation in Winter and

- ④ Start the engine.
- ⑤ ② Turn the throttle to the "SUCTION" position.
- ⑥ ⑤ Pull the suction lever to create a vacuum state inside the pump.
- ⑦ Open the pump drain cock to suck in antifreeze.
- ⑧ Pull the ⑤ suction lever again, and when antifreeze comes out of the vacuum pump exhaust port, return the ⑤ suction lever.
- ⑨ Remove the hose and hose nipple from the pump drain cock.
- ⑩ Pull the ⑤ suction lever and stop the engine when the antifreeze stops coming out of the vacuum pump exhaust port.
- ⑪ After collecting antifreeze from the pump drain cock, close the drain cock.

(2) Preventing the vacuum pump from freezing (how to fill the vacuum pump with antifreeze)

- ① Connect the connector and hose to the water shut-off valve drainpipe and place it in a container of antifreeze.
- ② Start the engine.
- ③ Set the ② throttle to the "SUCTION" position.
- ④ Pull the ⑤ suction lever and suck in the antifreeze.
- ⑤ If antifreeze comes out of the vacuum pump exhaust port, return the water suction lever.
- ⑥ Remove the connector and open the pump drain cock.
- ⑦ Pull the ⑤ suction lever, and when the antifreeze stops coming out of the vacuum pump exhaust port, return the ② throttle to the "LOW" position and stop the engine.
- ⑧ Close the pump drain cock.



(3) Antifreeze should also be injected into water discharge valves and hose couplings.

CAUTION: Do not use alcohol to prevent freezing, since it will damage the rubber seals. Collect drained antifreeze in a liquid container.

4. Precautions for storage

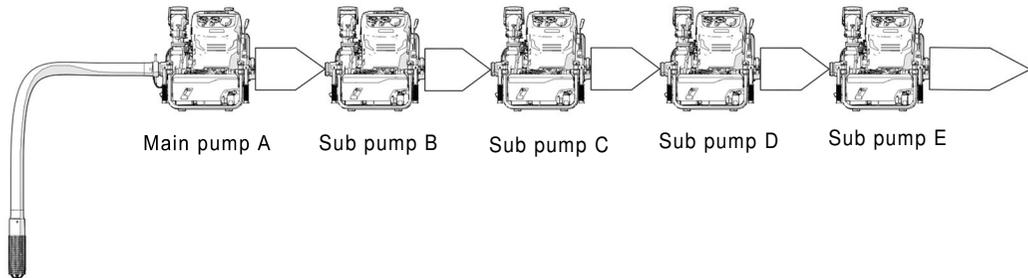
Choose the fuel with good quality. (The better quality of gasoline is highly volatile, and has better starting performance.)

- (1) Be sure to always have antifreeze on hand.
- (2) Batteries may freeze when the relative density of electrolyte becomes low. Be sure the battery is always recharged. If battery performance deteriorates, replace the battery as soon as possible.

4 Handling method (Relaying water with multiple pumps)

In the case of forest fires or urban fires where the water supply is far away, two or more pumps may be connected in series to relay water. The relay water requires different operations and special attention compared to normal operation because each pump is located far from the others. Daily training is also necessary to enable judgment and activities based on the state the pump's operators are facing. See the general method of relay operation below.

Figure 1.



1. Setting Locations

- (1) The number of units and their locations should be determined based on the number of hoses and the height of the water source.
- (2) Install a relay coupling to the suction port of sub-pumps (B to E in Figure 1), to connect the fire hose.
In this case, the automatic relay valve, "Direct Valve" can prevent accidents caused by sudden pressure fluctuations and high-pressure water.
- (3) The wye-valve is also recommended to be attached to the discharge port.
(The hose couplings that connect each pump may not be removed even after the discharge operation, because of the water pressure inside the fire hose.)

2. Operation Method (*An operator is required for every pump.)

- (1) Open the water discharge valves of the sub-pumps (B to E) beforehand.
Be sure to open the variable nozzle when it is attached to the fire hose.
- (2) Operate the main pump (A) and discharge water as usual.
- (3) Send water to the original pump first and then to others sequentially.
- (4) Check the pressure scale in the sub pump (E) and increase the engine speed to regulate the discharging water by controlling the throttle of the sub-pumps (B to E)
The sub pump (B to E): Should be more than 0.05MPa in a scale of suction gauge pressure, be less than 1.2MPa in a scale of power.
- (5) If there is not enough power of water discharge at the nozzle, turn the throttle dial of the original pump (A) to "HIGH" position gradually, then the turn the throttle dial of sub-pump, from the one closer to the original (from B to E), sequentially.
- (6) When stopping water discharge, turn the throttle dial of the last pump, the one close to the nozzle (E), to "LOW" position first and stop gradually (from E to B).
Stop the water supply from the main pump. When the supply of water from the main pump has been stopped, close the water discharge valve of each pump.

4 Handling method (Relaying water with multiple pumps)



Caution

- Do not close the nozzle or water discharge valve while multiple pumps are relayed and the water is discharged.
- Abnormally high pump pressure may result in damage to the pump and hoses.

1. Suction and discharge from water hydrant

The capacity of water supply from the fire hydrant

It is necessary to check the sufficient volume of water for discharging from the fire hydrant in advance.

It would depend on several factors, such as the diameter of the hydrant, the condition of the piping, the initial water pressure, and others.

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 could have high capacity for water supply with wider diameter despite low water pressure.

Water supply method

- (1) Be sure to open and close the hydrant's valve and release water to remove the foreign objects, such as sand, before connecting the hose to the hydrant.
- (2) Connect the water hydrant and pump. Use a suction hose that can endure the water supply pressure. The supply pressure limit for the suction hose with a nominal diameter of 65mm is 0.9 MPa. The suction hose for connection to the hydrant should be inspected periodically to avoid any damage.

How to check and adjust water supply pressure

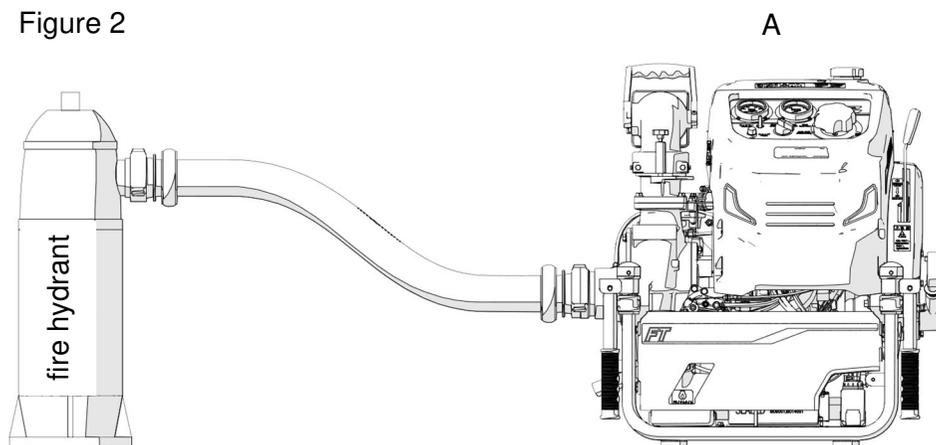
- (1) Open the open/close valves of the fire hydrant and the water discharge valve of the pump to full open.
- (2) Gradually close the pump's water discharge valve while checking the water supply pressure with a suction gauge.
- (3) If the water supply pressure is high, adjust the water supply pressure with the hydrant's open/close valve.

4 Handling Method (Suction, discharge, and relay the water from the fire hydrant)

2. Water discharge and delivery

When a single pump receives and discharges water (Figure 2)

Figure 2



- (1) Open the water discharge valve of pump (A) in advance.
If the fire hose has a variable nozzle at the end, be sure to leave it open.
- (2) Before starting the engine, open the hydrant and check the pressure on the compound (suction) gauge of the pump (A).
- (3) After confirming that water has been sent from the fire hydrant, start the engine of the pump (A) and begin discharging water.

- (4) Adjust the pressure by operating the throttle of the pump (A) to achieve the required pressure and flow rate.

The throttle should be operated gradually, and the compound (suction) gauge should be kept above 0.05 MPa.

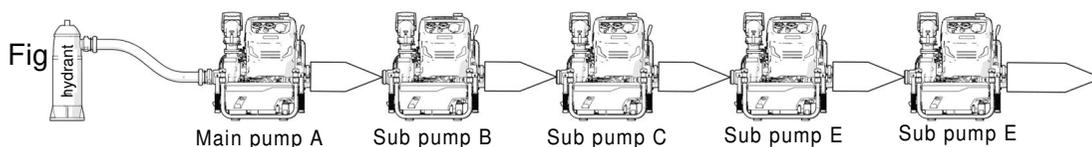
Adjust the hydrant open/close valve to adjust the pressure gauge to not exceed 1.2 MPa. At this time, the compound (suction) gauge of the pump (A) should be less than 0.6 MPa

- (5) To stop water discharge, turn the throttle of pump (A) to the "LOW" position, stop the engine, and close the hydrant.

Do not close the water discharge valve of pump (A) until the water supply from the hydrant stops.

4 Handling Method (Suction, discharge, and relay the water from the fire hydrant)

When discharging water by relaying with multiple pumps
(An operator is required for all pumps: Fig. 3)



- (1) Open the water discharge valves of all pumps (A to E) in advance. If a variable nozzle is attached to the fire hose-end at the water discharge side, be sure to open it.
- (2) Before starting the engine, open the hydrant and check the pressure of the compound (suction) gauge of the main pump (A).
- (3) After confirming that water has been delivered from the fire hydrant, start the engine of the main pump (A) to deliver water to the next pump.
- (4) Start and supply water to the second and sub-pumps (B to E) in the same manner as for the original pump (2) and (3).
- (5) Read the pressure gauge on the sub-pump (E) and adjust the pressure by operating the throttles on all pumps (A to E) to achieve the required pressure and flow rate at the nozzle. Operate the throttles gradually and make sure that each pump keeps above 0.05MPa on the compound (pressure) gauge and above 1.2MPa on the pressure gauge.

Adjust the hydrant opening to make the compound (pressure) gauge of each pump is not less than 0.6MPa.

- (6) To stop the water discharge, shut down the engine by turning the throttle to the "LOW" position, starting with the pump (E) closest to the end of nozzle, and finally close the fire hydrant. Do not close the water discharge valves of each pump until the water supply from the hydrant has stopped.

5 Periodical Inspections

1. Periodical inspections

Be sure to perform periodic inspections according to the following items.

Item	Duration or operating time							Inspection details	treatment		
	Period										
	Before use	after use	1 month	6 months	1 year	2 years	3 years				Operation time (Hour)
fuel	●	●							Quantity/ Deterioration (ie color, smell)	Refill or replace	
				●					-	Replace	
2-cycle oil	●								Quantity	Refill	
					●				-	Replace	
Battery		●							-	Recharge	
			●						Deterioration	Replace	
						●			-	Replace	
Spark plug					○			100	-	Replace	○
Appearance		●							Dirt, etc.	Clean	
Starter rope			●						Wear, breakage	exchange	○
Vacuum pump belt				●				50	Become loose/Wear	Adjust or replace	○
Fan belt				●				50	Become loose/Wear	Adjust or replace	○
Fuel pipes				●				50	Leakage/damage	Replace	○
Water discharge valve					●			100	Valve feels heavy, vacuum leakage	Adjust or replace the parts if necessary	○
Fuel filter				●			○	200	Foreign material stuck	Clean or replace	○
Engine start and vacuum			●						Operation/Perfor mance	Replace parts if necessary	○
Prime and discharge			●						Operation/Perfor mance	Replace parts if necessary	○
All parts							○	300		Replace parts if necessary	○

Note:

- For items marked with "●" in the period column, please practice the inspection by yourself. Please ask your dealer to inspect the items marked with "○" in the period column and to handle the items marked "○" in the column of treatment.
- Measure the inspection timing by either comes earlier, "period" or "operation time". For example, consider replacing spark plug when the operation time reaches to 100 hours, even if the operation period is less than a year.
- This inspection table shows the period and time under general operating conditions. Make sure to perform inspections earlier when the pump is used under tough conditions.

5 Periodical Inspections

Recommended replacement parts and period

Part Name	Recommended Replacement Period	Example of Defects
Spark plug	Every Year	Bad to start due to wear and tear
Fuel Pipes	Every 2 years	Fuel leakage due to deterioration
Battery	Every 2 years	Deterioration
2 Cycle Oil Pipe	Every 2 years	Oil leakage due to deterioration
Vacuum Pump Belt	Every 3 years	Slippage due to wear
Fan Belt	Every 3 years	Slippage due to wear
Other Rubbers	Every 2 years	Deterioration
Starter Rope	Every 3 years	Breakage due to wear
Fuel Filter	Every 3 years	Clogging and Bad start due to the water drip
2-cycle Oil Filter	Every 3 years	Clogging, and Poor lubrication due to the moisture.
Discharge Valve Water shut-off valve (rubber)	Every 3 years	Deterioration of the check valve
Mechanical Seal	Every 3 years	Poor suction due to deterioration
Oilless Vacuum Pump Blades	Every 3 years	Poor suction due to deterioration
Carburetor	10 years	Corrosion inside the tank
Fuel Tank	10 years	Corrosion inside the tank

Parts recommend replacing when disassembling

- Gaskets • Push nuts
- O-rings • Spring pins
- Lock washers • E-rings



Caution

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

5 Periodical Inspections

2. Inspection method

Periodic inspections are essential to ensure the fire-fighting pump's safety and use every possible function. Inspect the pump correctly and safely 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, 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.



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 recommended to replace the battery earlier.

Recommended battery : GS YUASA YTX20L-BS

For handling the battery, please follow the instruction manual that comes with the battery.

5 Periodical Inspections



Caution

- When disposing of batteries, oils, etc., please entrust disposal to a specialized industrial waste disposal contractor.
- It may cause fire, burns, or pollute the environment.

(2) Handling of Shibaura full-automatic charger



Caution

- To use the charger safely and correctly, be sure to read the instruction manual that comes with the charger. Improper use may cause an accident. After reading the charger instruction manual, be sure to keep it close to the product.

A) Unpacking



Caution

- Remove packing materials from the battery charger before charging.
- There is a risk

B) Location to place



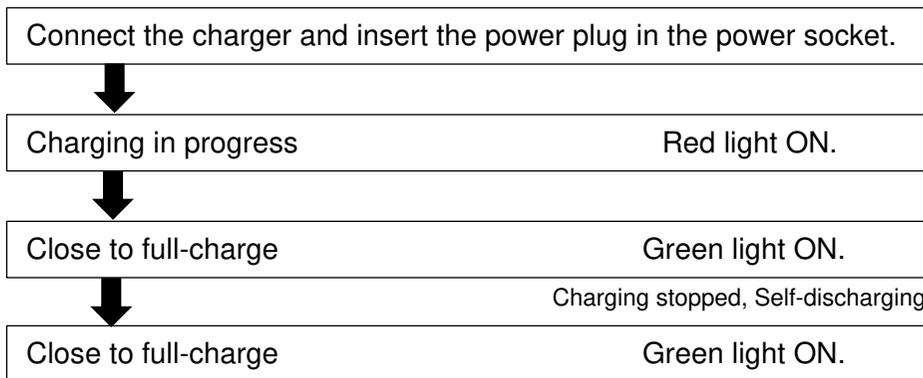
Warning

- Do not use the charger in high-temperature places such as under direct sunlight or near heating elements, in extremely humid places, or wet areas such as rain or snow.
- There is a risk of overheating, burnout, or damage to the charger, or leakage of electricity or electric shock.

C) Make sure before use

- Remove the power plug from the socket (Be sure the charger is turned off).
- Connect the output of the charger cable firmly to the fire-fighting pump.
- After connecting the cable to the charger unit(AC inlet), plug in the socket.

D) Battery charger Operating Manual



【Maintenance charging *】

5 Periodical Inspections

* Maintenance charge mode

This function automatically recharges the battery when the capacity has declined. It always monitors the decline of the battery capacity by self-discharge.

After starting the charging (Red Light ON), when the battery is close to full charging, the indicator will change to Green Light ON, and the status will automatically change to the maintenance charging mode (Green Light ON). After that, the Red Light and the Green Light will light up alternately to reduce the deterioration of the battery.

Note:

Remove the power plug to stop the main unit from charging. Then, remove the output terminal.

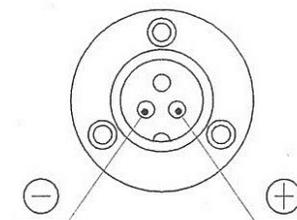
LED indication and charge status

CHARGE STATUS	CHARGE LED (RED)	FULL LED (GREEN)
No Charging	OFF	OFF
Charging	ON	OFF
Close to full-charge	OFF	ON
Error (⚠)	ON	ON

⚠ Refer to "5. Periodical inspections" when an error has occurred.

Note:

When starting the engine using a fully charged battery, if the starter does not rotate sufficiently, this may be due to battery deterioration. Please inspect or replace the battery.



E) Protective operations

- Input (primary side)
Protected from circuit errors by current fuse.
- Output (secondary side)
Protected from battery reverse connection and output short-circuiting by electronic circuit and circuit breaker.

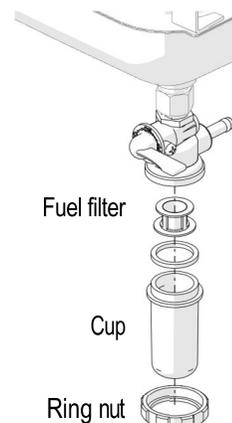
F) Inspection method when an error has occurred

Symptom	Cause	Measure *
Both red and green LEDs come on	Power cable is not connected correctly.	Check the connection status.
	The circuit breaker is open.	Pull out the power plug. After the body of the charger stops, remove the error cause, and close the circuit breaker after 60 seconds.
	The output connector is loose.	Insert the output connector all the way, and lock it securely.
The battery is obviously in discharged state, but the tickle charge mode starts immediately.	Battery is in the deteriorated state.	Replace the battery with a new one.
LED does not come on (both red and green)	Protective operation is activated.	Turn off the power and wait for 60 seconds. After that, charging the battery again.

5 Periodical Inspections

(3) Cleaning the fuel cock filter

- ① Close the fuel cock.
- ② Loosen and remove the ring nut with pliers.
- ③ Wipe off any debris in the cup with a cloth or the like.
- ④ Remove the filter attached to the ④❶ fuel cock main unit and wash it with gasoline.
- ⑤ Install the fuel cock securely to the original position. Be sure to open the ❶ fuel cock and inspect if there are no leaks.
- ⑥ After inspection, close the ❶ fuel cock.



(4) Replacement of the fuel in the tank

Storing fuel for a long period of time may result in poor starting performance and rust.
Replace with new fuel every 6 months.



Danger

- Keep fire away when refueling.
- There is a risk of ignition and explosion.

(5) Spark plug cleaning

Use [NGK BR8HIX] spark plugs.

Clean the spark plugs that are contaminated with exhaust gases and carbon.

- (1) Stop the engine to cool down sufficiently before working on it.
- (2) Remove the spark plug cap and spark plug using the spark plug box wrench.
- (3) Clean the outside, inside, and electrode of the spark plug.
- (4) Tighten the spark plug to the cylinder head and keep the spark spark plug cap pressed in.



Caution

- Do not touch the ignition plug or high-voltage cord during operation.
- There is a risk of electric shock.

(6) Check the governor oil level

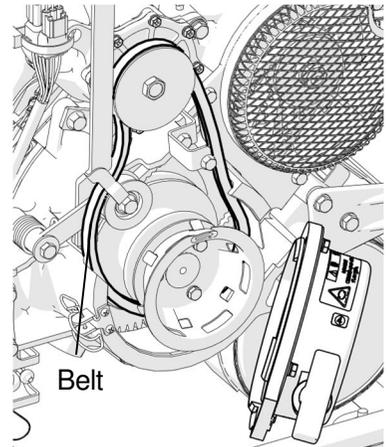
(See "4 Handling Methods (Preparation for Operation) 1.

5 Periodical Inspections

(7) Vacuum pump belt inspection

Replacement of the vacuum pump belt is required if it is stretched, worn, or cracked.

- ① Open the recoil starter.
Do not start the engine during the inspection.
Also, the belt may be hot immediately after operation, so wait until the engine has cooled down before inspecting
- ② Remove the front cover and vacuum pump cover.
(See "4 Handling Methods (Preparation for Operation) 1.")
- ③ Remove the belt from the pulley groove.
- ④ Install a new belt.
- ⑤ Install the cover as before.

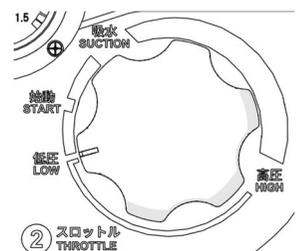
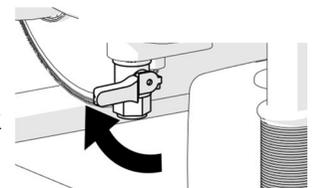
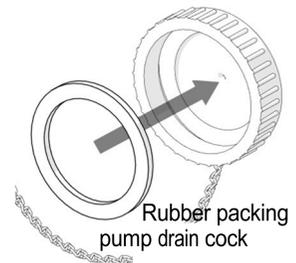


(8) Starting and vacuum inspection

Vacuum inspections must be performed even if the suction and discharge tests (which are described in the next page) are difficult to carry out.

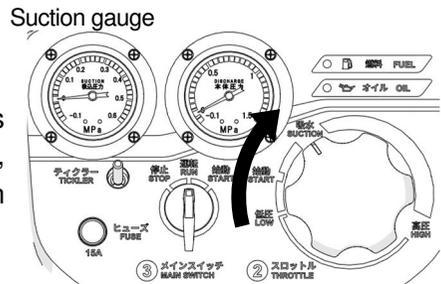
Defects such as engine not starting, poor vacuum performance, or vacuum leakage can cause accidents, such as not being able to operate the water discharge at the actual site, or falling water during the discharge.

- ① Check that the rubber packing is in the water suction cap, and attach the inlet cap to the water inlet.
- ② Close the pump drain cock.
- ③ Start the engine.
- ④ ② Warm up the engine with the throttle dial in the "low pressure" position for about 1 minute, and visually check for any abnormalities in the various parts.



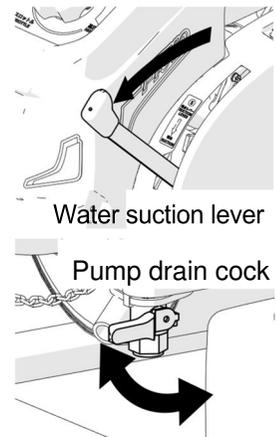
5 Periodical Inspections

- ⑤② Turn the throttle to the "suction" position and pull the ⑤ suction lever toward you to activate the vacuum pump. When the pointer of the ⑥ suction gauge reads -0.06 to -0.08 MPa, return the ⑤ suction lever, ② throttle to the "low pressure" position, and then stop the engine.
- ⑦ If there is no change in the indicated value of the suction gauge after leaving it for 1 minute, the vacuum performance is good.



- ⑧ Open the pump drain cock to release the vacuum and close the pump drain cock.

* If any abnormality is found, please consult your dealer.



(9) Water suction and discharge inspection

Suck and Discharge the water to inspect if there is no abnormalities found in each part of your pump

- (1) Are there any abnormal sounds?
- (2) Is there any water fall?
- (3) Is the water suction slow?
- (4) Are there any water leaks?
- (5) Is the startability good?
- (6) Are there any looseness in each part?
- (7) Are there any fuel leaks?
- (8) Other

*If any abnormality is found, refer to the "6 Troubleshooting" in the next section for appropriate treatments.

6 Troubleshooting

Daily inspection and maintenance are important to prevent fire-fighting pump malfunctions. Detect malfunctions at an early stage and perform maintenance immediately. If the trouble is not easily solved, or if the malfunction is not listed below, please consult the dealer where you purchased the pump, giving the model name and serial number.

1. Engine area

	Symptom	Cause	Action
Hard to Start	No fuel flow to carburetor.	1 Fuel cock filter or fuel line is clogging 2 Needle valve is sticking 3 There's no fuel.	1 Clean 2 Clean 3 Fill
	Fuel does not flow to combustion chamber (remove spark plugs to see)	1 Choke does not close (auto choke) 2 Rotational speed is low when starting. 3 Carburetor (needle valve, jet) is clogging	1 Repair and adjust 2 Replenish the battery 3 Clean
	Fuel goes to combustion chamber but does not start	1 Overflow (excessive fuel) 2 Tickler is overused (excessive fuel) 3 Choke does not open fully closed (auto choke) 4 Fuel is deteriorated 5 Water is mixed in the fuel. 6 Excessive lubricating oil	1 Inspect and adjust the carburetor 2 Drain the fuel from the seal at the crankcase. 3 Replace diaphragms and clean pipes. 4 Exchange. 5 Drain water 6 Adjust to the proper amount
	Abnormality of combustion system	1 Fuel cock filter is clogged 2 Carburetor valve seat is clogged 3 Carburetor is poorly adjusted, or there is a clog on the carburetor 4 Carburetor is poorly tightened.	1 Clean 2 Clean 3 Adjust or clean 4 Retighten
	Sparks are poor	1 Spark plug cap has damages, electrode gap is improper, or the spark plug is defective. 2 Leakage from high voltage cord 3 Leakage from spark plug cap 4 Defective ignition coil 5 Defective CDI unit 6 Poor rotation of the starting motor	1 Exchange 2 Exchange 3 Exchange 4 Exchange 5 Exchange 6 Replenish the battery

6 Troubleshooting

Symptom		Cause	Action	
Hard to Start	No sparks	<ol style="list-style-type: none"> 1 Short circuit of the ground wire 2 Spark plugs are damaged or stained. 3 Spark plug has gap failure 4 Ignition coil is defective 5 CDI unit is defective 6 Wiring connection is poor or disconnected 7 Main switch is defective 	<ol style="list-style-type: none"> 1 Repair the point short circuited 2 Exchange. 3 Exchange 4 Exchange 5 Exchange 6 Adjust the connection 7 Exchange. 	
	Poor compression	<ol style="list-style-type: none"> 1 Piston wear or seizure 2 Piston rings 3 Worn or damaged oil seals 4 Lack of lubricant 5 Damaged cylinder head gasket 	<ol style="list-style-type: none"> 1 Repair or replace 2 Exchange. 3 Exchange 4 Refill to the proper amount 5 Exchange 	
Poor running	Insufficient rotation	Combustion system error (mis-hunting)	<ol style="list-style-type: none"> 1 Carburetor main jet is clogged or misadjusted 2 Fuel cock filter clogged 3 Overflow 4 Poor installation of the carburetor 5 Icing 	<ol style="list-style-type: none"> 1 Clean or replace 2 Cleaning 3 Check and adjust the carburetor 4 Correct the place or replace. 5 Remove and add fuel tank drainage agent
		Abnormalities in the governor system	<ol style="list-style-type: none"> 1 Governor maladjustment 2 Governor operating parts wear 3 Defective caulking of flyweight 4 Poorly tightened governor arm 5 Governor spring tension failure 6 Governor lever ring hole worn or rattling large 	<ol style="list-style-type: none"> 1 Adjust 2 Exchange. 3 Correct or exchange 4 Readjust and retighten. 5 Exchange. 6 Replace or correct
		Cooling system abnormalities	<ol style="list-style-type: none"> 1 Cooling air is weak 	<ol style="list-style-type: none"> 1 Pay attention to the ventilation
		Other	<ol style="list-style-type: none"> 1 Overload 2 Muffler and exhaust port clogging 3 Inlet clogging 4 Defective spark plug 	<ol style="list-style-type: none"> 1 Change nozzle diameter or use safety nozzle 2 Remove the clog 3 Remove the clog 4 Exchange

6 Troubleshooting

		Symptom	Cause	Action
Poor running	Abnormal noise	Mechanical sound	<ol style="list-style-type: none"> 1 Flywheel is fixed loosely 2 Piston is worn, and tapping sounds come out from the piston skirt 3 Armature plate is contacting the other parts. 4 Foreign material is caught inside the crankcase and fan cover 5 Foreign material is caught inside the pump or impeller is touching the pump casing 6 Each part becomes loose 	<ol style="list-style-type: none"> 1 Retighten 2 Replace the piston 3 Reassemble 4 Remove the foreign material 5 Remove the foreign material or reassemble the pump 6 Retighten
		Knocking sound (combustion system abnormalities)	<ol style="list-style-type: none"> 1 Insufficient fuel (main jet or use of different diameter parts) 2 Overload 3 Rotation speed too low or too high 4 Different spark plug is used 	<ol style="list-style-type: none"> 1 Clean or replace 2 Open water discharge valve 3 Adjust to proper rotation speed 4 Replace with proper spark plugs

6 Troubleshooting

2. Pump

		Symptom	Cause	Action	
Water suction failure	A suction gauge does not have negative pressure	Abnormality on water pump side	<ol style="list-style-type: none"> 1 Poorly tightened suction pipe 2 Air suction from the tip of the suction pipe 3 Forgot to close the drain cock 4 Defective suction pipe packing 5 suction pipe fissure 6 Foreign matter caught in water discharge valve 	<ol style="list-style-type: none"> 1 Tighten securely 2 Put it completely underwater 3 Close securely 4 Exchange. 5 Exchange. 6 Remove foreign objects 	
		Abnormality on the vacuum pump side	No Rotation	<ol style="list-style-type: none"> 1 Internal freeze 2 Foreign object inhalation 3 Vacuum pump damaged 4 V Belt slip or breakage 	<ol style="list-style-type: none"> 1 Defrost 2 Remove foreign objects 3 Exchange. 4 Exchange.
			Rotating	<ol style="list-style-type: none"> 1 Clogged or poorly tightened vacuum passage 2 Strainer at the water shut-off valve is clogged 	<ol style="list-style-type: none"> 1 Clean or retighten 2 Clean
	The coupled meter becomes negative pressure	Vacuum leak (engine) Falling water when stopped)	Refer to "Water suction failure - compound meter does not become negative pressure - Water pump side abnormality"		
		No vacuum leakage	<ol style="list-style-type: none"> 1 Clogged suction pipe strainer or inside suction pipe 2 Air pocket in the suction pipe. 3 Suction height is too high, or the suction pipe is too long 4 Air suction from the tip of the suction pipe 5 Low engine speed at water suction 6 Short water suction operation time 7 Clogged or poorly tightened vacuum passage 8 Strainer at the water shut-off valve is clogged 	<ol style="list-style-type: none"> 1 Clean 2 Correct the layout 3 Keep the height within 8m 4 Put the tip completely underwater 5 Adjust to water suction rotation speed 6 Lengthen operation time 7 Clean or retighten 8 Cleaning 	

6 Troubleshooting

Symptom		Cause	Action	
Water Discharge Failure	Pressure does not increase	Abnormality on water pump side	<ol style="list-style-type: none"> 1 Clog in the suction pipe strainer or suction pipe 2 Air pocket in suction pipe 3 Suction height is too high, or the suction pipe is too long. 4 Air suction from the tip of the suction pipe 5 Poorly tightened suction pipe 6 Discharge valve half-open 7 Forgot to remove the safety nozzle (not necessary when the nozzle is attached) 8 Foreign matter in the nozzle 9 Frozen inside the pump 	<ol style="list-style-type: none"> 1 Clean 2 Correct the layout of the suction pipe. 3 Keep the height within 8m 4 Put the tip completely underwater. 5 Tighten securely 6 Open the valve completely 7 Remove 8 Remove foreign objects 9 Defrost and remove the ice
		Engine malfunction	Refer to 1. Engine – Hard to start and poor running	
	Other Abnormalities	<ol style="list-style-type: none"> 1 Muffler and exhaust port clogging 2 Air Inlet of the carburetor clogging 	<ol style="list-style-type: none"> 1 Remove the clog 2 Remove the clog 	

3. Electrical

Symptom		Cause	Action
Bad start	Starting motor does not rotate	<ol style="list-style-type: none"> 1 Insufficient battery capacity 2 Deterioration of the battery 3 Fuse burnout 4 The cable connection is loose or Disconnected 	<ol style="list-style-type: none"> 1 Recharge 2 Replace 3 Replace. 4 Check the cable connection and plug-in surely. Replace parts if necessary.
Battery failure	Batteries run out too quickly.	<ol style="list-style-type: none"> 1 Deterioration of the battery 2 Mistake in main switch operation. 3 Mistake in charge operation 	<ol style="list-style-type: none"> 1 Exchange. 2 Operate properly 3 Operate properly
Connection failure	Wiring burnout	<ol style="list-style-type: none"> 1 Battery reverse connection 2 Poor connection or short-circuit at the outlet terminal 3 Poor wiring connection or disconnection 4 Fuse burnout 	<ol style="list-style-type: none"> 1 Connect correctly 2 Connect correctly, or Repair or replace the short-circuited parts. 3 Correct the wiring or repair, or replace 4 Replace

6 Troubleshooting

Symptom		cause	treatment	
Defective wiring	Lamp does not light	1 Lamp blew out 2 Wiring is loose or disconnected	1 Replace 2 Correct the circuit, repair, or replacement	
Defective monitor lamp	All monitor lamps do not light up immediately after turning the main switch to operate	1 Battery capacity is not enough, or the battery is deteriorated. 2 Fuse burnout 3 Wiring is loose or disconnected	1 Recharge or replace 2 Replace 3 Correct the circuit, repair, or replacement.	
	The lamps do not light even if they should have lit up	Common & typical matters to be noticed	1 Loose or disconnected wiring of each sensor and switch	1 Correct the circuit, repair, or replacement
		Fuel	1 Switch is broken	1 Replace
		2-cycle oil	1 Switch is broken	1 Replace
Monitor lamp light up	Please refer to Section No. 3 – Monitor Lamp (P. 7) and cope with each matter displayed			

7 Specifications

1. Fire-fighting pump	
Model	FT510-A
Classification (JPN)	(B-2)
Notification No. (JPN)	(P0145001)
Dimension (L x W x H)	737mm x 572mm x 740mm
Dry Weight	90 kg
2. Pump	
Type	High-pressure 1-stage turbine pump (with inducer)
Discharge water volume	Normal 1.01 m ³ /min
	High pressure 0.64 m ³ /min
Pump pressure	Normal 0.70 MPa
	High pressure 1.00 MPa
Nozzle diameter	Standard 24.0 mm
	High pressure 17.5 mm
Rated rotation speed	5800 rpm
Water inlet	Nominal 75mm, Fire engine thread (JIS B 9912)
Water outlet	Nominal 65mm, Fire engine Thread (JIS B 9912)
3. Engine	
Type	Air-cooled, 2-cycle, inclined, 2-cylinder gasoline engine
Model name	E440C
Displacement	436mL
Authorized output	22.8 kW / 5800rpm
Fuel feeding system	Carburetor
Fuel type and tank capacity	Regular gasoline for automobiles - 14.5L
Lubrication system and tank capacity	Separate lubrication system (2-cycle oil) - 2L
Fuel consumption	Approx. 14L/h
Cooling system	Forced air-cooled
Ignition system	CDI ignition system
Starting system	Starting motor & recoil
Lighting	12V-35W (searchlight), 12V-3W (instrument panel light)
Spark plug	NGK BR8HIX

7 Specifications

4. Vacuum pump	
Type	Oilless type: 4-vane eccentric rotary type
Maximum Suction Height	Approx. 9 m
Drive system	V Belt clutch type
5. Accessories	
Battery	12V15Ah/5h
Charger	AC100V~AC240V – DC12V charger
Tools, etc.	1 x Tool kit, 1 x instruction manual 1 x Spark plug, 1 x safety nozzle
Pump cover	1 pc.
6. Optional parts	
Searchlight lamp	1 pc.
Searchlight stand	1 pc.



Shibaura Fire Pump Co., Ltd.

TEL: +81 263 29 1072

FAX: +81 263 29 1074

E-MAIL: overseas-sales@shibaura-bousai.co.jp

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SHIBAURA

OPERATION MANUAL

SHIBAURA FIRE-FIGHTING PUMP FT510-A



Please read this operation manual carefully to operate the Shibaaura Fire-fighting Pump safely and correctly. Incorrect operation of the pump may result in an accident. If this manual is missing or damaged, please order a new one from us or our agent promptly.

Shibaaura Fire Pump Co., Ltd.

- For safe use

Keep it in a safe place with the fire-fighting pump.

- Items marked with  in this instruction manual are particularly important for safe use and must be observed.

 Danger	The case when there is an imminent risk of death, serious injury, or the product is mishandled.
 Warning	The case when there is a risk of death or serious injury, or the product is mishandled.
 Caution	In cases when the product is mishandled, minor injuries or property damage may occur.

- Product specifications and appearance are subject to change without notice for improvement. Therefore, please note that the contents of this document and some of the photographs and illustrations may not correspond to the product.
- If you have any questions or difficulties after reading this manual, please contact the dealer where you purchased the product or our company.
- For inspection and maintenance, please contact a maintenance business or dealer that is qualified to service portable fire-fighting pumps.

○ Contents

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1 Things you must follow for your safety

1. Warning Label Locations



Part No.L82900900



Part No.290192430



Part No.290192770



Part No.290192410



Part No.290192400



Part No.290192400

- If the contents of the label become difficult to see or the label is about to come off, replace it immediately.

1 Things you must follow for your safety

2. Caution Marks



- Do not suck in or discharge the substances other than water, such as flammable materials, drugs, or chemical liquid.
- There is a risk of explosion, fire, burns, poisoning, etc.

- Keep fire away when refueling.
- Do not overfill fuel into the tank.
- If the fuel is spilled, wipe it up immediately. Keep the wiping cloth away from fire.
- Refill the fuel after the engine has cooled down.
- Do not use fire to defrost the pump.
- There is a risk of ignition and explosion.



- Fire-fighting pumps should be operated by firefighters, voluntary disaster prevention team members, maintenance and inspection personnel, and others who have been trained specifically for safe operation.
- Misuse or mishandling may result in serious accidents, including death.

- No neck wraps, ties, waist towels, etc., are allowed. Wear helmets, non-slip shoes, and no loose-fitting clothing.
- There is a risk of getting caught in the machine or slipping and falling, resulting in injury.

- Do not operate a fire-fighting pump if you are unable to concentrate on your work due to alcohol consumption, tiredness, illness, or the effects of drugs.
- This could lead to a serious accident.

- Use only genuine parts or specified attachments. No modifications are allowed.
- Failure to do so may result in accidents, injuries, or machine malfunctions.

- Install at least 3 m away from combustible materials.
- Remove flammable materials, such as dry grass, before installation.
- Exhaust fumes and heat from the muffler may cause a fire.

- Do not install indoors or in tunnels with poor ventilation.
- There is a risk of exhaust gas poisoning.

- Be sure to install the cover when operating.
- There is a risk of injury or burns.

- Be sure to close the recoil starter during operation.
- There is a risk of getting caught in pulleys or belts, or of getting cut yourself.

- Keep fire away from the battery.
- There is a risk of fire and explosion.

- Remove packing materials from the battery charger before charging.
- There is a risk of fire.

- Be sure to carry out periodic inspections. Operate and discharge the water at least once a month to check for any abnormalities.
- Accidents may occur due to damage, etc., and fire-fighting activities may be hindered.

1 Things you must follow for your safety

Caution

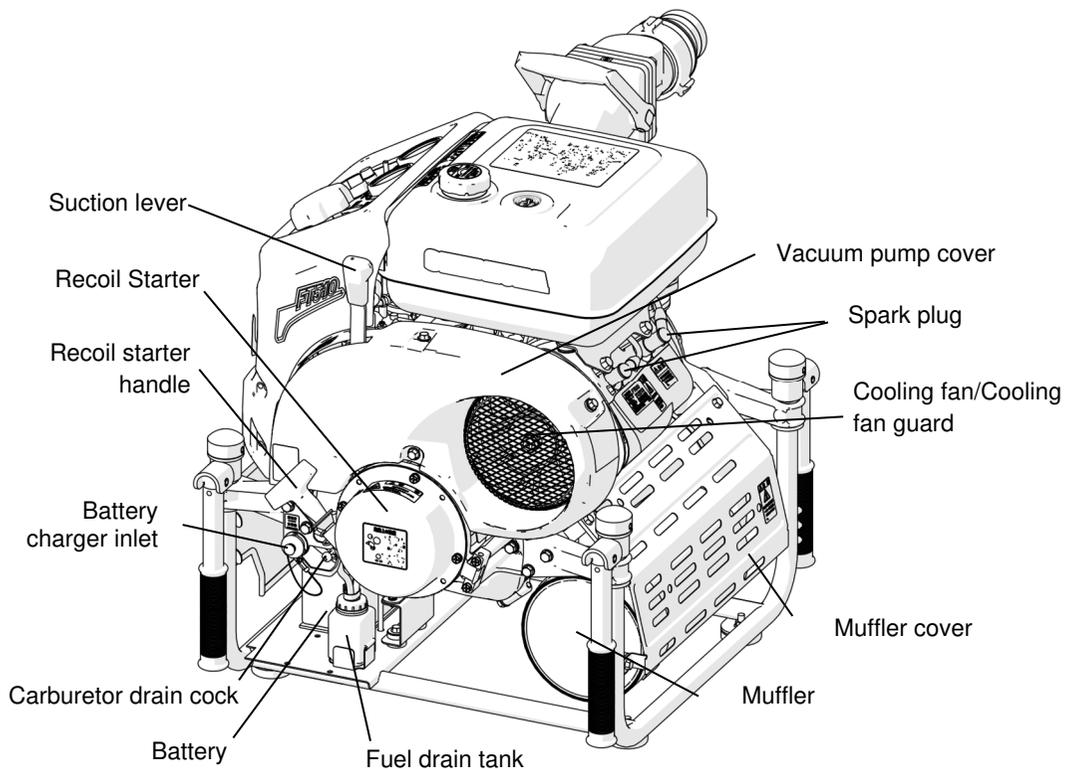
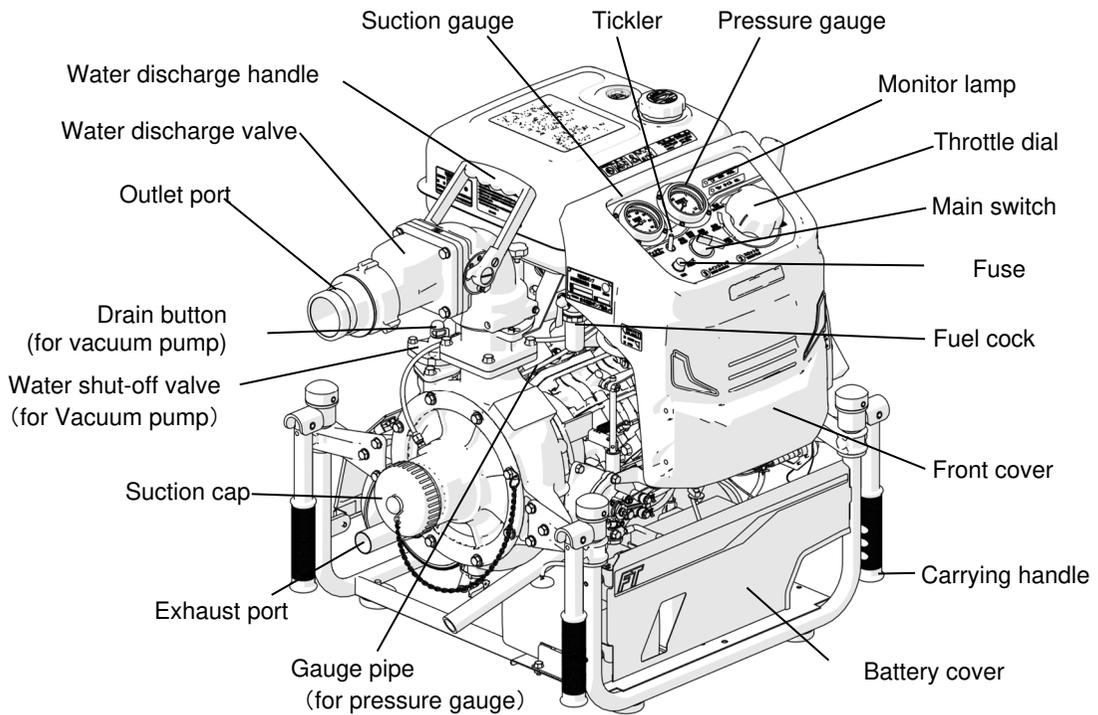
- Do not use fire-fighting pumps for activities other than fire-fighting, such as civil engineering, irrigation, water sprinkling, etc.
- There is a risk of hitting some objects and injuring people or damaging property around you.
- When disposing of batteries, oils, etc., please entrust disposal to a specialized industrial waste disposal contractor.
- It may cause fire, burns, or pollute the environment.
- Do not put fingers or hands in the water discharge valve.
- There is a risk of injury.
- After refueling, tighten the fuel tank cap securely.
- There is a risk of ignition and explosion.
- Check the fuel once a month, and if the fuel has a pungent odor or is cloudy, replace it with new fuel immediately.
- This may cause engine malfunction or equipment failure.
- When adding two-cycle oil, always use the same brand and grade of oil.
- Avoid entering water or debris when refilling the two-cycle oil.
- This may cause engine malfunction or equipment failure.
- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.
- When replenishing the governor oil, add the same brand and grade of oil.
- Avoid entering water or debris when refilling the governor oil.
- This may cause engine malfunction or equipment failure.
- When holding the carrying handle, do not touch the joint parts.
- Failure to do so may result in injury from pinching fingers.
- When carrying or loading/unloading the fire-fighting pump, four people should do so.
- Dropping it on your foot may cause injury or back pain.
- Connect the fire hose securely and always ensure it cannot be disconnected.
- If it is pulled out during water discharge, there is a risk of injury.
- Lay out the fire hoses without folds, twists, or sharp turns.
- There is a risk of the water hose springing up and causing injury.
- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.
- When starting with a recoil starter, avoid getting clothing or gloves caught.
- There is a risk of injury.
- When starting with the recoil starter, keep people at least two meters away from the starter.
- There is a risk of injury to elbows from being knocked by recoil ropes.

1 Things you must follow for your safety

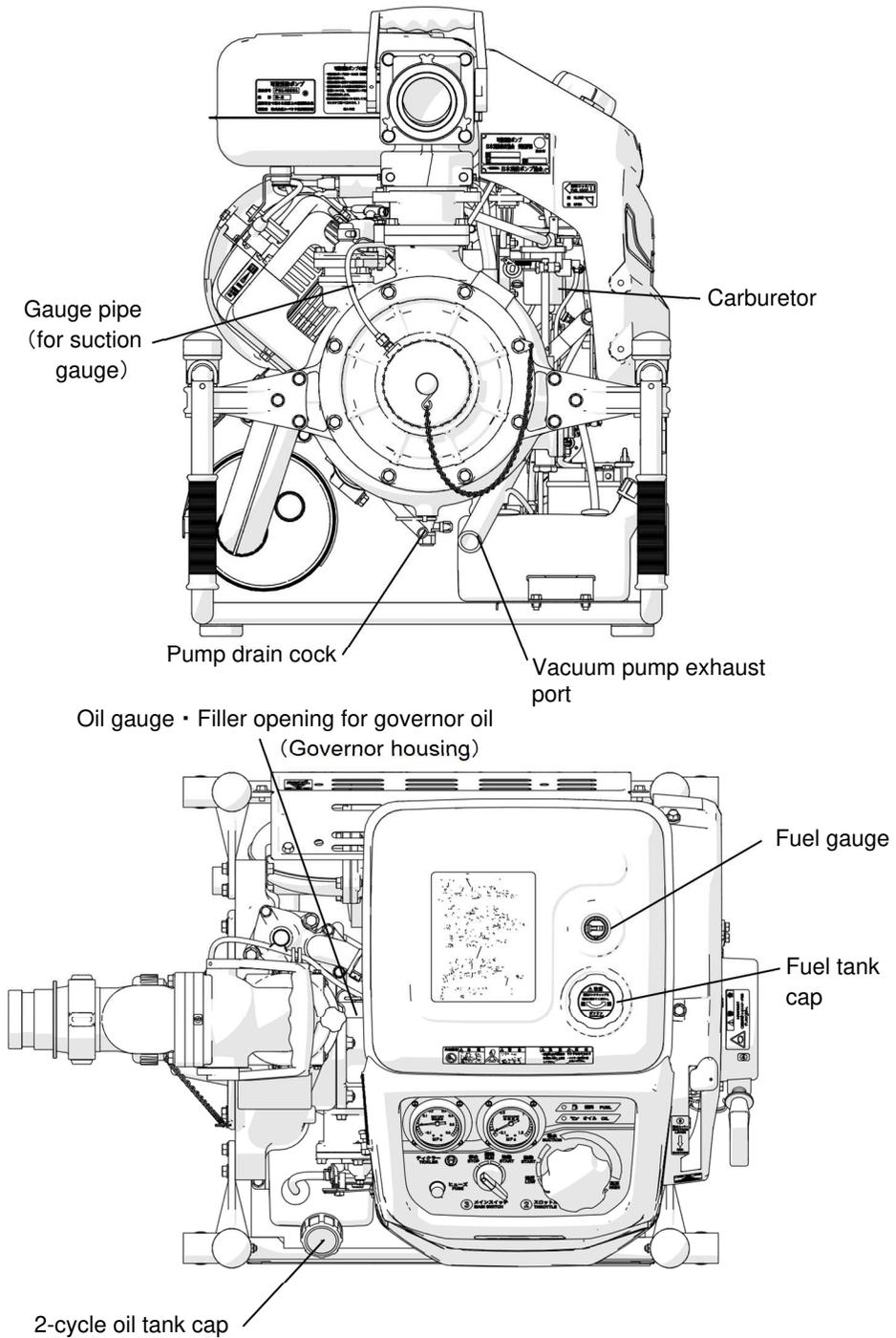
Caution

- Always return the throttle to the "LOW" position before opening and closing the water discharge valve.
- Hold the fire nozzle firmly and discharge water.
- There is a risk of injury because the fire nozzle runs away.
- Operate the water discharge valve slowly.
- There is a risk of injury from pinching or bumping hands.
- Do not aim the water at people or peer into the nozzle.
- High water pressure may cause them to be blown away, resulting in injury.
- Do not touch the spark spark plug or high-voltage cord during operation.
- There is a risk of electric shock.
- Never touch the muffler and exhaust pipe during and after operation since they become very hot.
- There is a risk of burns.
- While operating, be careful not to have the suction pipe or hose stepped on by vehicles or other objects.
- Accidents may occur due to damage, etc., and fire-fighting activities may be hindered.
- Do not start the engine with the water discharge valve handle open.
- When discharging water, the engine operator should communicate with the operator at the nozzle. Do not open the water discharge valve without notice or accelerate the throttle rapidly.
- There is a risk of injury from being blown away by the high-pressure water.
- Inspection and maintenance should be performed after the engine has been stopped and cooled down sufficiently.
- Failure to do so may result in injury, burns, or fire.
- Read the instruction manual that comes with the battery and the information on the battery itself carefully to ensure that the battery is used correctly.
- When disconnecting the battery cord, remove the (-) cord first, and when installing the battery cord, connect the (+) cord first.
- Short-circuiting may cause fire or burns.
- Do not use the charger in high-temperature places such as under direct sunlight or near heating elements, in extremely humid places, or wet areas such as rain or snow.
- There is a risk of overheating, burnout, or damage to the charger, or leakage of electricity or electric shock.
- The charger should be installed in a dry, well-ventilated location that is not wet.
- Failure to do so may cause electric shock or fire.
- Do not charge the battery with a charger other than the specified one.
- There is a risk of fire due to heating or burnout of the wiring.
- When operating without attaching the suction pipe (e.g., to check the vacuum level), attach the suction cap.
- There is a risk of getting caught in the machine or injured.
- Do not close the nozzle or water discharge valve while multiple pumps are relayed and the water is discharged.
- Abnormally high pressure may result in damage to the pump and hoses.

2 Name of each component



2 Name of each component



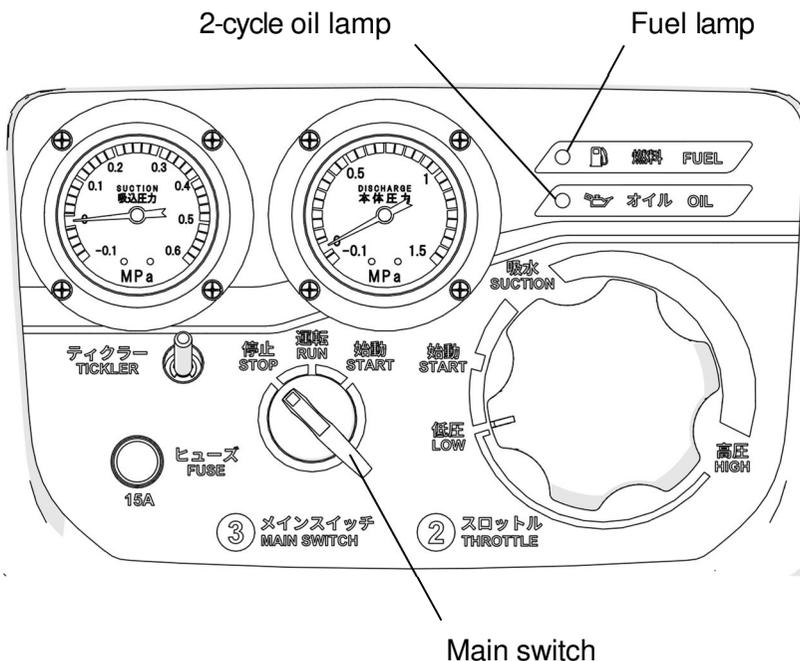
3 Monitor lamp

The pump with a starting motor activates when the main switch is turned into the "Run" position. When the power is turned on, two lights illuminate at the same time. If they do not light up, the battery voltage is insufficient, or there is a faulty circuit, the pump needs to be repaired. All lights are turned off after a few seconds.

All lights are turned off during water discharge, but the lights are turned on when operating the starting motor. It is because the battery voltage drops. Be sure to inspect or maintain when the following items are lit up.

Display	Feature	How it works	Measures
 fuel	Indicates that the fuel must be added	Lights up when the remaining fuel in the tank is low.	Refill the regular gasoline.
 2-cycle oil	Indication of when to refill 2-cycle oil	Lights up when the remaining oil in the tank is low, then stop the engine.	Refill the 2-cycle oil.

If the monitor lamp still illuminates or blinks after following the measures above, consult your dealer.



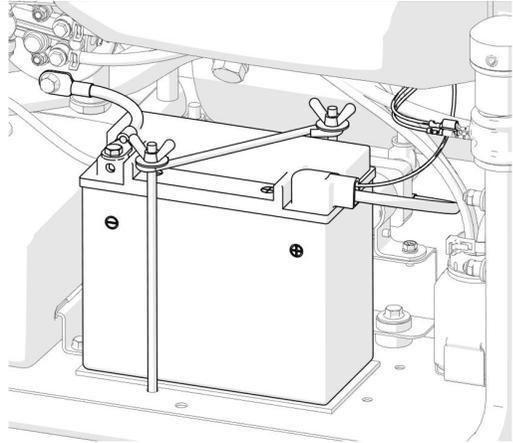
4 Handling method (Before)

Installing Battery

Caution

- Read the instruction manual that comes with the battery and the information on the battery itself carefully to ensure that the battery is used correctly.

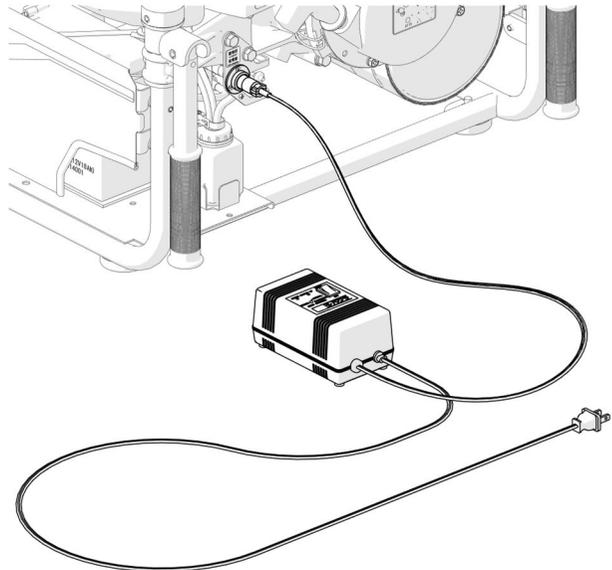
- (1) For handling, be sure to follow the battery instruction manual.
- (2) Fix the battery to the bed with two rods and one holder.
- (3) Firstly, connect two battery (+) cables (red), then connect one (-) cable (black) . Be sure to keep the connecting order.



Caution

- When disconnecting the battery cable, remove the (-) cord first, and when installing, connect the (+) cable first.
- Short-circuiting may cause fire or burns.

- (4) Connect the supplied charger to a charger inlet to charge the battery. (See "5 Periodic Inspection 2. Inspection Method (2) Handling of Fully Automatic Charger" on p. 29.)



4 Handling Method (Preparation for Operation)

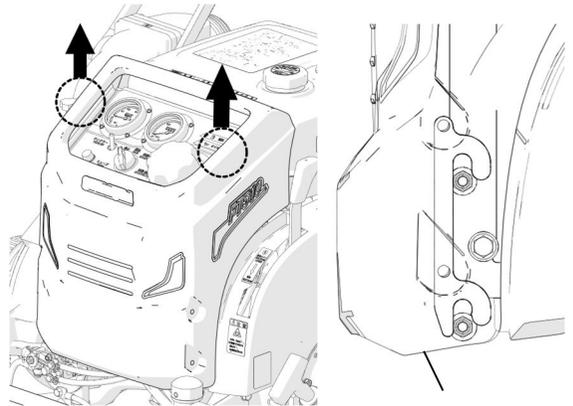
1. Removing and attaching covers

When removing the cover, follow the procedure below.

(1) Removing/attaching front cover

Hold the circled places on the illustration on the right. Shift it upward first, and then remove it toward you.

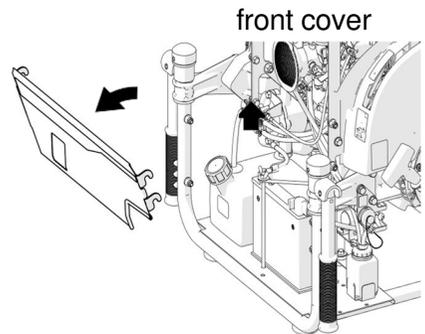
Installation is the reverse procedure.



(2) Removing and attaching the battery cover

Slide the battery cover upward first, and then remove it toward you.

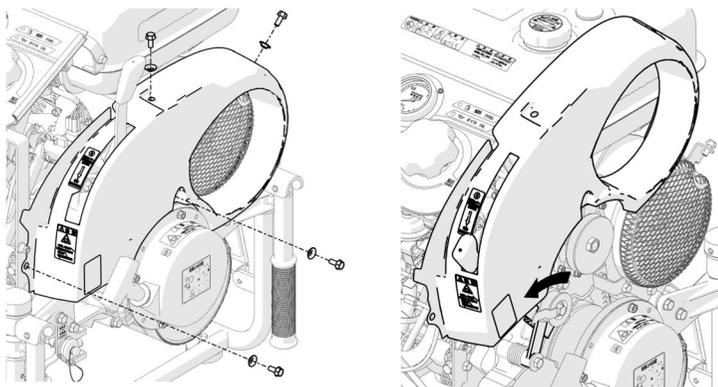
Installation is the reverse procedure.



(3) Removing and attaching vacuum pump cover

Remove the four bolts and collars. Pull the water suction lever toward you and remove it through the lever opening of the vacuum pump cover.

Installation is the reverse procedure.



Warning

○ Be sure to attach the cover when driving.

● There is a risk of injury or burns.

4 Handling Method (Preparation for Operation)

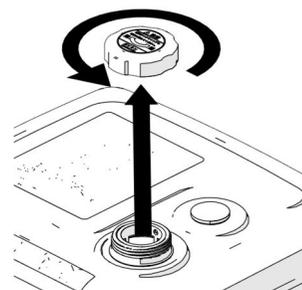
1. Replenishment

(1) Fuel

(Fuel tank capacity: approx. 14.5L)

Fill the tank with regular gasoline until the fuel gauge indicates "F".

Do not add gasoline mixed with two-cycle oil or bio-gasoline.



Danger

- Keep fire away when refueling.
- Do not overfill fuel into the tank.
- If the fuel is spilled, wipe it up immediately. Keep the cloth away from fire.
- Refill the fuel after the engine has cooled down.
- There is a risk of ignition and explosion.
- Hold the nozzle firmly and discharge water.
- There is a risk of injury due to swinging of the discharge nozzle.

Caution

- Tighten the fuel tank cap securely after refueling.
- There is a risk of ignition and explosion.

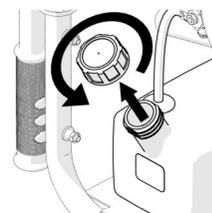
Caution

- Check the fuel once a month, and if the fuel has a pungent odor or is cloudy, replace it with new fuel immediately.
- This may cause engine malfunction or equipment failure.

(2) Engine oil

(Oil tank capacity: Approx. 2L).

Fill the 2-cycle oil into the oil tank at the bottom of the fire-fighting pump.



Caution

- When refilling the 2-cycle oil, use the same brand and grade of oil.
- Do not allow water or debris to enter when refilling.
- This may cause engine malfunction or equipment failure.

Caution

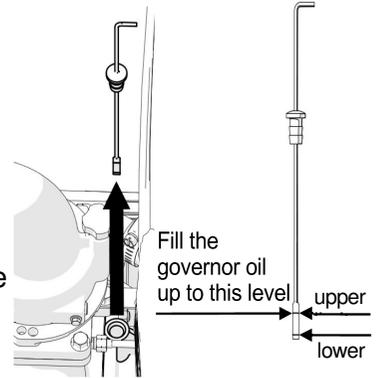
- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.

4 Handling Method (Preparation for Operation)

(3) Governor oil

(1) Place the pump on the level place and check the governor oil level with an oil gauge.

- Remove the governor oil level gauge and check the oil level. Refill the oil to the original level when the oil level has become in the middle or lower. Put back the oil gauge after refilling. Do not replenish more than the upper limit.
- If the oil is very dirty or cloudy, consult your dealer.
- Recommended oil (Automotive engine oil) SAE:10W-30(API:SJ)



Caution

- When replenishing governor oil, add the same brand and grade of oil.
- Do not allow water or debris to enter the oil inlet when refilling.
- This may cause engine malfunction or equipment failure.

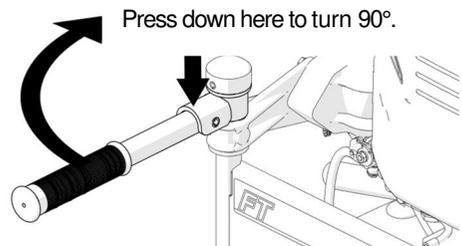


Caution

- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.

2. Carrying the pump

Hold the transport handle correctly when moving and loading/unloading the fire-fighting pump.
The carrying handle can be turned 90 deg.



Caution

- When holding the carrying handle, do not touch the bend.
- Fingers may be pinched, resulting in injury.

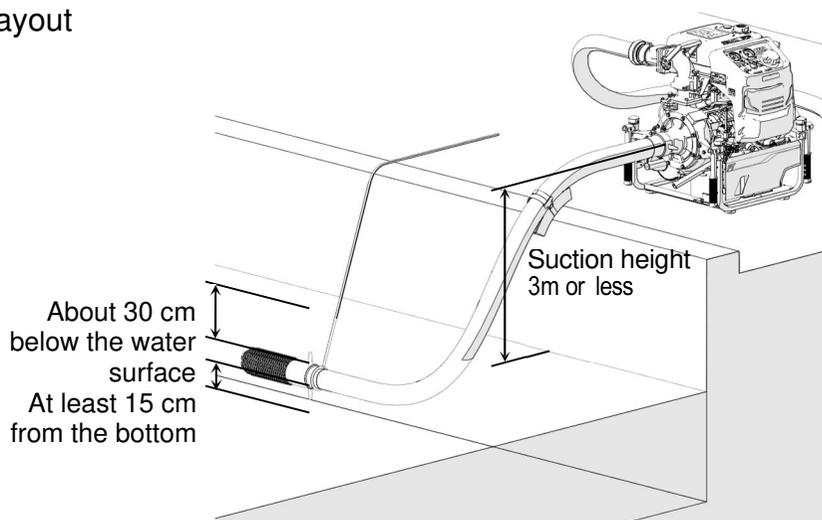


Caution

- 4 people is necessary to carry the pump.
- Dropping it on your foot may cause injury or back pain.

4 Handling Method (Preparation for Operation)

3. Pump layout



- (1) Check the water source. Make sure that there will be no problems with use, such as no decay, floating matter, or sediment.
- (2) Place the pump close to the water source and on a level surface.



Warning

- Avoid installation in places with poor ventilation, such as indoor, in a vehicle, tunnel. There is a risk of exhaust gas poisoning.



Warning

- Place at least 3 m away from combustible materials.
- Remove dead grass and other flammable materials before setting.
- Exhaust fumes and heat from the muffler may cause a fire.

- (3) Keep the suction height below 3m as much as possible to avoid falling water because of the reduction of the pump capacity.
- (4) Lay out the suction hose with no bends or bumps and fasten it tightly to the suction inlet port. Ensure the level of the inlet port side is higher than the suction hose tip at the water source side.
- (5) Always attach a strainer and basket to the suction port of the suction hose and keep it below the water surface to prevent air sucking in. Place the tip about 30 cm above the bottom. If the tip of the device is 15 cm or more away from the bottom. Place a straw mat to prevent sediment from being sucked into the device. If the water source has algae, watergrass, etc., remove them around the water inlet.
- (6) Connect the fire hoses securely and lay them out. Be sure not to fold.

4 Handling Method (Preparation for Operation)



Caution

- Connect the fire hose securely and always ensure it cannot be disconnected.
- If it is pulled out during water discharge, there is a risk of injury.



Caution

- Lay out the fire hoses without folds, twists, or sharp turns.
- There is a risk of the water hose springing up and causing injury.

4. Pump user

- (1) Fire-fighting pumps are small but high-performance machines with strong power. Improper use may cause serious accidents, including death.



Warning

- Fire-fighting pumps should be operated by firefighters, voluntary disaster prevention team members, maintenance and inspection personnel, and others who have been trained specifically for safe operation.
- Misuse or mishandling may result in serious accidents, including death.

- (2) Wear clothing appropriate for the operation.



Warning

- No headbands, neck wraps, ties, waist towels, etc., are allowed. Wear helmets, non-slip shoes, and no loose-fitting clothing.
- There is a risk of getting caught in the machine or slipping and falling, resulting in injury.

- (3) Do not operate if you are not feeling well.



Warning

- Do not operate fire-fighting pump if you are unable to concentrate on your work due to alcohol consumption, tiredness, illness, or the effects of drugs.
- This could lead to a serious accident.

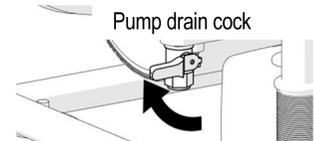
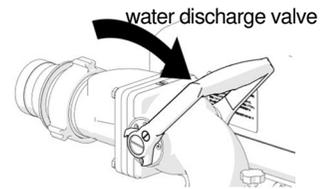
4 Handling method (Operation)

1. Starting the engine

Close the ⑥ water discharge valve and pump drain cock before starting the engine.

Please be sure to check the following

Follow the operating instructions in the order of ❶ to ❹ numbers on the unit.



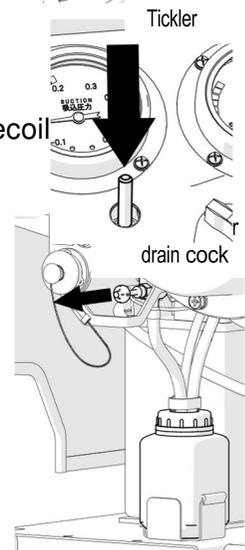
(1) Open the ❶ fuel cock.

Move the fuel cock lever straight down to "Open" ❶ to open the fuel cock.



(2) In cold weather, use the tickler in the carburetor.

- If it is difficult to start the engine with auto-choke alone in cold weather, press the tickler for 2 to 3 seconds.
- Press the tickler for 2 to 3 seconds when starting with the recoil starter and the engine is cold.
- If you use tickler for multiple times and the engine does not start, close the ❶ fuel cock, drain fuel from the carburetor drain cock, then start the engine.
- If the engine does not start properly due to excessive fuel, such as when restarting after warm-up, close the fuel cock, open the carburetor drain cock, and drain the gasoline from the carburetor before starting the engine. After starting, turn the fuel cock "open". If the car stops, start the car again.



*Remove and dispose of the fuel in the drain tank every time.

Fuel drain tank

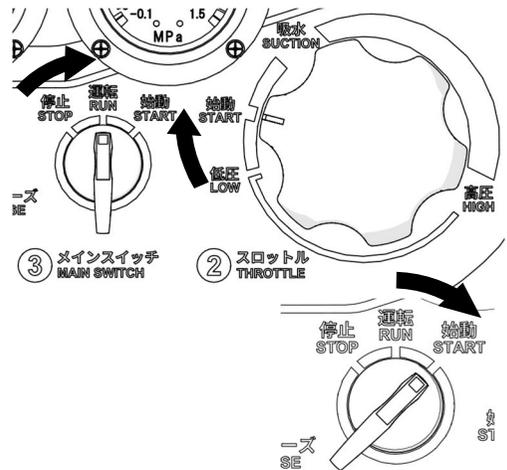


Caution

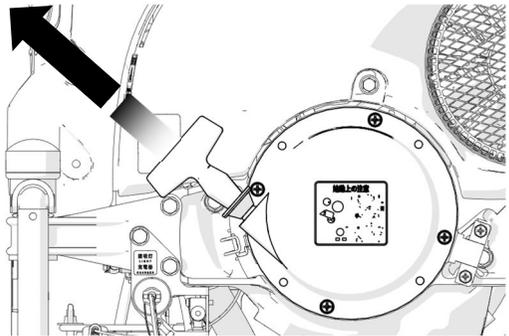
- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.

4 Handling method (Operation)

- (3) Turn the ② throttle to the "start" position.
- (4) Turn the main switch to the "run" position.
When starting the starter motor, turn it to the "START" position. The starter motor works, and the engine starts.
- Once the engine is started, set the ③ main switch to the "operation" position.
 - Stop the starter motor for at least 5 seconds after running it for 3 seconds. Continuous operation will cause deterioration of the battery and the starter motor.



- (5) For recoil starting, pull the ④ recoil starter handle out to the point where it is slightly heavy, then pull quickly and sharply.



Caution

- When starting with a recoil starter, avoid getting clothing or gloves caught.
- There is a risk of injury.



Caution

- When starting with the recoil starter, keep people at least two meters away.
- There is a risk of injury to the elbows from being knocked by recoil ropes.



Warning

- Be sure to close the recoil starter during operation.
- There is a risk of getting caught in pulleys or belts, or of cutting yourself.

4 Handling method (Operation)

2. Suction

- (1) Turn the ② throttle to the "suction" position after starting the engine.
- (2) Pull the ⑤ suction lever toward you to activate the vacuum pump and suction water.
 - Promptly return the ⑤ suction lever when the pressure gauge needle swings and the pressure increases and stabilizes.
 - Keep the vacuum operation time less than 30 seconds.

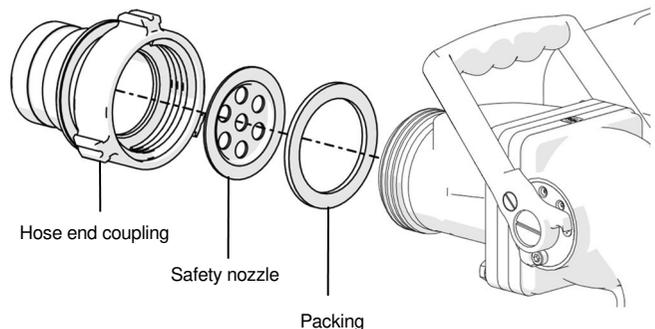


3. Water discharge

Before discharging water, check the safety of the nozzle. Give a signal to the person at the nozzle to start discharging water.

- (1) ⑥ Operate the water discharge handle gradually in the "→Open" direction until it stops.
 - Turn the throttle to the desired water pressure level.
 - Adjust the pressure with the ② throttle according to the water discharge conditions.
 - Be careful not to use too high a water discharge pressure or to open or close the ⑥ water discharge valve handle too rapidly, which may cause the water discharge hose to swing.
- (2) Standby for water discharge
 - To close the ⑥ water discharge valve and put the machine in standby mode during water discharge, ② turn the throttle to the "low pressure" position and stop the engine. In this case, the check valve will operate and water will not fall, so restart the engine and open the ⑥ water release valve to re-discharge water. (However, restarting must be done within 3 minutes.)
 - If it is necessary to stand by without stopping the engine, be sure to put the ② throttle in the "low pressure" position.
- (3) The case when discharging water without using a nozzle

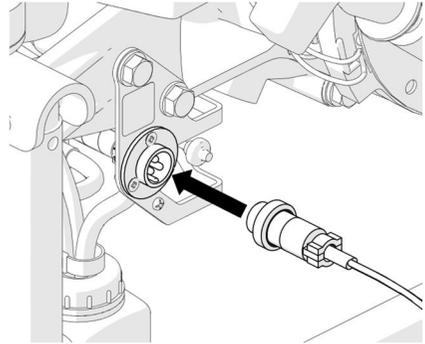
- When operating without using the nozzle, such as pumping water from a water tank or pumping water to a relay tank, be sure to set the attached safety nozzle between the hose end coupling and the water discharge valve, as shown in the figure.



4 Handling method (Operation)

(4) To turn on the searchlight

- To turn on the searchlight, plug the searchlight into the charger inlet on the recoil side.



Caution

- Always return the throttle to the "LOW" position before opening and closing the water discharge valve.
- Hold the nozzle firmly and discharge water.
- There is a risk of injury due to swinging of the discharge nozzle.

Caution

- Operate the water discharge valve slowly.
- There is a risk of injury from pinching or bumping hands.

Caution

- Do not aim the water at people or peer into the nozzle.
- High water pressure may cause them to be blown away, resulting in injury.

Caution

- Do not touch the spark plug or high-voltage cord during operation.
- There is a risk of electric shock.

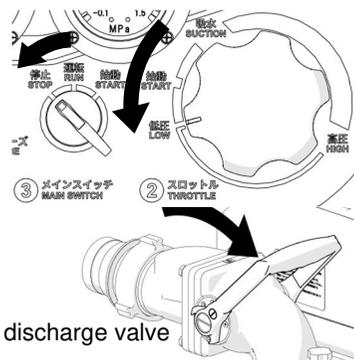
Caution

- Never touch the muffler and exhaust pipe during and after operation since they become very hot.
- There is a risk of burns.

4 Handling method (Operation)

4. Stopping the engine

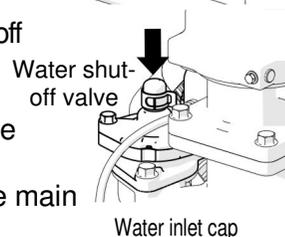
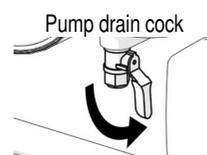
- (1) ② Turn the throttle to the "LOW" position.
 - If the engine is hot, run the engine at low speed for about 1 minute to cool it down.
- (2) Close the ⑥ water discharge valve handle by operating it in the "→ close" direction.
- (3) ③ Turn the main switch to the "STOP" position. The engine will stop.



5. Draining water

After the operation, a large amount of water remains inside the pump. This remaining water may cause corrosion and freezing cracks during cold weather. Be sure to drain water before storing.

- (1) Open the pump drain cock.
- (2) Open and close the ⑥ water release valve, press the water shut-off valve drain button, and drain completely.
- (3) Close the pump drain cock and install the water inlet cap.
- (4) Start the engine and pull the ⑤ suction lever to activate the vacuum pump for approximately 5 seconds.
- (5) ② Turn the throttle to the "low pressure" position, ③ Turn the main switch to the "stop" position and stop the engine.
- (6) Open the pump drain cock and remove the water inlet cap to confirm that it is completely drained. If drainage is insufficient, repeat steps (3) to (5).
- (7) Close the pump drain cock and install the water inlet cap.



Treatment after using seawater or muddy water

If seawater or muddy water is used, be sure to operate the pump by discharging water with clean water for at least 5 minutes to clean the inside of the pump. Also, to clean the inside of the vacuum pump, operate the vacuum pump for about 5 seconds by pulling the ⑤ suction lever while discharging water at low pressure, and drain clean water from the vacuum pump exhaust hose. After cleaning is complete, be sure to drain the water using the operation described in the previous section "5".

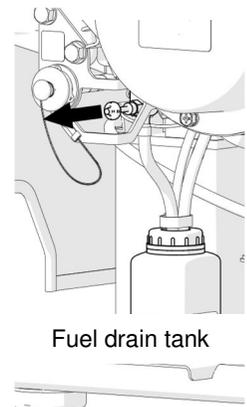
4 Handling method (Operation)

6. Storing the pump

- (1) Store in a dry, temperature-controlled area, away from dust and direct sunlight.
- (2) Wipe off oil, dust, and dirt and keep clean.
- (3) Fill the fuel up to the "F" level when storing. ●Close the fuel cock.
- (4) Fill the specified amount of 2-cycle oil.
- (5) Drain the fuel in the carburetor from the carburetor drain cock, on the recoil starter side.
*Make sure to remove the fuel inside the fuel drain tank every time.
- (6) Please charge the battery with the supplied charger while in storage.
(See "5 Periodic Inspection 2. Inspection Method (2) Handling of Automatic Charger" on p. 29)
- (7) Cover the pump with the attached pump cover.



Carburetor drain cock



Fuel drain tank

- Before storing the pump, be sure to check that the water inside is completely drained. Also, fill the pump with antifreeze to prevent freezing when storing the pump in cold weather (see "4 Handling Methods" Operation in Winter and Cold Weather, on P. 20)
- Operate and discharge water for 5 to 10 minutes at "HIGH" throttle position every month.
- Check the fuel in the fuel tank once a month, and if there is a pungent odor or cloudiness, replace the fuel with new fuel. The recommended replacement time is 6 months after refueling.
- If the vehicle has been in storage for a long period of time without a monthly periodic inspection, operate the pump for 1 minute at "LOW" position to warm up the engine. Be sure to inspect visually to see if there are any abnormalities.



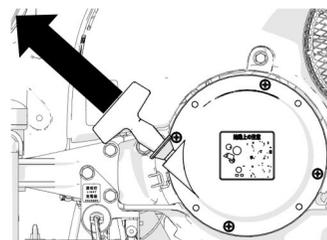
Caution

- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.

4 Handling Method (Operation in Winter and

1. Before starting the engine

- (1) In cold weather, battery capacity is significantly reduced. Please be sure to charge regularly.
- (2) ● Gently pull the recoil starter handle and check that the pump turns.
 - If it does not turn, the pump may be frozen. Pour the warm water into the pump from the suction port or defrost it in a warm room.



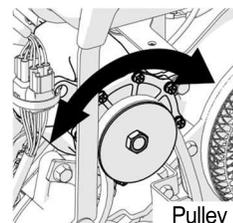
Recoil starter handle

- (3) Remove the vacuum pump cover.

(See "4 Handling Methods (Preparation for Operation)"

1. Removing and attaching the covers, on page 9.)

- Turn the vacuum pump pulley by hand and check if the vacuum pump turns.
- If it does not turn, the vacuum pump may be frozen.



Pulley

Blow warm air outside the vacuum pump or defrost in a warm room.



Danger

- Do not use fire to defrost the pump.
- There is a risk of ignition and explosion.

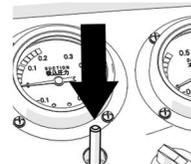


Caution

- Inspection and maintenance should be performed after the engine has been stopped and cooled down sufficiently.

2. Starting the engine

- (1) In cold weather, press the tickler for 2 to 3 seconds.
- (2) Immediately after the engine starts, operation may be unstable; run the machine idle at low speed for 1 to 2 minutes.



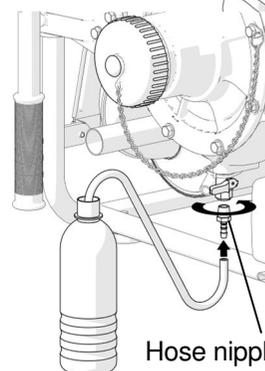
3. Treatment after water discharge (freeze prevention)

- (1) Preventing pumps from freezing (how to add antifreeze)

- ① Drain the water.

(Refer to "4 Handling Method (Operation) 5. Draining water)

- ② Close the water suction cap.
- ③ Attach the hose nipple and hose to the pump drain cock and place the hose in a bottle filled with antifreeze



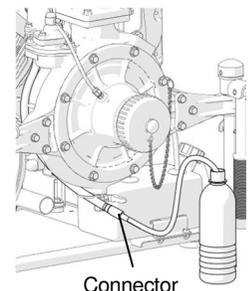
Hose nipple

4 Handling Method (Operation in Winter and

- ④ Start the engine.
- ⑤ ② Turn the throttle to the "SUCTION" position.
- ⑥ ⑤ Pull the suction lever to create a vacuum state inside the pump.
- ⑦ Open the pump drain cock to suck in antifreeze.
- ⑧ Pull the ⑤ suction lever again, and when antifreeze comes out of the vacuum pump exhaust port, return the ⑤ suction lever.
- ⑨ Remove the hose and hose nipple from the pump drain cock.
- ⑩ Pull the ⑤ suction lever and stop the engine when the antifreeze stops coming out of the vacuum pump exhaust port.
- ⑪ After collecting antifreeze from the pump drain cock, close the drain cock.

(2) Preventing the vacuum pump from freezing (how to fill the vacuum pump with antifreeze)

- ① Connect the connector and hose to the water shut-off valve drainpipe and place it in a container of antifreeze.
- ② Start the engine.
- ③ Set the ② throttle to the "SUCTION" position.
- ④ Pull the ⑤ suction lever and suck in the antifreeze.
- ⑤ If antifreeze comes out of the vacuum pump exhaust port, return the water suction lever.
- ⑥ Remove the connector and open the pump drain cock.
- ⑦ Pull the ⑤ suction lever, and when the antifreeze stops coming out of the vacuum pump exhaust port, return the ② throttle to the "LOW" position and stop the engine.
- ⑧ Close the pump drain cock.



(3) Antifreeze should also be injected into water discharge valves and hose couplings.

CAUTION: Do not use alcohol to prevent freezing, since it will damage the rubber seals. Collect drained antifreeze in a liquid container.

4. Precautions for storage

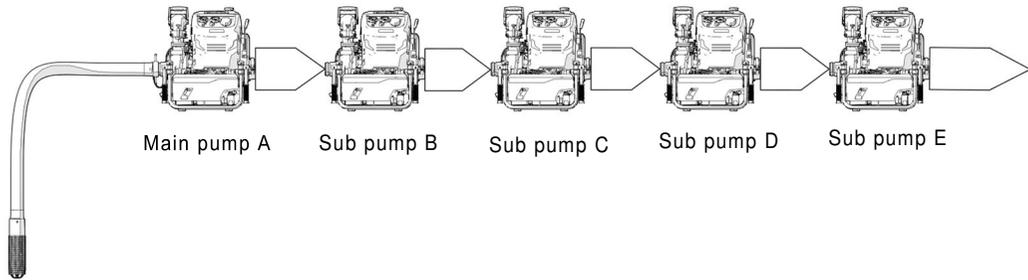
Choose the fuel with good quality. (The better quality of gasoline is highly volatile, and has better starting performance.)

- (1) Be sure to always have antifreeze on hand.
- (2) Batteries may freeze when the relative density of electrolyte becomes low. Be sure the battery is always recharged. If battery performance deteriorates, replace the battery as soon as possible.

4 Handling method (Relaying water with multiple pumps)

In the case of forest fires or urban fires where the water supply is far away, two or more pumps may be connected in series to relay water. The relay water requires different operations and special attention compared to normal operation because each pump is located far from the others. Daily training is also necessary to enable judgment and activities based on the state the pump's operators are facing. See the general method of relay operation below.

Figure 1.



1. Setting Locations

- (1) The number of units and their locations should be determined based on the number of hoses and the height of the water source.
- (2) Install a relay coupling to the suction port of sub-pumps (B to E in Figure 1), to connect the fire hose.
In this case, the automatic relay valve, "Direct Valve" can prevent accidents caused by sudden pressure fluctuations and high-pressure water.
- (3) The wye-valve is also recommended to be attached to the discharge port.
(The hose couplings that connect each pump may not be removed even after the discharge operation, because of the water pressure inside the fire hose.)

2. Operation Method (*An operator is required for every pump.)

- (1) Open the water discharge valves of the sub-pumps (B to E) beforehand.
Be sure to open the variable nozzle when it is attached to the fire hose.
- (2) Operate the main pump (A) and discharge water as usual.
- (3) Send water to the original pump first and then to others sequentially.
- (4) Check the pressure scale in the sub pump (E) and increase the engine speed to regulate the discharging water by controlling the throttle of the sub-pumps (B to E)
The sub pump (B to E): Should be more than 0.05MPa in a scale of suction gauge pressure, be less than 1.2MPa in a scale of power.
- (5) If there is not enough power of water discharge at the nozzle, turn the throttle dial of the original pump (A) to "HIGH" position gradually, then the turn the throttle dial of sub-pump, from the one closer to the original (from B to E), sequentially.
- (6) When stopping water discharge, turn the throttle dial of the last pump, the one close to the nozzle (E), to "LOW" position first and stop gradually (from E to B).
Stop the water supply from the main pump. When the supply of water from the main pump has been stopped, close the water discharge valve of each pump.

4 Handling method (Relaying water with multiple pumps)



Caution

- Do not close the nozzle or water discharge valve while multiple pumps are relayed and the water is discharged.
- Abnormally high pump pressure may result in damage to the pump and hoses.

1. Suction and discharge from water hydrant

The capacity of water supply from the fire hydrant

It is necessary to check the sufficient volume of water for discharging from the fire hydrant in advance.

It would depend on several factors, such as the diameter of the hydrant, the condition of the piping, the initial water pressure, and others.

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 could have high capacity for water supply with wider diameter despite low water pressure.

Water supply method

- (1) Be sure to open and close the hydrant's valve and release water to remove the foreign objects, such as sand, before connecting the hose to the hydrant.
- (2) Connect the water hydrant and pump. Use a suction hose that can endure the water supply pressure. The supply pressure limit for the suction hose with a nominal diameter of 65mm is 0.9 MPa. The suction hose for connection to the hydrant should be inspected periodically to avoid any damage.

How to check and adjust water supply pressure

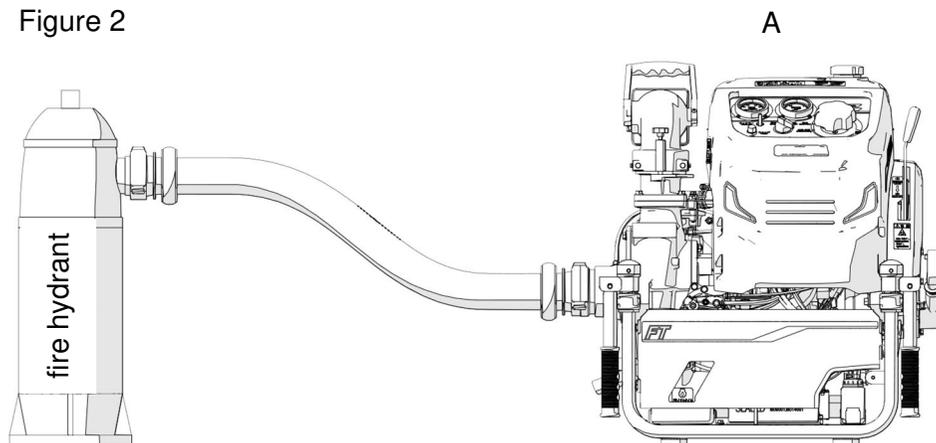
- (1) Open the open/close valves of the fire hydrant and the water discharge valve of the pump to full open.
- (2) Gradually close the pump's water discharge valve while checking the water supply pressure with a suction gauge.
- (3) If the water supply pressure is high, adjust the water supply pressure with the hydrant's open/close valve.

4 Handling Method (Suction, discharge, and relay the water from the fire hydrant)

2. Water discharge and delivery

When a single pump receives and discharges water (Figure 2)

Figure 2



- (1) Open the water discharge valve of pump (A) in advance.
If the fire hose has a variable nozzle at the end, be sure to leave it open.
- (2) Before starting the engine, open the hydrant and check the pressure on the compound (suction) gauge of the pump (A).
- (3) After confirming that water has been sent from the fire hydrant, start the engine of the pump (A) and begin discharging water.

- (4) Adjust the pressure by operating the throttle of the pump (A) to achieve the required pressure and flow rate.

The throttle should be operated gradually, and the compound (suction) gauge should be kept above 0.05 MPa.

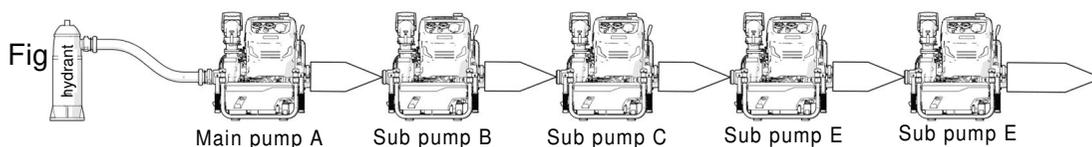
Adjust the hydrant open/close valve to adjust the pressure gauge to not exceed 1.2 MPa. At this time, the compound (suction) gauge of the pump (A) should be less than 0.6 MPa

- (5) To stop water discharge, turn the throttle of pump (A) to the "LOW" position, stop the engine, and close the hydrant.

Do not close the water discharge valve of pump (A) until the water supply from the hydrant stops.

4 Handling Method (Suction, discharge, and relay the water from the fire hydrant)

When discharging water by relaying with multiple pumps
(An operator is required for all pumps: Fig. 3)



- (1) Open the water discharge valves of all pumps (A to E) in advance. If a variable nozzle is attached to the fire hose-end at the water discharge side, be sure to open it.
- (2) Before starting the engine, open the hydrant and check the pressure of the compound (suction) gauge of the main pump (A).
- (3) After confirming that water has been delivered from the fire hydrant, start the engine of the main pump (A) to deliver water to the next pump.
- (4) Start and supply water to the second and sub-pumps (B to E) in the same manner as for the original pump (2) and (3).
- (5) Read the pressure gauge on the sub-pump (E) and adjust the pressure by operating the throttles on all pumps (A to E) to achieve the required pressure and flow rate at the nozzle. Operate the throttles gradually and make sure that each pump keeps above 0.05MPa on the compound (pressure) gauge and above 1.2MPa on the pressure gauge.

Adjust the hydrant opening to make the compound (pressure) gauge of each pump is not less than 0.6MPa.

- (6) To stop the water discharge, shut down the engine by turning the throttle to the "LOW" position, starting with the pump (E) closest to the end of nozzle, and finally close the fire hydrant. Do not close the water discharge valves of each pump until the water supply from the hydrant has stopped.

5 Periodical Inspections

1. Periodical inspections

Be sure to perform periodic inspections according to the following items.

Item	Duration or operating time							Inspection details	treatment		
	Period										
	Before use	after use	1 month	6 months	1 year	2 years	3 years				Operation time (Hour)
fuel	●	●						Quantity/ Deterioration (ie color, smell)	Refill or replace		
				●				-	Replace		
2-cycle oil	●							Quantity	Refill		
					●			-	Replace		
Battery		●						-	Recharge		
			●					Deterioration	Replace		
						●		-	Replace		
Spark plug					○		100	-	Replace	○	
Appearance		●						Dirt, etc.	Clean		
Starter rope			●					Wear, breakage	exchange	○	
Vacuum pump belt				●			50	Become loose/Wear	Adjust or replace	○	
Fan belt				●			50	Become loose/Wear	Adjust or replace	○	
Fuel pipes				●			50	Leakage/damage	Replace	○	
Water discharge valve					●		100	Valve feels heavy, vacuum leakage	Adjust or replace the parts if necessary	○	
Fuel filter				●			○	200	Foreign material stuck	Clean or replace	○
Engine start and vacuum			●					Operation/Perfor mance	Replace parts if necessary	○	
Prime and discharge			●					Operation/Perfor mance	Replace parts if necessary	○	
All parts							○	300		Replace parts if necessary	○

Note:

- For items marked with "●" in the period column, please practice the inspection by yourself. Please ask your dealer to inspect the items marked with "○" in the period column and to handle the items marked "○" in the column of treatment.
- Measure the inspection timing by either comes earlier, "period" or "operation time". For example, consider replacing spark plug when the operation time reaches to 100 hours, even if the operation period is less than a year.
- This inspection table shows the period and time under general operating conditions. Make sure to perform inspections earlier when the pump is used under tough conditions.

5 Periodical Inspections

Recommended replacement parts and period

Part Name	Recommended Replacement Period	Example of Defects
Spark plug	Every Year	Bad to start due to wear and tear
Fuel Pipes	Every 2 years	Fuel leakage due to deterioration
Battery	Every 2 years	Deterioration
2 Cycle Oil Pipe	Every 2 years	Oil leakage due to deterioration
Vacuum Pump Belt	Every 3 years	Slippage due to wear
Fan Belt	Every 3 years	Slippage due to wear
Other Rubbers	Every 2 years	Deterioration
Starter Rope	Every 3 years	Breakage due to wear
Fuel Filter	Every 3 years	Clogging and Bad start due to the water drip
2-cycle Oil Filter	Every 3 years	Clogging, and Poor lubrication due to the moisture.
Discharge Valve Water shut-off valve (rubber)	Every 3 years	Deterioration of the check valve
Mechanical Seal	Every 3 years	Poor suction due to deterioration
Oilless Vacuum Pump Blades	Every 3 years	Poor suction due to deterioration
Carburetor	10 years	Corrosion inside the tank
Fuel Tank	10 years	Corrosion inside the tank

Parts recommend replacing when disassembling

- Gaskets • Push nuts
- O-rings • Spring pins
- Lock washers • E-rings



Caution

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

5 Periodical Inspections

2. Inspection method

Periodic inspections are essential to ensure the fire-fighting pump's safety and use every possible function. Inspect the pump correctly and safely 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, 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.



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 recommended to replace the battery earlier.

Recommended battery : GS YUASA YTX20L-BS

For handling the battery, please follow the instruction manual that comes with the battery.

5 Periodical Inspections



Caution

- When disposing of batteries, oils, etc., please entrust disposal to a specialized industrial waste disposal contractor.
- It may cause fire, burns, or pollute the environment.

(2) Handling of Shibaura full-automatic charger



Caution

- To use the charger safely and correctly, be sure to read the instruction manual that comes with the charger. Improper use may cause an accident. After reading the charger instruction manual, be sure to keep it close to the product.

A) Unpacking



Caution

- Remove packing materials from the battery charger before charging.
- There is a risk

B) Location to place



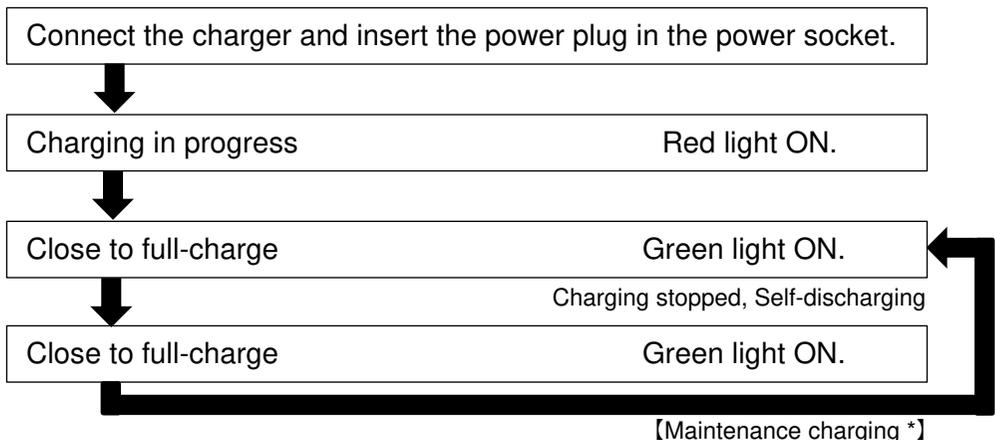
Warning

- Do not use the charger in high-temperature places such as under direct sunlight or near heating elements, in extremely humid places, or wet areas such as rain or snow.
- There is a risk of overheating, burnout, or damage to the charger, or leakage of electricity or electric shock.

C) Make sure before use

- Remove the power plug from the socket (Be sure the charger is turned off).
- Connect the output of the charger cable firmly to the fire-fighting pump.
- After connecting the cable to the charger unit(AC inlet), plug in the socket.

D) Battery charger Operating Manual



5 Periodical Inspections

* Maintenance charge mode

This function automatically recharges the battery when the capacity has declined. It always monitors the decline of the battery capacity by self-discharge.

After starting the charging (Red Light ON), when the battery is close to full charging, the indicator will change to Green Light ON, and the status will automatically change to the maintenance charging mode (Green Light ON). After that, the Red Light and the Green Light will light up alternately to reduce the deterioration of the battery.

Note:

Remove the power plug to stop the main unit from charging. Then, remove the output terminal.

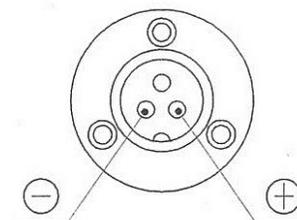
LED indication and charge status

CHARGE STATUS	CHARGE LED (RED)	FULL LED (GREEN)
No Charging	OFF	OFF
Charging	ON	OFF
Close to full-charge	OFF	ON
Error (⚠)	ON	ON

⚠ Refer to "5. Periodical inspections" when an error has occurred.

Note:

When starting the engine using a fully charged battery, if the starter does not rotate sufficiently, this may be due to battery deterioration. Please inspect or replace the battery.



E) Protective operations

- Input (primary side)
Protected from circuit errors by current fuse.
- Output (secondary side)
Protected from battery reverse connection and output short-circuiting by electronic circuit and circuit breaker.

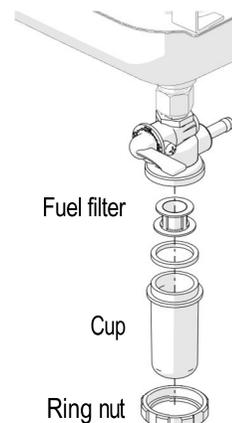
F) Inspection method when an error has occurred

Symptom	Cause	Measure *
Both red and green LEDs come on	Power cable is not connected correctly.	Check the connection status.
	The circuit breaker is open.	Pull out the power plug. After the body of the charger stops, remove the error cause, and close the circuit breaker after 60 seconds.
	The output connector is loose.	Insert the output connector all the way, and lock it securely.
The battery is obviously in discharged state, but the tickle charge mode starts immediately.	Battery is in the deteriorated state.	Replace the battery with a new one.
LED does not come on (both red and green)	Protective operation is activated.	Turn off the power and wait for 60 seconds. After that, charging the battery again.

5 Periodical Inspections

(3) Cleaning the fuel cock filter

- ① Close the fuel cock.
- ② Loosen and remove the ring nut with pliers.
- ③ Wipe off any debris in the cup with a cloth or the like.
- ④ Remove the filter attached to the ④➊ fuel cock main unit and wash it with gasoline.
- ⑤ Install the fuel cock securely to the original position. Be sure to open the ➊ fuel cock and inspect if there are no leaks.
- ⑥ After inspection, close the ➊ fuel cock.



(4) Replacement of the fuel in the tank

Storing fuel for a long period of time may result in poor starting performance and rust.
Replace with new fuel every 6 months.



Danger

- Keep fire away when refueling.
- There is a risk of ignition and explosion.

(5) Spark plug cleaning

Use [NGK BR8HIX] spark plugs.

Clean the spark plugs that are contaminated with exhaust gases and carbon.

- (1) Stop the engine to cool down sufficiently before working on it.
- (2) Remove the spark plug cap and spark plug using the spark plug box wrench.
- (3) Clean the outside, inside, and electrode of the spark plug.
- (4) Tighten the spark plug to the cylinder head and keep the spark spark plug cap pressed in.



Caution

- Do not touch the ignition plug or high-voltage cord during operation.
- There is a risk of electric shock.

(6) Check the governor oil level

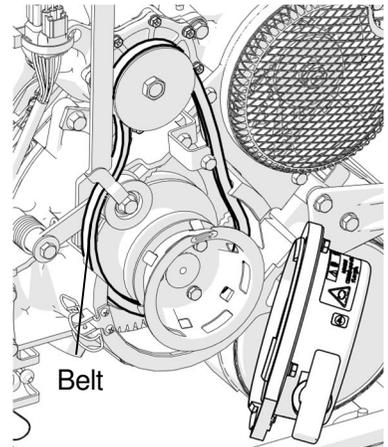
(See "4 Handling Methods (Preparation for Operation) 1.

5 Periodical Inspections

(7) Vacuum pump belt inspection

Replacement of the vacuum pump belt is required if it is stretched, worn, or cracked.

- ① Open the recoil starter.
Do not start the engine during the inspection.
Also, the belt may be hot immediately after operation, so wait until the engine has cooled down before inspecting
- ② Remove the front cover and vacuum pump cover.
(See "4 Handling Methods (Preparation for Operation) 1.")
- ③ Remove the belt from the pulley groove.
- ④ Install a new belt.
- ⑤ Install the cover as before.

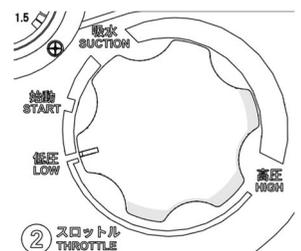
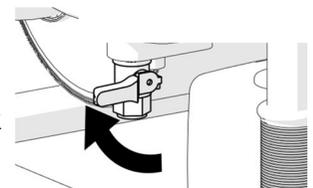
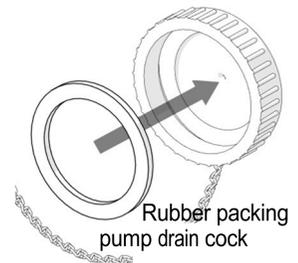


(8) Starting and vacuum inspection

Vacuum inspections must be performed even if the suction and discharge tests (which are described in the next page) are difficult to carry out.

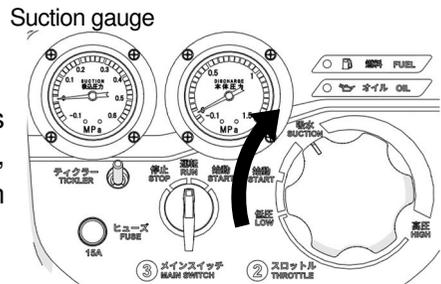
Defects such as engine not starting, poor vacuum performance, or vacuum leakage can cause accidents, such as not being able to operate the water discharge at the actual site, or falling water during the discharge.

- ① Check that the rubber packing is in the water suction cap, and attach the inlet cap to the water inlet.
- ② Close the pump drain cock.
- ③ Start the engine.
- ④ ② Warm up the engine with the throttle dial in the "low pressure" position for about 1 minute, and visually check for any abnormalities in the various parts.



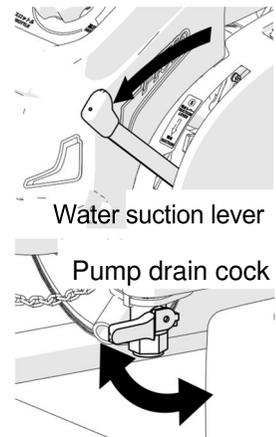
5 Periodical Inspections

- ⑤② Turn the throttle to the "suction" position and pull the ⑤ suction lever toward you to activate the vacuum pump. When the pointer of the ⑥ suction gauge reads -0.06 to -0.08 MPa, return the ⑤ suction lever, ② throttle to the "low pressure" position, and then stop the engine.
- ⑦ If there is no change in the indicated value of the suction gauge after leaving it for 1 minute, the vacuum performance is good.



- ⑧ Open the pump drain cock to release the vacuum and close the pump drain cock.

* If any abnormality is found, please consult your dealer.



(9) Water suction and discharge inspection

Suck and Discharge the water to inspect if there is no abnormalities found in each part of your pump

- (1) Are there any abnormal sounds?
- (2) Is there any water fall?
- (3) Is the water suction slow?
- (4) Are there any water leaks?
- (5) Is the startability good?
- (6) Are there any looseness in each part?
- (7) Are there any fuel leaks?
- (8) Other

*If any abnormality is found, refer to the "6 Troubleshooting" in the next section for appropriate treatments.

6 Troubleshooting

Daily inspection and maintenance are important to prevent fire-fighting pump malfunctions. Detect malfunctions at an early stage and perform maintenance immediately. If the trouble is not easily solved, or if the malfunction is not listed below, please consult the dealer where you purchased the pump, giving the model name and serial number.

1. Engine area

	Symptom	Cause	Action
Hard to Start	No fuel flow to carburetor.	1 Fuel cock filter or fuel line is clogging 2 Needle valve is sticking 3 There's no fuel.	1 Clean 2 Clean 3 Fill
	Fuel does not flow to combustion chamber (remove spark plugs to see)	1 Choke does not close (auto choke) 2 Rotational speed is low when starting. 3 Carburetor (needle valve, jet) is clogging	1 Repair and adjust 2 Replenish the battery 3 Clean
	Fuel goes to combustion chamber but does not start	1 Overflow (excessive fuel) 2 Tickler is overused (excessive fuel) 3 Choke does not open fully closed (auto choke) 4 Fuel is deteriorated 5 Water is mixed in the fuel. 6 Excessive lubricating oil	1 Inspect and adjust the carburetor 2 Drain the fuel from the seal at the crankcase. 3 Replace diaphragms and clean pipes. 4 Exchange. 5 Drain water 6 Adjust to the proper amount
	Abnormality of combustion system	1 Fuel cock filter is clogged 2 Carburetor valve seat is clogged 3 Carburetor is poorly adjusted, or there is a clog on the carburetor 4 Carburetor is poorly tightened.	1 Clean 2 Clean 3 Adjust or clean 4 Retighten
	Sparks are poor	1 Spark plug cap has damages, electrode gap is improper, or the spark plug is defective. 2 Leakage from high voltage cord 3 Leakage from spark plug cap 4 Defective ignition coil 5 Defective CDI unit 6 Poor rotation of the starting motor	1 Exchange 2 Exchange 3 Exchange 4 Exchange 5 Exchange 6 Replenish the battery

6 Troubleshooting

Symptom		Cause	Action	
Hard to Start	No sparks	<ol style="list-style-type: none"> 1 Short circuit of the ground wire 2 Spark plugs are damaged or stained. 3 Spark plug has gap failure 4 Ignition coil is defective 5 CDI unit is defective 6 Wiring connection is poor or disconnected 7 Main switch is defective 	<ol style="list-style-type: none"> 1 Repair the point short circuited 2 Exchange. 3 Exchange 4 Exchange 5 Exchange 6 Adjust the connection 7 Exchange. 	
	Poor compression	<ol style="list-style-type: none"> 1 Piston wear or seizure 2 Piston rings 3 Worn or damaged oil seals 4 Lack of lubricant 5 Damaged cylinder head gasket 	<ol style="list-style-type: none"> 1 Repair or replace 2 Exchange. 3 Exchange 4 Refill to the proper amount 5 Exchange 	
Poor running	Insufficient rotation	Combustion system error (mis-hunting)	<ol style="list-style-type: none"> 1 Carburetor main jet is clogged or misadjusted 2 Fuel cock filter clogged 3 Overflow 4 Poor installation of the carburetor 5 Icing 	<ol style="list-style-type: none"> 1 Clean or replace 2 Cleaning 3 Check and adjust the carburetor 4 Correct the place or replace. 5 Remove and add fuel tank drainage agent
		Abnormalities in the governor system	<ol style="list-style-type: none"> 1 Governor maladjustment 2 Governor operating parts wear 3 Defective caulking of flyweight 4 Poorly tightened governor arm 5 Governor spring tension failure 6 Governor lever ring hole worn or rattling large 	<ol style="list-style-type: none"> 1 Adjust 2 Exchange. 3 Correct or exchange 4 Readjust and retighten. 5 Exchange. 6 Replace or correct
		Cooling system abnormalities	<ol style="list-style-type: none"> 1 Cooling air is weak 	<ol style="list-style-type: none"> 1 Pay attention to the ventilation
		Other	<ol style="list-style-type: none"> 1 Overload 2 Muffler and exhaust port clogging 3 Inlet clogging 4 Defective spark plug 	<ol style="list-style-type: none"> 1 Change nozzle diameter or use safety nozzle 2 Remove the clog 3 Remove the clog 4 Exchange

6 Troubleshooting

		Symptom	Cause	Action
Poor running	Abnormal noise	Mechanical sound	<ol style="list-style-type: none"> 1 Flywheel is fixed loosely 2 Piston is worn, and tapping sounds come out from the piston skirt 3 Armature plate is contacting the other parts. 4 Foreign material is caught inside the crankcase and fan cover 5 Foreign material is caught inside the pump or impeller is touching the pump casing 6 Each part becomes loose 	<ol style="list-style-type: none"> 1 Retighten 2 Replace the piston 3 Reassemble 4 Remove the foreign material 5 Remove the foreign material or reassemble the pump 6 Retighten
		Knocking sound (combustion system abnormalities)	<ol style="list-style-type: none"> 1 Insufficient fuel (main jet or use of different diameter parts) 2 Overload 3 Rotation speed too low or too high 4 Different spark plug is used 	<ol style="list-style-type: none"> 1 Clean or replace 2 Open water discharge valve 3 Adjust to proper rotation speed 4 Replace with proper spark plugs

6 Troubleshooting

2. Pump

		Symptom	Cause	Action	
Water suction failure	A suction gauge does not have negative pressure	Abnormality on water pump side	<ol style="list-style-type: none"> 1 Poorly tightened suction pipe 2 Air suction from the tip of the suction pipe 3 Forgot to close the drain cock 4 Defective suction pipe packing 5 suction pipe fissure 6 Foreign matter caught in water discharge valve 	<ol style="list-style-type: none"> 1 Tighten securely 2 Put it completely underwater 3 Close securely 4 Exchange. 5 Exchange. 6 Remove foreign objects 	
		Abnormality on the vacuum pump side	No Rotation	<ol style="list-style-type: none"> 1 Internal freeze 2 Foreign object inhalation 3 Vacuum pump damaged 4 V Belt slip or breakage 	<ol style="list-style-type: none"> 1 Defrost 2 Remove foreign objects 3 Exchange. 4 Exchange.
			Rotating	<ol style="list-style-type: none"> 1 Clogged or poorly tightened vacuum passage 2 Strainer at the water shut-off valve is clogged 	<ol style="list-style-type: none"> 1 Clean or retighten 2 Clean
	The coupled meter becomes negative pressure	Vacuum leak (engine) Falling water when stopped)	Refer to "Water suction failure - compound meter does not become negative pressure - Water pump side abnormality"		
		No vacuum leakage	<ol style="list-style-type: none"> 1 Clogged suction pipe strainer or inside suction pipe 2 Air pocket in the suction pipe. 3 Suction height is too high, or the suction pipe is too long 4 Air suction from the tip of the suction pipe 5 Low engine speed at water suction 6 Short water suction operation time 7 Clogged or poorly tightened vacuum passage 8 Strainer at the water shut-off valve is clogged 	<ol style="list-style-type: none"> 1 Clean 2 Correct the layout 3 Keep the height within 8m 4 Put the tip completely underwater 5 Adjust to water suction rotation speed 6 Lengthen operation time 7 Clean or retighten 8 Cleaning 	

6 Troubleshooting

Symptom		Cause	Action	
Water Discharge Failure	Pressure does not increase	Abnormality on water pump side	<ol style="list-style-type: none"> 1 Clog in the suction pipe strainer or suction pipe 2 Air pocket in suction pipe 3 Suction height is too high, or the suction pipe is too long. 4 Air suction from the tip of the suction pipe 5 Poorly tightened suction pipe 6 Discharge valve half-open 7 Forgot to remove the safety nozzle (not necessary when the nozzle is attached) 8 Foreign matter in the nozzle 9 Frozen inside the pump 	<ol style="list-style-type: none"> 1 Clean 2 Correct the layout of the suction pipe. 3 Keep the height within 8m 4 Put the tip completely underwater. 5 Tighten securely 6 Open the valve completely 7 Remove 8 Remove foreign objects 9 Defrost and remove the ice
		Engine malfunction	Refer to 1. Engine – Hard to start and poor running	
	Other Abnormalities	<ol style="list-style-type: none"> 1 Muffler and exhaust port clogging 2 Air Inlet of the carburetor clogging 	<ol style="list-style-type: none"> 1 Remove the clog 2 Remove the clog 	

3. Electrical

Symptom		Cause	Action
Bad start	Starting motor does not rotate	<ol style="list-style-type: none"> 1 Insufficient battery capacity 2 Deterioration of the battery 3 Fuse burnout 4 The cable connection is loose or Disconnected 	<ol style="list-style-type: none"> 1 Recharge 2 Replace 3 Replace. 4 Check the cable connection and plug-in surely. Replace parts if necessary.
Battery failure	Batteries run out too quickly.	<ol style="list-style-type: none"> 1 Deterioration of the battery 2 Mistake in main switch operation. 3 Mistake in charge operation 	<ol style="list-style-type: none"> 1 Exchange. 2 Operate properly 3 Operate properly
Connection failure	Wiring burnout	<ol style="list-style-type: none"> 1 Battery reverse connection 2 Poor connection or short-circuit at the outlet terminal 3 Poor wiring connection or disconnection 4 Fuse burnout 	<ol style="list-style-type: none"> 1 Connect correctly 2 Connect correctly, or Repair or replace the short-circuited parts. 3 Correct the wiring or repair, or replace 4 Replace

6 Troubleshooting

Symptom		cause	treatment	
Defective wiring	Lamp does not light	1 Lamp blew out 2 Wiring is loose or disconnected	1 Replace 2 Correct the circuit, repair, or replacement	
Defective monitor lamp	All monitor lamps do not light up immediately after turning the main switch to operate	1 Battery capacity is not enough, or the battery is deteriorated. 2 Fuse burnout 3 Wiring is loose or disconnected	1 Recharge or replace 2 Replace 3 Correct the circuit, repair, or replacement.	
	The lamps do not light even if they should have lit up	Common & typical matters to be noticed	1 Loose or disconnected wiring of each sensor and switch	1 Correct the circuit, repair, or replacement
		Fuel	1 Switch is broken	1 Replace
		2-cycle oil	1 Switch is broken	1 Replace
Monitor lamp light up	Please refer to Section No. 3 – Monitor Lamp (P. 7) and cope with each matter displayed			

7 Specifications

1. Fire-fighting pump	
Model	FT510-A
Classification (JPN)	(B-2)
Notification No. (JPN)	(P0145001)
Dimension (L x W x H)	737mm x 572mm x 740mm
Dry Weight	90 kg
2. Pump	
Type	High-pressure 1-stage turbine pump (with inducer)
Discharge water volume	Normal 1.01 m ³ /min
	High pressure 0.64 m ³ /min
Pump pressure	Normal 0.70 MPa
	High pressure 1.00 MPa
Nozzle diameter	Standard 24.0 mm
	High pressure 17.5 mm
Rated rotation speed	5800 rpm
Water inlet	Nominal 75mm, Fire engine thread (JIS B 9912)
Water outlet	Nominal 65mm, Fire engine Thread (JIS B 9912)
3. Engine	
Type	Air-cooled, 2-cycle, inclined, 2-cylinder gasoline engine
Model name	E440C
Displacement	436mL
Authorized output	22.8 kW / 5800rpm
Fuel feeding system	Carburetor
Fuel type and tank capacity	Regular gasoline for automobiles - 14.5L
Lubrication system and tank capacity	Separate lubrication system (2-cycle oil) - 2L
Fuel consumption	Approx. 14L/h
Cooling system	Forced air-cooled
Ignition system	CDI ignition system
Starting system	Starting motor & recoil
Lighting	12V-35W (searchlight), 12V-3W (instrument panel light)
Spark plug	NGK BR8HIX

7 Specifications

4. Vacuum pump	
Type	Oilless type: 4-vane eccentric rotary type
Maximum Suction Height	Approx. 9 m
Drive system	V Belt clutch type
5. Accessories	
Battery	12V15Ah/5h
Charger	AC100V~AC240V – DC12V charger
Tools, etc.	1 x Tool kit, 1 x instruction manual 1 x Spark plug, 1 x safety nozzle
Pump cover	1 pc.
6. Optional parts	
Searchlight lamp	1 pc.
Searchlight stand	1 pc.



Shibaura Fire Pump Co., Ltd.

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SHIBAURA

OPERATION MANUAL

SHIBAURA FIRE-FIGHTING PUMP FT510-A



Please read this operation manual carefully to operate the Shibaaura Fire-fighting Pump safely and correctly. Incorrect operation of the pump may result in an accident. If this manual is missing or damaged, please order a new one from us or our agent promptly.

Shibaaura Fire Pump Co., Ltd.

- For safe use

Keep it in a safe place with the fire-fighting pump.

- Items marked with  in this instruction manual are particularly important for safe use and must be observed.

 Danger	The case when there is an imminent risk of death, serious injury, or the product is mishandled.
 Warning	The case when there is a risk of death or serious injury, or the product is mishandled.
 Caution	In cases when the product is mishandled, minor injuries or property damage may occur.

- Product specifications and appearance are subject to change without notice for improvement. Therefore, please note that the contents of this document and some of the photographs and illustrations may not correspond to the product.
- If you have any questions or difficulties after reading this manual, please contact the dealer where you purchased the product or our company.
- For inspection and maintenance, please contact a maintenance business or dealer that is qualified to service portable fire-fighting pumps.

○ Contents

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1 Things you must follow for your safety

1. Warning Label Locations



Part No.L82900900



Part No.290192430



Part No.290192770



Part No.290192410



Part No.290192400



Part No.290192400

- If the contents of the label become difficult to see or the label is about to come off, replace it immediately.

1 Things you must follow for your safety

2. Caution Marks

Danger

- Do not suck in or discharge the substances other than water, such as flammable materials, drugs, or chemical liquid.
- There is a risk of explosion, fire, burns, poisoning, etc.

- Keep fire away when refueling.
- Do not overfill fuel into the tank.
- If the fuel is spilled, wipe it up immediately. Keep the wiping cloth away from fire.
- Refill the fuel after the engine has cooled down.
- Do not use fire to defrost the pump.
- There is a risk of ignition and explosion.

Warning.

- Fire-fighting pumps should be operated by firefighters, voluntary disaster prevention team members, maintenance and inspection personnel, and others who have been trained specifically for safe operation.
- Misuse or mishandling may result in serious accidents, including death.

- No neck wraps, ties, waist towels, etc., are allowed. Wear helmets, non-slip shoes, and no loose-fitting clothing.
- There is a risk of getting caught in the machine or slipping and falling, resulting in injury.

- Do not operate a fire-fighting pump if you are unable to concentrate on your work due to alcohol consumption, tiredness, illness, or the effects of drugs.
- This could lead to a serious accident.

- Use only genuine parts or specified attachments. No modifications are allowed.
- Failure to do so may result in accidents, injuries, or machine malfunctions.

- Install at least 3 m away from combustible materials.
- Remove flammable materials, such as dry grass, before installation.
- Exhaust fumes and heat from the muffler may cause a fire.

- Do not install indoors or in tunnels with poor ventilation.
- There is a risk of exhaust gas poisoning.

- Be sure to install the cover when operating.
- There is a risk of injury or burns.

- Be sure to close the recoil starter during operation.
- There is a risk of getting caught in pulleys or belts, or of getting cut yourself.

- Keep fire away from the battery.
- There is a risk of fire and explosion.

- Remove packing materials from the battery charger before charging.
- There is a risk of fire.

- Be sure to carry out periodic inspections. Operate and discharge the water at least once a month to check for any abnormalities.
- Accidents may occur due to damage, etc., and fire-fighting activities may be hindered.

1 Things you must follow for your safety

Caution

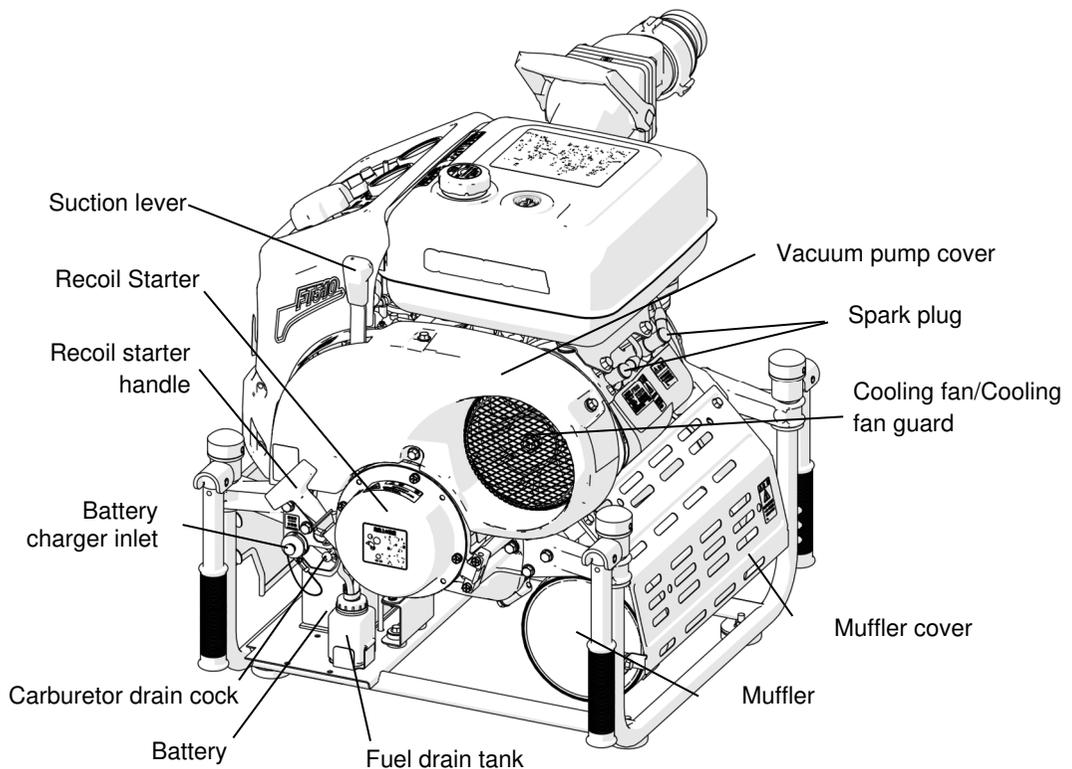
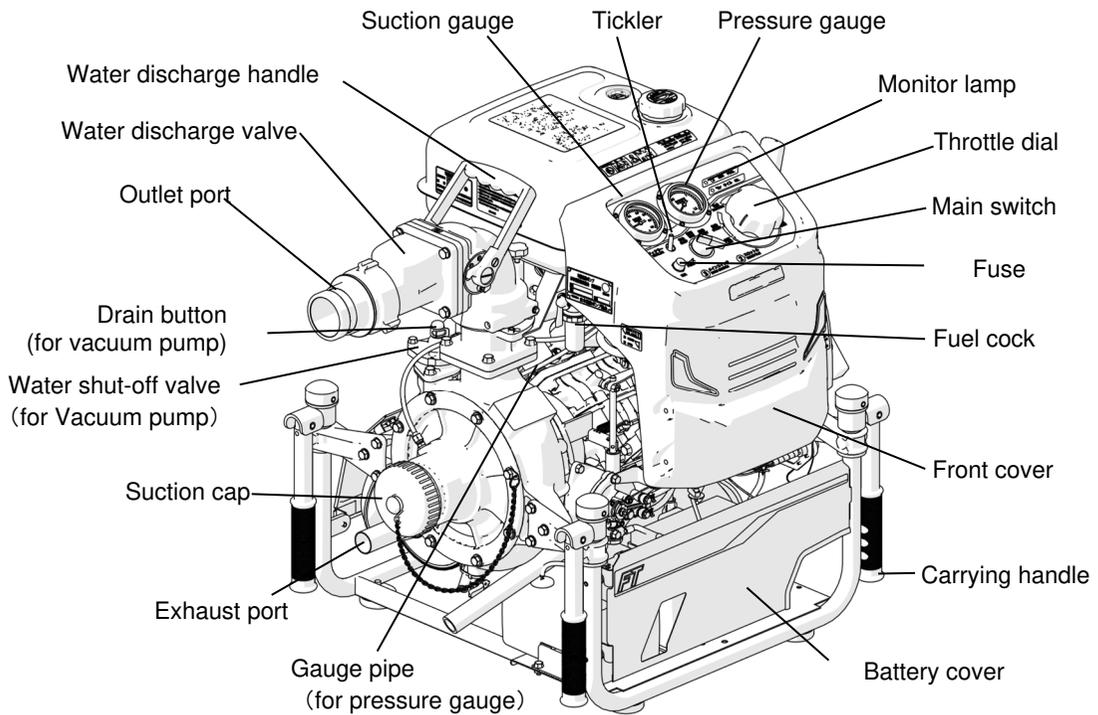
- Do not use fire-fighting pumps for activities other than fire-fighting, such as civil engineering, irrigation, water sprinkling, etc.
- There is a risk of hitting some objects and injuring people or damaging property around you.
- When disposing of batteries, oils, etc., please entrust disposal to a specialized industrial waste disposal contractor.
- It may cause fire, burns, or pollute the environment.
- Do not put fingers or hands in the water discharge valve.
- There is a risk of injury.
- After refueling, tighten the fuel tank cap securely.
- There is a risk of ignition and explosion.
- Check the fuel once a month, and if the fuel has a pungent odor or is cloudy, replace it with new fuel immediately.
- This may cause engine malfunction or equipment failure.
- When adding two-cycle oil, always use the same brand and grade of oil.
- Avoid entering water or debris when refilling the two-cycle oil.
- This may cause engine malfunction or equipment failure.
- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.
- When replenishing the governor oil, add the same brand and grade of oil.
- Avoid entering water or debris when refilling the governor oil.
- This may cause engine malfunction or equipment failure.
- When holding the carrying handle, do not touch the joint parts.
- Failure to do so may result in injury from pinching fingers.
- When carrying or loading/unloading the fire-fighting pump, four people should do so.
- Dropping it on your foot may cause injury or back pain.
- Connect the fire hose securely and always ensure it cannot be disconnected.
- If it is pulled out during water discharge, there is a risk of injury.
- Lay out the fire hoses without folds, twists, or sharp turns.
- There is a risk of the water hose springing up and causing injury.
- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.
- When starting with a recoil starter, avoid getting clothing or gloves caught.
- There is a risk of injury.
- When starting with the recoil starter, keep people at least two meters away from the starter.
- There is a risk of injury to elbows from being knocked by recoil ropes.

1 Things you must follow for your safety

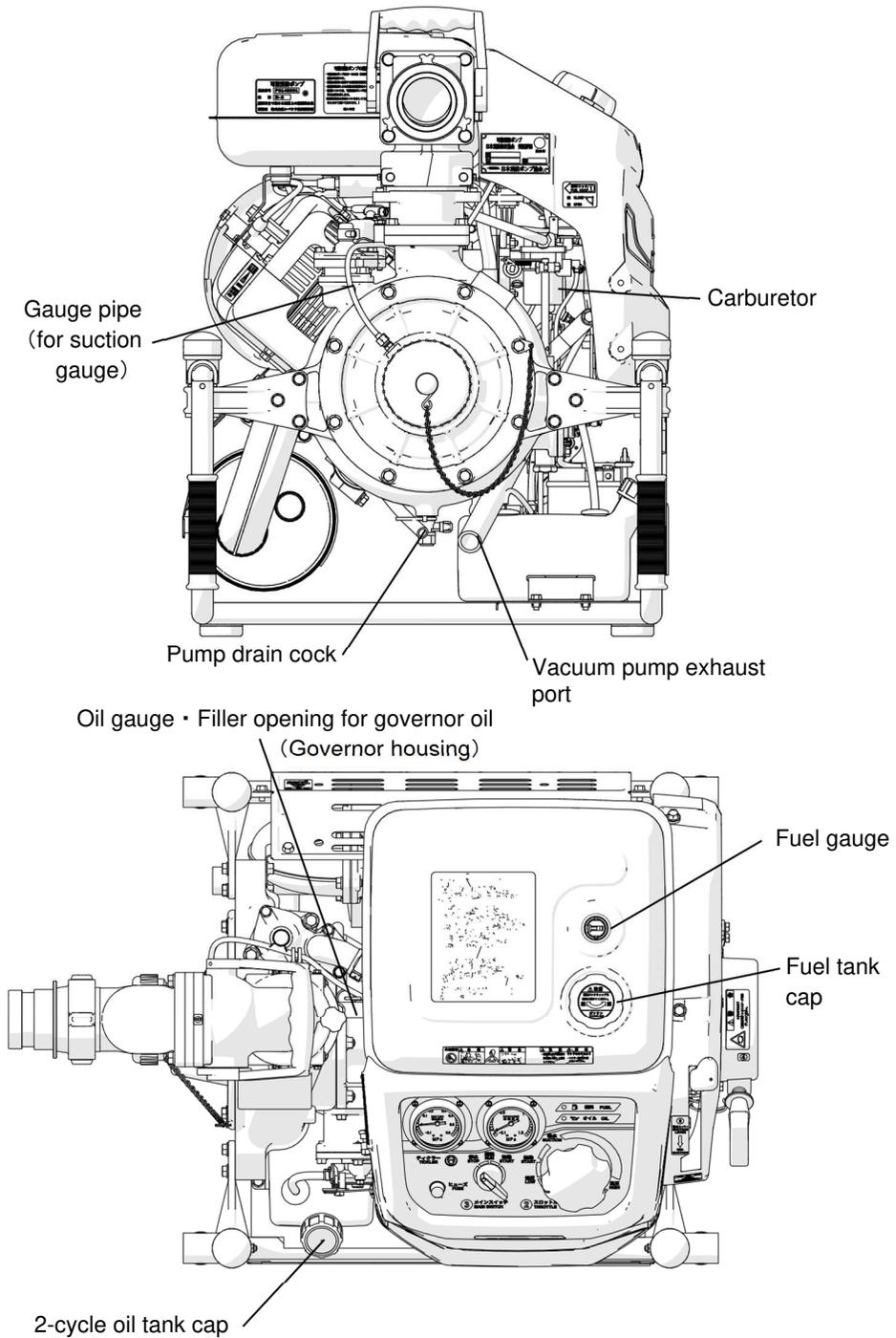
Caution

- Always return the throttle to the "LOW" position before opening and closing the water discharge valve.
- Hold the fire nozzle firmly and discharge water.
- There is a risk of injury because the fire nozzle runs away.
- Operate the water discharge valve slowly.
- There is a risk of injury from pinching or bumping hands.
- Do not aim the water at people or peer into the nozzle.
- High water pressure may cause them to be blown away, resulting in injury.
- Do not touch the spark spark plug or high-voltage cord during operation.
- There is a risk of electric shock.
- Never touch the muffler and exhaust pipe during and after operation since they become very hot.
- There is a risk of burns.
- While operating, be careful not to have the suction pipe or hose stepped on by vehicles or other objects.
- Accidents may occur due to damage, etc., and fire-fighting activities may be hindered.
- Do not start the engine with the water discharge valve handle open.
- When discharging water, the engine operator should communicate with the operator at the nozzle. Do not open the water discharge valve without notice or accelerate the throttle rapidly.
- There is a risk of injury from being blown away by the high-pressure water.
- Inspection and maintenance should be performed after the engine has been stopped and cooled down sufficiently.
- Failure to do so may result in injury, burns, or fire.
- Read the instruction manual that comes with the battery and the information on the battery itself carefully to ensure that the battery is used correctly.
- When disconnecting the battery cord, remove the (-) cord first, and when installing the battery cord, connect the (+) cord first.
- Short-circuiting may cause fire or burns.
- Do not use the charger in high-temperature places such as under direct sunlight or near heating elements, in extremely humid places, or wet areas such as rain or snow.
- There is a risk of overheating, burnout, or damage to the charger, or leakage of electricity or electric shock.
- The charger should be installed in a dry, well-ventilated location that is not wet.
- Failure to do so may cause electric shock or fire.
- Do not charge the battery with a charger other than the specified one.
- There is a risk of fire due to heating or burnout of the wiring.
- When operating without attaching the suction pipe (e.g., to check the vacuum level), attach the suction cap.
- There is a risk of getting caught in the machine or injured.
- Do not close the nozzle or water discharge valve while multiple pumps are relayed and the water is discharged.
- Abnormally high pressure may result in damage to the pump and hoses.

2 Name of each component



2 Name of each component



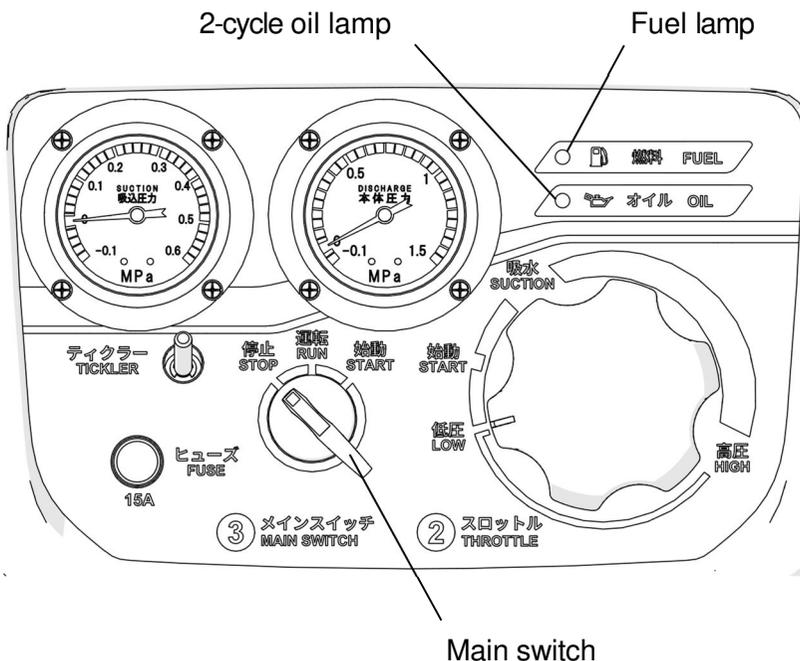
3 Monitor lamp

The pump with a starting motor activates when the main switch is turned into the "Run" position. When the power is turned on, two lights illuminate at the same time. If they do not light up, the battery voltage is insufficient, or there is a faulty circuit, the pump needs to be repaired. All lights are turned off after a few seconds.

All lights are turned off during water discharge, but the lights are turned on when operating the starting motor. It is because the battery voltage drops. Be sure to inspect or maintain when the following items are lit up.

Display	Feature	How it works	Measures
 fuel	Indicates that the fuel must be added	Lights up when the remaining fuel in the tank is low.	Refill the regular gasoline.
 2-cycle oil	Indication of when to refill 2-cycle oil	Lights up when the remaining oil in the tank is low, then stop the engine.	Refill the 2-cycle oil.

If the monitor lamp still illuminates or blinks after following the measures above, consult your dealer.



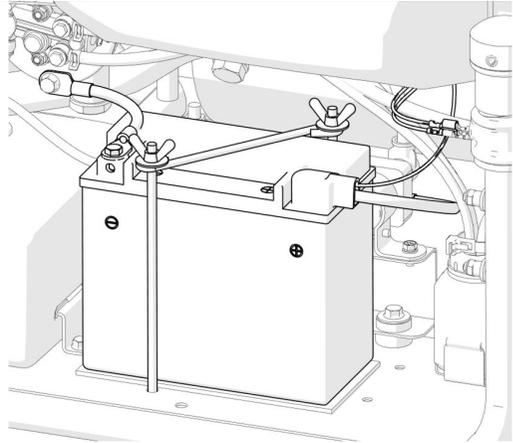
4 Handling method (Before)

Installing Battery

Caution

- Read the instruction manual that comes with the battery and the information on the battery itself carefully to ensure that the battery is used correctly.

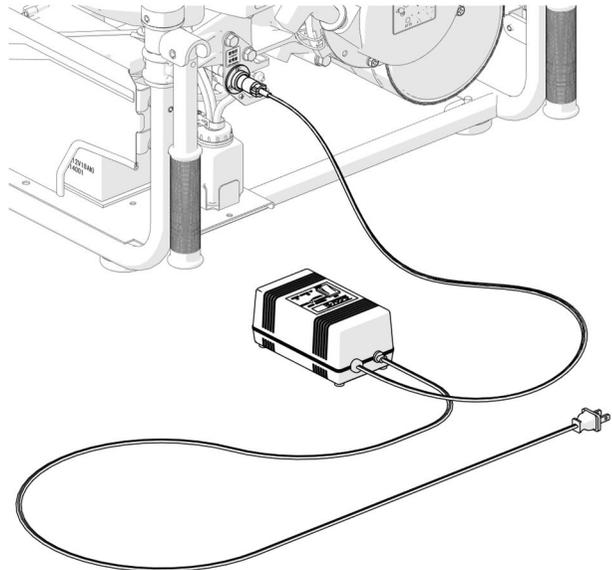
- (1) For handling, be sure to follow the battery instruction manual.
- (2) Fix the battery to the bed with two rods and one holder.
- (3) Firstly, connect two battery (+) cables (red), then connect one (-) cable (black) . Be sure to keep the connecting order.



Caution

- When disconnecting the battery cable, remove the (-) cord first, and when installing, connect the (+) cable first.
- Short-circuiting may cause fire or burns.

- (4) Connect the supplied charger to a charger inlet to charge the battery. (See "5 Periodic Inspection 2. Inspection Method (2) Handling of Fully Automatic Charger" on p. 29.)



4 Handling Method (Preparation for Operation)

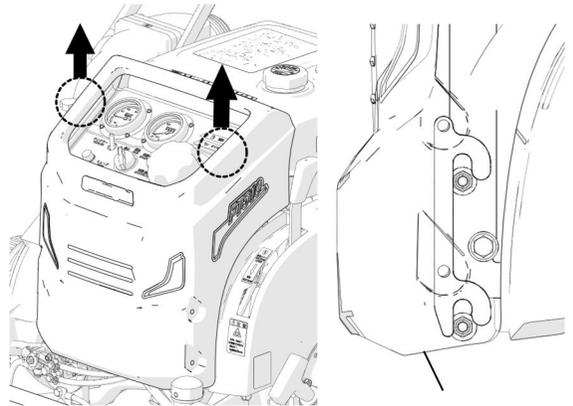
1. Removing and attaching covers

When removing the cover, follow the procedure below.

(1) Removing/attaching front cover

Hold the circled places on the illustration on the right. Shift it upward first, and then remove it toward you.

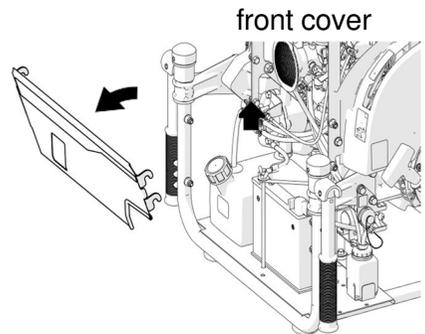
Installation is the reverse procedure.



(2) Removing and attaching the battery cover

Slide the battery cover upward first, and then remove it toward you.

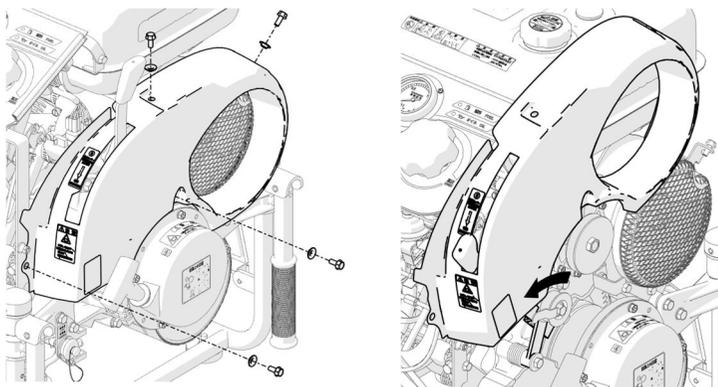
Installation is the reverse procedure.



(3) Removing and attaching vacuum pump cover

Remove the four bolts and collars. Pull the water suction lever toward you and remove it through the lever opening of the vacuum pump cover.

Installation is the reverse procedure.



Warning

○ Be sure to attach the cover when driving.

● There is a risk of injury or burns.

4 Handling Method (Preparation for Operation)

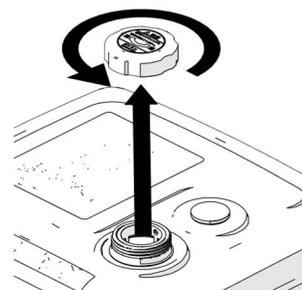
1. Replenishment

(1) Fuel

(Fuel tank capacity: approx. 14.5L)

Fill the tank with regular gasoline until the fuel gauge indicates "F".

Do not add gasoline mixed with two-cycle oil or bio-gasoline.



Danger

- Keep fire away when refueling.
- Do not overfill fuel into the tank.
- If the fuel is spilled, wipe it up immediately. Keep the cloth away from fire.
- Refill the fuel after the engine has cooled down.
- There is a risk of ignition and explosion.
- Hold the nozzle firmly and discharge water.
- There is a risk of injury due to swinging of the discharge nozzle.

Caution

- Tighten the fuel tank cap securely after refueling.
- There is a risk of ignition and explosion.

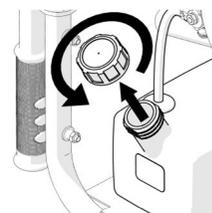
Caution

- Check the fuel once a month, and if the fuel has a pungent odor or is cloudy, replace it with new fuel immediately.
- This may cause engine malfunction or equipment failure.

(2) Engine oil

(Oil tank capacity: Approx. 2L).

Fill the 2-cycle oil into the oil tank at the bottom of the fire-fighting pump.



Caution

- When refilling the 2-cycle oil, use the same brand and grade of oil.
- Do not allow water or debris to enter when refilling.
- This may cause engine malfunction or equipment failure.

Caution

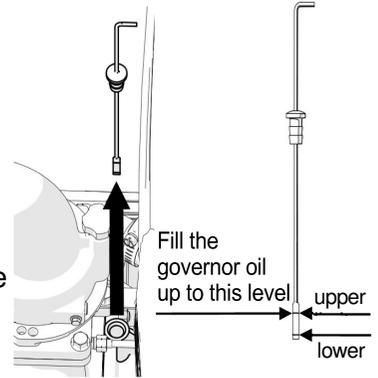
- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.

4 Handling Method (Preparation for Operation)

(3) Governor oil

(1) Place the pump on the level place and check the governor oil level with an oil gauge.

- Remove the governor oil level gauge and check the oil level. Refill the oil to the original level when the oil level has become in the middle or lower. Put back the oil gauge after refilling. Do not replenish more than the upper limit.
- If the oil is very dirty or cloudy, consult your dealer.
- Recommended oil (Automotive engine oil) SAE:10W-30(API:SJ)



Caution

- When replenishing governor oil, add the same brand and grade of oil.
- Do not allow water or debris to enter the oil inlet when refilling.
- This may cause engine malfunction or equipment failure.

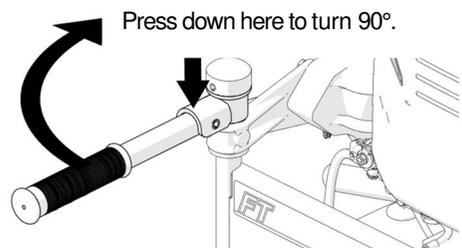


Caution

- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.

2. Carrying the pump

Hold the transport handle correctly when moving and loading/unloading the fire-fighting pump.
The carrying handle can be turned 90 deg.



Caution

- When holding the carrying handle, do not touch the bend.
- Fingers may be pinched, resulting in injury.

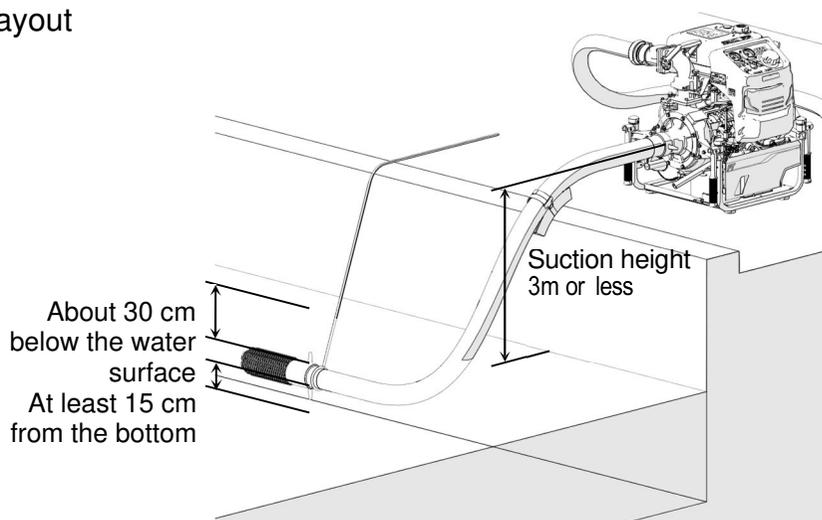


Caution

- 4 people is necessary to carry the pump.
- Dropping it on your foot may cause injury or back pain.

4 Handling Method (Preparation for Operation)

3. Pump layout



- (1) Check the water source. Make sure that there will be no problems with use, such as no decay, floating matter, or sediment.
- (2) Place the pump close to the water source and on a level surface.



Warning

- Avoid installation in places with poor ventilation, such as indoor, in a vehicle, tunnel. There is a risk of exhaust gas poisoning.



Warning

- Place at least 3 m away from combustible materials.
- Remove dead grass and other flammable materials before setting.
- Exhaust fumes and heat from the muffler may cause a fire.

- (3) Keep the suction height below 3m as much as possible to avoid falling water because of the reduction of the pump capacity.
- (4) Lay out the suction hose with no bends or bumps and fasten it tightly to the suction inlet port. Ensure the level of the inlet port side is higher than the suction hose tip at the water source side.
- (5) Always attach a strainer and basket to the suction port of the suction hose and keep it below the water surface to prevent air sucking in. Place the tip about 30 cm above the bottom. If the tip of the device is 15 cm or more away from the bottom. Place a straw mat to prevent sediment from being sucked into the device. If the water source has algae, watergrass, etc., remove them around the water inlet.
- (6) Connect the fire hoses securely and lay them out. Be sure not to fold.

4 Handling Method (Preparation for Operation)



Caution

- Connect the fire hose securely and always ensure it cannot be disconnected.
- If it is pulled out during water discharge, there is a risk of injury.



Caution

- Lay out the fire hoses without folds, twists, or sharp turns.
- There is a risk of the water hose springing up and causing injury.

4. Pump user

- (1) Fire-fighting pumps are small but high-performance machines with strong power. Improper use may cause serious accidents, including death.



Warning

- Fire-fighting pumps should be operated by firefighters, voluntary disaster prevention team members, maintenance and inspection personnel, and others who have been trained specifically for safe operation.
- Misuse or mishandling may result in serious accidents, including death.

- (2) Wear clothing appropriate for the operation.



Warning

- No headbands, neck wraps, ties, waist towels, etc., are allowed. Wear helmets, non-slip shoes, and no loose-fitting clothing.
- There is a risk of getting caught in the machine or slipping and falling, resulting in injury.

- (3) Do not operate if you are not feeling well.



Warning

- Do not operate fire-fighting pump if you are unable to concentrate on your work due to alcohol consumption, tiredness, illness, or the effects of drugs.
- This could lead to a serious accident.

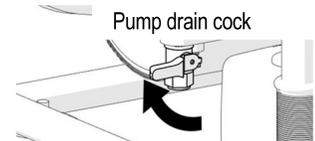
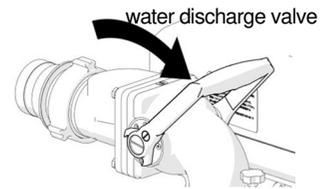
4 Handling method (Operation)

1. Starting the engine

Close the ⑥ water discharge valve and pump drain cock before starting the engine.

Please be sure to check the following

Follow the operating instructions in the order of ❶ to ❹ numbers on the unit.



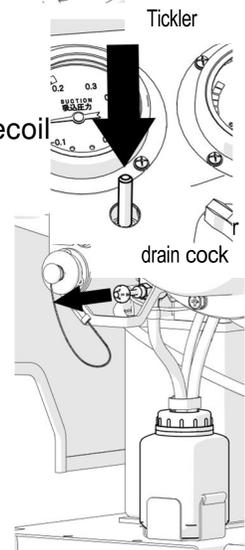
(1) Open the ❶ fuel cock.

Move the fuel cock lever straight down to "Open" ❶ to open the fuel cock.



(2) In cold weather, use the tickler in the carburetor.

- If it is difficult to start the engine with auto-choke alone in cold weather, press the tickler for 2 to 3 seconds.
- Press the tickler for 2 to 3 seconds when starting with the recoil starter and the engine is cold.
- If you use tickler for multiple times and the engine does not start, close the ❶ fuel cock, drain fuel from the carburetor drain cock, then start the engine.
- If the engine does not start properly due to excessive fuel, such as when restarting after warm-up, close the fuel cock, open the carburetor drain cock, and drain the gasoline from the carburetor before starting the engine. After starting, turn the fuel cock "open". If the car stops, start the car again.



*Remove and dispose of the fuel in the drain tank every time.

Fuel drain tank

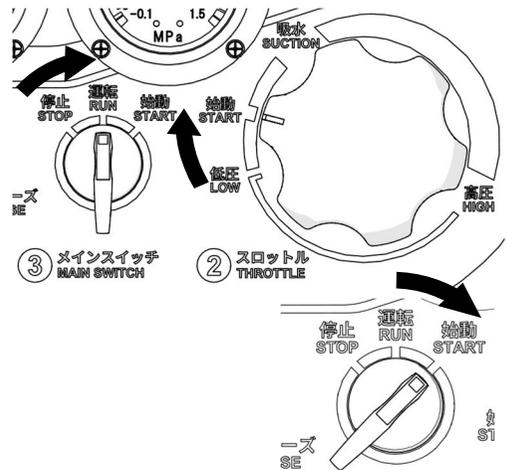


Caution

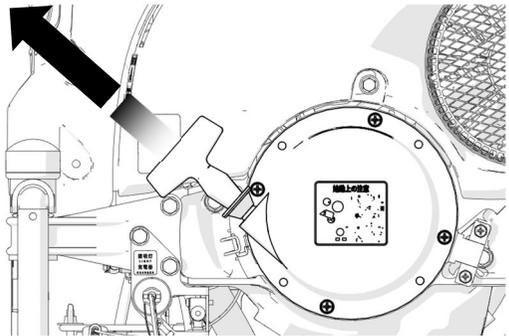
- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.

4 Handling method (Operation)

- (3) Turn the ② throttle to the "start" position.
 (4) Turn the main switch to the "run" position.
 When starting the starter motor, turn it to the "START" position. The starter motor works, and the engine starts.
- Once the engine is started, set the ③ main switch to the "operation" position.
 - Stop the starter motor for at least 5 seconds after running it for 3 seconds. Continuous operation will cause deterioration of the battery and the starter motor.



- (5) For recoil starting, pull the ④ recoil starter handle out to the point where it is slightly heavy, then pull quickly and sharply.



Caution

- When starting with a recoil starter, avoid getting clothing or gloves caught.
- There is a risk of injury.



Caution

- When starting with the recoil starter, keep people at least two meters away.
- There is a risk of injury to the elbows from being knocked by recoil ropes.



Warning

- Be sure to close the recoil starter during operation.
- There is a risk of getting caught in pulleys or belts, or of cutting yourself.

4 Handling method (Operation)

2. Suction

- (1) Turn the ② throttle to the "suction" position after starting the engine.
- (2) Pull the ⑤ suction lever toward you to activate the vacuum pump and suction water.
 - Promptly return the ⑤ suction lever when the pressure gauge needle swings and the pressure increases and stabilizes.
 - Keep the vacuum operation time less than 30 seconds.

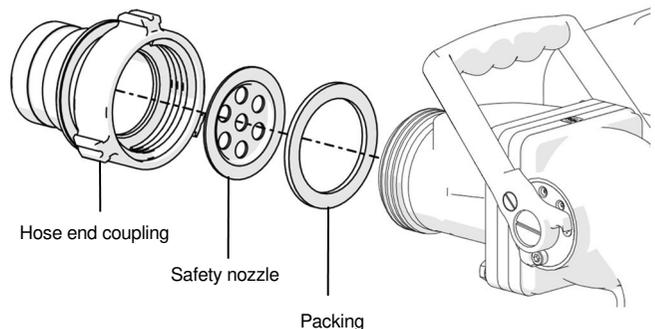


3. Water discharge

Before discharging water, check the safety of the nozzle. Give a signal to the person at the nozzle to start discharging water.

- (1) ⑥ Operate the water discharge handle gradually in the "→Open" direction until it stops. Turn the throttle to the desired water pressure level. Adjust the pressure with the ② throttle according to the water discharge conditions.
 - Be careful not to use too high a water discharge pressure or to open or close the ⑥ water discharge valve handle too rapidly, which may cause the water discharge hose to swing.
- (2) Standby for water discharge
 - To close the ⑥ water discharge valve and put the machine in standby mode during water discharge, ② turn the throttle to the "low pressure" position and stop the engine. In this case, the check valve will operate and water will not fall, so restart the engine and open the ⑥ water release valve to re-discharge water. (However, restarting must be done within 3 minutes.)
 - If it is necessary to stand by without stopping the engine, be sure to put the ② throttle in the "low pressure" position.
- (3) The case when discharging water without using a nozzle

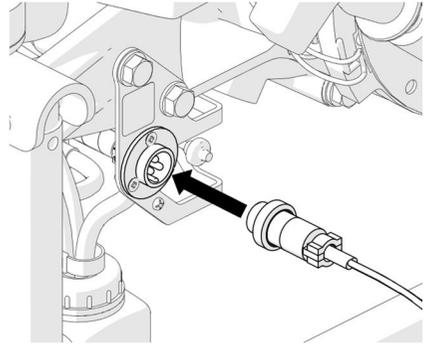
- When operating without using the nozzle, such as pumping water from a water tank or pumping water to a relay tank, be sure to set the attached safety nozzle between the hose end coupling and the water discharge valve, as shown in the figure.



4 Handling method (Operation)

(4) To turn on the searchlight

- To turn on the searchlight, plug the searchlight into the charger inlet on the recoil side.



Caution

- Always return the throttle to the "LOW" position before opening and closing the water discharge valve.
- Hold the nozzle firmly and discharge water.
- There is a risk of injury due to swinging of the discharge nozzle.

Caution

- Operate the water discharge valve slowly.
- There is a risk of injury from pinching or bumping hands.

Caution

- Do not aim the water at people or peer into the nozzle.
- High water pressure may cause them to be blown away, resulting in injury.

Caution

- Do not touch the spark plug or high-voltage cord during operation.
- There is a risk of electric shock.

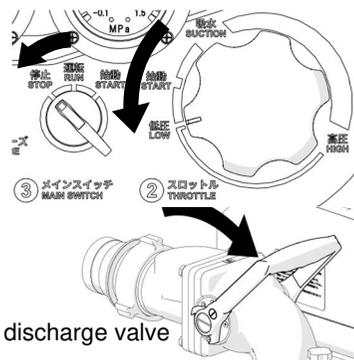
Caution

- Never touch the muffler and exhaust pipe during and after operation since they become very hot.
- There is a risk of burns.

4 Handling method (Operation)

4. Stopping the engine

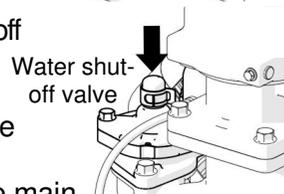
- (1) ② Turn the throttle to the "LOW" position.
 - If the engine is hot, run the engine at low speed for about 1 minute to cool it down.
- (2) Close the ⑥ water discharge valve handle by operating it in the "→ close" direction.
- (3) ③ Turn the main switch to the "STOP" position. The engine will stop.



5. Draining water

After the operation, a large amount of water remains inside the pump. This remaining water may cause corrosion and freezing cracks during cold weather. Be sure to drain water before storing.

- (1) Open the pump drain cock.
- (2) Open and close the ⑥ water release valve, press the water shut-off valve drain button, and drain completely.
- (3) Close the pump drain cock and install the water inlet cap.
- (4) Start the engine and pull the ⑤ suction lever to activate the vacuum pump for approximately 5 seconds.
- (5) ② Turn the throttle to the "low pressure" position, ③ Turn the main switch to the "stop" position and stop the engine.
- (6) Open the pump drain cock and remove the water inlet cap to confirm that it is completely drained. If drainage is insufficient, repeat steps (3) to (5).
- (7) Close the pump drain cock and install the water inlet cap.



Treatment after using seawater or muddy water

If seawater or muddy water is used, be sure to operate the pump by discharging water with clean water for at least 5 minutes to clean the inside of the pump. Also, to clean the inside of the vacuum pump, operate the vacuum pump for about 5 seconds by pulling the ⑤ suction lever while discharging water at low pressure, and drain clean water from the vacuum pump exhaust hose. After cleaning is complete, be sure to drain the water using the operation described in the previous section "5".

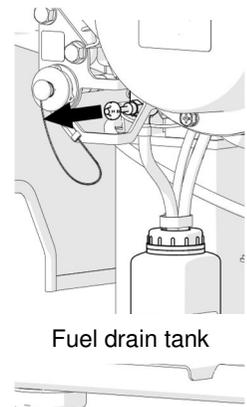
4 Handling method (Operation)

6. Storing the pump

- (1) Store in a dry, temperature-controlled area, away from dust and direct sunlight.
- (2) Wipe off oil, dust, and dirt and keep clean.
- (3) Fill the fuel up to the "F" level when storing. ●Close the fuel cock.
- (4) Fill the specified amount of 2-cycle oil.
- (5) Drain the fuel in the carburetor from the carburetor drain cock, on the recoil starter side.
*Make sure to remove the fuel inside the fuel drain tank every time.
- (6) Please charge the battery with the supplied charger while in storage.
(See "5 Periodic Inspection 2. Inspection Method (2) Handling of Automatic Charger" on p. 29)
- (7) Cover the pump with the attached pump cover.



Carburetor drain cock



Fuel drain tank

- Before storing the pump, be sure to check that the water inside is completely drained. Also, fill the pump with antifreeze to prevent freezing when storing the pump in cold weather (see "4 Handling Methods" Operation in Winter and Cold Weather, on P. 20)
- Operate and discharge water for 5 to 10 minutes at "HIGH" throttle position every month.
- Check the fuel in the fuel tank once a month, and if there is a pungent odor or cloudiness, replace the fuel with new fuel. The recommended replacement time is 6 months after refueling.
- If the vehicle has been in storage for a long period of time without a monthly periodic inspection, operate the pump for 1 minute at "LOW" position to warm up the engine. Be sure to inspect visually to see if there are any abnormalities.



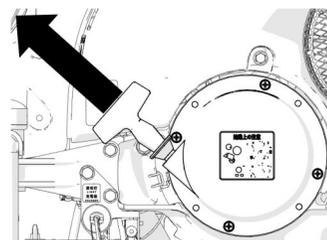
Caution

- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.

4 Handling Method (Operation in Winter and

1. Before starting the engine

- (1) In cold weather, battery capacity is significantly reduced. Please be sure to charge regularly.
- (2) ● Gently pull the recoil starter handle and check that the pump turns.
 - If it does not turn, the pump may be frozen. Pour the warm water into the pump from the suction port or defrost it in a warm room.



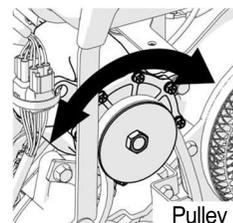
Recoil starter handle

- (3) Remove the vacuum pump cover.

(See "4 Handling Methods (Preparation for Operation)"

1. Removing and attaching the covers, on page 9 .)

- Turn the vacuum pump pulley by hand and check if the vacuum pump turns.
- If it does not turn, the vacuum pump may be frozen.
Blow warm air outside the vacuum pump or defrost in a warm room.



Pulley



Danger

- Do not use fire to defrost the pump.
- There is a risk of ignition and explosion.

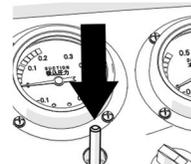


Caution

- Inspection and maintenance should be performed after the engine has been stopped and cooled down sufficiently.

2. Starting the engine

- (1) In cold weather, press the tickler for 2 to 3 seconds.
- (2) Immediately after the engine starts, operation may be unstable; run the machine idle at low speed for 1 to 2 minutes.



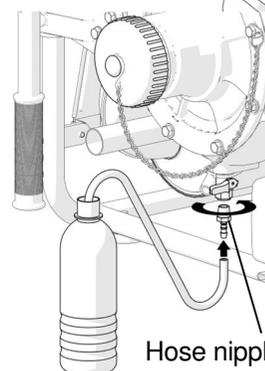
3. Treatment after water discharge (freeze prevention)

- (1) Preventing pumps from freezing (how to add antifreeze)

- ① Drain the water.

(Refer to "4 Handling Method (Operation) 5. Draining water)

- ② Close the water suction cap.
- ③ Attach the hose nipple and hose to the pump drain cock and place the hose in a bottle filled with antifreeze



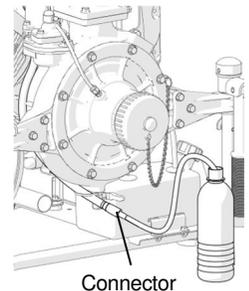
Hose nipple

4 Handling Method (Operation in Winter and

- ④ Start the engine.
- ⑤ ② Turn the throttle to the "SUCTION" position.
- ⑥ ⑤ Pull the suction lever to create a vacuum state inside the pump.
- ⑦ Open the pump drain cock to suck in antifreeze.
- ⑧ Pull the ⑤ suction lever again, and when antifreeze comes out of the vacuum pump exhaust port, return the ⑤ suction lever.
- ⑨ Remove the hose and hose nipple from the pump drain cock.
- ⑩ Pull the ⑤ suction lever and stop the engine when the antifreeze stops coming out of the vacuum pump exhaust port.
- ⑪ After collecting antifreeze from the pump drain cock, close the drain cock.

(2) Preventing the vacuum pump from freezing (how to fill the vacuum pump with antifreeze)

- ① Connect the connector and hose to the water shut-off valve drainpipe and place it in a container of antifreeze.
- ② Start the engine.
- ③ Set the ② throttle to the "SUCTION" position.
- ④ Pull the ⑤ suction lever and suck in the antifreeze.
- ⑤ If antifreeze comes out of the vacuum pump exhaust port, return the water suction lever.
- ⑥ Remove the connector and open the pump drain cock.
- ⑦ Pull the ⑤ suction lever, and when the antifreeze stops coming out of the vacuum pump exhaust port, return the ② throttle to the "LOW" position and stop the engine.
- ⑧ Close the pump drain cock.



(3) Antifreeze should also be injected into water discharge valves and hose couplings.

CAUTION: Do not use alcohol to prevent freezing, since it will damage the rubber seals. Collect drained antifreeze in a liquid container.

4. Precautions for storage

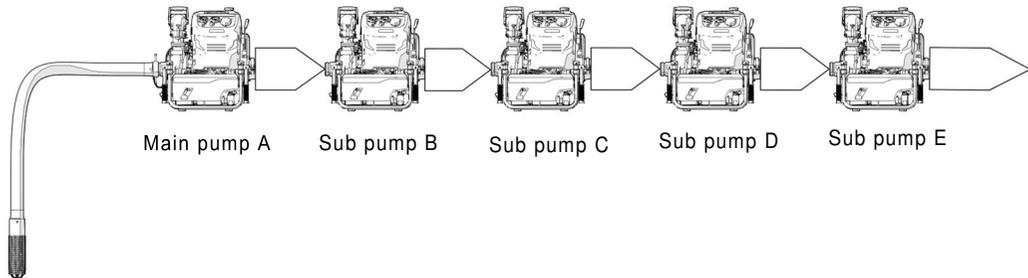
Choose the fuel with good quality. (The better quality of gasoline is highly volatile, and has better starting performance.)

- (1) Be sure to always have antifreeze on hand.
- (2) Batteries may freeze when the relative density of electrolyte becomes low. Be sure the battery is always recharged. If battery performance deteriorates, replace the battery as soon as possible.

4 Handling method (Relaying water with multiple pumps)

In the case of forest fires or urban fires where the water supply is far away, two or more pumps may be connected in series to relay water. The relay water requires different operations and special attention compared to normal operation because each pump is located far from the others. Daily training is also necessary to enable judgment and activities based on the state the pump's operators are facing. See the general method of relay operation below.

Figure 1.



1. Setting Locations

- (1) The number of units and their locations should be determined based on the number of hoses and the height of the water source.
- (2) Install a relay coupling to the suction port of sub-pumps (B to E in Figure 1), to connect the fire hose.
In this case, the automatic relay valve, "Direct Valve" can prevent accidents caused by sudden pressure fluctuations and high-pressure water.
- (3) The wye-valve is also recommended to be attached to the discharge port.
(The hose couplings that connect each pump may not be removed even after the discharge operation, because of the water pressure inside the fire hose.)

2. Operation Method (*An operator is required for every pump.)

- (1) Open the water discharge valves of the sub-pumps (B to E) beforehand.
Be sure to open the variable nozzle when it is attached to the fire hose.
- (2) Operate the main pump (A) and discharge water as usual.
- (3) Send water to the original pump first and then to others sequentially.
- (4) Check the pressure scale in the sub pump (E) and increase the engine speed to regulate the discharging water by controlling the throttle of the sub-pumps (B to E)
The sub pump (B to E): Should be more than 0.05MPa in a scale of suction gauge pressure, be less than 1.2MPa in a scale of power.
- (5) If there is not enough power of water discharge at the nozzle, turn the throttle dial of the original pump (A) to "HIGH" position gradually, then the turn the throttle dial of sub-pump, from the one closer to the original (from B to E), sequentially.
- (6) When stopping water discharge, turn the throttle dial of the last pump, the one close to the nozzle (E), to "LOW" position first and stop gradually (from E to B).
Stop the water supply from the main pump. When the supply of water from the main pump has been stopped, close the water discharge valve of each pump.

4 Handling method (Relaying water with multiple pumps)



Caution

- Do not close the nozzle or water discharge valve while multiple pumps are relayed and the water is discharged.
- Abnormally high pump pressure may result in damage to the pump and hoses.

1. Suction and discharge from water hydrant

The capacity of water supply from the fire hydrant

It is necessary to check the sufficient volume of water for discharging from the fire hydrant in advance.

It would depend on several factors, such as the diameter of the hydrant, the condition of the piping, the initial water pressure, and others.

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 could have high capacity for water supply with wider diameter despite low water pressure.

Water supply method

- (1) Be sure to open and close the hydrant's valve and release water to remove the foreign objects, such as sand, before connecting the hose to the hydrant.
- (2) Connect the water hydrant and pump. Use a suction hose that can endure the water supply pressure. The supply pressure limit for the suction hose with a nominal diameter of 65mm is 0.9 MPa. The suction hose for connection to the hydrant should be inspected periodically to avoid any damage.

How to check and adjust water supply pressure

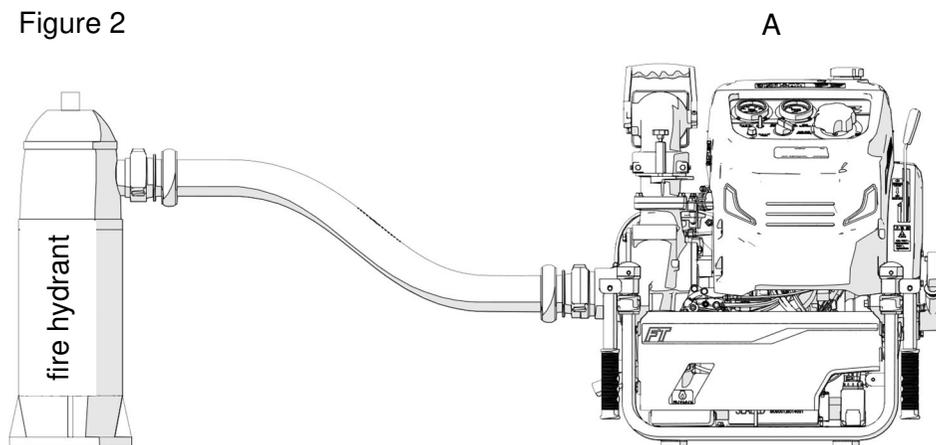
- (1) Open the open/close valves of the fire hydrant and the water discharge valve of the pump to full open.
- (2) Gradually close the pump's water discharge valve while checking the water supply pressure with a suction gauge.
- (3) If the water supply pressure is high, adjust the water supply pressure with the hydrant's open/close valve.

4 Handling Method (Suction, discharge, and relay the water from the fire hydrant)

2. Water discharge and delivery

When a single pump receives and discharges water (Figure 2)

Figure 2



- (1) Open the water discharge valve of pump (A) in advance.
If the fire hose has a variable nozzle at the end, be sure to leave it open.
- (2) Before starting the engine, open the hydrant and check the pressure on the compound (suction) gauge of the pump (A).
- (3) After confirming that water has been sent from the fire hydrant, start the engine of the pump (A) and begin discharging water.

- (4) Adjust the pressure by operating the throttle of the pump (A) to achieve the required pressure and flow rate.

The throttle should be operated gradually, and the compound (suction) gauge should be kept above 0.05 MPa.

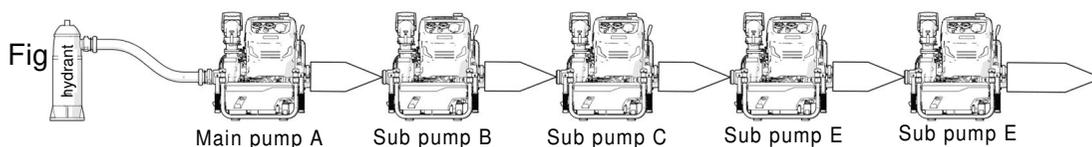
Adjust the hydrant open/close valve to adjust the pressure gauge to not exceed 1.2 MPa. At this time, the compound (suction) gauge of the pump (A) should be less than 0.6 MPa

- (5) To stop water discharge, turn the throttle of pump (A) to the "LOW" position, stop the engine, and close the hydrant.

Do not close the water discharge valve of pump (A) until the water supply from the hydrant stops.

4 Handling Method (Suction, discharge, and relay the water from the fire hydrant)

When discharging water by relaying with multiple pumps
(An operator is required for all pumps: Fig. 3)



- (1) Open the water discharge valves of all pumps (A to E) in advance. If a variable nozzle is attached to the fire hose-end at the water discharge side, be sure to open it.
- (2) Before starting the engine, open the hydrant and check the pressure of the compound (suction) gauge of the main pump (A).
- (3) After confirming that water has been delivered from the fire hydrant, start the engine of the main pump (A) to deliver water to the next pump.
- (4) Start and supply water to the second and sub-pumps (B to E) in the same manner as for the original pump (2) and (3).
- (5) Read the pressure gauge on the sub-pump (E) and adjust the pressure by operating the throttles on all pumps (A to E) to achieve the required pressure and flow rate at the nozzle. Operate the throttles gradually and make sure that each pump keeps above 0.05MPa on the compound (pressure) gauge and above 1.2MPa on the pressure gauge.

Adjust the hydrant opening to make the compound (pressure) gauge of each pump is not less than 0.6MPa.

- (6) To stop the water discharge, shut down the engine by turning the throttle to the "LOW" position, starting with the pump (E) closest to the end of nozzle, and finally close the fire hydrant. Do not close the water discharge valves of each pump until the water supply from the hydrant has stopped.

5 Periodical Inspections

1. Periodical inspections

Be sure to perform periodic inspections according to the following items.

Item	Duration or operating time							Inspection details	treatment	
	Period									
	Before use	after use	1 month	6 months	1 year	2 years	3 years			
fuel	●	●						Quantity/ Deterioration (ie color, smell)	Refill or replace	
				●				-	Replace	
2-cycle oil	●							Quantity	Refill	
					●			-	Replace	
Battery		●						-	Recharge	
			●					Deterioration	Replace	
						●		-	Replace	
Spark plug					○		100	-	Replace	○
Appearance		●						Dirt, etc.	Clean	
Starter rope			●					Wear, breakage	exchange	○
Vacuum pump belt				●			50	Become loose/Wear	Adjust or replace	○
Fan belt				●			50	Become loose/Wear	Adjust or replace	○
Fuel pipes				●			50	Leakage/damage	Replace	○
Water discharge valve					●		100	Valve feels heavy, vacuum leakage	Adjust or replace the parts if necessary	○
Fuel filter				●			200	Foreign material stuck	Clean or replace	○
Engine start and vacuum			●					Operation/Perfor mance	Replace parts if necessary	○
Prime and discharge			●					Operation/Perfor mance	Replace parts if necessary	○
All parts							○ 300		Replace parts if necessary	○

Note:

- For items marked with "●" in the period column, please practice the inspection by yourself. Please ask your dealer to inspect the items marked with "○" in the period column and to handle the items marked "○" in the column of treatment.
- Measure the inspection timing by either comes earlier, "period" or "operation time". For example, consider replacing spark plug when the operation time reaches to 100 hours, even if the operation period is less than a year.
- This inspection table shows the period and time under general operating conditions. Make sure to perform inspections earlier when the pump is used under tough conditions.

5 Periodical Inspections

Recommended replacement parts and period

Part Name	Recommended Replacement Period	Example of Defects
Spark plug	Every Year	Bad to start due to wear and tear
Fuel Pipes	Every 2 years	Fuel leakage due to deterioration
Battery	Every 2 years	Deterioration
2 Cycle Oil Pipe	Every 2 years	Oil leakage due to deterioration
Vacuum Pump Belt	Every 3 years	Slippage due to wear
Fan Belt	Every 3 years	Slippage due to wear
Other Rubbers	Every 2 years	Deterioration
Starter Rope	Every 3 years	Breakage due to wear
Fuel Filter	Every 3 years	Clogging and Bad start due to the water drip
2-cycle Oil Filter	Every 3 years	Clogging, and Poor lubrication due to the moisture.
Discharge Valve Water shut-off valve (rubber)	Every 3 years	Deterioration of the check valve
Mechanical Seal	Every 3 years	Poor suction due to deterioration
Oilless Vacuum Pump Blades	Every 3 years	Poor suction due to deterioration
Carburetor	10 years	Corrosion inside the tank
Fuel Tank	10 years	Corrosion inside the tank

Parts recommend replacing when disassembling

- Gaskets • Push nuts
- O-rings • Spring pins
- Lock washers • E-rings



Caution

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

5 Periodical Inspections

2. Inspection method

Periodic inspections are essential to ensure the fire-fighting pump's safety and use every possible function. Inspect the pump correctly and safely 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, 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.



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 recommended to replace the battery earlier.

Recommended battery : GS YUASA YTX20L-BS

For handling the battery, please follow the instruction manual that comes with the battery.

5 Periodical Inspections



Caution

- When disposing of batteries, oils, etc., please entrust disposal to a specialized industrial waste disposal contractor.
- It may cause fire, burns, or pollute the environment.

(2) Handling of Shibaura full-automatic charger



Caution

- To use the charger safely and correctly, be sure to read the instruction manual that comes with the charger. Improper use may cause an accident. After reading the charger instruction manual, be sure to keep it close to the product.

A) Unpacking



Caution

- Remove packing materials from the battery charger before charging.
- There is a risk

B) Location to place



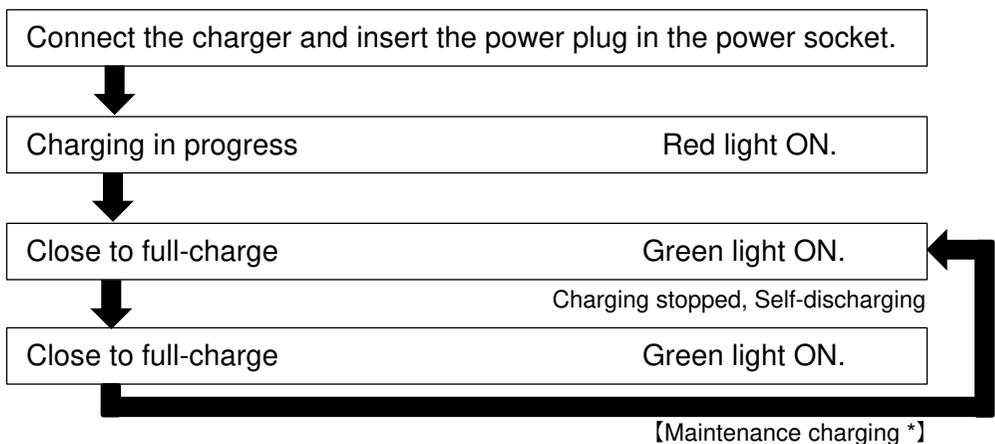
Warning

- Do not use the charger in high-temperature places such as under direct sunlight or near heating elements, in extremely humid places, or wet areas such as rain or snow.
- There is a risk of overheating, burnout, or damage to the charger, or leakage of electricity or electric shock.

C) Make sure before use

- Remove the power plug from the socket (Be sure the charger is turned off).
- Connect the output of the charger cable firmly to the fire-fighting pump.
- After connecting the cable to the charger unit(AC inlet), plug in the socket.

D) Battery charger Operating Manual



【Maintenance charging *】

5 Periodical Inspections

* Maintenance charge mode

This function automatically recharges the battery when the capacity has declined. It always monitors the decline of the battery capacity by self-discharge.

After starting the charging (Red Light ON), when the battery is close to full charging, the indicator will change to Green Light ON, and the status will automatically change to the maintenance charging mode (Green Light ON). After that, the Red Light and the Green Light will light up alternately to reduce the deterioration of the battery.

Note:

Remove the power plug to stop the main unit from charging. Then, remove the output terminal.

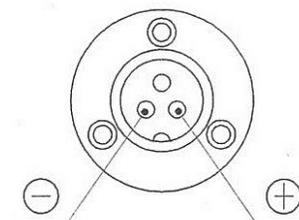
LED indication and charge status

CHARGE STATUS	CHARGE LED (RED)	FULL LED (GREEN)
No Charging	OFF	OFF
Charging	ON	OFF
Close to full-charge	OFF	ON
Error (⚠)	ON	ON

⚠ Refer to "5. Periodical inspections" when an error has occurred.

Note:

When starting the engine using a fully charged battery, if the starter does not rotate sufficiently, this may be due to battery deterioration. Please inspect or replace the battery.



E) Protective operations

- Input (primary side)
Protected from circuit errors by current fuse.
- Output (secondary side)
Protected from battery reverse connection and output short-circuiting by electronic circuit and circuit breaker.

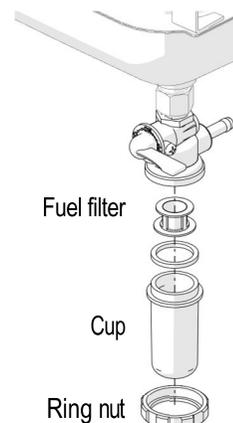
F) Inspection method when an error has occurred

Symptom	Cause	Measure *
Both red and green LEDs come on	Power cable is not connected correctly.	Check the connection status.
	The circuit breaker is open.	Pull out the power plug. After the body of the charger stops, remove the error cause, and close the circuit breaker after 60 seconds.
	The output connector is loose.	Insert the output connector all the way, and lock it securely.
The battery is obviously in discharged state, but the tickle charge mode starts immediately.	Battery is in the deteriorated state.	Replace the battery with a new one.
LED does not come on (both red and green)	Protective operation is activated.	Turn off the power and wait for 60 seconds. After that, charging the battery again.

5 Periodical Inspections

(3) Cleaning the fuel cock filter

- ① Close the fuel cock.
- ② Loosen and remove the ring nut with pliers.
- ③ Wipe off any debris in the cup with a cloth or the like.
- ④ Remove the filter attached to the ④➊ fuel cock main unit and wash it with gasoline.
- ⑤ Install the fuel cock securely to the original position. Be sure to open the ➊ fuel cock and inspect if there are no leaks.
- ⑥ After inspection, close the ➊ fuel cock.



(4) Replacement of the fuel in the tank

Storing fuel for a long period of time may result in poor starting performance and rust.
Replace with new fuel every 6 months.



Danger

- Keep fire away when refueling.
- There is a risk of ignition and explosion.

(5) Spark plug cleaning

Use [NGK BR8HIX] spark plugs.

Clean the spark plugs that are contaminated with exhaust gases and carbon.

- (1) Stop the engine to cool down sufficiently before working on it.
- (2) Remove the spark plug cap and spark plug using the spark plug box wrench.
- (3) Clean the outside, inside, and electrode of the spark plug.
- (4) Tighten the spark plug to the cylinder head and keep the spark plug cap pressed in.



Caution

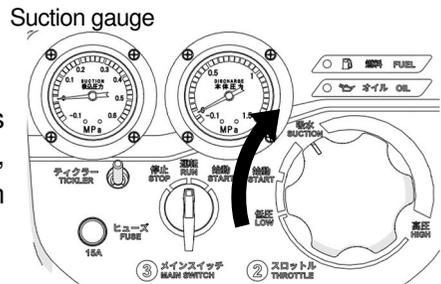
- Do not touch the ignition plug or high-voltage cord during operation.
- There is a risk of electric shock.

(6) Check the governor oil level

(See "4 Handling Methods (Preparation for Operation) 1.

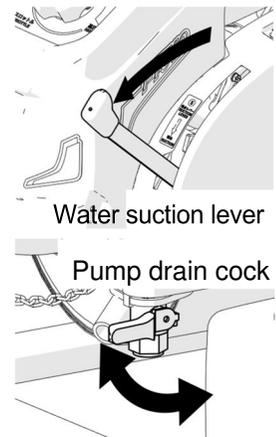
5 Periodical Inspections

- ⑤② Turn the throttle to the "suction" position and pull the ⑤ suction lever toward you to activate the vacuum pump. When the pointer of the ⑥ suction gauge reads -0.06 to -0.08 MPa, return the ⑤ suction lever, ② throttle to the "low pressure" position, and then stop the engine.
- ⑦ If there is no change in the indicated value of the suction gauge after leaving it for 1 minute, the vacuum performance is good.



- ⑧ Open the pump drain cock to release the vacuum and close the pump drain cock.

* If any abnormality is found, please consult your dealer.



(9) Water suction and discharge inspection

Suck and Discharge the water to inspect if there is no abnormalities found in each part of your pump

- (1) Are there any abnormal sounds?
- (2) Is there any water fall?
- (3) Is the water suction slow?
- (4) Are there any water leaks?
- (5) Is the startability good?
- (6) Are there any looseness in each part?
- (7) Are there any fuel leaks?
- (8) Other

*If any abnormality is found, refer to the "6 Troubleshooting" in the next section for appropriate treatments.

6 Troubleshooting

Daily inspection and maintenance are important to prevent fire-fighting pump malfunctions. Detect malfunctions at an early stage and perform maintenance immediately. If the trouble is not easily solved, or if the malfunction is not listed below, please consult the dealer where you purchased the pump, giving the model name and serial number.

1. Engine area

	Symptom	Cause	Action
Hard to Start	No fuel flow to carburetor.	1 Fuel cock filter or fuel line is clogging 2 Needle valve is sticking 3 There's no fuel.	1 Clean 2 Clean 3 Fill
	Fuel does not flow to combustion chamber (remove spark plugs to see)	1 Choke does not close (auto choke) 2 Rotational speed is low when starting. 3 Carburetor (needle valve, jet) is clogging	1 Repair and adjust 2 Replenish the battery 3 Clean
	Fuel goes to combustion chamber but does not start	1 Overflow (excessive fuel) 2 Tickler is overused (excessive fuel) 3 Choke does not open fully closed (auto choke) 4 Fuel is deteriorated 5 Water is mixed in the fuel. 6 Excessive lubricating oil	1 Inspect and adjust the carburetor 2 Drain the fuel from the seal at the crankcase. 3 Replace diaphragms and clean pipes. 4 Exchange. 5 Drain water 6 Adjust to the proper amount
	Abnormality of combustion system	1 Fuel cock filter is clogged 2 Carburetor valve seat is clogged 3 Carburetor is poorly adjusted, or there is a clog on the carburetor 4 Carburetor is poorly tightened.	1 Clean 2 Clean 3 Adjust or clean 4 Retighten
	Sparks are poor	1 Spark plug cap has damages, electrode gap is improper, or the spark plug is defective. 2 Leakage from high voltage cord 3 Leakage from spark plug cap 4 Defective ignition coil 5 Defective CDI unit 6 Poor rotation of the starting motor	1 Exchange 2 Exchange 3 Exchange 4 Exchange 5 Exchange 6 Replenish the battery

6 Troubleshooting

Symptom		Cause	Action	
Hard to Start	No sparks	<ol style="list-style-type: none"> 1 Short circuit of the ground wire 2 Spark plugs are damaged or stained. 3 Spark plug has gap failure 4 Ignition coil is defective 5 CDI unit is defective 6 Wiring connection is poor or disconnected 7 Main switch is defective 	<ol style="list-style-type: none"> 1 Repair the point short circuited 2 Exchange. 3 Exchange 4 Exchange 5 Exchange 6 Adjust the connection 7 Exchange. 	
	Poor compression	<ol style="list-style-type: none"> 1 Piston wear or seizure 2 Piston rings 3 Worn or damaged oil seals 4 Lack of lubricant 5 Damaged cylinder head gasket 	<ol style="list-style-type: none"> 1 Repair or replace 2 Exchange. 3 Exchange 4 Refill to the proper amount 5 Exchange 	
Poor running	Insufficient rotation	Combustion system error (mis-hunting)	<ol style="list-style-type: none"> 1 Carburetor main jet is clogged or misadjusted 2 Fuel cock filter clogged 3 Overflow 4 Poor installation of the carburetor 5 Icing 	<ol style="list-style-type: none"> 1 Clean or replace 2 Cleaning 3 Check and adjust the carburetor 4 Correct the place or replace. 5 Remove and add fuel tank drainage agent
		Abnormalities in the governor system	<ol style="list-style-type: none"> 1 Governor maladjustment 2 Governor operating parts wear 3 Defective caulking of flyweight 4 Poorly tightened governor arm 5 Governor spring tension failure 6 Governor lever ring hole worn or rattling large 	<ol style="list-style-type: none"> 1 Adjust 2 Exchange. 3 Correct or exchange 4 Readjust and retighten. 5 Exchange. 6 Replace or correct
		Cooling system abnormalities	<ol style="list-style-type: none"> 1 Cooling air is weak 	<ol style="list-style-type: none"> 1 Pay attention to the ventilation
		Other	<ol style="list-style-type: none"> 1 Overload 2 Muffler and exhaust port clogging 3 Inlet clogging 4 Defective spark plug 	<ol style="list-style-type: none"> 1 Change nozzle diameter or use safety nozzle 2 Remove the clog 3 Remove the clog 4 Exchange

6 Troubleshooting

		Symptom	Cause	Action
Poor running	Abnormal noise	Mechanical sound	<ol style="list-style-type: none"> 1 Flywheel is fixed loosely 2 Piston is worn, and tapping sounds come out from the piston skirt 3 Armature plate is contacting the other parts. 4 Foreign material is caught inside the crankcase and fan cover 5 Foreign material is caught inside the pump or impeller is touching the pump casing 6 Each part becomes loose 	<ol style="list-style-type: none"> 1 Retighten 2 Replace the piston 3 Reassemble 4 Remove the foreign material 5 Remove the foreign material or reassemble the pump 6 Retighten
		Knocking sound (combustion system abnormalities)	<ol style="list-style-type: none"> 1 Insufficient fuel (main jet or use of different diameter parts) 2 Overload 3 Rotation speed too low or too high 4 Different spark plug is used 	<ol style="list-style-type: none"> 1 Clean or replace 2 Open water discharge valve 3 Adjust to proper rotation speed 4 Replace with proper spark plugs

6 Troubleshooting

2. Pump

		Symptom	Cause	Action	
Water suction failure	A suction gauge does not have negative pressure	Abnormality on water pump side	<ol style="list-style-type: none"> 1 Poorly tightened suction pipe 2 Air suction from the tip of the suction pipe 3 Forgot to close the drain cock 4 Defective suction pipe packing 5 suction pipe fissure 6 Foreign matter caught in water discharge valve 	<ol style="list-style-type: none"> 1 Tighten securely 2 Put it completely underwater 3 Close securely 4 Exchange. 5 Exchange. 6 Remove foreign objects 	
		Abnormality on the vacuum pump side	No Rotation	<ol style="list-style-type: none"> 1 Internal freeze 2 Foreign object inhalation 3 Vacuum pump damaged 4 V Belt slip or breakage 	<ol style="list-style-type: none"> 1 Defrost 2 Remove foreign objects 3 Exchange. 4 Exchange.
			Rotating	<ol style="list-style-type: none"> 1 Clogged or poorly tightened vacuum passage 2 Strainer at the water shut-off valve is clogged 	<ol style="list-style-type: none"> 1 Clean or retighten 2 Clean
	The coupled meter becomes negative pressure	Vacuum leak (engine) Falling water when stopped)	Refer to "Water suction failure - compound meter does not become negative pressure - Water pump side abnormality"		
		No vacuum leakage	<ol style="list-style-type: none"> 1 Clogged suction pipe strainer or inside suction pipe 2 Air pocket in the suction pipe. 3 Suction height is too high, or the suction pipe is too long 4 Air suction from the tip of the suction pipe 5 Low engine speed at water suction 6 Short water suction operation time 7 Clogged or poorly tightened vacuum passage 8 Strainer at the water shut-off valve is clogged 	<ol style="list-style-type: none"> 1 Clean 2 Correct the layout 3 Keep the height within 8m 4 Put the tip completely underwater 5 Adjust to water suction rotation speed 6 Lengthen operation time 7 Clean or retighten 8 Cleaning 	

6 Troubleshooting

Symptom		Cause	Action	
Water Discharge Failure	Pressure does not increase	Abnormality on water pump side	<ol style="list-style-type: none"> 1 Clog in the suction pipe strainer or suction pipe 2 Air pocket in suction pipe 3 Suction height is too high, or the suction pipe is too long. 4 Air suction from the tip of the suction pipe 5 Poorly tightened suction pipe 6 Discharge valve half-open 7 Forgot to remove the safety nozzle (not necessary when the nozzle is attached) 8 Foreign matter in the nozzle 9 Frozen inside the pump 	<ol style="list-style-type: none"> 1 Clean 2 Correct the layout of the suction pipe. 3 Keep the height within 8m 4 Put the tip completely underwater. 5 Tighten securely 6 Open the valve completely 7 Remove 8 Remove foreign objects 9 Defrost and remove the ice
		Engine malfunction	Refer to 1. Engine – Hard to start and poor running	
	Other Abnormalities	<ol style="list-style-type: none"> 1 Muffler and exhaust port clogging 2 Air Inlet of the carburetor clogging 	<ol style="list-style-type: none"> 1 Remove the clog 2 Remove the clog 	

3. Electrical

Symptom		Cause	Action
Bad start	Starting motor does not rotate	<ol style="list-style-type: none"> 1 Insufficient battery capacity 2 Deterioration of the battery 3 Fuse burnout 4 The cable connection is loose or Disconnected 	<ol style="list-style-type: none"> 1 Recharge 2 Replace 3 Replace. 4 Check the cable connection and plug-in surely. Replace parts if necessary.
Battery failure	Batteries run out too quickly.	<ol style="list-style-type: none"> 1 Deterioration of the battery 2 Mistake in main switch operation. 3 Mistake in charge operation 	<ol style="list-style-type: none"> 1 Exchange. 2 Operate properly 3 Operate properly
Connection failure	Wiring burnout	<ol style="list-style-type: none"> 1 Battery reverse connection 2 Poor connection or short-circuit at the outlet terminal 3 Poor wiring connection or disconnection 4 Fuse burnout 	<ol style="list-style-type: none"> 1 Connect correctly 2 Connect correctly, or Repair or replace the short-circuited parts. 3 Correct the wiring or repair, or replace 4 Replace

6 Troubleshooting

Symptom		cause	treatment	
Defective wiring	Lamp does not light	1 Lamp blew out 2 Wiring is loose or disconnected	1 Replace 2 Correct the circuit, repair, or replacement	
Defective monitor lamp	All monitor lamps do not light up immediately after turning the main switch to operate	1 Battery capacity is not enough, or the battery is deteriorated. 2 Fuse burnout 3 Wiring is loose or disconnected	1 Recharge or replace 2 Replace 3 Correct the circuit, repair, or replacement.	
	The lamps do not light even if they should have lit up	Common & typical matters to be noticed	1 Loose or disconnected wiring of each sensor and switch	1 Correct the circuit, repair, or replacement
		Fuel	1 Switch is broken	1 Replace
		2-cycle oil	1 Switch is broken	1 Replace
Monitor lamp light up	Please refer to Section No. 3 – Monitor Lamp (P. 7) and cope with each matter displayed			

7 Specifications

1. Fire-fighting pump	
Model	FT510-A
Classification (JPN)	(B-2)
Notification No. (JPN)	(P0145001)
Dimension (L x W x H)	737mm x 572mm x 740mm
Dry Weight	90 kg
2. Pump	
Type	High-pressure 1-stage turbine pump (with inducer)
Discharge water volume	Normal 1.01 m ³ /min
	High pressure 0.64 m ³ /min
Pump pressure	Normal 0.70 MPa
	High pressure 1.00 MPa
Nozzle diameter	Standard 24.0 mm
	High pressure 17.5 mm
Rated rotation speed	5800 rpm
Water inlet	Nominal 75mm, Fire engine thread (JIS B 9912)
Water outlet	Nominal 65mm, Fire engine Thread (JIS B 9912)
3. Engine	
Type	Air-cooled, 2-cycle, inclined, 2-cylinder gasoline engine
Model name	E440C
Displacement	436mL
Authorized output	22.8 kW / 5800rpm
Fuel feeding system	Carburetor
Fuel type and tank capacity	Regular gasoline for automobiles - 14.5L
Lubrication system and tank capacity	Separate lubrication system (2-cycle oil) - 2L
Fuel consumption	Approx. 14L/h
Cooling system	Forced air-cooled
Ignition system	CDI ignition system
Starting system	Starting motor & recoil
Lighting	12V-35W (searchlight), 12V-3W (instrument panel light)
Spark plug	NGK BR8HIX

7 Specifications

4. Vacuum pump	
Type	Oilless type: 4-vane eccentric rotary type
Maximum Suction Height	Approx. 9 m
Drive system	V Belt clutch type
5. Accessories	
Battery	12V15Ah/5h
Charger	AC100V~AC240V – DC12V charger
Tools, etc.	1 x Tool kit, 1 x instruction manual 1 x Spark plug, 1 x safety nozzle
Pump cover	1 pc.
6. Optional parts	
Searchlight lamp	1 pc.
Searchlight stand	1 pc.



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SHIBAURA

OPERATION MANUAL

SHIBAURA FIRE-FIGHTING PUMP FT510-A



Please read this operation manual carefully to operate the Shibaaura Fire-fighting Pump safely and correctly. Incorrect operation of the pump may result in an accident. If this manual is missing or damaged, please order a new one from us or our agent promptly.

Shibaaura Fire Pump Co., Ltd.

- For safe use

Keep it in a safe place with the fire-fighting pump.

- Items marked with  in this instruction manual are particularly important for safe use and must be observed.

 Danger	The case when there is an imminent risk of death, serious injury, or the product is mishandled.
 Warning	The case when there is a risk of death or serious injury, or the product is mishandled.
 Caution	In cases when the product is mishandled, minor injuries or property damage may occur.

- Product specifications and appearance are subject to change without notice for improvement. Therefore, please note that the contents of this document and some of the photographs and illustrations may not correspond to the product.
- If you have any questions or difficulties after reading this manual, please contact the dealer where you purchased the product or our company.
- For inspection and maintenance, please contact a maintenance business or dealer that is qualified to service portable fire-fighting pumps.

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1 Things you must follow for your safety

1. Warning Label Locations



Part No.L82900900



Part No.290192430



Part No.290192770



Part No.290192410



Part No.290192400



Part No.290192400

- If the contents of the label become difficult to see or the label is about to come off, replace it immediately.

1 Things you must follow for your safety

2. Caution Marks

Danger

- Do not suck in or discharge the substances other than water, such as flammable materials, drugs, or chemical liquid.
- There is a risk of explosion, fire, burns, poisoning, etc.

- Keep fire away when refueling.
- Do not overfill fuel into the tank.
- If the fuel is spilled, wipe it up immediately. Keep the wiping cloth away from fire.
- Refill the fuel after the engine has cooled down.
- Do not use fire to defrost the pump.
- There is a risk of ignition and explosion.

Warning.

- Fire-fighting pumps should be operated by firefighters, voluntary disaster prevention team members, maintenance and inspection personnel, and others who have been trained specifically for safe operation.
- Misuse or mishandling may result in serious accidents, including death.

- No neck wraps, ties, waist towels, etc., are allowed. Wear helmets, non-slip shoes, and no loose-fitting clothing.
- There is a risk of getting caught in the machine or slipping and falling, resulting in injury.

- Do not operate a fire-fighting pump if you are unable to concentrate on your work due to alcohol consumption, tiredness, illness, or the effects of drugs.
- This could lead to a serious accident.

- Use only genuine parts or specified attachments. No modifications are allowed.
- Failure to do so may result in accidents, injuries, or machine malfunctions.

- Install at least 3 m away from combustible materials.
- Remove flammable materials, such as dry grass, before installation.
- Exhaust fumes and heat from the muffler may cause a fire.

- Do not install indoors or in tunnels with poor ventilation.
- There is a risk of exhaust gas poisoning.

- Be sure to install the cover when operating.
- There is a risk of injury or burns.

- Be sure to close the recoil starter during operation.
- There is a risk of getting caught in pulleys or belts, or of getting cut yourself.

- Keep fire away from the battery.
- There is a risk of fire and explosion.

- Remove packing materials from the battery charger before charging.
- There is a risk of fire.

- Be sure to carry out periodic inspections. Operate and discharge the water at least once a month to check for any abnormalities.
- Accidents may occur due to damage, etc., and fire-fighting activities may be hindered.

1 Things you must follow for your safety

Caution

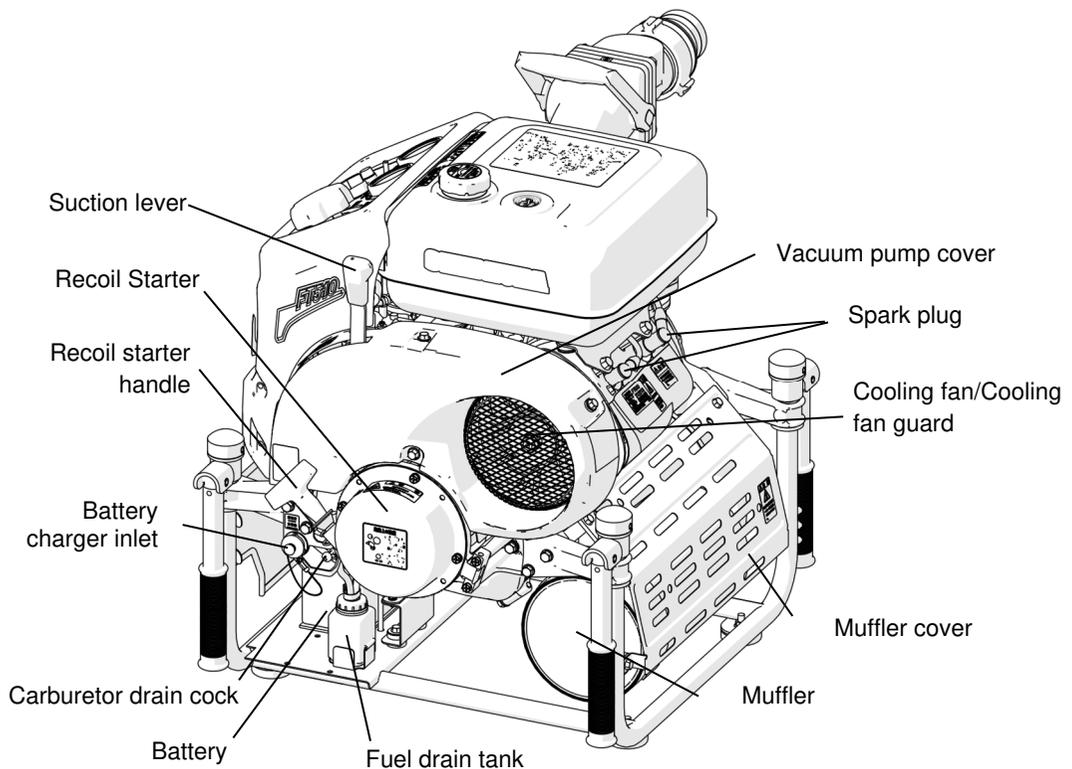
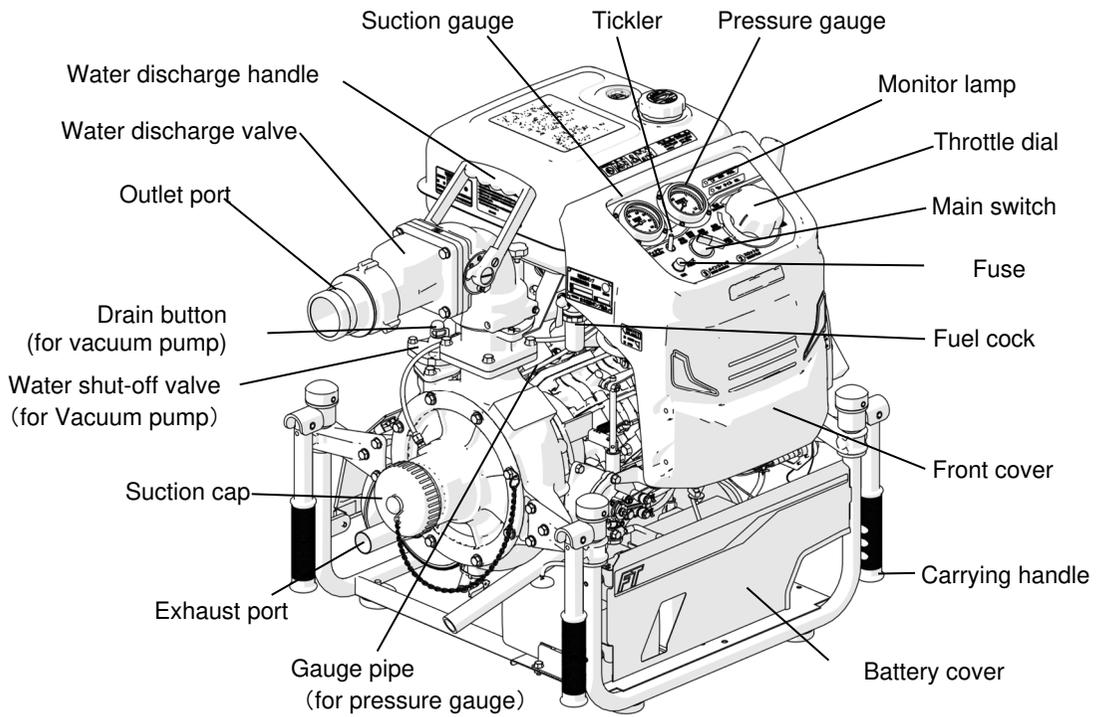
- Do not use fire-fighting pumps for activities other than fire-fighting, such as civil engineering, irrigation, water sprinkling, etc.
- There is a risk of hitting some objects and injuring people or damaging property around you.
- When disposing of batteries, oils, etc., please entrust disposal to a specialized industrial waste disposal contractor.
- It may cause fire, burns, or pollute the environment.
- Do not put fingers or hands in the water discharge valve.
- There is a risk of injury.
- After refueling, tighten the fuel tank cap securely.
- There is a risk of ignition and explosion.
- Check the fuel once a month, and if the fuel has a pungent odor or is cloudy, replace it with new fuel immediately.
- This may cause engine malfunction or equipment failure.
- When adding two-cycle oil, always use the same brand and grade of oil.
- Avoid entering water or debris when refilling the two-cycle oil.
- This may cause engine malfunction or equipment failure.
- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.
- When replenishing the governor oil, add the same brand and grade of oil.
- Avoid entering water or debris when refilling the governor oil.
- This may cause engine malfunction or equipment failure.
- When holding the carrying handle, do not touch the joint parts.
- Failure to do so may result in injury from pinching fingers.
- When carrying or loading/unloading the fire-fighting pump, four people should do so.
- Dropping it on your foot may cause injury or back pain.
- Connect the fire hose securely and always ensure it cannot be disconnected.
- If it is pulled out during water discharge, there is a risk of injury.
- Lay out the fire hoses without folds, twists, or sharp turns.
- There is a risk of the water hose springing up and causing injury.
- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.
- When starting with a recoil starter, avoid getting clothing or gloves caught.
- There is a risk of injury.
- When starting with the recoil starter, keep people at least two meters away from the starter.
- There is a risk of injury to elbows from being knocked by recoil ropes.

1 Things you must follow for your safety

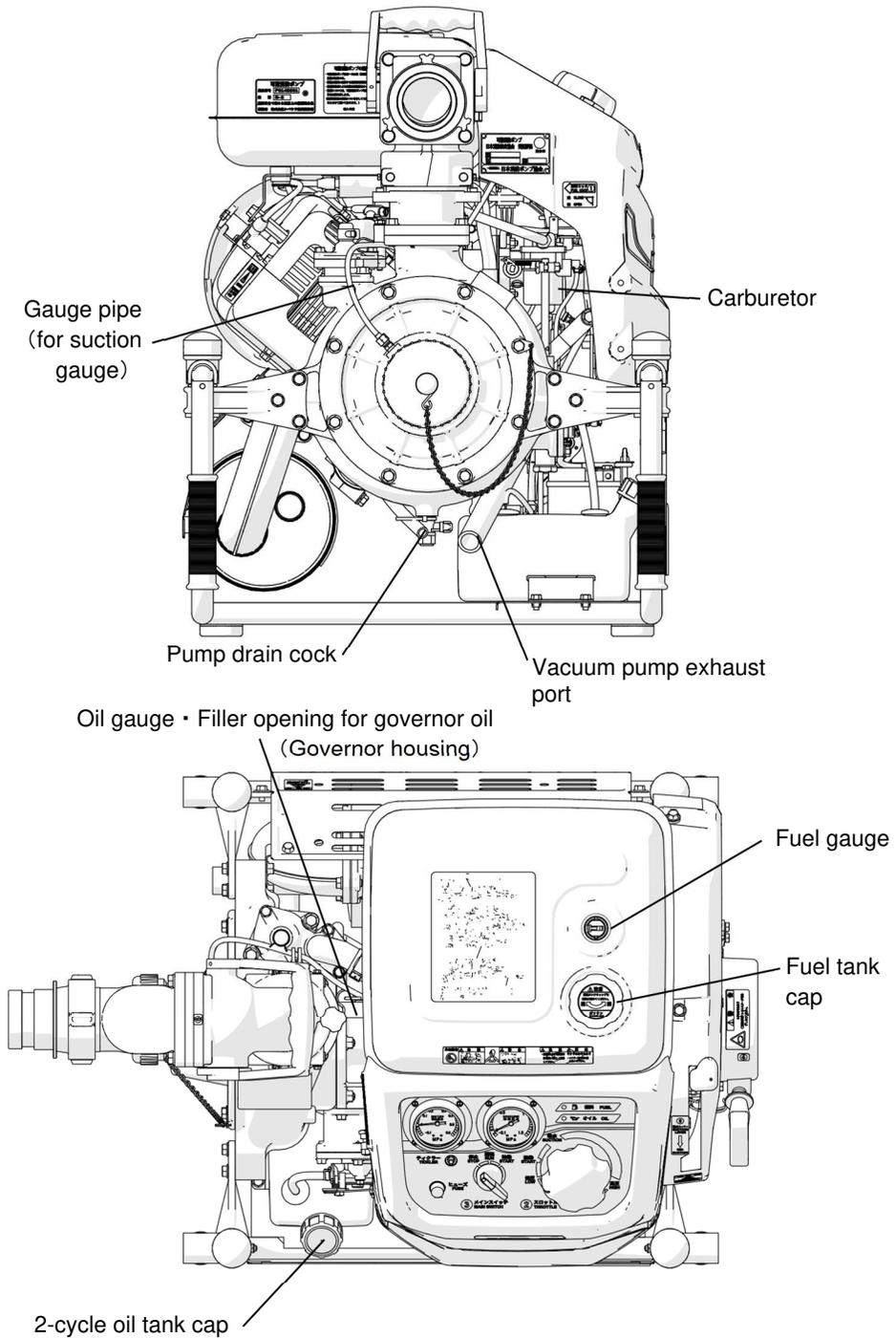
Caution

- Always return the throttle to the "LOW" position before opening and closing the water discharge valve.
- Hold the fire nozzle firmly and discharge water.
- There is a risk of injury because the fire nozzle runs away.
- Operate the water discharge valve slowly.
- There is a risk of injury from pinching or bumping hands.
- Do not aim the water at people or peer into the nozzle.
- High water pressure may cause them to be blown away, resulting in injury.
- Do not touch the spark spark plug or high-voltage cord during operation.
- There is a risk of electric shock.
- Never touch the muffler and exhaust pipe during and after operation since they become very hot.
- There is a risk of burns.
- While operating, be careful not to have the suction pipe or hose stepped on by vehicles or other objects.
- Accidents may occur due to damage, etc., and fire-fighting activities may be hindered.
- Do not start the engine with the water discharge valve handle open.
- When discharging water, the engine operator should communicate with the operator at the nozzle. Do not open the water discharge valve without notice or accelerate the throttle rapidly.
- There is a risk of injury from being blown away by the high-pressure water.
- Inspection and maintenance should be performed after the engine has been stopped and cooled down sufficiently.
- Failure to do so may result in injury, burns, or fire.
- Read the instruction manual that comes with the battery and the information on the battery itself carefully to ensure that the battery is used correctly.
- When disconnecting the battery cord, remove the (-) cord first, and when installing the battery cord, connect the (+) cord first.
- Short-circuiting may cause fire or burns.
- Do not use the charger in high-temperature places such as under direct sunlight or near heating elements, in extremely humid places, or wet areas such as rain or snow.
- There is a risk of overheating, burnout, or damage to the charger, or leakage of electricity or electric shock.
- The charger should be installed in a dry, well-ventilated location that is not wet.
- Failure to do so may cause electric shock or fire.
- Do not charge the battery with a charger other than the specified one.
- There is a risk of fire due to heating or burnout of the wiring.
- When operating without attaching the suction pipe (e.g., to check the vacuum level), attach the suction cap.
- There is a risk of getting caught in the machine or injured.
- Do not close the nozzle or water discharge valve while multiple pumps are relayed and the water is discharged.
- Abnormally high pressure may result in damage to the pump and hoses.

2 Name of each component



2 Name of each component



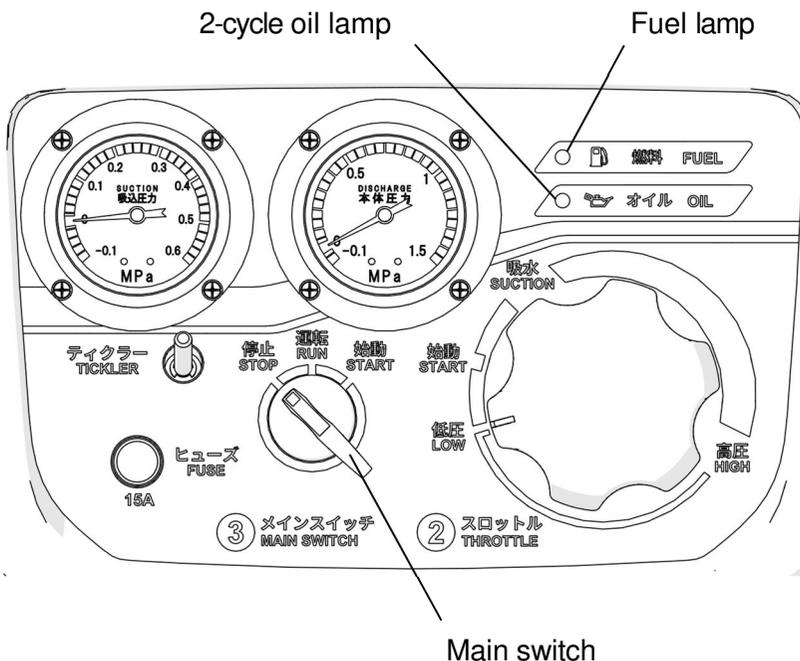
3 Monitor lamp

The pump with a starting motor activates when the main switch is turned into the "Run" position. When the power is turned on, two lights illuminate at the same time. If they do not light up, the battery voltage is insufficient, or there is a faulty circuit, the pump needs to be repaired. All lights are turned off after a few seconds.

All lights are turned off during water discharge, but the lights are turned on when operating the starting motor. It is because the battery voltage drops. Be sure to inspect or maintain when the following items are lit up.

Display	Feature	How it works	Measures
 fuel	Indicates that the fuel must be added	Lights up when the remaining fuel in the tank is low.	Refill the regular gasoline.
 2-cycle oil	Indication of when to refill 2-cycle oil	Lights up when the remaining oil in the tank is low, then stop the engine.	Refill the 2-cycle oil.

If the monitor lamp still illuminates or blinks after following the measures above, consult your dealer.



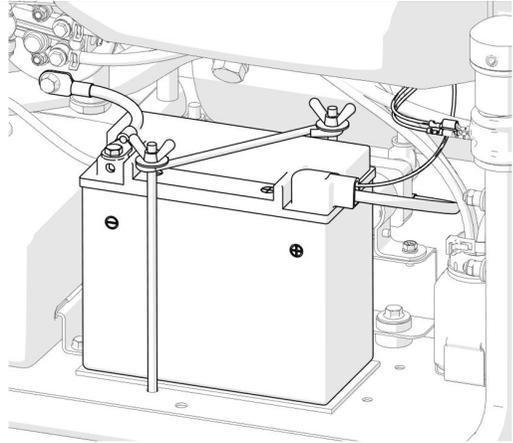
4 Handling method (Before)

Installing Battery

Caution

- Read the instruction manual that comes with the battery and the information on the battery itself carefully to ensure that the battery is used correctly.

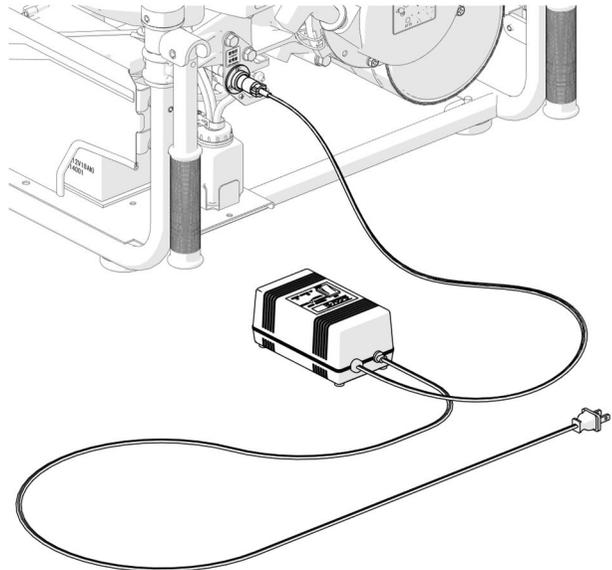
- (1) For handling, be sure to follow the battery instruction manual.
- (2) Fix the battery to the bed with two rods and one holder.
- (3) Firstly, connect two battery (+) cables (red), then connect one (-) cable (black) . Be sure to keep the connecting order.



Caution

- When disconnecting the battery cable, remove the (-) cord first, and when installing, connect the (+) cable first.
- Short-circuiting may cause fire or burns.

- (4) Connect the supplied charger to a charger inlet to charge the battery. (See "5 Periodic Inspection 2. Inspection Method (2) Handling of Fully Automatic Charger" on p. 29.)



4 Handling Method (Preparation for Operation)

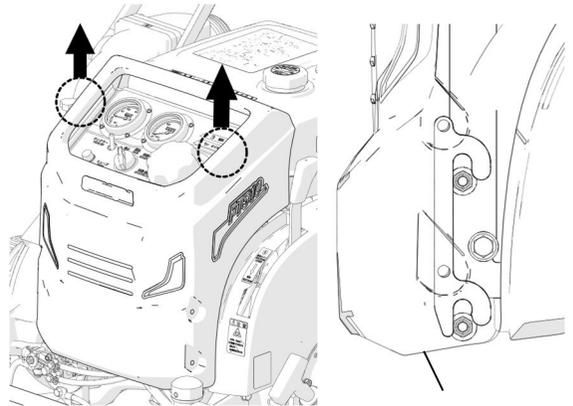
1. Removing and attaching covers

When removing the cover, follow the procedure below.

(1) Removing/attaching front cover

Hold the circled places on the illustration on the right. Shift it upward first, and then remove it toward you.

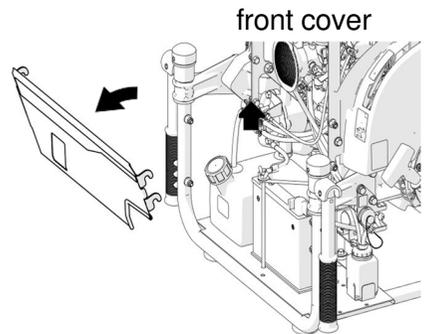
Installation is the reverse procedure.



(2) Removing and attaching the battery cover

Slide the battery cover upward first, and then remove it toward you.

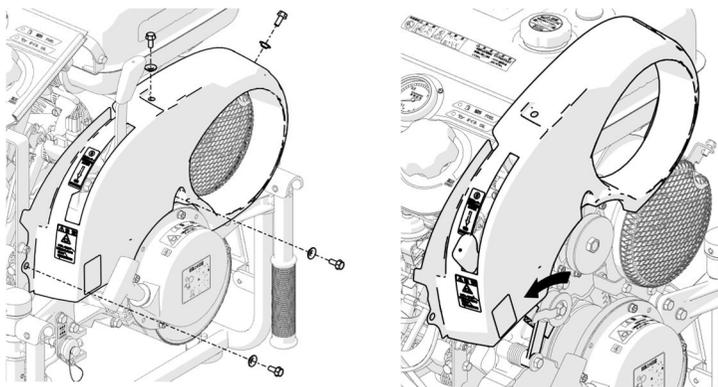
Installation is the reverse procedure.



(3) Removing and attaching vacuum pump cover

Remove the four bolts and collars. Pull the water suction lever toward you and remove it through the lever opening of the vacuum pump cover.

Installation is the reverse procedure.



Warning

○ Be sure to attach the cover when driving.

● There is a risk of injury or burns.

4 Handling Method (Preparation for Operation)

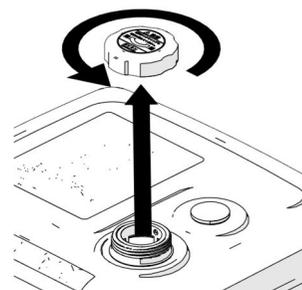
1. Replenishment

(1) Fuel

(Fuel tank capacity: approx. 14.5L)

Fill the tank with regular gasoline until the fuel gauge indicates "F".

Do not add gasoline mixed with two-cycle oil or bio-gasoline.



Danger

- Keep fire away when refueling.
- Do not overfill fuel into the tank.
- If the fuel is spilled, wipe it up immediately. Keep the cloth away from fire.
- Refill the fuel after the engine has cooled down.
- There is a risk of ignition and explosion.
- Hold the nozzle firmly and discharge water.
- There is a risk of injury due to swinging of the discharge nozzle.

Caution

- Tighten the fuel tank cap securely after refueling.
- There is a risk of ignition and explosion.

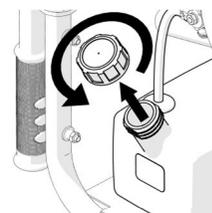
Caution

- Check the fuel once a month, and if the fuel has a pungent odor or is cloudy, replace it with new fuel immediately.
- This may cause engine malfunction or equipment failure.

(2) Engine oil

(Oil tank capacity: Approx. 2L).

Fill the 2-cycle oil into the oil tank at the bottom of the fire-fighting pump.



Caution

- When refilling the 2-cycle oil, use the same brand and grade of oil.
- Do not allow water or debris to enter when refilling.
- This may cause engine malfunction or equipment failure.

Caution

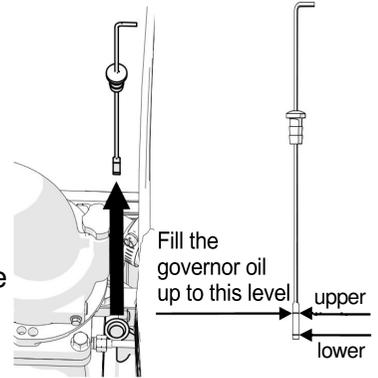
- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.

4 Handling Method (Preparation for Operation)

(3) Governor oil

(1) Place the pump on the level place and check the governor oil level with an oil gauge.

- Remove the governor oil level gauge and check the oil level. Refill the oil to the original level when the oil level has become in the middle or lower. Put back the oil gauge after refilling. Do not replenish more than the upper limit.
- If the oil is very dirty or cloudy, consult your dealer.
- Recommended oil (Automotive engine oil) SAE:10W-30(API:SJ)



Caution

- When replenishing governor oil, add the same brand and grade of oil.
- Do not allow water or debris to enter the oil inlet when refilling.
- This may cause engine malfunction or equipment failure.

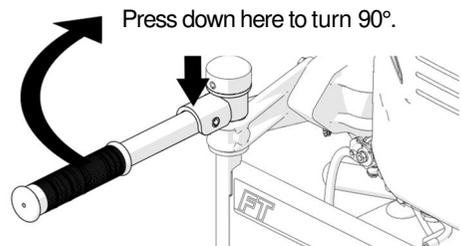


Caution

- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.

2. Carrying the pump

Hold the transport handle correctly when moving and loading/unloading the fire-fighting pump.
The carrying handle can be turned 90 deg.



Caution

- When holding the carrying handle, do not touch the bend.
- Fingers may be pinched, resulting in injury.

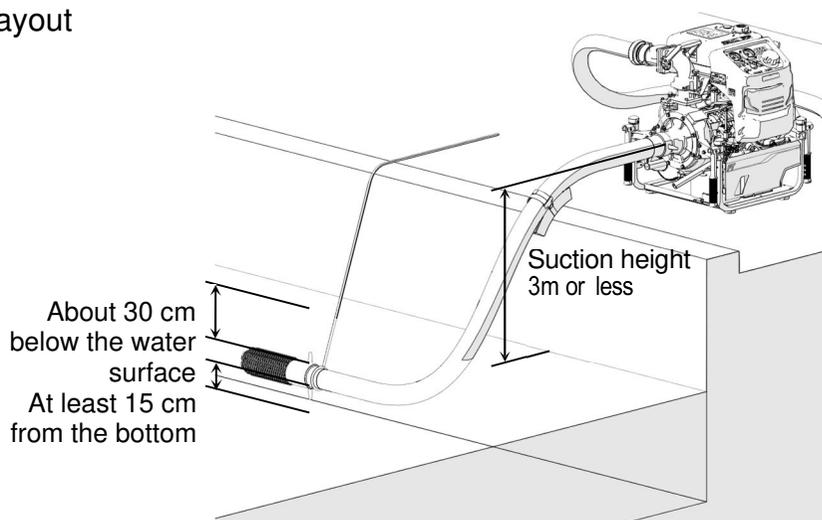


Caution

- 4 people is necessary to carry the pump.
- Dropping it on your foot may cause injury or back pain.

4 Handling Method (Preparation for Operation)

3. Pump layout



- (1) Check the water source. Make sure that there will be no problems with use, such as no decay, floating matter, or sediment.
- (2) Place the pump close to the water source and on a level surface.



Warning

- Avoid installation in places with poor ventilation, such as indoor, in a vehicle, tunnel. There is a risk of exhaust gas poisoning.



Warning

- Place at least 3 m away from combustible materials.
- Remove dead grass and other flammable materials before setting.
- Exhaust fumes and heat from the muffler may cause a fire.

- (3) Keep the suction height below 3m as much as possible to avoid falling water because of the reduction of the pump capacity.
- (4) Lay out the suction hose with no bends or bumps and fasten it tightly to the suction inlet port. Ensure the level of the inlet port side is higher than the suction hose tip at the water source side.
- (5) Always attach a strainer and basket to the suction port of the suction hose and keep it below the water surface to prevent air sucking in. Place the tip about 30 cm above the bottom. If the tip of the device is 15 cm or more away from the bottom. Place a straw mat to prevent sediment from being sucked into the device. If the water source has algae, watergrass, etc., remove them around the water inlet.
- (6) Connect the fire hoses securely and lay them out. Be sure not to fold.

4 Handling Method (Preparation for Operation)



Caution

- Connect the fire hose securely and always ensure it cannot be disconnected.
- If it is pulled out during water discharge, there is a risk of injury.



Caution

- Lay out the fire hoses without folds, twists, or sharp turns.
- There is a risk of the water hose springing up and causing injury.

4. Pump user

- (1) Fire-fighting pumps are small but high-performance machines with strong power. Improper use may cause serious accidents, including death.



Warning

- Fire-fighting pumps should be operated by firefighters, voluntary disaster prevention team members, maintenance and inspection personnel, and others who have been trained specifically for safe operation.
- Misuse or mishandling may result in serious accidents, including death.

- (2) Wear clothing appropriate for the operation.



Warning

- No headbands, neck wraps, ties, waist towels, etc., are allowed. Wear helmets, non-slip shoes, and no loose-fitting clothing.
- There is a risk of getting caught in the machine or slipping and falling, resulting in injury.

- (3) Do not operate if you are not feeling well.



Warning

- Do not operate fire-fighting pump if you are unable to concentrate on your work due to alcohol consumption, tiredness, illness, or the effects of drugs.
- This could lead to a serious accident.

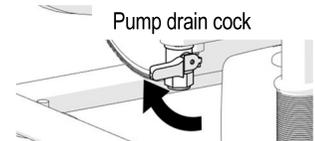
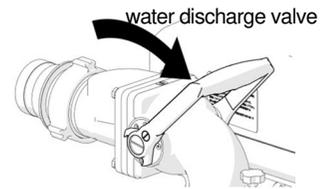
4 Handling method (Operation)

1. Starting the engine

Close the ⑥ water discharge valve and pump drain cock before starting the engine.

Please be sure to check the following

Follow the operating instructions in the order of ❶ to ❹ numbers on the unit.



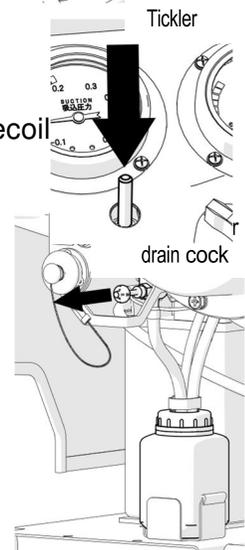
(1) Open the ❶ fuel cock.

Move the fuel cock lever straight down to "Open" ❶ to open the fuel cock.



(2) In cold weather, use the tickler in the carburetor.

- If it is difficult to start the engine with auto-choke alone in cold weather, press the tickler for 2 to 3 seconds.
- Press the tickler for 2 to 3 seconds when starting with the recoil starter and the engine is cold.
- If you use tickler for multiple times and the engine does not start, close the ❶ fuel cock, drain fuel from the carburetor drain cock, then start the engine.
- If the engine does not start properly due to excessive fuel, such as when restarting after warm-up, close the fuel cock, open the carburetor drain cock, and drain the gasoline from the carburetor before starting the engine. After starting, turn the fuel cock "open". If the car stops, start the car again.



*Remove and dispose of the fuel in the drain tank every time.

Fuel drain tank

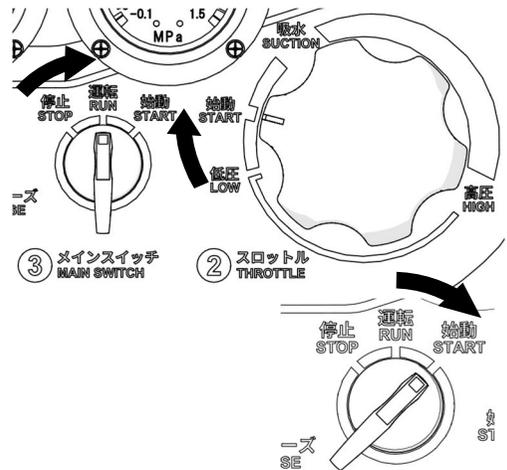


Caution

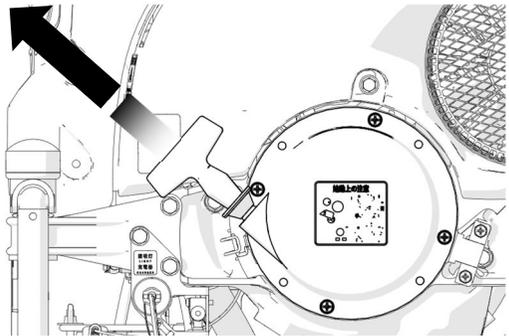
- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.

4 Handling method (Operation)

- (3) Turn the ② throttle to the "start" position.
 (4) Turn the main switch to the "run" position.
 When starting the starter motor, turn it to the "START" position. The starter motor works, and the engine starts.
- Once the engine is started, set the ③ main switch to the "operation" position.
 - Stop the starter motor for at least 5 seconds after running it for 3 seconds. Continuous operation will cause deterioration of the battery and the starter motor.



- (5) For recoil starting, pull the ④ recoil starter handle out to the point where it is slightly heavy, then pull quickly and sharply.



Caution

- When starting with a recoil starter, avoid getting clothing or gloves caught.
- There is a risk of injury.



Caution

- When starting with the recoil starter, keep people at least two meters away.
- There is a risk of injury to the elbows from being knocked by recoil ropes.



Warning

- Be sure to close the recoil starter during operation.
- There is a risk of getting caught in pulleys or belts, or of cutting yourself.

4 Handling method (Operation)

2. Suction

- (1) Turn the ② throttle to the "suction" position after starting the engine.
- (2) Pull the ⑤ suction lever toward you to activate the vacuum pump and suction water.
 - Promptly return the ⑤ suction lever when the pressure gauge needle swings and the pressure increases and stabilizes.
 - Keep the vacuum operation time less than 30 seconds.

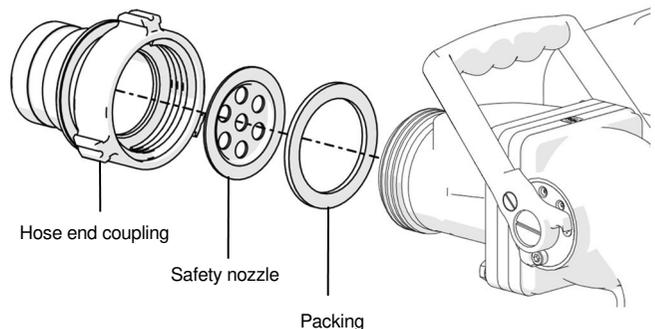


3. Water discharge

Before discharging water, check the safety of the nozzle. Give a signal to the person at the nozzle to start discharging water.

- (1) ⑥ Operate the water discharge handle gradually in the "→Open" direction until it stops. Turn the throttle to the desired water pressure level. Adjust the pressure with the ② throttle according to the water discharge conditions.
 - Be careful not to use too high a water discharge pressure or to open or close the ⑥ water discharge valve handle too rapidly, which may cause the water discharge hose to swing.
- (2) Standby for water discharge
 - To close the ⑥ water discharge valve and put the machine in standby mode during water discharge, ② turn the throttle to the "low pressure" position and stop the engine. In this case, the check valve will operate and water will not fall, so restart the engine and open the ⑥ water release valve to re-discharge water. (However, restarting must be done within 3 minutes.)
 - If it is necessary to stand by without stopping the engine, be sure to put the ② throttle in the "low pressure" position.
- (3) The case when discharging water without using a nozzle

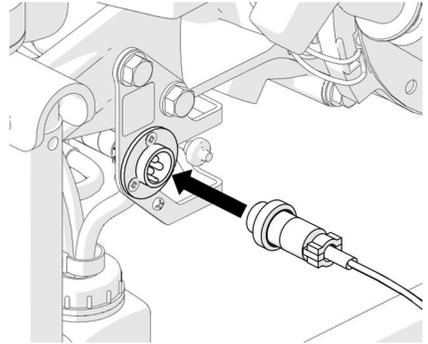
- When operating without using the nozzle, such as pumping water from a water tank or pumping water to a relay tank, be sure to set the attached safety nozzle between the hose end coupling and the water discharge valve, as shown in the figure.



4 Handling method (Operation)

(4) To turn on the searchlight

- To turn on the searchlight, plug the searchlight into the charger inlet on the recoil side.



Caution

- Always return the throttle to the "LOW" position before opening and closing the water discharge valve.
- Hold the nozzle firmly and discharge water.
- There is a risk of injury due to swinging of the discharge nozzle.

Caution

- Operate the water discharge valve slowly.
- There is a risk of injury from pinching or bumping hands.

Caution

- Do not aim the water at people or peer into the nozzle.
- High water pressure may cause them to be blown away, resulting in injury.

Caution

- Do not touch the spark plug or high-voltage cord during operation.
- There is a risk of electric shock.

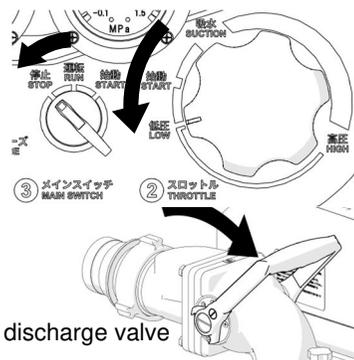
Caution

- Never touch the muffler and exhaust pipe during and after operation since they become very hot.
- There is a risk of burns.

4 Handling method (Operation)

4. Stopping the engine

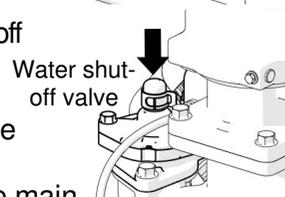
- (1) ② Turn the throttle to the "LOW" position.
 - If the engine is hot, run the engine at low speed for about 1 minute to cool it down.
- (2) Close the ⑥ water discharge valve handle by operating it in the "→ close" direction.
- (3) ③ Turn the main switch to the "STOP" position. The engine will stop.



5. Draining water

After the operation, a large amount of water remains inside the pump. This remaining water may cause corrosion and freezing cracks during cold weather. Be sure to drain water before storing.

- (1) Open the pump drain cock.
- (2) Open and close the ⑥ water release valve, press the water shut-off valve drain button, and drain completely.
- (3) Close the pump drain cock and install the water inlet cap.
- (4) Start the engine and pull the ⑤ suction lever to activate the vacuum pump for approximately 5 seconds.
- (5) ② Turn the throttle to the "low pressure" position, ③ Turn the main switch to the "stop" position and stop the engine.
- (6) Open the pump drain cock and remove the water inlet cap to confirm that it is completely drained. If drainage is insufficient, repeat steps (3) to (5).
- (7) Close the pump drain cock and install the water inlet cap.



Treatment after using seawater or muddy water

If seawater or muddy water is used, be sure to operate the pump by discharging water with clean water for at least 5 minutes to clean the inside of the pump. Also, to clean the inside of the vacuum pump, operate the vacuum pump for about 5 seconds by pulling the ⑤ suction lever while discharging water at low pressure, and drain clean water from the vacuum pump exhaust hose. After cleaning is complete, be sure to drain the water using the operation described in the previous section "5".

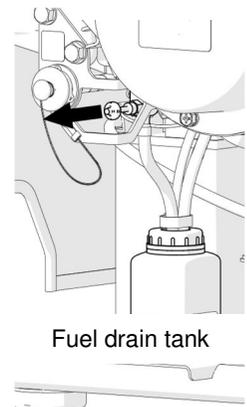
4 Handling method (Operation)

6. Storing the pump

- (1) Store in a dry, temperature-controlled area, away from dust and direct sunlight.
- (2) Wipe off oil, dust, and dirt and keep clean.
- (3) Fill the fuel up to the "F" level when storing. ●Close the fuel cock.
- (4) Fill the specified amount of 2-cycle oil.
- (5) Drain the fuel in the carburetor from the carburetor drain cock, on the recoil starter side.
*Make sure to remove the fuel inside the fuel drain tank every time.
- (6) Please charge the battery with the supplied charger while in storage.
(See "5 Periodic Inspection 2. Inspection Method (2) Handling of Automatic Charger" on p. 29)
- (7) Cover the pump with the attached pump cover.



Carburetor drain cock



Fuel drain tank

- Before storing the pump, be sure to check that the water inside is completely drained. Also, fill the pump with antifreeze to prevent freezing when storing the pump in cold weather (see "4 Handling Methods" Operation in Winter and Cold Weather, on P. 20)
- Operate and discharge water for 5 to 10 minutes at "HIGH" throttle position every month.
- Check the fuel in the fuel tank once a month, and if there is a pungent odor or cloudiness, replace the fuel with new fuel. The recommended replacement time is 6 months after refueling.
- If the vehicle has been in storage for a long period of time without a monthly periodic inspection, operate the pump for 1 minute at "LOW" position to warm up the engine. Be sure to inspect visually to see if there are any abnormalities.



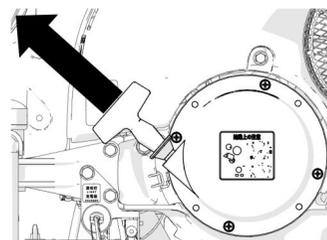
Caution

- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.

4 Handling Method (Operation in Winter and

1. Before starting the engine

- (1) In cold weather, battery capacity is significantly reduced. Please be sure to charge regularly.
- (2) ● Gently pull the recoil starter handle and check that the pump turns.
 - If it does not turn, the pump may be frozen. Pour the warm water into the pump from the suction port or defrost it in a warm room.



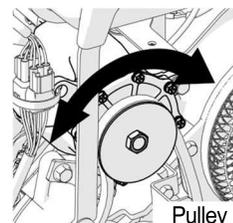
Recoil starter handle

- (3) Remove the vacuum pump cover.

(See "4 Handling Methods (Preparation for Operation)"

1. Removing and attaching the covers, on page 9 .)

- Turn the vacuum pump pulley by hand and check if the vacuum pump turns.
- If it does not turn, the vacuum pump may be frozen.
Blow warm air outside the vacuum pump or defrost in a warm room.



Pulley



Danger

- Do not use fire to defrost the pump.
- There is a risk of ignition and explosion.

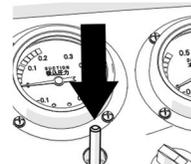


Caution

- Inspection and maintenance should be performed after the engine has been stopped and cooled down sufficiently.

2. Starting the engine

- (1) In cold weather, press the tickler for 2 to 3 seconds.
- (2) Immediately after the engine starts, operation may be unstable; run the machine idle at low speed for 1 to 2 minutes.



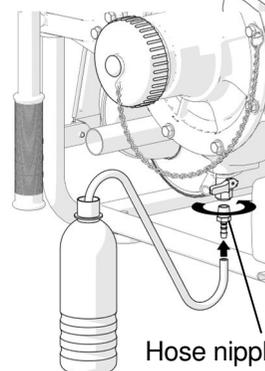
3. Treatment after water discharge (freeze prevention)

- (1) Preventing pumps from freezing (how to add antifreeze)

- ① Drain the water.

(Refer to "4 Handling Method (Operation) 5. Draining water)

- ② Close the water suction cap.
- ③ Attach the hose nipple and hose to the pump drain cock and place the hose in a bottle filled with antifreeze



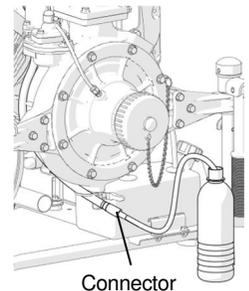
Hose nipple

4 Handling Method (Operation in Winter and

- ④ Start the engine.
- ⑤ ② Turn the throttle to the "SUCTION" position.
- ⑥ ⑤ Pull the suction lever to create a vacuum state inside the pump.
- ⑦ Open the pump drain cock to suck in antifreeze.
- ⑧ Pull the ⑤ suction lever again, and when antifreeze comes out of the vacuum pump exhaust port, return the ⑤ suction lever.
- ⑨ Remove the hose and hose nipple from the pump drain cock.
- ⑩ Pull the ⑤ suction lever and stop the engine when the antifreeze stops coming out of the vacuum pump exhaust port.
- ⑪ After collecting antifreeze from the pump drain cock, close the drain cock.

(2) Preventing the vacuum pump from freezing (how to fill the vacuum pump with antifreeze)

- ① Connect the connector and hose to the water shut-off valve drainpipe and place it in a container of antifreeze.
- ② Start the engine.
- ③ Set the ② throttle to the "SUCTION" position.
- ④ Pull the ⑤ suction lever and suck in the antifreeze.
- ⑤ If antifreeze comes out of the vacuum pump exhaust port, return the water suction lever.
- ⑥ Remove the connector and open the pump drain cock.
- ⑦ Pull the ⑤ suction lever, and when the antifreeze stops coming out of the vacuum pump exhaust port, return the ② throttle to the "LOW" position and stop the engine.
- ⑧ Close the pump drain cock.



(3) Antifreeze should also be injected into water discharge valves and hose couplings.

CAUTION: Do not use alcohol to prevent freezing, since it will damage the rubber seals. Collect drained antifreeze in a liquid container.

4. Precautions for storage

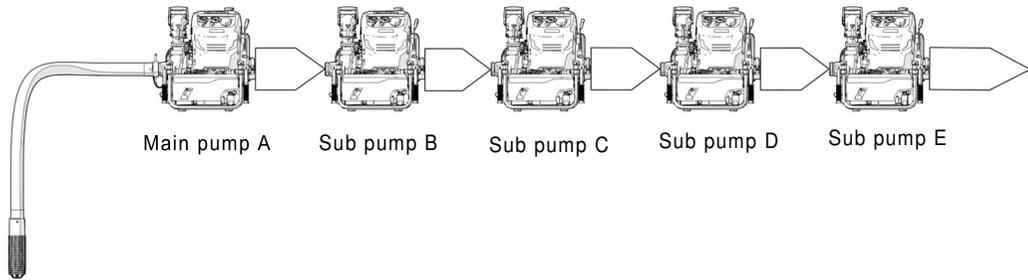
Choose the fuel with good quality. (The better quality of gasoline is highly volatile, and has better starting performance.)

- (1) Be sure to always have antifreeze on hand.
- (2) Batteries may freeze when the relative density of electrolyte becomes low. Be sure the battery is always recharged. If battery performance deteriorates, replace the battery as soon as possible.

4 Handling method (Relaying water with multiple pumps)

In the case of forest fires or urban fires where the water supply is far away, two or more pumps may be connected in series to relay water. The relay water requires different operations and special attention compared to normal operation because each pump is located far from the others. Daily training is also necessary to enable judgment and activities based on the state the pump's operators are facing. See the general method of relay operation below.

Figure 1.



1. Setting Locations

- (1) The number of units and their locations should be determined based on the number of hoses and the height of the water source.
- (2) Install a relay coupling to the suction port of sub-pumps (B to E in Figure 1), to connect the fire hose.
In this case, the automatic relay valve, "Direct Valve" can prevent accidents caused by sudden pressure fluctuations and high-pressure water.
- (3) The wye-valve is also recommended to be attached to the discharge port.
(The hose couplings that connect each pump may not be removed even after the discharge operation, because of the water pressure inside the fire hose.)

2. Operation Method (*An operator is required for every pump.)

- (1) Open the water discharge valves of the sub-pumps (B to E) beforehand.
Be sure to open the variable nozzle when it is attached to the fire hose.
- (2) Operate the main pump (A) and discharge water as usual.
- (3) Send water to the original pump first and then to others sequentially.
- (4) Check the pressure scale in the sub pump (E) and increase the engine speed to regulate the discharging water by controlling the throttle of the sub-pumps (B to E)
The sub pump (B to E): Should be more than 0.05MPa in a scale of suction gauge pressure, be less than 1.2MPa in a scale of power.
- (5) If there is not enough power of water discharge at the nozzle, turn the throttle dial of the original pump (A) to "HIGH" position gradually, then the turn the throttle dial of sub-pump, from the one closer to the original (from B to E), sequentially.
- (6) When stopping water discharge, turn the throttle dial of the last pump, the one close to the nozzle (E), to "LOW" position first and stop gradually (from E to B).
Stop the water supply from the main pump. When the supply of water from the main pump has been stopped, close the water discharge valve of each pump.

4 Handling method (Relaying water with multiple pumps)



Caution

- Do not close the nozzle or water discharge valve while multiple pumps are relayed and the water is discharged.
- Abnormally high pump pressure may result in damage to the pump and hoses.

1. Suction and discharge from water hydrant

The capacity of water supply from the fire hydrant

It is necessary to check the sufficient volume of water for discharging from the fire hydrant in advance.

It would depend on several factors, such as the diameter of the hydrant, the condition of the piping, the initial water pressure, and others.

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 could have high capacity for water supply with wider diameter despite low water pressure.

Water supply method

- (1) Be sure to open and close the hydrant's valve and release water to remove the foreign objects, such as sand, before connecting the hose to the hydrant.
- (2) Connect the water hydrant and pump. Use a suction hose that can endure the water supply pressure. The supply pressure limit for the suction hose with a nominal diameter of 65mm is 0.9 MPa. The suction hose for connection to the hydrant should be inspected periodically to avoid any damage.

How to check and adjust water supply pressure

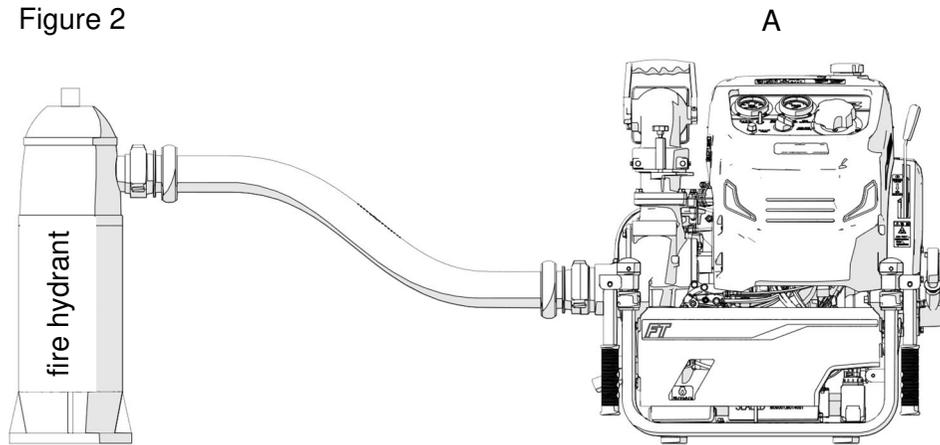
- (1) Open the open/close valves of the fire hydrant and the water discharge valve of the pump to full open.
- (2) Gradually close the pump's water discharge valve while checking the water supply pressure with a suction gauge.
- (3) If the water supply pressure is high, adjust the water supply pressure with the hydrant's open/close valve.

4 Handling Method (Suction, discharge, and relay the water from the fire hydrant)

2. Water discharge and delivery

When a single pump receives and discharges water (Figure 2)

Figure 2



- (1) Open the water discharge valve of pump (A) in advance.
If the fire hose has a variable nozzle at the end, be sure to leave it open.
- (2) Before starting the engine, open the hydrant and check the pressure on the compound (suction) gauge of the pump (A).
- (3) After confirming that water has been sent from the fire hydrant, start the engine of the pump (A) and begin discharging water.

- (4) Adjust the pressure by operating the throttle of the pump (A) to achieve the required pressure and flow rate.

The throttle should be operated gradually, and the compound (suction) gauge should be kept above 0.05 MPa.

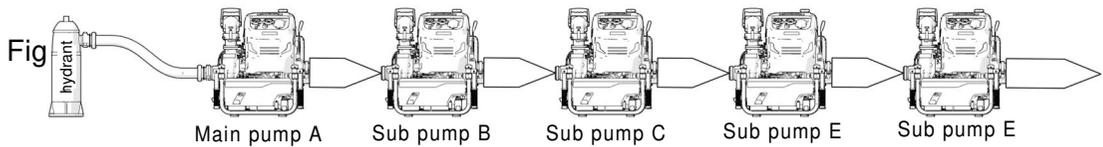
Adjust the hydrant open/close valve to adjust the pressure gauge to not exceed 1.2 MPa. At this time, the compound (suction) gauge of the pump (A) should be less than 0.6 MPa

- (5) To stop water discharge, turn the throttle of pump (A) to the "LOW" position, stop the engine, and close the hydrant.

Do not close the water discharge valve of pump (A) until the water supply from the hydrant stops.

4 Handling Method (Suction, discharge, and relay the water from the fire hydrant)

When discharging water by relaying with multiple pumps
(An operator is required for all pumps: Fig. 3)



- (1) Open the water discharge valves of all pumps (A to E) in advance. If a variable nozzle is attached to the fire hose-end at the water discharge side, be sure to open it.
- (2) Before starting the engine, open the hydrant and check the pressure of the compound (suction) gauge of the main pump (A).
- (3) After confirming that water has been delivered from the fire hydrant, start the engine of the main pump (A) to deliver water to the next pump.
- (4) Start and supply water to the second and sub-pumps (B to E) in the same manner as for the original pump (2) and (3).
- (5) Read the pressure gauge on the sub-pump (E) and adjust the pressure by operating the throttles on all pumps (A to E) to achieve the required pressure and flow rate at the nozzle. Operate the throttles gradually and make sure that each pump keeps above 0.05MPa on the compound (pressure) gauge and above 1.2MPa on the pressure gauge.
Adjust the hydrant opening to make the compound (pressure) gauge of each pump is not less than 0.6MPa.

- (6) To stop the water discharge, shut down the engine by turning the throttle to the "LOW" position, starting with the pump (E) closest to the end of nozzle, and finally close the fire hydrant. Do not close the water discharge valves of each pump until the water supply from the hydrant has stopped.

5 Periodical Inspections

1. Periodical inspections

Be sure to perform periodic inspections according to the following items.

Item	Duration or operating time							Inspection details	treatment		
	Period										
	Before use	after use	1 month	6 months	1 year	2 years	3 years				Operation time (Hour)
fuel	●	●							Quantity/ Deterioration (ie color, smell)	Refill or replace	
				●					-	Replace	
2-cycle oil	●								Quantity	Refill	
					●				-	Replace	
Battery		●							-	Recharge	
			●						Deterioration	Replace	
						●			-	Replace	
Spark plug					○			100	-	Replace	○
Appearance		●							Dirt, etc.	Clean	
Starter rope			●						Wear, breakage	exchange	○
Vacuum pump belt				●				50	Become loose/Wear	Adjust or replace	○
Fan belt				●				50	Become loose/Wear	Adjust or replace	○
Fuel pipes				●				50	Leakage/damage	Replace	○
Water discharge valve					●			100	Valve feels heavy, vacuum leakage	Adjust or replace the parts if necessary	○
Fuel filter				●			○	200	Foreign material stuck	Clean or replace	○
Engine start and vacuum			●						Operation/Perfor mance	Replace parts if necessary	○
Prime and discharge			●						Operation/Perfor mance	Replace parts if necessary	○
All parts							○	300		Replace parts if necessary	○

Note:

- For items marked with "●" in the period column, please practice the inspection by yourself. Please ask your dealer to inspect the items marked with "○" in the period column and to handle the items marked "○" in the column of treatment.
- Measure the inspection timing by either comes earlier, "period" or "operation time". For example, consider replacing spark plug when the operation time reaches to 100 hours, even if the operation period is less than a year.
- This inspection table shows the period and time under general operating conditions. Make sure to perform inspections earlier when the pump is used under tough conditions.

5 Periodical Inspections

Recommended replacement parts and period

Part Name	Recommended Replacement Period	Example of Defects
Spark plug	Every Year	Bad to start due to wear and tear
Fuel Pipes	Every 2 years	Fuel leakage due to deterioration
Battery	Every 2 years	Deterioration
2 Cycle Oil Pipe	Every 2 years	Oil leakage due to deterioration
Vacuum Pump Belt	Every 3 years	Slippage due to wear
Fan Belt	Every 3 years	Slippage due to wear
Other Rubbers	Every 2 years	Deterioration
Starter Rope	Every 3 years	Breakage due to wear
Fuel Filter	Every 3 years	Clogging and Bad start due to the water drip
2-cycle Oil Filter	Every 3 years	Clogging, and Poor lubrication due to the moisture.
Discharge Valve Water shut-off valve (rubber)	Every 3 years	Deterioration of the check valve
Mechanical Seal	Every 3 years	Poor suction due to deterioration
Oilless Vacuum Pump Blades	Every 3 years	Poor suction due to deterioration
Carburetor	10 years	Corrosion inside the tank
Fuel Tank	10 years	Corrosion inside the tank

Parts recommend replacing when disassembling

- Gaskets • Push nuts
- O-rings • Spring pins
- Lock washers • E-rings



Caution

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

5 Periodical Inspections

2. Inspection method

Periodic inspections are essential to ensure the fire-fighting pump's safety and use every possible function. Inspect the pump correctly and safely 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, 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.



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 recommended to replace the battery earlier.

Recommended battery : GS YUASA YTX20L-BS

For handling the battery, please follow the instruction manual that comes with the battery.

5 Periodical Inspections



Caution

- When disposing of batteries, oils, etc., please entrust disposal to a specialized industrial waste disposal contractor.
- It may cause fire, burns, or pollute the environment.

(2) Handling of Shibaura full-automatic charger



Caution

- To use the charger safely and correctly, be sure to read the instruction manual that comes with the charger. Improper use may cause an accident. After reading the charger instruction manual, be sure to keep it close to the product.

A) Unpacking



Caution

- Remove packing materials from the battery charger before charging.
- There is a risk

B) Location to place



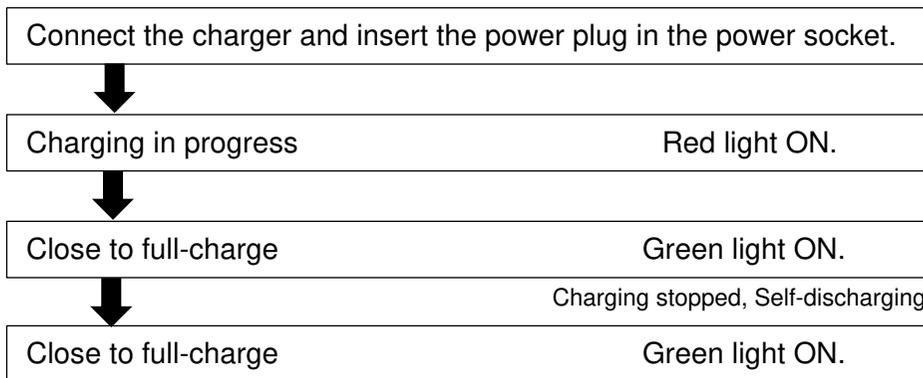
Warning

- Do not use the charger in high-temperature places such as under direct sunlight or near heating elements, in extremely humid places, or wet areas such as rain or snow.
- There is a risk of overheating, burnout, or damage to the charger, or leakage of electricity or electric shock.

C) Make sure before use

- Remove the power plug from the socket (Be sure the charger is turned off).
- Connect the output of the charger cable firmly to the fire-fighting pump.
- After connecting the cable to the charger unit(AC inlet), plug in the socket.

D) Battery charger Operating Manual



【Maintenance charging *】

5 Periodical Inspections

* Maintenance charge mode

This function automatically recharges the battery when the capacity has declined. It always monitors the decline of the battery capacity by self-discharge.

After starting the charging (Red Light ON), when the battery is close to full charging, the indicator will change to Green Light ON, and the status will automatically change to the maintenance charging mode (Green Light ON). After that, the Red Light and the Green Light will light up alternately to reduce the deterioration of the battery.

Note:

Remove the power plug to stop the main unit from charging. Then, remove the output terminal.

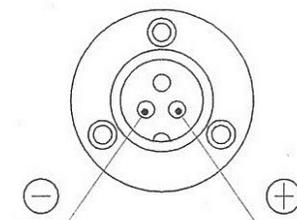
LED indication and charge status

CHARGE STATUS	CHARGE LED (RED)	FULL LED (GREEN)
No Charging	OFF	OFF
Charging	ON	OFF
Close to full-charge	OFF	ON
Error (⚠)	ON	ON

⚠ Refer to "5. Periodical inspections" when an error has occurred.

Note:

When starting the engine using a fully charged battery, if the starter does not rotate sufficiently, this may be due to battery deterioration. Please inspect or replace the battery.



E) Protective operations

- Input (primary side)
Protected from circuit errors by current fuse.
- Output (secondary side)
Protected from battery reverse connection and output short-circuiting by electronic circuit and circuit breaker.

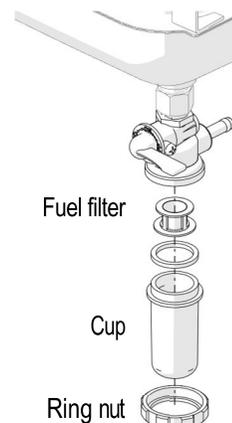
F) Inspection method when an error has occurred

Symptom	Cause	Measure *
Both red and green LEDs come on	Power cable is not connected correctly.	Check the connection status.
	The circuit breaker is open.	Pull out the power plug. After the body of the charger stops, remove the error cause, and close the circuit breaker after 60 seconds.
	The output connector is loose.	Insert the output connector all the way, and lock it securely.
The battery is obviously in discharged state, but the tickle charge mode starts immediately.	Battery is in the deteriorated state.	Replace the battery with a new one.
LED does not come on (both red and green)	Protective operation is activated.	Turn off the power and wait for 60 seconds. After that, charging the battery again.

5 Periodical Inspections

(3) Cleaning the fuel cock filter

- ① Close the fuel cock.
- ② Loosen and remove the ring nut with pliers.
- ③ Wipe off any debris in the cup with a cloth or the like.
- ④ Remove the filter attached to the ④❶ fuel cock main unit and wash it with gasoline.
- ⑤ Install the fuel cock securely to the original position. Be sure to open the ❶ fuel cock and inspect if there are no leaks.
- ⑥ After inspection, close the ❶ fuel cock.



(4) Replacement of the fuel in the tank

Storing fuel for a long period of time may result in poor starting performance and rust.
Replace with new fuel every 6 months.



Danger

- Keep fire away when refueling.
- There is a risk of ignition and explosion.

(5) Spark plug cleaning

Use [NGK BR8HIX] spark plugs.

Clean the spark plugs that are contaminated with exhaust gases and carbon.

- (1) Stop the engine to cool down sufficiently before working on it.
- (2) Remove the spark plug cap and spark plug using the spark plug box wrench.
- (3) Clean the outside, inside, and electrode of the spark plug.
- (4) Tighten the spark plug to the cylinder head and keep the spark spark plug cap pressed in.



Caution

- Do not touch the ignition plug or high-voltage cord during operation.
- There is a risk of electric shock.

(6) Check the governor oil level

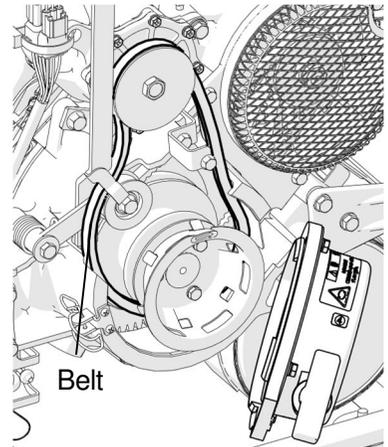
(See "4 Handling Methods (Preparation for Operation) 1.

5 Periodical Inspections

(7) Vacuum pump belt inspection

Replacement of the vacuum pump belt is required if it is stretched, worn, or cracked.

- ① Open the recoil starter.
Do not start the engine during the inspection.
Also, the belt may be hot immediately after operation, so wait until the engine has cooled down before inspecting
- ② Remove the front cover and vacuum pump cover.
(See "4 Handling Methods (Preparation for Operation) 1.")
- ③ Remove the belt from the pulley groove.
- ④ Install a new belt.
- ⑤ Install the cover as before.

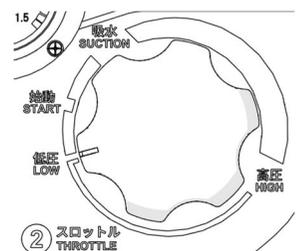
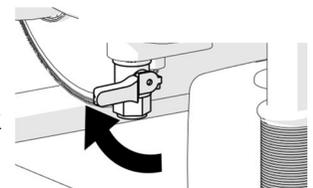
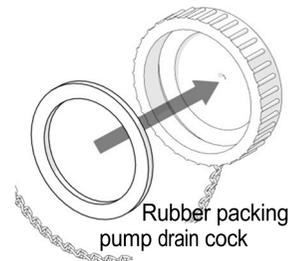


(8) Starting and vacuum inspection

Vacuum inspections must be performed even if the suction and discharge tests (which are described in the next page) are difficult to carry out.

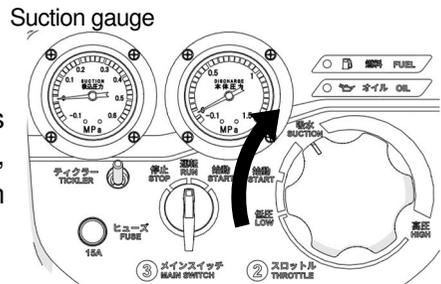
Defects such as engine not starting, poor vacuum performance, or vacuum leakage can cause accidents, such as not being able to operate the water discharge at the actual site, or falling water during the discharge.

- ① Check that the rubber packing is in the water suction cap, and attach the inlet cap to the water inlet.
- ② Close the pump drain cock.
- ③ Start the engine.
- ④ ② Warm up the engine with the throttle dial in the "low pressure" position for about 1 minute, and visually check for any abnormalities in the various parts.



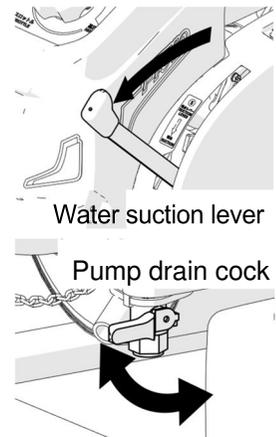
5 Periodical Inspections

- ⑤② Turn the throttle to the "suction" position and pull the ⑤ suction lever toward you to activate the vacuum pump. When the pointer of the ⑥ suction gauge reads -0.06 to -0.08 MPa, return the ⑤ suction lever, ② throttle to the "low pressure" position, and then stop the engine.
- ⑦ If there is no change in the indicated value of the suction gauge after leaving it for 1 minute, the vacuum performance is good.



- ⑧ Open the pump drain cock to release the vacuum and close the pump drain cock.

* If any abnormality is found, please consult your dealer.



(9) Water suction and discharge inspection

Suck and Discharge the water to inspect if there is no abnormalities found in each part of your pump

- (1) Are there any abnormal sounds?
- (2) Is there any water fall?
- (3) Is the water suction slow?
- (4) Are there any water leaks?
- (5) Is the startability good?
- (6) Are there any looseness in each part?
- (7) Are there any fuel leaks?
- (8) Other

*If any abnormality is found, refer to the "6 Troubleshooting" in the next section for appropriate treatments.

6 Troubleshooting

Daily inspection and maintenance are important to prevent fire-fighting pump malfunctions. Detect malfunctions at an early stage and perform maintenance immediately. If the trouble is not easily solved, or if the malfunction is not listed below, please consult the dealer where you purchased the pump, giving the model name and serial number.

1. Engine area

	Symptom	Cause	Action
Hard to Start	No fuel flow to carburetor.	1 Fuel cock filter or fuel line is clogging 2 Needle valve is sticking 3 There's no fuel.	1 Clean 2 Clean 3 Fill
	Fuel does not flow to combustion chamber (remove spark plugs to see)	1 Choke does not close (auto choke) 2 Rotational speed is low when starting. 3 Carburetor (needle valve, jet) is clogging	1 Repair and adjust 2 Replenish the battery 3 Clean
	Fuel goes to combustion chamber but does not start	1 Overflow (excessive fuel) 2 Tickler is overused (excessive fuel) 3 Choke does not open fully closed (auto choke) 4 Fuel is deteriorated 5 Water is mixed in the fuel. 6 Excessive lubricating oil	1 Inspect and adjust the carburetor 2 Drain the fuel from the seal at the crankcase. 3 Replace diaphragms and clean pipes. 4 Exchange. 5 Drain water 6 Adjust to the proper amount
	Abnormality of combustion system	1 Fuel cock filter is clogged 2 Carburetor valve seat is clogged 3 Carburetor is poorly adjusted, or there is a clog on the carburetor 4 Carburetor is poorly tightened.	1 Clean 2 Clean 3 Adjust or clean 4 Retighten
	Sparks are poor	1 Spark plug cap has damages, electrode gap is improper, or the spark plug is defective. 2 Leakage from high voltage cord 3 Leakage from spark plug cap 4 Defective ignition coil 5 Defective CDI unit 6 Poor rotation of the starting motor	1 Exchange 2 Exchange 3 Exchange 4 Exchange 5 Exchange 6 Replenish the battery

6 Troubleshooting

Symptom		Cause	Action	
Hard to Start	No sparks	<ol style="list-style-type: none"> 1 Short circuit of the ground wire 2 Spark plugs are damaged or stained. 3 Spark plug has gap failure 4 Ignition coil is defective 5 CDI unit is defective 6 Wiring connection is poor or disconnected 7 Main switch is defective 	<ol style="list-style-type: none"> 1 Repair the point short circuited 2 Exchange. 3 Exchange 4 Exchange 5 Exchange 6 Adjust the connection 7 Exchange. 	
	Poor compression	<ol style="list-style-type: none"> 1 Piston wear or seizure 2 Piston rings 3 Worn or damaged oil seals 4 Lack of lubricant 5 Damaged cylinder head gasket 	<ol style="list-style-type: none"> 1 Repair or replace 2 Exchange. 3 Exchange 4 Refill to the proper amount 5 Exchange 	
Poor running	Insufficient rotation	Combustion system error (mis-hunting)	<ol style="list-style-type: none"> 1 Carburetor main jet is clogged or misadjusted 2 Fuel cock filter clogged 3 Overflow 4 Poor installation of the carburetor 5 Icing 	<ol style="list-style-type: none"> 1 Clean or replace 2 Cleaning 3 Check and adjust the carburetor 4 Correct the place or replace. 5 Remove and add fuel tank drainage agent
		Abnormalities in the governor system	<ol style="list-style-type: none"> 1 Governor maladjustment 2 Governor operating parts wear 3 Defective caulking of flyweight 4 Poorly tightened governor arm 5 Governor spring tension failure 6 Governor lever ring hole worn or rattling large 	<ol style="list-style-type: none"> 1 Adjust 2 Exchange. 3 Correct or exchange 4 Readjust and retighten. 5 Exchange. 6 Replace or correct
		Cooling system abnormalities	<ol style="list-style-type: none"> 1 Cooling air is weak 	<ol style="list-style-type: none"> 1 Pay attention to the ventilation
		Other	<ol style="list-style-type: none"> 1 Overload 2 Muffler and exhaust port clogging 3 Inlet clogging 4 Defective spark plug 	<ol style="list-style-type: none"> 1 Change nozzle diameter or use safety nozzle 2 Remove the clog 3 Remove the clog 4 Exchange

6 Troubleshooting

		Symptom	Cause	Action
Poor running	Abnormal noise	Mechanical sound	<ol style="list-style-type: none"> 1 Flywheel is fixed loosely 2 Piston is worn, and tapping sounds come out from the piston skirt 3 Armature plate is contacting the other parts. 4 Foreign material is caught inside the crankcase and fan cover 5 Foreign material is caught inside the pump or impeller is touching the pump casing 6 Each part becomes loose 	<ol style="list-style-type: none"> 1 Retighten 2 Replace the piston 3 Reassemble 4 Remove the foreign material 5 Remove the foreign material or reassemble the pump 6 Retighten
		Knocking sound (combustion system abnormalities)	<ol style="list-style-type: none"> 1 Insufficient fuel (main jet or use of different diameter parts) 2 Overload 3 Rotation speed too low or too high 4 Different spark plug is used 	<ol style="list-style-type: none"> 1 Clean or replace 2 Open water discharge valve 3 Adjust to proper rotation speed 4 Replace with proper spark plugs

6 Troubleshooting

2. Pump

		Symptom	Cause	Action	
Water suction failure	A suction gauge does not have negative pressure	Abnormality on water pump side	<ol style="list-style-type: none"> 1 Poorly tightened suction pipe 2 Air suction from the tip of the suction pipe 3 Forgot to close the drain cock 4 Defective suction pipe packing 5 suction pipe fissure 6 Foreign matter caught in water discharge valve 	<ol style="list-style-type: none"> 1 Tighten securely 2 Put it completely underwater 3 Close securely 4 Exchange. 5 Exchange. 6 Remove foreign objects 	
		Abnormality on the vacuum pump side	No Rotation	<ol style="list-style-type: none"> 1 Internal freeze 2 Foreign object inhalation 3 Vacuum pump damaged 4 V Belt slip or breakage 	<ol style="list-style-type: none"> 1 Defrost 2 Remove foreign objects 3 Exchange. 4 Exchange.
			Rotating	<ol style="list-style-type: none"> 1 Clogged or poorly tightened vacuum passage 2 Strainer at the water shut-off valve is clogged 	<ol style="list-style-type: none"> 1 Clean or retighten 2 Clean
	The coupled meter becomes negative pressure	Vacuum leak (engine) Falling water when stopped)	Refer to "Water suction failure - compound meter does not become negative pressure - Water pump side abnormality"		
		No vacuum leakage	<ol style="list-style-type: none"> 1 Clogged suction pipe strainer or inside suction pipe 2 Air pocket in the suction pipe. 3 Suction height is too high, or the suction pipe is too long 4 Air suction from the tip of the suction pipe 5 Low engine speed at water suction 6 Short water suction operation time 7 Clogged or poorly tightened vacuum passage 8 Strainer at the water shut-off valve is clogged 	<ol style="list-style-type: none"> 1 Clean 2 Correct the layout 3 Keep the height within 8m 4 Put the tip completely underwater 5 Adjust to water suction rotation speed 6 Lengthen operation time 7 Clean or retighten 8 Cleaning 	

6 Troubleshooting

Symptom		Cause	Action	
Water Discharge Failure	Pressure does not increase	Abnormality on water pump side	<ol style="list-style-type: none"> 1 Clog in the suction pipe strainer or suction pipe 2 Air pocket in suction pipe 3 Suction height is too high, or the suction pipe is too long. 4 Air suction from the tip of the suction pipe 5 Poorly tightened suction pipe 6 Discharge valve half-open 7 Forgot to remove the safety nozzle (not necessary when the nozzle is attached) 8 Foreign matter in the nozzle 9 Frozen inside the pump 	<ol style="list-style-type: none"> 1 Clean 2 Correct the layout of the suction pipe. 3 Keep the height within 8m 4 Put the tip completely underwater. 5 Tighten securely 6 Open the valve completely 7 Remove 8 Remove foreign objects 9 Defrost and remove the ice
		Engine malfunction	Refer to 1. Engine – Hard to start and poor running	
	Other Abnormalities	<ol style="list-style-type: none"> 1 Muffler and exhaust port clogging 2 Air Inlet of the carburetor clogging 	<ol style="list-style-type: none"> 1 Remove the clog 2 Remove the clog 	

3. Electrical

Symptom		Cause	Action
Bad start	Starting motor does not rotate	<ol style="list-style-type: none"> 1 Insufficient battery capacity 2 Deterioration of the battery 3 Fuse burnout 4 The cable connection is loose or Disconnected 	<ol style="list-style-type: none"> 1 Recharge 2 Replace 3 Replace. 4 Check the cable connection and plug-in surely. Replace parts if necessary.
Battery failure	Batteries run out too quickly.	<ol style="list-style-type: none"> 1 Deterioration of the battery 2 Mistake in main switch operation. 3 Mistake in charge operation 	<ol style="list-style-type: none"> 1 Exchange. 2 Operate properly 3 Operate properly
Connection failure	Wiring burnout	<ol style="list-style-type: none"> 1 Battery reverse connection 2 Poor connection or short-circuit at the outlet terminal 3 Poor wiring connection or disconnection 4 Fuse burnout 	<ol style="list-style-type: none"> 1 Connect correctly 2 Connect correctly, or Repair or replace the short-circuited parts. 3 Correct the wiring or repair, or replace 4 Replace

6 Troubleshooting

Symptom		cause	treatment	
Defective wiring	Lamp does not light	1 Lamp blew out 2 Wiring is loose or disconnected	1 Replace 2 Correct the circuit, repair, or replacement	
Defective monitor lamp	All monitor lamps do not light up immediately after turning the main switch to operate	1 Battery capacity is not enough, or the battery is deteriorated. 2 Fuse burnout 3 Wiring is loose or disconnected	1 Recharge or replace 2 Replace 3 Correct the circuit, repair, or replacement.	
	The lamps do not light even if they should have lit up	Common & typical matters to be noticed	1 Loose or disconnected wiring of each sensor and switch	1 Correct the circuit, repair, or replacement
		Fuel	1 Switch is broken	1 Replace
		2-cycle oil	1 Switch is broken	1 Replace
Monitor lamp light up	Please refer to Section No. 3 – Monitor Lamp (P. 7) and cope with each matter displayed			

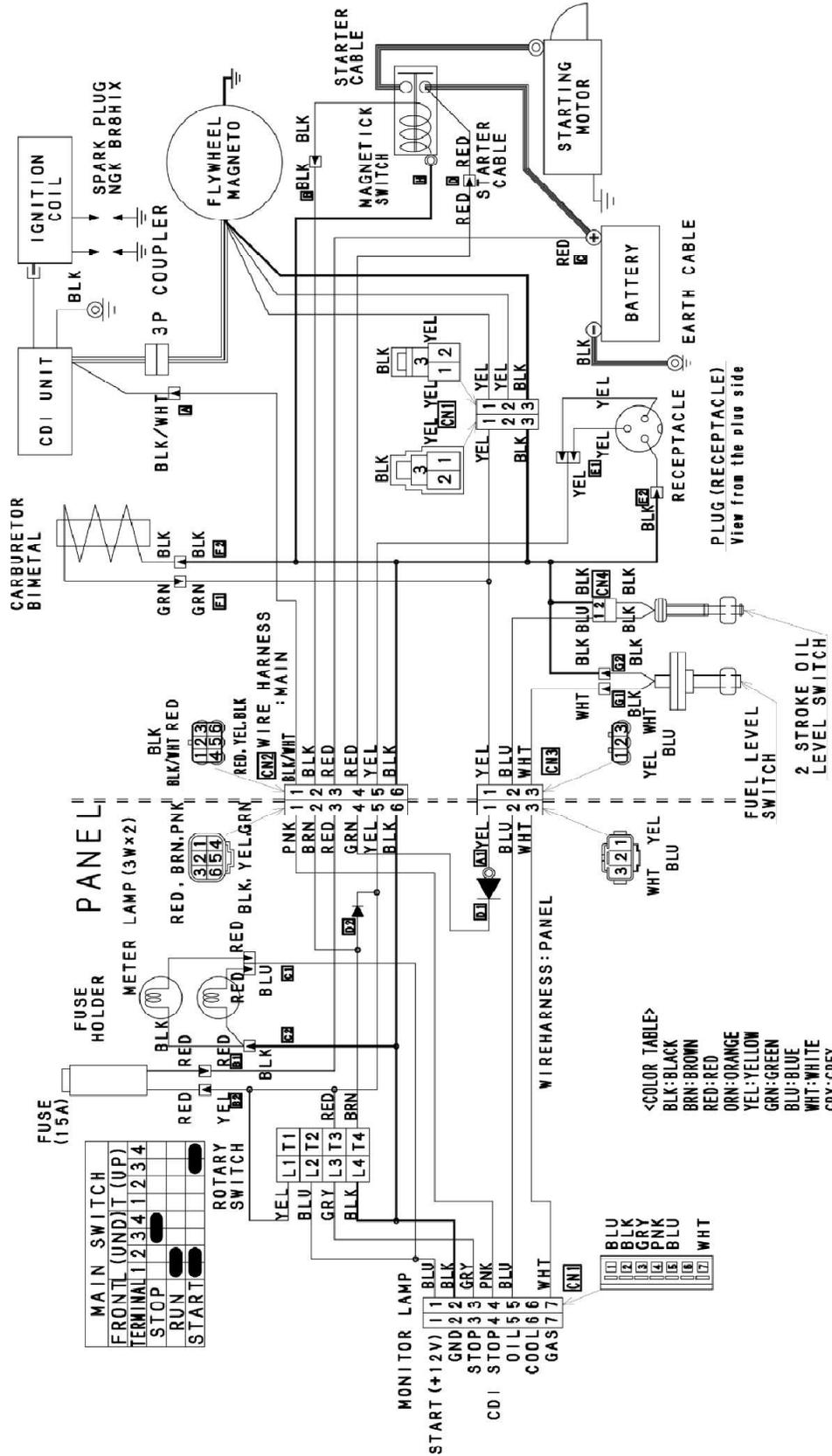
7 Specifications

1. Fire-fighting pump	
Model	FT510-A
Classification (JPN)	(B-2)
Notification No. (JPN)	(P0145001)
Dimension (L x W x H)	737mm x 572mm x 740mm
Dry Weight	90 kg
2. Pump	
Type	High-pressure 1-stage turbine pump (with inducer)
Discharge water volume	Normal 1.01 m ³ /min
	High pressure 0.64 m ³ /min
Pump pressure	Normal 0.70 MPa
	High pressure 1.00 MPa
Nozzle diameter	Standard 24.0 mm
	High pressure 17.5 mm
Rated rotation speed	5800 rpm
Water inlet	Nominal 75mm, Fire engine thread (JIS B 9912)
Water outlet	Nominal 65mm, Fire engine Thread (JIS B 9912)
3. Engine	
Type	Air-cooled, 2-cycle, inclined, 2-cylinder gasoline engine
Model name	E440C
Displacement	436mL
Authorized output	22.8 kW / 5800rpm
Fuel feeding system	Carburetor
Fuel type and tank capacity	Regular gasoline for automobiles - 14.5L
Lubrication system and tank capacity	Separate lubrication system (2-cycle oil) - 2L
Fuel consumption	Approx. 14L/h
Cooling system	Forced air-cooled
Ignition system	CDI ignition system
Starting system	Starting motor & recoil
Lighting	12V-35W (searchlight), 12V-3W (instrument panel light)
Spark plug	NGK BR8HIX

7 Specifications

4. Vacuum pump	
Type	Oilless type: 4-vane eccentric rotary type
Maximum Suction Height	Approx. 9 m
Drive system	V Belt clutch type
5. Accessories	
Battery	12V15Ah/5h
Charger	AC100V~AC240V – DC12V charger
Tools, etc.	1 x Tool kit, 1 x instruction manual 1 x Spark plug, 1 x safety nozzle
Pump cover	1 pc.
6. Optional parts	
Searchlight lamp	1 pc.
Searchlight stand	1 pc.

8 Wiring Diagram





Shibaura Fire Pump Co., Ltd.

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FAX: +81 263 29 1074

E-MAIL: overseas-sales@shibaura-bousai.co.jp

URL: www.shibaura-bousai.co.jp

SHIBAURA

OPERATION MANUAL

SHIBAURA FIRE-FIGHTING PUMP FT510-A



Please read this operation manual carefully to operate the Shibaaura Fire-fighting Pump safely and correctly. Incorrect operation of the pump may result in an accident. If this manual is missing or damaged, please order a new one from us or our agent promptly.

Shibaaura Fire Pump Co., Ltd.

- For safe use

Keep it in a safe place with the fire-fighting pump.

- Items marked with  in this instruction manual are particularly important for safe use and must be observed.

 Danger	The case when there is an imminent risk of death, serious injury, or the product is mishandled.
 Warning	The case when there is a risk of death or serious injury, or the product is mishandled.
 Caution	In cases when the product is mishandled, minor injuries or property damage may occur.

- Product specifications and appearance are subject to change without notice for improvement. Therefore, please note that the contents of this document and some of the photographs and illustrations may not correspond to the product.
- If you have any questions or difficulties after reading this manual, please contact the dealer where you purchased the product or our company.
- For inspection and maintenance, please contact a maintenance business or dealer that is qualified to service portable fire-fighting pumps.

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1 Things you must follow for your safety

1. Warning Label Locations



Part No.L82900900



Part No.290192430



Part No.290192770



Part No.290192410



Part No.290192400



Part No.290192400

- If the contents of the label become difficult to see or the label is about to come off, replace it immediately.

1 Things you must follow for your safety

2. Caution Marks



- Do not suck in or discharge the substances other than water, such as flammable materials, drugs, or chemical liquid.
- There is a risk of explosion, fire, burns, poisoning, etc.

- Keep fire away when refueling.
- Do not overfill fuel into the tank.
- If the fuel is spilled, wipe it up immediately. Keep the wiping cloth away from fire.
- Refill the fuel after the engine has cooled down.
- Do not use fire to defrost the pump.
- There is a risk of ignition and explosion.



- Fire-fighting pumps should be operated by firefighters, voluntary disaster prevention team members, maintenance and inspection personnel, and others who have been trained specifically for safe operation.
- Misuse or mishandling may result in serious accidents, including death.

- No neck wraps, ties, waist towels, etc., are allowed. Wear helmets, non-slip shoes, and no loose-fitting clothing.
- There is a risk of getting caught in the machine or slipping and falling, resulting in injury.

- Do not operate a fire-fighting pump if you are unable to concentrate on your work due to alcohol consumption, tiredness, illness, or the effects of drugs.
- This could lead to a serious accident.

- Use only genuine parts or specified attachments. No modifications are allowed.
- Failure to do so may result in accidents, injuries, or machine malfunctions.

- Install at least 3 m away from combustible materials.
- Remove flammable materials, such as dry grass, before installation.
- Exhaust fumes and heat from the muffler may cause a fire.

- Do not install indoors or in tunnels with poor ventilation.
- There is a risk of exhaust gas poisoning.

- Be sure to install the cover when operating.
- There is a risk of injury or burns.

- Be sure to close the recoil starter during operation.
- There is a risk of getting caught in pulleys or belts, or of getting cut yourself.

- Keep fire away from the battery.
- There is a risk of fire and explosion.

- Remove packing materials from the battery charger before charging.
- There is a risk of fire.

- Be sure to carry out periodic inspections. Operate and discharge the water at least once a month to check for any abnormalities.
- Accidents may occur due to damage, etc., and fire-fighting activities may be hindered.

1 Things you must follow for your safety

Caution

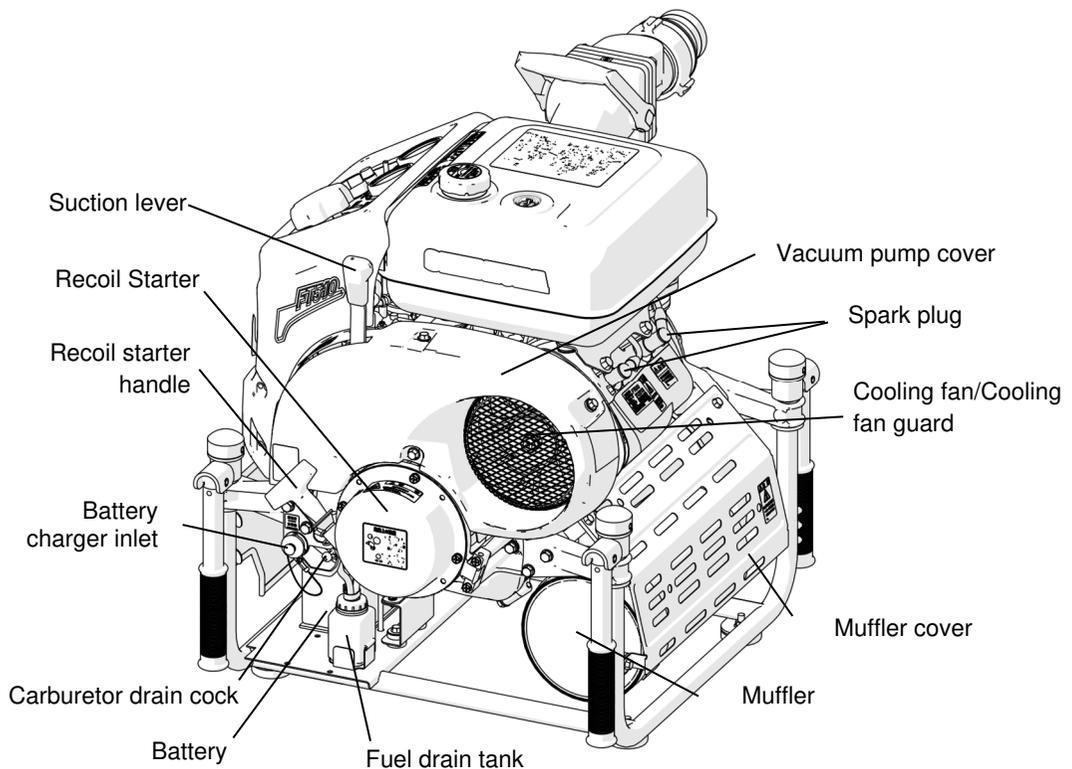
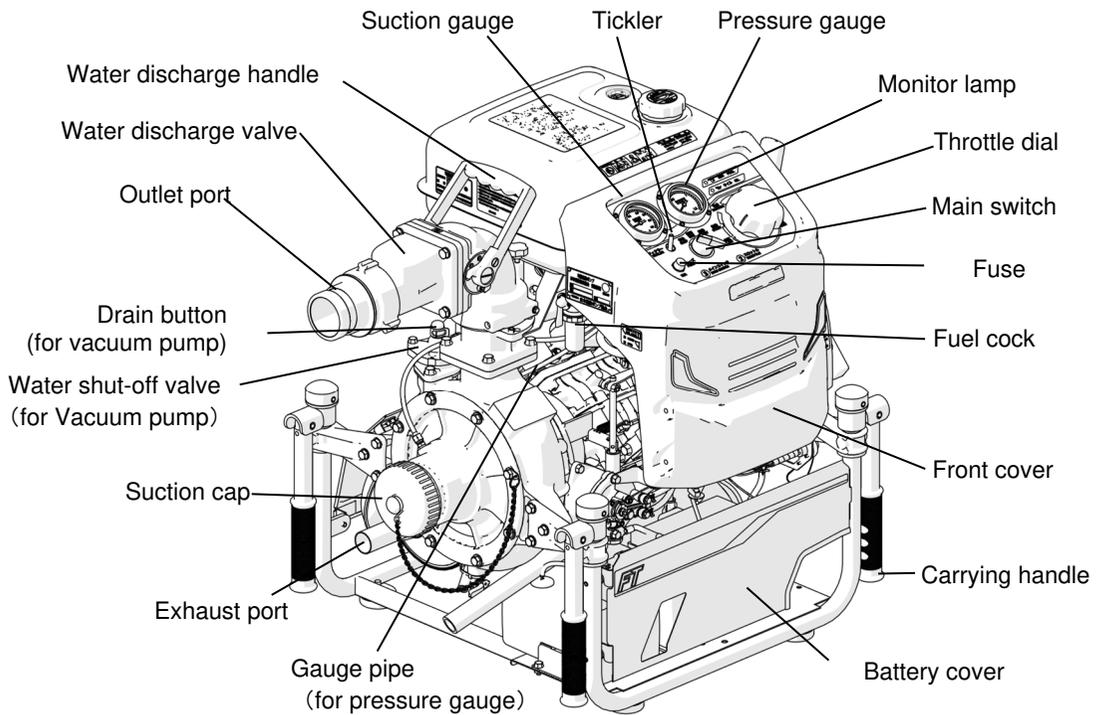
- Do not use fire-fighting pumps for activities other than fire-fighting, such as civil engineering, irrigation, water sprinkling, etc.
- There is a risk of hitting some objects and injuring people or damaging property around you.
- When disposing of batteries, oils, etc., please entrust disposal to a specialized industrial waste disposal contractor.
- It may cause fire, burns, or pollute the environment.
- Do not put fingers or hands in the water discharge valve.
- There is a risk of injury.
- After refueling, tighten the fuel tank cap securely.
- There is a risk of ignition and explosion.
- Check the fuel once a month, and if the fuel has a pungent odor or is cloudy, replace it with new fuel immediately.
- This may cause engine malfunction or equipment failure.
- When adding two-cycle oil, always use the same brand and grade of oil.
- Avoid entering water or debris when refilling the two-cycle oil.
- This may cause engine malfunction or equipment failure.
- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.
- When replenishing the governor oil, add the same brand and grade of oil.
- Avoid entering water or debris when refilling the governor oil.
- This may cause engine malfunction or equipment failure.
- When holding the carrying handle, do not touch the joint parts.
- Failure to do so may result in injury from pinching fingers.
- When carrying or loading/unloading the fire-fighting pump, four people should do so.
- Dropping it on your foot may cause injury or back pain.
- Connect the fire hose securely and always ensure it cannot be disconnected.
- If it is pulled out during water discharge, there is a risk of injury.
- Lay out the fire hoses without folds, twists, or sharp turns.
- There is a risk of the water hose springing up and causing injury.
- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.
- When starting with a recoil starter, avoid getting clothing or gloves caught.
- There is a risk of injury.
- When starting with the recoil starter, keep people at least two meters away from the starter.
- There is a risk of injury to elbows from being knocked by recoil ropes.

1 Things you must follow for your safety

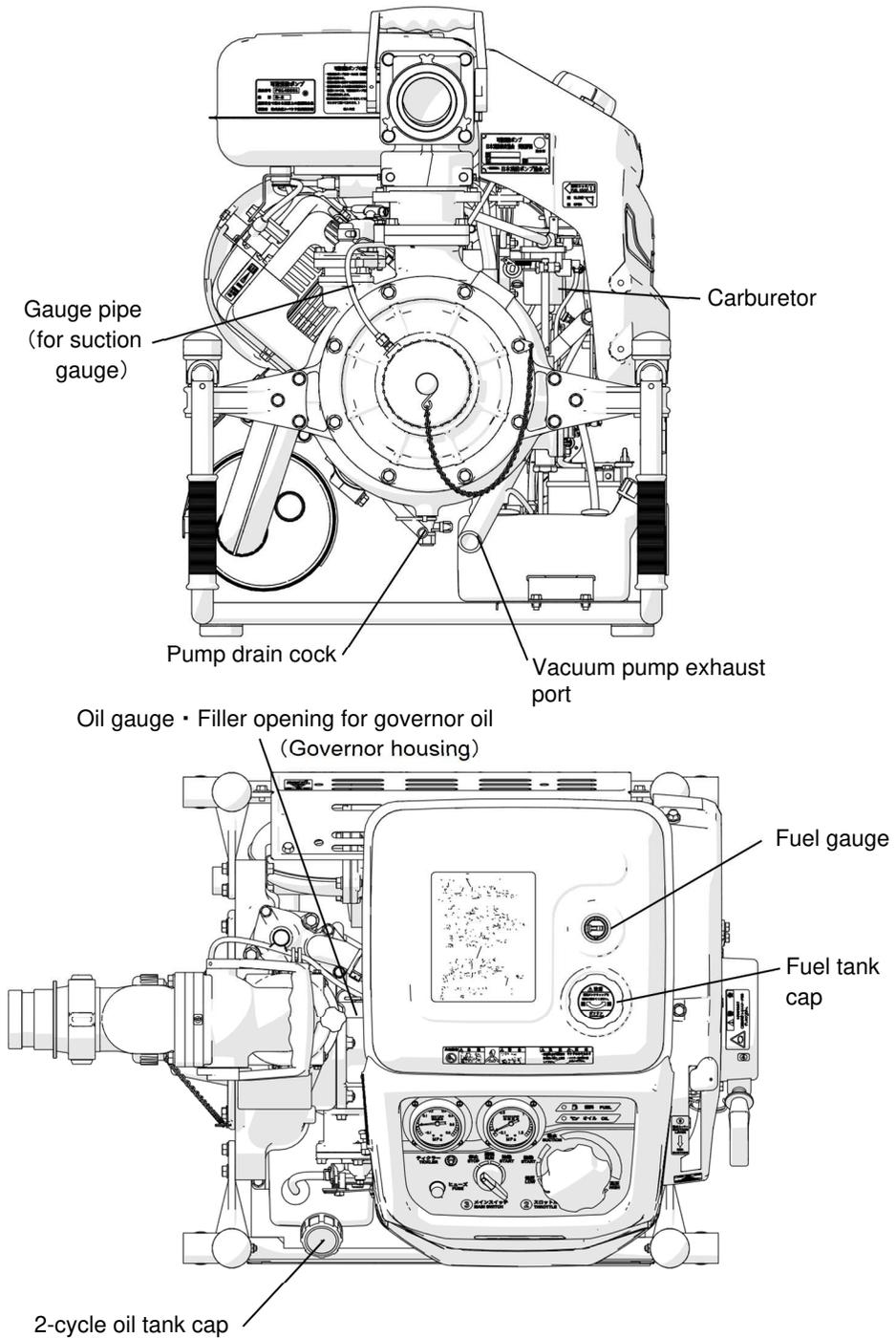
Caution

- Always return the throttle to the "LOW" position before opening and closing the water discharge valve.
- Hold the fire nozzle firmly and discharge water.
- There is a risk of injury because the fire nozzle runs away.
- Operate the water discharge valve slowly.
- There is a risk of injury from pinching or bumping hands.
- Do not aim the water at people or peer into the nozzle.
- High water pressure may cause them to be blown away, resulting in injury.
- Do not touch the spark spark plug or high-voltage cord during operation.
- There is a risk of electric shock.
- Never touch the muffler and exhaust pipe during and after operation since they become very hot.
- There is a risk of burns.
- While operating, be careful not to have the suction pipe or hose stepped on by vehicles or other objects.
- Accidents may occur due to damage, etc., and fire-fighting activities may be hindered.
- Do not start the engine with the water discharge valve handle open.
- When discharging water, the engine operator should communicate with the operator at the nozzle. Do not open the water discharge valve without notice or accelerate the throttle rapidly.
- There is a risk of injury from being blown away by the high-pressure water.
- Inspection and maintenance should be performed after the engine has been stopped and cooled down sufficiently.
- Failure to do so may result in injury, burns, or fire.
- Read the instruction manual that comes with the battery and the information on the battery itself carefully to ensure that the battery is used correctly.
- When disconnecting the battery cord, remove the (-) cord first, and when installing the battery cord, connect the (+) cord first.
- Short-circuiting may cause fire or burns.
- Do not use the charger in high-temperature places such as under direct sunlight or near heating elements, in extremely humid places, or wet areas such as rain or snow.
- There is a risk of overheating, burnout, or damage to the charger, or leakage of electricity or electric shock.
- The charger should be installed in a dry, well-ventilated location that is not wet.
- Failure to do so may cause electric shock or fire.
- Do not charge the battery with a charger other than the specified one.
- There is a risk of fire due to heating or burnout of the wiring.
- When operating without attaching the suction pipe (e.g., to check the vacuum level), attach the suction cap.
- There is a risk of getting caught in the machine or injured.
- Do not close the nozzle or water discharge valve while multiple pumps are relayed and the water is discharged.
- Abnormally high pressure may result in damage to the pump and hoses.

2 Name of each component



2 Name of each component



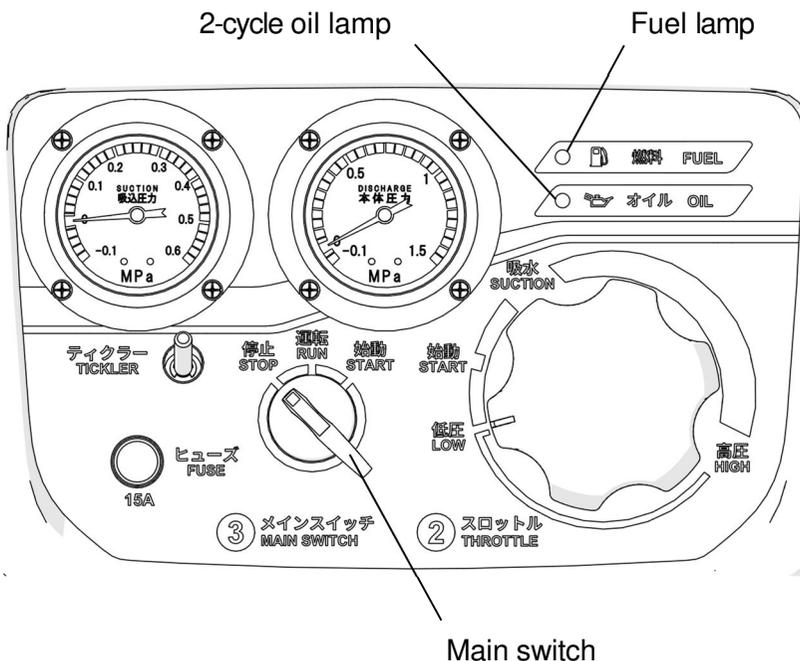
3 Monitor lamp

The pump with a starting motor activates when the main switch is turned into the "Run" position. When the power is turned on, two lights illuminate at the same time. If they do not light up, the battery voltage is insufficient, or there is a faulty circuit, the pump needs to be repaired. All lights are turned off after a few seconds.

All lights are turned off during water discharge, but the lights are turned on when operating the starting motor. It is because the battery voltage drops. Be sure to inspect or maintain when the following items are lit up.

Display	Feature	How it works	Measures
 fuel	Indicates that the fuel must be added	Lights up when the remaining fuel in the tank is low.	Refill the regular gasoline.
 2-cycle oil	Indication of when to refill 2-cycle oil	Lights up when the remaining oil in the tank is low, then stop the engine.	Refill the 2-cycle oil.

If the monitor lamp still illuminates or blinks after following the measures above, consult your dealer.



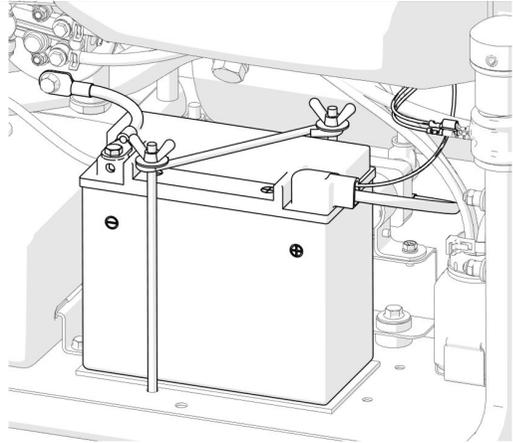
4 Handling method (Before)

Installing Battery

Caution

- Read the instruction manual that comes with the battery and the information on the battery itself carefully to ensure that the battery is used correctly.

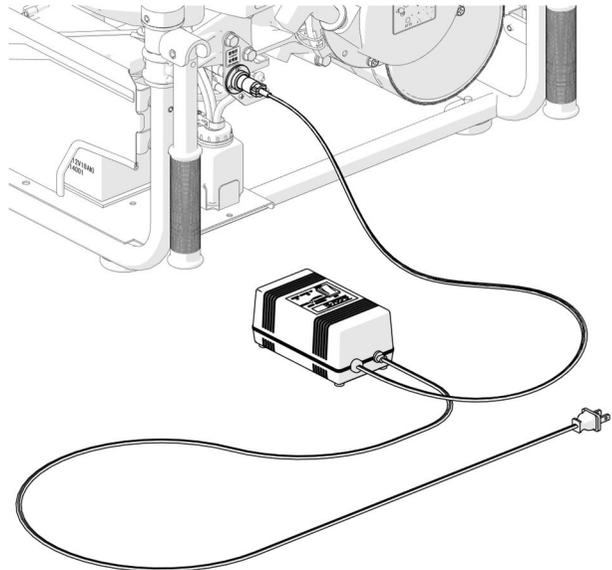
- (1) For handling, be sure to follow the battery instruction manual.
- (2) Fix the battery to the bed with two rods and one holder.
- (3) Firstly, connect two battery (+) cables (red), then connect one (-) cable (black) . Be sure to keep the connecting order.



Caution

- When disconnecting the battery cable, remove the (-) cord first, and when installing, connect the (+) cable first.
- Short-circuiting may cause fire or burns.

- (4) Connect the supplied charger to a charger inlet to charge the battery. (See "5 Periodic Inspection 2. Inspection Method (2) Handling of Fully Automatic Charger" on p. 29.)



4 Handling Method (Preparation for Operation)

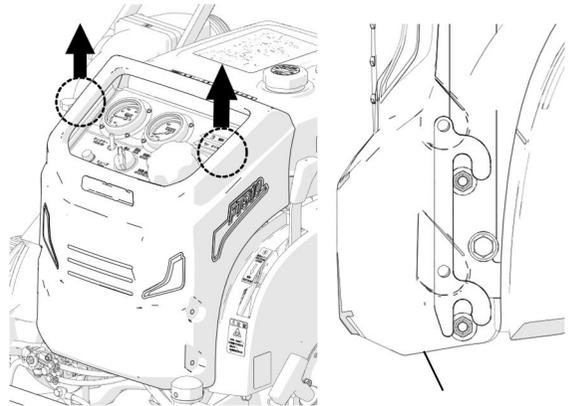
1. Removing and attaching covers

When removing the cover, follow the procedure below.

(1) Removing/attaching front cover

Hold the circled places on the illustration on the right. Shift it upward first, and then remove it toward you.

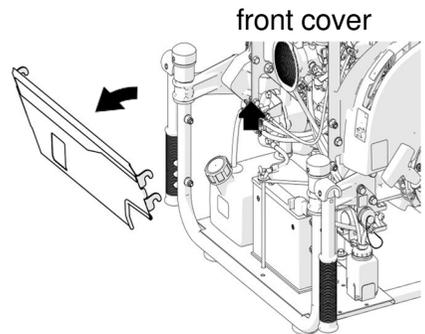
Installation is the reverse procedure.



(2) Removing and attaching the battery cover

Slide the battery cover upward first, and then remove it toward you.

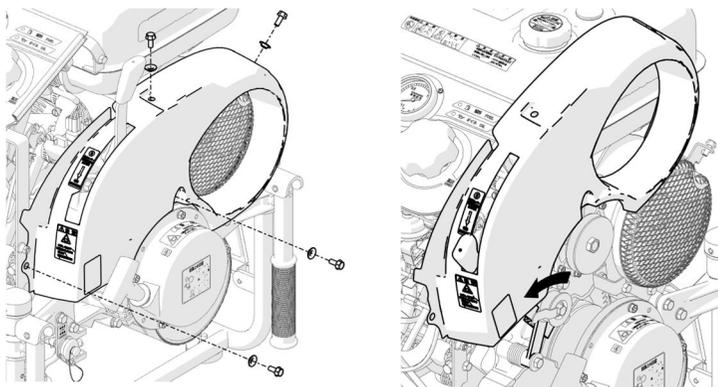
Installation is the reverse procedure.



(3) Removing and attaching vacuum pump cover

Remove the four bolts and collars. Pull the water suction lever toward you and remove it through the lever opening of the vacuum pump cover.

Installation is the reverse procedure.



Warning

○ Be sure to attach the cover when driving.

● There is a risk of injury or burns.

4 Handling Method (Preparation for Operation)

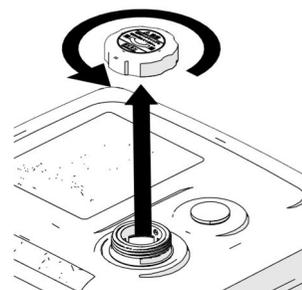
1. Replenishment

(1) Fuel

(Fuel tank capacity: approx. 14.5L)

Fill the tank with regular gasoline until the fuel gauge indicates "F".

Do not add gasoline mixed with two-cycle oil or bio-gasoline.



Danger

- Keep fire away when refueling.
- Do not overfill fuel into the tank.
- If the fuel is spilled, wipe it up immediately. Keep the cloth away from fire.
- Refill the fuel after the engine has cooled down.
- There is a risk of ignition and explosion.
- Hold the nozzle firmly and discharge water.
- There is a risk of injury due to swinging of the discharge nozzle.

Caution

- Tighten the fuel tank cap securely after refueling.
- There is a risk of ignition and explosion.

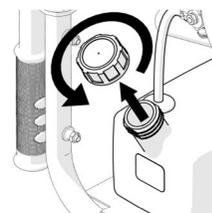
Caution

- Check the fuel once a month, and if the fuel has a pungent odor or is cloudy, replace it with new fuel immediately.
- This may cause engine malfunction or equipment failure.

(2) Engine oil

(Oil tank capacity: Approx. 2L).

Fill the 2-cycle oil into the oil tank at the bottom of the fire-fighting pump.



Caution

- When refilling the 2-cycle oil, use the same brand and grade of oil.
- Do not allow water or debris to enter when refilling.
- This may cause engine malfunction or equipment failure.

Caution

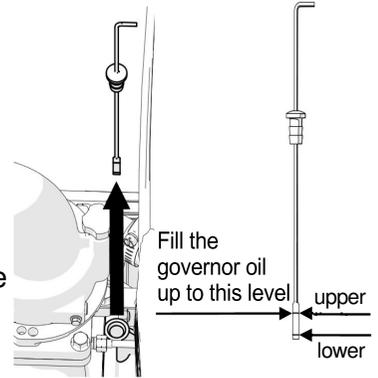
- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.

4 Handling Method (Preparation for Operation)

(3) Governor oil

(1) Place the pump on the level place and check the governor oil level with an oil gauge.

- Remove the governor oil level gauge and check the oil level. Refill the oil to the original level when the oil level has become in the middle or lower. Put back the oil gauge after refilling. Do not replenish more than the upper limit.
- If the oil is very dirty or cloudy, consult your dealer.
- Recommended oil (Automotive engine oil) SAE:10W-30(API:SJ)



Caution

- When replenishing governor oil, add the same brand and grade of oil.
- Do not allow water or debris to enter the oil inlet when refilling.
- This may cause engine malfunction or equipment failure.

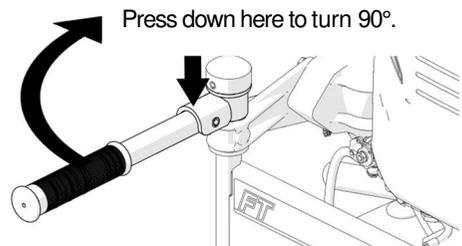


Caution

- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.

2. Carrying the pump

Hold the transport handle correctly when moving and loading/unloading the fire-fighting pump.
The carrying handle can be turned 90 deg.



Caution

- When holding the carrying handle, do not touch the bend.
- Fingers may be pinched, resulting in injury.

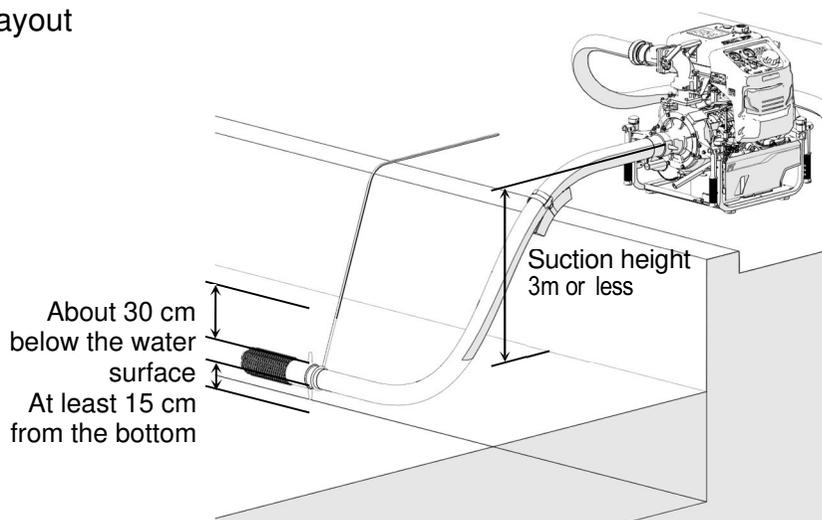


Caution

- 4 people is necessary to carry the pump.
- Dropping it on your foot may cause injury or back pain.

4 Handling Method (Preparation for Operation)

3. Pump layout



- (1) Check the water source. Make sure that there will be no problems with use, such as no decay, floating matter, or sediment.
- (2) Place the pump close to the water source and on a level surface.



Warning

- Avoid installation in places with poor ventilation, such as indoor, in a vehicle, tunnel. There is a risk of exhaust gas poisoning.



Warning

- Place at least 3 m away from combustible materials.
- Remove dead grass and other flammable materials before setting.
- Exhaust fumes and heat from the muffler may cause a fire.

- (3) Keep the suction height below 3m as much as possible to avoid falling water because of the reduction of the pump capacity.
- (4) Lay out the suction hose with no bends or bumps and fasten it tightly to the suction inlet port. Ensure the level of the inlet port side is higher than the suction hose tip at the water source side.
- (5) Always attach a strainer and basket to the suction port of the suction hose and keep it below the water surface to prevent air sucking in. Place the tip about 30 cm above the bottom. If the tip of the device is 15 cm or more away from the bottom. Place a straw mat to prevent sediment from being sucked into the device. If the water source has algae, watergrass, etc., remove them around the water inlet.
- (6) Connect the fire hoses securely and lay them out. Be sure not to fold.

4 Handling Method (Preparation for Operation)



Caution

- Connect the fire hose securely and always ensure it cannot be disconnected.
- If it is pulled out during water discharge, there is a risk of injury.



Caution

- Lay out the fire hoses without folds, twists, or sharp turns.
- There is a risk of the water hose springing up and causing injury.

4. Pump user

- (1) Fire-fighting pumps are small but high-performance machines with strong power. Improper use may cause serious accidents, including death.



Warning

- Fire-fighting pumps should be operated by firefighters, voluntary disaster prevention team members, maintenance and inspection personnel, and others who have been trained specifically for safe operation.
- Misuse or mishandling may result in serious accidents, including death.

- (2) Wear clothing appropriate for the operation.



Warning

- No headbands, neck wraps, ties, waist towels, etc., are allowed. Wear helmets, non-slip shoes, and no loose-fitting clothing.
- There is a risk of getting caught in the machine or slipping and falling, resulting in injury.

- (3) Do not operate if you are not feeling well.



Warning

- Do not operate fire-fighting pump if you are unable to concentrate on your work due to alcohol consumption, tiredness, illness, or the effects of drugs.
- This could lead to a serious accident.

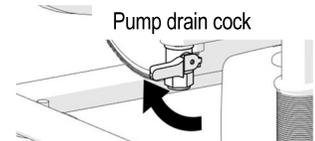
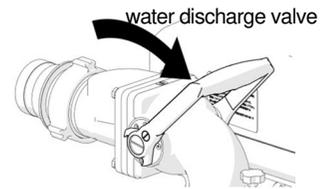
4 Handling method (Operation)

1. Starting the engine

Close the ⑥ water discharge valve and pump drain cock before starting the engine.

Please be sure to check the following

Follow the operating instructions in the order of ❶ to ❹ numbers on the unit.



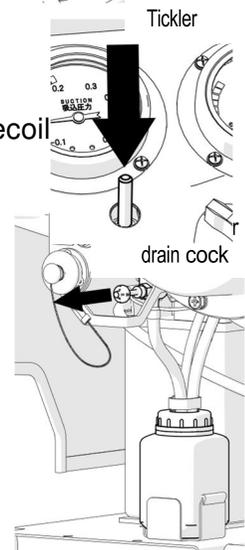
(1) Open the ❶ fuel cock.

Move the fuel cock lever straight down to "Open" ❶ to open the fuel cock.



(2) In cold weather, use the tickler in the carburetor.

- If it is difficult to start the engine with auto-choke alone in cold weather, press the tickler for 2 to 3 seconds.
- Press the tickler for 2 to 3 seconds when starting with the recoil starter and the engine is cold.
- If you use tickler for multiple times and the engine does not start, close the ❶ fuel cock, drain fuel from the carburetor drain cock, then start the engine.
- If the engine does not start properly due to excessive fuel, such as when restarting after warm-up, close the fuel cock, open the carburetor drain cock, and drain the gasoline from the carburetor before starting the engine. After starting, turn the fuel cock "open". If the car stops, start the car again.



*Remove and dispose of the fuel in the drain tank every time.

Fuel drain tank

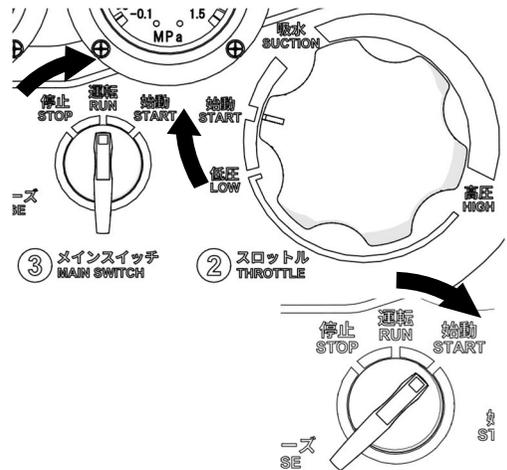


Caution

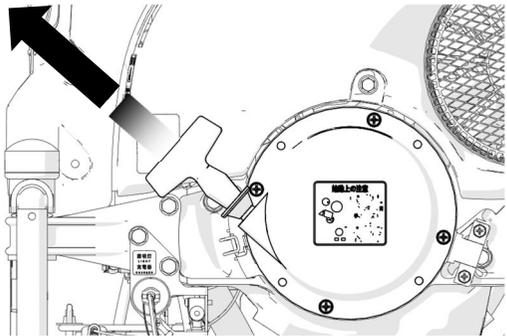
- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.

4 Handling method (Operation)

- (3) Turn the ② throttle to the "start" position.
 (4) Turn the main switch to the "run" position.
 When starting the starter motor, turn it to the "START" position. The starter motor works, and the engine starts.
- Once the engine is started, set the ③ main switch to the "operation" position.
 - Stop the starter motor for at least 5 seconds after running it for 3 seconds. Continuous operation will cause deterioration of the battery and the starter motor.



- (5) For recoil starting, pull the ④ recoil starter handle out to the point where it is slightly heavy, then pull quickly and sharply.



Caution

- When starting with a recoil starter, avoid getting clothing or gloves caught.
- There is a risk of injury.



Caution

- When starting with the recoil starter, keep people at least two meters away.
- There is a risk of injury to the elbows from being knocked by recoil ropes.



Warning

- Be sure to close the recoil starter during operation.
- There is a risk of getting caught in pulleys or belts, or of cutting yourself.

4 Handling method (Operation)

2. Suction

- (1) Turn the ② throttle to the "suction" position after starting the engine.
- (2) Pull the ⑤ suction lever toward you to activate the vacuum pump and suction water.
 - Promptly return the ⑤ suction lever when the pressure gauge needle swings and the pressure increases and stabilizes.
 - Keep the vacuum operation time less than 30 seconds.

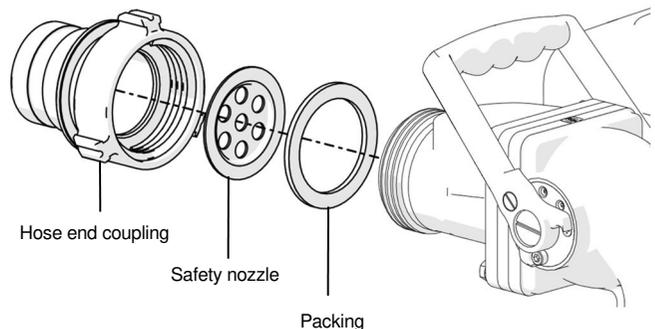


3. Water discharge

Before discharging water, check the safety of the nozzle. Give a signal to the person at the nozzle to start discharging water.

- (1) ⑥ Operate the water discharge handle gradually in the "→Open" direction until it stops.
 - Turn the throttle to the desired water pressure level.
 - Adjust the pressure with the ② throttle according to the water discharge conditions.
 - Be careful not to use too high a water discharge pressure or to open or close the ⑥ water discharge valve handle too rapidly, which may cause the water discharge hose to swing.
- (2) Standby for water discharge
 - To close the ⑥ water discharge valve and put the machine in standby mode during water discharge, ② turn the throttle to the "low pressure" position and stop the engine. In this case, the check valve will operate and water will not fall, so restart the engine and open the ⑥ water release valve to re-discharge water. (However, restarting must be done within 3 minutes.)
 - If it is necessary to stand by without stopping the engine, be sure to put the ② throttle in the "low pressure" position.
- (3) The case when discharging water without using a nozzle

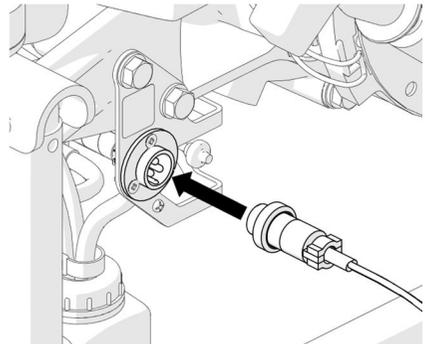
- When operating without using the nozzle, such as pumping water from a water tank or pumping water to a relay tank, be sure to set the attached safety nozzle between the hose end coupling and the water discharge valve, as shown in the figure.



4 Handling method (Operation)

(4) To turn on the searchlight

- To turn on the searchlight, plug the searchlight into the charger inlet on the recoil side.



Caution

- Always return the throttle to the "LOW" position before opening and closing the water discharge valve.
- Hold the nozzle firmly and discharge water.
- There is a risk of injury due to swinging of the discharge nozzle.



Caution

- Operate the water discharge valve slowly.
- There is a risk of injury from pinching or bumping hands.



Caution

- Do not aim the water at people or peer into the nozzle.
- High water pressure may cause them to be blown away, resulting in injury.



Caution

- Do not touch the spark plug or high-voltage cord during operation.
- There is a risk of electric shock.



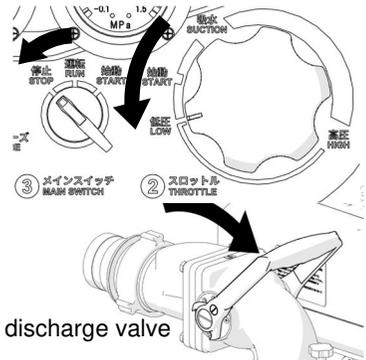
Caution

- Never touch the muffler and exhaust pipe during and after operation since they become very hot.
- There is a risk of burns.

4 Handling method (Operation)

4. Stopping the engine

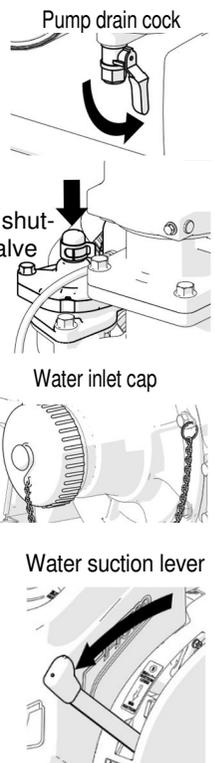
- (1) ② Turn the throttle to the "LOW" position.
 - If the engine is hot, run the engine at low speed for about 1 minute to cool it down.
- (2) Close the ⑥ water discharge valve handle by operating it in the "→ close" direction.
- (3) ③ Turn the main switch to the "STOP" position. The engine will stop.



5. Draining water

After the operation, a large amount of water remains inside the pump. This remaining water may cause corrosion and freezing cracks during cold weather. Be sure to drain water before storing.

- (1) Open the pump drain cock.
- (2) Open and close the ⑥ water release valve, press the water shut-off valve drain button, and drain completely.
- (3) Close the pump drain cock and install the water inlet cap.
- (4) Start the engine and pull the ⑤ suction lever to activate the vacuum pump for approximately 5 seconds.
- (5) ② Turn the throttle to the "low pressure" position, ③ Turn the main switch to the "stop" position and stop the engine.
- (6) Open the pump drain cock and remove the water inlet cap to confirm that it is completely drained. If drainage is insufficient, repeat steps (3) to (5).
- (7) Close the pump drain cock and install the water inlet cap.



Treatment after using seawater or muddy water

If seawater or muddy water is used, be sure to operate the pump by discharging water with clean water for at least 5 minutes to clean the inside of the pump. Also, to clean the inside of the vacuum pump, operate the vacuum pump for about 5 seconds by pulling the ⑤ suction lever while discharging water at low pressure, and drain clean water from the vacuum pump exhaust hose. After cleaning is complete, be sure to drain the water using the operation described in the previous section "5".

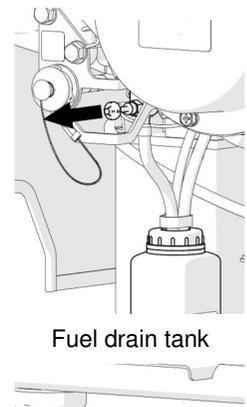
4 Handling method (Operation)

6. Storing the pump

- (1) Store in a dry, temperature-controlled area, away from dust and direct sunlight.
- (2) Wipe off oil, dust, and dirt and keep clean.
- (3) Fill the fuel up to the "F" level when storing. ●Close the fuel cock.
- (4) Fill the specified amount of 2-cycle oil.
- (5) Drain the fuel in the carburetor from the carburetor drain cock, on the recoil starter side.
*Make sure to remove the fuel inside the fuel drain tank every time.
- (6) Please charge the battery with the supplied charger while in storage.
(See "5 Periodic Inspection 2. Inspection Method (2) Handling of Automatic Charger" on p. 29)
- (7) Cover the pump with the attached pump cover.



Carburetor drain cock



Fuel drain tank

- Before storing the pump, be sure to check that the water inside is completely drained. Also, fill the pump with antifreeze to prevent freezing when storing the pump in cold weather (see "4 Handling Methods" Operation in Winter and Cold Weather, on P. 20)
- Operate and discharge water for 5 to 10 minutes at "HIGH" throttle position every month.
- Check the fuel in the fuel tank once a month, and if there is a pungent odor or cloudiness, replace the fuel with new fuel. The recommended replacement time is 6 months after refueling.
- If the vehicle has been in storage for a long period of time without a monthly periodic inspection, operate the pump for 1 minute at "LOW" position to warm up the engine. Be sure to inspect visually to see if there are any abnormalities.



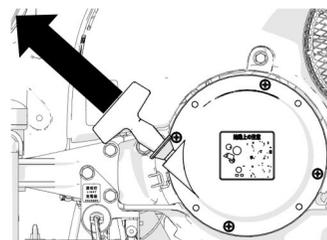
Caution

- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.

4 Handling Method (Operation in Winter and

1. Before starting the engine

- (1) In cold weather, battery capacity is significantly reduced. Please be sure to charge regularly.
- (2) ● Gently pull the recoil starter handle and check that the pump turns.
 - If it does not turn, the pump may be frozen. Pour the warm water into the pump from the suction port or defrost it in a warm room.



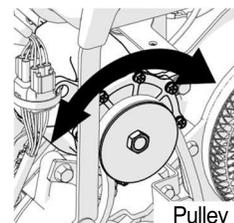
Recoil starter handle

- (3) Remove the vacuum pump cover.

(See "4 Handling Methods (Preparation for Operation)"

1. Removing and attaching the covers, on page 9.)

- Turn the vacuum pump pulley by hand and check if the vacuum pump turns.
- If it does not turn, the vacuum pump may be frozen.
Blow warm air outside the vacuum pump or defrost in a warm room.



Pulley



Danger

- Do not use fire to defrost the pump.
- There is a risk of ignition and explosion.

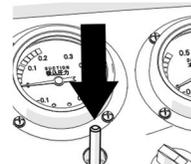


Caution

- Inspection and maintenance should be performed after the engine has been stopped and cooled down sufficiently.

2. Starting the engine

- (1) In cold weather, press the tickler for 2 to 3 seconds.
- (2) Immediately after the engine starts, operation may be unstable; run the machine idle at low speed for 1 to 2 minutes.



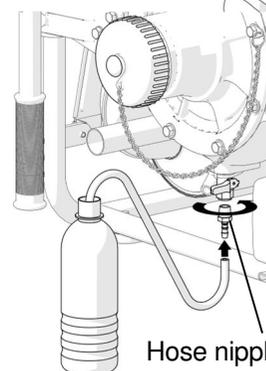
3. Treatment after water discharge (freeze prevention)

- (1) Preventing pumps from freezing (how to add antifreeze)

- ① Drain the water.

(Refer to "4 Handling Method (Operation) 5. Draining water)

- ② Close the water suction cap.
- ③ Attach the hose nipple and hose to the pump drain cock and place the hose in a bottle filled with antifreeze



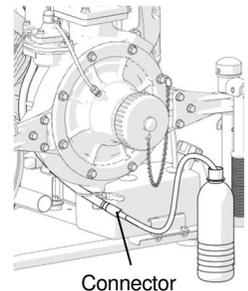
Hose nipple

4 Handling Method (Operation in Winter and

- ④ Start the engine.
- ⑤ ② Turn the throttle to the "SUCTION" position.
- ⑥ ⑤ Pull the suction lever to create a vacuum state inside the pump.
- ⑦ Open the pump drain cock to suck in antifreeze.
- ⑧ Pull the ⑤ suction lever again, and when antifreeze comes out of the vacuum pump exhaust port, return the ⑤ suction lever.
- ⑨ Remove the hose and hose nipple from the pump drain cock.
- ⑩ Pull the ⑤ suction lever and stop the engine when the antifreeze stops coming out of the vacuum pump exhaust port.
- ⑪ After collecting antifreeze from the pump drain cock, close the drain cock.

(2) Preventing the vacuum pump from freezing (how to fill the vacuum pump with antifreeze)

- ① Connect the connector and hose to the water shut-off valve drainpipe and place it in a container of antifreeze.
- ② Start the engine.
- ③ Set the ② throttle to the "SUCTION" position.
- ④ Pull the ⑤ suction lever and suck in the antifreeze.
- ⑤ If antifreeze comes out of the vacuum pump exhaust port, return the water suction lever.
- ⑥ Remove the connector and open the pump drain cock.
- ⑦ Pull the ⑤ suction lever, and when the antifreeze stops coming out of the vacuum pump exhaust port, return the ② throttle to the "LOW" position and stop the engine.
- ⑧ Close the pump drain cock.



(3) Antifreeze should also be injected into water discharge valves and hose couplings.

CAUTION: Do not use alcohol to prevent freezing, since it will damage the rubber seals. Collect drained antifreeze in a liquid container.

4. Precautions for storage

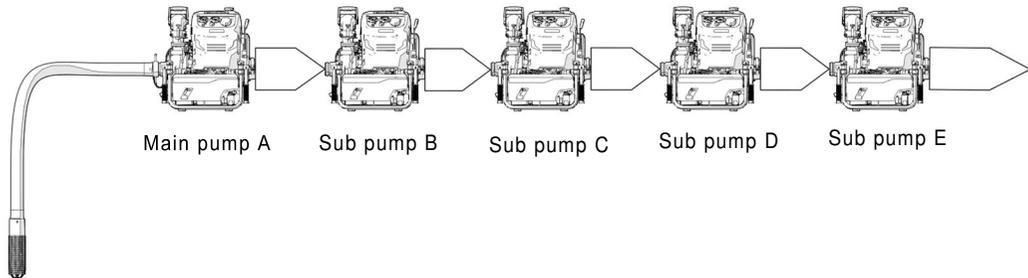
Choose the fuel with good quality. (The better quality of gasoline is highly volatile, and has better starting performance.)

- (1) Be sure to always have antifreeze on hand.
- (2) Batteries may freeze when the relative density of electrolyte becomes low. Be sure the battery is always recharged. If battery performance deteriorates, replace the battery as soon as possible.

4 Handling method (Relaying water with multiple pumps)

In the case of forest fires or urban fires where the water supply is far away, two or more pumps may be connected in series to relay water. The relay water requires different operations and special attention compared to normal operation because each pump is located far from the others. Daily training is also necessary to enable judgment and activities based on the state the pump's operators are facing. See the general method of relay operation below.

Figure 1.



1. Setting Locations

- (1) The number of units and their locations should be determined based on the number of hoses and the height of the water source.
- (2) Install a relay coupling to the suction port of sub-pumps (B to E in Figure 1), to connect the fire hose.
In this case, the automatic relay valve, "Direct Valve" can prevent accidents caused by sudden pressure fluctuations and high-pressure water.
- (3) The wye-valve is also recommended to be attached to the discharge port.
(The hose couplings that connect each pump may not be removed even after the discharge operation, because of the water pressure inside the fire hose.)

2. Operation Method (*An operator is required for every pump.)

- (1) Open the water discharge valves of the sub-pumps (B to E) beforehand.
Be sure to open the variable nozzle when it is attached to the fire hose.
- (2) Operate the main pump (A) and discharge water as usual.
- (3) Send water to the original pump first and then to others sequentially.
- (4) Check the pressure scale in the sub pump (E) and increase the engine speed to regulate the discharging water by controlling the throttle of the sub-pumps (B to E)
The sub pump (B to E): Should be more than 0.05MPa in a scale of suction gauge pressure, be less than 1.2MPa in a scale of power.
- (5) If there is not enough power of water discharge at the nozzle, turn the throttle dial of the original pump (A) to "HIGH" position gradually, then the turn the throttle dial of sub-pump, from the one closer to the original (from B to E), sequentially.
- (6) When stopping water discharge, turn the throttle dial of the last pump, the one close to the nozzle (E), to "LOW" position first and stop gradually (from E to B).
Stop the water supply from the main pump. When the supply of water from the main pump has been stopped, close the water discharge valve of each pump.

4 Handling method (Relaying water with multiple pumps)



Caution

- Do not close the nozzle or water discharge valve while multiple pumps are relayed and the water is discharged.
- Abnormally high pump pressure may result in damage to the pump and hoses.

1. Suction and discharge from water hydrant

The capacity of water supply from the fire hydrant

It is necessary to check the sufficient volume of water for discharging from the fire hydrant in advance.

It would depend on several factors, such as the diameter of the hydrant, the condition of the piping, the initial water pressure, and others.

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 could have high capacity for water supply with wider diameter despite low water pressure.

Water supply method

- (1) Be sure to open and close the hydrant's valve and release water to remove the foreign objects, such as sand, before connecting the hose to the hydrant.
- (2) Connect the water hydrant and pump. Use a suction hose that can endure the water supply pressure. The supply pressure limit for the suction hose with a nominal diameter of 65mm is 0.9 MPa. The suction hose for connection to the hydrant should be inspected periodically to avoid any damage.

How to check and adjust water supply pressure

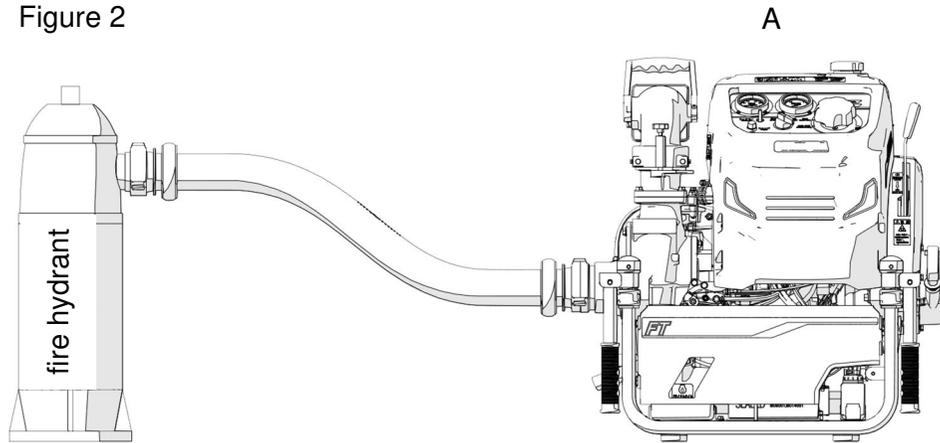
- (1) Open the open/close valves of the fire hydrant and the water discharge valve of the pump to full open.
- (2) Gradually close the pump's water discharge valve while checking the water supply pressure with a suction gauge.
- (3) If the water supply pressure is high, adjust the water supply pressure with the hydrant's open/close valve.

4 Handling Method (Suction, discharge, and relay the water from the fire hydrant)

2. Water discharge and delivery

When a single pump receives and discharges water (Figure 2)

Figure 2



- (1) Open the water discharge valve of pump (A) in advance.
If the fire hose has a variable nozzle at the end, be sure to leave it open.
- (2) Before starting the engine, open the hydrant and check the pressure on the compound (suction) gauge of the pump (A).
- (3) After confirming that water has been sent from the fire hydrant, start the engine of the pump (A) and begin discharging water.

- (4) Adjust the pressure by operating the throttle of the pump (A) to achieve the required pressure and flow rate.

The throttle should be operated gradually, and the compound (suction) gauge should be kept above 0.05 MPa.

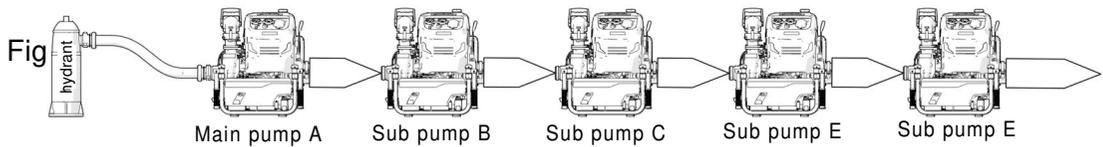
Adjust the hydrant open/close valve to adjust the pressure gauge to not exceed 1.2 MPa. At this time, the compound (suction) gauge of the pump (A) should be less than 0.6 MPa

- (5) To stop water discharge, turn the throttle of pump (A) to the "LOW" position, stop the engine, and close the hydrant.

Do not close the water discharge valve of pump (A) until the water supply from the hydrant stops.

4 Handling Method (Suction, discharge, and relay the water from the fire hydrant)

When discharging water by relaying with multiple pumps
(An operator is required for all pumps: Fig. 3)



- (1) Open the water discharge valves of all pumps (A to E) in advance. If a variable nozzle is attached to the fire hose-end at the water discharge side, be sure to open it.
- (2) Before starting the engine, open the hydrant and check the pressure of the compound (suction) gauge of the main pump (A).
- (3) After confirming that water has been delivered from the fire hydrant, start the engine of the main pump (A) to deliver water to the next pump.
- (4) Start and supply water to the second and sub-pumps (B to E) in the same manner as for the original pump (2) and (3).
- (5) Read the pressure gauge on the sub-pump (E) and adjust the pressure by operating the throttles on all pumps (A to E) to achieve the required pressure and flow rate at the nozzle. Operate the throttles gradually and make sure that each pump keeps above 0.05MPa on the compound (pressure) gauge and above 1.2MPa on the pressure gauge.
Adjust the hydrant opening to make the compound (pressure) gauge of each pump is not less than 0.6MPa.
- (6) To stop the water discharge, shut down the engine by turning the throttle to the "LOW" position, starting with the pump (E) closest to the end of nozzle, and finally close the fire hydrant. Do not close the water discharge valves of each pump until the water supply from the hydrant has stopped.

5 Periodical Inspections

1. Periodical inspections

Be sure to perform periodic inspections according to the following items.

Item	Duration or operating time							Inspection details	treatment		
	Period										
	Before use	after use	1 month	6 months	1 year	2 years	3 years				Operation time (Hour)
fuel	●	●							Quantity/ Deterioration (ie color, smell)	Refill or replace	
				●					-	Replace	
2-cycle oil	●								Quantity	Refill	
					●				-	Replace	
Battery		●							-	Recharge	
			●						Deterioration	Replace	
						●			-	Replace	
Spark plug					○			100	-	Replace	○
Appearance		●							Dirt, etc.	Clean	
Starter rope			●						Wear, breakage	exchange	○
Vacuum pump belt				●				50	Become loose/Wear	Adjust or replace	○
Fan belt				●				50	Become loose/Wear	Adjust or replace	○
Fuel pipes				●				50	Leakage/damage	Replace	○
Water discharge valve					●			100	Valve feels heavy, vacuum leakage	Adjust or replace the parts if necessary	○
Fuel filter				●			○	200	Foreign material stuck	Clean or replace	○
Engine start and vacuum			●						Operation/Perfor mance	Replace parts if necessary	○
Prime and discharge			●						Operation/Perfor mance	Replace parts if necessary	○
All parts							○	300		Replace parts if necessary	○

Note:

- For items marked with "●" in the period column, please practice the inspection by yourself. Please ask your dealer to inspect the items marked with "○" in the period column and to handle the items marked "○" in the column of treatment.
- Measure the inspection timing by either comes earlier, "period" or "operation time". For example, consider replacing spark plug when the operation time reaches to 100 hours, even if the operation period is less than a year.
- This inspection table shows the period and time under general operating conditions. Make sure to perform inspections earlier when the pump is used under tough conditions.

5 Periodical Inspections

Recommended replacement parts and period

Part Name	Recommended Replacement Period	Example of Defects
Spark plug	Every Year	Bad to start due to wear and tear
Fuel Pipes	Every 2 years	Fuel leakage due to deterioration
Battery	Every 2 years	Deterioration
2 Cycle Oil Pipe	Every 2 years	Oil leakage due to deterioration
Vacuum Pump Belt	Every 3 years	Slippage due to wear
Fan Belt	Every 3 years	Slippage due to wear
Other Rubbers	Every 2 years	Deterioration
Starter Rope	Every 3 years	Breakage due to wear
Fuel Filter	Every 3 years	Clogging and Bad start due to the water drip
2-cycle Oil Filter	Every 3 years	Clogging, and Poor lubrication due to the moisture.
Discharge Valve Water shut-off valve (rubber)	Every 3 years	Deterioration of the check valve
Mechanical Seal	Every 3 years	Poor suction due to deterioration
Oilless Vacuum Pump Blades	Every 3 years	Poor suction due to deterioration
Carburetor	10 years	Corrosion inside the tank
Fuel Tank	10 years	Corrosion inside the tank

Parts recommend replacing when disassembling

- Gaskets • Push nuts
- O-rings • Spring pins
- Lock washers • E-rings



Caution

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

5 Periodical Inspections

2. Inspection method

Periodic inspections are essential to ensure the fire-fighting pump's safety and use every possible function. Inspect the pump correctly and safely 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, 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.



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 recommended to replace the battery earlier.

Recommended battery : GS YUASA YTX20L-BS

For handling the battery, please follow the instruction manual that comes with the battery.

5 Periodical Inspections



Caution

- When disposing of batteries, oils, etc., please entrust disposal to a specialized industrial waste disposal contractor.
- It may cause fire, burns, or pollute the environment.

(2) Handling of Shibaura full-automatic charger



Caution

- To use the charger safely and correctly, be sure to read the instruction manual that comes with the charger. Improper use may cause an accident. After reading the charger instruction manual, be sure to keep it close to the product.

A) Unpacking



Caution

- Remove packing materials from the battery charger before charging.
- There is a risk

B) Location to place



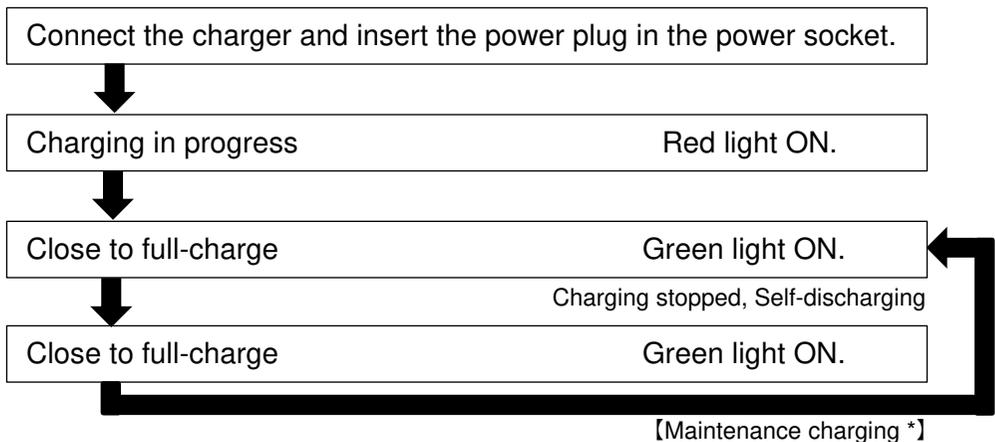
Warning

- Do not use the charger in high-temperature places such as under direct sunlight or near heating elements, in extremely humid places, or wet areas such as rain or snow.
- There is a risk of overheating, burnout, or damage to the charger, or leakage of electricity or electric shock.

C) Make sure before use

- Remove the power plug from the socket (Be sure the charger is turned off).
- Connect the output of the charger cable firmly to the fire-fighting pump.
- After connecting the cable to the charger unit(AC inlet), plug in the socket.

D) Battery charger Operating Manual



5 Periodical Inspections

* Maintenance charge mode

This function automatically recharges the battery when the capacity has declined. It always monitors the decline of the battery capacity by self-discharge.

After starting the charging (Red Light ON), when the battery is close to full charging, the indicator will change to Green Light ON, and the status will automatically change to the maintenance charging mode (Green Light ON). After that, the Red Light and the Green Light will light up alternately to reduce the deterioration of the battery.

Note:

Remove the power plug to stop the main unit from charging. Then, remove the output terminal.

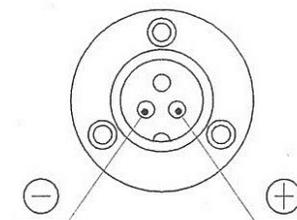
LED indication and charge status

CHARGE STATUS	CHARGE LED (RED)	FULL LED (GREEN)
No Charging	OFF	OFF
Charging	ON	OFF
Close to full-charge	OFF	ON
Error (⚠)	ON	ON

⚠ Refer to "5. Periodical inspections" when an error has occurred.

Note:

When starting the engine using a fully charged battery, if the starter does not rotate sufficiently, this may be due to battery deterioration. Please inspect or replace the battery.



E) Protective operations

- Input (primary side)
Protected from circuit errors by current fuse.
- Output (secondary side)
Protected from battery reverse connection and output short-circuiting by electronic circuit and circuit breaker.

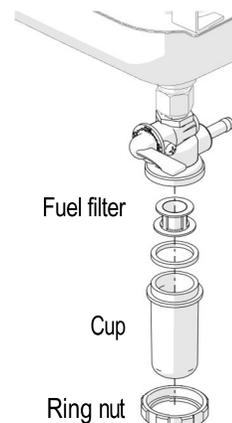
F) Inspection method when an error has occurred

Symptom	Cause	Measure *
Both red and green LEDs come on	Power cable is not connected correctly.	Check the connection status.
	The circuit breaker is open.	Pull out the power plug. After the body of the charger stops, remove the error cause, and close the circuit breaker after 60 seconds.
	The output connector is loose.	Insert the output connector all the way, and lock it securely.
The battery is obviously in discharged state, but the tickle charge mode starts immediately.	Battery is in the deteriorated state.	Replace the battery with a new one.
LED does not come on (both red and green)	Protective operation is activated.	Turn off the power and wait for 60 seconds. After that, charging the battery again.

5 Periodical Inspections

(3) Cleaning the fuel cock filter

- ① Close the fuel cock.
- ② Loosen and remove the ring nut with pliers.
- ③ Wipe off any debris in the cup with a cloth or the like.
- ④ Remove the filter attached to the ④❶ fuel cock main unit and wash it with gasoline.
- ⑤ Install the fuel cock securely to the original position. Be sure to open the ❶ fuel cock and inspect if there are no leaks.
- ⑥ After inspection, close the ❶ fuel cock.



(4) Replacement of the fuel in the tank

Storing fuel for a long period of time may result in poor starting performance and rust.
Replace with new fuel every 6 months.



Danger

- Keep fire away when refueling.
- There is a risk of ignition and explosion.

(5) Spark plug cleaning

Use [NGK BR8HIX] spark plugs.

Clean the spark plugs that are contaminated with exhaust gases and carbon.

- (1) Stop the engine to cool down sufficiently before working on it.
- (2) Remove the spark plug cap and spark plug using the spark plug box wrench.
- (3) Clean the outside, inside, and electrode of the spark plug.
- (4) Tighten the spark plug to the cylinder head and keep the spark spark plug cap pressed in.



Caution

- Do not touch the ignition plug or high-voltage cord during operation.
- There is a risk of electric shock.

(6) Check the governor oil level

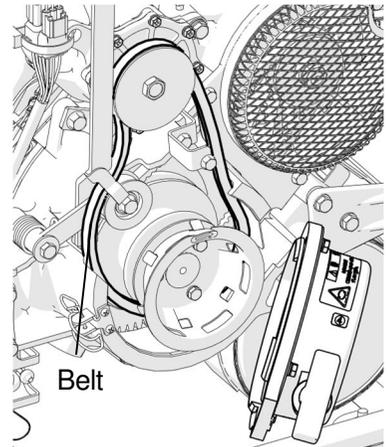
(See "4 Handling Methods (Preparation for Operation) 1.

5 Periodical Inspections

(7) Vacuum pump belt inspection

Replacement of the vacuum pump belt is required if it is stretched, worn, or cracked.

- ① Open the recoil starter.
Do not start the engine during the inspection.
Also, the belt may be hot immediately after operation, so wait until the engine has cooled down before inspecting
- ② Remove the front cover and vacuum pump cover.
(See "4 Handling Methods (Preparation for Operation) 1.")
- ③ Remove the belt from the pulley groove.
- ④ Install a new belt.
- ⑤ Install the cover as before.

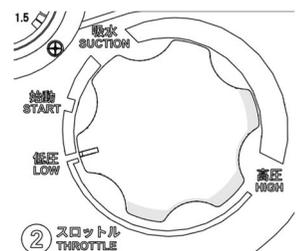
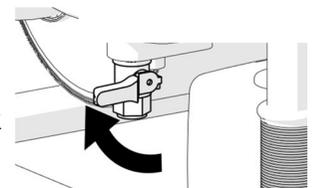
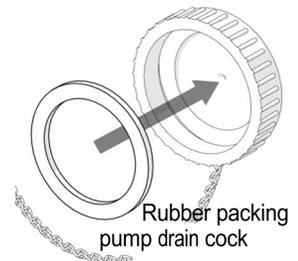


(8) Starting and vacuum inspection

Vacuum inspections must be performed even if the suction and discharge tests (which are described in the next page) are difficult to carry out.

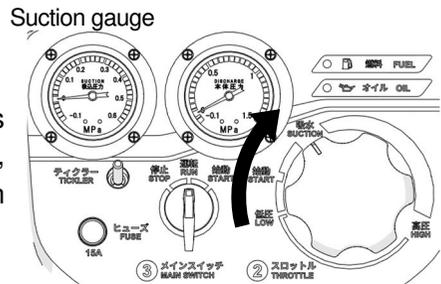
Defects such as engine not starting, poor vacuum performance, or vacuum leakage can cause accidents, such as not being able to operate the water discharge at the actual site, or falling water during the discharge.

- ① Check that the rubber packing is in the water suction cap, and attach the inlet cap to the water inlet.
- ② Close the pump drain cock.
- ③ Start the engine.
- ④ ② Warm up the engine with the throttle dial in the "low pressure" position for about 1 minute, and visually check for any abnormalities in the various parts.



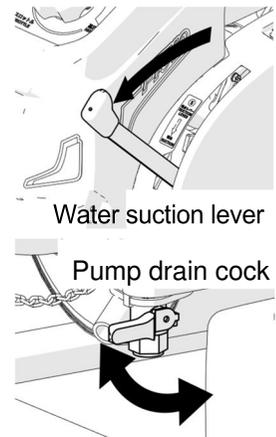
5 Periodical Inspections

- ⑤② Turn the throttle to the "suction" position and pull the ⑤ suction lever toward you to activate the vacuum pump. When the pointer of the ⑥ suction gauge reads -0.06 to -0.08 MPa, return the ⑤ suction lever, ② throttle to the "low pressure" position, and then stop the engine.
- ⑦ If there is no change in the indicated value of the suction gauge after leaving it for 1 minute, the vacuum performance is good.



- ⑧ Open the pump drain cock to release the vacuum and close the pump drain cock.

* If any abnormality is found, please consult your dealer.



(9) Water suction and discharge inspection

Suck and Discharge the water to inspect if there is no abnormalities found in each part of your pump

- (1) Are there any abnormal sounds?
- (2) Is there any water fall?
- (3) Is the water suction slow?
- (4) Are there any water leaks?
- (5) Is the startability good?
- (6) Are there any looseness in each part?
- (7) Are there any fuel leaks?
- (8) Other

*If any abnormality is found, refer to the "6 Troubleshooting" in the next section for appropriate treatments.

6 Troubleshooting

Daily inspection and maintenance are important to prevent fire-fighting pump malfunctions. Detect malfunctions at an early stage and perform maintenance immediately. If the trouble is not easily solved, or if the malfunction is not listed below, please consult the dealer where you purchased the pump, giving the model name and serial number.

1. Engine area

	Symptom	Cause	Action
Hard to Start	No fuel flow to carburetor.	1 Fuel cock filter or fuel line is clogging 2 Needle valve is sticking 3 There's no fuel.	1 Clean 2 Clean 3 Fill
	Fuel does not flow to combustion chamber (remove spark plugs to see)	1 Choke does not close (auto choke) 2 Rotational speed is low when starting. 3 Carburetor (needle valve, jet) is clogging	1 Repair and adjust 2 Replenish the battery 3 Clean
	Fuel goes to combustion chamber but does not start	1 Overflow (excessive fuel) 2 Tickler is overused (excessive fuel) 3 Choke does not open fully closed (auto choke) 4 Fuel is deteriorated 5 Water is mixed in the fuel. 6 Excessive lubricating oil	1 Inspect and adjust the carburetor 2 Drain the fuel from the seal at the crankcase. 3 Replace diaphragms and clean pipes. 4 Exchange. 5 Drain water 6 Adjust to the proper amount
	Abnormality of combustion system	1 Fuel cock filter is clogged 2 Carburetor valve seat is clogged 3 Carburetor is poorly adjusted, or there is a clog on the carburetor 4 Carburetor is poorly tightened.	1 Clean 2 Clean 3 Adjust or clean 4 Retighten
	Sparks are poor	1 Spark plug cap has damages, electrode gap is improper, or the spark plug is defective. 2 Leakage from high voltage cord 3 Leakage from spark plug cap 4 Defective ignition coil 5 Defective CDI unit 6 Poor rotation of the starting motor	1 Exchange 2 Exchange 3 Exchange 4 Exchange 5 Exchange 6 Replenish the battery

6 Troubleshooting

Symptom		Cause	Action	
Hard to Start	No sparks	<ol style="list-style-type: none"> 1 Short circuit of the ground wire 2 Spark plugs are damaged or stained. 3 Spark plug has gap failure 4 Ignition coil is defective 5 CDI unit is defective 6 Wiring connection is poor or disconnected 7 Main switch is defective 	<ol style="list-style-type: none"> 1 Repair the point short circuited 2 Exchange. 3 Exchange 4 Exchange 5 Exchange 6 Adjust the connection 7 Exchange. 	
	Poor compression	<ol style="list-style-type: none"> 1 Piston wear or seizure 2 Piston rings 3 Worn or damaged oil seals 4 Lack of lubricant 5 Damaged cylinder head gasket 	<ol style="list-style-type: none"> 1 Repair or replace 2 Exchange. 3 Exchange 4 Refill to the proper amount 5 Exchange 	
Poor running	Insufficient rotation	Combustion system error (mis-hunting)	<ol style="list-style-type: none"> 1 Carburetor main jet is clogged or misadjusted 2 Fuel cock filter clogged 3 Overflow 4 Poor installation of the carburetor 5 Icing 	<ol style="list-style-type: none"> 1 Clean or replace 2 Cleaning 3 Check and adjust the carburetor 4 Correct the place or replace. 5 Remove and add fuel tank drainage agent
		Abnormalities in the governor system	<ol style="list-style-type: none"> 1 Governor maladjustment 2 Governor operating parts wear 3 Defective caulking of flyweight 4 Poorly tightened governor arm 5 Governor spring tension failure 6 Governor lever ring hole worn or rattling large 	<ol style="list-style-type: none"> 1 Adjust 2 Exchange. 3 Correct or exchange 4 Readjust and retighten. 5 Exchange. 6 Replace or correct
		Cooling system abnormalities	<ol style="list-style-type: none"> 1 Cooling air is weak 	<ol style="list-style-type: none"> 1 Pay attention to the ventilation
		Other	<ol style="list-style-type: none"> 1 Overload 2 Muffler and exhaust port clogging 3 Inlet clogging 4 Defective spark plug 	<ol style="list-style-type: none"> 1 Change nozzle diameter or use safety nozzle 2 Remove the clog 3 Remove the clog 4 Exchange

6 Troubleshooting

		Symptom	Cause	Action
Poor running	Abnormal noise	Mechanical sound	<ol style="list-style-type: none"> 1 Flywheel is fixed loosely 2 Piston is worn, and tapping sounds come out from the piston skirt 3 Armature plate is contacting the other parts. 4 Foreign material is caught inside the crankcase and fan cover 5 Foreign material is caught inside the pump or impeller is touching the pump casing 6 Each part becomes loose 	<ol style="list-style-type: none"> 1 Retighten 2 Replace the piston 3 Reassemble 4 Remove the foreign material 5 Remove the foreign material or reassemble the pump 6 Retighten
		Knocking sound (combustion system abnormalities)	<ol style="list-style-type: none"> 1 Insufficient fuel (main jet or use of different diameter parts) 2 Overload 3 Rotation speed too low or too high 4 Different spark plug is used 	<ol style="list-style-type: none"> 1 Clean or replace 2 Open water discharge valve 3 Adjust to proper rotation speed 4 Replace with proper spark plugs

6 Troubleshooting

2. Pump

		Symptom	Cause	Action	
Water suction failure	A suction gauge does not have negative pressure	Abnormality on water pump side	<ol style="list-style-type: none"> 1 Poorly tightened suction pipe 2 Air suction from the tip of the suction pipe 3 Forgot to close the drain cock 4 Defective suction pipe packing 5 suction pipe fissure 6 Foreign matter caught in water discharge valve 	<ol style="list-style-type: none"> 1 Tighten securely 2 Put it completely underwater 3 Close securely 4 Exchange. 5 Exchange. 6 Remove foreign objects 	
		Abnormality on the vacuum pump side	No Rotation	<ol style="list-style-type: none"> 1 Internal freeze 2 Foreign object inhalation 3 Vacuum pump damaged 4 V Belt slip or breakage 	<ol style="list-style-type: none"> 1 Defrost 2 Remove foreign objects 3 Exchange. 4 Exchange.
			Rotating	<ol style="list-style-type: none"> 1 Clogged or poorly tightened vacuum passage 2 Strainer at the water shut-off valve is clogged 	<ol style="list-style-type: none"> 1 Clean or retighten 2 Clean
	The coupled meter becomes negative pressure	Vacuum leak (engine) Falling water when stopped)	Refer to "Water suction failure - compound meter does not become negative pressure - Water pump side abnormality"		
		No vacuum leakage	<ol style="list-style-type: none"> 1 Clogged suction pipe strainer or inside suction pipe 2 Air pocket in the suction pipe. 3 Suction height is too high, or the suction pipe is too long 4 Air suction from the tip of the suction pipe 5 Low engine speed at water suction 6 Short water suction operation time 7 Clogged or poorly tightened vacuum passage 8 Strainer at the water shut-off valve is clogged 	<ol style="list-style-type: none"> 1 Clean 2 Correct the layout 3 Keep the height within 8m 4 Put the tip completely underwater 5 Adjust to water suction rotation speed 6 Lengthen operation time 7 Clean or retighten 8 Cleaning 	

6 Troubleshooting

Symptom		Cause	Action	
Water Discharge Failure	Pressure does not increase	Abnormality on water pump side	<ol style="list-style-type: none"> 1 Clog in the suction pipe strainer or suction pipe 2 Air pocket in suction pipe 3 Suction height is too high, or the suction pipe is too long. 4 Air suction from the tip of the suction pipe 5 Poorly tightened suction pipe 6 Discharge valve half-open 7 Forgot to remove the safety nozzle (not necessary when the nozzle is attached) 8 Foreign matter in the nozzle 9 Frozen inside the pump 	<ol style="list-style-type: none"> 1 Clean 2 Correct the layout of the suction pipe. 3 Keep the height within 8m 4 Put the tip completely underwater. 5 Tighten securely 6 Open the valve completely 7 Remove 8 Remove foreign objects 9 Defrost and remove the ice
		Engine malfunction	Refer to 1. Engine – Hard to start and poor running	
	Other Abnormalities	<ol style="list-style-type: none"> 1 Muffler and exhaust port clogging 2 Air Inlet of the carburetor clogging 	<ol style="list-style-type: none"> 1 Remove the clog 2 Remove the clog 	

3. Electrical

Symptom		Cause	Action
Bad start	Starting motor does not rotate	<ol style="list-style-type: none"> 1 Insufficient battery capacity 2 Deterioration of the battery 3 Fuse burnout 4 The cable connection is loose or Disconnected 	<ol style="list-style-type: none"> 1 Recharge 2 Replace 3 Replace. 4 Check the cable connection and plug-in surely. Replace parts if necessary.
Battery failure	Batteries run out too quickly.	<ol style="list-style-type: none"> 1 Deterioration of the battery 2 Mistake in main switch operation. 3 Mistake in charge operation 	<ol style="list-style-type: none"> 1 Exchange. 2 Operate properly 3 Operate properly
Connection failure	Wiring burnout	<ol style="list-style-type: none"> 1 Battery reverse connection 2 Poor connection or short-circuit at the outlet terminal 3 Poor wiring connection or disconnection 4 Fuse burnout 	<ol style="list-style-type: none"> 1 Connect correctly 2 Connect correctly, or Repair or replace the short-circuited parts. 3 Correct the wiring or repair, or replace 4 Replace

6 Troubleshooting

Symptom		cause	treatment	
Defective wiring	Lamp does not light	1 Lamp blew out 2 Wiring is loose or disconnected	1 Replace 2 Correct the circuit, repair, or replacement	
Defective monitor lamp	All monitor lamps do not light up immediately after turning the main switch to operate	1 Battery capacity is not enough, or the battery is deteriorated. 2 Fuse burnout 3 Wiring is loose or disconnected	1 Recharge or replace 2 Replace 3 Correct the circuit, repair, or replacement.	
	The lamps do not light even if they should have lit up	Common & typical matters to be noticed	1 Loose or disconnected wiring of each sensor and switch	1 Correct the circuit, repair, or replacement
		Fuel	1 Switch is broken	1 Replace
		2-cycle oil	1 Switch is broken	1 Replace
Monitor lamp light up	Please refer to Section No. 3 – Monitor Lamp (P. 7) and cope with each matter displayed			

7 Specifications

1. Fire-fighting pump	
Model	FT510-A
Classification (JPN)	(B-2)
Notification No. (JPN)	(P0145001)
Dimension (L x W x H)	737mm x 572mm x 740mm
Dry Weight	90 kg
2. Pump	
Type	High-pressure 1-stage turbine pump (with inducer)
Discharge water volume	Normal 1.01 m ³ /min
	High pressure 0.64 m ³ /min
Pump pressure	Normal 0.70 MPa
	High pressure 1.00 MPa
Nozzle diameter	Standard 24.0 mm
	High pressure 17.5 mm
Rated rotation speed	5800 rpm
Water inlet	Nominal 75mm, Fire engine thread (JIS B 9912)
Water outlet	Nominal 65mm, Fire engine Thread (JIS B 9912)
3. Engine	
Type	Air-cooled, 2-cycle, inclined, 2-cylinder gasoline engine
Model name	E440C
Displacement	436mL
Authorized output	22.8 kW / 5800rpm
Fuel feeding system	Carburetor
Fuel type and tank capacity	Regular gasoline for automobiles - 14.5L
Lubrication system and tank capacity	Separate lubrication system (2-cycle oil) - 2L
Fuel consumption	Approx. 14L/h
Cooling system	Forced air-cooled
Ignition system	CDI ignition system
Starting system	Starting motor & recoil
Lighting	12V-35W (searchlight), 12V-3W (instrument panel light)
Spark plug	NGK BR8HIX

7 Specifications

4. Vacuum pump	
Type	Oilless type: 4-vane eccentric rotary type
Maximum Suction Height	Approx. 9 m
Drive system	V Belt clutch type
5. Accessories	
Battery	12V15Ah/5h
Charger	AC100V~AC240V – DC12V charger
Tools, etc.	1 x Tool kit, 1 x instruction manual 1 x Spark plug, 1 x safety nozzle
Pump cover	1 pc.
6. Optional parts	
Searchlight lamp	1 pc.
Searchlight stand	1 pc.



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SHIBAURA

OPERATION MANUAL

SHIBAURA FIRE-FIGHTING PUMP FT510-A



Please read this operation manual carefully to operate the Shibaaura Fire-fighting Pump safely and correctly. Incorrect operation of the pump may result in an accident. If this manual is missing or damaged, please order a new one from us or our agent promptly.

Shibaaura Fire Pump Co., Ltd.

- For safe use

Keep it in a safe place with the fire-fighting pump.

- Items marked with  in this instruction manual are particularly important for safe use and must be observed.

 Danger	The case when there is an imminent risk of death, serious injury, or the product is mishandled.
 Warning	The case when there is a risk of death or serious injury, or the product is mishandled.
 Caution	In cases when the product is mishandled, minor injuries or property damage may occur.

- Product specifications and appearance are subject to change without notice for improvement. Therefore, please note that the contents of this document and some of the photographs and illustrations may not correspond to the product.
- If you have any questions or difficulties after reading this manual, please contact the dealer where you purchased the product or our company.
- For inspection and maintenance, please contact a maintenance business or dealer that is qualified to service portable fire-fighting pumps.

○ Contents

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1 Things you must follow for your safety

1. Warning Label Locations



Part No.L82900900



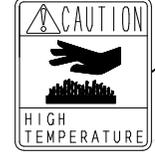
Part No.290192430



Part No.290192770



Part No.290192410



Part No.290192400



Part No.290192400

- If the contents of the label become difficult to see or the label is about to come off, replace it immediately.

1 Things you must follow for your safety

2. Caution Marks



- Do not suck in or discharge the substances other than water, such as flammable materials, drugs, or chemical liquid.
- There is a risk of explosion, fire, burns, poisoning, etc.

- Keep fire away when refueling.
- Do not overfill fuel into the tank.
- If the fuel is spilled, wipe it up immediately. Keep the wiping cloth away from fire.
- Refill the fuel after the engine has cooled down.
- Do not use fire to defrost the pump.
- There is a risk of ignition and explosion.



- Fire-fighting pumps should be operated by firefighters, voluntary disaster prevention team members, maintenance and inspection personnel, and others who have been trained specifically for safe operation.
- Misuse or mishandling may result in serious accidents, including death.

- No neck wraps, ties, waist towels, etc., are allowed. Wear helmets, non-slip shoes, and no loose-fitting clothing.
- There is a risk of getting caught in the machine or slipping and falling, resulting in injury.

- Do not operate a fire-fighting pump if you are unable to concentrate on your work due to alcohol consumption, tiredness, illness, or the effects of drugs.
- This could lead to a serious accident.

- Use only genuine parts or specified attachments. No modifications are allowed.
- Failure to do so may result in accidents, injuries, or machine malfunctions.

- Install at least 3 m away from combustible materials.
- Remove flammable materials, such as dry grass, before installation.
- Exhaust fumes and heat from the muffler may cause a fire.

- Do not install indoors or in tunnels with poor ventilation.
- There is a risk of exhaust gas poisoning.

- Be sure to install the cover when operating.
- There is a risk of injury or burns.

- Be sure to close the recoil starter during operation.
- There is a risk of getting caught in pulleys or belts, or of getting cut yourself.

- Keep fire away from the battery.
- There is a risk of fire and explosion.

- Remove packing materials from the battery charger before charging.
- There is a risk of fire.

- Be sure to carry out periodic inspections. Operate and discharge the water at least once a month to check for any abnormalities.
- Accidents may occur due to damage, etc., and fire-fighting activities may be hindered.

1 Things you must follow for your safety

Caution

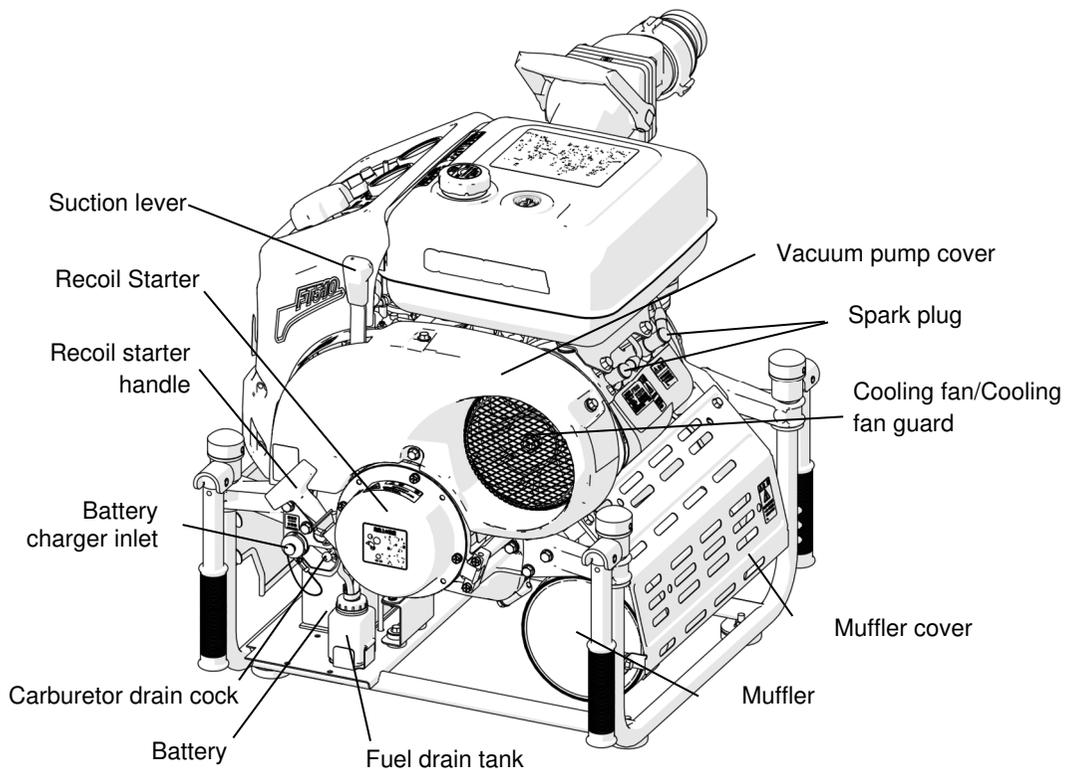
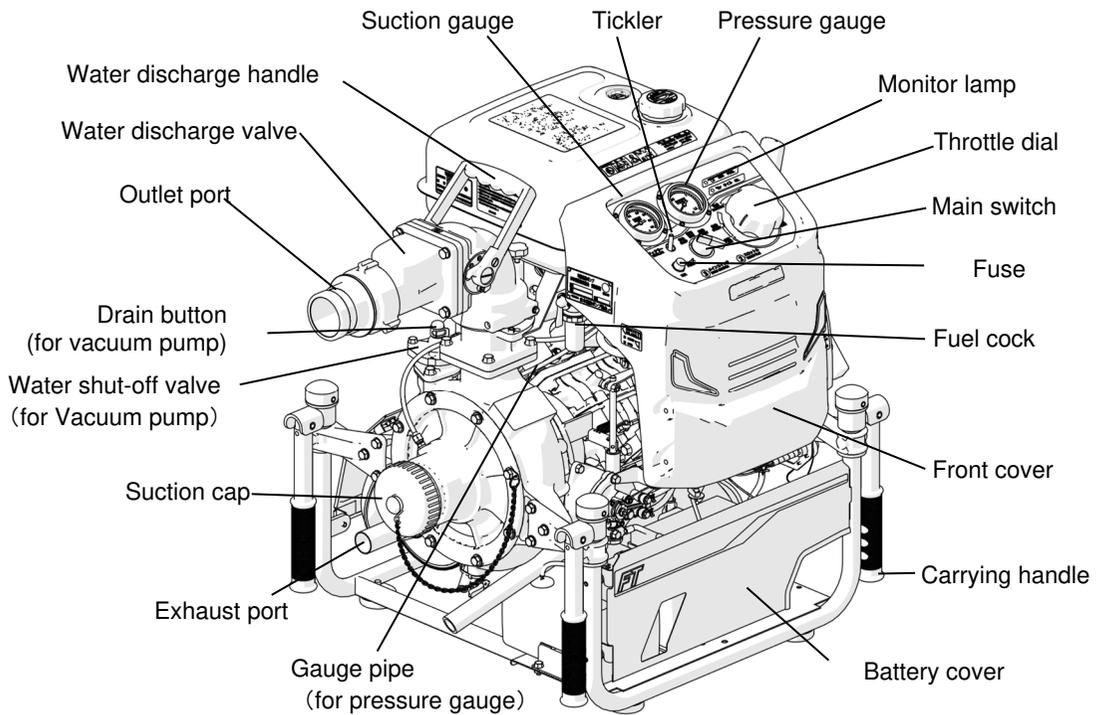
- Do not use fire-fighting pumps for activities other than fire-fighting, such as civil engineering, irrigation, water sprinkling, etc.
- There is a risk of hitting some objects and injuring people or damaging property around you.
- When disposing of batteries, oils, etc., please entrust disposal to a specialized industrial waste disposal contractor.
- It may cause fire, burns, or pollute the environment.
- Do not put fingers or hands in the water discharge valve.
- There is a risk of injury.
- After refueling, tighten the fuel tank cap securely.
- There is a risk of ignition and explosion.
- Check the fuel once a month, and if the fuel has a pungent odor or is cloudy, replace it with new fuel immediately.
- This may cause engine malfunction or equipment failure.
- When adding two-cycle oil, always use the same brand and grade of oil.
- Avoid entering water or debris when refilling the two-cycle oil.
- This may cause engine malfunction or equipment failure.
- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.
- When replenishing the governor oil, add the same brand and grade of oil.
- Avoid entering water or debris when refilling the governor oil.
- This may cause engine malfunction or equipment failure.
- When holding the carrying handle, do not touch the joint parts.
- Failure to do so may result in injury from pinching fingers.
- When carrying or loading/unloading the fire-fighting pump, four people should do so.
- Dropping it on your foot may cause injury or back pain.
- Connect the fire hose securely and always ensure it cannot be disconnected.
- If it is pulled out during water discharge, there is a risk of injury.
- Lay out the fire hoses without folds, twists, or sharp turns.
- There is a risk of the water hose springing up and causing injury.
- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.
- When starting with a recoil starter, avoid getting clothing or gloves caught.
- There is a risk of injury.
- When starting with the recoil starter, keep people at least two meters away from the starter.
- There is a risk of injury to elbows from being knocked by recoil ropes.

1 Things you must follow for your safety

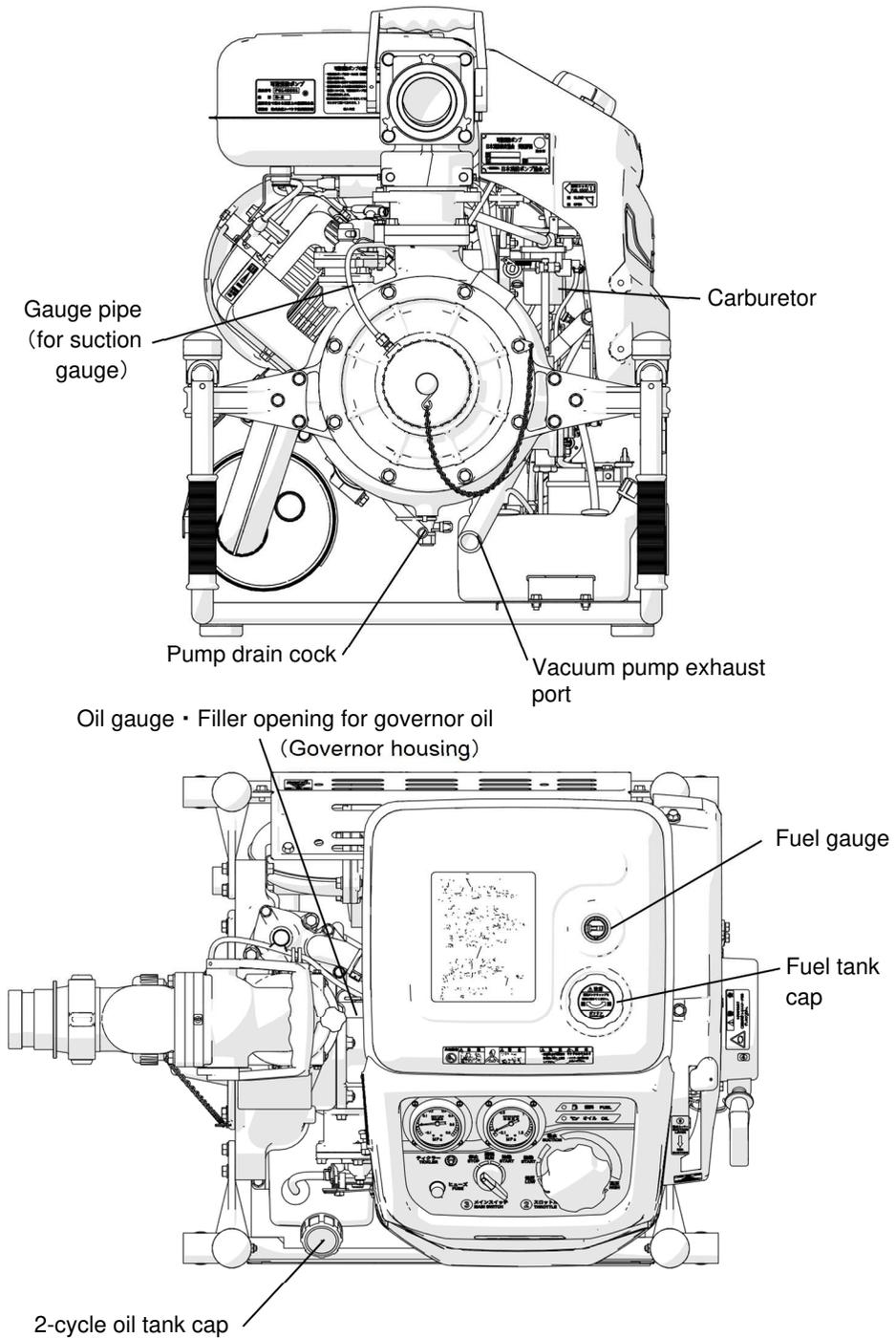
Caution

- Always return the throttle to the "LOW" position before opening and closing the water discharge valve.
- Hold the fire nozzle firmly and discharge water.
- There is a risk of injury because the fire nozzle runs away.
- Operate the water discharge valve slowly.
- There is a risk of injury from pinching or bumping hands.
- Do not aim the water at people or peer into the nozzle.
- High water pressure may cause them to be blown away, resulting in injury.
- Do not touch the spark spark plug or high-voltage cord during operation.
- There is a risk of electric shock.
- Never touch the muffler and exhaust pipe during and after operation since they become very hot.
- There is a risk of burns.
- While operating, be careful not to have the suction pipe or hose stepped on by vehicles or other objects.
- Accidents may occur due to damage, etc., and fire-fighting activities may be hindered.
- Do not start the engine with the water discharge valve handle open.
- When discharging water, the engine operator should communicate with the operator at the nozzle. Do not open the water discharge valve without notice or accelerate the throttle rapidly.
- There is a risk of injury from being blown away by the high-pressure water.
- Inspection and maintenance should be performed after the engine has been stopped and cooled down sufficiently.
- Failure to do so may result in injury, burns, or fire.
- Read the instruction manual that comes with the battery and the information on the battery itself carefully to ensure that the battery is used correctly.
- When disconnecting the battery cord, remove the (-) cord first, and when installing the battery cord, connect the (+) cord first.
- Short-circuiting may cause fire or burns.
- Do not use the charger in high-temperature places such as under direct sunlight or near heating elements, in extremely humid places, or wet areas such as rain or snow.
- There is a risk of overheating, burnout, or damage to the charger, or leakage of electricity or electric shock.
- The charger should be installed in a dry, well-ventilated location that is not wet.
- Failure to do so may cause electric shock or fire.
- Do not charge the battery with a charger other than the specified one.
- There is a risk of fire due to heating or burnout of the wiring.
- When operating without attaching the suction pipe (e.g., to check the vacuum level), attach the suction cap.
- There is a risk of getting caught in the machine or injured.
- Do not close the nozzle or water discharge valve while multiple pumps are relayed and the water is discharged.
- Abnormally high pressure may result in damage to the pump and hoses.

2 Name of each component



2 Name of each component



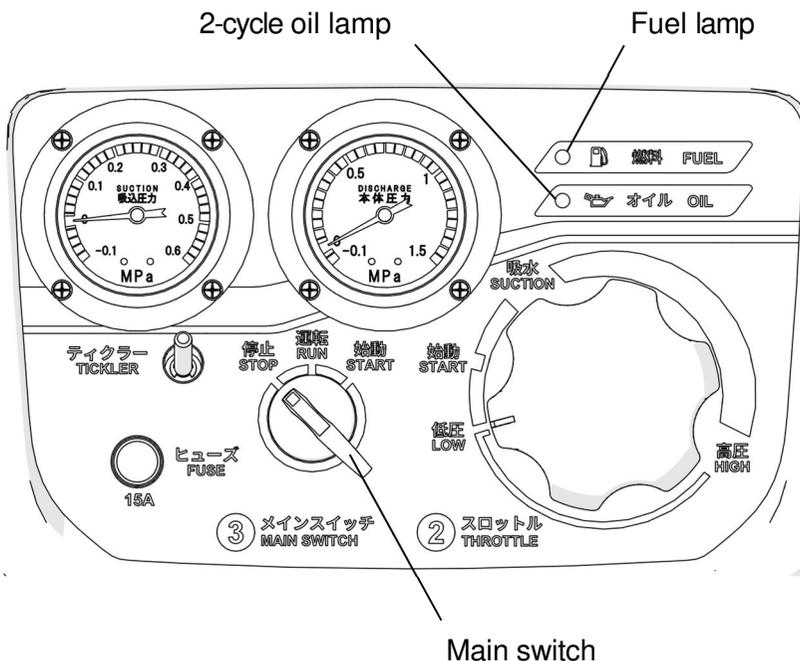
3 Monitor lamp

The pump with a starting motor activates when the main switch is turned into the "Run" position. When the power is turned on, two lights illuminate at the same time. If they do not light up, the battery voltage is insufficient, or there is a faulty circuit, the pump needs to be repaired. All lights are turned off after a few seconds.

All lights are turned off during water discharge, but the lights are turned on when operating the starting motor. It is because the battery voltage drops. Be sure to inspect or maintain when the following items are lit up.

Display	Feature	How it works	Measures
 fuel	Indicates that the fuel must be added	Lights up when the remaining fuel in the tank is low.	Refill the regular gasoline.
 2-cycle oil	Indication of when to refill 2-cycle oil	Lights up when the remaining oil in the tank is low, then stop the engine.	Refill the 2-cycle oil.

If the monitor lamp still illuminates or blinks after following the measures above, consult your dealer.



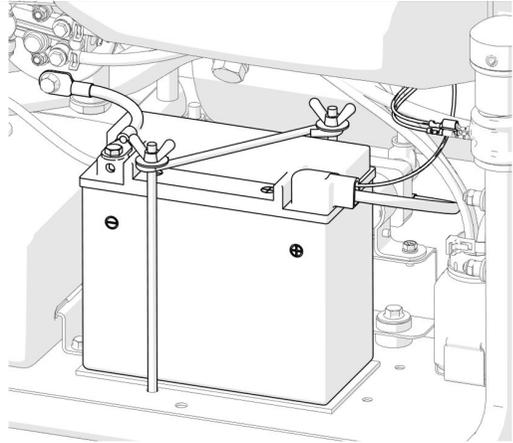
4 Handling method (Before)

Installing Battery

Caution

- Read the instruction manual that comes with the battery and the information on the battery itself carefully to ensure that the battery is used correctly.

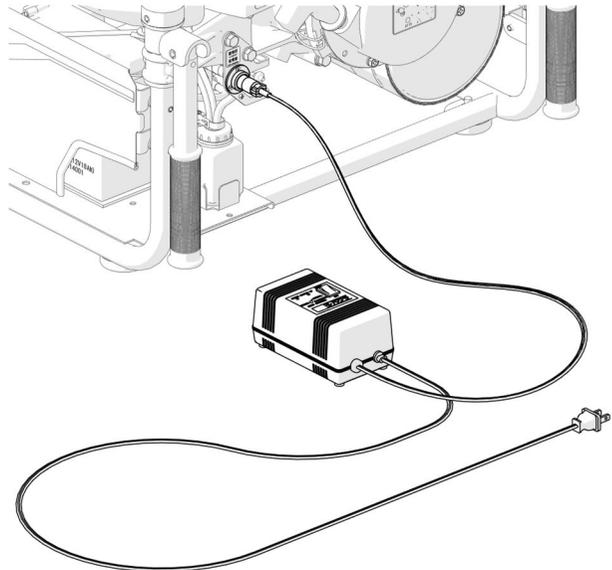
- (1) For handling, be sure to follow the battery instruction manual.
- (2) Fix the battery to the bed with two rods and one holder.
- (3) Firstly, connect two battery (+) cables (red), then connect one (-) cable (black) . Be sure to keep the connecting order.



Caution

- When disconnecting the battery cable, remove the (-) cord first, and when installing, connect the (+) cable first.
- Short-circuiting may cause fire or burns.

- (4) Connect the supplied charger to a charger inlet to charge the battery. (See "5 Periodic Inspection 2. Inspection Method (2) Handling of Fully Automatic Charger" on p. 29.)



4 Handling Method (Preparation for Operation)

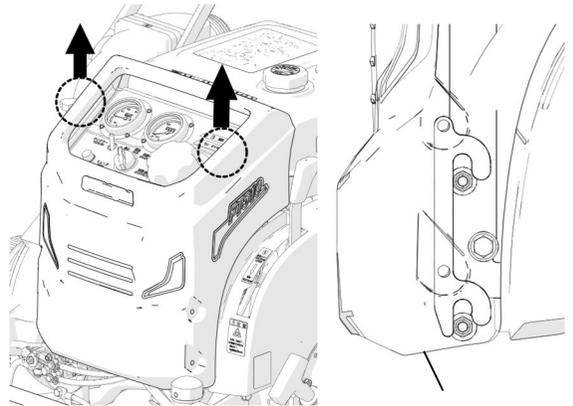
1. Removing and attaching covers

When removing the cover, follow the procedure below.

(1) Removing/attaching front cover

Hold the circled places on the illustration on the right. Shift it upward first, and then remove it toward you.

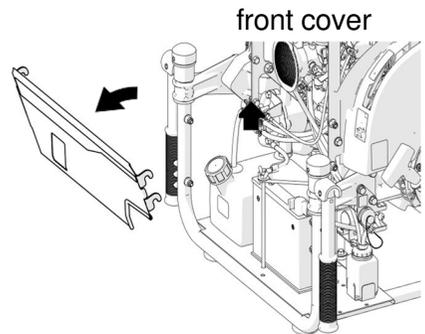
Installation is the reverse procedure.



(2) Removing and attaching the battery cover

Slide the battery cover upward first, and then remove it toward you.

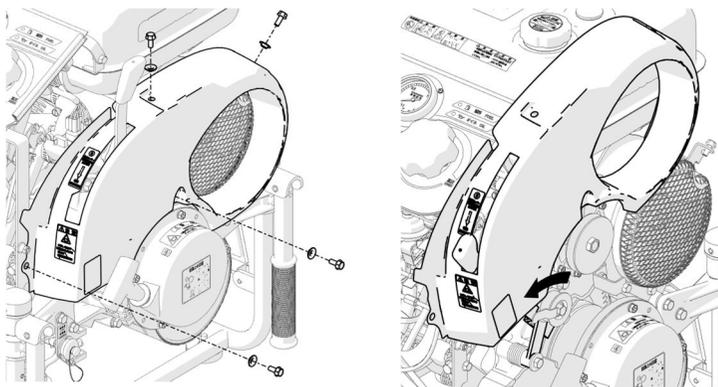
Installation is the reverse procedure.



(3) Removing and attaching vacuum pump cover

Remove the four bolts and collars. Pull the water suction lever toward you and remove it through the lever opening of the vacuum pump cover.

Installation is the reverse procedure.



Warning

○ Be sure to attach the cover when driving.

● There is a risk of injury or burns.

4 Handling Method (Preparation for Operation)

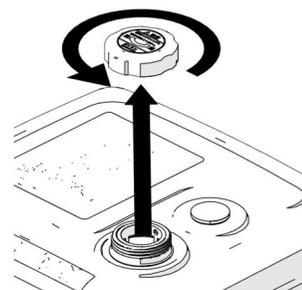
1. Replenishment

(1) Fuel

(Fuel tank capacity: approx. 14.5L)

Fill the tank with regular gasoline until the fuel gauge indicates "F".

Do not add gasoline mixed with two-cycle oil or bio-gasoline.



Danger

- Keep fire away when refueling.
- Do not overfill fuel into the tank.
- If the fuel is spilled, wipe it up immediately. Keep the cloth away from fire.
- Refill the fuel after the engine has cooled down.
- There is a risk of ignition and explosion.
- Hold the nozzle firmly and discharge water.
- There is a risk of injury due to swinging of the discharge nozzle.

Caution

- Tighten the fuel tank cap securely after refueling.
- There is a risk of ignition and explosion.

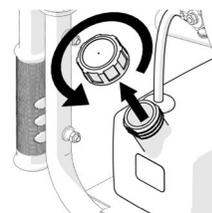
Caution

- Check the fuel once a month, and if the fuel has a pungent odor or is cloudy, replace it with new fuel immediately.
- This may cause engine malfunction or equipment failure.

(2) Engine oil

(Oil tank capacity: Approx. 2L).

Fill the 2-cycle oil into the oil tank at the bottom of the fire-fighting pump.



Caution

- When refilling the 2-cycle oil, use the same brand and grade of oil.
- Do not allow water or debris to enter when refilling.
- This may cause engine malfunction or equipment failure.

Caution

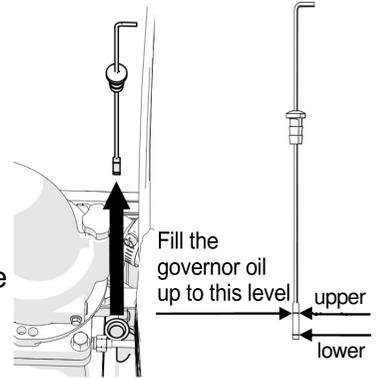
- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.

4 Handling Method (Preparation for Operation)

(3) Governor oil

(1) Place the pump on the level place and check the governor oil level with an oil gauge.

- Remove the governor oil level gauge and check the oil level. Refill the oil to the original level when the oil level has become in the middle or lower. Put back the oil gauge after refilling. Do not replenish more than the upper limit.
- If the oil is very dirty or cloudy, consult your dealer.
- Recommended oil (Automotive engine oil) SAE:10W-30(API:SJ)



Caution

- When replenishing governor oil, add the same brand and grade of oil.
- Do not allow water or debris to enter the oil inlet when refilling.
- This may cause engine malfunction or equipment failure.

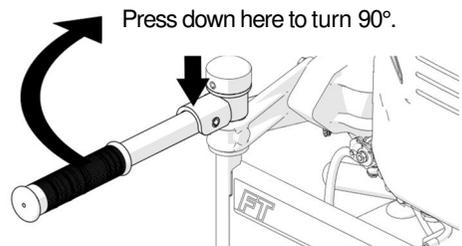


Caution

- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.

2. Carrying the pump

Hold the transport handle correctly when moving and loading/unloading the fire-fighting pump.
The carrying handle can be turned 90 deg.



Caution

- When holding the carrying handle, do not touch the bend.
- Fingers may be pinched, resulting in injury.

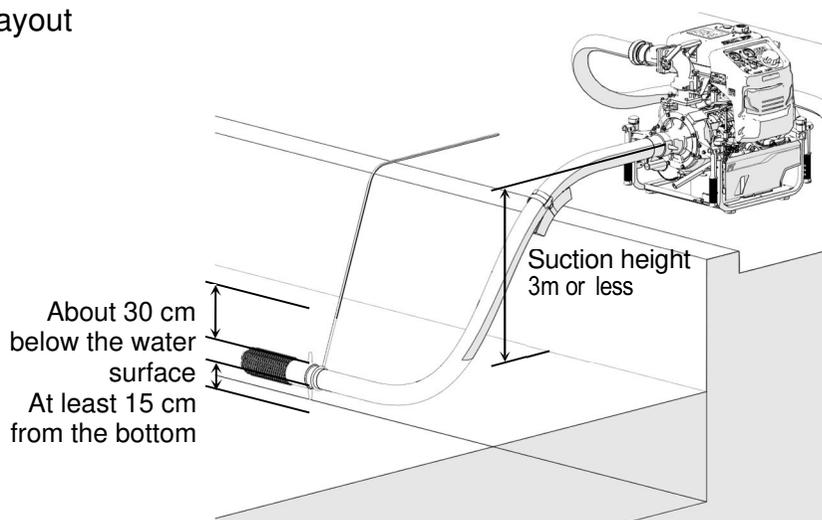


Caution

- 4 people is necessary to carry the pump.
- Dropping it on your foot may cause injury or back pain.

4 Handling Method (Preparation for Operation)

3. Pump layout



- (1) Check the water source. Make sure that there will be no problems with use, such as no decay, floating matter, or sediment.
- (2) Place the pump close to the water source and on a level surface.



Warning

- Avoid installation in places with poor ventilation, such as indoor, in a vehicle, tunnel. There is a risk of exhaust gas poisoning.



Warning

- Place at least 3 m away from combustible materials.
- Remove dead grass and other flammable materials before setting.
- Exhaust fumes and heat from the muffler may cause a fire.

- (3) Keep the suction height below 3m as much as possible to avoid falling water because of the reduction of the pump capacity.
- (4) Lay out the suction hose with no bends or bumps and fasten it tightly to the suction inlet port. Ensure the level of the inlet port side is higher than the suction hose tip at the water source side.
- (5) Always attach a strainer and basket to the suction port of the suction hose and keep it below the water surface to prevent air sucking in. Place the tip about 30 cm above the bottom. If the tip of the device is 15 cm or more away from the bottom. Place a straw mat to prevent sediment from being sucked into the device. If the water source has algae, watergrass, etc., remove them around the water inlet.
- (6) Connect the fire hoses securely and lay them out. Be sure not to fold.

4 Handling Method (Preparation for Operation)



Caution

- Connect the fire hose securely and always ensure it cannot be disconnected.
- If it is pulled out during water discharge, there is a risk of injury.



Caution

- Lay out the fire hoses without folds, twists, or sharp turns.
- There is a risk of the water hose springing up and causing injury.

4. Pump user

- (1) Fire-fighting pumps are small but high-performance machines with strong power. Improper use may cause serious accidents, including death.



Warning

- Fire-fighting pumps should be operated by firefighters, voluntary disaster prevention team members, maintenance and inspection personnel, and others who have been trained specifically for safe operation.
- Misuse or mishandling may result in serious accidents, including death.

- (2) Wear clothing appropriate for the operation.



Warning

- No headbands, neck wraps, ties, waist towels, etc., are allowed. Wear helmets, non-slip shoes, and no loose-fitting clothing.
- There is a risk of getting caught in the machine or slipping and falling, resulting in injury.

- (3) Do not operate if you are not feeling well.



Warning

- Do not operate fire-fighting pump if you are unable to concentrate on your work due to alcohol consumption, tiredness, illness, or the effects of drugs.
- This could lead to a serious accident.

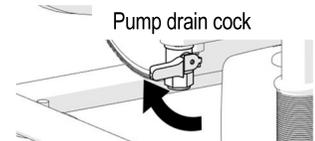
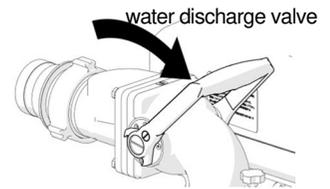
4 Handling method (Operation)

1. Starting the engine

Close the ⑥ water discharge valve and pump drain cock before starting the engine.

Please be sure to check the following

Follow the operating instructions in the order of ❶ to ❹ numbers on the unit.



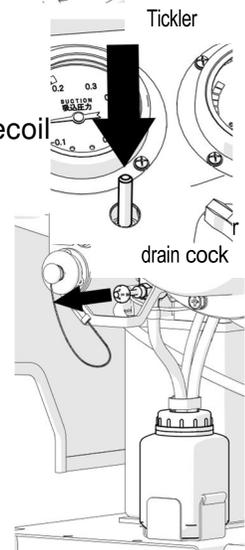
(1) Open the ❶ fuel cock.

Move the fuel cock lever straight down to "Open" ❶ to open the fuel cock.



(2) In cold weather, use the tickler in the carburetor.

- If it is difficult to start the engine with auto-choke alone in cold weather, press the tickler for 2 to 3 seconds.
- Press the tickler for 2 to 3 seconds when starting with the recoil starter and the engine is cold.
- If you use tickler for multiple times and the engine does not start, close the ❶ fuel cock, drain fuel from the carburetor drain cock, then start the engine.
- If the engine does not start properly due to excessive fuel, such as when restarting after warm-up, close the fuel cock, open the carburetor drain cock, and drain the gasoline from the carburetor before starting the engine. After starting, turn the fuel cock "open". If the car stops, start the car again.



*Remove and dispose of the fuel in the drain tank every time.

Fuel drain tank

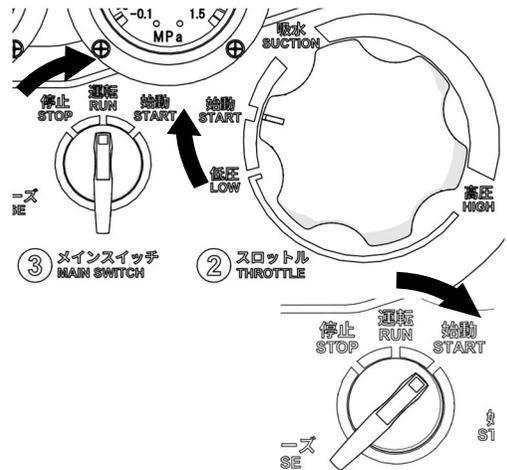


Caution

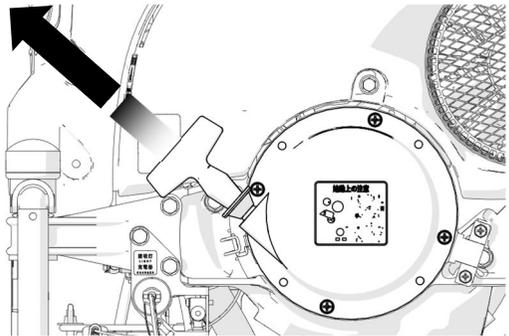
- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.

4 Handling method (Operation)

- (3) Turn the ② throttle to the "start" position.
- (4) Turn the main switch to the "run" position.
When starting the starter motor, turn it to the "START" position. The starter motor works, and the engine starts.
- Once the engine is started, set the ③ main switch to the "operation" position.
 - Stop the starter motor for at least 5 seconds after running it for 3 seconds. Continuous operation will cause deterioration of the battery and the starter motor.



- (5) For recoil starting, pull the ④ recoil starter handle out to the point where it is slightly heavy, then pull quickly and sharply.



Caution

- When starting with a recoil starter, avoid getting clothing or gloves caught.
- There is a risk of injury.



Caution

- When starting with the recoil starter, keep people at least two meters away.
- There is a risk of injury to the elbows from being knocked by recoil ropes.



Warning

- Be sure to close the recoil starter during operation.
- There is a risk of getting caught in pulleys or belts, or of cutting yourself.

4 Handling method (Operation)

2. Suction

- (1) Turn the ② throttle to the "suction" position after starting the engine.
- (2) Pull the ⑤ suction lever toward you to activate the vacuum pump and suction water.
 - Promptly return the ⑤ suction lever when the pressure gauge needle swings and the pressure increases and stabilizes.
 - Keep the vacuum operation time less than 30 seconds.

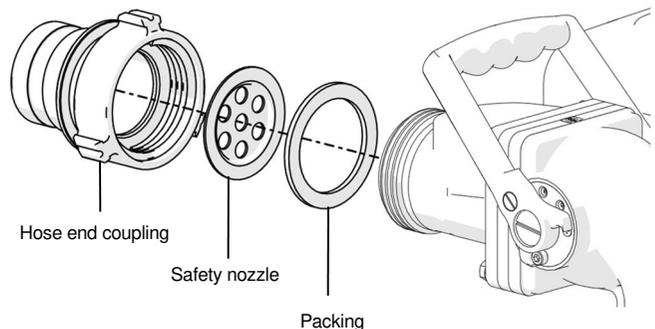


3. Water discharge

Before discharging water, check the safety of the nozzle. Give a signal to the person at the nozzle to start discharging water.

- (1) ⑥ Operate the water discharge handle gradually in the "→Open" direction until it stops.
 - Turn the throttle to the desired water pressure level.
 - Adjust the pressure with the ② throttle according to the water discharge conditions.
 - Be careful not to use too high a water discharge pressure or to open or close the ⑥ water discharge valve handle too rapidly, which may cause the water discharge hose to swing.
- (2) Standby for water discharge
 - To close the ⑥ water discharge valve and put the machine in standby mode during water discharge, ② turn the throttle to the "low pressure" position and stop the engine. In this case, the check valve will operate and water will not fall, so restart the engine and open the ⑥ water release valve to re-discharge water. (However, restarting must be done within 3 minutes.)
 - If it is necessary to stand by without stopping the engine, be sure to put the ② throttle in the "low pressure" position.
- (3) The case when discharging water without using a nozzle

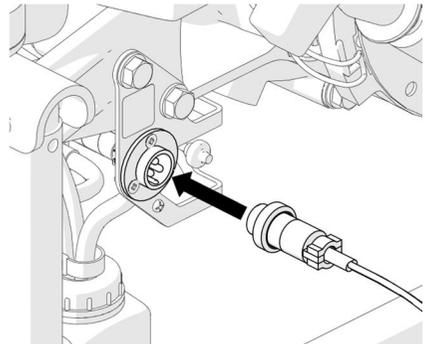
- When operating without using the nozzle, such as pumping water from a water tank or pumping water to a relay tank, be sure to set the attached safety nozzle between the hose end coupling and the water discharge valve, as shown in the figure.



4 Handling method (Operation)

(4) To turn on the searchlight

- To turn on the searchlight, plug the searchlight into the charger inlet on the recoil side.



Caution

- Always return the throttle to the "LOW" position before opening and closing the water discharge valve.
- Hold the nozzle firmly and discharge water.
- There is a risk of injury due to swinging of the discharge nozzle.

Caution

- Operate the water discharge valve slowly.
- There is a risk of injury from pinching or bumping hands.

Caution

- Do not aim the water at people or peer into the nozzle.
- High water pressure may cause them to be blown away, resulting in injury.

Caution

- Do not touch the spark plug or high-voltage cord during operation.
- There is a risk of electric shock.

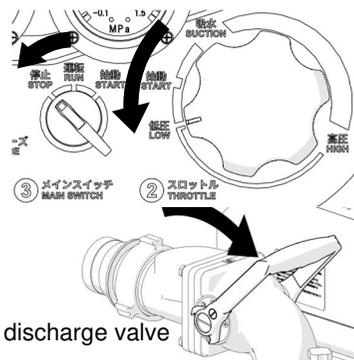
Caution

- Never touch the muffler and exhaust pipe during and after operation since they become very hot.
- There is a risk of burns.

4 Handling method (Operation)

4. Stopping the engine

- (1) ② Turn the throttle to the "LOW" position.
 - If the engine is hot, run the engine at low speed for about 1 minute to cool it down.
- (2) Close the ⑥ water discharge valve handle by operating it in the "→ close" direction.
- (3) ③ Turn the main switch to the "STOP" position. The engine will stop.



5. Draining water

After the operation, a large amount of water remains inside the pump. This remaining water may cause corrosion and freezing cracks during cold weather. Be sure to drain water before storing.

- (1) Open the pump drain cock.
- (2) Open and close the ⑥ water release valve, press the water shut-off valve drain button, and drain completely.
- (3) Close the pump drain cock and install the water inlet cap.
- (4) Start the engine and pull the ⑤ suction lever to activate the vacuum pump for approximately 5 seconds.
- (5) ② Turn the throttle to the "low pressure" position, ③ Turn the main switch to the "stop" position and stop the engine.
- (6) Open the pump drain cock and remove the water inlet cap to confirm that it is completely drained. If drainage is insufficient, repeat steps (3) to (5).
- (7) Close the pump drain cock and install the water inlet cap.



Treatment after using seawater or muddy water

If seawater or muddy water is used, be sure to operate the pump by discharging water with clean water for at least 5 minutes to clean the inside of the pump. Also, to clean the inside of the vacuum pump, operate the vacuum pump for about 5 seconds by pulling the ⑤ suction lever while discharging water at low pressure, and drain clean water from the vacuum pump exhaust hose. After cleaning is complete, be sure to drain the water using the operation described in the previous section "5".

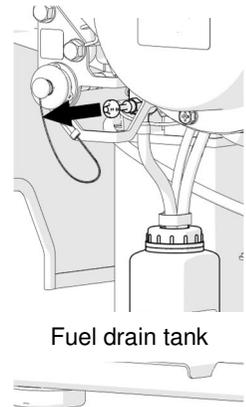
4 Handling method (Operation)

6. Storing the pump

- (1) Store in a dry, temperature-controlled area, away from dust and direct sunlight.
- (2) Wipe off oil, dust, and dirt and keep clean.
- (3) Fill the fuel up to the "F" level when storing. ●Close the fuel cock.
- (4) Fill the specified amount of 2-cycle oil.
- (5) Drain the fuel in the carburetor from the carburetor drain cock, on the recoil starter side.
*Make sure to remove the fuel inside the fuel drain tank every time.
- (6) Please charge the battery with the supplied charger while in storage.
(See "5 Periodic Inspection 2. Inspection Method (2) Handling of Automatic Charger" on p. 29)
- (7) Cover the pump with the attached pump cover.



Carburetor drain cock



Fuel drain tank

- Before storing the pump, be sure to check that the water inside is completely drained. Also, fill the pump with antifreeze to prevent freezing when storing the pump in cold weather (see "4 Handling Methods" Operation in Winter and Cold Weather, on P. 20)
- Operate and discharge water for 5 to 10 minutes at "HIGH" throttle position every month.
- Check the fuel in the fuel tank once a month, and if there is a pungent odor or cloudiness, replace the fuel with new fuel. The recommended replacement time is 6 months after refueling.
- If the vehicle has been in storage for a long period of time without a monthly periodic inspection, operate the pump for 1 minute at "LOW" position to warm up the engine. Be sure to inspect visually to see if there are any abnormalities.



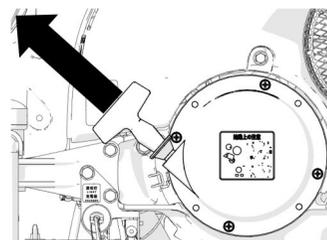
Caution

- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.

4 Handling Method (Operation in Winter and

1. Before starting the engine

- (1) In cold weather, battery capacity is significantly reduced. Please be sure to charge regularly.
- (2) ● Gently pull the recoil starter handle and check that the pump turns.
 - If it does not turn, the pump may be frozen. Pour the warm water into the pump from the suction port or defrost it in a warm room.



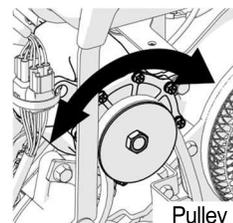
Recoil starter handle

- (3) Remove the vacuum pump cover.

(See "4 Handling Methods (Preparation for Operation)"

1. Removing and attaching the covers, on page 9 .)

- Turn the vacuum pump pulley by hand and check if the vacuum pump turns.
- If it does not turn, the vacuum pump may be frozen.
Blow warm air outside the vacuum pump or defrost in a warm room.



Pulley



Danger

- Do not use fire to defrost the pump.
- There is a risk of ignition and explosion.

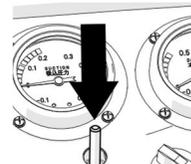


Caution

- Inspection and maintenance should be performed after the engine has been stopped and cooled down sufficiently.

2. Starting the engine

- (1) In cold weather, press the tickler for 2 to 3 seconds.
- (2) Immediately after the engine starts, operation may be unstable; run the machine idle at low speed for 1 to 2 minutes.



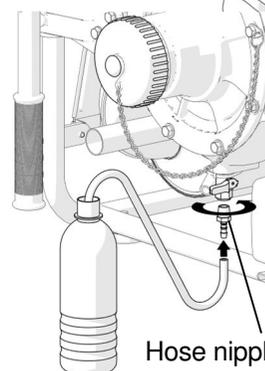
3. Treatment after water discharge (freeze prevention)

- (1) Preventing pumps from freezing (how to add antifreeze)

- ① Drain the water.

(Refer to "4 Handling Method (Operation) 5. Draining water)

- ② Close the water suction cap.
- ③ Attach the hose nipple and hose to the pump drain cock and place the hose in a bottle filled with antifreeze



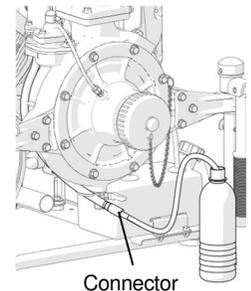
Hose nipple

4 Handling Method (Operation in Winter and

- ④ Start the engine.
- ⑤ ② Turn the throttle to the "SUCTION" position.
- ⑥ ⑤ Pull the suction lever to create a vacuum state inside the pump.
- ⑦ Open the pump drain cock to suck in antifreeze.
- ⑧ Pull the ⑤ suction lever again, and when antifreeze comes out of the vacuum pump exhaust port, return the ⑤ suction lever.
- ⑨ Remove the hose and hose nipple from the pump drain cock.
- ⑩ Pull the ⑤ suction lever and stop the engine when the antifreeze stops coming out of the vacuum pump exhaust port.
- ⑪ After collecting antifreeze from the pump drain cock, close the drain cock.

(2) Preventing the vacuum pump from freezing (how to fill the vacuum pump with antifreeze)

- ① Connect the connector and hose to the water shut-off valve drainpipe and place it in a container of antifreeze.
- ② Start the engine.
- ③ Set the ② throttle to the "SUCTION" position.
- ④ Pull the ⑤ suction lever and suck in the antifreeze.
- ⑤ If antifreeze comes out of the vacuum pump exhaust port, return the water suction lever.
- ⑥ Remove the connector and open the pump drain cock.
- ⑦ Pull the ⑤ suction lever, and when the antifreeze stops coming out of the vacuum pump exhaust port, return the ② throttle to the "LOW" position and stop the engine.
- ⑧ Close the pump drain cock.



(3) Antifreeze should also be injected into water discharge valves and hose couplings.

CAUTION: Do not use alcohol to prevent freezing, since it will damage the rubber seals. Collect drained antifreeze in a liquid container.

4. Precautions for storage

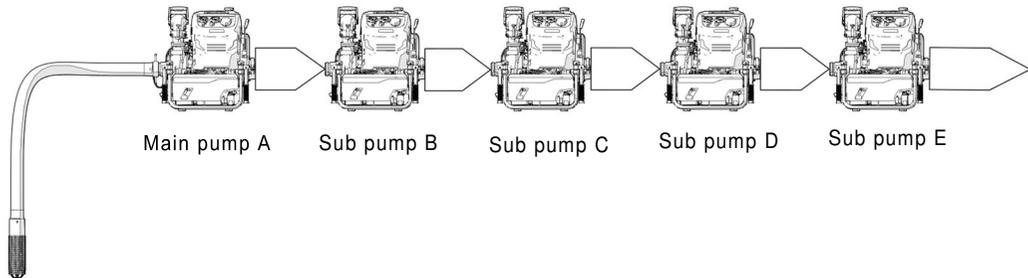
Choose the fuel with good quality. (The better quality of gasoline is highly volatile, and has better starting performance.)

- (1) Be sure to always have antifreeze on hand.
- (2) Batteries may freeze when the relative density of electrolyte becomes low. Be sure the battery is always recharged. If battery performance deteriorates, replace the battery as soon as possible.

4 Handling method (Relaying water with multiple pumps)

In the case of forest fires or urban fires where the water supply is far away, two or more pumps may be connected in series to relay water. The relay water requires different operations and special attention compared to normal operation because each pump is located far from the others. Daily training is also necessary to enable judgment and activities based on the state the pump's operators are facing. See the general method of relay operation below.

Figure 1.



1. Setting Locations

- (1) The number of units and their locations should be determined based on the number of hoses and the height of the water source.
- (2) Install a relay coupling to the suction port of sub-pumps (B to E in Figure 1), to connect the fire hose.
In this case, the automatic relay valve, "Direct Valve" can prevent accidents caused by sudden pressure fluctuations and high-pressure water.
- (3) The wye-valve is also recommended to be attached to the discharge port.
(The hose couplings that connect each pump may not be removed even after the discharge operation, because of the water pressure inside the fire hose.)

2. Operation Method (*An operator is required for every pump.)

- (1) Open the water discharge valves of the sub-pumps (B to E) beforehand.
Be sure to open the variable nozzle when it is attached to the fire hose.
- (2) Operate the main pump (A) and discharge water as usual.
- (3) Send water to the original pump first and then to others sequentially.
- (4) Check the pressure scale in the sub pump (E) and increase the engine speed to regulate the discharging water by controlling the throttle of the sub-pumps (B to E)
The sub pump (B to E): Should be more than 0.05MPa in a scale of suction gauge pressure, be less than 1.2MPa in a scale of power.
- (5) If there is not enough power of water discharge at the nozzle, turn the throttle dial of the original pump (A) to "HIGH" position gradually, then the turn the throttle dial of sub-pump, from the one closer to the original (from B to E), sequentially.
- (6) When stopping water discharge, turn the throttle dial of the last pump, the one close to the nozzle (E), to "LOW" position first and stop gradually (from E to B).
Stop the water supply from the main pump. When the supply of water from the main pump has been stopped, close the water discharge valve of each pump.

4 Handling method (Relaying water with multiple pumps)



Caution

- Do not close the nozzle or water discharge valve while multiple pumps are relayed and the water is discharged.
- Abnormally high pump pressure may result in damage to the pump and hoses.

1. Suction and discharge from water hydrant

The capacity of water supply from the fire hydrant

It is necessary to check the sufficient volume of water for discharging from the fire hydrant in advance.

It would depend on several factors, such as the diameter of the hydrant, the condition of the piping, the initial water pressure, and others.

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 could have high capacity for water supply with wider diameter despite low water pressure.

Water supply method

- (1) Be sure to open and close the hydrant's valve and release water to remove the foreign objects, such as sand, before connecting the hose to the hydrant.
- (2) Connect the water hydrant and pump. Use a suction hose that can endure the water supply pressure. The supply pressure limit for the suction hose with a nominal diameter of 65mm is 0.9 MPa. The suction hose for connection to the hydrant should be inspected periodically to avoid any damage.

How to check and adjust water supply pressure

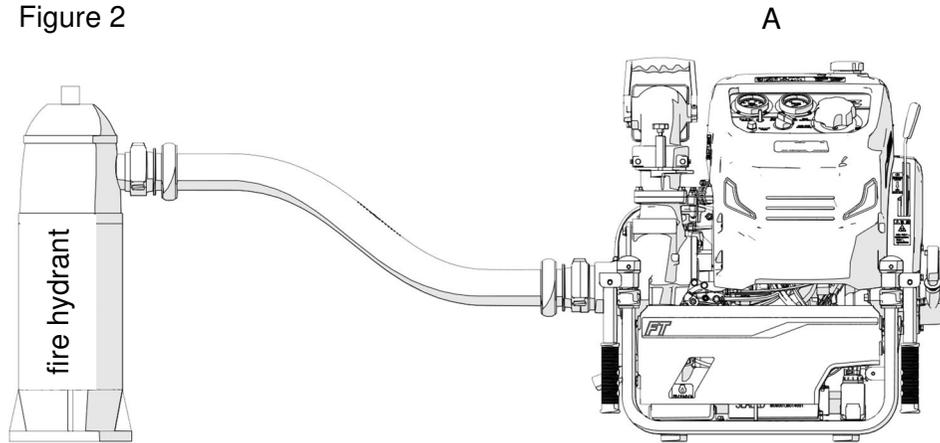
- (1) Open the open/close valves of the fire hydrant and the water discharge valve of the pump to full open.
- (2) Gradually close the pump's water discharge valve while checking the water supply pressure with a suction gauge.
- (3) If the water supply pressure is high, adjust the water supply pressure with the hydrant's open/close valve.

4 Handling Method (Suction, discharge, and relay the water from the fire hydrant)

2. Water discharge and delivery

When a single pump receives and discharges water (Figure 2)

Figure 2



- (1) Open the water discharge valve of pump (A) in advance.
If the fire hose has a variable nozzle at the end, be sure to leave it open.
- (2) Before starting the engine, open the hydrant and check the pressure on the compound (suction) gauge of the pump (A).
- (3) After confirming that water has been sent from the fire hydrant, start the engine of the pump (A) and begin discharging water.

- (4) Adjust the pressure by operating the throttle of the pump (A) to achieve the required pressure and flow rate.

The throttle should be operated gradually, and the compound (suction) gauge should be kept above 0.05 MPa.

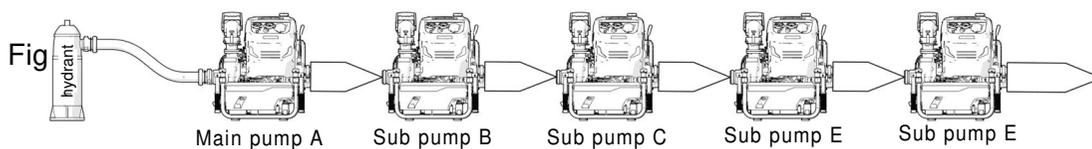
Adjust the hydrant open/close valve to adjust the pressure gauge to not exceed 1.2 MPa. At this time, the compound (suction) gauge of the pump (A) should be less than 0.6 MPa

- (5) To stop water discharge, turn the throttle of pump (A) to the "LOW" position, stop the engine, and close the hydrant.

Do not close the water discharge valve of pump (A) until the water supply from the hydrant stops.

4 Handling Method (Suction, discharge, and relay the water from the fire hydrant)

When discharging water by relaying with multiple pumps
(An operator is required for all pumps: Fig. 3)



- (1) Open the water discharge valves of all pumps (A to E) in advance. If a variable nozzle is attached to the fire hose-end at the water discharge side, be sure to open it.
- (2) Before starting the engine, open the hydrant and check the pressure of the compound (suction) gauge of the main pump (A).
- (3) After confirming that water has been delivered from the fire hydrant, start the engine of the main pump (A) to deliver water to the next pump.
- (4) Start and supply water to the second and sub-pumps (B to E) in the same manner as for the original pump (2) and (3).
- (5) Read the pressure gauge on the sub-pump (E) and adjust the pressure by operating the throttles on all pumps (A to E) to achieve the required pressure and flow rate at the nozzle. Operate the throttles gradually and make sure that each pump keeps above 0.05MPa on the compound (pressure) gauge and above 1.2MPa on the pressure gauge.
Adjust the hydrant opening to make the compound (pressure) gauge of each pump is not less than 0.6MPa.
- (6) To stop the water discharge, shut down the engine by turning the throttle to the "LOW" position, starting with the pump (E) closest to the end of nozzle, and finally close the fire hydrant. Do not close the water discharge valves of each pump until the water supply from the hydrant has stopped.

5 Periodical Inspections

1. Periodical inspections

Be sure to perform periodic inspections according to the following items.

Item	Duration or operating time							Inspection details	treatment		
	Period										
	Before use	after use	1 month	6 months	1 year	2 years	3 years				Operation time (Hour)
fuel	●	●							Quantity/ Deterioration (ie color, smell)	Refill or replace	
				●					-	Replace	
2-cycle oil	●								Quantity	Refill	
					●				-	Replace	
Battery		●							-	Recharge	
			●						Deterioration	Replace	
						●			-	Replace	
Spark plug					○			100	-	Replace	○
Appearance		●							Dirt, etc.	Clean	
Starter rope			●						Wear, breakage	exchange	○
Vacuum pump belt				●				50	Become loose/Wear	Adjust or replace	○
Fan belt				●				50	Become loose/Wear	Adjust or replace	○
Fuel pipes				●				50	Leakage/damage	Replace	○
Water discharge valve					●			100	Valve feels heavy, vacuum leakage	Adjust or replace the parts if necessary	○
Fuel filter				●			○	200	Foreign material stuck	Clean or replace	○
Engine start and vacuum			●						Operation/Perfor mance	Replace parts if necessary	○
Prime and discharge			●						Operation/Perfor mance	Replace parts if necessary	○
All parts							○	300		Replace parts if necessary	○

Note:

- For items marked with "●" in the period column, please practice the inspection by yourself. Please ask your dealer to inspect the items marked with "○" in the period column and to handle the items marked "○" in the column of treatment.
- Measure the inspection timing by either comes earlier, "period" or "operation time". For example, consider replacing spark plug when the operation time reaches to 100 hours, even if the operation period is less than a year.
- This inspection table shows the period and time under general operating conditions. Make sure to perform inspections earlier when the pump is used under tough conditions.

5 Periodical Inspections

Recommended replacement parts and period

Part Name	Recommended Replacement Period	Example of Defects
Spark plug	Every Year	Bad to start due to wear and tear
Fuel Pipes	Every 2 years	Fuel leakage due to deterioration
Battery	Every 2 years	Deterioration
2 Cycle Oil Pipe	Every 2 years	Oil leakage due to deterioration
Vacuum Pump Belt	Every 3 years	Slippage due to wear
Fan Belt	Every 3 years	Slippage due to wear
Other Rubbers	Every 2 years	Deterioration
Starter Rope	Every 3 years	Breakage due to wear
Fuel Filter	Every 3 years	Clogging and Bad start due to the water drip
2-cycle Oil Filter	Every 3 years	Clogging, and Poor lubrication due to the moisture.
Discharge Valve Water shut-off valve (rubber)	Every 3 years	Deterioration of the check valve
Mechanical Seal	Every 3 years	Poor suction due to deterioration
Oilless Vacuum Pump Blades	Every 3 years	Poor suction due to deterioration
Carburetor	10 years	Corrosion inside the tank
Fuel Tank	10 years	Corrosion inside the tank

Parts recommend replacing when disassembling

- Gaskets • Push nuts
- O-rings • Spring pins
- Lock washers • E-rings



Caution

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

5 Periodical Inspections

2. Inspection method

Periodic inspections are essential to ensure the fire-fighting pump's safety and use every possible function. Inspect the pump correctly and safely 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, 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.



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 recommended to replace the battery earlier.

Recommended battery : GS YUASA YTX20L-BS

For handling the battery, please follow the instruction manual that comes with the battery.

5 Periodical Inspections



Caution

- When disposing of batteries, oils, etc., please entrust disposal to a specialized industrial waste disposal contractor.
- It may cause fire, burns, or pollute the environment.

(2) Handling of Shibaura full-automatic charger



Caution

- To use the charger safely and correctly, be sure to read the instruction manual that comes with the charger. Improper use may cause an accident. After reading the charger instruction manual, be sure to keep it close to the product.

A) Unpacking



Caution

- Remove packing materials from the battery charger before charging.
- There is a risk

B) Location to place



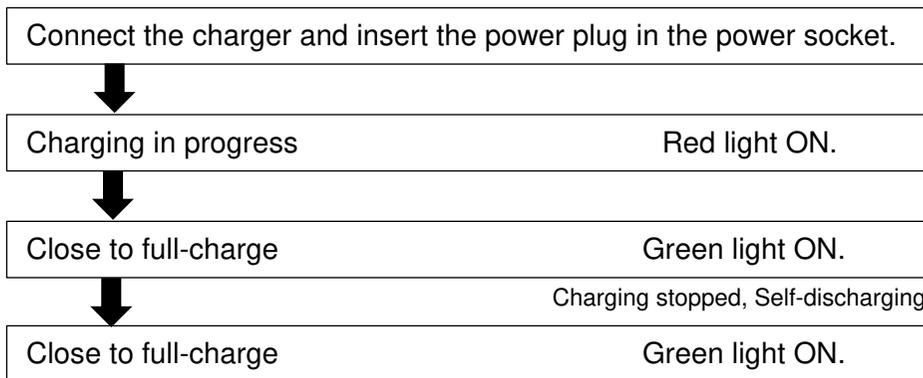
Warning

- Do not use the charger in high-temperature places such as under direct sunlight or near heating elements, in extremely humid places, or wet areas such as rain or snow.
- There is a risk of overheating, burnout, or damage to the charger, or leakage of electricity or electric shock.

C) Make sure before use

- Remove the power plug from the socket (Be sure the charger is turned off).
- Connect the output of the charger cable firmly to the fire-fighting pump.
- After connecting the cable to the charger unit(AC inlet), plug in the socket.

D) Battery charger Operating Manual



【Maintenance charging *】

5 Periodical Inspections

* Maintenance charge mode

This function automatically recharges the battery when the capacity has declined. It always monitors the decline of the battery capacity by self-discharge.

After starting the charging (Red Light ON), when the battery is close to full charging, the indicator will change to Green Light ON, and the status will automatically change to the maintenance charging mode (Green Light ON). After that, the Red Light and the Green Light will light up alternately to reduce the deterioration of the battery.

Note:

Remove the power plug to stop the main unit from charging. Then, remove the output terminal.

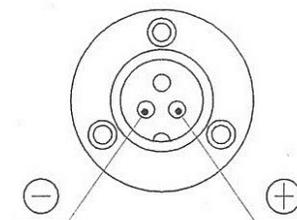
LED indication and charge status

CHARGE STATUS	CHARGE LED (RED)	FULL LED (GREEN)
No Charging	OFF	OFF
Charging	ON	OFF
Close to full-charge	OFF	ON
Error (⚠)	ON	ON

⚠ Refer to "5. Periodical inspections" when an error has occurred.

Note:

When starting the engine using a fully charged battery, if the starter does not rotate sufficiently, this may be due to battery deterioration. Please inspect or replace the battery.



E) Protective operations

- Input (primary side)
Protected from circuit errors by current fuse.
- Output (secondary side)
Protected from battery reverse connection and output short-circuiting by electronic circuit and circuit breaker.

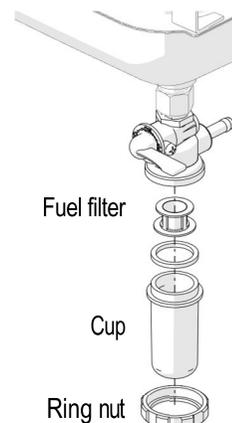
F) Inspection method when an error has occurred

Symptom	Cause	Measure *
Both red and green LEDs come on	Power cable is not connected correctly.	Check the connection status.
	The circuit breaker is open.	Pull out the power plug. After the body of the charger stops, remove the error cause, and close the circuit breaker after 60 seconds.
	The output connector is loose.	Insert the output connector all the way, and lock it securely.
The battery is obviously in discharged state, but the tickle charge mode starts immediately.	Battery is in the deteriorated state.	Replace the battery with a new one.
LED does not come on (both red and green)	Protective operation is activated.	Turn off the power and wait for 60 seconds. After that, charging the battery again.

5 Periodical Inspections

(3) Cleaning the fuel cock filter

- ① Close the fuel cock.
- ② Loosen and remove the ring nut with pliers.
- ③ Wipe off any debris in the cup with a cloth or the like.
- ④ Remove the filter attached to the ④➊ fuel cock main unit and wash it with gasoline.
- ⑤ Install the fuel cock securely to the original position. Be sure to open the ➊ fuel cock and inspect if there are no leaks.
- ⑥ After inspection, close the ➊ fuel cock.



(4) Replacement of the fuel in the tank

Storing fuel for a long period of time may result in poor starting performance and rust.
Replace with new fuel every 6 months.



Danger

- Keep fire away when refueling.
- There is a risk of ignition and explosion.

(5) Spark plug cleaning

Use [NGK BR8HIX] spark plugs.

Clean the spark plugs that are contaminated with exhaust gases and carbon.

- (1) Stop the engine to cool down sufficiently before working on it.
- (2) Remove the spark plug cap and spark plug using the spark plug box wrench.
- (3) Clean the outside, inside, and electrode of the spark plug.
- (4) Tighten the spark plug to the cylinder head and keep the spark spark plug cap pressed in.



Caution

- Do not touch the ignition plug or high-voltage cord during operation.
- There is a risk of electric shock.

(6) Check the governor oil level

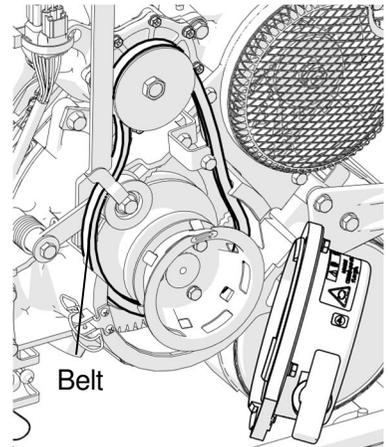
(See "4 Handling Methods (Preparation for Operation) 1.

5 Periodical Inspections

(7) Vacuum pump belt inspection

Replacement of the vacuum pump belt is required if it is stretched, worn, or cracked.

- ① Open the recoil starter.
Do not start the engine during the inspection.
Also, the belt may be hot immediately after operation, so wait until the engine has cooled down before inspecting
- ② Remove the front cover and vacuum pump cover.
(See "4 Handling Methods (Preparation for Operation) 1.")
- ③ Remove the belt from the pulley groove.
- ④ Install a new belt.
- ⑤ Install the cover as before.

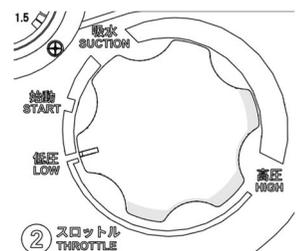
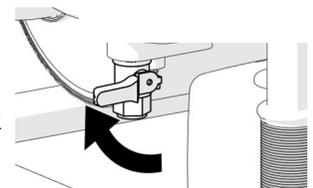
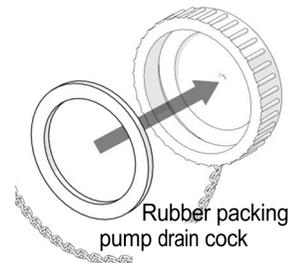


(8) Starting and vacuum inspection

Vacuum inspections must be performed even if the suction and discharge tests (which are described in the next page) are difficult to carry out.

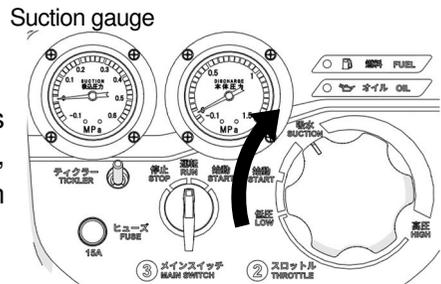
Defects such as engine not starting, poor vacuum performance, or vacuum leakage can cause accidents, such as not being able to operate the water discharge at the actual site, or falling water during the discharge.

- ① Check that the rubber packing is in the water suction cap, and attach the inlet cap to the water inlet.
- ② Close the pump drain cock.
- ③ Start the engine.
- ④ ② Warm up the engine with the throttle dial in the "low pressure" position for about 1 minute, and visually check for any abnormalities in the various parts.



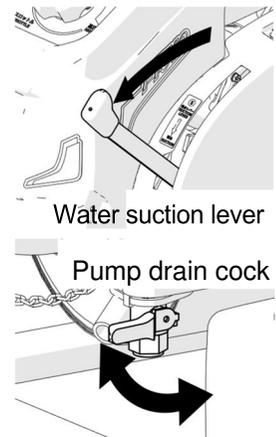
5 Periodical Inspections

- ⑤② Turn the throttle to the "suction" position and pull the ⑤ suction lever toward you to activate the vacuum pump. When the pointer of the ⑥ suction gauge reads -0.06 to -0.08 MPa, return the ⑤ suction lever, ② throttle to the "low pressure" position, and then stop the engine.
- ⑦ If there is no change in the indicated value of the suction gauge after leaving it for 1 minute, the vacuum performance is good.



- ⑧ Open the pump drain cock to release the vacuum and close the pump drain cock.

* If any abnormality is found, please consult your dealer.



(9) Water suction and discharge inspection

Suck and Discharge the water to inspect if there is no abnormalities found in each part of your pump

- (1) Are there any abnormal sounds?
- (2) Is there any water fall?
- (3) Is the water suction slow?
- (4) Are there any water leaks?
- (5) Is the startability good?
- (6) Are there any looseness in each part?
- (7) Are there any fuel leaks?
- (8) Other

*If any abnormality is found, refer to the "6 Troubleshooting" in the next section for appropriate treatments.

6 Troubleshooting

Daily inspection and maintenance are important to prevent fire-fighting pump malfunctions. Detect malfunctions at an early stage and perform maintenance immediately. If the trouble is not easily solved, or if the malfunction is not listed below, please consult the dealer where you purchased the pump, giving the model name and serial number.

1. Engine area

	Symptom	Cause	Action
Hard to Start	No fuel flow to carburetor.	1 Fuel cock filter or fuel line is clogging 2 Needle valve is sticking 3 There's no fuel.	1 Clean 2 Clean 3 Fill
	Fuel does not flow to combustion chamber (remove spark plugs to see)	1 Choke does not close (auto choke) 2 Rotational speed is low when starting. 3 Carburetor (needle valve, jet) is clogging	1 Repair and adjust 2 Replenish the battery 3 Clean
	Fuel goes to combustion chamber but does not start	1 Overflow (excessive fuel) 2 Tickler is overused (excessive fuel) 3 Choke does not open fully closed (auto choke) 4 Fuel is deteriorated 5 Water is mixed in the fuel. 6 Excessive lubricating oil	1 Inspect and adjust the carburetor 2 Drain the fuel from the seal at the crankcase. 3 Replace diaphragms and clean pipes. 4 Exchange. 5 Drain water 6 Adjust to the proper amount
	Abnormality of combustion system	1 Fuel cock filter is clogged 2 Carburetor valve seat is clogged 3 Carburetor is poorly adjusted, or there is a clog on the carburetor 4 Carburetor is poorly tightened.	1 Clean 2 Clean 3 Adjust or clean 4 Retighten
	Sparks are poor	1 Spark plug cap has damages, electrode gap is improper, or the spark plug is defective. 2 Leakage from high voltage cord 3 Leakage from spark plug cap 4 Defective ignition coil 5 Defective CDI unit 6 Poor rotation of the starting motor	1 Exchange 2 Exchange 3 Exchange 4 Exchange 5 Exchange 6 Replenish the battery

6 Troubleshooting

Symptom		Cause	Action	
Hard to Start	No sparks	<ol style="list-style-type: none"> 1 Short circuit of the ground wire 2 Spark plugs are damaged or stained. 3 Spark plug has gap failure 4 Ignition coil is defective 5 CDI unit is defective 6 Wiring connection is poor or disconnected 7 Main switch is defective 	<ol style="list-style-type: none"> 1 Repair the point short circuited 2 Exchange. 3 Exchange 4 Exchange 5 Exchange 6 Adjust the connection 7 Exchange. 	
	Poor compression	<ol style="list-style-type: none"> 1 Piston wear or seizure 2 Piston rings 3 Worn or damaged oil seals 4 Lack of lubricant 5 Damaged cylinder head gasket 	<ol style="list-style-type: none"> 1 Repair or replace 2 Exchange. 3 Exchange 4 Refill to the proper amount 5 Exchange 	
Poor running	Insufficient rotation	Combustion system error (mis-hunting)	<ol style="list-style-type: none"> 1 Carburetor main jet is clogged or misadjusted 2 Fuel cock filter clogged 3 Overflow 4 Poor installation of the carburetor 5 Icing 	<ol style="list-style-type: none"> 1 Clean or replace 2 Cleaning 3 Check and adjust the carburetor 4 Correct the place or replace. 5 Remove and add fuel tank drainage agent
		Abnormalities in the governor system	<ol style="list-style-type: none"> 1 Governor maladjustment 2 Governor operating parts wear 3 Defective caulking of flyweight 4 Poorly tightened governor arm 5 Governor spring tension failure 6 Governor lever ring hole worn or rattling large 	<ol style="list-style-type: none"> 1 Adjust 2 Exchange. 3 Correct or exchange 4 Readjust and retighten. 5 Exchange. 6 Replace or correct
		Cooling system abnormalities	<ol style="list-style-type: none"> 1 Cooling air is weak 	<ol style="list-style-type: none"> 1 Pay attention to the ventilation
		Other	<ol style="list-style-type: none"> 1 Overload 2 Muffler and exhaust port clogging 3 Inlet clogging 4 Defective spark plug 	<ol style="list-style-type: none"> 1 Change nozzle diameter or use safety nozzle 2 Remove the clog 3 Remove the clog 4 Exchange

6 Troubleshooting

		Symptom	Cause	Action
Poor running	Abnormal noise	Mechanical sound	<ol style="list-style-type: none"> 1 Flywheel is fixed loosely 2 Piston is worn, and tapping sounds come out from the piston skirt 3 Armature plate is contacting the other parts. 4 Foreign material is caught inside the crankcase and fan cover 5 Foreign material is caught inside the pump or impeller is touching the pump casing 6 Each part becomes loose 	<ol style="list-style-type: none"> 1 Retighten 2 Replace the piston 3 Reassemble 4 Remove the foreign material 5 Remove the foreign material or reassemble the pump 6 Retighten
		Knocking sound (combustion system abnormalities)	<ol style="list-style-type: none"> 1 Insufficient fuel (main jet or use of different diameter parts) 2 Overload 3 Rotation speed too low or too high 4 Different spark plug is used 	<ol style="list-style-type: none"> 1 Clean or replace 2 Open water discharge valve 3 Adjust to proper rotation speed 4 Replace with proper spark plugs

6 Troubleshooting

2. Pump

		Symptom	Cause	Action	
Water suction failure	A suction gauge does not have negative pressure	Abnormality on water pump side	<ol style="list-style-type: none"> 1 Poorly tightened suction pipe 2 Air suction from the tip of the suction pipe 3 Forgot to close the drain cock 4 Defective suction pipe packing 5 suction pipe fissure 6 Foreign matter caught in water discharge valve 	<ol style="list-style-type: none"> 1 Tighten securely 2 Put it completely underwater 3 Close securely 4 Exchange. 5 Exchange. 6 Remove foreign objects 	
		Abnormality on the vacuum pump side	No Rotation	<ol style="list-style-type: none"> 1 Internal freeze 2 Foreign object inhalation 3 Vacuum pump damaged 4 V Belt slip or breakage 	<ol style="list-style-type: none"> 1 Defrost 2 Remove foreign objects 3 Exchange. 4 Exchange.
			Rotating	<ol style="list-style-type: none"> 1 Clogged or poorly tightened vacuum passage 2 Strainer at the water shut-off valve is clogged 	<ol style="list-style-type: none"> 1 Clean or retighten 2 Clean
	The coupled meter becomes negative pressure	Vacuum leak (engine) Falling water when stopped)	Refer to "Water suction failure - compound meter does not become negative pressure - Water pump side abnormality"		
		No vacuum leakage	<ol style="list-style-type: none"> 1 Clogged suction pipe strainer or inside suction pipe 2 Air pocket in the suction pipe. 3 Suction height is too high, or the suction pipe is too long 4 Air suction from the tip of the suction pipe 5 Low engine speed at water suction 6 Short water suction operation time 7 Clogged or poorly tightened vacuum passage 8 Strainer at the water shut-off valve is clogged 	<ol style="list-style-type: none"> 1 Clean 2 Correct the layout 3 Keep the height within 8m 4 Put the tip completely underwater 5 Adjust to water suction rotation speed 6 Lengthen operation time 7 Clean or retighten 8 Cleaning 	

6 Troubleshooting

Symptom		Cause	Action	
Water Discharge Failure	Pressure does not increase	Abnormality on water pump side	<ol style="list-style-type: none"> 1 Clog in the suction pipe strainer or suction pipe 2 Air pocket in suction pipe 3 Suction height is too high, or the suction pipe is too long. 4 Air suction from the tip of the suction pipe 5 Poorly tightened suction pipe 6 Discharge valve half-open 7 Forgot to remove the safety nozzle (not necessary when the nozzle is attached) 8 Foreign matter in the nozzle 9 Frozen inside the pump 	<ol style="list-style-type: none"> 1 Clean 2 Correct the layout of the suction pipe. 3 Keep the height within 8m 4 Put the tip completely underwater. 5 Tighten securely 6 Open the valve completely 7 Remove 8 Remove foreign objects 9 Defrost and remove the ice
		Engine malfunction	Refer to 1. Engine – Hard to start and poor running	
	Other Abnormalities	<ol style="list-style-type: none"> 1 Muffler and exhaust port clogging 2 Air Inlet of the carburetor clogging 	<ol style="list-style-type: none"> 1 Remove the clog 2 Remove the clog 	

3. Electrical

Symptom		Cause	Action
Bad start	Starting motor does not rotate	<ol style="list-style-type: none"> 1 Insufficient battery capacity 2 Deterioration of the battery 3 Fuse burnout 4 The cable connection is loose or Disconnected 	<ol style="list-style-type: none"> 1 Recharge 2 Replace 3 Replace. 4 Check the cable connection and plug-in surely. Replace parts if necessary.
Battery failure	Batteries run out too quickly.	<ol style="list-style-type: none"> 1 Deterioration of the battery 2 Mistake in main switch operation. 3 Mistake in charge operation 	<ol style="list-style-type: none"> 1 Exchange. 2 Operate properly 3 Operate properly
Connection failure	Wiring burnout	<ol style="list-style-type: none"> 1 Battery reverse connection 2 Poor connection or short-circuit at the outlet terminal 3 Poor wiring connection or disconnection 4 Fuse burnout 	<ol style="list-style-type: none"> 1 Connect correctly 2 Connect correctly, or Repair or replace the short-circuited parts. 3 Correct the wiring or repair, or replace 4 Replace

6 Troubleshooting

Symptom		cause	treatment	
Defective wiring	Lamp does not light	1 Lamp blew out 2 Wiring is loose or disconnected	1 Replace 2 Correct the circuit, repair, or replacement	
Defective monitor lamp	All monitor lamps do not light up immediately after turning the main switch to operate	1 Battery capacity is not enough, or the battery is deteriorated. 2 Fuse burnout 3 Wiring is loose or disconnected	1 Recharge or replace 2 Replace 3 Correct the circuit, repair, or replacement.	
	The lamps do not light even if they should have lit up	Common & typical matters to be noticed	1 Loose or disconnected wiring of each sensor and switch	1 Correct the circuit, repair, or replacement
		Fuel	1 Switch is broken	1 Replace
		2-cycle oil	1 Switch is broken	1 Replace
Monitor lamp light up	Please refer to Section No. 3 – Monitor Lamp (P. 7) and cope with each matter displayed			

7 Specifications

1. Fire-fighting pump	
Model	FT510-A
Classification (JPN)	(B-2)
Notification No. (JPN)	(P0145001)
Dimension (L x W x H)	737mm x 572mm x 740mm
Dry Weight	90 kg
2. Pump	
Type	High-pressure 1-stage turbine pump (with inducer)
Discharge water volume	Normal 1.01 m ³ /min
	High pressure 0.64 m ³ /min
Pump pressure	Normal 0.70 MPa
	High pressure 1.00 MPa
Nozzle diameter	Standard 24.0 mm
	High pressure 17.5 mm
Rated rotation speed	5800 rpm
Water inlet	Nominal 75mm, Fire engine thread (JIS B 9912)
Water outlet	Nominal 65mm, Fire engine Thread (JIS B 9912)
3. Engine	
Type	Air-cooled, 2-cycle, inclined, 2-cylinder gasoline engine
Model name	E440C
Displacement	436mL
Authorized output	22.8 kW / 5800rpm
Fuel feeding system	Carburetor
Fuel type and tank capacity	Regular gasoline for automobiles - 14.5L
Lubrication system and tank capacity	Separate lubrication system (2-cycle oil) - 2L
Fuel consumption	Approx. 14L/h
Cooling system	Forced air-cooled
Ignition system	CDI ignition system
Starting system	Starting motor & recoil
Lighting	12V-35W (searchlight), 12V-3W (instrument panel light)
Spark plug	NGK BR8HIX

7 Specifications

4. Vacuum pump	
Type	Oilless type: 4-vane eccentric rotary type
Maximum Suction Height	Approx. 9 m
Drive system	V Belt clutch type
5. Accessories	
Battery	12V15Ah/5h
Charger	AC100V~AC240V – DC12V charger
Tools, etc.	1 x Tool kit, 1 x instruction manual 1 x Spark plug, 1 x safety nozzle
Pump cover	1 pc.
6. Optional parts	
Searchlight lamp	1 pc.
Searchlight stand	1 pc.



Shibaura Fire Pump Co., Ltd.

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SHIBAURA

OPERATION MANUAL

SHIBAURA FIRE-FIGHTING PUMP FT510-A



Please read this operation manual carefully to operate the Shibaaura Fire-fighting Pump safely and correctly. Incorrect operation of the pump may result in an accident. If this manual is missing or damaged, please order a new one from us or our agent promptly.

Shibaaura Fire Pump Co., Ltd.

- For safe use

Keep it in a safe place with the fire-fighting pump.

- Items marked with  in this instruction manual are particularly important for safe use and must be observed.

 Danger	The case when there is an imminent risk of death, serious injury, or the product is mishandled.
 Warning	The case when there is a risk of death or serious injury, or the product is mishandled.
 Caution	In cases when the product is mishandled, minor injuries or property damage may occur.

- Product specifications and appearance are subject to change without notice for improvement. Therefore, please note that the contents of this document and some of the photographs and illustrations may not correspond to the product.
- If you have any questions or difficulties after reading this manual, please contact the dealer where you purchased the product or our company.
- For inspection and maintenance, please contact a maintenance business or dealer that is qualified to service portable fire-fighting pumps.

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1 Things you must follow for your safety

1. Warning Label Locations



Part No.L82900900



Part No.290192430



Part No.290192770



Part No.290192410



Part No.290192400



Part No.290192400

- If the contents of the label become difficult to see or the label is about to come off, replace it immediately.

1 Things you must follow for your safety

2. Caution Marks

Danger

- Do not suck in or discharge the substances other than water, such as flammable materials, drugs, or chemical liquid.
- There is a risk of explosion, fire, burns, poisoning, etc.

- Keep fire away when refueling.
- Do not overfill fuel into the tank.
- If the fuel is spilled, wipe it up immediately. Keep the wiping cloth away from fire.
- Refill the fuel after the engine has cooled down.
- Do not use fire to defrost the pump.
- There is a risk of ignition and explosion.

Warning.

- Fire-fighting pumps should be operated by firefighters, voluntary disaster prevention team members, maintenance and inspection personnel, and others who have been trained specifically for safe operation.
- Misuse or mishandling may result in serious accidents, including death.

- No neck wraps, ties, waist towels, etc., are allowed. Wear helmets, non-slip shoes, and no loose-fitting clothing.
- There is a risk of getting caught in the machine or slipping and falling, resulting in injury.

- Do not operate a fire-fighting pump if you are unable to concentrate on your work due to alcohol consumption, tiredness, illness, or the effects of drugs.
- This could lead to a serious accident.

- Use only genuine parts or specified attachments. No modifications are allowed.
- Failure to do so may result in accidents, injuries, or machine malfunctions.

- Install at least 3 m away from combustible materials.
- Remove flammable materials, such as dry grass, before installation.
- Exhaust fumes and heat from the muffler may cause a fire.

- Do not install indoors or in tunnels with poor ventilation.
- There is a risk of exhaust gas poisoning.

- Be sure to install the cover when operating.
- There is a risk of injury or burns.

- Be sure to close the recoil starter during operation.
- There is a risk of getting caught in pulleys or belts, or of getting cut yourself.

- Keep fire away from the battery.
- There is a risk of fire and explosion.

- Remove packing materials from the battery charger before charging.
- There is a risk of fire.

- Be sure to carry out periodic inspections. Operate and discharge the water at least once a month to check for any abnormalities.
- Accidents may occur due to damage, etc., and fire-fighting activities may be hindered.

1 Things you must follow for your safety

Caution

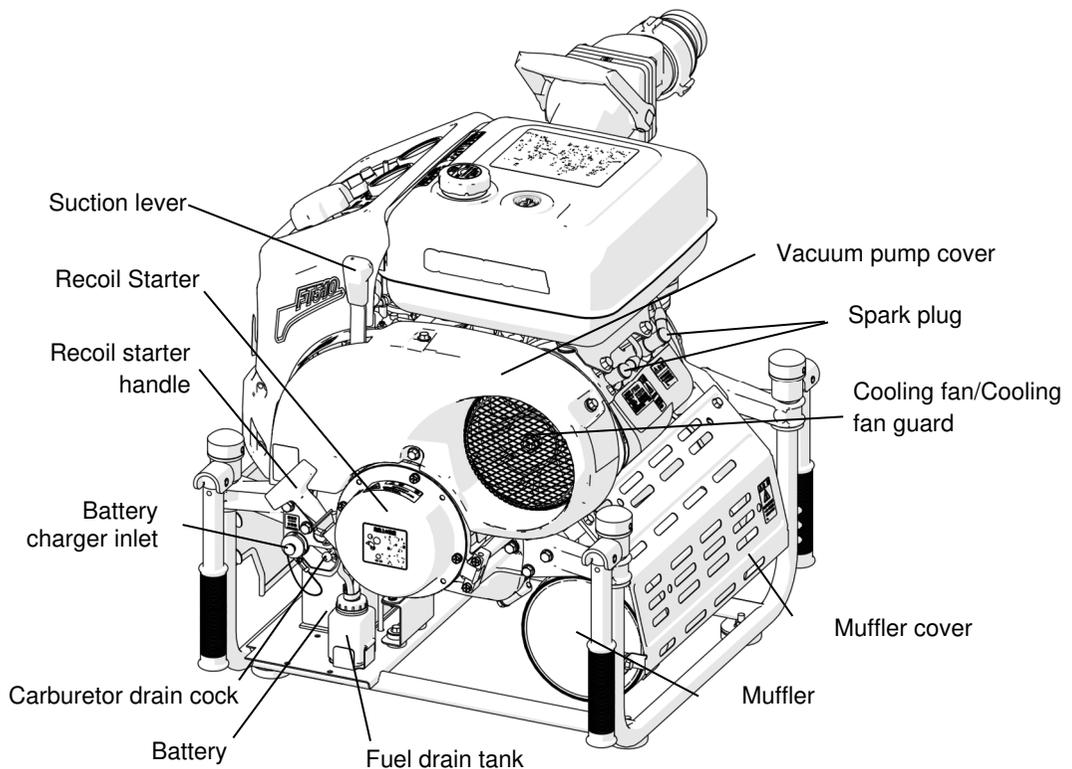
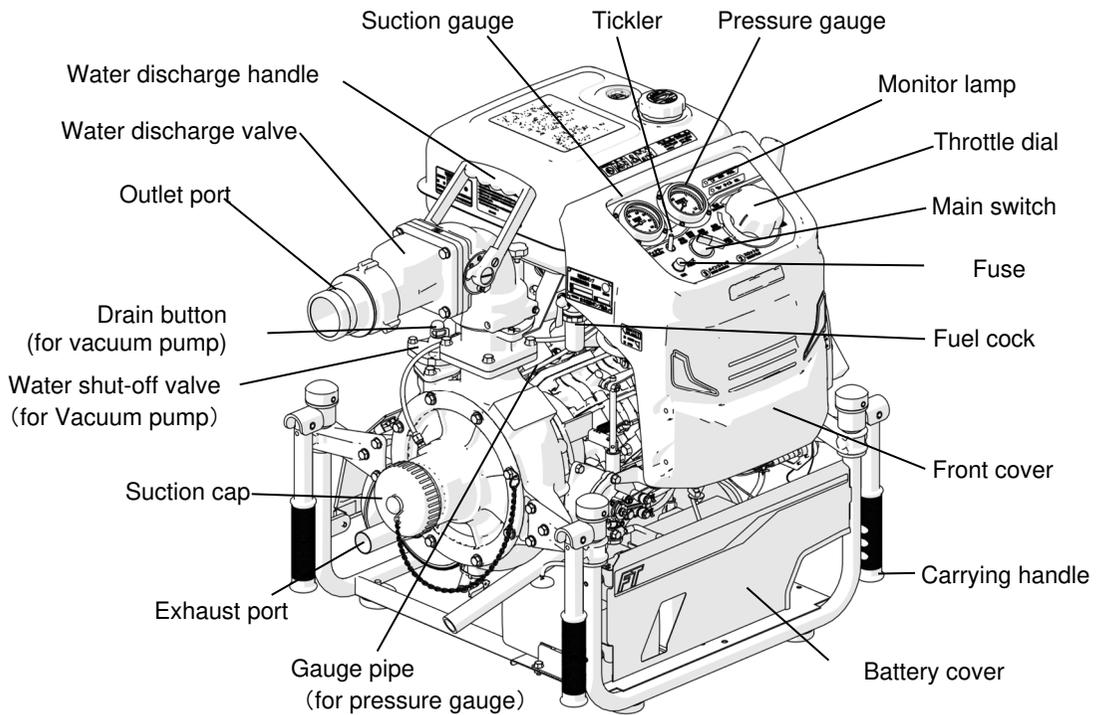
- Do not use fire-fighting pumps for activities other than fire-fighting, such as civil engineering, irrigation, water sprinkling, etc.
- There is a risk of hitting some objects and injuring people or damaging property around you.
- When disposing of batteries, oils, etc., please entrust disposal to a specialized industrial waste disposal contractor.
- It may cause fire, burns, or pollute the environment.
- Do not put fingers or hands in the water discharge valve.
- There is a risk of injury.
- After refueling, tighten the fuel tank cap securely.
- There is a risk of ignition and explosion.
- Check the fuel once a month, and if the fuel has a pungent odor or is cloudy, replace it with new fuel immediately.
- This may cause engine malfunction or equipment failure.
- When adding two-cycle oil, always use the same brand and grade of oil.
- Avoid entering water or debris when refilling the two-cycle oil.
- This may cause engine malfunction or equipment failure.
- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.
- When replenishing the governor oil, add the same brand and grade of oil.
- Avoid entering water or debris when refilling the governor oil.
- This may cause engine malfunction or equipment failure.
- When holding the carrying handle, do not touch the joint parts.
- Failure to do so may result in injury from pinching fingers.
- When carrying or loading/unloading the fire-fighting pump, four people should do so.
- Dropping it on your foot may cause injury or back pain.
- Connect the fire hose securely and always ensure it cannot be disconnected.
- If it is pulled out during water discharge, there is a risk of injury.
- Lay out the fire hoses without folds, twists, or sharp turns.
- There is a risk of the water hose springing up and causing injury.
- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.
- When starting with a recoil starter, avoid getting clothing or gloves caught.
- There is a risk of injury.
- When starting with the recoil starter, keep people at least two meters away from the starter.
- There is a risk of injury to elbows from being knocked by recoil ropes.

1 Things you must follow for your safety

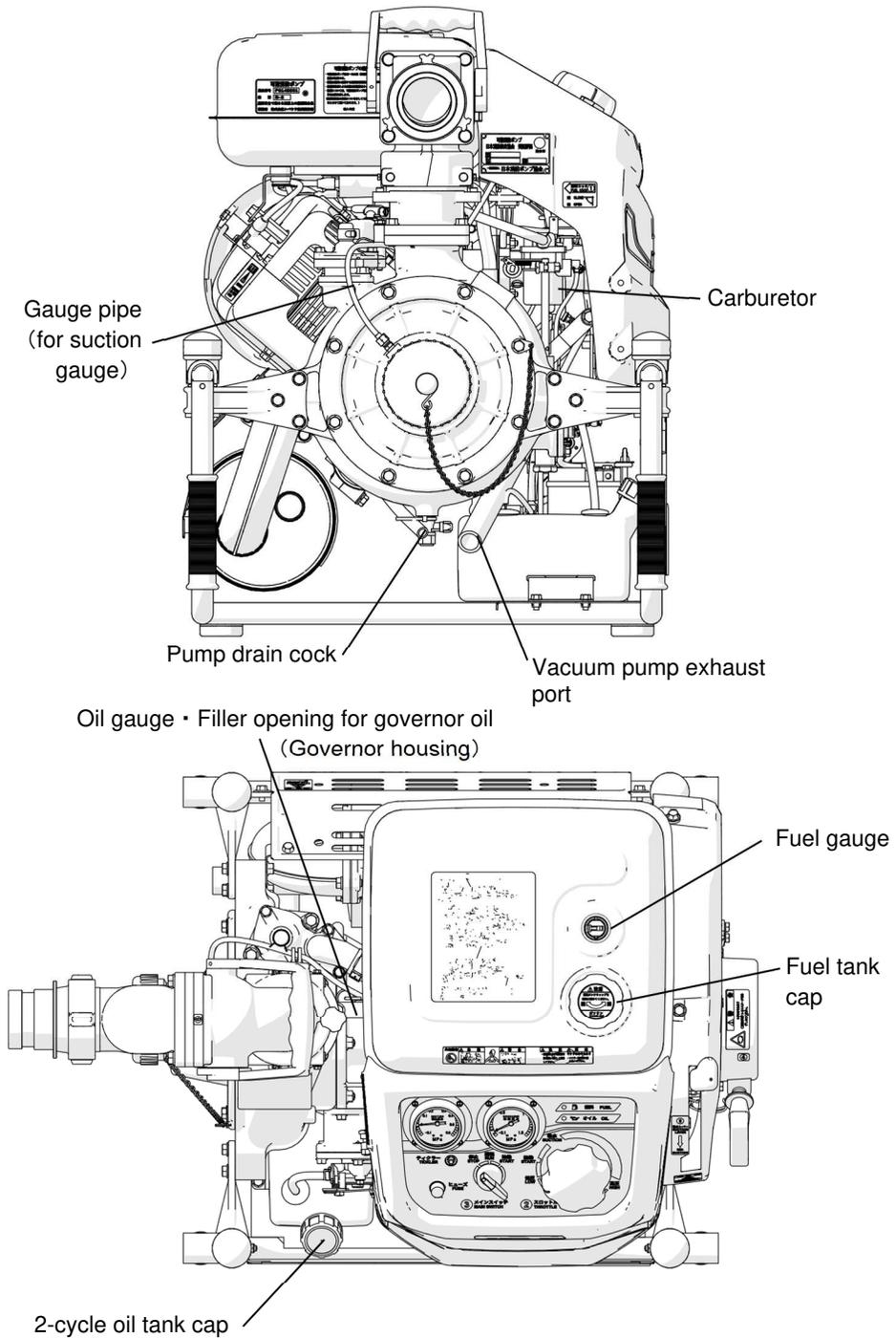
Caution

- Always return the throttle to the "LOW" position before opening and closing the water discharge valve.
- Hold the fire nozzle firmly and discharge water.
- There is a risk of injury because the fire nozzle runs away.
- Operate the water discharge valve slowly.
- There is a risk of injury from pinching or bumping hands.
- Do not aim the water at people or peer into the nozzle.
- High water pressure may cause them to be blown away, resulting in injury.
- Do not touch the spark spark plug or high-voltage cord during operation.
- There is a risk of electric shock.
- Never touch the muffler and exhaust pipe during and after operation since they become very hot.
- There is a risk of burns.
- While operating, be careful not to have the suction pipe or hose stepped on by vehicles or other objects.
- Accidents may occur due to damage, etc., and fire-fighting activities may be hindered.
- Do not start the engine with the water discharge valve handle open.
- When discharging water, the engine operator should communicate with the operator at the nozzle. Do not open the water discharge valve without notice or accelerate the throttle rapidly.
- There is a risk of injury from being blown away by the high-pressure water.
- Inspection and maintenance should be performed after the engine has been stopped and cooled down sufficiently.
- Failure to do so may result in injury, burns, or fire.
- Read the instruction manual that comes with the battery and the information on the battery itself carefully to ensure that the battery is used correctly.
- When disconnecting the battery cord, remove the (-) cord first, and when installing the battery cord, connect the (+) cord first.
- Short-circuiting may cause fire or burns.
- Do not use the charger in high-temperature places such as under direct sunlight or near heating elements, in extremely humid places, or wet areas such as rain or snow.
- There is a risk of overheating, burnout, or damage to the charger, or leakage of electricity or electric shock.
- The charger should be installed in a dry, well-ventilated location that is not wet.
- Failure to do so may cause electric shock or fire.
- Do not charge the battery with a charger other than the specified one.
- There is a risk of fire due to heating or burnout of the wiring.
- When operating without attaching the suction pipe (e.g., to check the vacuum level), attach the suction cap.
- There is a risk of getting caught in the machine or injured.
- Do not close the nozzle or water discharge valve while multiple pumps are relayed and the water is discharged.
- Abnormally high pressure may result in damage to the pump and hoses.

2 Name of each component



2 Name of each component



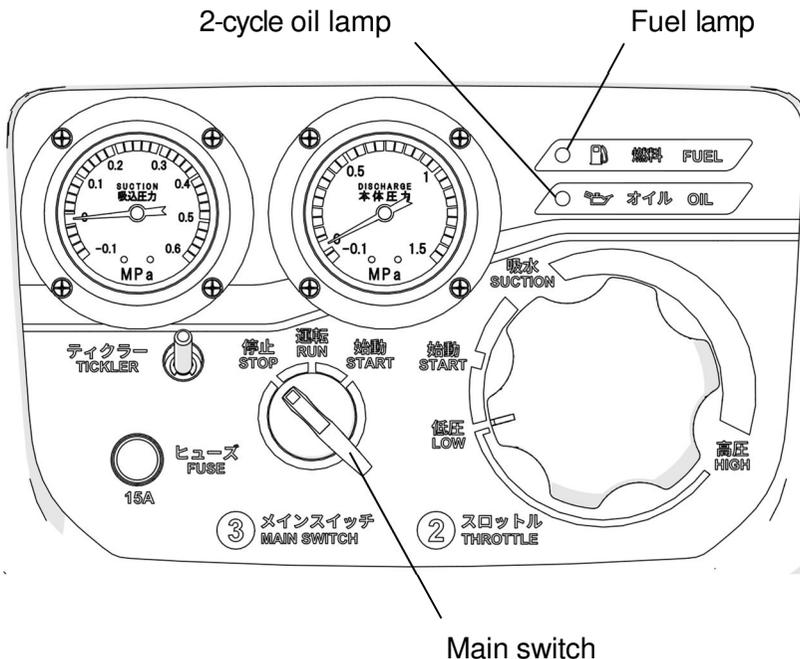
3 Monitor lamp

The pump with a starting motor activates when the main switch is turned into the "Run" position. When the power is turned on, two lights illuminate at the same time. If they do not light up, the battery voltage is insufficient, or there is a faulty circuit, the pump needs to be repaired. All lights are turned off after a few seconds.

All lights are turned off during water discharge, but the lights are turned on when operating the starting motor. It is because the battery voltage drops. Be sure to inspect or maintain when the following items are lit up.

Display	Feature	How it works	Measures
 fuel	Indicates that the fuel must be added	Lights up when the remaining fuel in the tank is low.	Refill the regular gasoline.
 2-cycle oil	Indication of when to refill 2-cycle oil	Lights up when the remaining oil in the tank is low, then stop the engine.	Refill the 2-cycle oil.

If the monitor lamp still illuminates or blinks after following the measures above, consult your dealer.



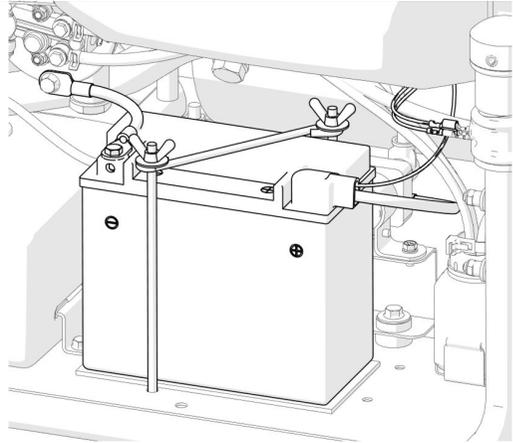
4 Handling method (Before)

Installing Battery

Caution

- Read the instruction manual that comes with the battery and the information on the battery itself carefully to ensure that the battery is used correctly.

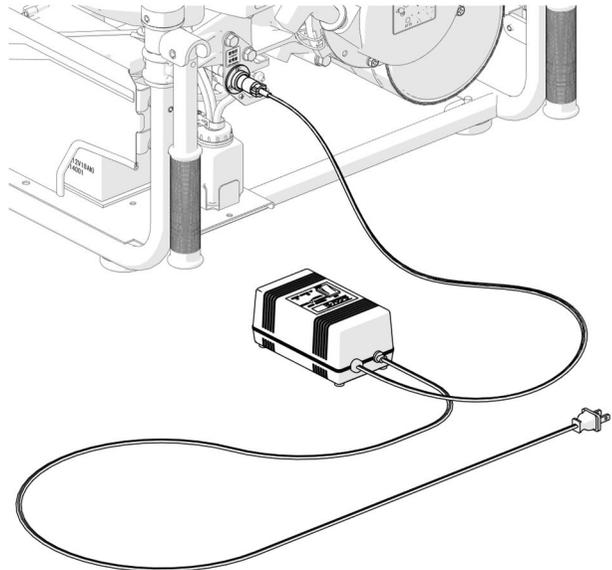
- (1) For handling, be sure to follow the battery instruction manual.
- (2) Fix the battery to the bed with two rods and one holder.
- (3) Firstly, connect two battery (+) cables (red), then connect one (-) cable (black) . Be sure to keep the connecting order.



Caution

- When disconnecting the battery cable, remove the (-) cord first, and when installing, connect the (+) cable first.
- Short-circuiting may cause fire or burns.

- (4) Connect the supplied charger to a charger inlet to charge the battery. (See "5 Periodic Inspection 2. Inspection Method (2) Handling of Fully Automatic Charger" on p. 29.)



4 Handling Method (Preparation for Operation)

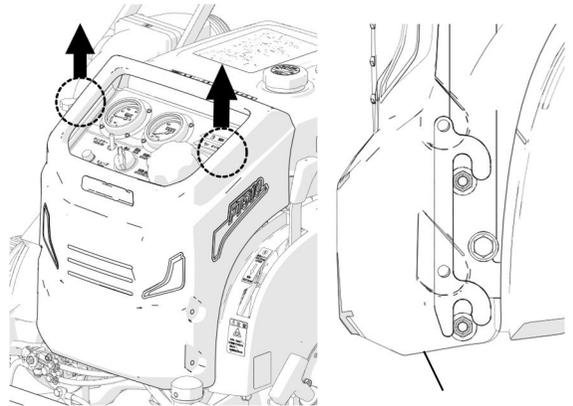
1. Removing and attaching covers

When removing the cover, follow the procedure below.

(1) Removing/attaching front cover

Hold the circled places on the illustration on the right. Shift it upward first, and then remove it toward you.

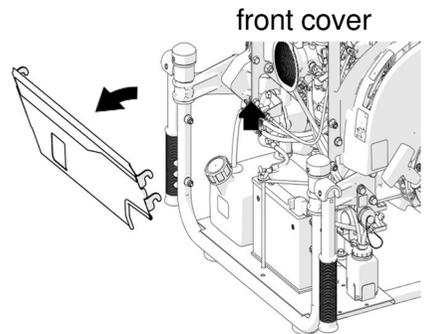
Installation is the reverse procedure.



(2) Removing and attaching the battery cover

Slide the battery cover upward first, and then remove it toward you.

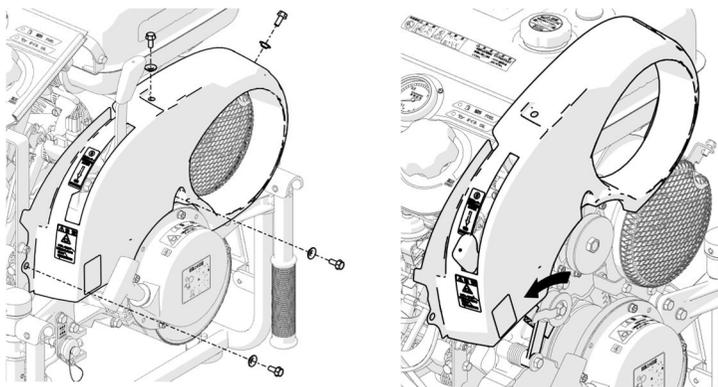
Installation is the reverse procedure.



(3) Removing and attaching vacuum pump cover

Remove the four bolts and collars. Pull the water suction lever toward you and remove it through the lever opening of the vacuum pump cover.

Installation is the reverse procedure.



Warning

○ Be sure to attach the cover when driving.

● There is a risk of injury or burns.

4 Handling Method (Preparation for Operation)

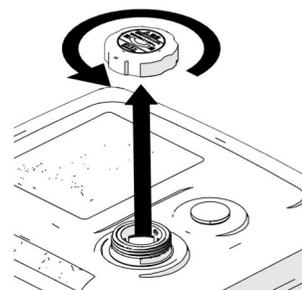
1. Replenishment

(1) Fuel

(Fuel tank capacity: approx. 14.5L)

Fill the tank with regular gasoline until the fuel gauge indicates "F".

Do not add gasoline mixed with two-cycle oil or bio-gasoline.



Danger

- Keep fire away when refueling.
- Do not overfill fuel into the tank.
- If the fuel is spilled, wipe it up immediately. Keep the cloth away from fire.
- Refill the fuel after the engine has cooled down.
- There is a risk of ignition and explosion.
- Hold the nozzle firmly and discharge water.
- There is a risk of injury due to swinging of the discharge nozzle.

Caution

- Tighten the fuel tank cap securely after refueling.
- There is a risk of ignition and explosion.

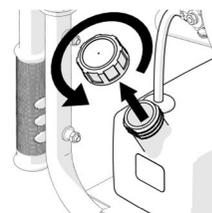
Caution

- Check the fuel once a month, and if the fuel has a pungent odor or is cloudy, replace it with new fuel immediately.
- This may cause engine malfunction or equipment failure.

(2) Engine oil

(Oil tank capacity: Approx. 2L).

Fill the 2-cycle oil into the oil tank at the bottom of the fire-fighting pump.



Caution

- When refilling the 2-cycle oil, use the same brand and grade of oil.
- Do not allow water or debris to enter when refilling.
- This may cause engine malfunction or equipment failure.

Caution

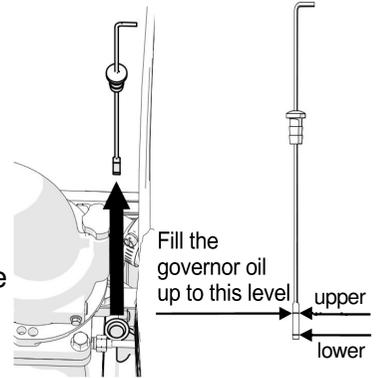
- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.

4 Handling Method (Preparation for Operation)

(3) Governor oil

(1) Place the pump on the level place and check the governor oil level with an oil gauge.

- Remove the governor oil level gauge and check the oil level. Refill the oil to the original level when the oil level has become in the middle or lower. Put back the oil gauge after refilling. Do not replenish more than the upper limit.
- If the oil is very dirty or cloudy, consult your dealer.
- Recommended oil (Automotive engine oil) SAE:10W-30(API:SJ)



Caution

- When replenishing governor oil, add the same brand and grade of oil.
- Do not allow water or debris to enter the oil inlet when refilling.
- This may cause engine malfunction or equipment failure.

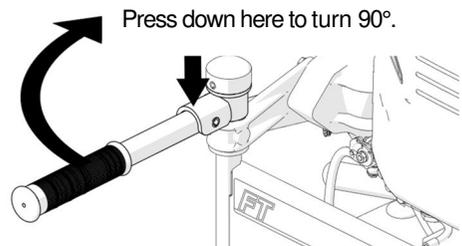


Caution

- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.

2. Carrying the pump

Hold the transport handle correctly when moving and loading/unloading the fire-fighting pump.
The carrying handle can be turned 90 deg.



Caution

- When holding the carrying handle, do not touch the bend.
- Fingers may be pinched, resulting in injury.

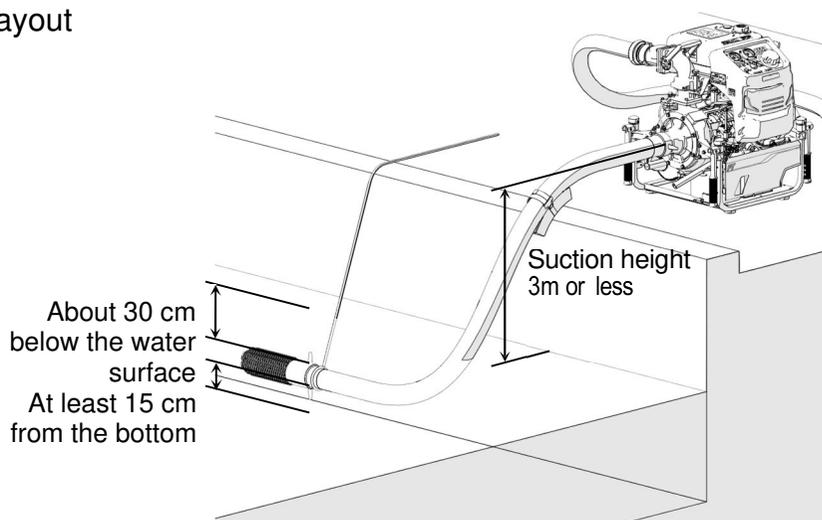


Caution

- 4 people is necessary to carry the pump.
- Dropping it on your foot may cause injury or back pain.

4 Handling Method (Preparation for Operation)

3. Pump layout



- (1) Check the water source. Make sure that there will be no problems with use, such as no decay, floating matter, or sediment.
- (2) Place the pump close to the water source and on a level surface.



Warning

- Avoid installation in places with poor ventilation, such as indoor, in a vehicle, tunnel. There is a risk of exhaust gas poisoning.



Warning

- Place at least 3 m away from combustible materials.
- Remove dead grass and other flammable materials before setting.
- Exhaust fumes and heat from the muffler may cause a fire.

- (3) Keep the suction height below 3m as much as possible to avoid falling water because of the reduction of the pump capacity.
- (4) Lay out the suction hose with no bends or bumps and fasten it tightly to the suction inlet port. Ensure the level of the inlet port side is higher than the suction hose tip at the water source side.
- (5) Always attach a strainer and basket to the suction port of the suction hose and keep it below the water surface to prevent air sucking in. Place the tip about 30 cm above the bottom. If the tip of the device is 15 cm or more away from the bottom. Place a straw mat to prevent sediment from being sucked into the device. If the water source has algae, watergrass, etc., remove them around the water inlet.
- (6) Connect the fire hoses securely and lay them out. Be sure not to fold.

4 Handling Method (Preparation for Operation)



Caution

- Connect the fire hose securely and always ensure it cannot be disconnected.
- If it is pulled out during water discharge, there is a risk of injury.



Caution

- Lay out the fire hoses without folds, twists, or sharp turns.
- There is a risk of the water hose springing up and causing injury.

4. Pump user

- (1) Fire-fighting pumps are small but high-performance machines with strong power. Improper use may cause serious accidents, including death.



Warning

- Fire-fighting pumps should be operated by firefighters, voluntary disaster prevention team members, maintenance and inspection personnel, and others who have been trained specifically for safe operation.
- Misuse or mishandling may result in serious accidents, including death.

- (2) Wear clothing appropriate for the operation.



Warning

- No headbands, neck wraps, ties, waist towels, etc., are allowed. Wear helmets, non-slip shoes, and no loose-fitting clothing.
- There is a risk of getting caught in the machine or slipping and falling, resulting in injury.

- (3) Do not operate if you are not feeling well.



Warning

- Do not operate fire-fighting pump if you are unable to concentrate on your work due to alcohol consumption, tiredness, illness, or the effects of drugs.
- This could lead to a serious accident.

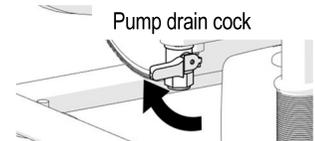
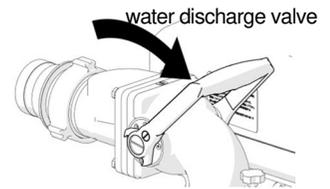
4 Handling method (Operation)

1. Starting the engine

Close the ⑥ water discharge valve and pump drain cock before starting the engine.

Please be sure to check the following

Follow the operating instructions in the order of ❶ to ⑥ numbers on the unit.



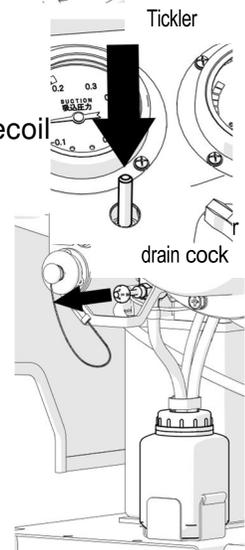
(1) Open the ❶ fuel cock.

Move the fuel cock lever straight down to "Open" ❶ to open the fuel cock.



(2) In cold weather, use the tickler in the carburetor.

- If it is difficult to start the engine with auto-choke alone in cold weather, press the tickler for 2 to 3 seconds.
- Press the tickler for 2 to 3 seconds when starting with the recoil starter and the engine is cold.
- If you use tickler for multiple times and the engine does not start, close the ❶ fuel cock, drain fuel from the carburetor drain cock, then start the engine.
- If the engine does not start properly due to excessive fuel, such as when restarting after warm-up, close the fuel cock, open the carburetor drain cock, and drain the gasoline from the carburetor before starting the engine. After starting, turn the fuel cock "open". If the car stops, start the car again.



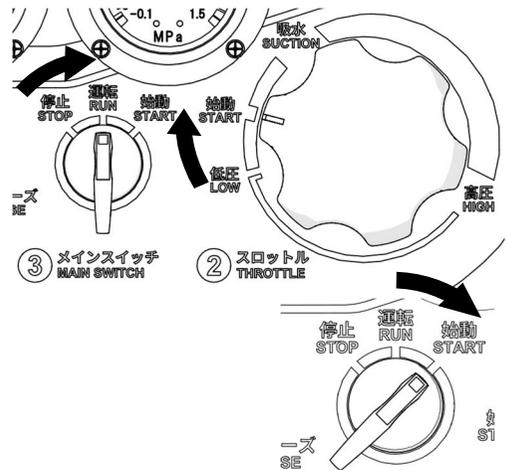
Fuel drain tank

 **Caution**

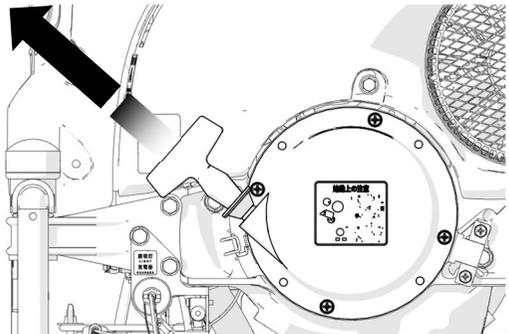
- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.

4 Handling method (Operation)

- (3) Turn the ② throttle to the "start" position.
 (4) Turn the main switch to the "run" position.
 When starting the starter motor, turn it to the "START" position. The starter motor works, and the engine starts.
- Once the engine is started, set the ③ main switch to the "operation" position.
 - Stop the starter motor for at least 5 seconds after running it for 3 seconds. Continuous operation will cause deterioration of the battery and the starter motor.



- (5) For recoil starting, pull the ④ recoil starter handle out to the point where it is slightly heavy, then pull quickly and sharply.



Caution

- When starting with a recoil starter, avoid getting clothing or gloves caught.
- There is a risk of injury.



Caution

- When starting with the recoil starter, keep people at least two meters away.
- There is a risk of injury to the elbows from being knocked by recoil ropes.



Warning

- Be sure to close the recoil starter during operation.
- There is a risk of getting caught in pulleys or belts, or of cutting yourself.

4 Handling method (Operation)

2. Suction

- (1) Turn the ② throttle to the "suction" position after starting the engine.
- (2) Pull the ⑤ suction lever toward you to activate the vacuum pump and suction water.
 - Promptly return the ⑤ suction lever when the pressure gauge needle swings and the pressure increases and stabilizes.
 - Keep the vacuum operation time less than 30 seconds.

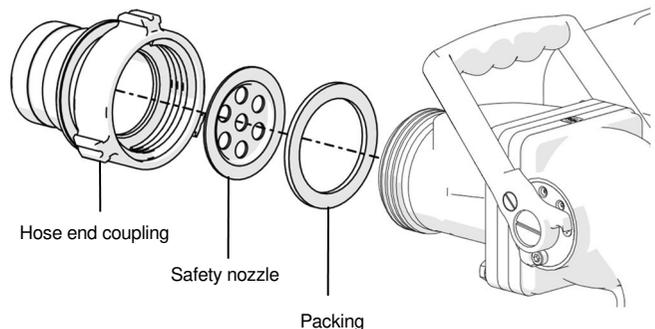


3. Water discharge

Before discharging water, check the safety of the nozzle. Give a signal to the person at the nozzle to start discharging water.

- (1) ⑥ Operate the water discharge handle gradually in the "→Open" direction until it stops. Turn the throttle to the desired water pressure level. Adjust the pressure with the ② throttle according to the water discharge conditions.
 - Be careful not to use too high a water discharge pressure or to open or close the ⑥ water discharge valve handle too rapidly, which may cause the water discharge hose to swing.
- (2) Standby for water discharge
 - To close the ⑥ water discharge valve and put the machine in standby mode during water discharge, ② turn the throttle to the "low pressure" position and stop the engine. In this case, the check valve will operate and water will not fall, so restart the engine and open the ⑥ water release valve to re-discharge water. (However, restarting must be done within 3 minutes.)
 - If it is necessary to stand by without stopping the engine, be sure to put the ② throttle in the "low pressure" position.
- (3) The case when discharging water without using a nozzle

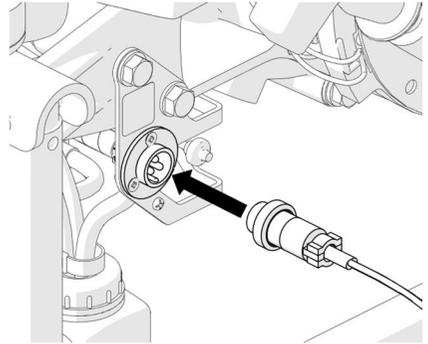
- When operating without using the nozzle, such as pumping water from a water tank or pumping water to a relay tank, be sure to set the attached safety nozzle between the hose end coupling and the water discharge valve, as shown in the figure.



4 Handling method (Operation)

(4) To turn on the searchlight

- To turn on the searchlight, plug the searchlight into the charger inlet on the recoil side.



Caution

- Always return the throttle to the "LOW" position before opening and closing the water discharge valve.
- Hold the nozzle firmly and discharge water.
- There is a risk of injury due to swinging of the discharge nozzle.

Caution

- Operate the water discharge valve slowly.
- There is a risk of injury from pinching or bumping hands.

Caution

- Do not aim the water at people or peer into the nozzle.
- High water pressure may cause them to be blown away, resulting in injury.

Caution

- Do not touch the spark plug or high-voltage cord during operation.
- There is a risk of electric shock.

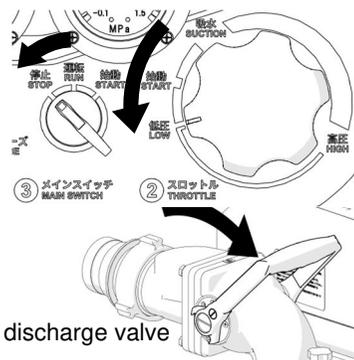
Caution

- Never touch the muffler and exhaust pipe during and after operation since they become very hot.
- There is a risk of burns.

4 Handling method (Operation)

4. Stopping the engine

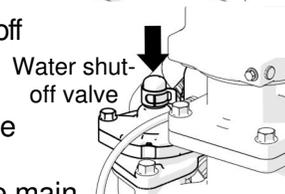
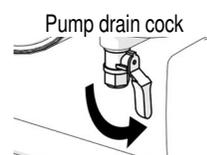
- (1) ② Turn the throttle to the "LOW" position.
 - If the engine is hot, run the engine at low speed for about 1 minute to cool it down.
- (2) Close the ⑥ water discharge valve handle by operating it in the "→ close" direction.
- (3) ③ Turn the main switch to the "STOP" position. The engine will stop.



5. Draining water

After the operation, a large amount of water remains inside the pump. This remaining water may cause corrosion and freezing cracks during cold weather. Be sure to drain water before storing.

- (1) Open the pump drain cock.
- (2) Open and close the ⑥ water release valve, press the water shut-off valve drain button, and drain completely.
- (3) Close the pump drain cock and install the water inlet cap.
- (4) Start the engine and pull the ⑤ suction lever to activate the vacuum pump for approximately 5 seconds.
- (5) ② Turn the throttle to the "low pressure" position, ③ Turn the main switch to the "stop" position and stop the engine.
- (6) Open the pump drain cock and remove the water inlet cap to confirm that it is completely drained. If drainage is insufficient, repeat steps (3) to (5).
- (7) Close the pump drain cock and install the water inlet cap.



Water suction lever



Treatment after using seawater or muddy water

If seawater or muddy water is used, be sure to operate the pump by discharging water with clean water for at least 5 minutes to clean the inside of the pump. Also, to clean the inside of the vacuum pump, operate the vacuum pump for about 5 seconds by pulling the ⑤ suction lever while discharging water at low pressure, and drain clean water from the vacuum pump exhaust hose. After cleaning is complete, be sure to drain the water using the operation described in the previous section "5".

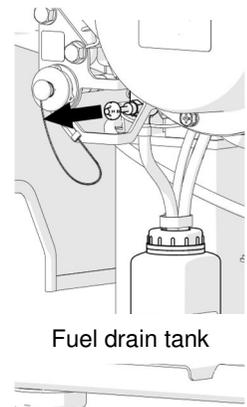
4 Handling method (Operation)

6. Storing the pump

- (1) Store in a dry, temperature-controlled area, away from dust and direct sunlight.
- (2) Wipe off oil, dust, and dirt and keep clean.
- (3) Fill the fuel up to the "F" level when storing. ●Close the fuel cock.
- (4) Fill the specified amount of 2-cycle oil.
- (5) Drain the fuel in the carburetor from the carburetor drain cock, on the recoil starter side.
*Make sure to remove the fuel inside the fuel drain tank every time.
- (6) Please charge the battery with the supplied charger while in storage.
(See "5 Periodic Inspection 2. Inspection Method (2) Handling of Automatic Charger" on p. 29)
- (7) Cover the pump with the attached pump cover.



Carburetor drain cock



Fuel drain tank

- Before storing the pump, be sure to check that the water inside is completely drained. Also, fill the pump with antifreeze to prevent freezing when storing the pump in cold weather (see "4 Handling Methods" Operation in Winter and Cold Weather, on P. 20)
- Operate and discharge water for 5 to 10 minutes at "HIGH" throttle position every month.
- Check the fuel in the fuel tank once a month, and if there is a pungent odor or cloudiness, replace the fuel with new fuel. The recommended replacement time is 6 months after refueling.
- If the vehicle has been in storage for a long period of time without a monthly periodic inspection, operate the pump for 1 minute at "LOW" position to warm up the engine. Be sure to inspect visually to see if there are any abnormalities.



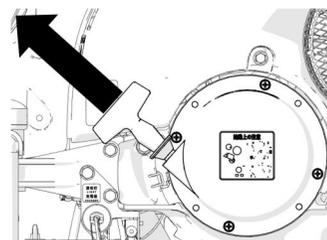
Caution

- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.

4 Handling Method (Operation in Winter and

1. Before starting the engine

- (1) In cold weather, battery capacity is significantly reduced. Please be sure to charge regularly.
- (2) ● Gently pull the recoil starter handle and check that the pump turns.
 - If it does not turn, the pump may be frozen. Pour the warm water into the pump from the suction port or defrost it in a warm room.



Recoil starter handle

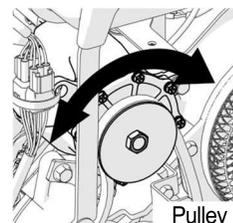
- (3) Remove the vacuum pump cover.

(See "4 Handling Methods (Preparation for Operation)"

1. Removing and attaching the covers, on page 9 .)

- Turn the vacuum pump pulley by hand and check if the vacuum pump turns.
- If it does not turn, the vacuum pump may be frozen.

Blow warm air outside the vacuum pump or defrost in a warm room.



Pulley



Danger

- Do not use fire to defrost the pump.
- There is a risk of ignition and explosion.

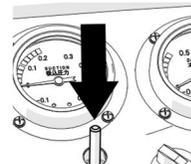


Caution

- Inspection and maintenance should be performed after the engine has been stopped and cooled down sufficiently.

2. Starting the engine

- (1) In cold weather, press the tickler for 2 to 3 seconds.
- (2) Immediately after the engine starts, operation may be unstable; run the machine idle at low speed for 1 to 2 minutes.



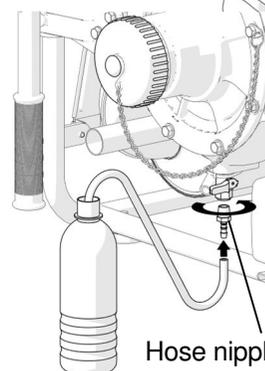
3. Treatment after water discharge (freeze prevention)

- (1) Preventing pumps from freezing (how to add antifreeze)

- ① Drain the water.

(Refer to "4 Handling Method (Operation) 5. Draining water)

- ② Close the water suction cap.
- ③ Attach the hose nipple and hose to the pump drain cock and place the hose in a bottle filled with antifreeze



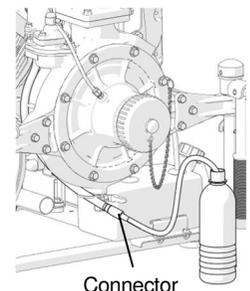
Hose nipple

4 Handling Method (Operation in Winter and

- ④ Start the engine.
- ⑤ ② Turn the throttle to the "SUCTION" position.
- ⑥ ⑤ Pull the suction lever to create a vacuum state inside the pump.
- ⑦ Open the pump drain cock to suck in antifreeze.
- ⑧ Pull the ⑤ suction lever again, and when antifreeze comes out of the vacuum pump exhaust port, return the ⑤ suction lever.
- ⑨ Remove the hose and hose nipple from the pump drain cock.
- ⑩ Pull the ⑤ suction lever and stop the engine when the antifreeze stops coming out of the vacuum pump exhaust port.
- ⑪ After collecting antifreeze from the pump drain cock, close the drain cock.

(2) Preventing the vacuum pump from freezing (how to fill the vacuum pump with antifreeze)

- ① Connect the connector and hose to the water shut-off valve drainpipe and place it in a container of antifreeze.
- ② Start the engine.
- ③ Set the ② throttle to the "SUCTION" position.
- ④ Pull the ⑤ suction lever and suck in the antifreeze.
- ⑤ If antifreeze comes out of the vacuum pump exhaust port, return the water suction lever.
- ⑥ Remove the connector and open the pump drain cock.
- ⑦ Pull the ⑤ suction lever, and when the antifreeze stops coming out of the vacuum pump exhaust port, return the ② throttle to the "LOW" position and stop the engine.
- ⑧ Close the pump drain cock.



(3) Antifreeze should also be injected into water discharge valves and hose couplings.

CAUTION: Do not use alcohol to prevent freezing, since it will damage the rubber seals. Collect drained antifreeze in a liquid container.

4. Precautions for storage

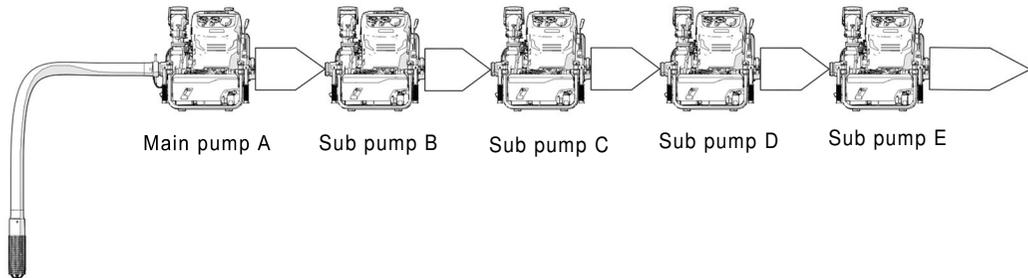
Choose the fuel with good quality. (The better quality of gasoline is highly volatile, and has better starting performance.)

- (1) Be sure to always have antifreeze on hand.
- (2) Batteries may freeze when the relative density of electrolyte becomes low. Be sure the battery is always recharged. If battery performance deteriorates, replace the battery as soon as possible.

4 Handling method (Relaying water with multiple pumps)

In the case of forest fires or urban fires where the water supply is far away, two or more pumps may be connected in series to relay water. The relay water requires different operations and special attention compared to normal operation because each pump is located far from the others. Daily training is also necessary to enable judgment and activities based on the state the pump's operators are facing. See the general method of relay operation below.

Figure 1.



1. Setting Locations

- (1) The number of units and their locations should be determined based on the number of hoses and the height of the water source.
- (2) Install a relay coupling to the suction port of sub-pumps (B to E in Figure 1), to connect the fire hose.
In this case, the automatic relay valve, "Direct Valve" can prevent accidents caused by sudden pressure fluctuations and high-pressure water.
- (3) The wye-valve is also recommended to be attached to the discharge port.

(The hose couplings that connect each pump may not be removed even after the discharge operation, because of the water pressure inside the fire hose.)

2. Operation Method (*An operator is required for every pump.)

- (1) Open the water discharge valves of the sub-pumps (B to E) beforehand.
Be sure to open the variable nozzle when it is attached to the fire hose.
- (2) Operate the main pump (A) and discharge water as usual.
- (3) Send water to the original pump first and then to others sequentially.
- (4) Check the pressure scale in the sub pump (E) and increase the engine speed to regulate the discharging water by controlling the throttle of the sub-pumps (B to E)
The sub pump (B to E): Should be more than 0.05MPa in a scale of suction gauge pressure, be less than 1.2MPa in a scale of power.
- (5) If there is not enough power of water discharge at the nozzle, turn the throttle dial of the original pump (A) to "HIGH" position gradually, then the turn the throttle dial of sub-pump, from the one closer to the original (from B to E), sequentially.
- (6) When stopping water discharge, turn the throttle dial of the last pump, the one close to the nozzle (E), to "LOW" position first and stop gradually (from E to B).
Stop the water supply from the main pump. When the supply of water from the main pump has been stopped, close the water discharge valve of each pump.

4 Handling method (Relaying water with multiple pumps)



Caution

- Do not close the nozzle or water discharge valve while multiple pumps are relayed and the water is discharged.
- Abnormally high pump pressure may result in damage to the pump and hoses.

1. Suction and discharge from water hydrant

The capacity of water supply from the fire hydrant

It is necessary to check the sufficient volume of water for discharging from the fire hydrant in advance.

It would depend on several factors, such as the diameter of the hydrant, the condition of the piping, the initial water pressure, and others.

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 could have high capacity for water supply with wider diameter despite low water pressure.

Water supply method

- (1) Be sure to open and close the hydrant's valve and release water to remove the foreign objects, such as sand, before connecting the hose to the hydrant.
- (2) Connect the water hydrant and pump. Use a suction hose that can endure the water supply pressure. The supply pressure limit for the suction hose with a nominal diameter of 65mm is 0.9 MPa. The suction hose for connection to the hydrant should be inspected periodically to avoid any damage.

How to check and adjust water supply pressure

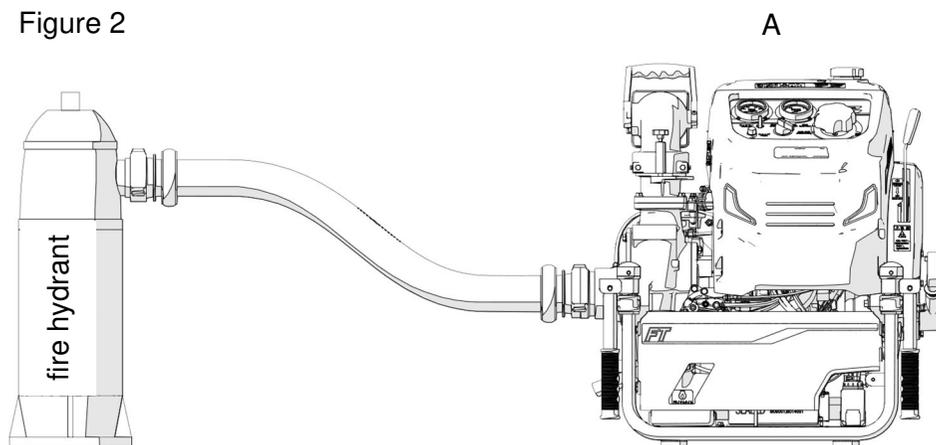
- (1) Open the open/close valves of the fire hydrant and the water discharge valve of the pump to full open.
- (2) Gradually close the pump's water discharge valve while checking the water supply pressure with a suction gauge.
- (3) If the water supply pressure is high, adjust the water supply pressure with the hydrant's open/close valve.

4 Handling Method (Suction, discharge, and relay the water from the fire hydrant)

2. Water discharge and delivery

When a single pump receives and discharges water (Figure 2)

Figure 2



- (1) Open the water discharge valve of pump (A) in advance.
If the fire hose has a variable nozzle at the end, be sure to leave it open.
- (2) Before starting the engine, open the hydrant and check the pressure on the compound (suction) gauge of the pump (A).
- (3) After confirming that water has been sent from the fire hydrant, start the engine of the pump (A) and begin discharging water.

- (4) Adjust the pressure by operating the throttle of the pump (A) to achieve the required pressure and flow rate.

The throttle should be operated gradually, and the compound (suction) gauge should be kept above 0.05 MPa.

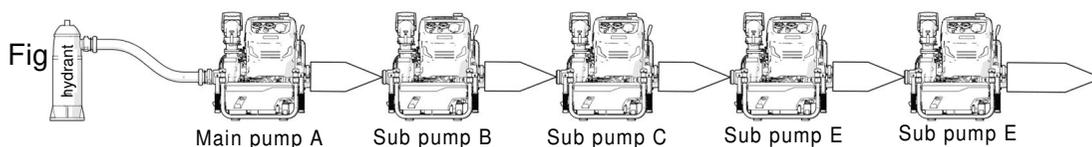
Adjust the hydrant open/close valve to adjust the pressure gauge to not exceed 1.2 MPa. At this time, the compound (suction) gauge of the pump (A) should be less than 0.6 MPa

- (5) To stop water discharge, turn the throttle of pump (A) to the "LOW" position, stop the engine, and close the hydrant.

Do not close the water discharge valve of pump (A) until the water supply from the hydrant stops.

4 Handling Method (Suction, discharge, and relay the water from the fire hydrant)

When discharging water by relaying with multiple pumps
(An operator is required for all pumps: Fig. 3)



- (1) Open the water discharge valves of all pumps (A to E) in advance. If a variable nozzle is attached to the fire hose-end at the water discharge side, be sure to open it.
- (2) Before starting the engine, open the hydrant and check the pressure of the compound (suction) gauge of the main pump (A).
- (3) After confirming that water has been delivered from the fire hydrant, start the engine of the main pump (A) to deliver water to the next pump.
- (4) Start and supply water to the second and sub-pumps (B to E) in the same manner as for the original pump (2) and (3).
- (5) Read the pressure gauge on the sub-pump (E) and adjust the pressure by operating the throttles on all pumps (A to E) to achieve the required pressure and flow rate at the nozzle. Operate the throttles gradually and make sure that each pump keeps above 0.05MPa on the compound (pressure) gauge and above 1.2MPa on the pressure gauge.
Adjust the hydrant opening to make the compound (pressure) gauge of each pump is not less than 0.6MPa.
- (6) To stop the water discharge, shut down the engine by turning the throttle to the "LOW" position, starting with the pump (E) closest to the end of nozzle, and finally close the fire hydrant. Do not close the water discharge valves of each pump until the water supply from the hydrant has stopped.

5 Periodical Inspections

1. Periodical inspections

Be sure to perform periodic inspections according to the following items.

Item	Duration or operating time							Inspection details	treatment		
	Period										
	Before use	after use	1 month	6 months	1 year	2 years	3 years				Operation time (Hour)
fuel	●	●							Quantity/ Deterioration (ie color, smell)	Refill or replace	
				●					-	Replace	
2-cycle oil	●								Quantity	Refill	
					●				-	Replace	
Battery		●							-	Recharge	
			●						Deterioration	Replace	
						●			-	Replace	
Spark plug					○			100	-	Replace	○
Appearance		●							Dirt, etc.	Clean	
Starter rope			●						Wear, breakage	exchange	○
Vacuum pump belt				●				50	Become loose/Wear	Adjust or replace	○
Fan belt				●				50	Become loose/Wear	Adjust or replace	○
Fuel pipes				●				50	Leakage/damage	Replace	○
Water discharge valve					●			100	Valve feels heavy, vacuum leakage	Adjust or replace the parts if necessary	○
Fuel filter				●			○	200	Foreign material stuck	Clean or replace	○
Engine start and vacuum			●						Operation/Perfor mance	Replace parts if necessary	○
Prime and discharge			●						Operation/Perfor mance	Replace parts if necessary	○
All parts							○	300		Replace parts if necessary	○

Note:

- For items marked with "●" in the period column, please practice the inspection by yourself. Please ask your dealer to inspect the items marked with "○" in the period column and to handle the items marked "○" in the column of treatment.
- Measure the inspection timing by either comes earlier, "period" or "operation time". For example, consider replacing spark plug when the operation time reaches to 100 hours, even if the operation period is less than a year.
- This inspection table shows the period and time under general operating conditions. Make sure to perform inspections earlier when the pump is used under tough conditions.

5 Periodical Inspections

Recommended replacement parts and period

Part Name	Recommended Replacement Period	Example of Defects
Spark plug	Every Year	Bad to start due to wear and tear
Fuel Pipes	Every 2 years	Fuel leakage due to deterioration
Battery	Every 2 years	Deterioration
2 Cycle Oil Pipe	Every 2 years	Oil leakage due to deterioration
Vacuum Pump Belt	Every 3 years	Slippage due to wear
Fan Belt	Every 3 years	Slippage due to wear
Other Rubbers	Every 2 years	Deterioration
Starter Rope	Every 3 years	Breakage due to wear
Fuel Filter	Every 3 years	Clogging and Bad start due to the water drip
2-cycle Oil Filter	Every 3 years	Clogging, and Poor lubrication due to the moisture.
Discharge Valve Water shut-off valve (rubber)	Every 3 years	Deterioration of the check valve
Mechanical Seal	Every 3 years	Poor suction due to deterioration
Oilless Vacuum Pump Blades	Every 3 years	Poor suction due to deterioration
Carburetor	10 years	Corrosion inside the tank
Fuel Tank	10 years	Corrosion inside the tank

Parts recommend replacing when disassembling

- Gaskets • Push nuts
- O-rings • Spring pins
- Lock washers • E-rings



Caution

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

5 Periodical Inspections

2. Inspection method

Periodic inspections are essential to ensure the fire-fighting pump's safety and use every possible function. Inspect the pump correctly and safely 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, 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.



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 recommended to replace the battery earlier.

Recommended battery : GS YUASA YTX20L-BS

For handling the battery, please follow the instruction manual that comes with the battery.

5 Periodical Inspections



Caution

- When disposing of batteries, oils, etc., please entrust disposal to a specialized industrial waste disposal contractor.
- It may cause fire, burns, or pollute the environment.

(2) Handling of Shibaura full-automatic charger



Caution

- To use the charger safely and correctly, be sure to read the instruction manual that comes with the charger. Improper use may cause an accident. After reading the charger instruction manual, be sure to keep it close to the product.

A) Unpacking



Caution

- Remove packing materials from the battery charger before charging.
- There is a risk

B) Location to place



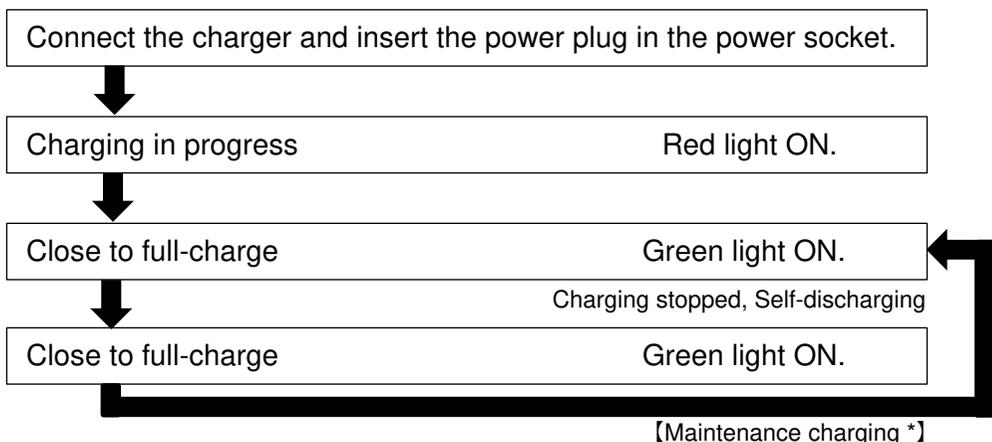
Warning

- Do not use the charger in high-temperature places such as under direct sunlight or near heating elements, in extremely humid places, or wet areas such as rain or snow.
- There is a risk of overheating, burnout, or damage to the charger, or leakage of electricity or electric shock.

C) Make sure before use

- Remove the power plug from the socket (Be sure the charger is turned off).
- Connect the output of the charger cable firmly to the fire-fighting pump.
- After connecting the cable to the charger unit(AC inlet), plug in the socket.

D) Battery charger Operating Manual



【Maintenance charging *】

5 Periodical Inspections

* Maintenance charge mode

This function automatically recharges the battery when the capacity has declined. It always monitors the decline of the battery capacity by self-discharge.

After starting the charging (Red Light ON), when the battery is close to full charging, the indicator will change to Green Light ON, and the status will automatically change to the maintenance charging mode (Green Light ON). After that, the Red Light and the Green Light will light up alternately to reduce the deterioration of the battery.

Note:

Remove the power plug to stop the main unit from charging. Then, remove the output terminal.

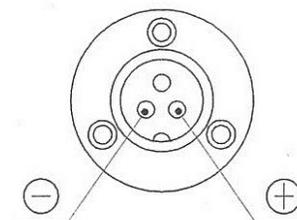
LED indication and charge status

CHARGE STATUS	CHARGE LED (RED)	FULL LED (GREEN)
No Charging	OFF	OFF
Charging	ON	OFF
Close to full-charge	OFF	ON
Error (⚠)	ON	ON

⚠ Refer to "5. Periodical inspections" when an error has occurred.

Note:

When starting the engine using a fully charged battery, if the starter does not rotate sufficiently, this may be due to battery deterioration. Please inspect or replace the battery.



E) Protective operations

- Input (primary side)
Protected from circuit errors by current fuse.
- Output (secondary side)
Protected from battery reverse connection and output short-circuiting by electronic circuit and circuit breaker.

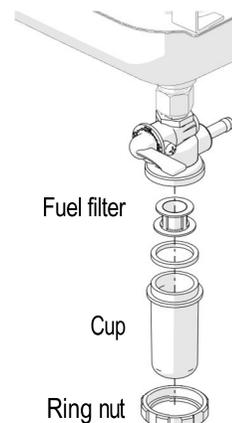
F) Inspection method when an error has occurred

Symptom	Cause	Measure *
Both red and green LEDs come on	Power cable is not connected correctly.	Check the connection status.
	The circuit breaker is open.	Pull out the power plug. After the body of the charger stops, remove the error cause, and close the circuit breaker after 60 seconds.
	The output connector is loose.	Insert the output connector all the way, and lock it securely.
The battery is obviously in discharged state, but the tickle charge mode starts immediately.	Battery is in the deteriorated state.	Replace the battery with a new one.
LED does not come on (both red and green)	Protective operation is activated.	Turn off the power and wait for 60 seconds. After that, charging the battery again.

5 Periodical Inspections

(3) Cleaning the fuel cock filter

- ① Close the fuel cock.
- ② Loosen and remove the ring nut with pliers.
- ③ Wipe off any debris in the cup with a cloth or the like.
- ④ Remove the filter attached to the ④➊ fuel cock main unit and wash it with gasoline.
- ⑤ Install the fuel cock securely to the original position. Be sure to open the ➊ fuel cock and inspect if there are no leaks.
- ⑥ After inspection, close the ➊ fuel cock.



(4) Replacement of the fuel in the tank

Storing fuel for a long period of time may result in poor starting performance and rust.
Replace with new fuel every 6 months.



Danger

- Keep fire away when refueling.
- There is a risk of ignition and explosion.

(5) Spark plug cleaning

Use [NGK BR8HIX] spark plugs.

Clean the spark plugs that are contaminated with exhaust gases and carbon.

- (1) Stop the engine to cool down sufficiently before working on it.
- (2) Remove the spark plug cap and spark plug using the spark plug box wrench.
- (3) Clean the outside, inside, and electrode of the spark plug.
- (4) Tighten the spark plug to the cylinder head and keep the spark spark plug cap pressed in.



Caution

- Do not touch the ignition plug or high-voltage cord during operation.
- There is a risk of electric shock.

(6) Check the governor oil level

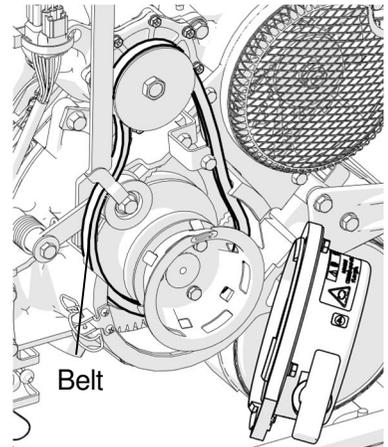
(See "4 Handling Methods (Preparation for Operation) 1.

5 Periodical Inspections

(7) Vacuum pump belt inspection

Replacement of the vacuum pump belt is required if it is stretched, worn, or cracked.

- ① Open the recoil starter.
Do not start the engine during the inspection. Also, the belt may be hot immediately after operation, so wait until the engine has cooled down before inspecting
- ② Remove the front cover and vacuum pump cover.
(See "4 Handling Methods (Preparation for Operation) 1.")
- ③ Remove the belt from the pulley groove.
- ④ Install a new belt.
- ⑤ Install the cover as before.

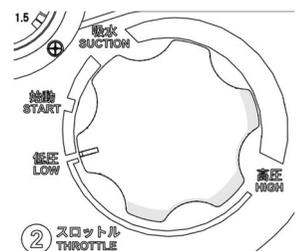
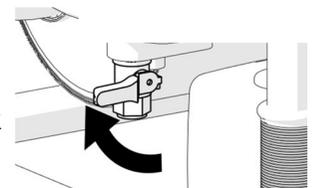
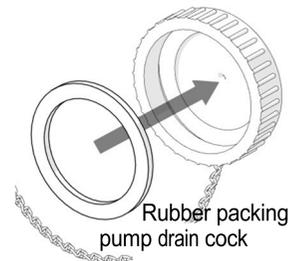


(8) Starting and vacuum inspection

Vacuum inspections must be performed even if the suction and discharge tests (which are described in the next page) are difficult to carry out.

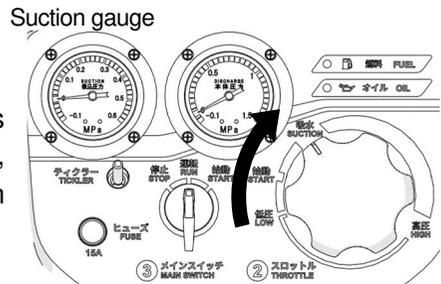
Defects such as engine not starting, poor vacuum performance, or vacuum leakage can cause accidents, such as not being able to operate the water discharge at the actual site, or falling water during the discharge.

- ① Check that the rubber packing is in the water suction cap, and attach the inlet cap to the water inlet.
- ② Close the pump drain cock.
- ③ Start the engine.
- ④ ② Warm up the engine with the throttle dial in the "low pressure" position for about 1 minute, and visually check for any abnormalities in the various parts.



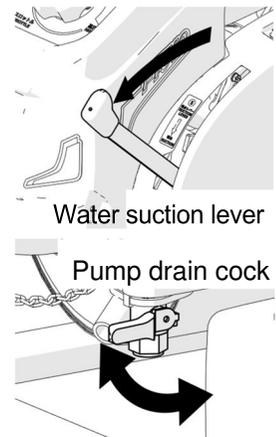
5 Periodical Inspections

- ⑤② Turn the throttle to the "suction" position and pull the ⑤ suction lever toward you to activate the vacuum pump. When the pointer of the ⑥ suction gauge reads -0.06 to -0.08 MPa, return the ⑤ suction lever, ② throttle to the "low pressure" position, and then stop the engine.
- ⑦ If there is no change in the indicated value of the suction gauge after leaving it for 1 minute, the vacuum performance is good.



- ⑧ Open the pump drain cock to release the vacuum and close the pump drain cock.

* If any abnormality is found, please consult your dealer.



(9) Water suction and discharge inspection

Suck and Discharge the water to inspect if there is no abnormalities found in each part of your pump

- (1) Are there any abnormal sounds?
- (2) Is there any water fall?
- (3) Is the water suction slow?
- (4) Are there any water leaks?
- (5) Is the startability good?
- (6) Are there any looseness in each part?
- (7) Are there any fuel leaks?
- (8) Other

*If any abnormality is found, refer to the "6 Troubleshooting" in the next section for appropriate treatments.

6 Troubleshooting

Daily inspection and maintenance are important to prevent fire-fighting pump malfunctions. Detect malfunctions at an early stage and perform maintenance immediately. If the trouble is not easily solved, or if the malfunction is not listed below, please consult the dealer where you purchased the pump, giving the model name and serial number.

1. Engine area

	Symptom	Cause	Action
Hard to Start	No fuel flow to carburetor.	1 Fuel cock filter or fuel line is clogging 2 Needle valve is sticking 3 There's no fuel.	1 Clean 2 Clean 3 Fill
	Fuel does not flow to combustion chamber (remove spark plugs to see)	1 Choke does not close (auto choke) 2 Rotational speed is low when starting. 3 Carburetor (needle valve, jet) is clogging	1 Repair and adjust 2 Replenish the battery 3 Clean
	Fuel goes to combustion chamber but does not start	1 Overflow (excessive fuel) 2 Tickler is overused (excessive fuel) 3 Choke does not open fully closed (auto choke) 4 Fuel is deteriorated 5 Water is mixed in the fuel. 6 Excessive lubricating oil	1 Inspect and adjust the carburetor 2 Drain the fuel from the seal at the crankcase. 3 Replace diaphragms and clean pipes. 4 Exchange. 5 Drain water 6 Adjust to the proper amount
	Abnormality of combustion system	1 Fuel cock filter is clogged 2 Carburetor valve seat is clogged 3 Carburetor is poorly adjusted, or there is a clog on the carburetor 4 Carburetor is poorly tightened.	1 Clean 2 Clean 3 Adjust or clean 4 Retighten
	Sparks are poor	1 Spark plug cap has damages, electrode gap is improper, or the spark plug is defective. 2 Leakage from high voltage cord 3 Leakage from spark plug cap 4 Defective ignition coil 5 Defective CDI unit 6 Poor rotation of the starting motor	1 Exchange 2 Exchange 3 Exchange 4 Exchange 5 Exchange 6 Replenish the battery

6 Troubleshooting

Symptom		Cause	Action	
Hard to Start	No sparks	<ol style="list-style-type: none"> 1 Short circuit of the ground wire 2 Spark plugs are damaged or stained. 3 Spark plug has gap failure 4 Ignition coil is defective 5 CDI unit is defective 6 Wiring connection is poor or disconnected 7 Main switch is defective 	<ol style="list-style-type: none"> 1 Repair the point short circuited 2 Exchange. 3 Exchange 4 Exchange 5 Exchange 6 Adjust the connection 7 Exchange. 	
	Poor compression	<ol style="list-style-type: none"> 1 Piston wear or seizure 2 Piston rings 3 Worn or damaged oil seals 4 Lack of lubricant 5 Damaged cylinder head gasket 	<ol style="list-style-type: none"> 1 Repair or replace 2 Exchange. 3 Exchange 4 Refill to the proper amount 5 Exchange 	
Poor running	Insufficient rotation	Combustion system error (mis-hunting)	<ol style="list-style-type: none"> 1 Carburetor main jet is clogged or misadjusted 2 Fuel cock filter clogged 3 Overflow 4 Poor installation of the carburetor 5 Icing 	<ol style="list-style-type: none"> 1 Clean or replace 2 Cleaning 3 Check and adjust the carburetor 4 Correct the place or replace. 5 Remove and add fuel tank drainage agent
		Abnormalities in the governor system	<ol style="list-style-type: none"> 1 Governor maladjustment 2 Governor operating parts wear 3 Defective caulking of flyweight 4 Poorly tightened governor arm 5 Governor spring tension failure 6 Governor lever ring hole worn or rattling large 	<ol style="list-style-type: none"> 1 Adjust 2 Exchange. 3 Correct or exchange 4 Readjust and retighten. 5 Exchange. 6 Replace or correct
		Cooling system abnormalities	<ol style="list-style-type: none"> 1 Cooling air is weak 	<ol style="list-style-type: none"> 1 Pay attention to the ventilation
		Other	<ol style="list-style-type: none"> 1 Overload 2 Muffler and exhaust port clogging 3 Inlet clogging 4 Defective spark plug 	<ol style="list-style-type: none"> 1 Change nozzle diameter or use safety nozzle 2 Remove the clog 3 Remove the clog 4 Exchange

6 Troubleshooting

		Symptom	Cause	Action
Poor running	Abnormal noise	Mechanical sound	<ol style="list-style-type: none"> 1 Flywheel is fixed loosely 2 Piston is worn, and tapping sounds come out from the piston skirt 3 Armature plate is contacting the other parts. 4 Foreign material is caught inside the crankcase and fan cover 5 Foreign material is caught inside the pump or impeller is touching the pump casing 6 Each part becomes loose 	<ol style="list-style-type: none"> 1 Retighten 2 Replace the piston 3 Reassemble 4 Remove the foreign material 5 Remove the foreign material or reassemble the pump 6 Retighten
		Knocking sound (combustion system abnormalities)	<ol style="list-style-type: none"> 1 Insufficient fuel (main jet or use of different diameter parts) 2 Overload 3 Rotation speed too low or too high 4 Different spark plug is used 	<ol style="list-style-type: none"> 1 Clean or replace 2 Open water discharge valve 3 Adjust to proper rotation speed 4 Replace with proper spark plugs

6 Troubleshooting

2. Pump

		Symptom	Cause	Action	
Water suction failure	A suction gauge does not have negative pressure	Abnormality on water pump side	<ol style="list-style-type: none"> 1 Poorly tightened suction pipe 2 Air suction from the tip of the suction pipe 3 Forgot to close the drain cock 4 Defective suction pipe packing 5 suction pipe fissure 6 Foreign matter caught in water discharge valve 	<ol style="list-style-type: none"> 1 Tighten securely 2 Put it completely underwater 3 Close securely 4 Exchange. 5 Exchange. 6 Remove foreign objects 	
		Abnormality on the vacuum pump side	No Rotation	<ol style="list-style-type: none"> 1 Internal freeze 2 Foreign object inhalation 3 Vacuum pump damaged 4 V Belt slip or breakage 	<ol style="list-style-type: none"> 1 Defrost 2 Remove foreign objects 3 Exchange. 4 Exchange.
			Rotating	<ol style="list-style-type: none"> 1 Clogged or poorly tightened vacuum passage 2 Strainer at the water shut-off valve is clogged 	<ol style="list-style-type: none"> 1 Clean or retighten 2 Clean
	The coupled meter becomes negative pressure	Vacuum leak (engine) Falling water when stopped)	Refer to "Water suction failure - compound meter does not become negative pressure - Water pump side abnormality"		
		No vacuum leakage	<ol style="list-style-type: none"> 1 Clogged suction pipe strainer or inside suction pipe 2 Air pocket in the suction pipe. 3 Suction height is too high, or the suction pipe is too long 4 Air suction from the tip of the suction pipe 5 Low engine speed at water suction 6 Short water suction operation time 7 Clogged or poorly tightened vacuum passage 8 Strainer at the water shut-off valve is clogged 	<ol style="list-style-type: none"> 1 Clean 2 Correct the layout 3 Keep the height within 8m 4 Put the tip completely underwater 5 Adjust to water suction rotation speed 6 Lengthen operation time 7 Clean or retighten 8 Cleaning 	

6 Troubleshooting

Symptom		Cause	Action	
Water Discharge Failure	Pressure does not increase	Abnormality on water pump side	<ol style="list-style-type: none"> 1 Clog in the suction pipe strainer or suction pipe 2 Air pocket in suction pipe 3 Suction height is too high, or the suction pipe is too long. 4 Air suction from the tip of the suction pipe 5 Poorly tightened suction pipe 6 Discharge valve half-open 7 Forgot to remove the safety nozzle (not necessary when the nozzle is attached) 8 Foreign matter in the nozzle 9 Frozen inside the pump 	<ol style="list-style-type: none"> 1 Clean 2 Correct the layout of the suction pipe. 3 Keep the height within 8m 4 Put the tip completely underwater. 5 Tighten securely 6 Open the valve completely 7 Remove 8 Remove foreign objects 9 Defrost and remove the ice
		Engine malfunction	Refer to 1. Engine – Hard to start and poor running	
	Other Abnormalities	<ol style="list-style-type: none"> 1 Muffler and exhaust port clogging 2 Air Inlet of the carburetor clogging 	<ol style="list-style-type: none"> 1 Remove the clog 2 Remove the clog 	

3. Electrical

Symptom		Cause	Action
Bad start	Starting motor does not rotate	<ol style="list-style-type: none"> 1 Insufficient battery capacity 2 Deterioration of the battery 3 Fuse burnout 4 The cable connection is loose or Disconnected 	<ol style="list-style-type: none"> 1 Recharge 2 Replace 3 Replace. 4 Check the cable connection and plug-in surely. Replace parts if necessary.
Battery failure	Batteries run out too quickly.	<ol style="list-style-type: none"> 1 Deterioration of the battery 2 Mistake in main switch operation. 3 Mistake in charge operation 	<ol style="list-style-type: none"> 1 Exchange. 2 Operate properly 3 Operate properly
Connection failure	Wiring burnout	<ol style="list-style-type: none"> 1 Battery reverse connection 2 Poor connection or short-circuit at the outlet terminal 3 Poor wiring connection or disconnection 4 Fuse burnout 	<ol style="list-style-type: none"> 1 Connect correctly 2 Connect correctly, or Repair or replace the short-circuited parts. 3 Correct the wiring or repair, or replace 4 Replace

6 Troubleshooting

Symptom		cause	treatment	
Defective wiring	Lamp does not light	1 Lamp blew out 2 Wiring is loose or disconnected	1 Replace 2 Correct the circuit, repair, or replacement	
Defective monitor lamp	All monitor lamps do not light up immediately after turning the main switch to operate	1 Battery capacity is not enough, or the battery is deteriorated. 2 Fuse burnout 3 Wiring is loose or disconnected	1 Recharge or replace 2 Replace 3 Correct the circuit, repair, or replacement.	
	The lamps do not light even if they should have lit up	Common & typical matters to be noticed	1 Loose or disconnected wiring of each sensor and switch 1 Correct the circuit, repair, or replacement	
		Fuel	1 Switch is broken	1 Replace
		2-cycle oil	1 Switch is broken	1 Replace
Monitor lamp light up	Please refer to Section No. 3 – Monitor Lamp (P. 7) and cope with each matter displayed			

7 Specifications

1. Fire-fighting pump	
Model	FT510-A
Classification (JPN)	(B-2)
Notification No. (JPN)	(P0145001)
Dimension (L x W x H)	737mm x 572mm x 740mm
Dry Weight	90 kg
2. Pump	
Type	High-pressure 1-stage turbine pump (with inducer)
Discharge water volume	Normal 1.01 m ³ /min
	High pressure 0.64 m ³ /min
Pump pressure	Normal 0.70 MPa
	High pressure 1.00 MPa
Nozzle diameter	Standard 24.0 mm
	High pressure 17.5 mm
Rated rotation speed	5800 rpm
Water inlet	Nominal 75mm, Fire engine thread (JIS B 9912)
Water outlet	Nominal 65mm, Fire engine Thread (JIS B 9912)
3. Engine	
Type	Air-cooled, 2-cycle, inclined, 2-cylinder gasoline engine
Model name	E440C
Displacement	436mL
Authorized output	22.8 kW / 5800rpm
Fuel feeding system	Carburetor
Fuel type and tank capacity	Regular gasoline for automobiles - 14.5L
Lubrication system and tank capacity	Separate lubrication system (2-cycle oil) - 2L
Fuel consumption	Approx. 14L/h
Cooling system	Forced air-cooled
Ignition system	CDI ignition system
Starting system	Starting motor & recoil
Lighting	12V-35W (searchlight), 12V-3W (instrument panel light)
Spark plug	NGK BR8HIX

7 Specifications

4. Vacuum pump	
Type	Oilless type: 4-vane eccentric rotary type
Maximum Suction Height	Approx. 9 m
Drive system	V Belt clutch type
5. Accessories	
Battery	12V15Ah/5h
Charger	AC100V~AC240V – DC12V charger
Tools, etc.	1 x Tool kit, 1 x instruction manual 1 x Spark plug, 1 x safety nozzle
Pump cover	1 pc.
6. Optional parts	
Searchlight lamp	1 pc.
Searchlight stand	1 pc.



Shibaura Fire Pump Co., Ltd.

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URL: www.shibaura-bousai.co.jp

SHIBAURA

OPERATION MANUAL

SHIBAURA FIRE-FIGHTING PUMP FT510-A



Please read this operation manual carefully to operate the Shibaaura Fire-fighting Pump safely and correctly. Incorrect operation of the pump may result in an accident. If this manual is missing or damaged, please order a new one from us or our agent promptly.

Shibaaura Fire Pump Co., Ltd.

- For safe use

Keep it in a safe place with the fire-fighting pump.

- Items marked with  in this instruction manual are particularly important for safe use and must be observed.

 Danger	The case when there is an imminent risk of death, serious injury, or the product is mishandled.
 Warning	The case when there is a risk of death or serious injury, or the product is mishandled.
 Caution	In cases when the product is mishandled, minor injuries or property damage may occur.

- Product specifications and appearance are subject to change without notice for improvement. Therefore, please note that the contents of this document and some of the photographs and illustrations may not correspond to the product.
- If you have any questions or difficulties after reading this manual, please contact the dealer where you purchased the product or our company.
- For inspection and maintenance, please contact a maintenance business or dealer that is qualified to service portable fire-fighting pumps.

○ Contents

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1 Things you must follow for your safety

1. Warning Label Locations



Part No.L82900900



Part No.290192430



Part No.290192770



Part No.290192410



Part No.290192400



Part No.290192400

- If the contents of the label become difficult to see or the label is about to come off, replace it immediately.

1 Things you must follow for your safety

2. Caution Marks



- Do not suck in or discharge the substances other than water, such as flammable materials, drugs, or chemical liquid.
- There is a risk of explosion, fire, burns, poisoning, etc.

- Keep fire away when refueling.
- Do not overfill fuel into the tank.
- If the fuel is spilled, wipe it up immediately. Keep the wiping cloth away from fire.
- Refill the fuel after the engine has cooled down.
- Do not use fire to defrost the pump.
- There is a risk of ignition and explosion.



- Fire-fighting pumps should be operated by firefighters, voluntary disaster prevention team members, maintenance and inspection personnel, and others who have been trained specifically for safe operation.
- Misuse or mishandling may result in serious accidents, including death.

- No neck wraps, ties, waist towels, etc., are allowed. Wear helmets, non-slip shoes, and no loose-fitting clothing.
- There is a risk of getting caught in the machine or slipping and falling, resulting in injury.

- Do not operate a fire-fighting pump if you are unable to concentrate on your work due to alcohol consumption, tiredness, illness, or the effects of drugs.
- This could lead to a serious accident.

- Use only genuine parts or specified attachments. No modifications are allowed.
- Failure to do so may result in accidents, injuries, or machine malfunctions.

- Install at least 3 m away from combustible materials.
- Remove flammable materials, such as dry grass, before installation.
- Exhaust fumes and heat from the muffler may cause a fire.

- Do not install indoors or in tunnels with poor ventilation.
- There is a risk of exhaust gas poisoning.

- Be sure to install the cover when operating.
- There is a risk of injury or burns.

- Be sure to close the recoil starter during operation.
- There is a risk of getting caught in pulleys or belts, or of getting cut yourself.

- Keep fire away from the battery.
- There is a risk of fire and explosion.

- Remove packing materials from the battery charger before charging.
- There is a risk of fire.

- Be sure to carry out periodic inspections. Operate and discharge the water at least once a month to check for any abnormalities.
- Accidents may occur due to damage, etc., and fire-fighting activities may be hindered.

1 Things you must follow for your safety

Caution

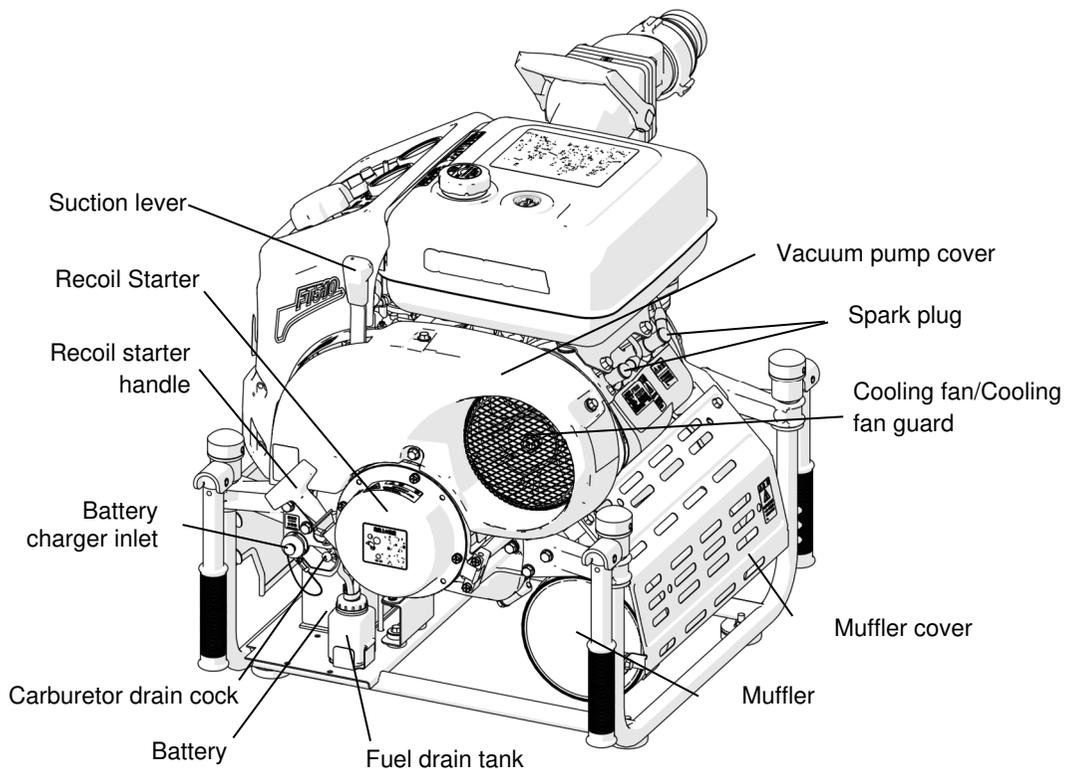
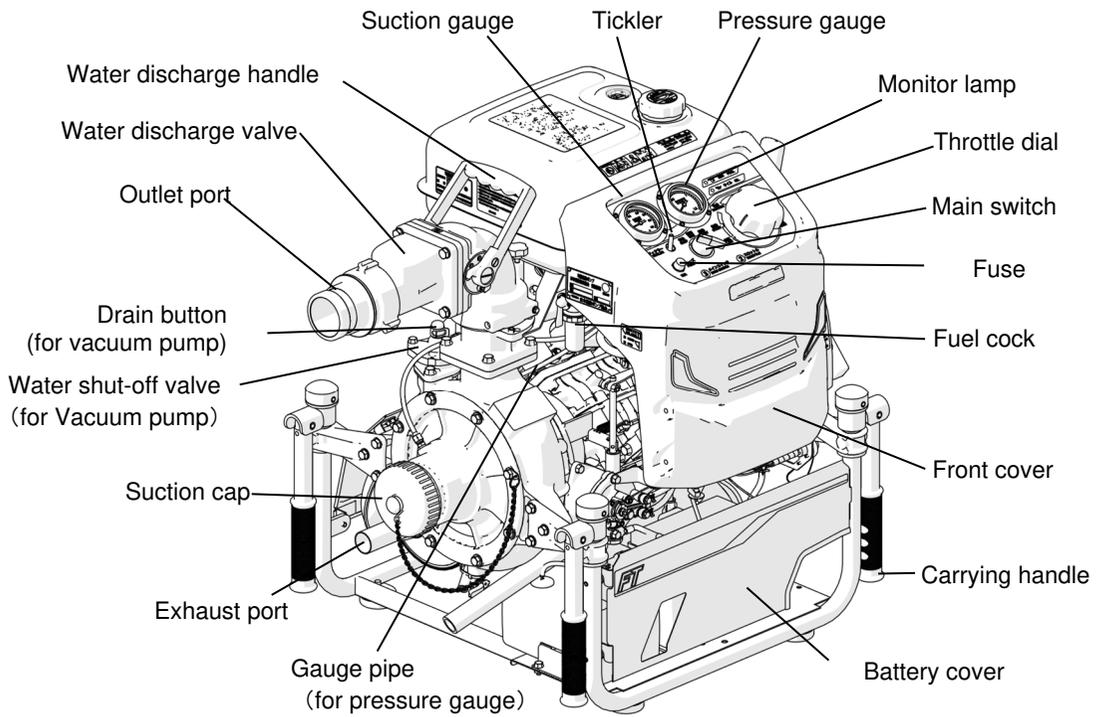
- Do not use fire-fighting pumps for activities other than fire-fighting, such as civil engineering, irrigation, water sprinkling, etc.
- There is a risk of hitting some objects and injuring people or damaging property around you.
- When disposing of batteries, oils, etc., please entrust disposal to a specialized industrial waste disposal contractor.
- It may cause fire, burns, or pollute the environment.
- Do not put fingers or hands in the water discharge valve.
- There is a risk of injury.
- After refueling, tighten the fuel tank cap securely.
- There is a risk of ignition and explosion.
- Check the fuel once a month, and if the fuel has a pungent odor or is cloudy, replace it with new fuel immediately.
- This may cause engine malfunction or equipment failure.
- When adding two-cycle oil, always use the same brand and grade of oil.
- Avoid entering water or debris when refilling the two-cycle oil.
- This may cause engine malfunction or equipment failure.
- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.
- When replenishing the governor oil, add the same brand and grade of oil.
- Avoid entering water or debris when refilling the governor oil.
- This may cause engine malfunction or equipment failure.
- When holding the carrying handle, do not touch the joint parts.
- Failure to do so may result in injury from pinching fingers.
- When carrying or loading/unloading the fire-fighting pump, four people should do so.
- Dropping it on your foot may cause injury or back pain.
- Connect the fire hose securely and always ensure it cannot be disconnected.
- If it is pulled out during water discharge, there is a risk of injury.
- Lay out the fire hoses without folds, twists, or sharp turns.
- There is a risk of the water hose springing up and causing injury.
- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.
- When starting with a recoil starter, avoid getting clothing or gloves caught.
- There is a risk of injury.
- When starting with the recoil starter, keep people at least two meters away from the starter.
- There is a risk of injury to elbows from being knocked by recoil ropes.

1 Things you must follow for your safety

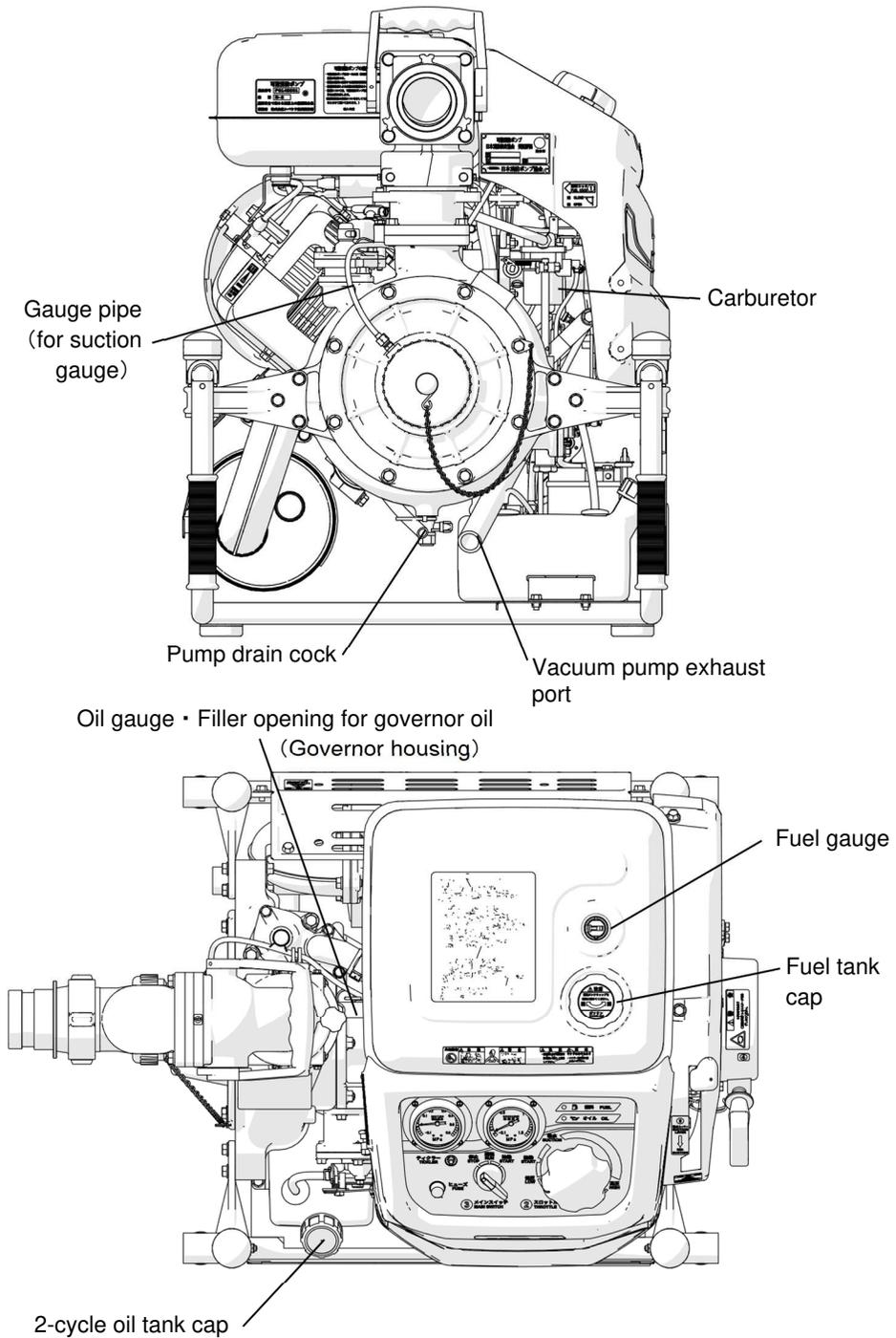
Caution

- Always return the throttle to the "LOW" position before opening and closing the water discharge valve.
- Hold the fire nozzle firmly and discharge water.
- There is a risk of injury because the fire nozzle runs away.
- Operate the water discharge valve slowly.
- There is a risk of injury from pinching or bumping hands.
- Do not aim the water at people or peer into the nozzle.
- High water pressure may cause them to be blown away, resulting in injury.
- Do not touch the spark spark plug or high-voltage cord during operation.
- There is a risk of electric shock.
- Never touch the muffler and exhaust pipe during and after operation since they become very hot.
- There is a risk of burns.
- While operating, be careful not to have the suction pipe or hose stepped on by vehicles or other objects.
- Accidents may occur due to damage, etc., and fire-fighting activities may be hindered.
- Do not start the engine with the water discharge valve handle open.
- When discharging water, the engine operator should communicate with the operator at the nozzle. Do not open the water discharge valve without notice or accelerate the throttle rapidly.
- There is a risk of injury from being blown away by the high-pressure water.
- Inspection and maintenance should be performed after the engine has been stopped and cooled down sufficiently.
- Failure to do so may result in injury, burns, or fire.
- Read the instruction manual that comes with the battery and the information on the battery itself carefully to ensure that the battery is used correctly.
- When disconnecting the battery cord, remove the (-) cord first, and when installing the battery cord, connect the (+) cord first.
- Short-circuiting may cause fire or burns.
- Do not use the charger in high-temperature places such as under direct sunlight or near heating elements, in extremely humid places, or wet areas such as rain or snow.
- There is a risk of overheating, burnout, or damage to the charger, or leakage of electricity or electric shock.
- The charger should be installed in a dry, well-ventilated location that is not wet.
- Failure to do so may cause electric shock or fire.
- Do not charge the battery with a charger other than the specified one.
- There is a risk of fire due to heating or burnout of the wiring.
- When operating without attaching the suction pipe (e.g., to check the vacuum level), attach the suction cap.
- There is a risk of getting caught in the machine or injured.
- Do not close the nozzle or water discharge valve while multiple pumps are relayed and the water is discharged.
- Abnormally high pressure may result in damage to the pump and hoses.

2 Name of each component



2 Name of each component



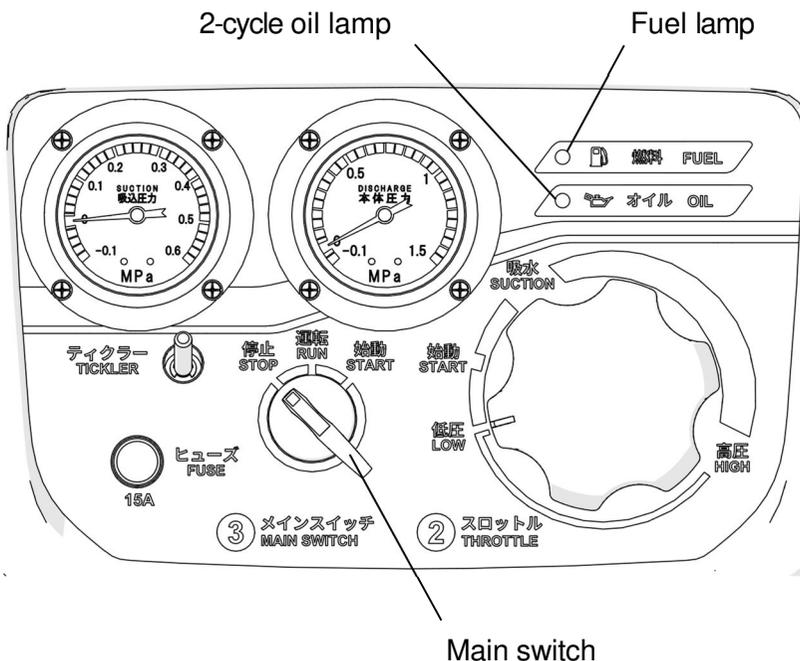
3 Monitor lamp

The pump with a starting motor activates when the main switch is turned into the "Run" position. When the power is turned on, two lights illuminate at the same time. If they do not light up, the battery voltage is insufficient, or there is a faulty circuit, the pump needs to be repaired. All lights are turned off after a few seconds.

All lights are turned off during water discharge, but the lights are turned on when operating the starting motor. It is because the battery voltage drops. Be sure to inspect or maintain when the following items are lit up.

Display	Feature	How it works	Measures
 fuel	Indicates that the fuel must be added	Lights up when the remaining fuel in the tank is low.	Refill the regular gasoline.
 2-cycle oil	Indication of when to refill 2-cycle oil	Lights up when the remaining oil in the tank is low, then stop the engine.	Refill the 2-cycle oil.

If the monitor lamp still illuminates or blinks after following the measures above, consult your dealer.



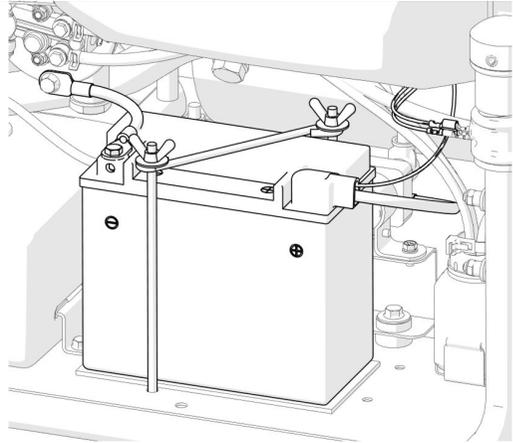
4 Handling method (Before)

Installing Battery

Caution

- Read the instruction manual that comes with the battery and the information on the battery itself carefully to ensure that the battery is used correctly.

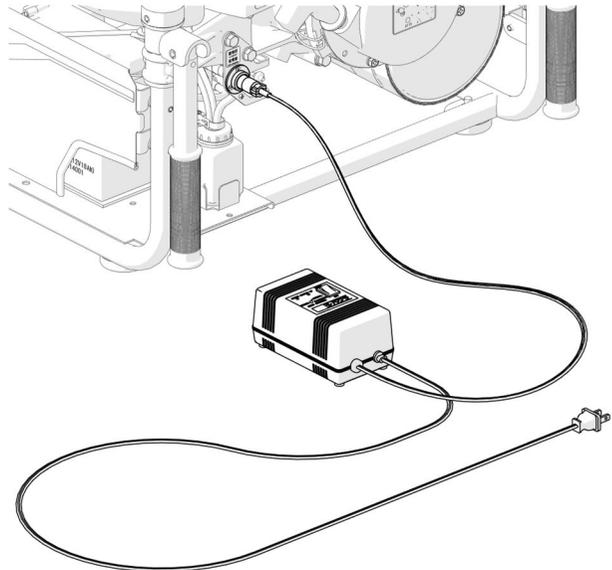
- (1) For handling, be sure to follow the battery instruction manual.
- (2) Fix the battery to the bed with two rods and one holder.
- (3) Firstly, connect two battery (+) cables (red), then connect one (-) cable (black) . Be sure to keep the connecting order.



Caution

- When disconnecting the battery cable, remove the (-) cord first, and when installing, connect the (+) cable first.
- Short-circuiting may cause fire or burns.

- (4) Connect the supplied charger to a charger inlet to charge the battery. (See "5 Periodic Inspection 2. Inspection Method (2) Handling of Fully Automatic Charger" on p. 29.)



4 Handling Method (Preparation for Operation)

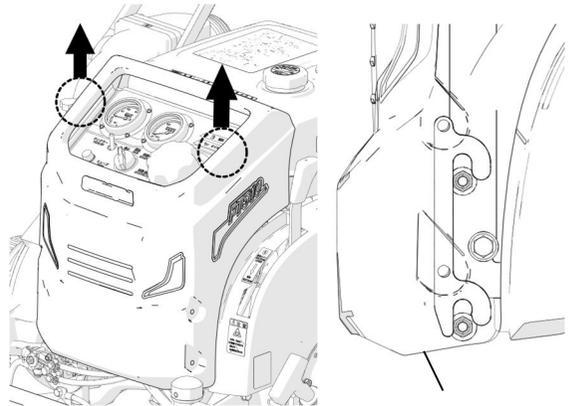
1. Removing and attaching covers

When removing the cover, follow the procedure below.

(1) Removing/attaching front cover

Hold the circled places on the illustration on the right. Shift it upward first, and then remove it toward you.

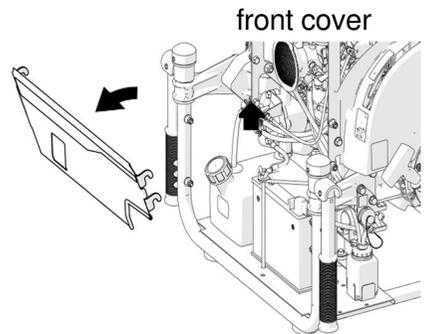
Installation is the reverse procedure.



(2) Removing and attaching the battery cover

Slide the battery cover upward first, and then remove it toward you.

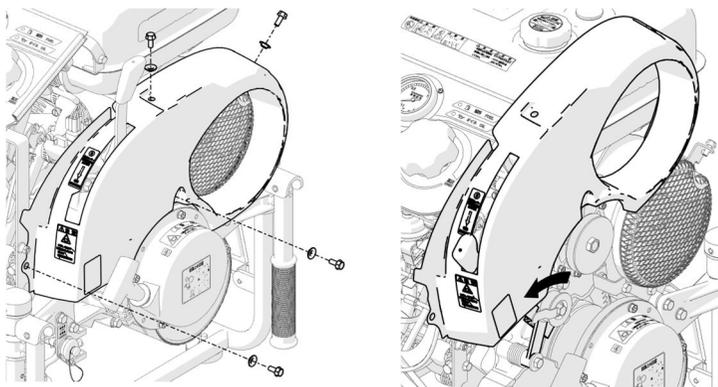
Installation is the reverse procedure.



(3) Removing and attaching vacuum pump cover

Remove the four bolts and collars. Pull the water suction lever toward you and remove it through the lever opening of the vacuum pump cover.

Installation is the reverse procedure.



Warning

○ Be sure to attach the cover when driving.

● There is a risk of injury or burns.

4 Handling Method (Preparation for Operation)

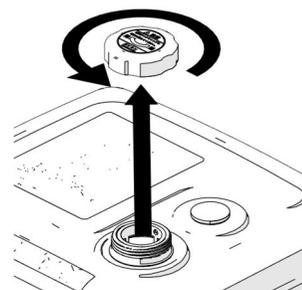
1. Replenishment

(1) Fuel

(Fuel tank capacity: approx. 14.5L)

Fill the tank with regular gasoline until the fuel gauge indicates "F".

Do not add gasoline mixed with two-cycle oil or bio-gasoline.



Danger

- Keep fire away when refueling.
- Do not overfill fuel into the tank.
- If the fuel is spilled, wipe it up immediately. Keep the cloth away from fire.
- Refill the fuel after the engine has cooled down.
- There is a risk of ignition and explosion.
- Hold the nozzle firmly and discharge water.
- There is a risk of injury due to swinging of the discharge nozzle.

Caution

- Tighten the fuel tank cap securely after refueling.
- There is a risk of ignition and explosion.

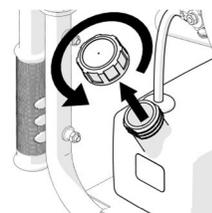
Caution

- Check the fuel once a month, and if the fuel has a pungent odor or is cloudy, replace it with new fuel immediately.
- This may cause engine malfunction or equipment failure.

(2) Engine oil

(Oil tank capacity: Approx. 2L).

Fill the 2-cycle oil into the oil tank at the bottom of the fire-fighting pump.



Caution

- When refilling the 2-cycle oil, use the same brand and grade of oil.
- Do not allow water or debris to enter when refilling.
- This may cause engine malfunction or equipment failure.

Caution

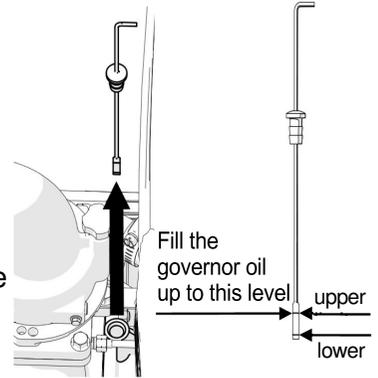
- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.

4 Handling Method (Preparation for Operation)

(3) Governor oil

(1) Place the pump on the level place and check the governor oil level with an oil gauge.

- Remove the governor oil level gauge and check the oil level. Refill the oil to the original level when the oil level has become in the middle or lower. Put back the oil gauge after refilling. Do not replenish more than the upper limit.
- If the oil is very dirty or cloudy, consult your dealer.
- Recommended oil (Automotive engine oil) SAE:10W-30(API:SJ)



Caution

- When replenishing governor oil, add the same brand and grade of oil.
- Do not allow water or debris to enter the oil inlet when refilling.
- This may cause engine malfunction or equipment failure.

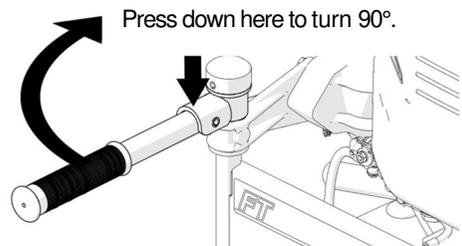


Caution

- Remove all the oil when it spills.
- There is a risk of slipping and falling, resulting in injury.

2. Carrying the pump

Hold the transport handle correctly when moving and loading/unloading the fire-fighting pump.
The carrying handle can be turned 90 deg.



Caution

- When holding the carrying handle, do not touch the bend.
- Fingers may be pinched, resulting in injury.

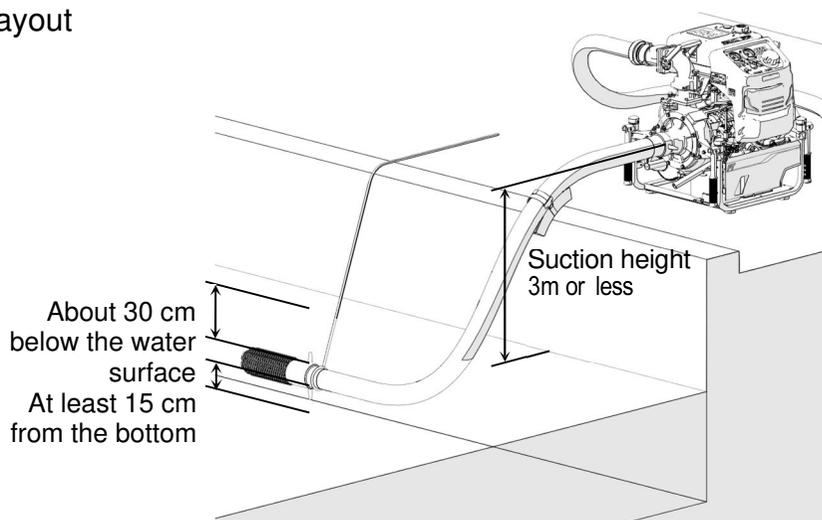


Caution

- 4 people is necessary to carry the pump.
- Dropping it on your foot may cause injury or back pain.

4 Handling Method (Preparation for Operation)

3. Pump layout



- (1) Check the water source. Make sure that there will be no problems with use, such as no decay, floating matter, or sediment.
- (2) Place the pump close to the water source and on a level surface.



Warning

- Avoid installation in places with poor ventilation, such as indoor, in a vehicle, tunnel. There is a risk of exhaust gas poisoning.



Warning

- Place at least 3 m away from combustible materials.
- Remove dead grass and other flammable materials before setting.
- Exhaust fumes and heat from the muffler may cause a fire.

- (3) Keep the suction height below 3m as much as possible to avoid falling water because of the reduction of the pump capacity.
- (4) Lay out the suction hose with no bends or bumps and fasten it tightly to the suction inlet port. Ensure the level of the inlet port side is higher than the suction hose tip at the water source side.
- (5) Always attach a strainer and basket to the suction port of the suction hose and keep it below the water surface to prevent air sucking in. Place the tip about 30 cm above the bottom. If the tip of the device is 15 cm or more away from the bottom. Place a straw mat to prevent sediment from being sucked into the device. If the water source has algae, watergrass, etc., remove them around the water inlet.
- (6) Connect the fire hoses securely and lay them out. Be sure not to fold.

4 Handling Method (Preparation for Operation)



Caution

- Connect the fire hose securely and always ensure it cannot be disconnected.
- If it is pulled out during water discharge, there is a risk of injury.



Caution

- Lay out the fire hoses without folds, twists, or sharp turns.
- There is a risk of the water hose springing up and causing injury.

4. Pump user

- (1) Fire-fighting pumps are small but high-performance machines with strong power. Improper use may cause serious accidents, including death.



Warning

- Fire-fighting pumps should be operated by firefighters, voluntary disaster prevention team members, maintenance and inspection personnel, and others who have been trained specifically for safe operation.
- Misuse or mishandling may result in serious accidents, including death.

- (2) Wear clothing appropriate for the operation.



Warning

- No headbands, neck wraps, ties, waist towels, etc., are allowed. Wear helmets, non-slip shoes, and no loose-fitting clothing.
- There is a risk of getting caught in the machine or slipping and falling, resulting in injury.

- (3) Do not operate if you are not feeling well.



Warning

- Do not operate fire-fighting pump if you are unable to concentrate on your work due to alcohol consumption, tiredness, illness, or the effects of drugs.
- This could lead to a serious accident.

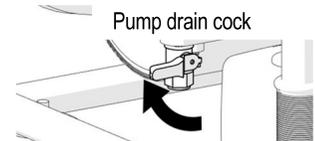
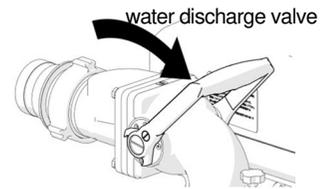
4 Handling method (Operation)

1. Starting the engine

Close the ⑥ water discharge valve and pump drain cock before starting the engine.

Please be sure to check the following

Follow the operating instructions in the order of ❶ to ❹ numbers on the unit.



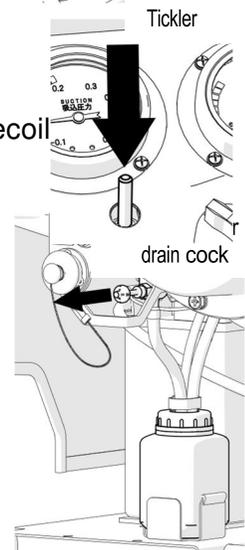
(1) Open the ❶ fuel cock.

Move the fuel cock lever straight down to "Open" ❶ to open the fuel cock.



(2) In cold weather, use the tickler in the carburetor.

- If it is difficult to start the engine with auto-choke alone in cold weather, press the tickler for 2 to 3 seconds.
- Press the tickler for 2 to 3 seconds when starting with the recoil starter and the engine is cold.
- If you use tickler for multiple times and the engine does not start, close the ❶ fuel cock, drain fuel from the carburetor drain cock, then start the engine.
- If the engine does not start properly due to excessive fuel, such as when restarting after warm-up, close the fuel cock, open the carburetor drain cock, and drain the gasoline from the carburetor before starting the engine. After starting, turn the fuel cock "open". If the car stops, start the car again.



*Remove and dispose of the fuel in the drain tank every time.

Fuel drain tank

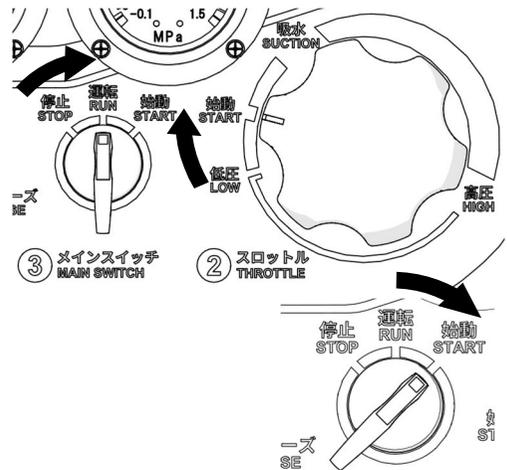


Caution

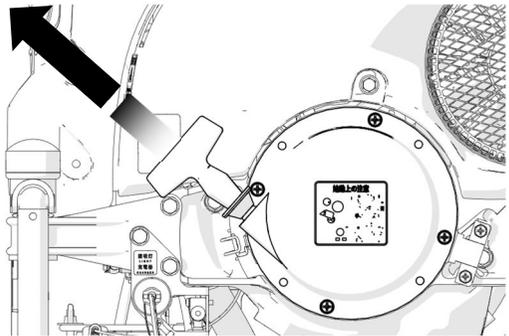
- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.

4 Handling method (Operation)

- (3) Turn the ② throttle to the "start" position.
 (4) Turn the main switch to the "run" position.
 When starting the starter motor, turn it to the "START" position. The starter motor works, and the engine starts.
- Once the engine is started, set the ③ main switch to the "operation" position.
 - Stop the starter motor for at least 5 seconds after running it for 3 seconds. Continuous operation will cause deterioration of the battery and the starter motor.



- (5) For recoil starting, pull the ④ recoil starter handle out to the point where it is slightly heavy, then pull quickly and sharply.



Caution

- When starting with a recoil starter, avoid getting clothing or gloves caught.
- There is a risk of injury.



Caution

- When starting with the recoil starter, keep people at least two meters away.
- There is a risk of injury to the elbows from being knocked by recoil ropes.



Warning

- Be sure to close the recoil starter during operation.
- There is a risk of getting caught in pulleys or belts, or of cutting yourself.

4 Handling method (Operation)

2. Suction

- (1) Turn the ② throttle to the "suction" position after starting the engine.
- (2) Pull the ⑤ suction lever toward you to activate the vacuum pump and suction water.
 - Promptly return the ⑤ suction lever when the pressure gauge needle swings and the pressure increases and stabilizes.
 - Keep the vacuum operation time less than 30 seconds.

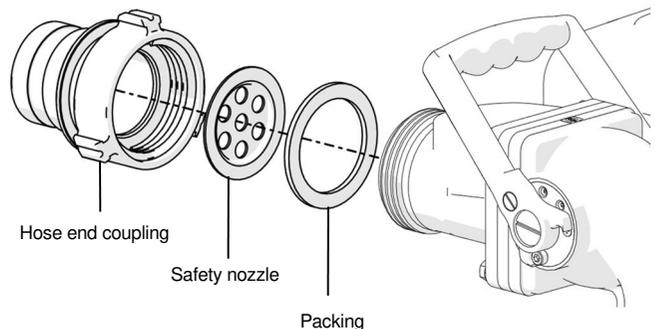


3. Water discharge

Before discharging water, check the safety of the nozzle. Give a signal to the person at the nozzle to start discharging water.

- (1) ⑥ Operate the water discharge handle gradually in the "→Open" direction until it stops.
 - Turn the throttle to the desired water pressure level.
 - Adjust the pressure with the ② throttle according to the water discharge conditions.
 - Be careful not to use too high a water discharge pressure or to open or close the ⑥ water discharge valve handle too rapidly, which may cause the water discharge hose to swing.
- (2) Standby for water discharge
 - To close the ⑥ water discharge valve and put the machine in standby mode during water discharge, ② turn the throttle to the "low pressure" position and stop the engine. In this case, the check valve will operate and water will not fall, so restart the engine and open the ⑥ water release valve to re-discharge water. (However, restarting must be done within 3 minutes.)
 - If it is necessary to stand by without stopping the engine, be sure to put the ② throttle in the "low pressure" position.
- (3) The case when discharging water without using a nozzle

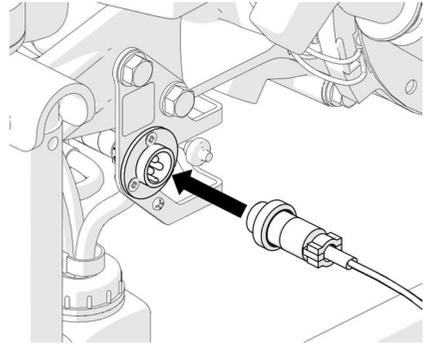
- When operating without using the nozzle, such as pumping water from a water tank or pumping water to a relay tank, be sure to set the attached safety nozzle between the hose end coupling and the water discharge valve, as shown in the figure.



4 Handling method (Operation)

(4) To turn on the searchlight

- To turn on the searchlight, plug the searchlight into the charger inlet on the recoil side.



Caution

- Always return the throttle to the "LOW" position before opening and closing the water discharge valve.
- Hold the nozzle firmly and discharge water.
- There is a risk of injury due to swinging of the discharge nozzle.

Caution

- Operate the water discharge valve slowly.
- There is a risk of injury from pinching or bumping hands.

Caution

- Do not aim the water at people or peer into the nozzle.
- High water pressure may cause them to be blown away, resulting in injury.

Caution

- Do not touch the spark plug or high-voltage cord during operation.
- There is a risk of electric shock.

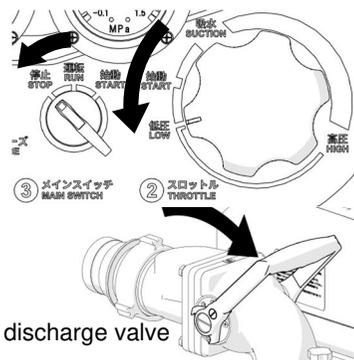
Caution

- Never touch the muffler and exhaust pipe during and after operation since they become very hot.
- There is a risk of burns.

4 Handling method (Operation)

4. Stopping the engine

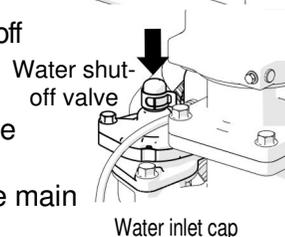
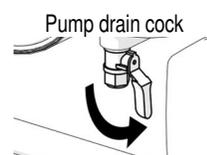
- (1) ② Turn the throttle to the "LOW" position.
 - If the engine is hot, run the engine at low speed for about 1 minute to cool it down.
- (2) Close the ⑥ water discharge valve handle by operating it in the "→ close" direction.
- (3) ③ Turn the main switch to the "STOP" position. The engine will stop.



5. Draining water

After the operation, a large amount of water remains inside the pump. This remaining water may cause corrosion and freezing cracks during cold weather. Be sure to drain water before storing.

- (1) Open the pump drain cock.
- (2) Open and close the ⑥ water release valve, press the water shut-off valve drain button, and drain completely.
- (3) Close the pump drain cock and install the water inlet cap.
- (4) Start the engine and pull the ⑤ suction lever to activate the vacuum pump for approximately 5 seconds.
- (5) ② Turn the throttle to the "low pressure" position, ③ Turn the main switch to the "stop" position and stop the engine.
- (6) Open the pump drain cock and remove the water inlet cap to confirm that it is completely drained. If drainage is insufficient, repeat steps (3) to (5).
- (7) Close the pump drain cock and install the water inlet cap.



Treatment after using seawater or muddy water

If seawater or muddy water is used, be sure to operate the pump by discharging water with clean water for at least 5 minutes to clean the inside of the pump. Also, to clean the inside of the vacuum pump, operate the vacuum pump for about 5 seconds by pulling the ⑤ suction lever while discharging water at low pressure, and drain clean water from the vacuum pump exhaust hose. After cleaning is complete, be sure to drain the water using the operation described in the previous section "5".

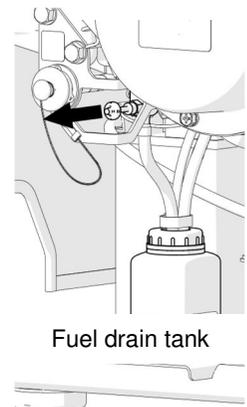
4 Handling method (Operation)

6. Storing the pump

- (1) Store in a dry, temperature-controlled area, away from dust and direct sunlight.
- (2) Wipe off oil, dust, and dirt and keep clean.
- (3) Fill the fuel up to the "F" level when storing. ●Close the fuel cock.
- (4) Fill the specified amount of 2-cycle oil.
- (5) Drain the fuel in the carburetor from the carburetor drain cock, on the recoil starter side.
*Make sure to remove the fuel inside the fuel drain tank every time.
- (6) Please charge the battery with the supplied charger while in storage.
(See "5 Periodic Inspection 2. Inspection Method (2) Handling of Automatic Charger" on p. 29)
- (7) Cover the pump with the attached pump cover.



Carburetor drain cock



Fuel drain tank

- Before storing the pump, be sure to check that the water inside is completely drained. Also, fill the pump with antifreeze to prevent freezing when storing the pump in cold weather (see "4 Handling Methods" Operation in Winter and Cold Weather, on P. 20)
- Operate and discharge water for 5 to 10 minutes at "HIGH" throttle position every month.
- Check the fuel in the fuel tank once a month, and if there is a pungent odor or cloudiness, replace the fuel with new fuel. The recommended replacement time is 6 months after refueling.
- If the vehicle has been in storage for a long period of time without a monthly periodic inspection, operate the pump for 1 minute at "LOW" position to warm up the engine. Be sure to inspect visually to see if there are any abnormalities.



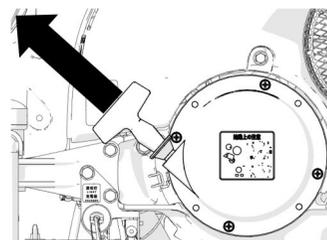
Caution

- Wipe off the fuel spilled immediately when operating the tickler or removing fuel from the carburetor.
- There is a risk of ignition and fire.

4 Handling Method (Operation in Winter and

1. Before starting the engine

- (1) In cold weather, battery capacity is significantly reduced. Please be sure to charge regularly.
- (2) ● Gently pull the recoil starter handle and check that the pump turns.
 - If it does not turn, the pump may be frozen. Pour the warm water into the pump from the suction port or defrost it in a warm room.



Recoil starter handle

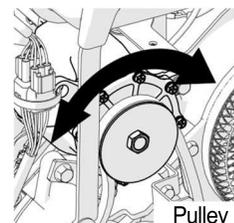
- (3) Remove the vacuum pump cover.

(See "4 Handling Methods (Preparation for Operation)"

1. Removing and attaching the covers, on page 9 .)

- Turn the vacuum pump pulley by hand and check if the vacuum pump turns.
- If it does not turn, the vacuum pump may be frozen.

Blow warm air outside the vacuum pump or defrost in a warm room.



Pulley



Danger

- Do not use fire to defrost the pump.
- There is a risk of ignition and explosion.

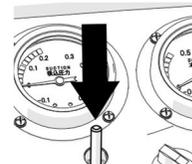


Caution

- Inspection and maintenance should be performed after the engine has been stopped and cooled down sufficiently.

2. Starting the engine

- (1) In cold weather, press the tickler for 2 to 3 seconds.
- (2) Immediately after the engine starts, operation may be unstable; run the machine idle at low speed for 1 to 2 minutes.



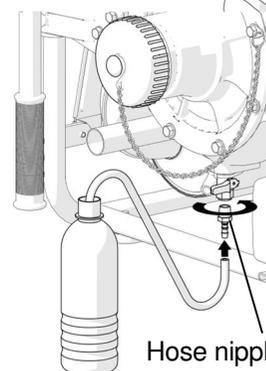
3. Treatment after water discharge (freeze prevention)

- (1) Preventing pumps from freezing (how to add antifreeze)

- ① Drain the water.

(Refer to "4 Handling Method (Operation) 5. Draining water)

- ② Close the water suction cap.
- ③ Attach the hose nipple and hose to the pump drain cock and place the hose in a bottle filled with antifreeze



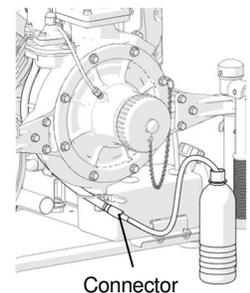
Hose nipple

4 Handling Method (Operation in Winter and

- ④ Start the engine.
- ⑤ ② Turn the throttle to the "SUCTION" position.
- ⑥ ⑤ Pull the suction lever to create a vacuum state inside the pump.
- ⑦ Open the pump drain cock to suck in antifreeze.
- ⑧ Pull the ⑤ suction lever again, and when antifreeze comes out of the vacuum pump exhaust port, return the ⑤ suction lever.
- ⑨ Remove the hose and hose nipple from the pump drain cock.
- ⑩ Pull the ⑤ suction lever and stop the engine when the antifreeze stops coming out of the vacuum pump exhaust port.
- ⑪ After collecting antifreeze from the pump drain cock, close the drain cock.

(2) Preventing the vacuum pump from freezing (how to fill the vacuum pump with antifreeze)

- ① Connect the connector and hose to the water shut-off valve drainpipe and place it in a container of antifreeze.
- ② Start the engine.
- ③ Set the ② throttle to the "SUCTION" position.
- ④ Pull the ⑤ suction lever and suck in the antifreeze.
- ⑤ If antifreeze comes out of the vacuum pump exhaust port, return the water suction lever.
- ⑥ Remove the connector and open the pump drain cock.
- ⑦ Pull the ⑤ suction lever, and when the antifreeze stops coming out of the vacuum pump exhaust port, return the ② throttle to the "LOW" position and stop the engine.
- ⑧ Close the pump drain cock.



(3) Antifreeze should also be injected into water discharge valves and hose couplings.

CAUTION: Do not use alcohol to prevent freezing, since it will damage the rubber seals. Collect drained antifreeze in a liquid container.

4. Precautions for storage

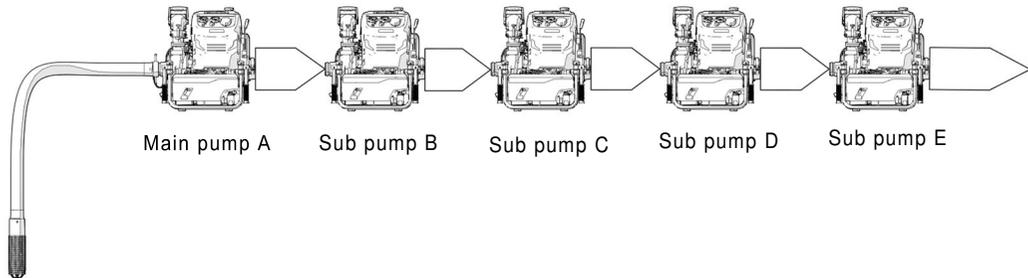
Choose the fuel with good quality. (The better quality of gasoline is highly volatile, and has better starting performance.)

- (1) Be sure to always have antifreeze on hand.
- (2) Batteries may freeze when the relative density of electrolyte becomes low. Be sure the battery is always recharged. If battery performance deteriorates, replace the battery as soon as possible.

4 Handling method (Relaying water with multiple pumps)

In the case of forest fires or urban fires where the water supply is far away, two or more pumps may be connected in series to relay water. The relay water requires different operations and special attention compared to normal operation because each pump is located far from the others. Daily training is also necessary to enable judgment and activities based on the state the pump's operators are facing. See the general method of relay operation below.

Figure 1.



1. Setting Locations

- (1) The number of units and their locations should be determined based on the number of hoses and the height of the water source.
- (2) Install a relay coupling to the suction port of sub-pumps (B to E in Figure 1), to connect the fire hose.
In this case, the automatic relay valve, "Direct Valve" can prevent accidents caused by sudden pressure fluctuations and high-pressure water.
- (3) The wye-valve is also recommended to be attached to the discharge port.
(The hose couplings that connect each pump may not be removed even after the discharge operation, because of the water pressure inside the fire hose.)

2. Operation Method (*An operator is required for every pump.)

- (1) Open the water discharge valves of the sub-pumps (B to E) beforehand.
Be sure to open the variable nozzle when it is attached to the fire hose.
- (2) Operate the main pump (A) and discharge water as usual.
- (3) Send water to the original pump first and then to others sequentially.
- (4) Check the pressure scale in the sub pump (E) and increase the engine speed to regulate the discharging water by controlling the throttle of the sub-pumps (B to E)
The sub pump (B to E): Should be more than 0.05MPa in a scale of suction gauge pressure, be less than 1.2MPa in a scale of power.
- (5) If there is not enough power of water discharge at the nozzle, turn the throttle dial of the original pump (A) to "HIGH" position gradually, then the turn the throttle dial of sub-pump, from the one closer to the original (from B to E), sequentially.
- (6) When stopping water discharge, turn the throttle dial of the last pump, the one close to the nozzle (E), to "LOW" position first and stop gradually (from E to B).
Stop the water supply from the main pump. When the supply of water from the main pump has been stopped, close the water discharge valve of each pump.

4 Handling method (Relaying water with multiple pumps)



Caution

- Do not close the nozzle or water discharge valve while multiple pumps are relayed and the water is discharged.
- Abnormally high pump pressure may result in damage to the pump and hoses.

1. Suction and discharge from water hydrant

The capacity of water supply from the fire hydrant

It is necessary to check the sufficient volume of water for discharging from the fire hydrant in advance.

It would depend on several factors, such as the diameter of the hydrant, the condition of the piping, the initial water pressure, and others.

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 could have high capacity for water supply with wider diameter despite low water pressure.

Water supply method

- (1) Be sure to open and close the hydrant's valve and release water to remove the foreign objects, such as sand, before connecting the hose to the hydrant.
- (2) Connect the water hydrant and pump. Use a suction hose that can endure the water supply pressure. The supply pressure limit for the suction hose with a nominal diameter of 65mm is 0.9 MPa. The suction hose for connection to the hydrant should be inspected periodically to avoid any damage.

How to check and adjust water supply pressure

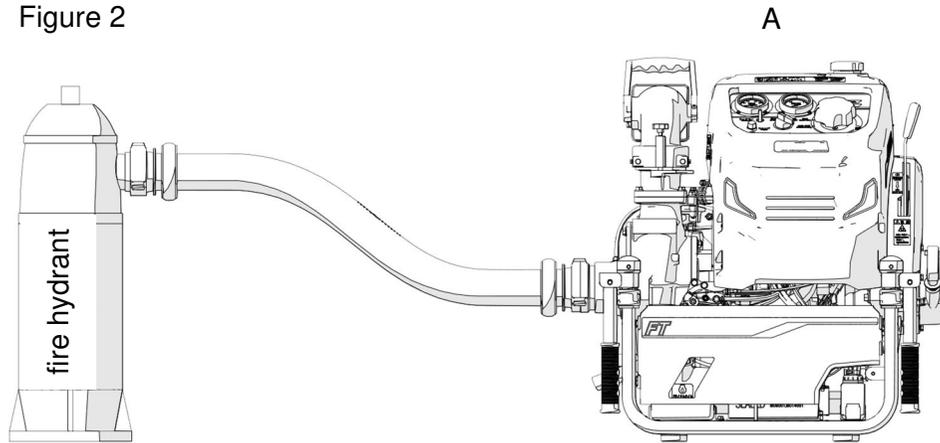
- (1) Open the open/close valves of the fire hydrant and the water discharge valve of the pump to full open.
- (2) Gradually close the pump's water discharge valve while checking the water supply pressure with a suction gauge.
- (3) If the water supply pressure is high, adjust the water supply pressure with the hydrant's open/close valve.

4 Handling Method (Suction, discharge, and relay the water from the fire hydrant)

2. Water discharge and delivery

When a single pump receives and discharges water (Figure 2)

Figure 2



- (1) Open the water discharge valve of pump (A) in advance.
If the fire hose has a variable nozzle at the end, be sure to leave it open.
- (2) Before starting the engine, open the hydrant and check the pressure on the compound (suction) gauge of the pump (A).
- (3) After confirming that water has been sent from the fire hydrant, start the engine of the pump (A) and begin discharging water.

- (4) Adjust the pressure by operating the throttle of the pump (A) to achieve the required pressure and flow rate.

The throttle should be operated gradually, and the compound (suction) gauge should be kept above 0.05 MPa.

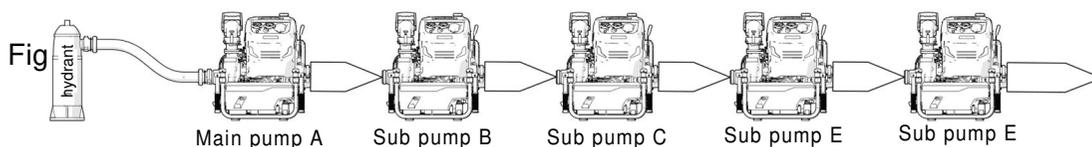
Adjust the hydrant open/close valve to adjust the pressure gauge to not exceed 1.2 MPa. At this time, the compound (suction) gauge of the pump (A) should be less than 0.6 MPa

- (5) To stop water discharge, turn the throttle of pump (A) to the "LOW" position, stop the engine, and close the hydrant.

Do not close the water discharge valve of pump (A) until the water supply from the hydrant stops.

4 Handling Method (Suction, discharge, and relay the water from the fire hydrant)

When discharging water by relaying with multiple pumps
(An operator is required for all pumps: Fig. 3)



- (1) Open the water discharge valves of all pumps (A to E) in advance. If a variable nozzle is attached to the fire hose-end at the water discharge side, be sure to open it.
- (2) Before starting the engine, open the hydrant and check the pressure of the compound (suction) gauge of the main pump (A).
- (3) After confirming that water has been delivered from the fire hydrant, start the engine of the main pump (A) to deliver water to the next pump.
- (4) Start and supply water to the second and sub-pumps (B to E) in the same manner as for the original pump (2) and (3).
- (5) Read the pressure gauge on the sub-pump (E) and adjust the pressure by operating the throttles on all pumps (A to E) to achieve the required pressure and flow rate at the nozzle. Operate the throttles gradually and make sure that each pump keeps above 0.05MPa on the compound (pressure) gauge and above 1.2MPa on the pressure gauge.
Adjust the hydrant opening to make the compound (pressure) gauge of each pump is not less than 0.6MPa.
- (6) To stop the water discharge, shut down the engine by turning the throttle to the "LOW" position, starting with the pump (E) closest to the end of nozzle, and finally close the fire hydrant. Do not close the water discharge valves of each pump until the water supply from the hydrant has stopped.

5 Periodical Inspections

1. Periodical inspections

Be sure to perform periodic inspections according to the following items.

Item	Duration or operating time							Inspection details	treatment		
	Period										
	Before use	after use	1 month	6 months	1 year	2 years	3 years				Operation time (Hour)
fuel	●	●						Quantity/ Deterioration (ie color, smell)	Refill or replace		
				●				-	Replace		
2-cycle oil	●							Quantity	Refill		
					●			-	Replace		
Battery		●						-	Recharge		
			●					Deterioration	Replace		
						●		-	Replace		
Spark plug					○		100	-	Replace	○	
Appearance		●						Dirt, etc.	Clean		
Starter rope			●					Wear, breakage	exchange	○	
Vacuum pump belt				●			50	Become loose/Wear	Adjust or replace	○	
Fan belt				●			50	Become loose/Wear	Adjust or replace	○	
Fuel pipes				●			50	Leakage/damage	Replace	○	
Water discharge valve					●		100	Valve feels heavy, vacuum leakage	Adjust or replace the parts if necessary	○	
Fuel filter				●			○	200	Foreign material stuck	Clean or replace	○
Engine start and vacuum			●					Operation/Perfor mance	Replace parts if necessary	○	
Prime and discharge			●					Operation/Perfor mance	Replace parts if necessary	○	
All parts							○	300		Replace parts if necessary	○

Note:

- For items marked with "●" in the period column, please practice the inspection by yourself. Please ask your dealer to inspect the items marked with "○" in the period column and to handle the items marked "○" in the column of treatment.
- Measure the inspection timing by either comes earlier, "period" or "operation time". For example, consider replacing spark plug when the operation time reaches to 100 hours, even if the operation period is less than a year.
- This inspection table shows the period and time under general operating conditions. Make sure to perform inspections earlier when the pump is used under tough conditions.

5 Periodical Inspections

Recommended replacement parts and period

Part Name	Recommended Replacement Period	Example of Defects
Spark plug	Every Year	Bad to start due to wear and tear
Fuel Pipes	Every 2 years	Fuel leakage due to deterioration
Battery	Every 2 years	Deterioration
2 Cycle Oil Pipe	Every 2 years	Oil leakage due to deterioration
Vacuum Pump Belt	Every 3 years	Slippage due to wear
Fan Belt	Every 3 years	Slippage due to wear
Other Rubbers	Every 2 years	Deterioration
Starter Rope	Every 3 years	Breakage due to wear
Fuel Filter	Every 3 years	Clogging and Bad start due to the water drip
2-cycle Oil Filter	Every 3 years	Clogging, and Poor lubrication due to the moisture.
Discharge Valve Water shut-off valve (rubber)	Every 3 years	Deterioration of the check valve
Mechanical Seal	Every 3 years	Poor suction due to deterioration
Oilless Vacuum Pump Blades	Every 3 years	Poor suction due to deterioration
Carburetor	10 years	Corrosion inside the tank
Fuel Tank	10 years	Corrosion inside the tank

Parts recommend replacing when disassembling

- Gaskets • Push nuts
- O-rings • Spring pins
- Lock washers • E-rings



Caution

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

5 Periodical Inspections

2. Inspection method

Periodic inspections are essential to ensure the fire-fighting pump's safety and use every possible function. Inspect the pump correctly and safely 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, 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.



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 recommended to replace the battery earlier.

Recommended battery : GS YUASA YTX20L-BS

For handling the battery, please follow the instruction manual that comes with the battery.

5 Periodical Inspections



Caution

- When disposing of batteries, oils, etc., please entrust disposal to a specialized industrial waste disposal contractor.
- It may cause fire, burns, or pollute the environment.

(2) Handling of Shibaura full-automatic charger



Caution

- To use the charger safely and correctly, be sure to read the instruction manual that comes with the charger. Improper use may cause an accident. After reading the charger instruction manual, be sure to keep it close to the product.

A) Unpacking



Caution

- Remove packing materials from the battery charger before charging.
- There is a risk

B) Location to place



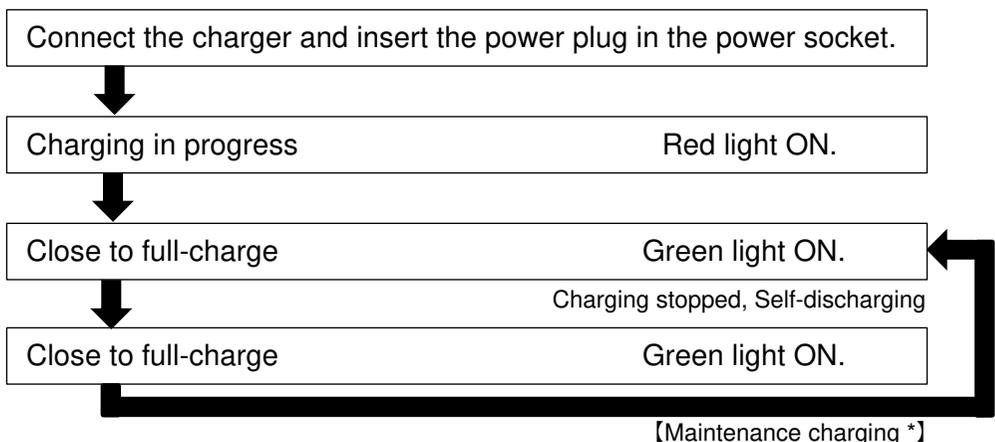
Warning

- Do not use the charger in high-temperature places such as under direct sunlight or near heating elements, in extremely humid places, or wet areas such as rain or snow.
- There is a risk of overheating, burnout, or damage to the charger, or leakage of electricity or electric shock.

C) Make sure before use

- Remove the power plug from the socket (Be sure the charger is turned off).
- Connect the output of the charger cable firmly to the fire-fighting pump.
- After connecting the cable to the charger unit(AC inlet), plug in the socket.

D) Battery charger Operating Manual



5 Periodical Inspections

* Maintenance charge mode

This function automatically recharges the battery when the capacity has declined. It always monitors the decline of the battery capacity by self-discharge.

After starting the charging (Red Light ON), when the battery is close to full charging, the indicator will change to Green Light ON, and the status will automatically change to the maintenance charging mode (Green Light ON). After that, the Red Light and the Green Light will light up alternately to reduce the deterioration of the battery.

Note:

Remove the power plug to stop the main unit from charging. Then, remove the output terminal.

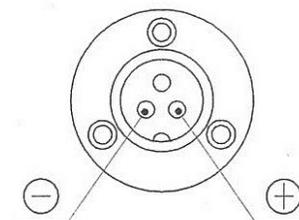
LED indication and charge status

CHARGE STATUS	CHARGE LED (RED)	FULL LED (GREEN)
No Charging	OFF	OFF
Charging	ON	OFF
Close to full-charge	OFF	ON
Error (⚠)	ON	ON

⚠ Refer to "5. Periodical inspections" when an error has occurred.

Note:

When starting the engine using a fully charged battery, if the starter does not rotate sufficiently, this may be due to battery deterioration. Please inspect or replace the battery.



E) Protective operations

- Input (primary side)
Protected from circuit errors by current fuse.
- Output (secondary side)
Protected from battery reverse connection and output short-circuiting by electronic circuit and circuit breaker.

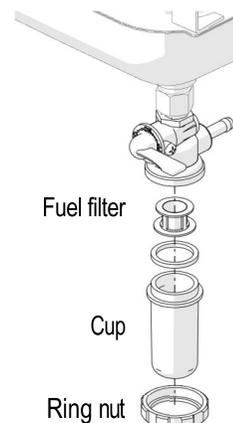
F) Inspection method when an error has occurred

Symptom	Cause	Measure *
Both red and green LEDs come on	Power cable is not connected correctly.	Check the connection status.
	The circuit breaker is open.	Pull out the power plug. After the body of the charger stops, remove the error cause, and close the circuit breaker after 60 seconds.
	The output connector is loose.	Insert the output connector all the way, and lock it securely.
The battery is obviously in discharged state, but the tickle charge mode starts immediately.	Battery is in the deteriorated state.	Replace the battery with a new one.
LED does not come on (both red and green)	Protective operation is activated.	Turn off the power and wait for 60 seconds. After that, charging the battery again.

5 Periodical Inspections

(3) Cleaning the fuel cock filter

- ① Close the fuel cock.
- ② Loosen and remove the ring nut with pliers.
- ③ Wipe off any debris in the cup with a cloth or the like.
- ④ Remove the filter attached to the ④➊ fuel cock main unit and wash it with gasoline.
- ⑤ Install the fuel cock securely to the original position. Be sure to open the ➊ fuel cock and inspect if there are no leaks.
- ⑥ After inspection, close the ➊ fuel cock.



(4) Replacement of the fuel in the tank

Storing fuel for a long period of time may result in poor starting performance and rust.
Replace with new fuel every 6 months.



Danger

- Keep fire away when refueling.
- There is a risk of ignition and explosion.

(5) Spark plug cleaning

Use [NGK BR8HIX] spark plugs.

Clean the spark plugs that are contaminated with exhaust gases and carbon.

- (1) Stop the engine to cool down sufficiently before working on it.
- (2) Remove the spark plug cap and spark plug using the spark plug box wrench.
- (3) Clean the outside, inside, and electrode of the spark plug.
- (4) Tighten the spark plug to the cylinder head and keep the spark spark plug cap pressed in.



Caution

- Do not touch the ignition plug or high-voltage cord during operation.
- There is a risk of electric shock.

(6) Check the governor oil level

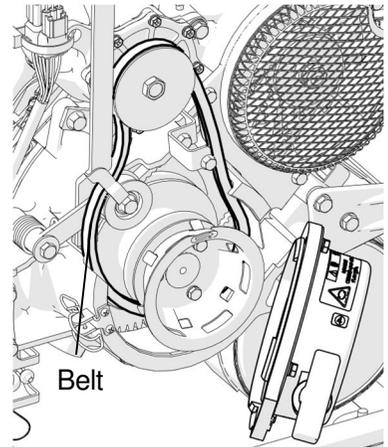
(See "4 Handling Methods (Preparation for Operation) 1.

5 Periodical Inspections

(7) Vacuum pump belt inspection

Replacement of the vacuum pump belt is required if it is stretched, worn, or cracked.

- ① Open the recoil starter.
Do not start the engine during the inspection.
Also, the belt may be hot immediately after operation, so wait until the engine has cooled down before inspecting
- ② Remove the front cover and vacuum pump cover.
(See "4 Handling Methods (Preparation for Operation) 1.")
- ③ Remove the belt from the pulley groove.
- ④ Install a new belt.
- ⑤ Install the cover as before.

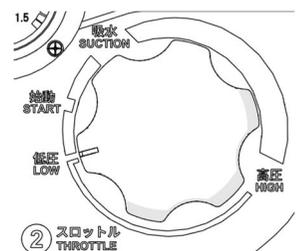
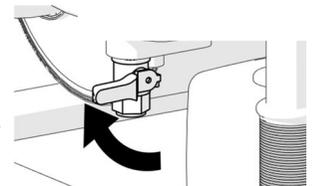
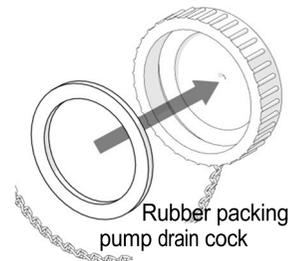


(8) Starting and vacuum inspection

Vacuum inspections must be performed even if the suction and discharge tests (which are described in the next page) are difficult to carry out.

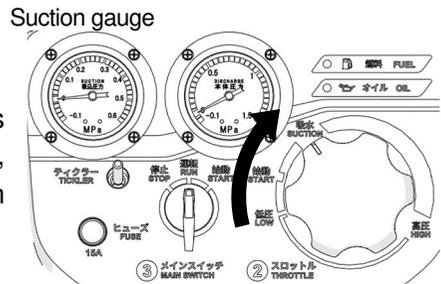
Defects such as engine not starting, poor vacuum performance, or vacuum leakage can cause accidents, such as not being able to operate the water discharge at the actual site, or falling water during the discharge.

- ① Check that the rubber packing is in the water suction cap, and attach the inlet cap to the water inlet.
- ② Close the pump drain cock.
- ③ Start the engine.
- ④ ② Warm up the engine with the throttle dial in the "low pressure" position for about 1 minute, and visually check for any abnormalities in the various parts.



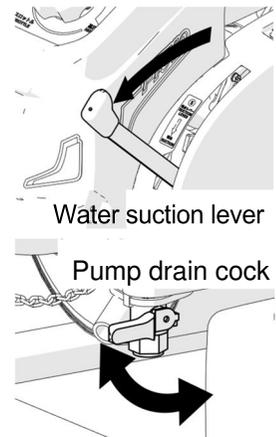
5 Periodical Inspections

- ⑤② Turn the throttle to the "suction" position and pull the ⑤ suction lever toward you to activate the vacuum pump. When the pointer of the ⑥ suction gauge reads -0.06 to -0.08 MPa, return the ⑤ suction lever, ② throttle to the "low pressure" position, and then stop the engine.
- ⑦ If there is no change in the indicated value of the suction gauge after leaving it for 1 minute, the vacuum performance is good.



- ⑧ Open the pump drain cock to release the vacuum and close the pump drain cock.

* If any abnormality is found, please consult your dealer.



(9) Water suction and discharge inspection

Suck and Discharge the water to inspect if there is no abnormalities found in each part of your pump

- (1) Are there any abnormal sounds?
- (2) Is there any water fall?
- (3) Is the water suction slow?
- (4) Are there any water leaks?
- (5) Is the startability good?
- (6) Are there any looseness in each part?
- (7) Are there any fuel leaks?
- (8) Other

*If any abnormality is found, refer to the "6 Troubleshooting" in the next section for appropriate treatments.

6 Troubleshooting

Daily inspection and maintenance are important to prevent fire-fighting pump malfunctions. Detect malfunctions at an early stage and perform maintenance immediately. If the trouble is not easily solved, or if the malfunction is not listed below, please consult the dealer where you purchased the pump, giving the model name and serial number.

1. Engine area

	Symptom	Cause	Action
Hard to Start	No fuel flow to carburetor.	1 Fuel cock filter or fuel line is clogging 2 Needle valve is sticking 3 There's no fuel.	1 Clean 2 Clean 3 Fill
	Fuel does not flow to combustion chamber (remove spark plugs to see)	1 Choke does not close (auto choke) 2 Rotational speed is low when starting. 3 Carburetor (needle valve, jet) is clogging	1 Repair and adjust 2 Replenish the battery 3 Clean
	Fuel goes to combustion chamber but does not start	1 Overflow (excessive fuel) 2 Tickler is overused (excessive fuel) 3 Choke does not open fully closed (auto choke) 4 Fuel is deteriorated 5 Water is mixed in the fuel. 6 Excessive lubricating oil	1 Inspect and adjust the carburetor 2 Drain the fuel from the seal at the crankcase. 3 Replace diaphragms and clean pipes. 4 Exchange. 5 Drain water 6 Adjust to the proper amount
	Abnormality of combustion system	1 Fuel cock filter is clogged 2 Carburetor valve seat is clogged 3 Carburetor is poorly adjusted, or there is a clog on the carburetor 4 Carburetor is poorly tightened.	1 Clean 2 Clean 3 Adjust or clean 4 Retighten
	Sparks are poor	1 Spark plug cap has damages, electrode gap is improper, or the spark plug is defective. 2 Leakage from high voltage cord 3 Leakage from spark plug cap 4 Defective ignition coil 5 Defective CDI unit 6 Poor rotation of the starting motor	1 Exchange 2 Exchange 3 Exchange 4 Exchange 5 Exchange 6 Replenish the battery

6 Troubleshooting

Symptom		Cause	Action	
Hard to Start	No sparks	<ol style="list-style-type: none"> 1 Short circuit of the ground wire 2 Spark plugs are damaged or stained. 3 Spark plug has gap failure 4 Ignition coil is defective 5 CDI unit is defective 6 Wiring connection is poor or disconnected 7 Main switch is defective 	<ol style="list-style-type: none"> 1 Repair the point short circuited 2 Exchange. 3 Exchange 4 Exchange 5 Exchange 6 Adjust the connection 7 Exchange. 	
	Poor compression	<ol style="list-style-type: none"> 1 Piston wear or seizure 2 Piston rings 3 Worn or damaged oil seals 4 Lack of lubricant 5 Damaged cylinder head gasket 	<ol style="list-style-type: none"> 1 Repair or replace 2 Exchange. 3 Exchange 4 Refill to the proper amount 5 Exchange 	
Poor running	Insufficient rotation	Combustion system error (mis-hunting)	<ol style="list-style-type: none"> 1 Carburetor main jet is clogged or misadjusted 2 Fuel cock filter clogged 3 Overflow 4 Poor installation of the carburetor 5 Icing 	<ol style="list-style-type: none"> 1 Clean or replace 2 Cleaning 3 Check and adjust the carburetor 4 Correct the place or replace. 5 Remove and add fuel tank drainage agent
		Abnormalities in the governor system	<ol style="list-style-type: none"> 1 Governor maladjustment 2 Governor operating parts wear 3 Defective caulking of flyweight 4 Poorly tightened governor arm 5 Governor spring tension failure 6 Governor lever ring hole worn or rattling large 	<ol style="list-style-type: none"> 1 Adjust 2 Exchange. 3 Correct or exchange 4 Readjust and retighten. 5 Exchange. 6 Replace or correct
		Cooling system abnormalities	<ol style="list-style-type: none"> 1 Cooling air is weak 	<ol style="list-style-type: none"> 1 Pay attention to the ventilation
		Other	<ol style="list-style-type: none"> 1 Overload 2 Muffler and exhaust port clogging 3 Inlet clogging 4 Defective spark plug 	<ol style="list-style-type: none"> 1 Change nozzle diameter or use safety nozzle 2 Remove the clog 3 Remove the clog 4 Exchange

6 Troubleshooting

		Symptom	Cause	Action
Poor running	Abnormal noise	Mechanical sound	<ol style="list-style-type: none"> 1 Flywheel is fixed loosely 2 Piston is worn, and tapping sounds come out from the piston skirt 3 Armature plate is contacting the other parts. 4 Foreign material is caught inside the crankcase and fan cover 5 Foreign material is caught inside the pump or impeller is touching the pump casing 6 Each part becomes loose 	<ol style="list-style-type: none"> 1 Retighten 2 Replace the piston 3 Reassemble 4 Remove the foreign material 5 Remove the foreign material or reassemble the pump 6 Retighten
		Knocking sound (combustion system abnormalities)	<ol style="list-style-type: none"> 1 Insufficient fuel (main jet or use of different diameter parts) 2 Overload 3 Rotation speed too low or too high 4 Different spark plug is used 	<ol style="list-style-type: none"> 1 Clean or replace 2 Open water discharge valve 3 Adjust to proper rotation speed 4 Replace with proper spark plugs

6 Troubleshooting

2. Pump

		Symptom	Cause	Action	
Water suction failure	A suction gauge does not have negative pressure	Abnormality on water pump side	<ol style="list-style-type: none"> 1 Poorly tightened suction pipe 2 Air suction from the tip of the suction pipe 3 Forgot to close the drain cock 4 Defective suction pipe packing 5 suction pipe fissure 6 Foreign matter caught in water discharge valve 	<ol style="list-style-type: none"> 1 Tighten securely 2 Put it completely underwater 3 Close securely 4 Exchange. 5 Exchange. 6 Remove foreign objects 	
		Abnormality on the vacuum pump side	No Rotation	<ol style="list-style-type: none"> 1 Internal freeze 2 Foreign object inhalation 3 Vacuum pump damaged 4 V Belt slip or breakage 	<ol style="list-style-type: none"> 1 Defrost 2 Remove foreign objects 3 Exchange. 4 Exchange.
			Rotating	<ol style="list-style-type: none"> 1 Clogged or poorly tightened vacuum passage 2 Strainer at the water shut-off valve is clogged 	<ol style="list-style-type: none"> 1 Clean or retighten 2 Clean
	The coupled meter becomes negative pressure	Vacuum leak (engine) Falling water when stopped)	Refer to "Water suction failure - compound meter does not become negative pressure - Water pump side abnormality"		
		No vacuum leakage	<ol style="list-style-type: none"> 1 Clogged suction pipe strainer or inside suction pipe 2 Air pocket in the suction pipe. 3 Suction height is too high, or the suction pipe is too long 4 Air suction from the tip of the suction pipe 5 Low engine speed at water suction 6 Short water suction operation time 7 Clogged or poorly tightened vacuum passage 8 Strainer at the water shut-off valve is clogged 	<ol style="list-style-type: none"> 1 Clean 2 Correct the layout 3 Keep the height within 8m 4 Put the tip completely underwater 5 Adjust to water suction rotation speed 6 Lengthen operation time 7 Clean or retighten 8 Cleaning 	

6 Troubleshooting

Symptom		Cause	Action	
Water Discharge Failure	Pressure does not increase	Abnormality on water pump side	<ol style="list-style-type: none"> 1 Clog in the suction pipe strainer or suction pipe 2 Air pocket in suction pipe 3 Suction height is too high, or the suction pipe is too long. 4 Air suction from the tip of the suction pipe 5 Poorly tightened suction pipe 6 Discharge valve half-open 7 Forgot to remove the safety nozzle (not necessary when the nozzle is attached) 8 Foreign matter in the nozzle 9 Frozen inside the pump 	<ol style="list-style-type: none"> 1 Clean 2 Correct the layout of the suction pipe. 3 Keep the height within 8m 4 Put the tip completely underwater. 5 Tighten securely 6 Open the valve completely 7 Remove 8 Remove foreign objects 9 Defrost and remove the ice
		Engine malfunction	Refer to 1. Engine – Hard to start and poor running	
	Other Abnormalities	<ol style="list-style-type: none"> 1 Muffler and exhaust port clogging 2 Air Inlet of the carburetor clogging 	<ol style="list-style-type: none"> 1 Remove the clog 2 Remove the clog 	

3. Electrical

Symptom		Cause	Action
Bad start	Starting motor does not rotate	<ol style="list-style-type: none"> 1 Insufficient battery capacity 2 Deterioration of the battery 3 Fuse burnout 4 The cable connection is loose or Disconnected 	<ol style="list-style-type: none"> 1 Recharge 2 Replace 3 Replace. 4 Check the cable connection and plug-in surely. Replace parts if necessary.
Battery failure	Batteries run out too quickly.	<ol style="list-style-type: none"> 1 Deterioration of the battery 2 Mistake in main switch operation. 3 Mistake in charge operation 	<ol style="list-style-type: none"> 1 Exchange. 2 Operate properly 3 Operate properly
Connection failure	Wiring burnout	<ol style="list-style-type: none"> 1 Battery reverse connection 2 Poor connection or short-circuit at the outlet terminal 3 Poor wiring connection or disconnection 4 Fuse burnout 	<ol style="list-style-type: none"> 1 Connect correctly 2 Connect correctly, or Repair or replace the short-circuited parts. 3 Correct the wiring or repair, or replace 4 Replace

6 Troubleshooting

Symptom		cause	treatment	
Defective wiring	Lamp does not light	1 Lamp blew out 2 Wiring is loose or disconnected	1 Replace 2 Correct the circuit, repair, or replacement	
Defective monitor lamp	All monitor lamps do not light up immediately after turning the main switch to operate	1 Battery capacity is not enough, or the battery is deteriorated. 2 Fuse burnout 3 Wiring is loose or disconnected	1 Recharge or replace 2 Replace 3 Correct the circuit, repair, or replacement.	
	The lamps do not light even if they should have lit up	Common & typical matters to be noticed	1 Loose or disconnected wiring of each sensor and switch	1 Correct the circuit, repair, or replacement
		Fuel	1 Switch is broken	1 Replace
		2-cycle oil	1 Switch is broken	1 Replace
Monitor lamp light up	Please refer to Section No. 3 – Monitor Lamp (P. 7) and cope with each matter displayed			

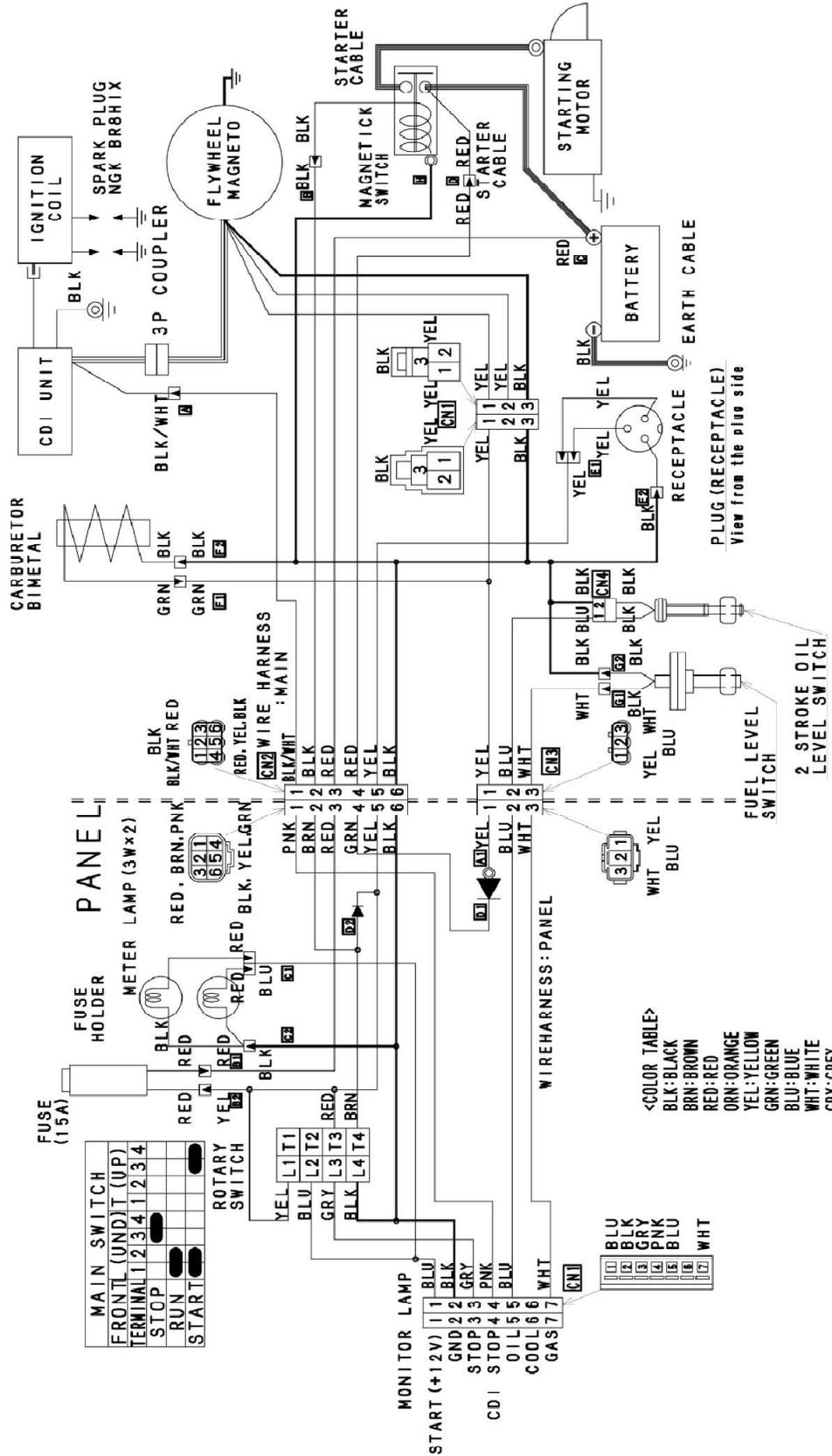
7 Specifications

1. Fire-fighting pump	
Model	FT510-A
Classification (JPN)	(B-2)
Notification No. (JPN)	(P0145001)
Dimension (L x W x H)	737mm x 572mm x 740mm
Dry Weight	90 kg
2. Pump	
Type	High-pressure 1-stage turbine pump (with inducer)
Discharge water volume	Normal 1.01 m ³ /min
	High pressure 0.64 m ³ /min
Pump pressure	Normal 0.70 MPa
	High pressure 1.00 MPa
Nozzle diameter	Standard 24.0 mm
	High pressure 17.5 mm
Rated rotation speed	5800 rpm
Water inlet	Nominal 75mm, Fire engine thread (JIS B 9912)
Water outlet	Nominal 65mm, Fire engine Thread (JIS B 9912)
3. Engine	
Type	Air-cooled, 2-cycle, inclined, 2-cylinder gasoline engine
Model name	E440C
Displacement	436mL
Authorized output	22.8 kW / 5800rpm
Fuel feeding system	Carburetor
Fuel type and tank capacity	Regular gasoline for automobiles - 14.5L
Lubrication system and tank capacity	Separate lubrication system (2-cycle oil) - 2L
Fuel consumption	Approx. 14L/h
Cooling system	Forced air-cooled
Ignition system	CDI ignition system
Starting system	Starting motor & recoil
Lighting	12V-35W (searchlight), 12V-3W (instrument panel light)
Spark plug	NGK BR8HIX

7 Specifications

4. Vacuum pump	
Type	Oilless type: 4-vane eccentric rotary type
Maximum Suction Height	Approx. 9 m
Drive system	V Belt clutch type
5. Accessories	
Battery	12V15Ah/5h
Charger	AC100V~AC240V – DC12V charger
Tools, etc.	1 x Tool kit, 1 x instruction manual 1 x Spark plug, 1 x safety nozzle
Pump cover	1 pc.
6. Optional parts	
Searchlight lamp	1 pc.
Searchlight stand	1 pc.

8 Wiring Diagram





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