

OWNER'S MANUAL

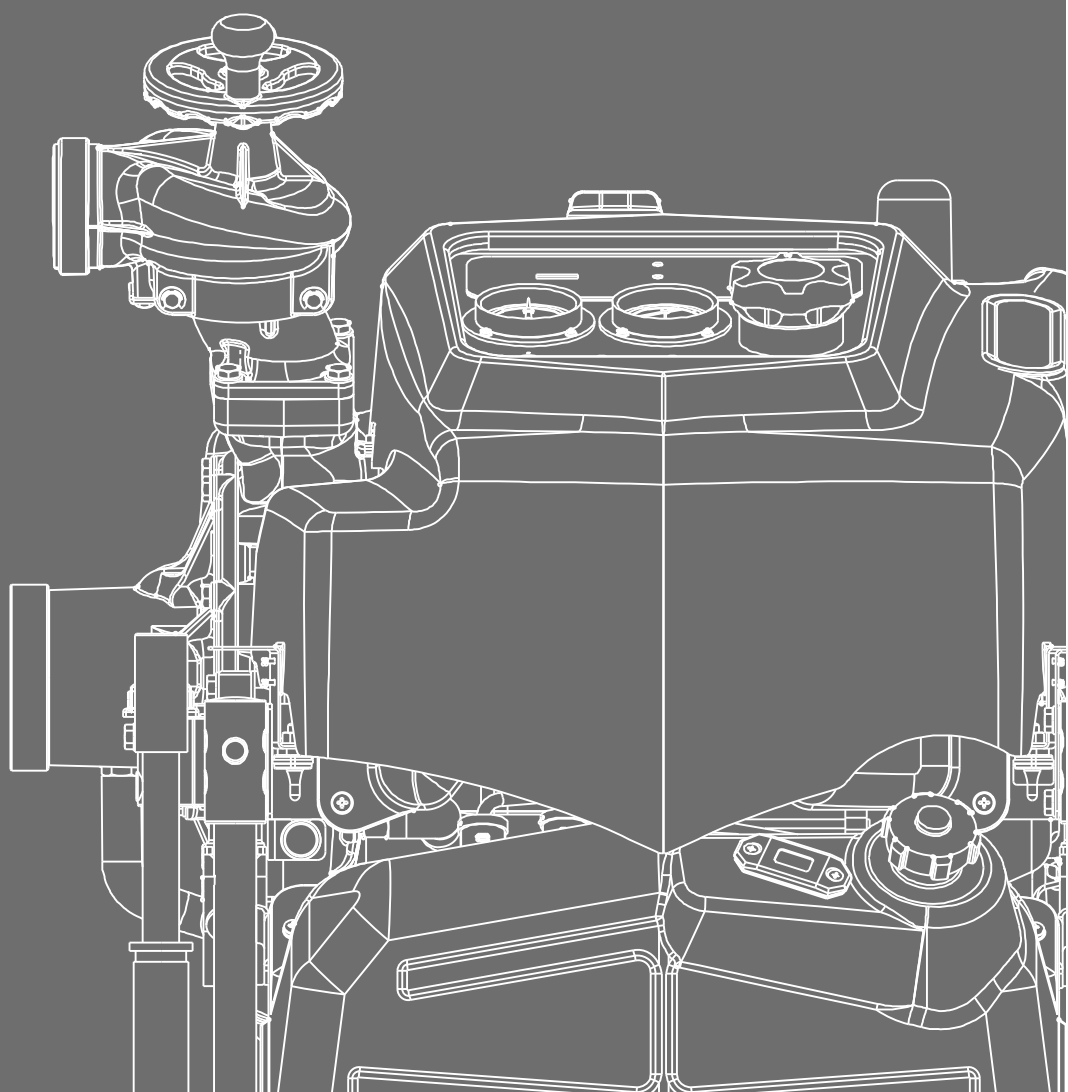
Original instructions



VE1500A-Ti

PORTABLE FIRE PUMP

No.003-12082-7



BACKS
YOU
UPTM

APPLICATIONS OF THIS FIRE PUMP

USAGE

TOHATSU fire pump “VE1500A-Ti” is manufactured for use in firefighting operations.

The portable fire pump is intended only for firefighting activities in collaboration with general public fire extinguishing equipment.

Using it for other applications is regarded as being used for improper purposes.

The manufacturer of the fire pump bears no responsibility for any damages that may result from modification of the fire pump without prior permission from the manufacture, improper use of the fire pump, or use of the fire pump for applications other than those stated above.

Note that use the fire pumps for applications other than those stated above can result in personal injury or damage to the equipment.

Using the fire pump within the range of intended uses implies that the user should follow the instructions provided by the manufacturer relevant to operation, servicing and maintenance.

Intended people

All persons who operate, service or maintain the fire pump must read and understand the following items:

- Owner's manual
- Safety-related instructions on the pump and the other parts such as the battery.
- The other owner's manuals such as battery charger.

The portable fire pump should be operated by only persons who received training as operators of fire engines along with each country's (region's) regulations.

The range of personal responsibility and supervision must be strictly defined by the user.

If a person does not have adequate professional knowledge which is required for his/her assignment, he/she must undergo relevant training or receive appropriate instructions from an individual who is actually knowledgeable in operation of the fire pump.

A person who does not have enough knowledge is not permitted to operate the fire pump.

When using the fire pump, conditions under which an explosion may occur are not considered.



- **Keep the manual in a safe place for further reference.**
- **Operators of the fire pump must always refer to all the relevant manuals in order to avoid errors, personal injuries and equipment damage when operating the portable fire pump, and to maintain faultless operation.**
- **Place owner's manual so that operators can refer to it where they operate the fire pump.**

INTRODUCTION

Thank you for purchasing the TOHATSU Fire Pump.

This fire pump has passed a range of quality assurance standards.

Owner's manual

The portable fire pump complies with relevant laws and regulations.

The manual includes a description for operation and maintenance. Before using the fire pump, be sure to read and understand the manual thoroughly.

Engine operation

This manual also includes a description for operation and maintenance of the engine.

NOTE

- The manual is an important item that goes with your portable fire pump.
- The manual should accompany the fire pump if sold to the other person.

Before using this fire pump, write down the serial number in the following boxes. It will be useful in the case of asking about servicing, repairs and genuine parts.

Serial Number



The pump identification number is marked on the pump casing.

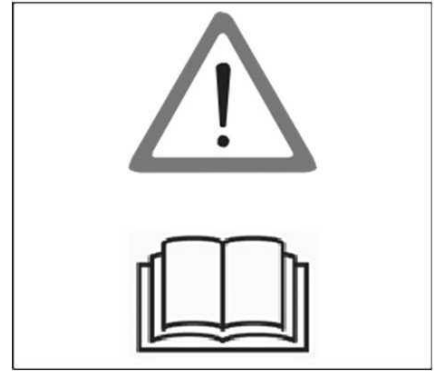
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GENERAL SAFETY INFORMATION

Overview

Before operating the TOHATSU fire pump thoroughly read the manual to understand the proper operation procedures including “DANGER”, “WARNING”, “CAUTION” and “NOTE”.

These notices are designed to bring attention to very important information necessary to ensure safe, trouble free operation.



Warning sign meaning

This sign is used for safety-related instructions in the manual.

Be sure to follow all safety-related instructions, otherwise personal injury may occur.



Signal words



- Failure to observe will result in severe personal injury or death, and possibly property damage.



- Failure to observe could result in severe personal injury or death.



- Failure to observe could result in personal injury or property damage.

- The instruction provides special information to facilitate the use or maintenance of the pump or to clarify important points.
- For attaching position of the warning label, refer to the contents “3. LABELS”.
- **Warning labels should be read clearly at any time.**

If the display of the warning label may become difficult to be read, it was almost come off, you must replace paste immediately.

Safety-related instructions and warning signs

Read and follow the safety-related instructions described in the manual and all warning signs on the portable fire pump thoroughly.

Always keep the warning signs in a legible condition. If any warning sign becomes illegible or detached, replace it immediately.

Transporting the portable fire pump



CAUTION

- Retractable handle is folding type.
- Do not put hand or finger between top of retractable handle and bracket.
- When transporting the portable fire pump, assign one person per handle.
- Also, when you transport the portable fire pump, it should be transported holding the handle firmly.
- There is a risk of injury to the leg by fall.



Durability of protection

When you purchase a new pump, it is placed in packing box and protected.

Storage of pump after transportation

Keep the pump away from high humidity, and place it on level ground.

Disposal of packing box

Dispose the packing box by following the environmental laws.

Emissions

Noise emission values

For noise emission values, refer to "CONTENT 17. APPENDIX".



CAUTION

- Wear proper hearing protection during operation.



Exhaust gas

Fatal hazard from carbon monoxide (CO) poisoning

Exhaust gas emitted from the engine contains carbon monoxide (CO) etc. that may seriously affect human health.

Do not operate the engine in a room, car, warehouse, tunnel or other closed locations that have poor ventilation.



Safety devices

Before operating this portable fire pump, be sure to check that all the safety devices have been installed in the appropriate positions.

Before removing the safety devices, turn the main switch off.



After protective devices (such as the muffler guard) have been disassembled as part of servicing and maintenance work, immediately install them back to their original locations, making sure that they are in safe and secure condition.

Check the portable fire pump visually and functionally on a regular basis.



If a failed device or equipment is found, remove it immediately, and repair or replace it, if necessary. Failure to do so may cause an accident.

After it has been repaired or replaced, make sure that it functions correctly.



Protective clothing and Protective equipment

During fire extinguishing training or regular firefighting services, wear normal protective clothing and equipment to protect your body.

- Fireproof protective clothing
- Fireproof helmet
- Fireproof protective gloves
- Fireproof protective boots



Service Maintenance

Servicing and maintenance of the fire pump must be carried out by only the persons who have professional knowledge, who are familiar with the device, and who understand laws and regulations regarding safety and accident prevention.

Before starting maintenance work, turn the main switch off to stop the engine.

Disconnect the negative terminal of the battery.

Before starting maintenance work, securely place the portable fire pump on the ground.

In the case of just after stopping the engine, do not touch the exhaust pipe, the muffler and the other engine parts until these parts will be cold enough. These parts could be very hot and will cause severe burns.



Electrical equipment

Only expert electricians or trained staff members should handle electrical equipment.

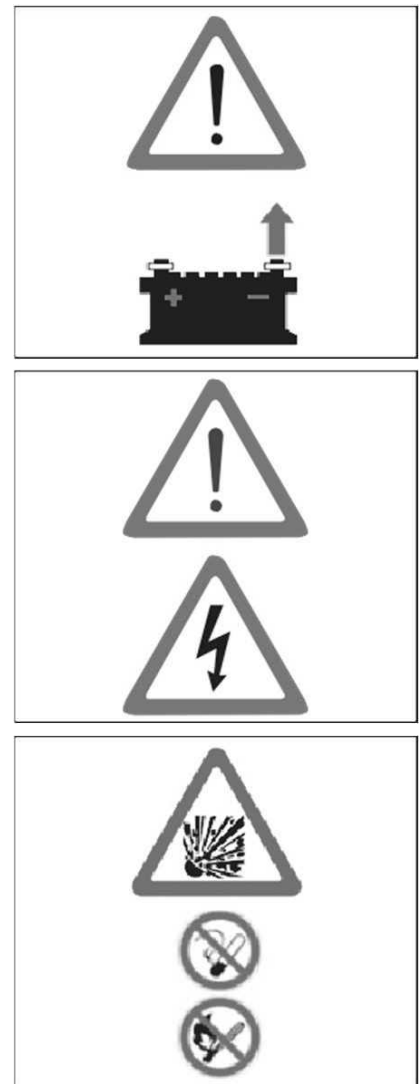
When disconnecting the cable from the battery, disconnect the negative (-) cable first.

When connecting the battery cable, be sure to connect the positive (+) cable first. After that, connect the negative (-) cable.

Do not place any metal on the top of or around the battery. Doing so may cause a short circuit.

Use a fuse with the same specifications as the original one when replacing it. Using a fuse that has a greater capacity than the rated value may damage the equipment.

Check the electrical equipment of the fire pump on a regular basis.



Battery

Follow any safety-related instructions shown on the battery.

The battery can generate flammable hydrogen gas that may **cause an explosion**.

Do not charge the battery in closed room.

Do not smoke around the battery.

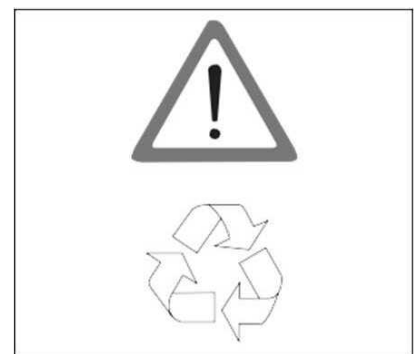
The battery electrolyte is **caustic and may cause personal injuries**.

- Always wear protective clothing.
- Always wear protective gloves.
- Always wear protective glasses.
- Do not tilt the battery. Doing so may cause the battery electrolyte to leak out from the vent hole.



Disposal

Dispose of disused batteries according to relevant laws and regulations.



Handling of fuel

Exercise care when handling fuel. Failure to do so may cause fire.

Do not bring any flames near fuel. Stop the engine before refueling. Do not smoke while refueling fuel.

Do not refill fuel in an enclosed room. Doing so may cause an explosion caused by fuel fumes.

If fuel spills, wipe it with a cloth or other material, and dispose it according to relevant laws and regulations.

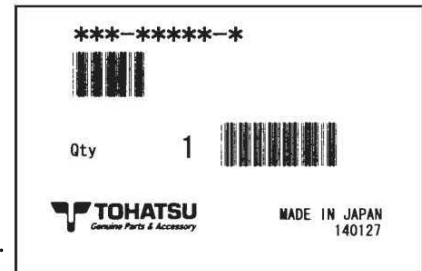


Genuine parts

When replacing parts for servicing and maintenance of portable fire pumps, be sure to use only Tohatsu genuine parts.

If genuine Tohatsu parts and accessories are not used, it may adversely affect the functioning and safety of the fire pump. Use genuine Tohatsu parts only.

Tohatsu bears no responsibility for any personal injuries or equipment damage that may result from use of parts or accessories obtained from outside sources.



Environmental protection measures

Dispose of oil, fuel, batteries, etc. according to relevant environmental laws.

Do not dump waste into the ground, water, or sewerage.

Store the fuel only in the specified container.

When disposing of parts, follow the correct disposal procedure.

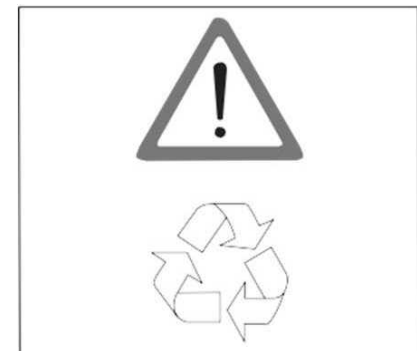


Water-prohibiting substance

Do not discharge water to water-prohibited substance.

Use of water

Do not pump combustible liquids, chemical or caustic liquids.



EC Declaration of Conformity (DoC)

This product conforms to certain portion of the European Parliament directive.

DoC contains the following information;

- Name and Address of the manufacturer
- Applied community directives
- Reference standard
- Description of the product (Model name and serial number)
- Signature of the responsible person (Name / Title / Date and place of issue)

Authorized Representative

Obelis S.A

Boulevard Général Wahis 53,B-1030 Brussels, BELGIUM.

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1. SPECIFICATIONS

Model		VE1500A-Ti
Description		Portable fire pump
Applicable standard		EN 14466
Type brief designation		PFPN 10-1500
Max. permissible inclination angle		During transport : 35° at all sides In operation : 15° at all sides
Max. operating pressure		16.5 bar
Usable ambient temperature		-20 °C ~ 40 °C
Engine		
Manufacturer		TOHATSU CORPORATION
Model		2WT81A
Type		2-stroke, 2-cylinder, water cooled, gasoline engine
Bore & Stroke		81 mm × 78 mm
Piston displacement		804 ml
Authorized output		44kW / 5350 r/min
Fuel type		Unleaded Gasoline (RON 91 or Higher)
Fuel tank capacity		24 L
Fuel consumption		Approx. 22 L/h (at 10 bar 1500 L/min)
Oil tank capacity		1.6 L
Ignition		Flywheel magneto (DIGITAL C.D.I. system)
Spark plug		NGK BPR7HS-10
Starting system		Electric starter and recoil
Lubrication		Auto mixing
Fuel feed system		Electronic fuel injection
Floodlight bulb		12V-35W
Battery *	Capacity	12 V-18 Ah/10 HR (226CCA)
	Dimensions (L x W x H)	150 x 87 x 161 mm
	Positive terminal	Right side

* The battery is not shipped with the pump. Install a battery equivalent to this specification.

1. SPECIFICATIONS

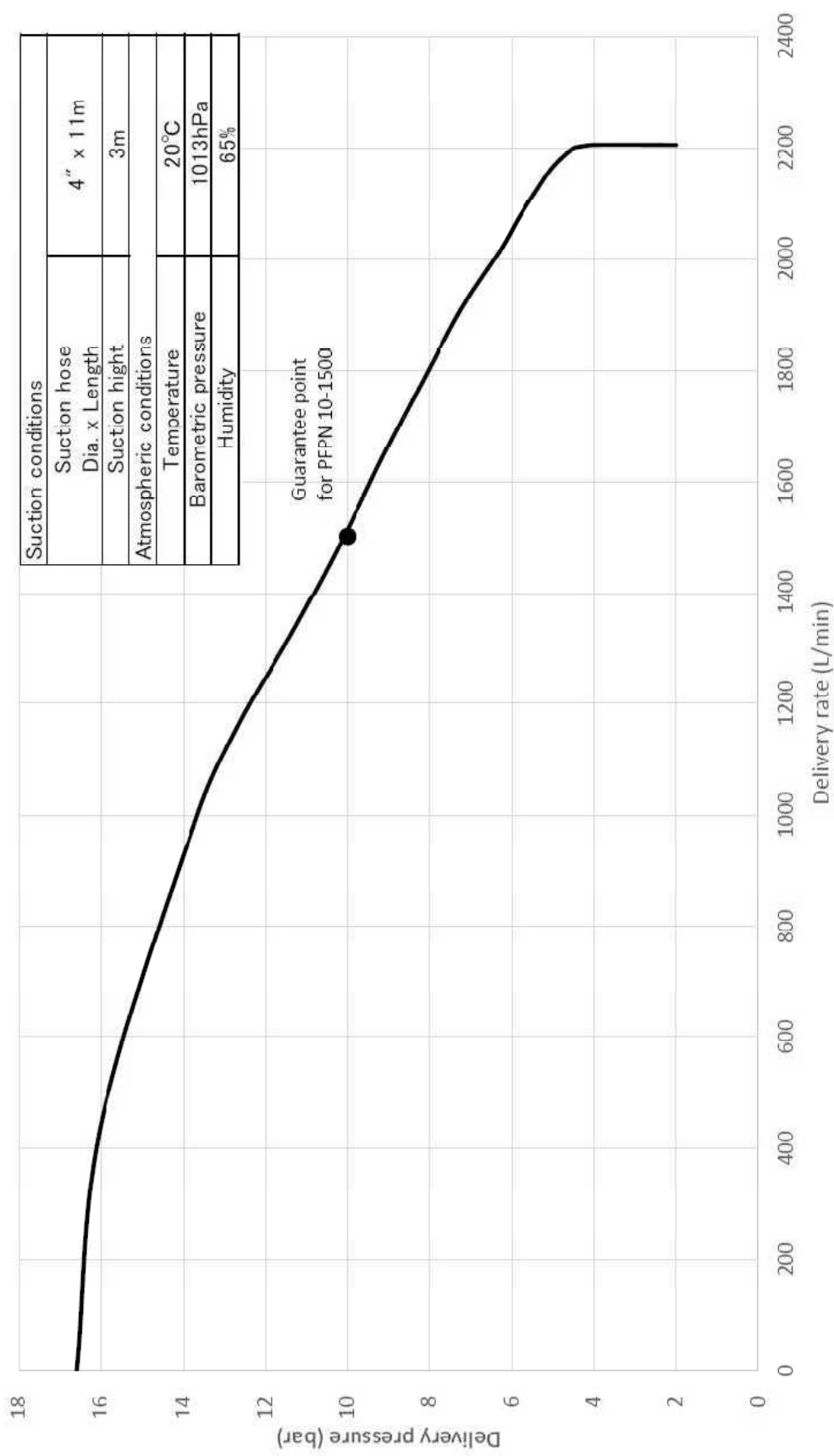
Model		VE1500A-Ti
Primer		
Type		Rotary-vane vacuum pump (Oil less type)
Max. suction height		Approx. 9m
Pump		
Type		Single suction, single stage, high pressure turbine pump
Transmission ratio		1 : 1
Number of delivery outlet		2
Discharge port coupling		BSP thread 2-1/2" male
Suction port coupling		BSP thread 4" male
Pump performance (Suction height: 3m)		2050 L/min at 6 bar
		1800 L/min at 8 bar
		1500 L/min at 10 bar
Dimensions and weight		
Overall Length x Width x Height		723 × 748 × 827 mm
Mass	Dry	105 kg
	Ready for operation	130 kg
Center of gravity		387 mm (The height of handles: 426 mm)
Remote operation		
Remote start / stop		Push button switch (High sensitivity switch)
Monitor lamp		Switch light / Operation / Discharge / Throttle position (9 levels indication) / Warning
Floodlight		Floodlight socket

Materials

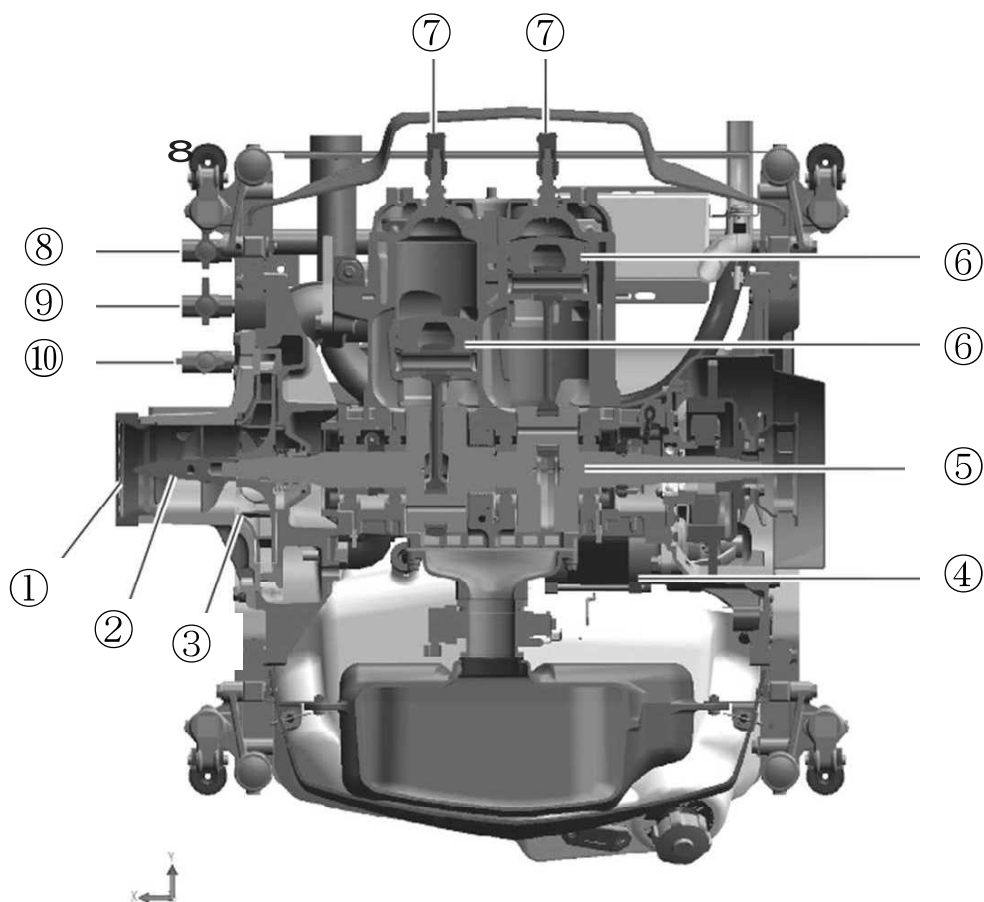
Engine	
Crankcase, Cylinder, Cylinder head	Aluminum alloy
Crankshaft	Chromium-molybdenum steel
Connecting rod	Chromium-molybdenum steel
Piston	Aluminum alloy
Pump shaft	Chromium-molybdenum steel with metal plating
Muffler	Steel and Stainless
Pump	
Pump case, Pump cover	Aluminum alloy
Impeller	Aluminum alloy
Shaft seal	
Type	Mechanical seal

1. SPECIFICATIONS

Performance Curve VE1500A-Ti

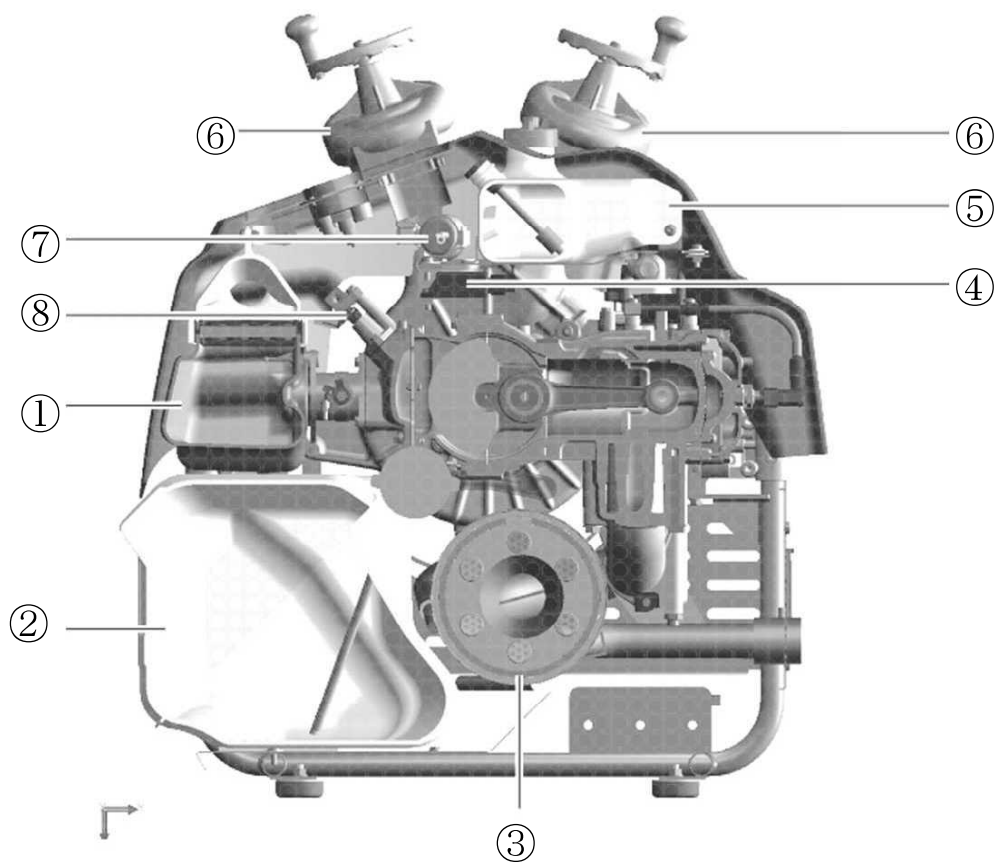


2. OPERATION DEVICE



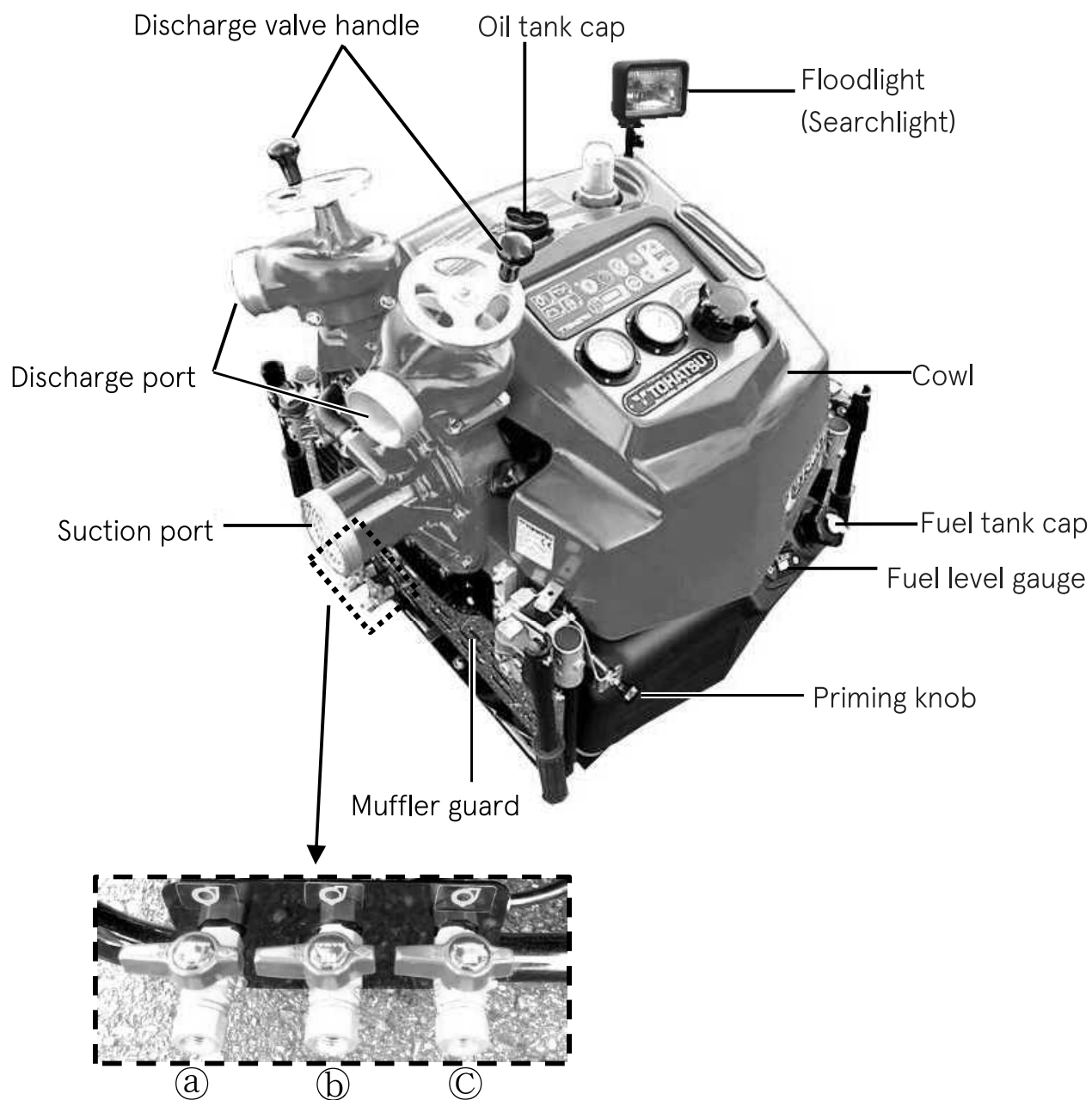
- ① Suction port
- ② Inducer
- ③ Impeller
- ④ Starter motor
- ⑤ Crankshaft
- ⑥ Piston
- ⑦ Spark plug
- ⑧ Cylinder drain valve
- ⑨ Pump drain valve
- ⑩ Muffler drain valve

2. OPERATION DEVICE



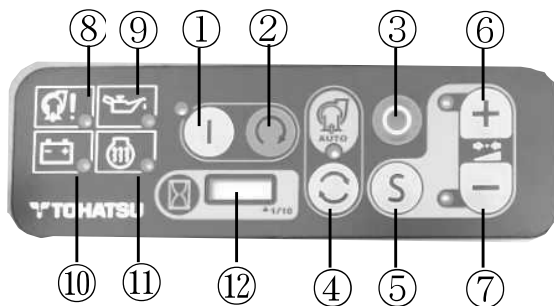
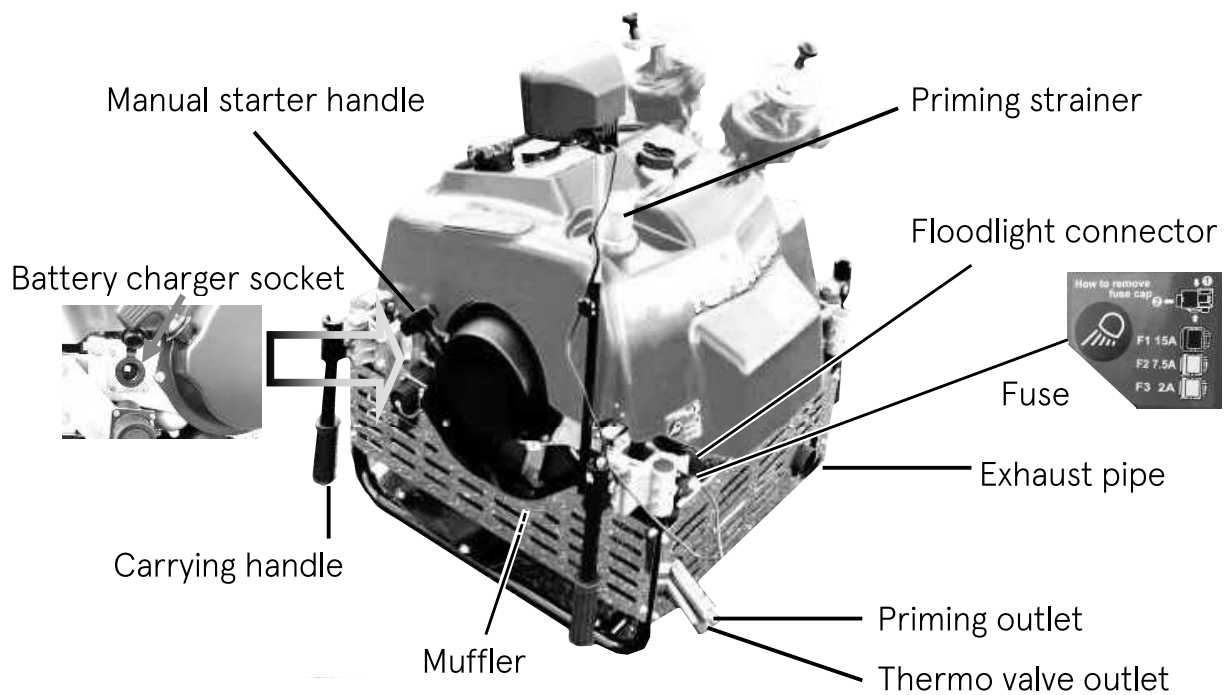
- ① Air silencer
- ② Fuel tank
- ③ Muffler
- ④ ECU
- ⑤ Oil tank
- ⑥ Discharge valve
- ⑦ Fuel feed pump
- ⑧ Injector

2. OPERATION DEVICE



- ① Cylinder drain valve
- ② Pump drain valve
- ③ Muffler drain valve

2. OPERATION DEVICE



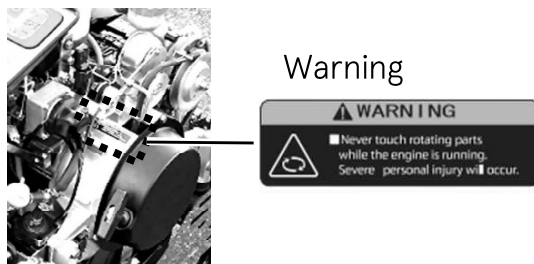
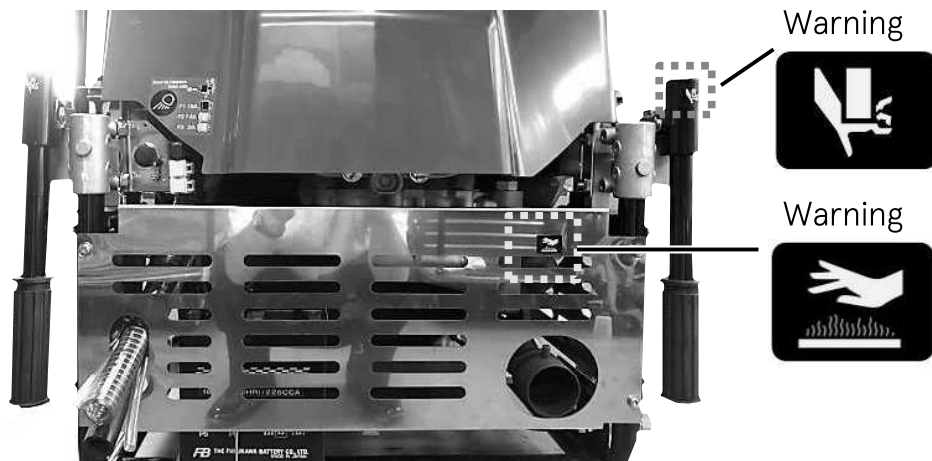
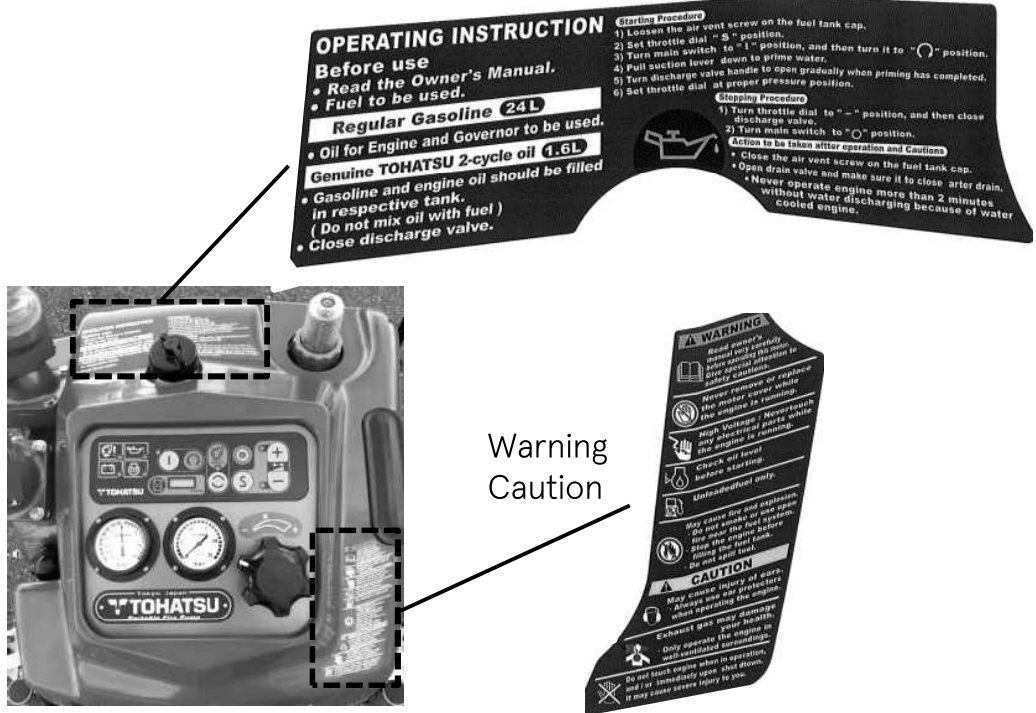
- ① Main switch
- ② Start switch / Low pressure switch
- ③ Stop switch
- ④ Priming operation mode switch
- ⑤ Throttle priming position switch*
- ⑥ Increase pressure switch*
- ⑦ Decrease pressure switch*
- ⑧ Priming failure lamp
- ⑨ Engine oil level warning lamp
- ⑩ Battery voltage low warning lamp
- ⑪ Overheat warning lamp
- ⑫ Hour meter

*⑤⑥⑦ : In the case of loading the pump (on a truck) connected to remote panel(s).

Pressure gauge for discharge
Pressure gauge for suction

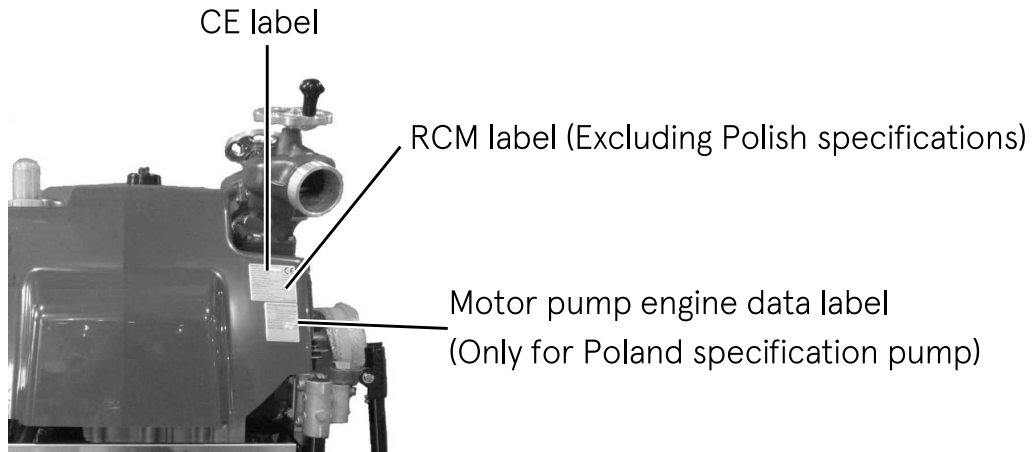
3. LABELS

Operating Instruction



3. LABELS

Location of CE Label



4. OPERATING PRECAUTIONS

Installing pump



CAUTION

- The fire pump must be installed on level ground. Otherwise, an accident may occur.
If the fire pump should be installed on uneven ground, it must be secured.
- When installing the portable pump in a vehicle, place the vehicle on a level place, and install the pump.
- When installing the portable pump in the vehicle, make sure to apply the brakes of the vehicle in order to stop the wheels.
- A serious accident may occur if the vehicle moves.
- Do not put your hands or fingers into the retractable part when operating the carrying handle.
- When transporting the portable fire pump, assign one person per handle. Also, when you transport the portable fire pump, it should be transported holding the handle firmly. There is a risk of injury to the leg by fall.
- Do not touch the exhaust pipe and the muffler while the engine is running, or for more than 10 minutes after the engine has been stopped.
- Confirm the engine temperature is cooled down enough. These parts are very hot and will cause severe burns.

NOTE

- Place the pump as near as possible to water source, and water suction height as low as possible.
- When lowering the portable fire pump to the ground, lower it gently and horizontally.
Max. permissible inclination angle: 15°
- In case of the inclined or uneven location, make sure that water suction hose is lower than suction port of the pump.
- In case of the suction hose is put undulated, air can be left easily in the hose, and possibly causes suction inability when the water discharge valve is opened. In this case, set the water discharge valve half-opened, and operate vacuum pump until water is discharged continuously (for 3 to 5 seconds from beginning of water discharge).
- Be sure to install strainer and basket on the end of suction hose. If the pump may suck sand or mud on the bottom of water source, place sheet below the basket.
- Put the strainer and basket of suction hose into the water more than 30 cm from the surface to prevent suck of air.
- Discharge hose should be arranged not to be bent.

5. DESCRIPTION OF DEVICES

Suction port

The diameter of the thread for fire pump is BSP thread 4".

Suction port

Strainer



WARNING

- Install the strainer. Putting a finger or a hand into the suction port while the pump is running may cause serious damage by the rotating inducer.

CAUTION

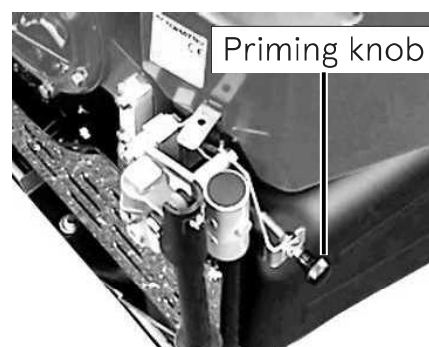
- Install the standard strainer to the suction port.
- Do not run the pump if the strainer is not installed.
- If the pump is operated without the strainer installed, gravel can enter the pump and the drainage capacity may be decreased considerably.



Priming knob

Used for suctioning water.

After starting the engine, pull the priming knob to suction water. After priming has been completed, return the priming lever to its original position.

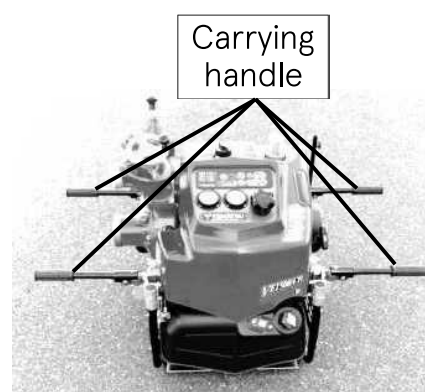


5. DESCRIPTION OF DEVICES

Carrying handle

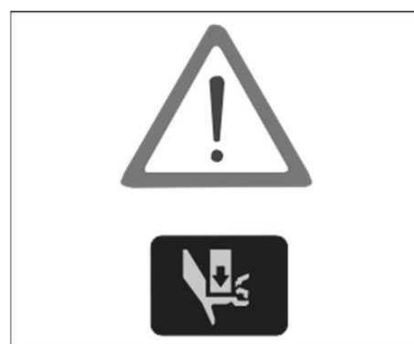
The fire pump is equipped with four carrying handles.

The handles can be manually folded, and also rotate it 90 degrees to open it.



CAUTION

- **Personal injuries may occur when opening or closing the handle.**
- **Do not put your hands or fingers into the retractable part when operating the handle.**

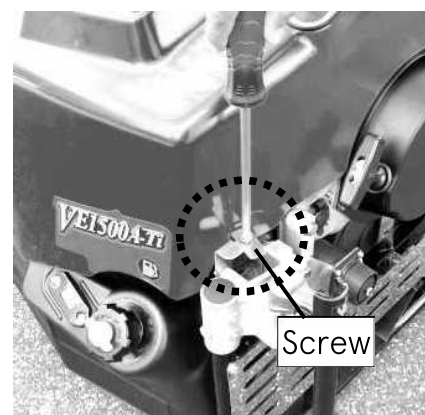


Removing cowl

1. Remove the fixing screw at the front side of the cowl.
2. Cowl can be removed by releasing 4 hooks up.

NOTE

- When removing the cowl, do not use excessive force, because the hook may be damaged.

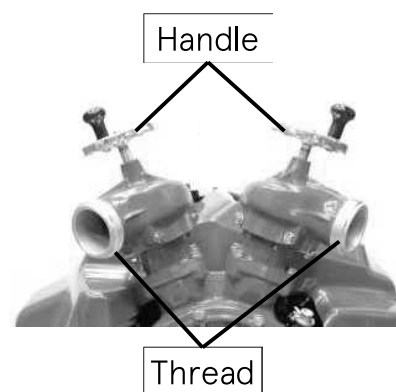


Discharge port

The diameter of the thread for the fire pump is BSP thread 2-1/2".

Discharge valve

Use discharge valve handle to open and close the discharge valves.



5. DESCRIPTION OF DEVICES

Drain valve

Use the drain valves to drain water.

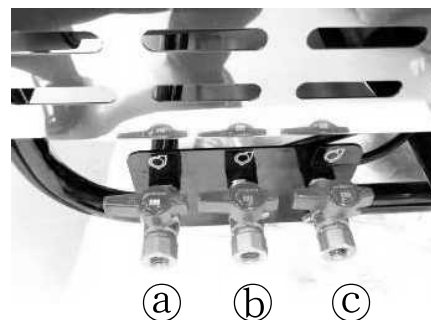
NOTE

- Close all the valves when operating the fire pump.
- If the valve is opened, the pump cannot suck up water.

Ⓐ Cylinder drain valve

Ⓑ Pump drain valve

Ⓒ Muffler drain valve

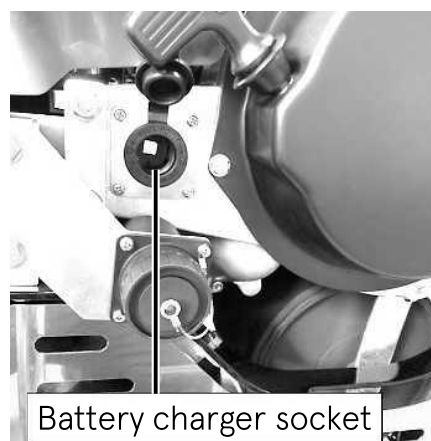


Battery charger socket

Connect the battery charger plug to the socket to charge the battery of the pump.

<Specifications of accessory socket>

- Inner diameter (ID): $\phi 21\text{mm}$
- Voltage: DC12V
- Max. allowable current: 5A



⚠ CAUTION

- **Before charging the battery, turn the main switch OFF.**
- **When starting pump operation, be sure to remove the battery charger before turning the main switch ON.**
- **Battery charger socket is only for battery charging. Do not use the socket for the others.**
- **Do not connect a cigarette lighter to the socket, because it is not a heat-resistant object.**

Fuel tank

The air vent of fuel tank should always be closed.

⚠ WARNING

- **When cleaning the fuel tank, use detergent not containing surfactant. If surfactant is contained, the tank may deteriorate and may break.**

⚠ CAUTION

- **Do not tilt the pump with the air vent open. Otherwise, the fuel may leak.**
- **If the fuel leaks, wipe it off using a cloth or other materials.**

NOTE

- There is another air vent installed on the fuel tank.



5. DESCRIPTION OF DEVICES

Control panel

The control panel has all the necessary operating and control instruments as follows.

Throttle dial

Use the throttle dial to control discharge pressure.

“S” indicates the throttle position of engine start and priming water.



Pressure gauge for suction

The pressure gauge for suction indicates the negative suction pressure and the input pressure supplied from an external water source.



Pressure gauge for discharge

The pressure gauge for discharge indicates the actual operating pressure.

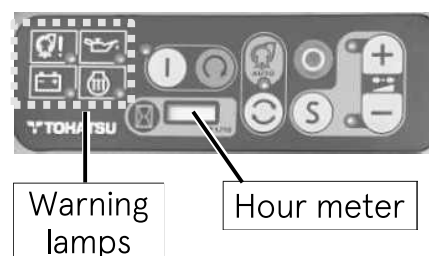


Operation panel

Various switches * are equipped to the operation panel.

* Main power supply, starting (& low speed), water priming mode switching, throttle (priming water) position, throttle Open/Close and stop.

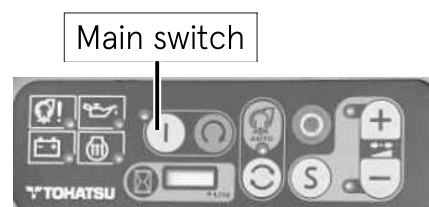
And also equipped warning lamps and an hour meter.



Warning lamp & buzzer

Press the main switch, then the check mode starts (Lamp check). The warning lamps light up and the buzzer sounds for a moment to enable to check those functions.

If the lamp and buzzer check mode show failure, refer to the troubleshooting section.



CAUTION In the case of failure showed, remove the cause by following “CONTENT 16 TROUBLESHOOTING”.

5. DESCRIPTION OF DEVICES

The monitor indicates the following information:

- Hour meter
- Low engine oil level warning
- Overheat warning
- Battery charge shortage warning
- Suction water incomplete

Hour meter

Hour meter indicates the accumulated operation time of the fire pump.

NOTE

- Use it to check the running time and maintenance timing.



Hour meter

Suction failure

In the case of engine stop due to unable suction water complete within 30 seconds in the auto priming mode, the warning lamp lights and the warning buzzer sounds.

Warning lamp (Suction)



Low engine oil level warning

If the engine oil level decreases below approximately 1/3 (0.5 L) of the oil tank, the warning lamp lights and the warning buzzer sounds.

Warning lamp (Oil level)



CAUTION

- **The engine does not stop even if the low engine oil level warning lamp lights up. This is to give priority to the continuation of fire fighting over protection of the engine. The engine remains operational for more than 30 minutes even after the warning lamp lights up. However, if the engine is operated for longer than this, it may stuck. Refill the oil immediately when the lamp lights.**

5. DESCRIPTION OF DEVICES

Overheat warning

If overheat is detected, the warning lamp lights up, the warning buzzer sounds and the engine stops automatically.



Warning lamp (Overheat)

CAUTION

- **The engine may be damaged.**
- **Do not restart the engine soon after it has stopped running.**

NOTE

- The engine stops automatically when an overheat is detected.

Battery charge shortage warning

Leaving the battery uncharged will degrade the battery. Charge the battery as soon as possible.



Warning lamp (Battery)

NOTE

- The battery charge alarm buzzer will not sound.
- If the battery is insufficiently charge such as less than about 7V, the alarm buzzer does not sound and the warning lamp does not light.

Engine starting switch

Press the switch to start the engine.

Engine starting switch

Priming water mode switch

Switching of water suction operating mode.

~Auto(Lamp off) / Manual(Lamp blinks)



Priming water mode switch

Throttle (Priming) position switch

In the case of connecting to remote panel(s), set the throttle to the priming water position by pushing it. ✕ The throttle dial does not activate.



Throttle(Priming) position switch

Increasing/Decreasing pressure switch

In the case of connecting to remote panel(s) (Such as the case of loading the pump on a fire truck), the switches activate.

Turning the throttle by pressing the switches.

✕The throttle dial does not activate.



: Tuning the throttle to increase the pressure.



: Tuning the throttle to decrease the pressure.



Increasing/Decreasing pressure switch

5. DESCRIPTION OF DEVICES

Engine oil tank

Engine oil filler cap is located as shown in the picture.



CAUTION

- **Close the cap other than at refueling.**



Governor oil level

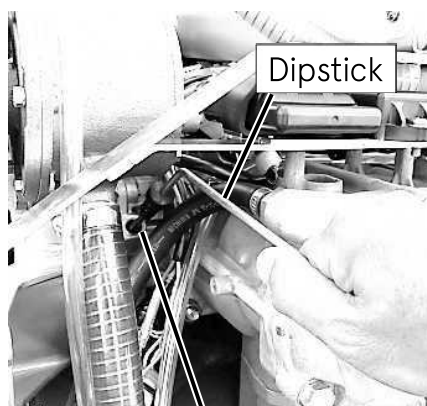
The governor oil level can be checked with the dipstick.

Use the engine oil recommended by the engine manufacturer.



CAUTION

- **Be sure to stop the engine before checking the oil level. If you pull the dipstick when the engine is running, the oil may blow out.**



Governor oil filler port

Manual starter

In case of the battery is not sufficiently charged to start the engine, use the manual starter to start the engine.

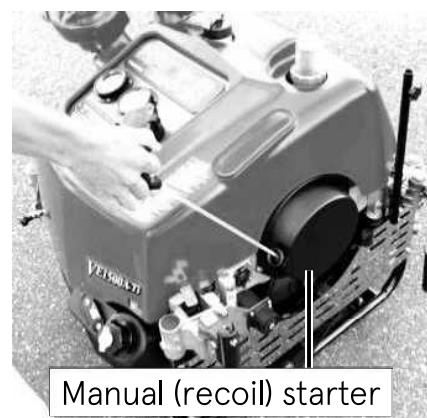


CAUTION

- **Do not pull the manual starter handle when the pump is running. Otherwise, the manual starter may be damaged and personal injuries may occur.**

NOTE

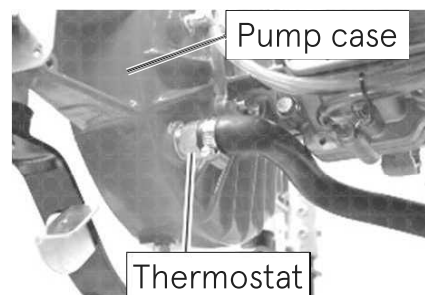
- To start the engine with manual starter, engage the manual starter ratchet by pulling the starter rope slowly. And then pull the starter handle quickly with great force from the position in which feeling harder resistance.



5. DESCRIPTION OF DEVICES

Thermostat

When the water temperature in the pump rises above 50°C (such as during closed discharge valves operation after priming water), the thermostat installed on the pump case opens to discharge high-temperature water for prevention of water (engine) temperature rise.



- **When performing closed discharge valves operation in the case of the suction height is 1 meter or more, be sure to run the pump with the pump pressure of 1 bar and above. If the pump pressure is too low, the pump may suck air in when the thermostat opens, and cannot keep water in the pump without suction operation.**

Overheat prevention device

The device monitors the engine temperature with a temperature sensor. If the engine temperature goes up to the setting temperature (approximately 90°C) or higher, the warning buzzer alarms, and automatically stops the engine to prevent overheating.

- Status of the lamp after the overheat prevention device is actuated.
 - ① If the engine is restarted while the main switch is being at operating status, the alarm lamp turns on (an alarm buzzer also sounds)
 - ② If the engine is restarted after the main switch turned to OFF status once, the alarm lamp goes (reset) and the alarm buzzer does not sound.
- Precautions for restarting after the overheat prevention device is actuated.
 - ① Resolve the cause of abnormally high engine temperature, and then restart the engine. If the cause of the abnormally high engine temperature has not been resolved, the engine will stop again within approximately 30 seconds. (The time in seconds until the engine stop varies, its depending on the temperature of the engine.)

5. DESCRIPTION OF DEVICES

- ② It's possible to run the starter motor when the engine temperature exceeds approximately 120 °C, but the engine prevention function is actuated and the pump cannot be restarted.

NOTE

- Do not repeatedly restart the engine without resolving the cause of the abnormally high engine temperature.

Mechanical governor

A built-in mechanical governor operates to control the throttle valve so that the maximum engine speed does not exceed 6000 r/min.

Electric Safety Governor (ESG)

Designed as a system to assist the mechanical governor, the electric safety governor controls the engine speed by cutting off ignition so that the engine speed does not exceed 6100 r/min.

Battery save control

If the engine is not started within 30 minutes of power ON, the power is automatically turned OFF.

Anti-After Burn Control

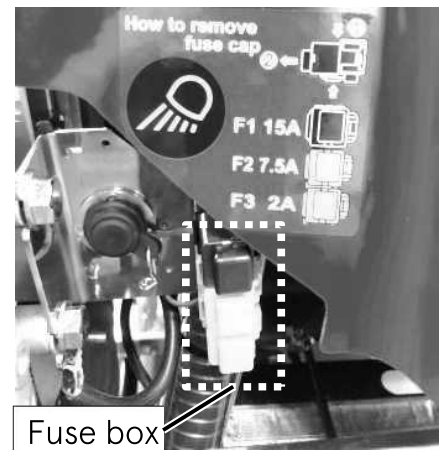
This substantially reduces the “phenomenon that causes combustion inside the muffler (after burn)” by cutting the fuel injection in advance to purge the residual unburned gas in the engine when the engine is stopped.

5. DESCRIPTION OF DEVICES

Fuse box

Security fuses are installed for electrical circuit in the fuse boxes.

- Black color fuse box is for 15A fuse.
- Yellow color fuse box is for 7.5A, 2A fuse.



Floodlight (Searchlight)

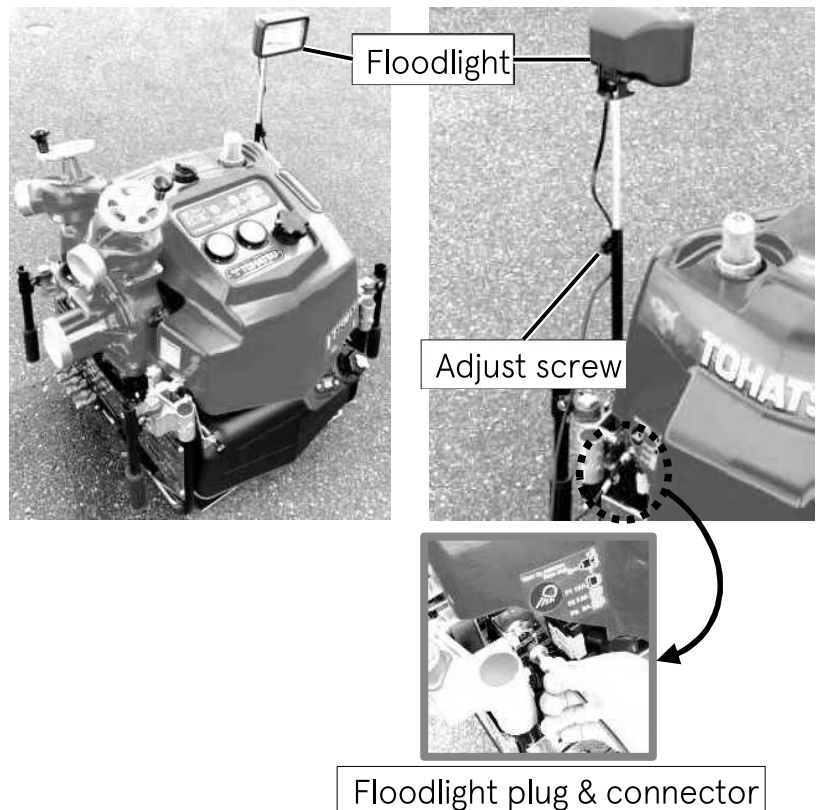
Use the floodlight projector to light up the location where the fire pump operates.

Connect the floodlight plug to the floodlight connector of pump.

Loosen the adjust screw and pull up the floodlight projector to adjust its height. After the adjustment is completed, tighten the adjust screw.



- **Secure enough lighting for the location where the fire pump is operated, otherwise an accident may occur.**



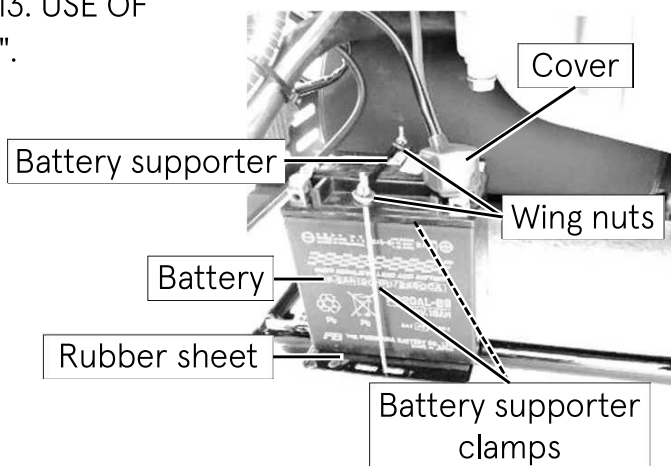
6. PREPARATION FOR OPERATION

Installing battery

Remove the muffler cover and install the battery in the pump. Secure the battery with the battery terminals facing outward.

CAUTION

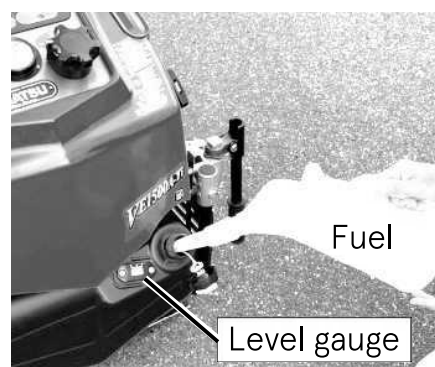
- Refer to the contents "13. USE OF ACCESSORY Battery".



Initial charge of battery

The battery can be used immediately after filling cells with electrolyte.

If the battery is maintenance free of electrode (Sealed type battery), do not open the battery after filling it with electrolyte. Refer to INSTRUCTION of the battery.



Fuel

Fill fuel until the maximum level of the gauge indicator (in Red).

- Fuel tank capacity : 24L

DANGER

- Vaporized fuel may cause ignition or an explosion.
- Do not bring any flames near fuel.
- Stop the engine before refilling fuel.
- Do not spill fuel. Do not overfill fuel to the tank.

CAUTION

- Do not breathe in petrol vapor! Petrol fumes are very toxic.
- After stopping the engine, do not touch it while it is hot.
- Refill fuel after the engine has cooled down.
- Fuel tank cap should be always tightly closed.
- Fuel tank cap should be removed only to fill fuel to the tank.
- Properly clean up all fuel spills (checking for gasoline vapor) before starting engine.
- If petrol or fuel spills, wipe it off using a cloth or other materials, and dispose of them according to the relevant laws and regulations.



6. PREPARATION FOR OPERATION

NOTE

- Use of low-quality fuel results in a short engine life as well as starting difficulty and other engine problems.
- Fuel containing alcohol, methanol (methyl) or ethanol (ethyl), may cause:
 - Deterioration of rubber parts and plastic parts.
 - Starting, idling, and other engine performance problems.
- Do not use fuel that contains more than 10% ethanol or more than 5% methanol.
- Damages resulting from the use of fuel that contain alcohol are not covered under the limited warranty.

An air vent is installed to the fuel filler cap. Check that the air vent of the cap is closed.

CAUTION

- **Do not tilt the pump with the air vent open. Otherwise, the fuel may leak.**
- **If the fuel leaks, wipe it off using a cloth or other materials.**



NOTE

- The air vent is installed on the fuel tank. Always close the air vent of the cap.

Engine oil

Refill the 2-stroke engine oil to the oil tank.

If the engine oil is not enough filled, pressing start switch "ON", then the warning buzzer sounds.

CAUTION

- **If different grades of engine oil are mixed, the oil may gelate, which may result in oil filters becoming clogged. Be sure to use the same grade of engine oil.**



2-stroke engine oil

We recommend that using engine oil of ISO-L-EGB grade or higher.

- Engine oil tank capacity : 1.6L

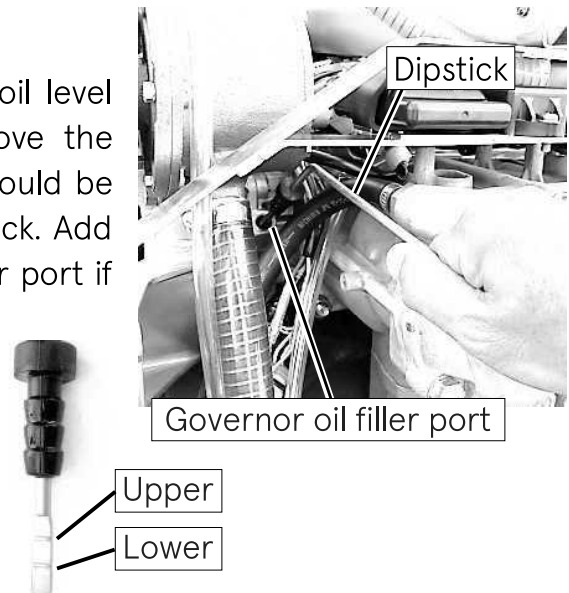
6. PREPARATION FOR OPERATION

Oil level sensor

The lamp on the operation panel will light when the level of engine oil in the tank has decreased approximate to 1/3 (0.5 L) of the tank. A warning buzzer will also sound. In this case, add 2-stroke engine oil immediately.

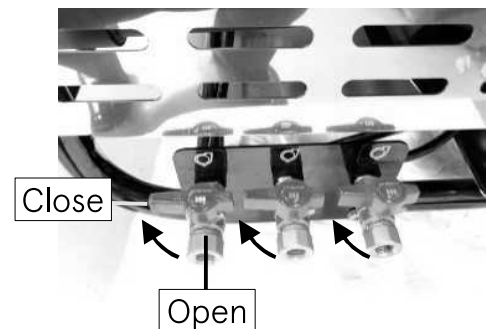
Governor oil

Before using a fire pump, check the governor oil level with the oil dipstick. To check oil level, remove the dipstick and check the oil level. The oil level should be between upper and lower limit line on the dipstick. Add 2-stroke engine oil through the governor oil filler port if the oil level is lower than the lower limit line.



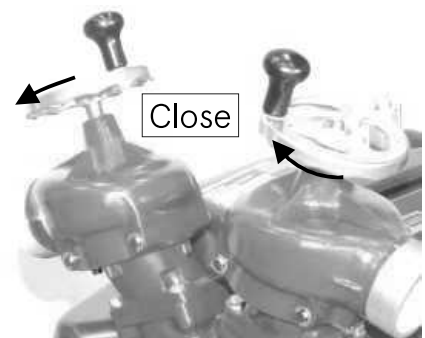
Drain valve

Make sure all the drain valves are closed.



Discharge valve

Make sure the discharge valves are closed.



Overheat protection sensor

This device shuts down the engine automatically when the engine has excessively overheated caused by lack of cooling water.

6. PREPARATION FOR OPERATION

Overheat warning lamp

When the temperature of the engine reaches approximately 90°C or more, the warning lamp lights up, an alarm sounds, the engine stops automatically, and overheating is prevented.

Warning lamp (Overheat)



Warning lamp and sensor

Turning on the main switch, warning lamps light up and the buzzer sounds for a moment.

Main switch



Warning lamp



CAUTION

- After the engine has stopped due to overheating, restarting the engine immediately may cause damage. Before restarting the engine, eliminate the cause.

(Refer to “Chapter 16 TROUBLESHOOTING”).

Also check that the warning lamps are all turned off.

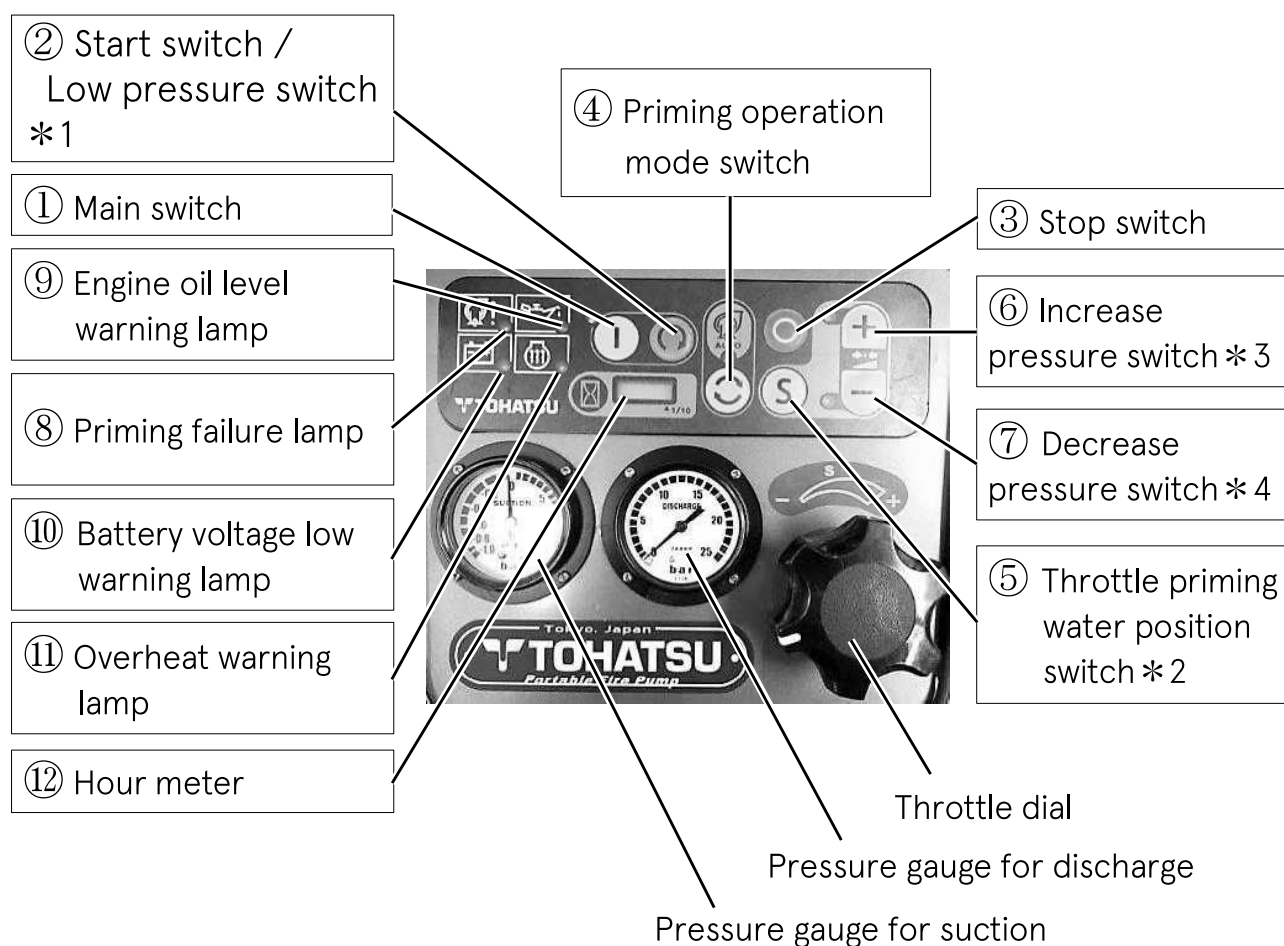
Closed Circulating Water Cooling System

In this system, cooling water is taken from the suction water and pressurized by the pump, and passing through while cooling the engine and muffler, and finally returns to the water inlet of the pump.

7. USE OF OPERATION PANEL

Operation panel

Pump operation panel



In the case of the pump operation panel and the remote controller operation panel(s) is connected.

- *1. Throttle position switch (Low pressure)
Set the throttle to low pressure position (while the engine running).
- *2. Throttle position switch (Priming water)
Set the throttle to suck up water position.
- *3. Turning the throttle to increase the pressure.
- *4. Turning the throttle to decrease the pressure.

7. USE OF OPERATION PANEL

Alert action check (Lamp Check)

When the warning lamps are off, there is no trouble on each function. When the warning lamp(s) is on or blinking, the pump does not work properly.

NOTE

- When the power is turned on, the warning lamps and buzzer will be activated for approximately one second, and the alert action check is automatically performed. After that, the installed computer starts monitoring.

Warning system

Alert		Warning indicator								Description of faults or notice	Remedy
							High speed ESG	Warning sound	Engine operation		
		Oil warning lamp	Overheat warning lamp	Battery charge warning lamp	Suction failure warning lamp	Throttle limit lamp					
Alert check		One time flash	One time flash	One time flash	One time flash	One time flash		One time alarm		Normal system test when main switch ON. (*2)	
Warning	Oil level	ON						ON		Oil level is below approx. 1/3	A
	Overheat		ON					ON	Stop	Engine has stopped due to insufficient cooling water, etc.	B
	Prior warning overheat		ON					ON Intermittent sound		Warning of engine stoppage due to insufficient coolant, etc. is sent in advance.	C
	Battery voltage			ON(*5)						Insufficient battery charge	D
	Suction failure				ON			ON	Stop	Unable suction water complete within 30 sec.	E
	Throttle control abnormality					ON				Failure of sensor of limit switch. Setting failure. (*3)	G
Engine over speed							ON			Engine speed exceeds maximum-allowable RPM(*4)	F
MAT / MAP Alert (*1)		Blinking						ON Intermittent sound		MAT or MAP failure or open circuit	G
TPS / WTS Alert (*1)			Blinking					ON Intermittent sound		TPS or WTS failure or open circuit	G

*1. Manifold Air Temperature sensor (MAT), Manifold Absolute Pressure sensor (MAP), Throttle Position Sensor (TPS), and Water Temperature Sensor (WTS).

*2. Pressing the main switch one time.

*3. Throttle turns to low pressure position and not to be controlled.

*4. Engine speed is controlled not to exceed 6100(*4) rpm.

*5. If the battery voltage is about 7V or less, the alarm does not work.

7. USE OF OPERATION PANEL

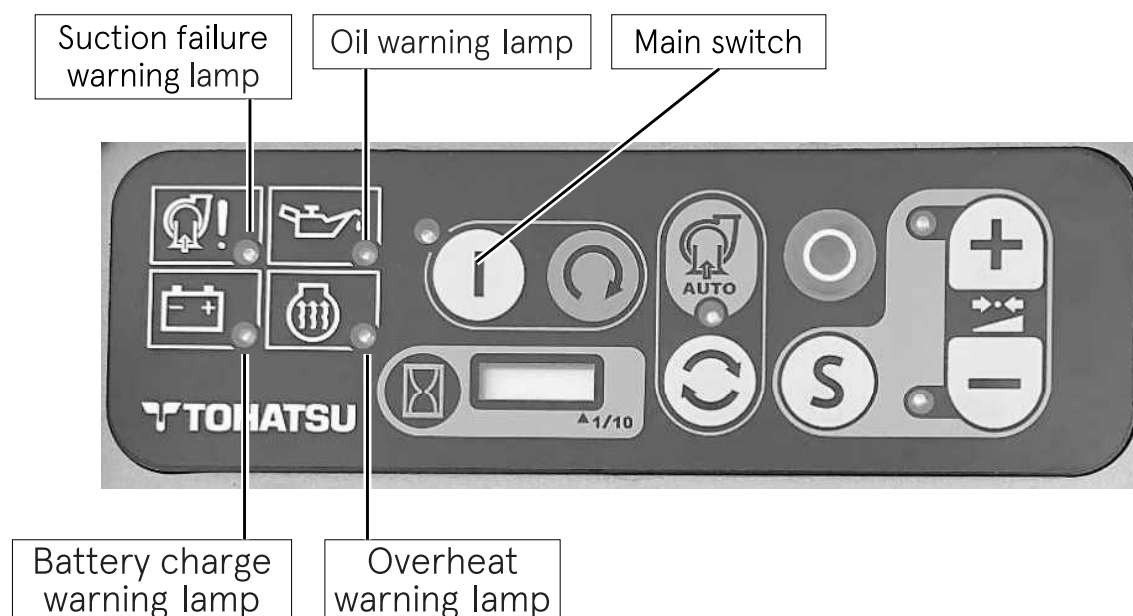
Engine status	Running	Overheating	Restart
80 °C ↗	Light & Buzzer ON		Engine can start at less than 120 °C and keep running for 30 seconds.
90 °C ↗	Engine STOP		
70 °C ↘	Light & Buzzer OFF		
Over 120 °C	Engine STOP		Engine cannot start.

Remedy

- A: Refill the engine oil.
- B: Remove the cause of insufficient cooling water and restart the engine.
- C: Remove the cause of insufficient cooling water.
- D: Charge the battery.
- E: Remove the cause of unable suction water.
- F: Turn the throttle to low speed position. (Throttle dial: “” mark)
- G: Stop the engine and contact our customer service.

NOTE

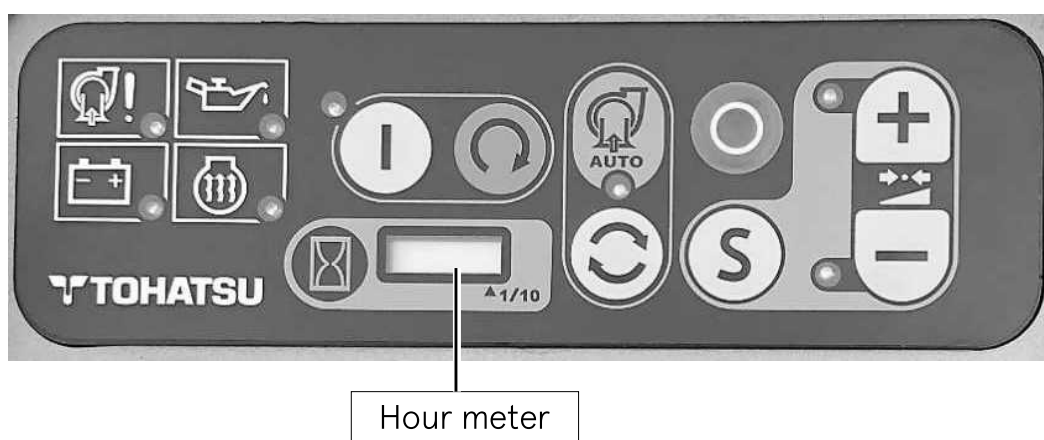
- Even if the engine oil warning buzzer sounds, the engine will not stop running (to discharge water). The system is designed to make life saving the top priority.



7. USE OF OPERATION PANEL

Hour Meter

1. The hour meter starts counting when the main switch is on, even if the engine has not been started.
2. The hour meter only works during the main switch is on.
3. There is no reset capability.
4. The hour meter keeps counting for approximately 30 minutes even if the engine has stopped while the engine power is on.
5. When the engine stops due to overheating or other reasons, still the hour meter counts while the main switch is turned on.



8. STARTING THE ENGINE

Pump Installation

WARNING

- Set the pump on a level ground at least three meters away from inflammable materials including dead leaves and wood. Because the temperature around the engine becomes high with the muffler and exhaust gas.
- Exhaust gas, which contains carbon monoxide, is deadly poisonous gas with no color and no smell.
- Do not operate the engine in a closed space or an insufficient ventilation place such as indoor, in the vehicle, warehouse, tunnel, well, in the hold of a ship.
- Do not start the engine with discharge valve opened.
- Do not pump up and discharge liquids other than water. (e.g., flammable liquids or chemicals)
- The pump is only designed to pump up water.
- Do not discharge water to water-prohibiting substance.
- Do not run the pump without suction port strainer.
- Inserting your hand into the suction port, you may be seriously injured by the rotating inducer.



CAUTION

- Do not run the pump without suction port strainer.
- If gravel enter the pump, then the pump could be damaged and the performance would be significantly reduced.

1. Place the pump near the water source on a flat area.
2. Connect a suction hose and a delivery hose to the pump securely. Put one end of suction hose into water source. The suction hose must have a strainer, and also must have a basket at the tip.
3. Recommend the nozzle diameter for discharging water are shown below.

Largest Nozzle Dia. (mm) *	
Twin outlet discharging (Branch pipe)	Single outlet discharging
25	36

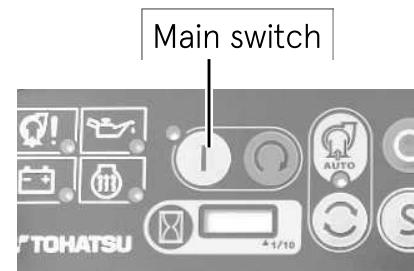
Remark: * The largest nozzle dia. at 3 m of suction head.

8. STARTING THE ENGINE

Removal of air from fuel line

Before initially fueling the portable pump or restarting the engine after the engine stopped due to lack of fuel, bleed air from the fuel line.

1. Press the main switch "1" and wait for approximately 15 seconds.



NOTE

- During the period, the electric fuel pump works and remove air from the fuel line.

2. Repeat this operation 2 ~ 3 times, and then start the engine.



CAUTION

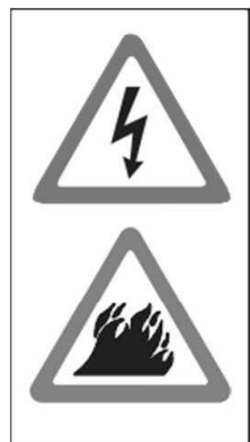
- **Wear proper hearing protection during the operation.**



- **While engine is running, never touch the high voltage ignition wire attached to spark plug. The wire carries very high voltage which will cause injury and bodily harm.**



- **Do not operate the pump on dry grass. The exhaust system will be very hot and could cause the dry grass burnt and fire. Clear the area if necessary.**



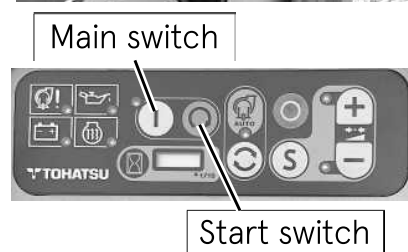
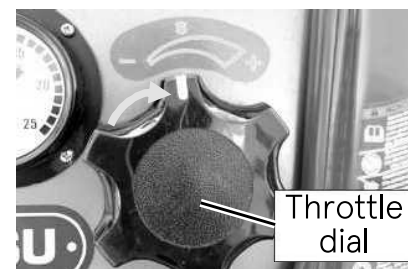
8. STARTING THE ENGINE

Starting engine

1. Check that the air vent of the fuel tank cap is closed.
2. Turn the throttle dial to “S” mark position.
3. Press the main switch, and press the start switch until the engine starts.
Release the start switch immediately after the engine starts.

NOTE

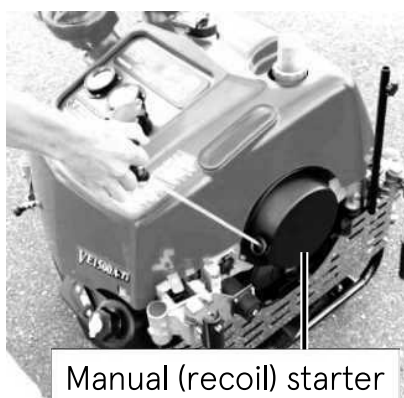
- When the starter motor runs for a long time continuously, the power of the battery will be exhausted. The maximum time for starting motor operation is 3 seconds at one time. If the engine does not start, wait 5 seconds before operating the starter motor again.
- Do not operate the starter motor after engine started.
- If the starter motor does not work, check that the battery terminals are tightly connected and the battery is fully charged.



Starting engine using a manual starter

If the electric starter does not work, use a manual starter as shown in the picture.

1. Press the main switch.
2. Turn the throttle dial to “S” mark position.
3. To start the engine with manual starter, engage the manual starter ratchet by pulling the starter rope slowly. And then pull the starter handle quickly with great force from the position in which feeling harder resistance.



CAUTION

- **Install the battery to start the engine and operate the pump, even if the battery is insufficient charged. If the battery is not installed and not connected, the electrical equipment may malfunction.**

8. STARTING THE ENGINE

Dry operation

The portable pump has outsource cooling system, limit the duration of dry operation so that it is within the following time periods.

Performing dry operation longer than the specified time period may cause damage to the engine or pump.

- In the case of idling: Within 2 minutes
- In the case of running with throttle dial at “**S**” mark position: Within 30 seconds

Closed discharge valves operation after priming water

When the pump is operated with the discharge valve closed, the cooling water temperature becomes high.

When the cooling water temperature reaches 50°C or more, the thermostat opens and allows the high temperature cooling water to be released outside through the pipe connected to the thermostat and simultaneously cooling water comes in from the water pump so that the cooling water temperature can be controlled. When the cooling water temperature goes down below 50°C, the thermostat closes to stop cooling water being released.



- **When performing the closed discharge valves operation after priming water, adjust the throttle so that the pump pressure becomes greater than 1 bar.**
- **If the pump is being operated with the pump pressure too low, the pump may suck air in when the thermostat opens, and cannot keep water in the pump without suction operation.**

9. PRIME AND DISCHARGE

WARNING

- While the engine is running with the cowl removed, do not touch the rotating parts of the pulley or belt. This may cause personal injuries.



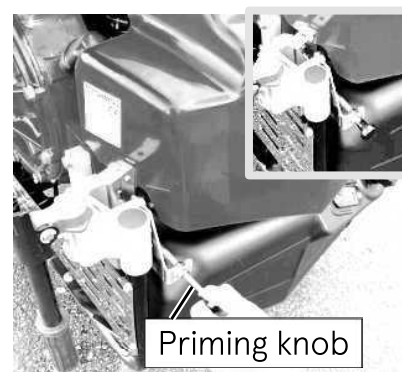
NOTE

- If the pump could not prime water in 30 seconds, or could not suck up water continuously by the pump during the discharge operation, check the following :
 - Is the tip of the suction hose completely below the water surface?
 - Is air sucked through the joint of the suction hose?
 - Is the suction hose damaged?
 - Does the vacuum performance of the priming pump reduced significantly?
 - Does the pump case keep vacuum? (No air leak from the pump case.)
 - Does vacuum leak occur when the pump is connected to a suction hose of which the opening is capped?

Refer to “Chapter 16 TROUBLESHOOTING”.

<Manual>

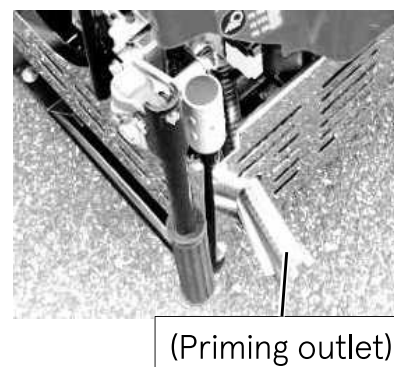
1. After starting the engine, pull the priming knob.
2. Confirm that the pumped water is discharged from the priming outlet of the vacuum pump and check the pressure gauge shows positive side.
3. Return the priming knob to the original position.



<Automatic>

1. Select the automatic water suction mode of the priming water mode switch on the operation panel.
2. Start the engine running.
3. Turn the throttle dial to "S" position.

Then the vacuum pump starts to run and prime (suck up) water.

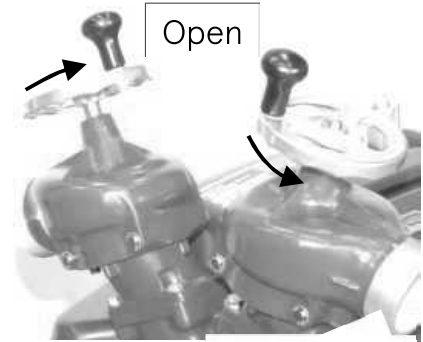


9. PRIME AND DISCHARGE

NOTE

- Limit the vacuum pump operating time within 30 seconds. If the pump cannot suction water within 30 seconds, it may have been caused by another problem.
- Refer to “Chapter 16 TROUBLESHOOTING” to eliminate defects.

4. Open the discharge valve(s).



CAUTION

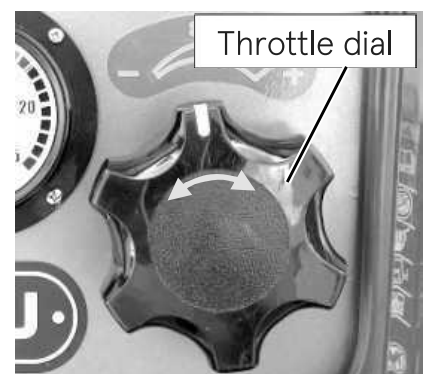
- **Check that the nozzle is ready to discharge water before opening the discharge valve.**

NOTE

- In order to avoid the occurrence of air pockets in the water line, place the pump upward location of the suction hose.
- If there is unevenness on the suction hose connected to the pump, air will remain in the hose, and the pump may not be able to discharge the water even if opening the discharge valve by the air in the hose.
- In this case, open the discharge valve and operate the vacuum pump for more 3 to 5 seconds just after the water discharge continuously.



5. Adjust the water pressure (volume) turning the throttle dial.



9. PRIME AND DISCHARGE

Performing relayed water supply. (In the case of sucking water from a fire hydrant.)

1. Determine the pump pressure in consideration of the water discharge pressure (nozzle pressure), hose pressure (friction) loss, and height loss.

$$\text{Pump pressure} = \text{needed pressure} + \text{friction loss} + \text{height loss}$$

2. Foreign materials such as dirt, gravel, iron rust, etc. may have intruded into a fire hydrant. Before connecting a hose, open a fire hydrant to discharge water in order to remove foreign materials.
3. When sucking water from a fire hydrant, use a mediation metal to connect a delivery hose to the suction port without using the suction hose in principle.
4. Set the discharge valve handle of the pump to the full open position.
5. Gradually open the fire hydrant on-off valve for the full open position.

However, check the water pressure from a fire hydrant with suction pressure gauge of the pump and adjust the opening of fire hydrant, if necessary.



CAUTION

- **In the case of water pressure from fire hydrant is higher than 6 bar, do not continue to open the fire hydrant on-off valve.**

*** In the case of water pressure from a fire hydrant is higher than the required discharge pressure, it is not necessary to start the pump. If the water pressure from the fire hydrant has not reached the required pump pressure, start the engine.**

6. If the water pressure from a fire hydrant is insufficient, start the engine and adjust the pressure to the required level by operating the throttle dial.

Stop increasing discharge pressure of the pump if the suction pressure gauge shows 1bar or below. In this case, stop increasing the pressure and keep the throttle dial as it is.

7. To end discharging water, turn the throttle dial to the low pressure firstly, then stop the engine, and close the fire hydrant on-off valve.



CAUTION

- **Be sure not to close the discharge valves and nozzle(s) of pumps until all the pumps stop and the fire hydrant on-off valve is closed.**

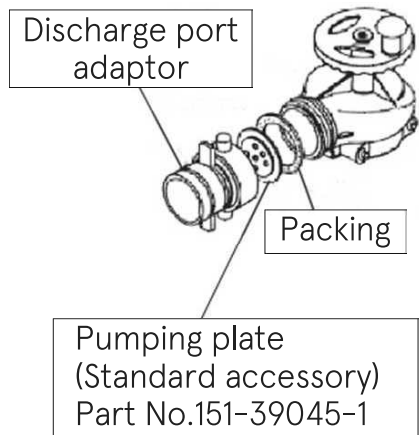
8. Open all the drain valves to drain all the remaining water as maintenance after operation.

9. PRIME AND DISCHARGE

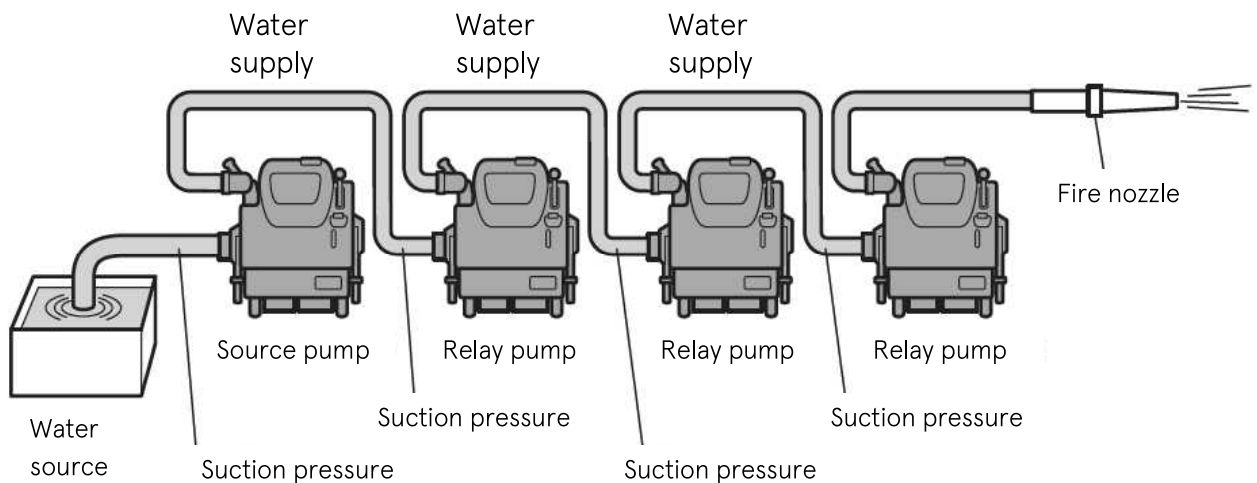
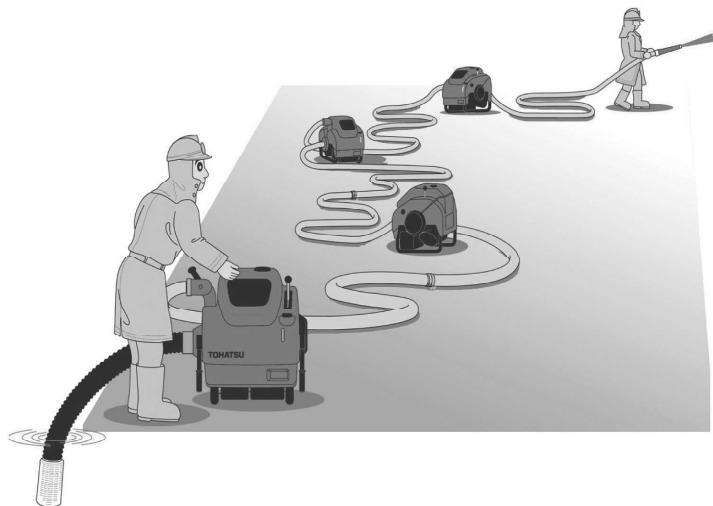
Relay pumping operations

⚠ CAUTION

- In the case of relay pumping operation training in a flat place, if the number of extending hose is less than ten, use the safety nozzle (pumping plate) attached.



Description of relay pumping operations



9. PRIME AND DISCHARGE

Preparation for operations



WARNING

- **Never close the discharge valve of source pump, the relay pump(s) and the fire nozzle(s). If the discharge valves or nozzle is(are) closed, there will be a risk of damage to the pumps and hoses with excessive pressure or water hammer.**

1. Decide how many relay pumps are needed in consideration of the distance and height between the water source and the fire ground.
2. Place the pumps according to the decision, and then connect the hoses.
3. Make sure that the relay pump discharge valves are opened, including the fire nozzle(s).
4. Decide the discharge pressure of each pump in consideration of needed pressure for the next pump (or fire nozzle) and the friction loss and height loss.

$$\text{Pump pressure} = \text{needed pressure} + \text{friction loss} + \text{height loss}$$

Starting of Source Pump



WARNING

- Once the water supply has started, keep supplying it until finished. If reducing or stopping water supply, overheat or cavitation may occur in the relay pump(s).

1. Start the source pump according to "Chapter 8 STARTING THE ENGINE".
2. Start supplying water according to "Chapter 9 PRIME AND DISCHARGE".

Starting of Relay Pump

1. Make sure that the discharge valve is opened and wait for the water supplied.
2. Check that the water was supplied from the source pump. At first, the hose swells due to air pressure. Step on a hose to judge whether the swelling of the hose is due to water or air.
3. When the water is supplied to the pump, check the pressure of the gauge. Start the engine if the pressure is lower than the decided. If the pressure is higher than the decided pressure, no need to start the engine.
4. Adjust the discharge pressure with the throttle dial. The suction pressure decreases with throttle dial up (Increase discharge water). Always check it with a suction pressure gauge.
5. If the suction pressure decreases below 1 bar, order the operator of the pre-stage pump to increase the water pressure, and adjust the relay pump pressure by the throttle.
6. If the suction pressure rises, adjust the water pressure by the throttle dial operation again.

9. PRIME AND DISCHARGE

Starting of Attack Pump

It is the same as the relay pump operations.

Finishing of Relay Pumping Operations

- Stop the attack pump running first.
- Stop the relay pump running from the pump closest to the nozzle in order.
- Finally, stop the source pump.

 **WARNING** • Do not close the fire nozzle until all the pumps stopped.

10. STOPPING THE ENGINE

CAUTION

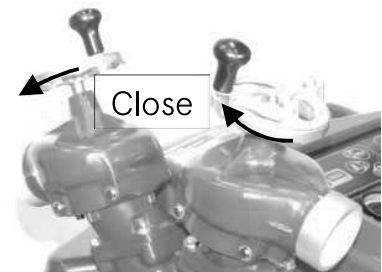
- Do not touch the exhaust pipe and the muffler while the engine is running, and also do not touch it for 10 minutes after the engine has been stopped.
These parts are very hot and will cause severe burns.



1. Return the throttle dial to “” position.



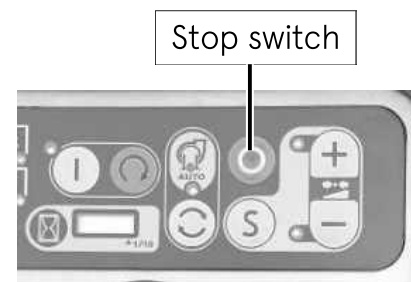
2. Close the discharge valves.



3. Press the stop switch “”.

NOTE

- It takes 1 ~ 3 seconds until the engine stops owing to the after-burn control.
This is a shut off behavior by an anti-after burn control, not a failure.



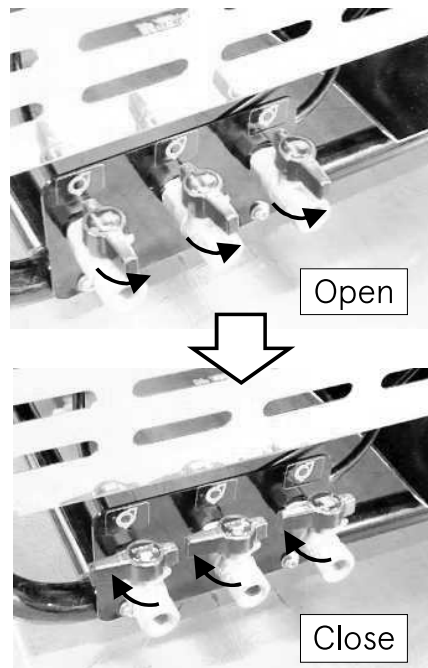
11. MAINTENANCE AFTER OPERATION

Maintenance after pumping seawater or foul water

In the case of the pumping seawater or foul water, the pump should be flushed out with fresh water immediately to prevent excessive corrosion. And operate the vacuum pump for 5 seconds at low engine speed ("—" position) in order to clean the inside of the vacuum pump.

Drain water

1. Open the drain valves and check the water in the pump has been completely drained.
2. Close all the drain valves for next operation.

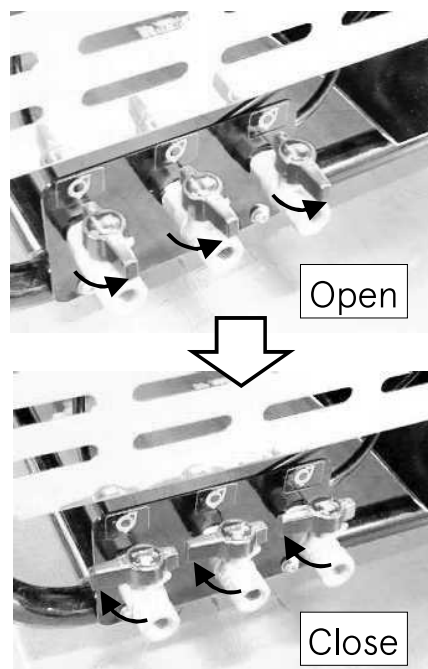


Checking Suction Performance

1. Open the drain valves and check the water in the pump has been completely drained.
2. Close all the drain valves and install the suction port cap.

NOTE

- Prepare a suction cap that is suitable for the suction coupling of the pump.



11. MAINTENANCE AFTER OPERATION

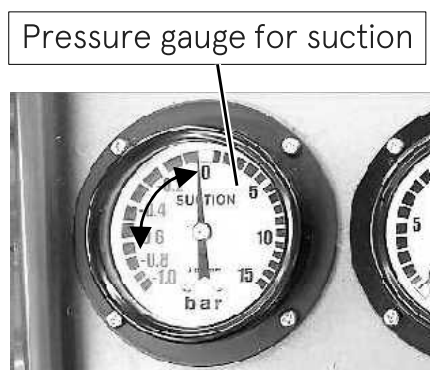
3. Confirm the throttle dial is set at "S" position and Start the engine. Pull the priming knob to generate vacuum. (Priming water operation must be within 30 seconds.)



4. After the vacuum is generated, immediately return the priming knob to the original position, and stop the engine.

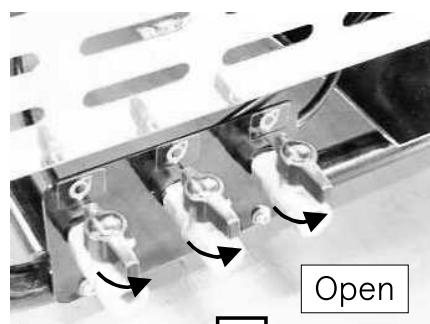


5. Check that the vacuum pressure of the pressure gauge for suction shows below -0.8 bar.

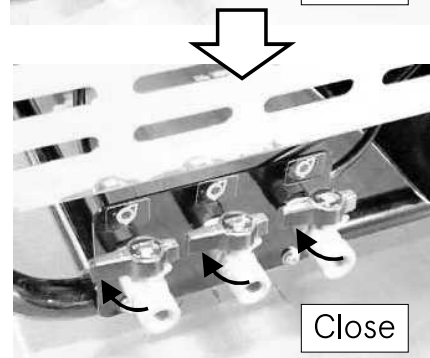


6. In order to check that there is no vacuum leak, leave it for 30 seconds and confirm that the pointer of the pressure gauge for suction keeps the same pressure indication.

7. Open the drain valves to expose it to the atmosphere, and check that the pointer of the pressure gauge for suction returns to "0".



8. Close the drain valves.



11. MAINTENANCE AFTER OPERATION

Fuel and Oil Supply

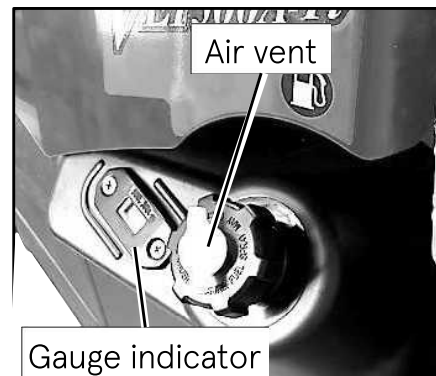
1. Fuel

Fill fuel until the maximum level of the gauge indicator (in red).

- Fuel tank capacity : 24L

CAUTION

- Do not tilt the pump with the air vent open. Otherwise, the fuel may leak. If the fuel leaks, wipe it off using a cloth or other materials.



2. Engine oil

Fill the oil tank with engine oil full.

- Engine oil tank capacity : 1.6L

NOTE

- Use 2-stroke engine oil of ISO-L-EGB grade or higher.

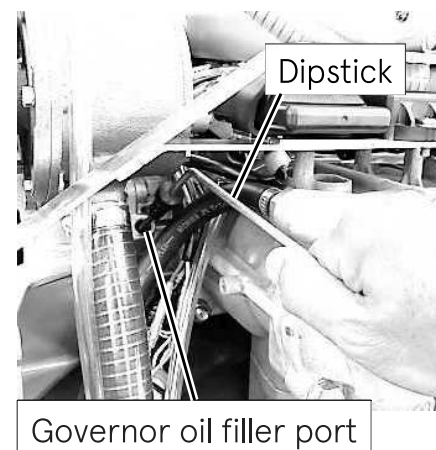


3. Governor oil

Check the oil level using the dipstick.

NOTE

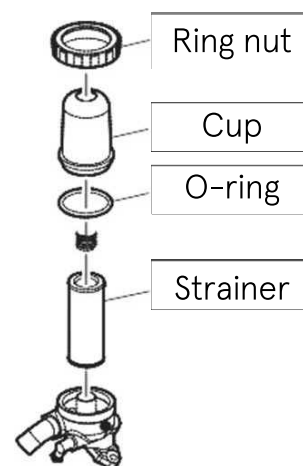
- Use 2-stroke engine oil of ISO-L-EGB grade or higher.
- The governor oil should be the same oil with the engine oil.



11. MAINTENANCE AFTER OPERATION

Cleaning strainer for priming water

Remove the ring nut and clean the strainer with fresh water. If the strainer is dirty with dust, etc., vacuum performance efficiency will be reduced.



NOTE

- When assembling the strainer, tighten the ring nut while holding and pushing slightly the strainer cup.



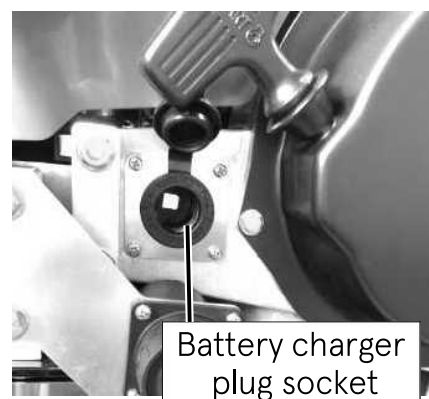
Charging battery

NOTE

- Removed the cowl when replacing a battery.
- Refer to "Chapter 15 SERVICE AND MAINTENANCE".

1. Make sure to charge the battery after each operation.

Battery charger plug socket



11. MAINTENANCE AFTER OPERATION

Battery charger

First, read the instruction manual of the battery charger.

CAUTION

- **Use an automatic battery charger.**
- **Use a maintenance-free (MF) battery.**
- **The battery capacity must be 12V-18Ah/10Hr.**
- **Use the battery charger that has an overcharge prevention function.**
- **Disconnect the battery charger after charging is completed.**

2. When charging the battery, turn off the power pressing the stop switch “”.

WARNING

- **Do not connect a cigarette lighter to the battery charger socket. Doing so may melt or burn out the socket due to overheating.**

NOTE

- If the pump power is on, the battery cannot be charged because the charging circuit is turned OFF.

3. When pressing the main switch “”, check that the insufficient battery charge warning lamp goes out after alert action check.

WARNING

- **If the battery is not enough charged to turn on the lamps on the control panel, charge the battery first or replace it with a battery which is charged fully before starting the engine.**

NOTE

- If the battery voltage is too low, "Lamp check" does not be done even if pressing the start switch. The alarm lamps of the control panel do not light on and the alarm does not sound.

12. MAINTENANCE IN COLD CONDITION

Infuse antifreeze



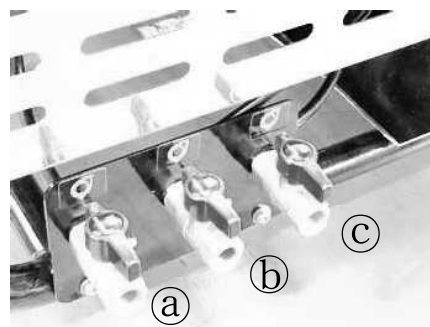
- If the temperature around the pump could be subzero, the pump inside may freeze up. It may cause not only damage in the pump, but also inability to start the engine.

For pump unit

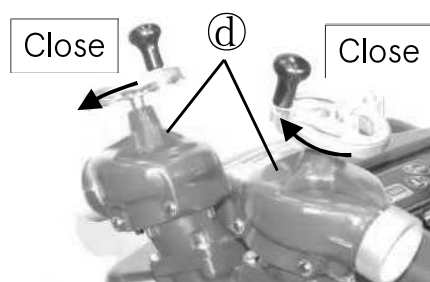
1. Open the drain valves (a), (b), (c).

Drain all the water from the pump.

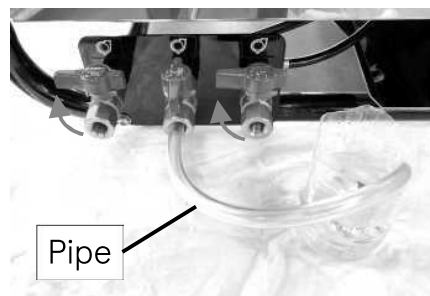
- (a) Cylinder drain valve
- (b) Pump drain valve
- (c) Muffler drain valve



2. Close the drain valves (a), (c) and the discharge valve handles (d).

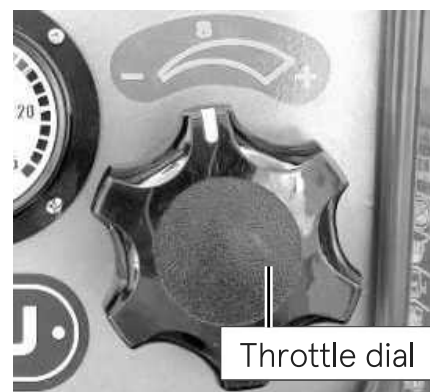


3. Attach the pipe (Plastic(vinyl) tube ~ Standard accessory) to the drain valve (b).



4. Insert the tip of the pipe into the container filled with anti-freezing fluid (180 ~ 200 mL).

5. Turn the throttle dial to "S" mark position.



12. MAINTENANCE IN COLD CONDITION

6. Press the main switch.

7. Switch the priming operation mode to "Automatic".

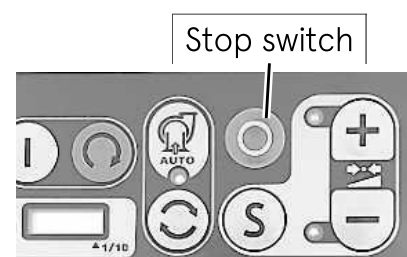
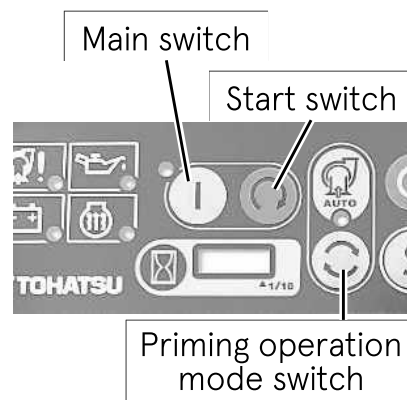
8. Start the engine pressing the start switch.

Release the start switch immediately after the engine starts.

Keep the engine running to suck up antifreeze.

* The engine will stop automatically in about 30 second because of water suction failure.

9. Stop the engine and turn off the power pressing the stop switch. Close the drain valve.



< In the case of infusing antifreeze liquid manually >

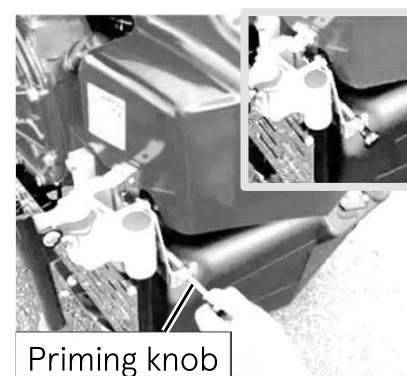
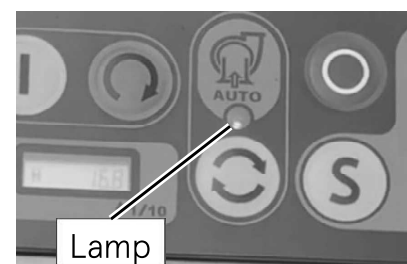
1~6. The infusing procedures from 1 to 6 are the same with the procedure for the automatic suction mentioned above.

7. Switch the priming operation mode to "Manual". (The lamp of the switch blinks slowly.)

8. Start the engine pressing the start switch.

Release the start switch immediately after the engine starts.

9. Pull the priming knob.

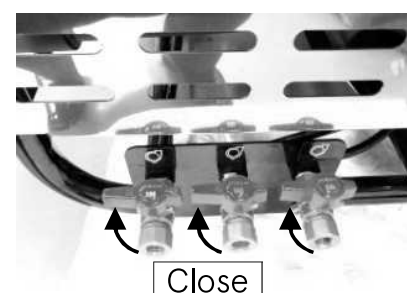


NOTE

- Even if anti-freezing fluid disappears, continue pulling the priming knob for 30 seconds.
- By this operation, anti-freezing fluid reaches most of all inside part of the water pump.

10. Return the priming knob to the original position.

11. Stop the engine and close the drain valves.



12. MAINTENANCE IN COLD CONDITION

For vacuum strainer

1. Turn the ring nut while holding and pressing the strainer cup for the vacuum pump, remove the strainer and strainer cup.
2. Inject antifreeze (undiluted 50 ml) to the strainer guide.
3. After injection, assemble the strainer and strainer cup by tightening the ring nut.

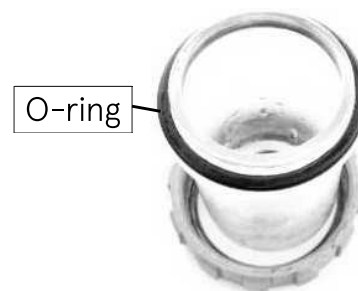
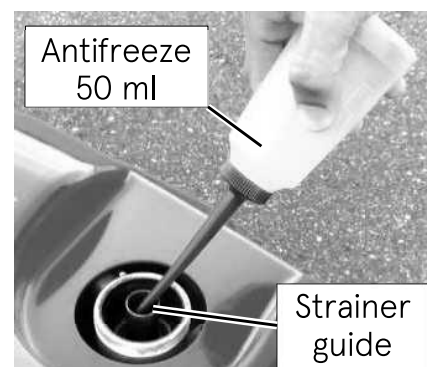


CAUTION

- When installing the strainer, exercise care so that the O-ring does not get caught in, and tighten the ring nut securely. If the ring nut is not tightened completely, vacuum leak may occur.

NOTE

- Pay attention to the protrusion of the O-ring while installing the O-ring. Install it correctly.
Otherwise, a vacuum leak may occur.
- When installing the strainer, tighten the ring nut while pressing the cup with your palm.



Discharge valve

Fill the inside of the discharge valve with antifreeze using a long nozzle containing antifreeze liquid.

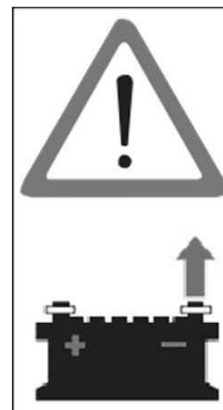
13. USE OF ACCESSORY

Battery

Battery performance deteriorates if the temperature goes down. Further, battery may freeze if the specific gravity is low in cold condition.

CAUTION

- When charging a battery, be sure to use an automatic battery charger dedicated to sealed battery.
- Use an automatic battery charger that matches the battery specification. Using a mismatched automatic battery charger may cause to explode the battery.
- Keep the battery surface clean.
- Battery life is normally 2~3 years even if a battery is used properly. Replace with new battery every 2~3 years checking the deterioration of the charging performance.
- When connecting battery cables, positive (+) side cable shall be connected first.
(When disconnecting battery cables, remove the negative (-) side cable first.)
- Battery electrolyte is very caustic acid, which will cause severe skin burns and damage to clothes.
- Hydrogen gases emitted from the battery will also cause severe burns on the skin and damage to clothes.
- Read instructions attached to the battery carefully before use.



13. USE OF ACCESSORY

Pumping plate

NOTE

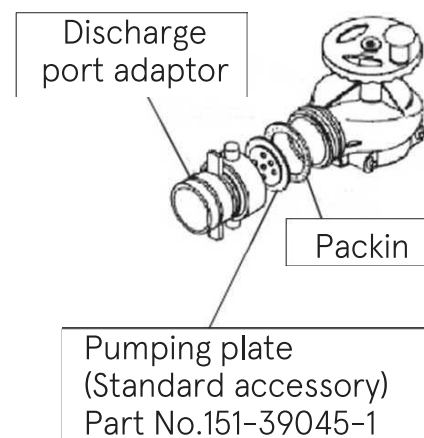
- When the pump is operated using a discharge nozzle that has a nozzle diameter greater than the maximum nozzle diameter, or without using a discharge nozzle, be sure to use the pumping plate. Otherwise the pump may break down due to cavitation or may overheat due to lack of cooling water.

Largest Nozzle Dia. (mm) *	
Twin outlet discharging	Single outlet discharging
25	36

Remark: * The largest nozzle dia. at 3 m of suction head.

When the fire pump is used for water pumping device such as pumping water out of a cellar, pumping plate must be installed to avoid engine overheating caused by lack of cooling water.

Install the pumping plate between the discharge port adaptor and the packing as shown in the figure on the right. With the pumping plate in place, the pump can be used without the discharge nozzle, so that pressure for cooling water in pump is maintained at certain level.



13. USE OF ACCESSORY

Detachable exhaust hose

<Specification>

- Inside diameter: $\phi 50$
- Length: 1500 mm
- Standard: EN 14466 : 2005 Annex C

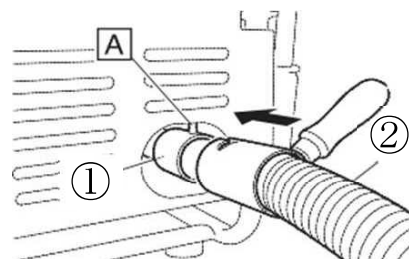


- **Do not touch the detachable exhaust hose because it becomes hot during operation.**
- **Do not operate the pump if it has been placed on combustible materials (Dried grass, deadwood, cloth, paper, etc.).**

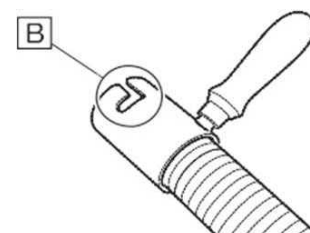


Always wear fireproof protective gloves when handling the muffler exhaust pipe extension.

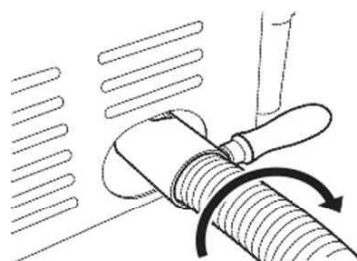
1. Connect exhaust pipe extension ② to muffler exhaust pipe ①.



2. Fit notch [B] of exhaust pipe extension ② to boss [A] of muffler exhaust pipe ①.



3. Turn the handle to fix exhaust pipe extension ②.



14. PERIODICAL INSPECTION

Perform periodical inspections and maintenance according to the following procedures.

Description		Inspection intervals				Inspection items	Measure
		After each operation	0.5 year or 50 hr	1 year or 100 hr	3 years or 300 hr		
Fuel System	Fuel filter		●			Impurities (ie. Water and / or waste)	Clean out
			●			Impurities (If water has accumulated to filter)	Replace *1 Check high pressure filter, fuel tank and portable fuel tank.
	Fuel	●				Fuel level	Refuel
			●			Preservation period 6 month or more	Replace *1
			●			Degradation (ie. Stink or color)	Replace *1
			●			Impurities (ie. Water and /or water)	Replace *1
	Fuel hose		●			Curling, crack, leakage	Replace *1
	High-pressure fuel filter				● Replace	—	Replace *1
Ignition	Spark plug		●			Fouling, wear, gap	Clean or replace
Engine	Cranking				●	- Is not locked - Proper compression pressure	Replace parts if necessary *1
	Engine oil	●				Oil level	Refill the same oil
	Governor oil		●			Oil level with oil dipstick	Refill
Starting System	Starter rope		●			Wear, damage	Replace *1
	Battery	●				Voltage measure	Charge
					● Replace	Period of use	Replace *1, 2

14. PERIODICAL INSPECTION

Description		Inspection intervals				Inspection items	Measure
		After each operation	0.5 year or 50 hr	1 year or 100 hr	3 years or 300 hr		
Priming system	V-Belt			●		Wear, crack, belt tension	Replace *1
	Strainer	●				Clogged or broken mesh	Clean or replace
	Primer	●				- Is not locked - Check performance (-0.8 bar)	Replace parts if necessary *1
		●				Air check	Check pump unit if necessary
Pump unit	Closed discharge valves operation after priming water		●			Check performance (10 bar)	Replace parts if necessary *1

*1 Ask our customer service staff to replace the parts

*2  **WARNING** • Battery that has been used for more than three years may explode if charged.

 **CAUTION** • Finish the performance test within one minute in order to protect the pump unit.

15. SERVICE AND MAINTENANCE

General

Servicing and maintenance of the fire pump must only be carried out by personnel who have professional related knowledge and who are familiar with the fire pump and regulations regarding safety and accident prevention.

Before starting maintenance work:

- Stop the engine.
- Disconnect the negative terminal of the battery.
- Place the pump on a level ground.



Safety Devices



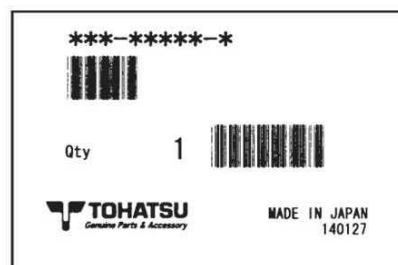
- In the case of safety or protective devices have been disassembled as part of servicing and maintenance work, immediately install them back to the original position after the maintenance work, and make sure that it works without problems.

Genuine parts

When replacing parts as part of servicing and maintenance of the fire pump, use only Tohatsu genuine parts.

If genuine Tohatsu parts and accessories are not used, it may adversely affect the functioning and safety of the fire pump. Therefore, for safety reason, use only Tohatsu genuine parts.

Tohatsu bears no responsibility for any personal injuries or equipment damage that may result from using of parts or accessories obtained from outside sources.



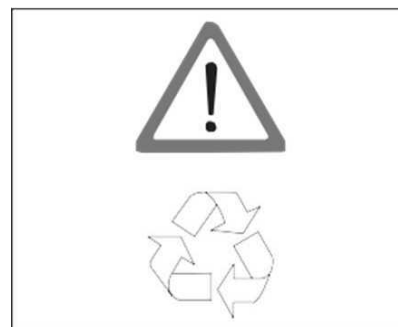
Environmental protection measures

Dispose of oil, fuel, batteries, etc. according to relevant environmental laws in the region. Do not dump to nature or sewerage.



Waste

When discarding parts, go waste in accordance with environmental laws in the region procedure.



15. SERVICE AND MAINTENANCE

Removal and installation of cowl

Cowl removal

1. Remove the mounting screw of the manual starter side.
2. Pull the cowl hooks (front side 2 pieces), lift the cowl slowly.



CAUTION

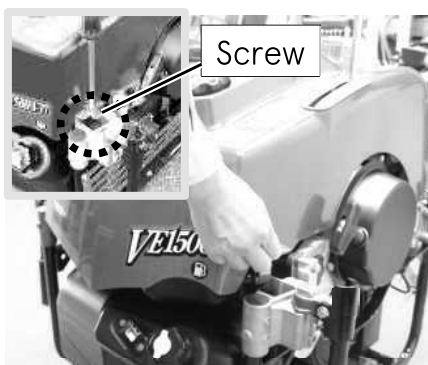
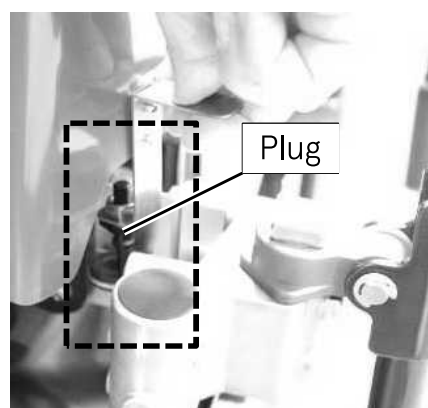
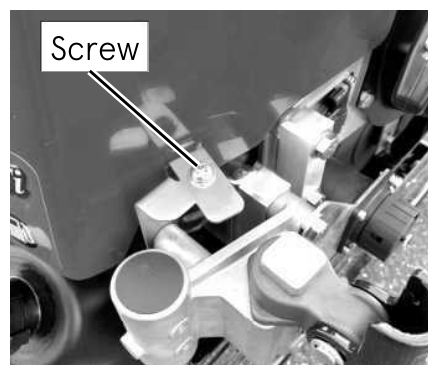
- Remove the cowl carefully without coming in contact with discharge valves.

3. Pull the cowl hook (total 4 hooks), remove the cowl completely.

Cowl installation

Install the cowl in reverse order of removal.

1. Fit the plugs to the plug holes on the rear side of the pump. (2 places)
Be careful without coming in contact with discharge valves.(Do not damage the cowl.)
2. Fit the hooks to the plug holes on the front side. (2 places)
3. Put the plugs in completely while holding the cowl top.
4. Fix the cowl with a mounting screw.



Vacuum pump strainer

Maintenance

Regarding disassemble and assemble, refer to "Chapter 11 MAINTENANCE AFTER OPERATION Cleaning strainer for priming water".

NOTE

- Incorrect installation of the strainer may cause a vacuum leak. Be sure to install the strainer correctly.

Wash the strainer with fresh water after each use.

Strainer



15. SERVICE AND MAINTENANCE

Engine oil

Check the oil level



CAUTION

- Every time after checking the oil level, attach the filler cap tightly.

1. Place the pump on a level ground.
2. Open the oil filler cap and check the oil level.
3. Refill the oil full. (Refill the oil until the lip of the oil tank.)

NOTE

- 2-stroke engine oil

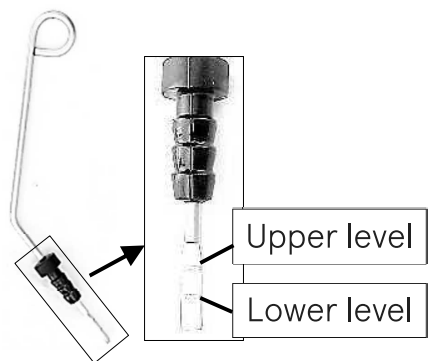
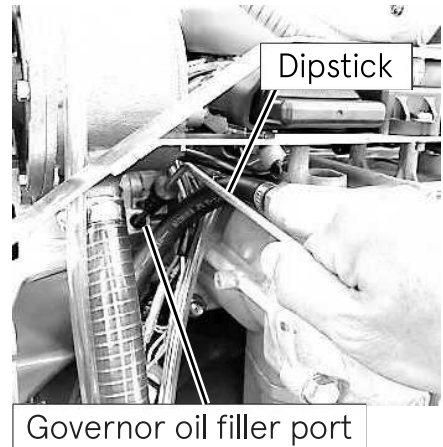
We recommend to use the engine oil of ISO-L-EGB grade or higher.



Governor oil

Check the oil level every three months or every 50 hours operating time.

1. Place the pump on a level ground.
2. Remove the oil dipstick, and wipe it with a cloth.
3. Insert the oil dipstick into the governor oil filler port completely.
4. Pull out the oil dipstick again, and check the oil level.
5. Refill the oil until the level between "Upper and lower oil level limit" if the oil level is not enough.



Vacuum pump V-belt

Check the V-belt every year or every 100 hours operating.

V-belt size.....M-29

15. SERVICE AND MAINTENANCE

Spark plug

Check the spark plugs

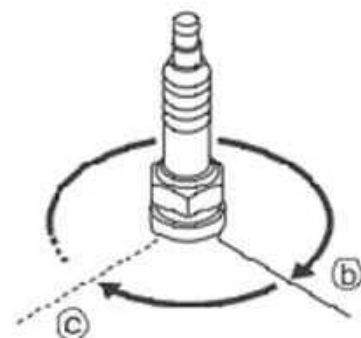
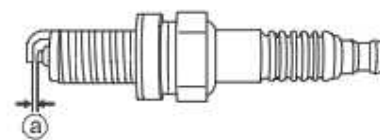
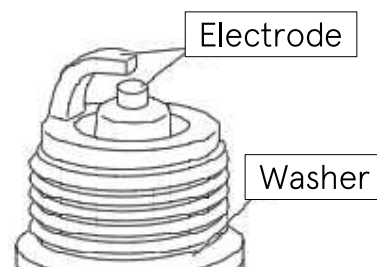
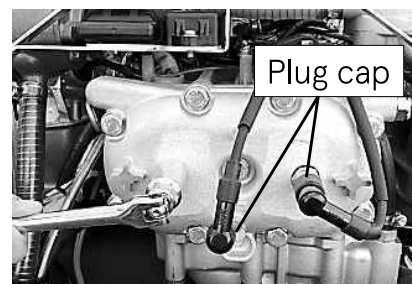
1. Remove the plug caps, and remove the spark plugs.
2. Using a wire brush or spark plug cleaner, clean the electrode of the spark plug.
3. Check the spark plug for excessive carbon deposit, electrode erosion and the washer for damage.
4. Measure the spark plug gap (a). If the gap is out of specification, replace the spark plug with the specified spark plug.

If necessary, adjust the gap to specified value.

- Spark plug gap (a) : 0.9–1.0 mm
- Usage limit : 1.2 mm
- Spark plug : NGK BPR7HS-10

5. After assembling the spark plug by hand (shown as (b)), tighten the plug using a plug wrench to the specified torque. (Shown as (c))

- Tightening torque : 27 N·m (20 lb·ft) [2.7 kgf·m]



15. SERVICE AND MAINTENANCE

Battery

General safety information

Follow the safety instruction of the battery.

When charging a battery, a highly explosive oxyhydrogen gas mixture is generated.

Never charge a battery in a poorly ventilated place. Do not smoke near the battery.



Danger of injury due to caustic substances of battery

- **Always wear protective clothing.**
- **Always wear protective gloves.**
- **Always wear protective glasses.**
- **Do not tip a battery, because acid may be discharged from air vents.**



Disposal

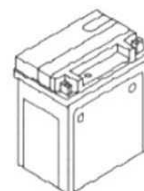
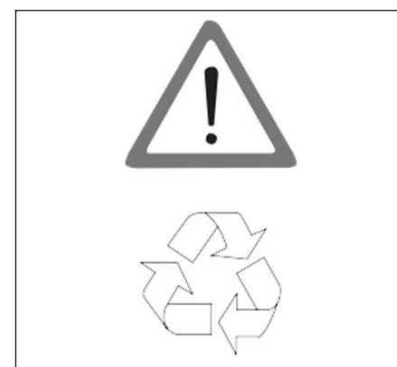
Disused batteries should be disposed according to local laws or regulations.

After each operation using a battery, check the voltage. Replace the battery if necessary.

1. Remove the muffler guard.
2. Disconnect the negative terminal of the battery cable first, after that, disconnect the positive terminal.



- **There is a risk of injury.**
- **When handling the battery, be sure to wear safety glasses and protective gloves.**



15. SERVICE AND MAINTENANCE

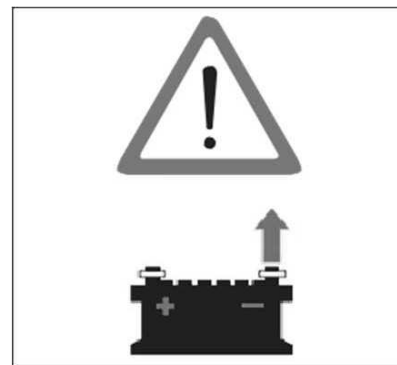
Electric equipment

Only expert electricians or trained staff members should handle electrical equipment.

Be sure to disconnect battery cables before handling electrical equipment. Disconnect the negative terminal first, and then disconnect the positive terminal.

When connecting battery cables, connect the positive terminal first, and connect the negative terminal.

Use a fuse with the same current rating (ampere) as that of the installed fuse. Using a fuse that has excessively high resistance may result in electrical equipment failures.



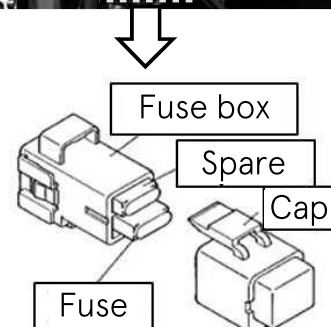
Fuse

Security fuses are installed in electrical circuits used in electrical equipment.

Before replacing the fuse, isolate the cause of the short circuit, and take an appropriate action.

After the appropriate action has been taken, replace the fuse with new one.

Be sure to prepare spare fuse for emergency.



15. SERVICE AND MAINTENANCE

Vacuum performance check

CAUTION

- Limit continuous operating time of the vacuum pump to 30 seconds or less.
- Operating the pump for 30 seconds or more continuously may cause the engine overheating. If the engine overheats, wait until it cools down, or perform the water discharge operation.
- The water discharge operation allows the (cooling) water circulates through the engine inside and cool the engine.

1. Close the suction port with a suitable suction cap, and then start the engine.

NOTE

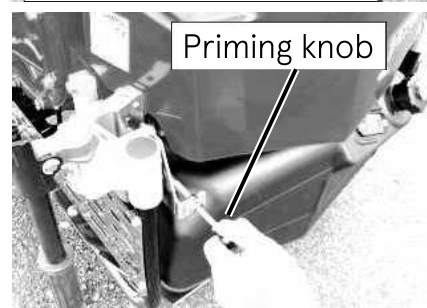
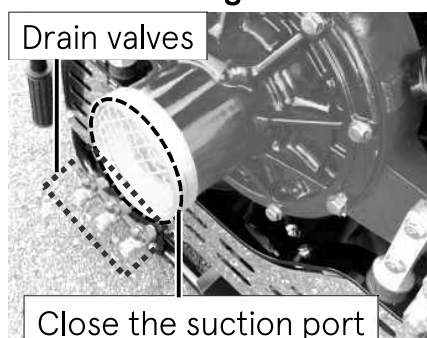
- Prepare a suction port cap that is suitable for the suction coupling.

2. Confirm the drain valves are all closed.
3. Press the main switch and press the start switch to start the engine.
4. Pull the priming knob to run the vacuum pump, and check that the pressure gauge for suction gauge points approximately -0.8 bar.
5. Stop the engine, and keep it for about 30 second. Check the suction pressure is kept the same pressure. If the vacuum leak is found, isolate the cause by referring to "Chapter 16 TROUBLESHOOTING". Then take appropriate measures and check the vacuum leak does not occur again.
6. Open one of the drain valves slowly to expose it to the atmospheric pressure, and check that the pointer of the suction pressure gauge returns to "0".
7. Close the drain valve.

If the vacuum leak is found, isolate the cause by referring to "Chapter 16 TROUBLESHOOTING". Then, take the appropriate action and check the vacuum leak again.

NOTE

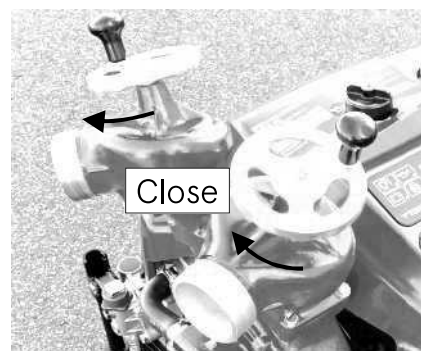
- Before storing the fire pump, flush with fresh water to purge all the foreign substances from the pump. (Especially after using salt water, muddy water, contaminated water, etc.)
- Rubber gaskets, O-rings, seals for the discharge and suction hose fitting wear: Worn rubber seals will cause water leaks, poor vacuum, etc. Frequent inspection of these items is mandatory.



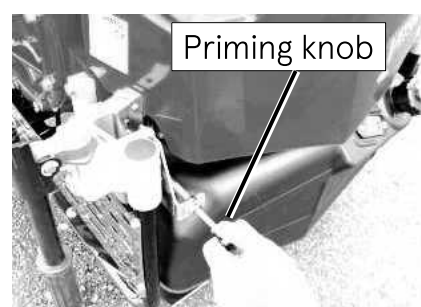
15. SERVICE AND MAINTENANCE

Water leak check

1. Connect the suction hose to the suction port, put the other end of the hose in the water source (Put the end of the hose into the water more than 30cm deep from the water surface).



2. Start the engine, and pull the priming knob to run the vacuum pump. After sucking up water, close the discharge valves.



3. Operate the throttle dial to raise the pump pressure almost to 10 bar, and then check for water leaks from each part of the pump.



If the water leak is found, isolate the cause by referring to “Chapter 16 TROUBLESHOOTING”. Then, take an appropriate action and check the leak again.

16. TROUBLESHOOTING

Typical causes of engine troubles are listed in the following tables.

Trouble		Cause												Action	
Warning lamp flashing Floodlight, Gauge lamp, Hour meter, Warning lamp do not work	Insufficient water discharge	Caused by engine unit			Caused by playpipe			Caused by pump unit			Caused by suction				
Fuel and lubrication	Fuel shortage														Refuel.
	Deterioration of fuel														Replace with new fuel.
	Fuel tank air vent clogging														Clean the air vent.
	Fuel filter clogging														Clean the filter.
	Fuel pump failure														Replace.
	Injector failure														Replace.
	Fuel pipe kink or snap														Fix routing of the pipe.
	Throttle dial at other than "S" position														Set the dial to "S" position.
	Oil filter clogging														Replace the oil filter. (Do not fill it up with the different brand of oil.)

16. TROUBLESHOOTING

Trouble		Cause													Action	
Warning lamp flashing Floodlight, Gauge lamp, Hour meter, Warning lamp do not work		Insufficient water discharge			Caused by engine unit										●	Plug in surely.
					Caused by playpipe											
					Caused by pump unit											
					Caused by suction											
		Water suction failure														
		Air leaking														
		Vacuum pressure defective														
		Engine seizing														
		Engine over heat													●	
		Engine over-rev.													●	
		Poor acceleration													●	
		Idling is too high													●	
		Rough idling													●	
		Engine stumble or stall													●	
		Engine start failure													●	
Starter motor does not work													●			
Battery charging failure													●			
Electrical		Spark plug cap comes off												●		
		Use of unspecified spark plug												●		
		Spark plug fouling (No spark or weak spark)												●		
		ECU and/or Sensors failure												●		
		Battery loose connection, terminal corrosion or expired												●		
		Battery charger defective												●		
		Check 7.5A fuse and/ or the battery charger. Replace parts if necessary.														

16. TROUBLESHOOTING

Action		Replace with a spare fuse. When the blowout of the fuse happens repeatedly, check below. 15A: O peration panel components(Gauge lamp), Starter, Vacuum pump solenoid 7.5A: Floodlight 2A: Operation panel control circuit.					Check the terminals, cords and screws. Replace parts if necessary.		Check the input of starter solenoid. (Equal to Operation panel output.) Replace parts if necessary.			
Warning lamp flashing Floodlight, Gauge lamp, Hour meter, Warning lamp do not work	Insufficient water discharge	Caused by engine unit	●									
		Caused by playpipe		●								
		Caused by pump unit										
	Caused by suction											
	Water suction failure											
	Air leaking											
	Vacuum pressure defective											
	Engine seizing											
	Engine over heat											
	Engine over-rev.											
	Poor acceleration											
	Idling is too high											
	Rough idling											
	Engine stumble or stall											
	Engine start failure											
	Starter motor does not work	●							●			
	Battery charging failure		●							●		
	Trouble	Cause	15A fuse blown									
			7.5A fuse blown									
2A fuse blown												
Starter motor defective												
Operation panel defective												

Electrical

16. TROUBLESHOOTING

Trouble		Cause		Action	
		Compression	Suction		
Warning lamp flashing Floodlight, Gauge lamp, Hour meter, Warning lamp do not work	Insufficient water discharge	Caused by engine unit	●		Correct or replace.
		Caused by playpipe			
		Caused by pump unit			
		Caused by suction			
	Water suction failure				Clean out.
	Air leaking				
	Vacuum pressure defective				
	Engine seizing	●	●		
	Engine over heat		●		Place the pump to nearer and/or lower position.
	Engine over-rev.				
	Poor acceleration	●			
	Idling is too high				
	Rough idling	●			Put the end of suction hose below 30cm of the water surface.
	Engine stumble or stall	●	●		
	Engine start failure	●			
	Starter motor does not work				
	Battery charging failure				Clean out the gasket and tighten securely. Replace a gasket if necessary.
	Piston, piston ring or cylinder excessively worn				Clean out.
	Carbon deposition in the combustion chamber				
	Suction height too high or length too long		●		
	Suction hose end is not in water		●	●	
	Suction hose coupling loose or gasket defective		●	●	Repair or replace.
	Suction hose strainer clogged with dead leaves or waste etc.			●	
	Suction hose cracking or lining peeling off		●	●	

16. TROUBLESHOOTING

Trouble		Cause		Action		
Warning lamp flashing Floodlight, Gauge lamp, Hour meter, Warning lamp do not work				Tighten securely the clump of vacuum pipe or replace.		
				Tighten securely or replace.		
				Replace.		
				Repair or replace.		
				Replace.		
		Insufficient water discharge		Caused by engine unit		
				Caused by playpipe		
				Caused by pump unit		
				Caused by suction		
				Water suction failure		●
		Air leaking			●	
		Vacuum pressure defective		●		
		Engine seizing				
		Engine over heat				
		Engine over-rev.				
		Poor acceleration				
		Idling is too high				
Rough idling						
Engine stumble or stall						
Engine start failure						
Starter motor does not work						
Battery charging failure						
Primer		Vacuum pipe loose or cracking				
		Strainer cap loose or O-ring failure				
		V-belt damaged or worn				
		Vacuum pump rotor shaft seizing				
		Vane, Side plate worn or damaged				
		Water stop valve		Water stop valve contamination	●	●
				Water stop valve diaphragm failure	●	●

16. TROUBLESHOOTING

Trouble		Cause										Action	
Pump	Warning lamp flashing Floodlight, Gauge lamp, Hour meter, Warning lamp do not work	Insufficient water discharge	Caused by engine unit									Close securely.	
			Caused by playpipe										
			Caused by pump unit										
		Water suction failure	Caused by suction									Clean out.	
		Air leaking		●	●	●						Open securely.	
		Vacuum pressure defective		●	●	●							
		Engine seizing										Tighten securely. Replace the gasket if necessary.	
		Engine over heat											
		Engine over-rev.				●						Tighten securely.	
		Poor acceleration											
		Idling is too high										Clean out or replace.	
		Rough idling											
		Engine stumble or stall										Clean out or replace.	
		Engine start failure											
		Starter motor does not work										Replace.	
		Battery charging failure											

16. TROUBLESHOOTING

Trouble		Cause		Action	
				Warning lamp flashing	
				Floodlight, Gauge lamp, Hour meter, Warning lamp do not work	
				Insufficient water discharge	Caused by engine unit
					Caused by playpipe
					Caused by pump unit
				Water suction failure	Caused by suction
				Air leaking	
				Vacuum pressure defective	
				Engine seizing	
				Engine over heat	●
				Engine over-rev.	●
				Poor acceleration	
				Idling is too high	●
				Rough idling	
				Engine stumble or stall	
				Engine start failure	
				Starter motor does not work	
				Battery charging failure	
	Nozzles	Discharge nozzle too large			Change the nozzle for suitable size or incorporate safety nozzle.
		Spray nozzle clogged			Clean out.
	Governor	Governor adjustment out of specified range		●	Adjust it securely.
		Governor link disconnected		●	Attach it securely

17. APPENDIX

Noise Emission Level

Machine Model: VE1500

Operating condition: According to EN14466 ANNEX E E.5 and ISO20361 Clause 8

Other information : See each test results

Declared DUAL-NUMBER Noise Emission Values

A-weighted Emission Sound Pressure Level:

L_{pA} at the operating position 97 dB(A)

Uncertainty K_{pA} 2.5 dB(A)

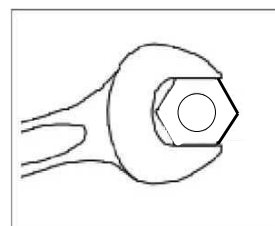
Measured A-weighted Sound Power Level:

L_{WA} 115 dB(A)

Uncertainty K_{WA} 2.5 dB(A)

Tightening torque specifications

		M3	M4	M5	M6	M8	M10
Standard Bolt	N·m	0.6~ 0.8	1.3~ 1.8	2.7~ 3.5	4.6~ 6.3	11.2~ 15.1	22.5~ 30.6
	kgf·m	0.06~ 0.08	0.13~ 0.18	0.27~ 0.36	0.47~ 0.64	1.14~ 1.54	2.30~ 3.12
Heat Treated Bolt	N·m	-	-	-	8.2~ 10.8	20.0~ 26.5	40.2~ 53.9
	kgf·m				0.84~ 1.10	2.04~ 2.70	4.10~ 5.50

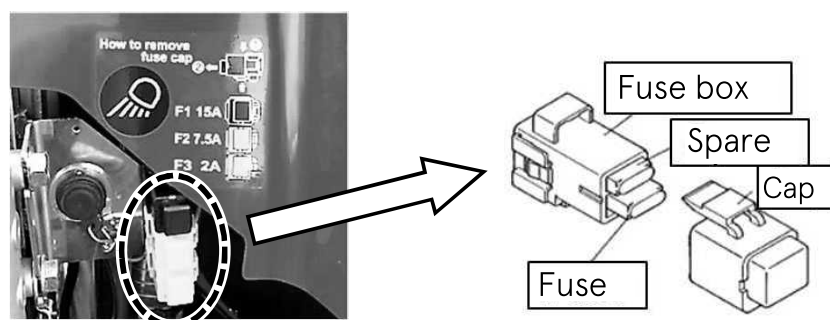


18. TOOL AND STANDARD ACCESSORY

Standard accessory

Description		Parts No.	Quantity
Tool kit		151-39010-2	1
• Tool kit bag		-	1
• Plug wrench		-	1
• Handle of plug wrench		-	1
Spark plug (BPR7HS-10)		9701-1-1014	1
Pumping plate		151-39045-1	2
Fuse *	15A	3T5-76246-0	1
	7.5A	1K1-39058-0	1
	2A	6F5-76240-0	1
Pipe assy		1H0-31569-0	1
Search Light (4P) (Floodlight)		1H9-39020-0	1
Auto battery charger		1T3-39039-2	1

* Spare fuses are stored in fuse boxes.



Special tool

Description	Parts No.
Puller	126-39100-0
Magneto puller assembly	1A6-39115-0
Puller magneto	151-39102-0
Plate magneto puller	1A6-39112-0
Screw	921621-0616
Impeller puller	151-39101-0
Friction measuring tool	1E0-39119-0
Pressure gauge assembly	3T5-72880-0
Piston ring tool	353-72249-0
Vacuum pressure gauge	3AC-99020-1

19. TRANSPORTING DEVICE

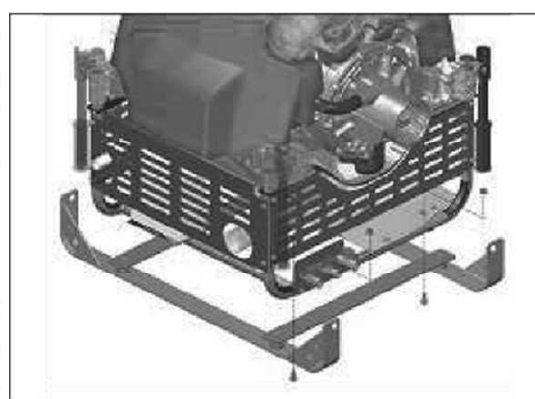
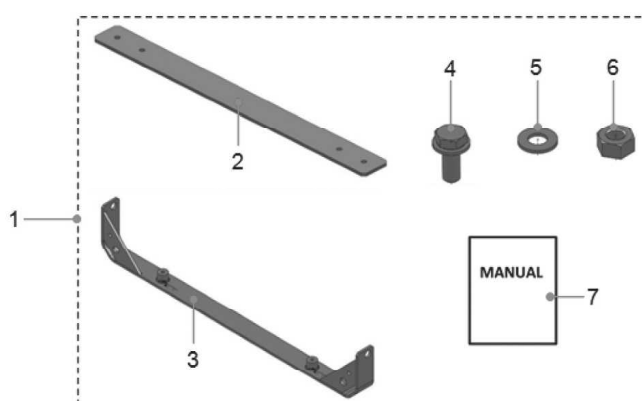
When loading the fire pump on a transport frame, use the TRANSPORTING DEVICE (TRANSPORT FRAME -optional-) and secure the pump.



- **Be sure to assemble the frame on a flat and level place.**
- **The frame should be assembled by two or more persons.**



TRANSPORTING DEVICE MANUAL



The TRANSPORTING DEVICE (TRANSPORT FRAME KIT) consists of the following parts. You can reorder only the parts having part numbers. Check the part numbers, and order them to Tohatsu Corporation.

Figure number	Part name	Part number	Quantity
1	TRANSPORTING DEVICE (TRANSPORT FRAME KIT)	1T3-37510-0	1
2	TRANSPORT FRAME A	-	2
3	TRANSPORT FRAME B	-	2
4	BOLT (with washer)	-	8
5	WASHER	-	4
6	NUT	-	4
7	TRANSPORTING DEVICE MANUAL	-	1

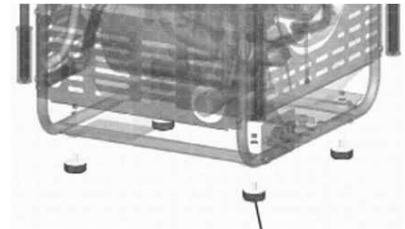
19. TRANSPORTING DEVICE

MOUNTING STRUCTURE AND MOUNTING METHOD

CAUTION

- **Be sure to assemble this frame on a flat and level place.**
- **The frame should be assembled by two or more persons.**

1. Remove the damper rubbers from the bottom of the pump frame. (4 places)

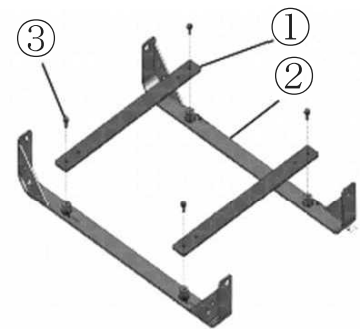


Damper rubber

2. Assemble TRANSPORT FRAME ①, ② and tighten the bolts ③ to the specified torque.

NOTE

- Confirm a direction of TRANSPORT FRAME B ② and the direction of the pump.



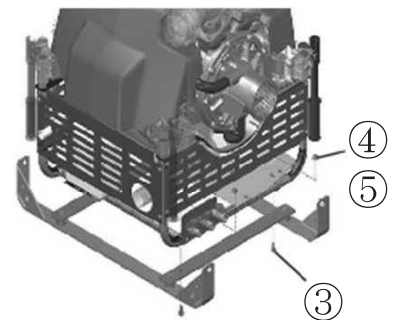
Tightening torque :

11-15 N·m (80-109 lb·ft) [1.1-1.5kgf·m] (Bolts ③)

3. Place the pump on the TRANSPORT FRAME, and tighten the bolt ③ with washer ④ and nut ⑤ to the specified torque. (4 places)

CAUTION

- **To prevent injuries, two or more persons should work together when carrying and placing the pump.**



NOTE

- Assemble damper rubbers using the holes where the damper rubbers were originally mounted.

Tightening torque :

11-15 N·m (80-109 lb·ft) [1.1-1.5kgf·m]

OWNER'S MANUAL

VE1500A-Ti

PORTABLE
FIRE PUMP

No.003-12082-7

TOHATSU CORPORATION

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