No. 87233210
For Archives

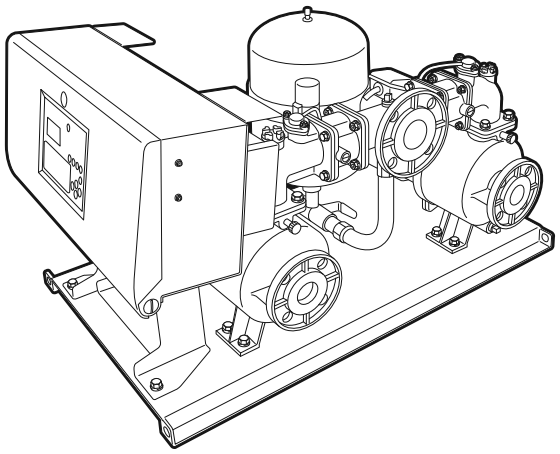
Uniting water with an abundant lifestyle····· Kawamoto

PUMPER KFE

KFE

Instruction Manual

Thank you for purchasing this automatic water supply pump.
Please read this manual thoroughly prior to use to ensure that it is used correctly and safely.
Be sure to store the manual in a readily accessible location after reading.



BO001

* Illustration shows 1.5 to 3.7kW pump.

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SAFETY PRECAUTIONS

This manual describes precautions intended to ensure safe and correct use of the product, and to prevent injury or damage to yourself or others before it happens.
Precautions have been classified as “DANGER”, “WARNING” or “CAUTION” to indicate the degree of injury or damage that could occur as a result of incorrect handling.
In either case, these are important matters relating to safety, and must be observed.

Degree of danger indicated by “DANGER”, “WARNING” or “CAUTION”

⚠ **DANGER**	Details which if ignored could pose an imminent danger of fatality or serious injury.
⚠ **WARNING**	Details which if ignored could lead to fatality or serious injury.
⚠ **CAUTION**	Details which if ignored could lead to personal injury or physical damage.

Meaning of symbols used in this manual

△ Indicates content for which care must be taken. For example, ⚠ indicates an "electric shock caution".	⃠ Indicates prohibited behavior. For example, ⃠ indicates "disassembly prohibited ".	● Indicates action that must be taken. For example, ⏚ indicates "always connect a ground wire".

⚠DANGER

Specifications

⃠ Prohibited

Never use at or greater than the maximum usage pressure.
Failure to observe this could result in a serious accident.

⚠WARNING

General product warning

⃠ Prohibited

Do not use at other than the prescribed product specifications.
Failure to observe this could result in electric shock, fire, or water leakage.

Installation

If unloading or carrying in the product, or if suspending it for installation, do so correctly by first checking the product weight and suspension method in the catalog, installation drawings, and installation manual. Furthermore, do not suspend products heavier than the rated load for the suspension equipment.
Failure to suspend properly could result in injury if the product falls.

Carry out installation properly in accordance with the instruction manual.
Failure to carry out installation properly could result in electric leakage, electric shock or fire, or injury if the product falls or topples. Failure to observe this could also cause the pump to vibrate.

Carry out installation in accordance with applicable legal requirements.
Failure to observe this may not only violate legal requirements, but could also result in fire or injury.

⃠ Prohibited

Do not connect directly to water pipes.
Doing so might be prohibited by Water Supply Act. Furthermore, backflow may occur, resulting in possible contamination of tap water.

Pay attention to packaging nails and staples when unpacking.
Failure to observe this could result in injury.

Store the pump in a location such as a pump room that can be locked with a key, or install a fence or enclosure to prevent third parties touching the pump.
Failure to observe this could lead to injury as a result of unexpected contact with rotating or hot parts, control panels settings could be changed and valves opened or closed, resulting in abnormal pump operation or water flow stoppages.

⚠WARNING

Installation

Prohibited

With the exception of pumps for outdoor use, do not install pumps outdoors or in locations where water pours.
Failure to observe this could result in rust formation or faults, or insulation may drop, leading to electric leakage, electric shock, or fire.

Prohibited

Do not burn plastic or rubber parts on site.
Failure to observe this could result in the generation of toxic gas. Check treatment methods with the relevant authorities.

Install equipment (safety valve, etc.) capable of reducing pressure if there is a possibility that the pressure inside the discharge pipe may rise due to temperature rises during the summer months.
Failure to observe this could result in damage to the pipe or valves, etc., or injury as a result of the internal pressure rise.

Taking the life of devices into consideration, select an installation location with good ventilation, where there is no dust, corrosive or explosive gas, salt, moisture, steam, or condensation, etc., and where the pump will not be exposed to wind, rain, or direct sunlight.
Failure to observe this could result in electric leakage, electric shock, or fire due to drops in control panel insulation, etc. that could occur if the pump is used in a poor environment.

Prohibited

Do not connect devices other than the heater or thermostat to the heater or thermostat terminal blocks.
Failure to observe this could result in a fault.

Do not bring the pump close to sources of fire such as candles, cigarettes, flames, or sparks.
Failure to observe this could result in fire.

Prohibited

Do not use the pump in an explosive atmosphere.
Failure to observe this could result in fire.

Avoid piggybacking electrical outlets (connecting multiple devices), and employ dedicated wiring.
Failure to observe this could result in electric leakage, electric shock, or fire.

Prohibited

Do not use the pump or carry out work with the product suspended.
Failure to observe this could result in injury if the product falls.

Electrical work, wiring

Carry out electrical work properly in accordance with applicable standards and regulations.
Inadequate wiring or connection could result in electric shock, electric leakage, or fire.

Always connect ground wire

Always ground the pump. (Ensure a grounding resistance value of 100 Ω or less for 200 V models, and 10 Ω or less for 400 V models.)
Failure to observe this could result in electric shock when a fault or electric leakage occurs. **Connect the ground wire to the pump grounding terminal, and then bury the ground bar in the ground.**

Always connect ground wire

Attach the ground wire securely, and install a dedicated earth leakage breaker at the power supply side.
Failure to observe this could result in electric shock, electric leakage, or fire.

Always carry out grounding work before turning ON the power.
Do not connect ground wires to gas pipes, water pipes, lightning rods, or telephone ground wires. Failure to carry out grounding work properly could result in electric shock.

Prohibited

Do not equip the pump with a phase advancing capacitor.
Failure to observe this could lead to trouble such as abnormal heat generation.

Trial operation, operation

When connecting or disconecting wires, always turn OFF the power, and ensure that power is not being supplied.
Failure to observe this could result in electric shock.

Touching prohibited

Do not touch charged parts of the control panel, motor terminals, or the ends of cables, etc. after turning ON the power, or with the power ON.
Failure to observe this could result in earth leakage, electric shock, or fire.

Touching prohibited

Do not leave the control panel door open, or touch charged parts after turning ON the power.
Failure to observe this could result in electric shock, electric leakage, or fire.

Touching with wet hands prohibited

Do not touch operation buttons and so on with wet hands after turning ON the power.
Failure to observe this could result in electric shock.

Always replace terminal box covers removed when performing wiring work and so on.
Failure to observe this could result in electric shock or injury.

⚠WARNING

Trial operation, operation

Eliminate any dust from power plugs, parts connecting wires, wiring connections, and terminals, etc.
Using the pump with dust adhering to such parts could result in heat generation and fire.

When using a generator with models equipped with an inverter, contact your dealer or KAWAMOTO.
Failure to observe this could result in control panel (electric parts assembly box) or generator faults or damage.

Ensure that no parts connecting wires or wiring connections are loose or disconnected before turning ON the power.
Looseness or disconnection at even one part could result in fire or electric shock.

Prohibited

Do not pour water on the motor or control panel (electric parts assembly box).
Failure to observe this could result in electric leakage, electric shock, fire, or faults.

Turn OFF the power switch if a power failure occurs.
Failure to observe this could result in damage to the product or equipment, or injury if the pump starts suddenly when the power is restored.

Prohibited

Do not place hands or feet near the suction port while it is running.
Failure to observe this could result in injury if hands or feet are drawn into the pump.

Inspection and repair

If the pump suffers a loss of power or abnormalities (burning smell, etc.) occur, stop operation immediately, turn OFF the power, and contact your dealer or KAWAMOTO to request inspection or repair.
Continued use in an abnormal condition, or inadequate repair could result in electric shock, fire, or water leakage.

Disassembly / modification prohibited

The pump should never be disassembled, repaired, or modified by anyone other than a qualified service engineer.
Inadequate repair could result in electric shock, fire, or water leakage.

When carrying out maintenance or repair, always turn OFF the power, and ensure that power is not being supplied.
Failure to observe this could result in electric shock or injury.

If moving and reinstalling the pump, consult contact your dealer or KAWAMOTO.
Inadequate installation could result in electric shock, fire, or water leakage.

If the accumulator gas pressure drops, fill with air or nitrogen gas.
Failure to observe this could cause pump chattering, resulting in a fault.

Prohibited

Do not fill the accumulator with explosive gas such as hydrogen.
Failure to observe this could result in an explosion.

When inspecting or replacing electric parts in the control panel (electric parts assembly box) or inverter, etc., wait until at least 10 minutes have elapsed since turning OFF the power, and use a tester, etc. to ensure that no voltage is applied.
Failure to observe this could result in electric shock or injury.

If the motor insulation resistance value drops to 1MΩ or below, contact your dealer or KAWAMOTO immediately.
Failure to do so could result in motor burnout, electric shock, or fire.

Use only genuine KAWAMOTO parts when carrying out repairs.
Use of other than genuine KAWAMOTO parts could result in an accident or faults. Furthermore, product functionality could suffer.

⚠CAUTION

General precautions

Caution is required if unable to permit rusting, corrosion, or elution occurring as a result of the application or fluid quality. Give consideration to both the pump and equipment in general when selecting the product.
Failure to observe this could result in unexpected damage.

Select a product suited to the application.
Use of the pump for unsuitable applications could result in an accident.

DANGER, WARNING, and CAUTION labels describe items that could result in harm to the human body or property damage, and therefore these items must be observed.
Failure to observe these could result in device faults, electric shock, fire, or injury, etc.

Repair the pump coating at suitable intervals based on the operating environment.
Rust may form on threaded parts, machined parts to which rust inhibitor has been applied, or parts that have been painted to prevent rust if the operating environment is highly humid, condensation is present, or water pours, leading to possible injury.

When using this pump for equipment for living things (fisheries, fish-tanks, aquariums, etc.), or for important equipment, always prepare a spare unit.
If the pump fails, oxygen deficiency or degradation of water quality, etc., could occur, affecting the lives of creatures.

Carry-in, installation, water quality

Check with the relevant authorities for details on methods for disposal of unnecessary parts or packaging materials.

Do not use the pump for fluids that do not indicate the specified fluid quality.
Failure to observe this could result in pump faults, electric leakage, electric shock, or fire.

If using the pump for the transport of food, take sufficient care by such means as checking the materials used.
Failure to observe this could result in contamination with foreign matter.

Avoid using this product with living things, etc. that are susceptible to copper alloys.
Failure to observe this could affect the lives of creatures.

Do not install the pump in a location that has not been treated for drainage, or that has not been waterproofed.
Water leakages could result in significant damage.
*We bear no responsibility for any damage arising from lack of drainage or water proof.

Do not install the pump in a location exposed to high levels of humidity such as a bathroom.
Failure to observe this could result in electric shock due to electric leakage.

Do not install the pump in locations such as machine shops or chemical plants where toxic gases such as acids, alkalies, organic solvents, or paints, or gases containing corrosive elements are produced, or in dusty locations.
Failure to observe this could result in electric leakage or fire.

Install the pump in a location at altitude of 1,000 m or less.
Failure to observe this could result in a pump fault or accident, and the pump may no longer be able to deliver normal functionality.

If using the pump to supply drinking water, conduct water quality inspections periodically and when installing the pump. in accordance with the instructions of your local health care center.
Deteriorating water quality could result in ill health if the water is consumed.

Do not apply impact to or overturn devices.
Failure to observe this could result in device damage.

Prepare a spare pump as a preemptive measure in the event of a pump stoppage.
Pump fault may result in water disruption or equipment stoppage.

Depending on the equipment, install a suitable filter, etc. at the discharge side based on the pump application, perform sufficient flushing, and use the pump after ensuring that there is no foreign matter.
Suction water may become contaminated by cutting oil, mold releasing agent for rubber, foreign matter from the product manufacturing process, or cutting oil or foreign matter in the pipe system.

Do not place objects on or mount devices.
Failure to observe this could result in device damage, or injury if devices topple.

Install a device such as a buzzer to issue alarms when faults, etc. occur.
Failure to observe this could result in serious accidents without realizing when faults occur.

⚠CAUTION

Carry-in, installation, water quality

Do not modify the control panel by such means as boring holes.
The adhesion of chips or steel powder produced by machining to parts could result in fire or faults.

Do not place anything other than accessories inside the control panel.
Failure to observe this could result in fire.

If using devices such as flush valve associated with sudden changes in flow rate, consult your dealer or KAWAMOTO beforehand.
Using a flush valve while the pump is stopped will cause the pressure inside the pipes to drop suddenly, and this could result in pressure fluctuations or mixing with air.

If there is a risk of freezing during the winter season, prevent freezing with the use of insulating material or by equipping the pump with a heater.
Failure to observe this could result in disruptive accidents due to freezing.

Tidy up the surrounding area before carrying out installation and inspections, etc.
Slipping or tripping could result in injury.

Fit suction pipes to pumps, avoid using right-angled loop pipes, ensure an uphill gradient (1/100 or greater), keep the pipe length to a minimum, and avoid the use of bends as much as possible.
Failure to observe this could hinder normal pump operation.

Do not use the pump in other than the specified total suction head range.
Failure to observe this could hinder normal pump operation.

Ensure that air does not build up inside the pipes.
Failure to observe this could hinder normal pump operation if air builds up inside the pipes.

Do not connect a commercial power supply directly to the motor.
Failure to observe this could result in fire, a fault, or damage.

The magnetic force exerted by magnets is powerful, and therefore watches, magnetic cards, and cardiac pacemakers, etc. must be kept at a distance.
Failure to observe this could result in a fault or affect device operation.

Do not install the pump in a location where there are obstacles in the surrounding area which interfere with motor cooling ventilation.
Failure to observe this could result in damage, burnout, or fire.

Do not place the plastic bag in which the product is wrapped over your head.
Failure to observe this could result in asphyxiation.

Take care not to jam fingers when opening and closing the control panel door.
Failure to observe this could result in injury to fingers.

If there is a possibility that insects or animals may gain entry to the pump when using it outdoors, etc., take appropriate countermeasures such as burying the gaps between cables and the control panel rubber bushing with caulking material.
Failure to prevent insects or animals from getting into the control panel, etc. could result in a defect or fault.

Take care not to jam fingers when reattaching the terminal (box) cover.
Failure to observe this could result in injury to fingers.

Trial operation, operation

Take care to avoid applying strong impact to plastic parts, or tightening plastic connections excessively.
Failure to observe this could result in a pump fault or damage, or water leakage.

Do not use the pump with other than the rated voltage.
Failure to observe this could result in fire or electric shock.

Do not touch rotating parts during operation, or insert fingers or rods into the motor opening.
Failure to observe this could result in electric shock or injury.

Do not touch the motor during operation.
The motor will be very hot, possibly resulting in burns.

Turn OFF the power if not using the pump for long periods of time.
Failure to observe this could result in electric shock, electric leakage, or fire due to insulation deterioration.

Do not perform idling (operation with no water in pump) or no-discharge operation (no water inflow or outflow inside pump).
The pump will be very hot, possibly resulting in burns.

Do not place objects near the pump, on motors or cables, or inside the control panel or pump cover. Furthermore, do not cover these devices with a cloth, etc.
Failure to observe this could cause overheating, resulting in combustion or injury.

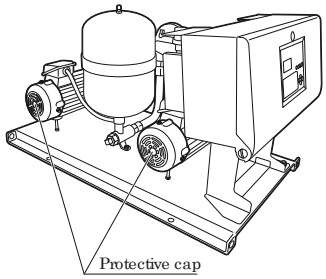
⚠CAUTION

Trial operation, operation

Prohibited

Do not lay the power cable or control cables in the same conduit or duct.
Failure to observe this could cause the product or other devices to malfunction.

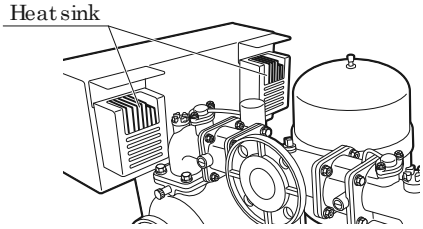
Always fit a protective cap to the end of the motor shaft before performing operation.
Running the pump with the protective cap removed could result in injury to hands or fingers.



BO017

High temp. caution

Do not touch the control panel heat sink.
The heat sink will be very hot, possibly resulting in burns.



BO018

Ensure that there is water inside the pump.
Failure to observe this could result in heater wire damage or fire.

If water is not used for a long period of time, run the water for a short while, and use the water once it runs clear.
Deteriorating water quality could result in ill health if the water is consumed.

Ensure that the pump is rotating in the right direction.
If the pump rotates in the wrong direction, impeller nuts or bolts could loosen through vibrations, leading to an accident.

Prohibited

Do not touch the pump, motor, inverter cooling fins, or heater while the pump is running, or immediately after it stops.
The motor will be very hot, possibly resulting in burns.

Prohibited

Do not perform idling or no-discharge operation. Furthermore, do not mix the fluid handled by the pump with air.
Failure to observe this could result in damage to the casing, bearings, or shaft seals, etc. making pumping impossible. Furthermore, there is also a danger that the pump may overheat, causing burns.

If changing control device settings, consult KAWAMOTO.
Changing values without prior consultation could result in a device fault or water leakage.

Set the control panel operation switches correctly.
Failure to observe this could result in secondary equipment damage or faults due to malfunction.

Use valves in their regulated conditions.
Failure to observe this could prevent valves functioning normally, leading to unit damage.

Run the pump within the range outlined in the specifications.
Failure to observe this could result in pump faults or an accident.

When performing trial operation, remove air sufficiently from inside the pump and pipes.
Failure to observe this could result in the pump causing an air lock, causing the temperature to rise, and leading to faults or an accident.

If priming or evacuating the pump, ensure that the product is not exposed to water.
Failure to observe this could result in electric leakage, electric shock, fire, or a fault.

Inspection and repair

Ensure that the pump internal pressure is zero before carrying out inspections.
Failure to observe this could cause water to spurt out.

Use an insulation resistance tester suitable for the power supply voltage when performing insulation resistance measurement. (250 V for 200 V models, 500 V for 400 V models)
Failure to observe this could result in damage to control PCBs, etc.

Prohibited

If the pump is hot, do not remove the plug (priming cup).
Hot water may spurt out, possibly resulting in burns.

Prohibited

Do not touch the inside of the control panel or inverter while the power is ON. When carrying out inspections or replacing electric parts, wait until at least 10 minutes have elapsed since turning OFF the power, and use a tester, etc. to ensure that no voltage is applied.
Failure to observe this could result in electric shock.

If not using the pump during the winter season, turn OFF the power, and drain water from the pipes.
If the pump is left with water still inside the pump or pipes, the pump may be damaged if it freezes.

⚠CAUTION

Inspection and repair

When starting the pump following long-term storage or a holiday, carry out "installation" and "operation" in this order, and then perform trial operation.
At start up of the operation after long time storage or a recess, perform a trial operation by following the "installation" and "operation" procedure in a specified order.

If not using the pump for long periods of time, drain water from the pump and pipes.
Failure to observe this could cause retained water to spoil, leading to the propagation of bacteria.

To ensure long-term use with peace-of-mind, it is recommended that both periodic inspections and daily inspections be carried out.
Failure to carry out inspection could result in pump faults, or an accident, etc. Consult your dealer or KAWAMOTO to discuss periodic inspections.

Perform a check of protection relay operation periodically.
The pump may not function properly when an accident occurs, resulting in electric shock or faults.

Replace consumable parts periodically.
The continued use of parts in a degraded or worn condition could lead to water leakage, seizure, or damage, etc. Contact your dealer or KAWAMOTO to request a periodic inspection or part replacement, etc.

When using a pressure gauge or compound gauge, close the cock at times other than when performing measurement.
Leaving the cock constantly open could result in pressure gauge or compound gauge faults, etc.

When carrying out a motor insulation resistance test, disconnect the wiring from the control panel, and measure across grounding terminals and each motor wire with an insulation resistance tester.
Carrying out an insulation resistance test with wiring still connected could lead to control part faults.

Prohibited

Do not measure the insulation resistance of electrodes or pressure switches, etc.
Failure to observe this could cause electric leakage, electric shock, fire, or a fault.

Always carry out inspections in accordance with the inspection items.
Failure to observe this could prevent faults being prevented beforehand, leading to an accident.

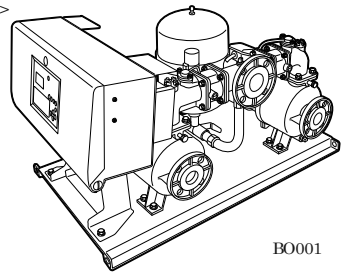
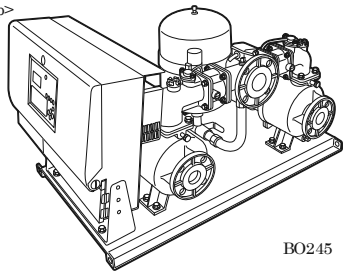
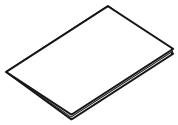
Carry out periodic pressure transmitter inspections.
If a fault occurs, the pump will fail to stop, possibly resulting in a rise in internal pressure, a fault, or damage.

* The illustrations used in this manual are those of a typical KFE pump, and the shape may differ slightly depending on the model.

Check Before Use

When the product arrives, check the following items, and contact your dealer if any problems are found.

- Check the nameplate to ensure that the received product is the same as that ordered. (Model, bore, total head, frequency, number of phases, rated output, etc.)
- Ensure that the pump has suffered no damage during transport, and check for any nut or bolt looseness. Tighten any loose nuts or bolts.
- Ensure that all of the product accessories have been provided.

Unit	Instruction manual
<1.5 to 3.7kW pump>  BO001 <5.5, 7.5kW pump>  BO245	 HDS038

Note

- Use of the product outside the scope of application, failure to observe cautions, inappropriate repairs or modifications, incidents caused by natural disasters, incidents caused by the installation environment (power supply abnormalities, foreign matter, sand, etc.), failure to comply with laws, ordinances, or corresponding standards, faults or damage resulting from unforeseen incidents or malice, defects resulting from consumable part replacement or resale, and so on are not covered by warranty.
- When making inquiries to KAWAMOTO, please let us know the "Model" and "Serial No." of your pump.

Product Specifications

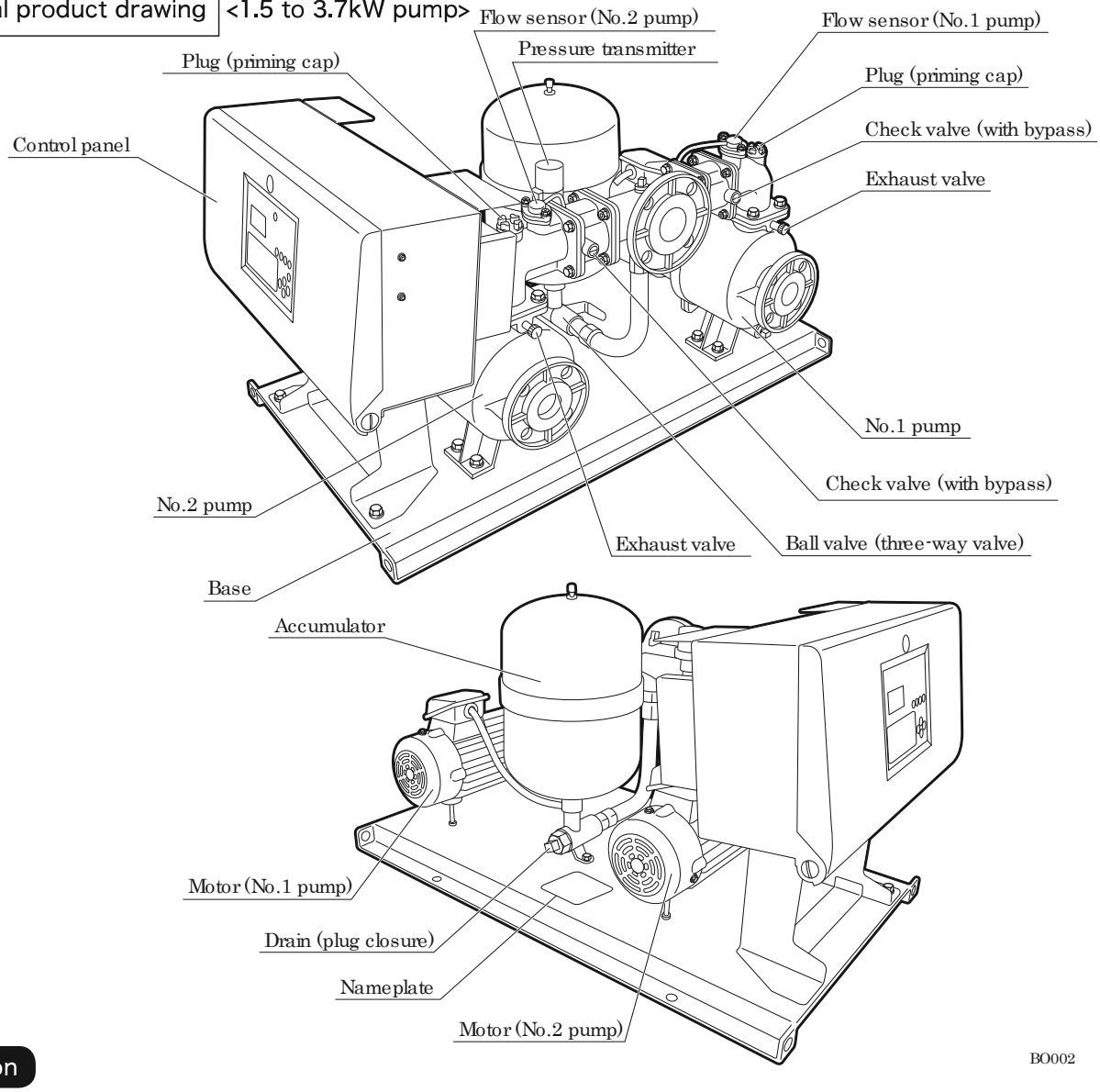
Water quality, water temperature			Fresh water, pH5.8 to 8.6, 0 to 40˚C (however, there should be no freezing)	
Installation location (ambient temperature, humidity)			Indoors (0 to 40˚C , 90% RH or lower, altitude: 1,000 m or lower)	
Power supply (*)			Single-phase, three-phase 200 V	Acceptable range: 95 to 110% Interphase imbalance factor: 3% or less
			Three-phase 380 to 440 V	
Frequency			50/60Hz	
Suction conditions	Inflow		Within 5 m	
	Suction		Total suction head: within -6 m (actual suction head: within -4 m)	
Pump			KR-C type stainless steel multi-stage turbine pump	
Control method			Estimated terminal constant pressure control using frequency control, or constant discharge pressure control	
Operation method			A: alternate operation, P: alternate parallel operation	
Control panel	Inverter		Low-noise PWM method	
	Motor protection device		Electronic thermal relay	
	Indicator lamps		Power supply, run (individual), trouble (individual), water level full, water level low, water level empty	
	Measuring instruments	7-segment LCD display	Power supply voltage, discharge head, motor voltage (individual), motor current (individual), power consumption (individual), operating frequency (individual), fault history, water level history, cumulative run time, cumulative start count, time, etc.	
	External signals (no-voltage)		Run (individual), trouble (individual), water level full, water level low, water level empty	

(*): Read the nameplate carefully. Differs depending on the model.

Name of Each Part

This drawing shows a typical KFE pump. The actual model may differ slightly from this drawing.

General product drawing <1.5 to 3.7kW pump>

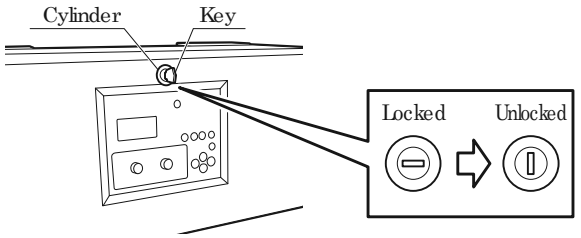


BO002

Caution

This motor is a magnet motor. Do not connect a commercial power supply directly. Failure to observe this could result in fire or faults.

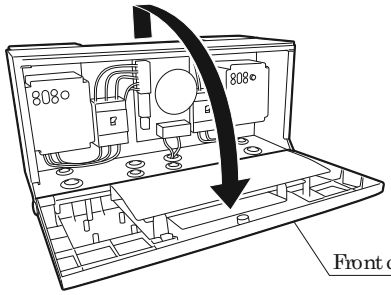
Opening and closing the control panel



Opening the control panel

1 Insert the key in the cylinder to unlock.

2 Lift up the front cover and open the control panel toward you.

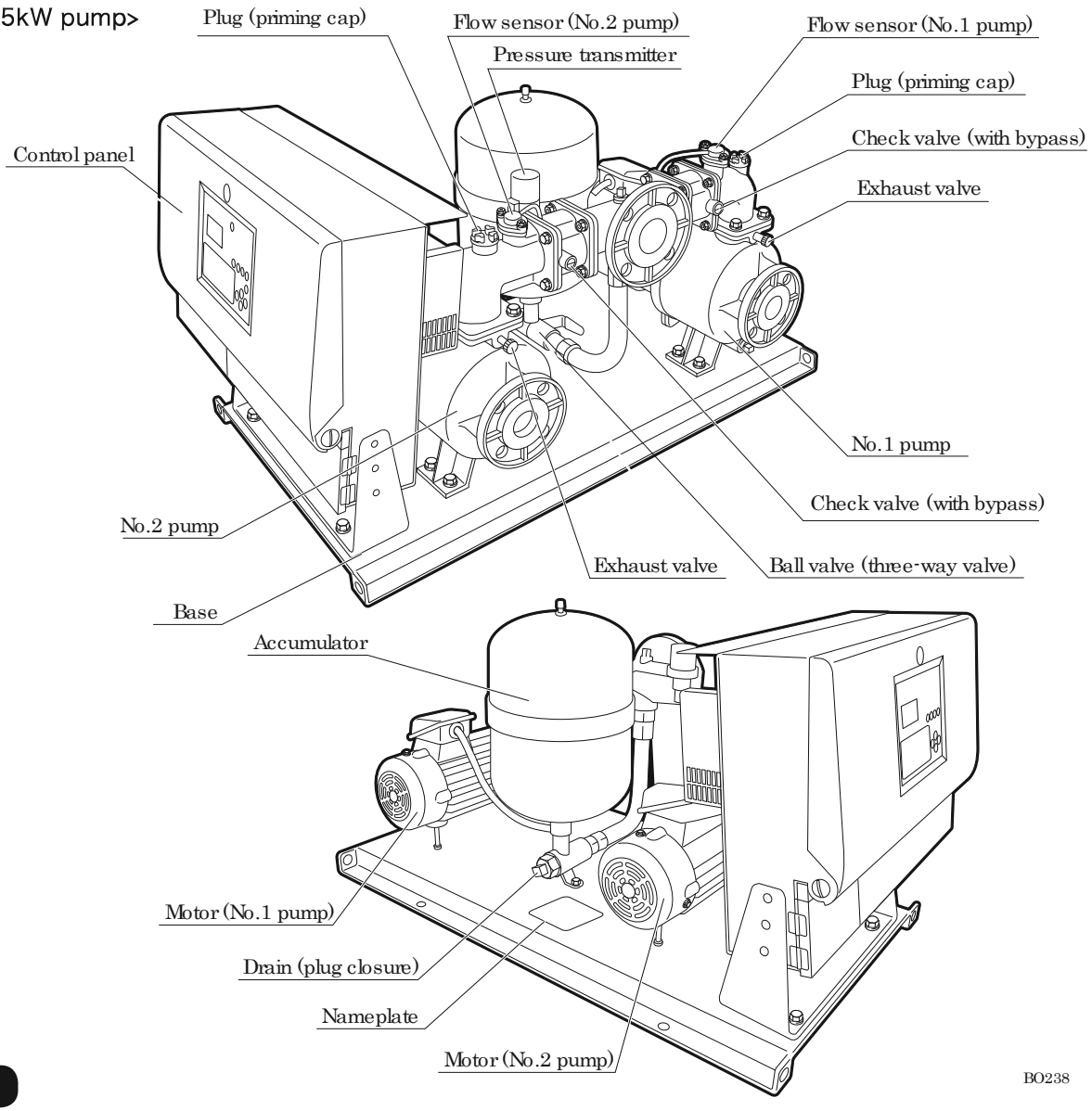


Closing the control panel

1 Use the reverse of the opening procedure to close the control panel.

BO019

<5.5, 7.5kW pump>



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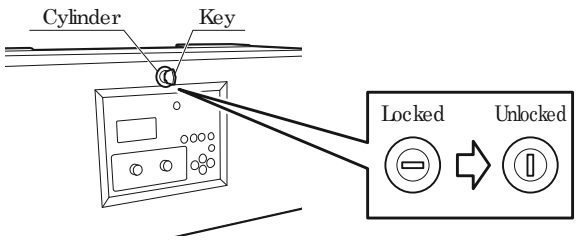

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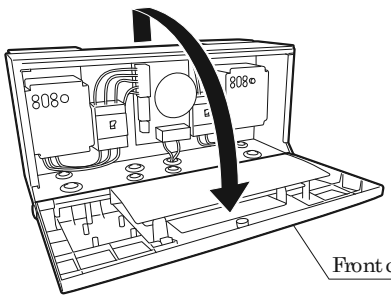
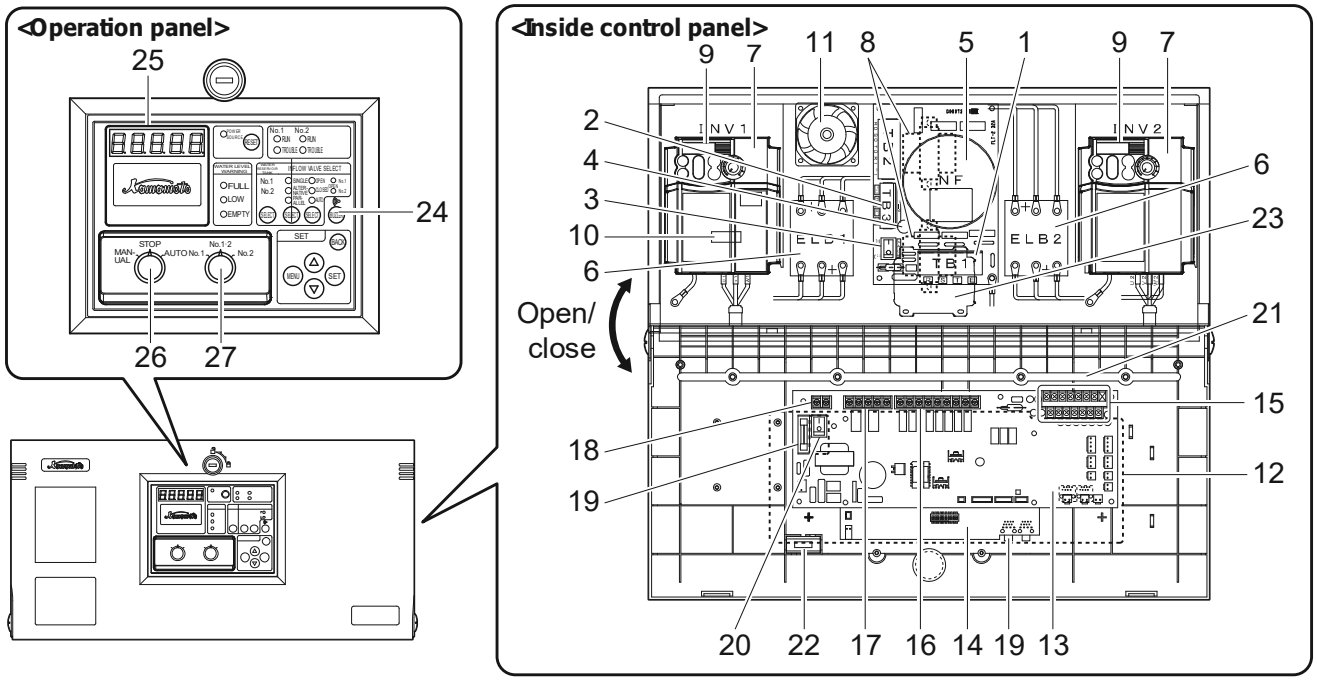


Closing the control panel

1 Use the reverse of the opening procedure to close the control panel.

Control panel (display and operation area)

Control panel: ECSG4 type <1.5 to 3.7kW pump>

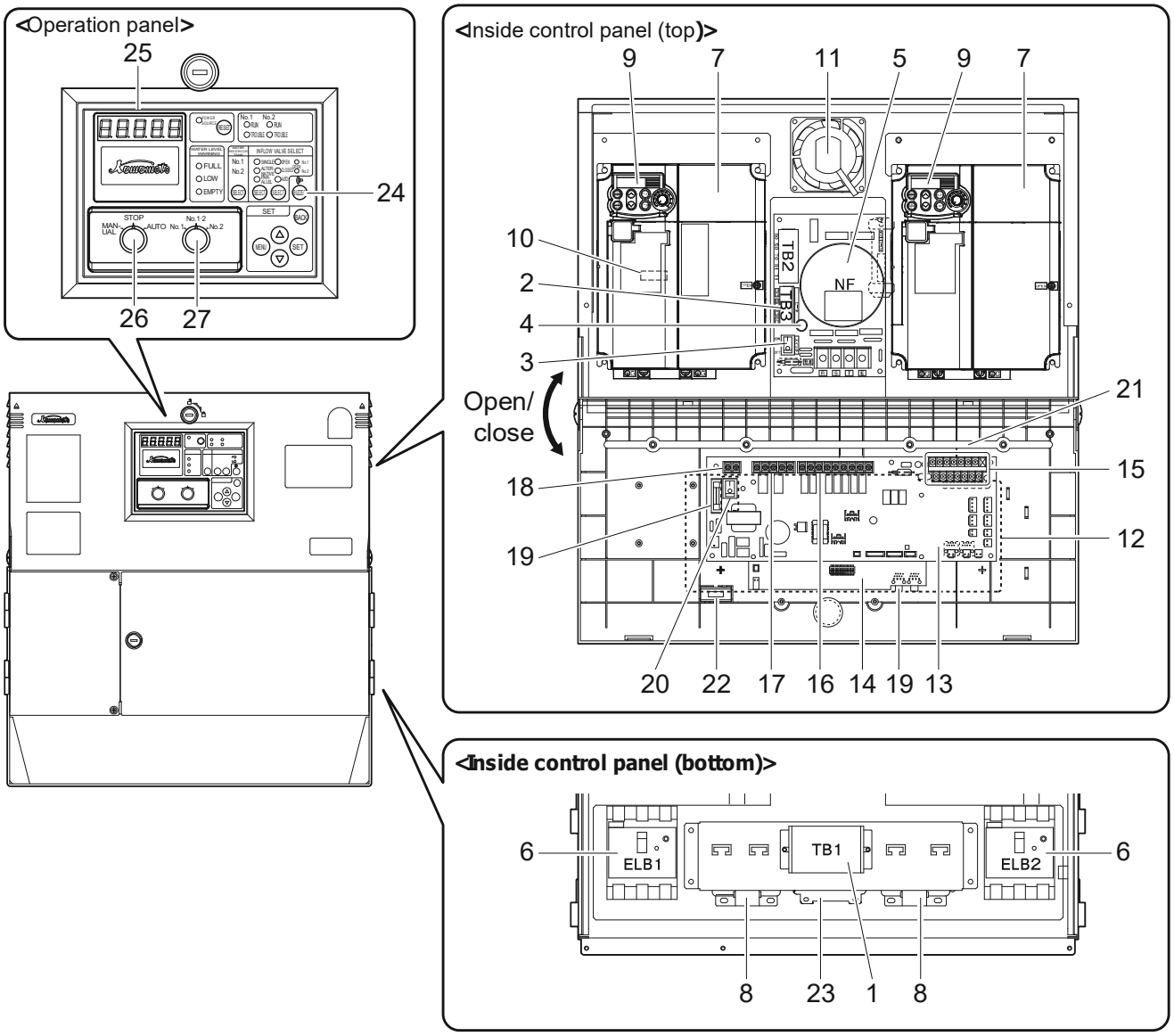


BO156

	No.	Name	Remarks
Inside control panel	1	Power supply terminal block	
	2	Heater terminal block (*)	For heater, thermostat connection
	3	Heater power switch (*)	Heater output (ON/OFF)
	4	Fuse (*)	For heater terminal block, 250 V/4A-20 mm
	5	Noise filter	
	6	Earth leakage circuit breaker	
	7	Inverter	
	8	DC reactor	On reverse side of noise filter
	9	Inverter display panel	
	10	Emergency operation switch	No.1 pump only (inside inverter terminal cover)
	11	Fan	3.7kW only
	12	Protective cover	Semi-transparent yellow sheet
	13	Control I/O PCB	
	14	Operation display panel	
	15	Water level signal input terminal block	
	16	No-voltage signal output terminal block	No voltage a-contact
	17	Inflow valve control output terminal block	No voltage c-contact
	18	Power supply output terminal block (*)	For No. 16, 17 terminal blocks
	19	Fuse (*)	For power supply output terminal block, 250 V/10A-30 mm
	20	Maintenance switch (*)	For No. 18 terminal block
	21	Wire retainer	Remove when carrying out wiring work.
	22	Storage battery	For time backup
	23	Transformer	400 V only
Operation panel	24	Buzzer	
	25	Display panel	Top: 7-segment, bottom: LCD
	26	Operation mode switch	MANUAL/STOP/AUTO
	27	Pump mode switch	No. 1, No.1・2, No. 2

(*): Not installed on pumps with 400 V power supply.
(These models are equipped with a maintenance switch (No.20), however, it is not functional.)

<5.5, 7.5kW pump>



BO239

	No.	Name	Remarks
Inside control panel	1	Power supply terminal block	
	2	Heater terminal block (*)	For heater, thermostat connection
	3	Heater power switch (*)	Heater output (ON/OFF)
	4	Fuse (*)	For heater terminal block, 250 V/4A-20 mm
	5	Noise filter	
	6	Earth leakage circuit breaker	
	7	Inverter	
	8	DC reactor	On reverse side of noise filter
	9	Inverter display panel	
	10	Emergency operation switch	No.1 pump only (inside inverter terminal cover)
	11	Fan	
	12	Protective cover	Semi-transparent yellow sheet
	13	Control I/O PCB	
	14	Operation display panel	

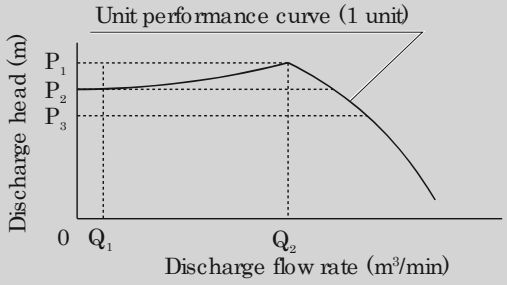
(*): Not installed on pumps with 400 V power supply.

Inside control panel	15	Water level signal input terminal block	
	16	No-voltage signal output terminal block	No voltage a-contact
	17	Inflow valve control output terminal block	No voltage c-contact
	18	Power supply output terminal block (*)	For No.16, 17 terminal blocks
	19	Fuse (*)	For power supply output terminal block, 250 V/10A-30 mm
	20	Maintenance switch (*)	For No.18 terminal block
	21	Wire retainer	Remove when carrying out wiring work.
	22	Storage battery	For time backup
	23	Transformer	400 V only
Operation panel	24	Buzzer	
	25	Display panel	Top: 7-segment, bottom: LCD
	26	Operation mode switch	MANUAL/STOP/AUTO
	27	Pump mode switch	No. 1, No.1・2, No. 2

(*): Not installed on pumps with 400 V power supply.
(These models are equipped with a maintenance switch (No.20), however, it is not functional.)

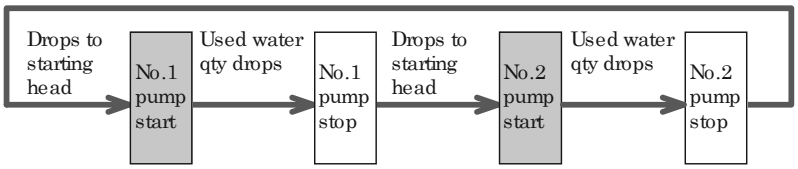
Alternate operation

Processes from pump start to stoppage are performed alternately with two pumps.



Q_1 = Stopped flow rate (10 L/ min)
Q_2 = Max. flow rate
P_1 = Operation head
P_2 = Estimated terminal head
P_3 = Starting head (P_2 - 4 m)

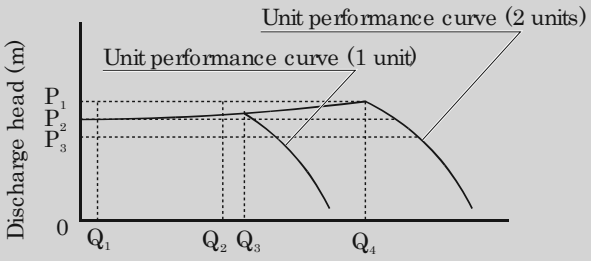
(1) If water is used when the pump is stopped, and the head drops to P_3, the pressure transmitter activates, and the pump starts.
(2) When the amount of water used is between Q_1 and Q_2, water supply will continue at the constant estimated terminal pressure.
(3) When the amount of water used drops to Q_1 or less, the flow sensor activates, and the pump stops.
(4) Steps (1) to (3) are repeated alternately by pump No. 1 and No. 2.



BO005

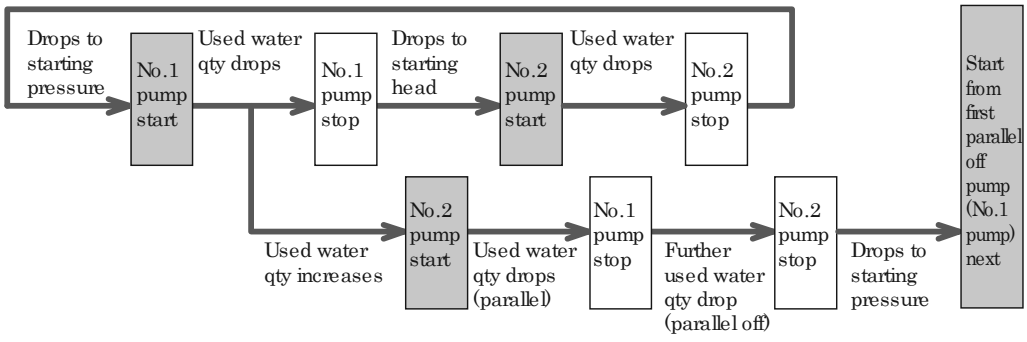
Alternate / parallel operation

The operation method is changed automatically based on the amount of water used.



Q_1 = Stopped flow rate (10 L/ min)
Q_2 = Parallel off flow rate
Q_3 = Parallel flow rate
Q_4 = Max. flow rate
P_1 = Operation head
P_2 = Estimated terminal head
P_3 = Starting head (P_2 - 4 m)

(1) If water is used when the pump is stopped, and the head drops to P_3, the pressure transmitter activates, and the pump starts.
(2) When the amount of water used is between Q_1 and Q_2, water supply will continue at the P_1 constant estimated terminal pressure.
(3) When the amount of water used drops to Q_1 or less, the flow sensor activates, and the pump stops.
(4) If the amount of water used is less than Q_3, alternate operation is performed repeatedly.
(5) If the amount of water used increases to Q_3 or more during one-pump operation, and the pressure drops to P_2, the second pump starts and parallel operation is performed.
(6) If the amount of water used is Q_2 or less during parallel operation, the pump started first stops (parallel off), and one-pump operation is performed.
(7) If the amount of water used is less than Q_3, alternate operation is performed, and if Q_3 or more, steps (5) and (6) are repeated.



BO006

Installation and Piping

Selecting the installation location

⚠CAUTION

Do not install the pump on flooring that has not been treated for drainage, and that has not been water-proofed. Water leakages could result in significant damage.
* We bear no responsibility for any damage arising from lack of drainage or water-proofing.

Install the pump at standard altitude of 1,000 m or less. If absolutely necessary to install the pump in a location that exceeds the standard altitude of 1,000 m, consult your dealer or KAWAMOTO.

Select an installation location that satisfies the following conditions.

- Location near water source
- Location that is not directly affected by weather such as typhoons
- Well-ventilated, cool location that is not exposed to rain or direct sunlight
  (If the pump is installed in a location where it will be exposed to rain or direct sunlight, install a pump cover (special accessory)).
- Location where the pump ambient temperature does not exceed 40℃
- Location allowing easy pump maintenance, inspection, disassembly and reassembly
- Location where the suction height (height from suction water level to pump center) is low, and the suction piping horizontal pulling length can be shortened as much as possible
- Location with at least 30 cm of space both above and around the pump to allow repair and inspection
- Flat surface with no unevenness

■ Installation precautions

- Always install the product so that it is level, and secure it with anchor bolts.
  (Anchor bolts must be purchased separately. [Recommended anchor bolts size: 4-M12 x 160])
  If the foundation is not flat or is uneven, the base may twist, resulting in damage.
- If suspending and moving the product by overhead crane, attach shackles to the four suspension holes on the base, and lift with four ropes.
- Check with the relevant authorities for details on methods for disposal of unnecessary parts or packaging materials.
- If vibrations become a problem, it is recommended that a vibration isolator be installed. (This is available as a special accessory. Contact your dealer or KAWAMOTO.)

■ If using the pump to draw water from a ground-water tank

Ensure a total suction head within -6 m (actual suction head: within -4 m).

■ Measures against cold weather

⚠CAUTION

Do not cover the pump with a blanket or cloth. Failure to observe this could result in overheating, leading to fire.

Wrap the pipes in heat insulating material to prevent freezing. It is also recommended that the heater be fitted with a heater.

Caution

- KAWAMOTO accepts no responsibility for disruptive accidents caused by freezing, and therefore thorough freezing prevention measures are recommended.
- <If using model with heater>
  Do not touch the heater during operation. The motor will be very hot, possibly resulting in burns.

Piping

⚠CAUTION

- Apply sealant to the pipe screw section and tighten securely. Failure to observe this could result in water leakage.
- Ensure that no foreign matter or sand gets sucked into the water supply pump. Failure to observe this could result in impeller locking, mechanical seal damage, or a malfunction.

Please refer to the following when carrying out piping work.

- No packing or flanges for pipe connection are provided. Flanges and packing matching the product standards should be prepared separately.
- Install vibration proof joints and pipe supports to prevent the weight of pipes being directly applied to the pump.
- Ensure that pipe joints are tightened sufficiently, and that there is no air suction or water leakages.
- Consider drainage measures such as drain installation to ensure that water can be sufficiently drained in the event of a water leak.

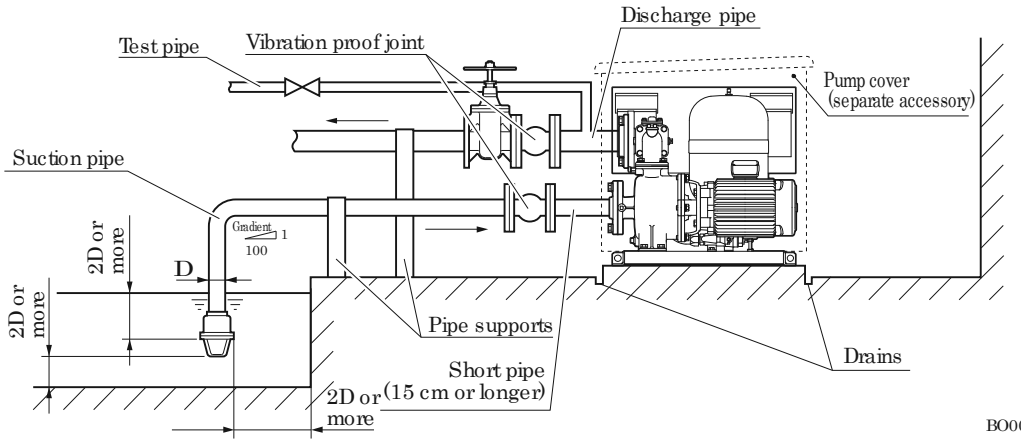
■ Suction piping

- Keep the length of piping to a minimum, and avoid the use of bends as much as possible.
- Do not use multiple pieces of suction piping joined in the middle.
- Install a strainer or sand filter if using the pump in a location where foreign matter or sand contamination is likely.

● In performing suction operation

- Ensure that the end of the suction pipe has a depth of length equal to or greater than twice the pipe diameter (D), and is at least 2D from the bottom and sides of the ground-water tank.
- Fit a foot valve to the end of the suction pipe.
- Ensure an uphill gradient (1/100 or greater) facing the pump to prevent air accumulating inside the suction pipe.
- Do not fit a sluice valve to the suction pipe.
- Rotate the check valve bypass valve twice in the counterclockwise direction to loosen, ensuring that positive pressure is applied to each suction pipe. Furthermore, ensure that there is no water leakage from the foot valve.

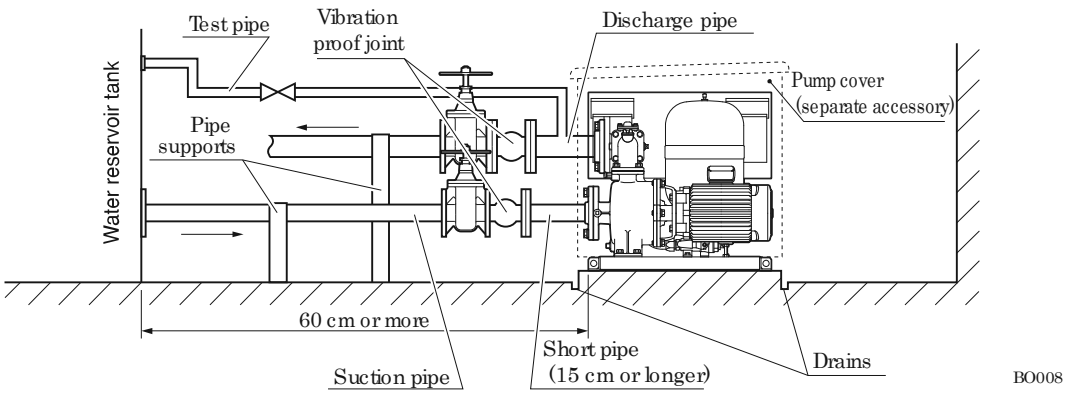
[In performing suction operation]



● **In performing inflow operation**

・Use the pump within an inflow of 5 m.
(40mm-5.5kW, 40mm-7.5kW, 50mm-7.5kW models: within 3m)
・Install a sluice valve near the suction port for maintenance.

[In performing inflow operation]



■ Discharge piping

- Install a sluice valve near the discharge port for maintenance.
- It is recommended that a test pipe be installed for maintenance purposes.
- Install an air vent cock or automatic exhaust valve to locations inside the discharge piping where air accumulates.

■ Pump cover installation precaution

- In fitting a vibration proof joint directly to the pump, it may interfere with the pump cover. If so, install a short pipe between the pump and vibration proof joint.

Electrical Work

⚠WARNING

Carry out electrical work properly in accordance with applicable standards and regulations. Inadequate wiring or connection could result in electric shock, electric leakage, or fire.

Prohibited

Do not equip the pump with a phase advancing capacitor. Failure to observe this could lead to trouble such as abnormal heat generation.

Please contact your dealer or nearest KAWAMOTO sales office if planning to use the product with an electric generator. Failure to observe this could result in damage to the control panel.

1 Connecting the earth leakage circuit breaker

Connect the earth leakage circuit breaker to the power supply.

* Use a harmonics and surge suppression (rated sensitive current: 100mA) earth leakage circuit breaker.
* Use of an earth leakage circuit breaker that does not match the inverter load may cause tripping due to leakage current from the inverter or noise filter.
* This water supply unit uses an inverter, and therefore power factor improvement is not possible with a phase advancing capacitor.
* If a capacitor is inserted on the output side of the inverter (motor side), a large charge current will flow to the capacitor and cause the inverter to trip. If this is repeated, the element could be damaged and lead to faults. Do not insert a capacitor.

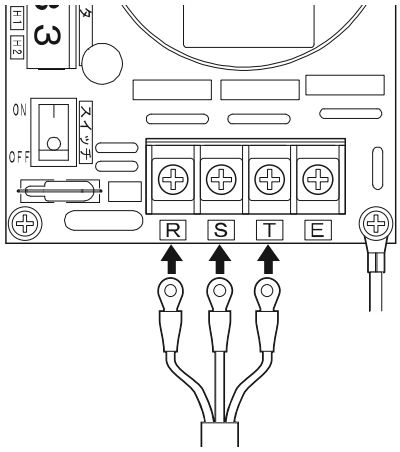
2 Connecting the power supply

Connect the power wires to the power supply terminal block inside the control panel.

Three-phase models: Connect the power wires to the R, S, and T terminals.

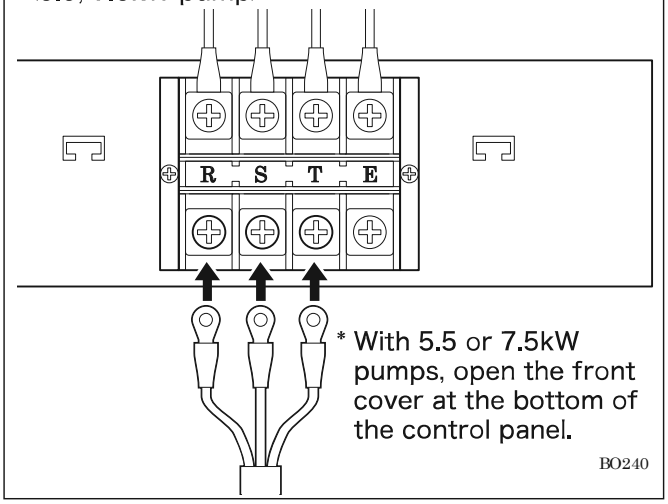
Single-phase models: Connect the power wires to the R and T terminals.

<1.5 to 3.7kW pump>



BO157

<5.5, 7.5kW pump>



* With 5.5 or 7.5kW pumps, open the front cover at the bottom of the control panel.

BO240

3 Grounding

⚠WARNING

Always carry out grounding work before turning ON the power. Do not connect ground wires to gas pipes, water pipes, lightning rods, or telephone ground wires. Failure to carry out grounding work properly could result in electric shock.

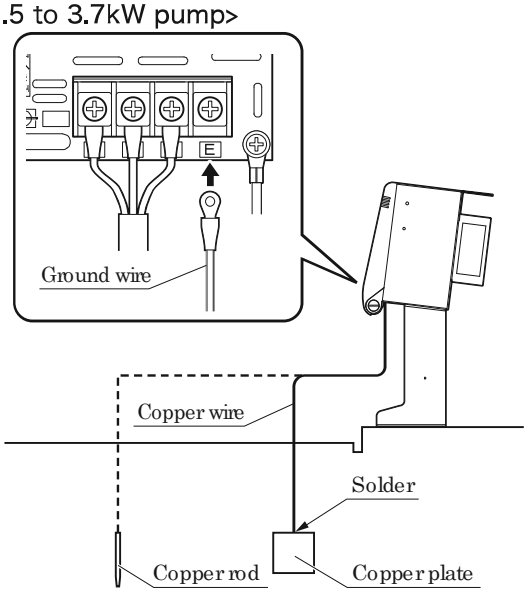
* Always ground the pump.
* Ensure a grounding according to the row or code in the region or country where pump is used

Connect the ground wire to the ground terminal on the power supply terminal block.

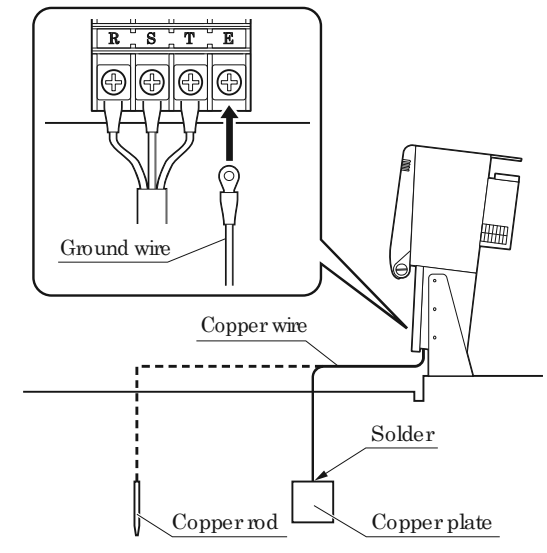
Caution

- When burying the ground bar, take care not to scratch the pipes.

<1.5 to 3.7kW pump>



<5.5, 7.5kW pump>



Connection

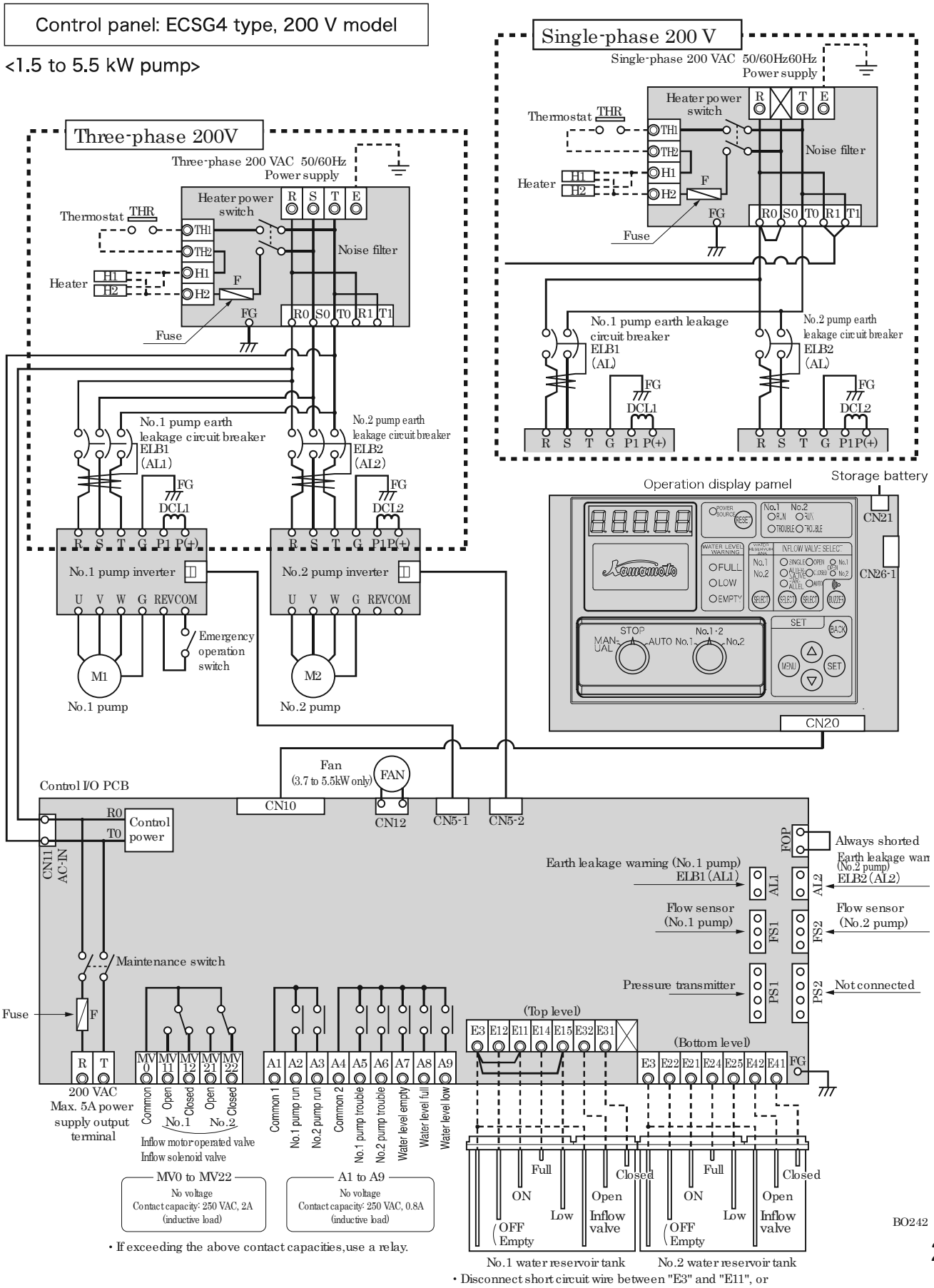
Wires for the main components of the pump are connected at the factory prior to shipping. If required, connect wires for water level control, etc. (P. 22).

*When carrying out inspections, always turn OFF the power, and ensure that there is no residual voltage in the inverter.

Wiring drawings

Control panel: ECSG4 type, 200 V model

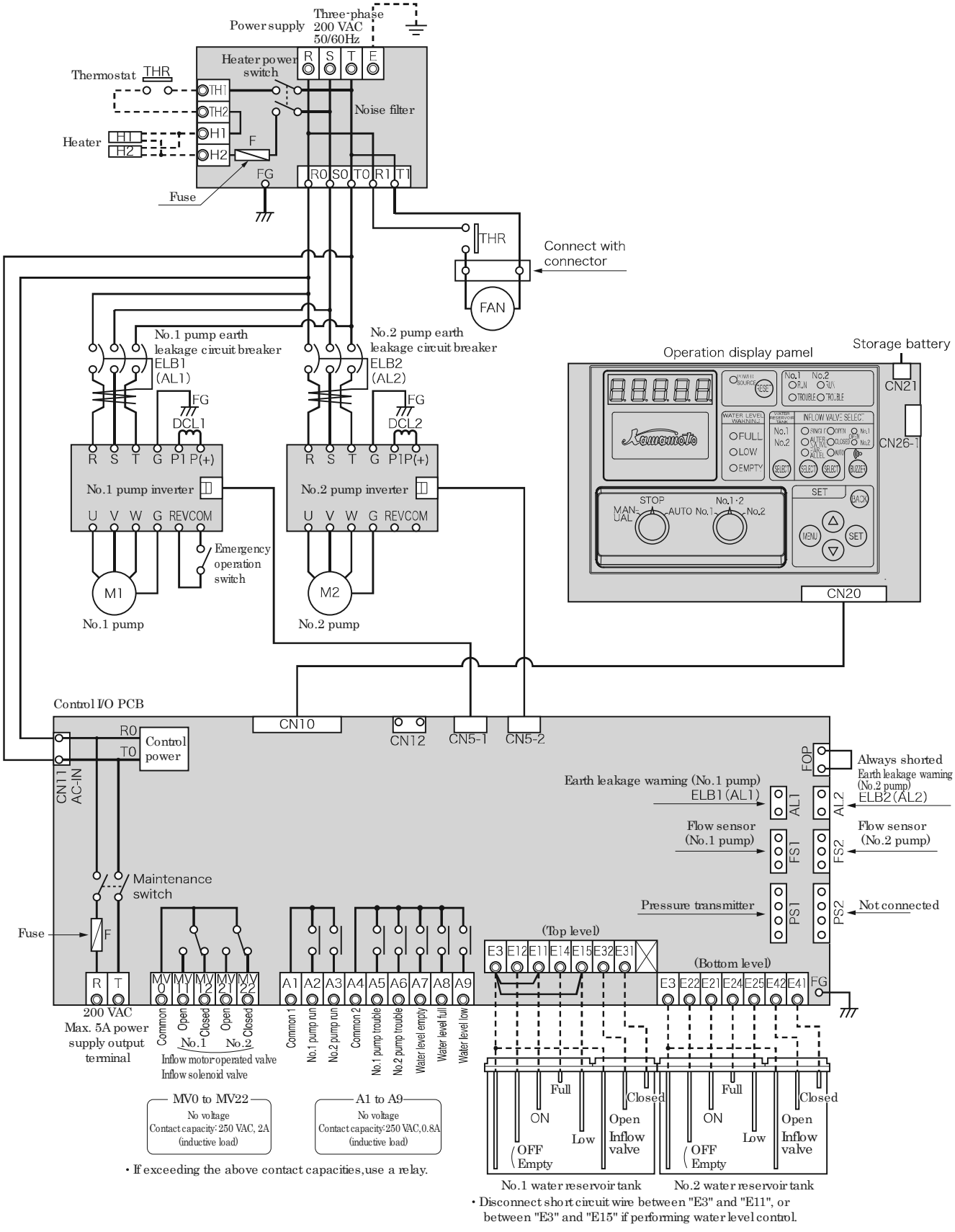
<1.5 to 5.5 kW pump>



BO242

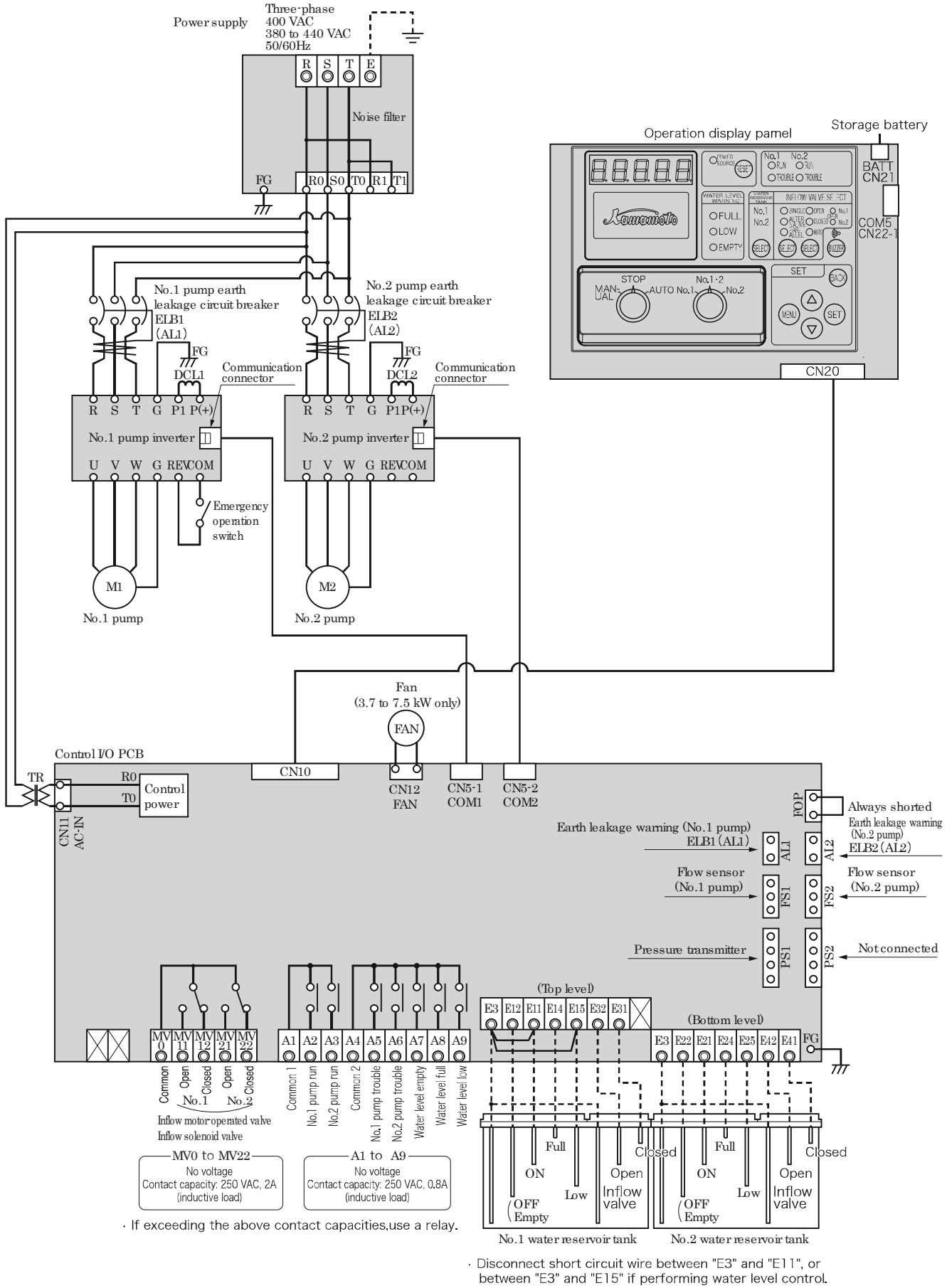
Control panel: ECSG4 type, 200 V model

<7.5 kW pump>



BO243

Control panel: ECSG4 type, 400 V model



Water level control (electrode bar connection)

⚠CAUTION

Prohibited

Do not perform idling (operation with no water in pump) or manual no-discharge operation (no water inflow or outflow inside pump). The pump will be very hot, possibly resulting in burns or a fault.

* The pump is wired not to perform water level control at the factory prior to shipping.

* An electrode bar is required to perform water level control. The electrode bar must be purchased separately.

1 Assemble the electrode bar based on the water level in the water reservoir tank.
* Prepare two sets if using a 2-tank water reservoir tank.
* The difference in water level may differ by several centimeters depending on the water quality, and therefore caution is advised.

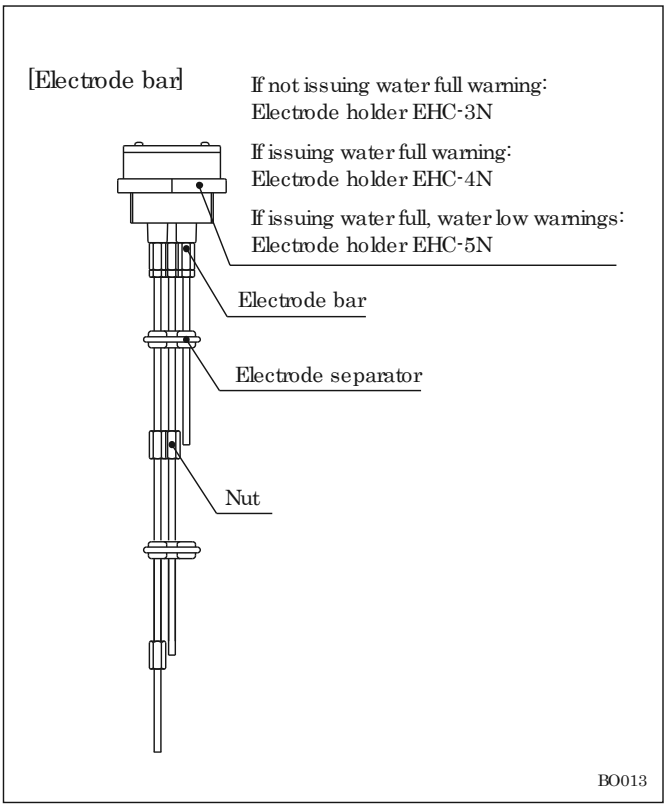
2 Disconnect the short circuit wire between "E3" and "E11", or between "E3" and "E15".

3 Connect the water level input terminal block based on the controlled water level.

No.1 water reservoir tank terminal block
......"E3" + "E11" to "E15"

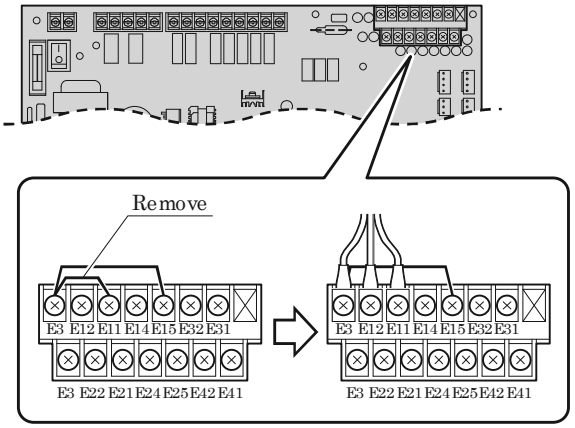
No.2 water reservoir tank terminal block
....."E3" + "E21" to "E25"

* If using a bias resistor electrode holder (EHC-3 or EHC-4), remove the bias resistor.
* If using multiple electrode holders, fit an E3 electrode to each holder.
* If not detecting water full or water low, use with a single 5P electrode holder.

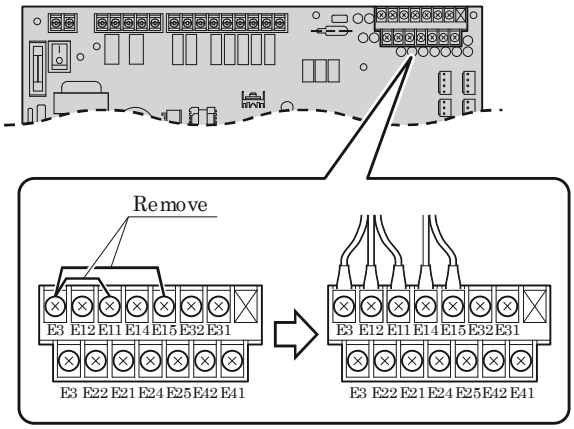


Connection example (No.1 water reservoir tank terminal block)

[Electrode bar connection] E11, E12, E3
(In water empty, water empty, recovery detected)



[Electrode bar connection] E15, E14, E11, E12, E3
(In water full, water low detected)



* Purchase wiring separately.

BO014

Inflow motor-operated valve, inflow solenoid valve connection

This is a terminal block used to control an inflow motor-operated valve or inflow solenoid valve for the water reservoir tank.

1 Connect the water level input terminal block based on the controlled water level.

No.1 water reservoir tank terminal block: "E31", "E32"

No.2 water reservoir tank terminal block: "E41", "E42"

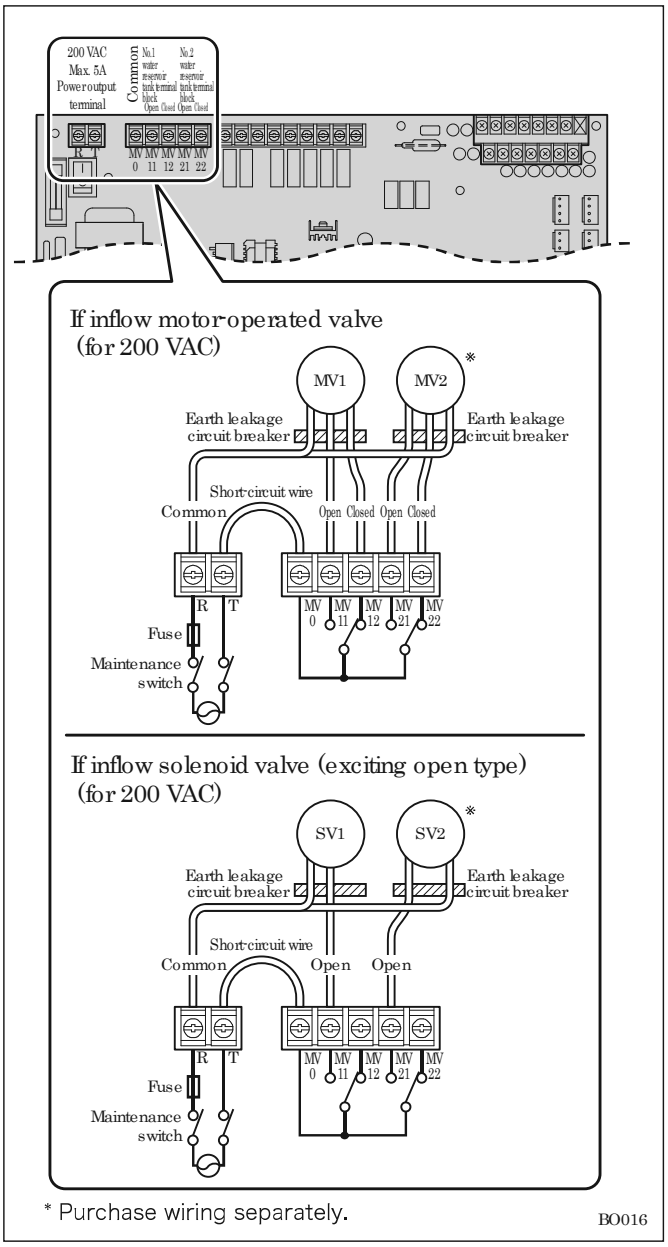
* If using only a single tank, use the circuit for the No.1 water reservoir tank terminal block.

2 Connect the inflow motor-operated valve terminal block based on the above-mentioned water reservoir tank being controlled.

No.1 water reservoir tank terminal block ..... "MV0", "MV11", "MV12"

No.2 water reservoir tank terminal block ..... "MV0", "MV21", "MV22"

* There are two connection methods depending on whether using an inflow motor-operated valve for 200 VAC, or an inflow solenoid valve (exciting open type) for 200 VAC. Refer to the diagrams on the right to connect the respective valves.
  If using a normal open type inflow solenoid valve, connect the solenoid valve between closed and common.
* If the electrical load across the terminals exceeds the contact capacity of 250 V, 2A (inductive load), use after employing a relay. The motor-operated valve power supply is 200 VAC, 5A, and therefore attention should be paid to the capacity.

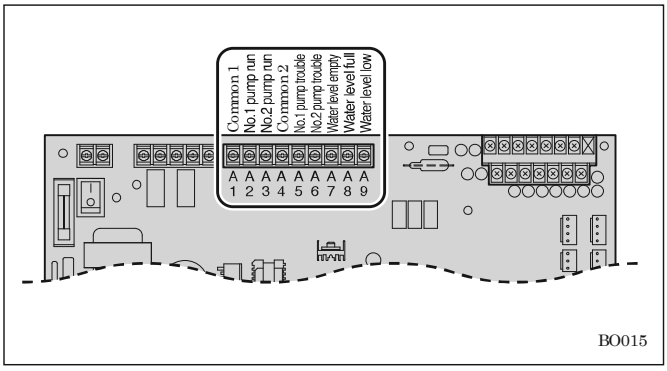


External signal connection

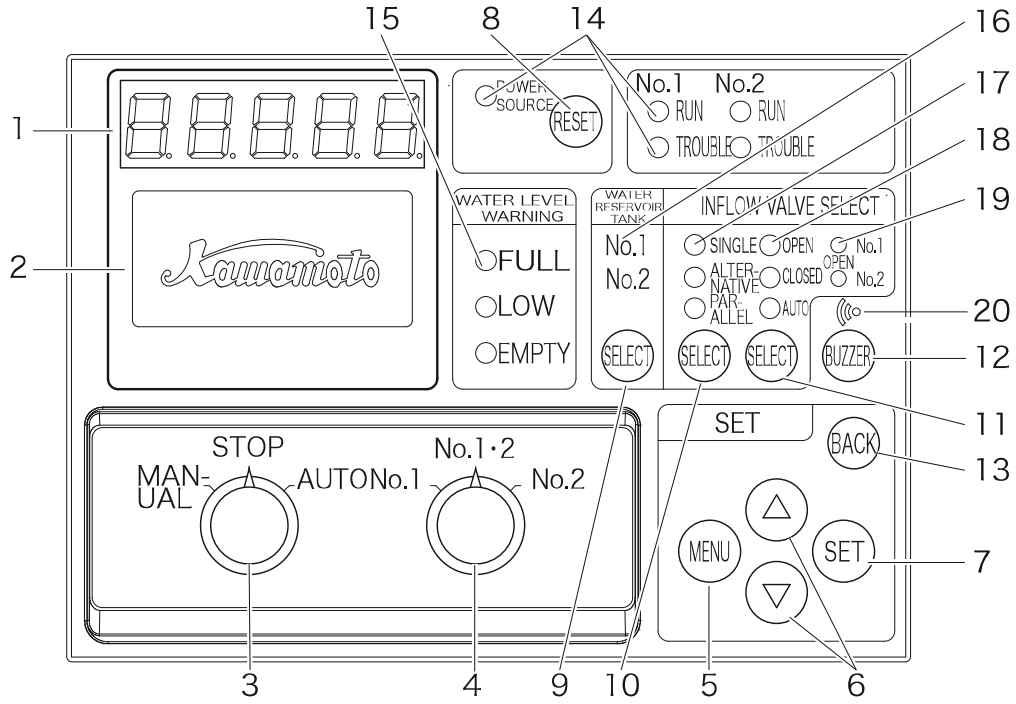
Connect to an external signal/no-voltage output terminal block in order to connect to a monitoring PCB, etc.

Connect "A1" to "A9" as required.

* If the electrical load across the terminals exceeds the contact capacity of 250 V, 0.8A (inductive load), use after employing a relay. When connecting motor-operated valve power supply wires "R" and "T" and the above-mentioned output terminals, pay attention to the capacity (max. 5A).



Name of Each Part

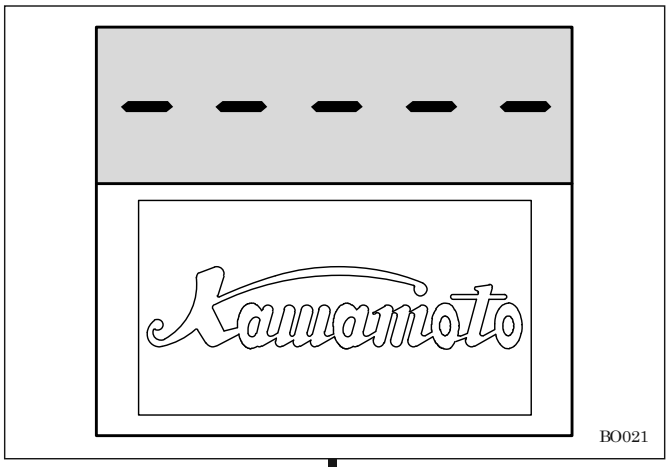


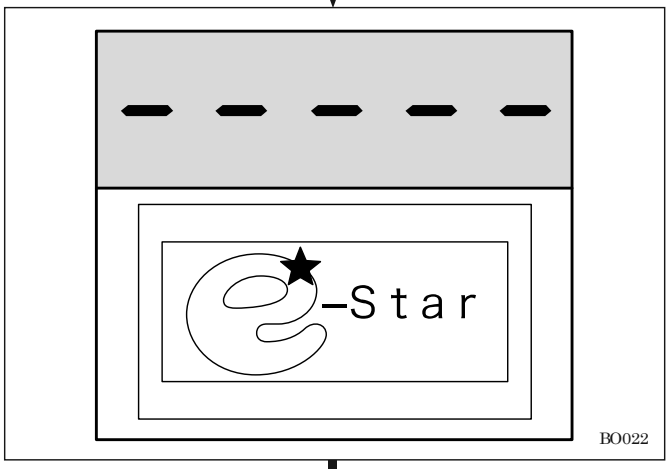
BO020

No.	Name	Display color	Function/description
1	7-segment monitor	5-digit, 7-segment LED (red)	Displays discharge head and menu names. Displays function code data.
2	LCD panel	Backlight (yellow green)	Displays pump control panel operation and fault information, maintenance information. Displays a description of menu function codes.
3	Operation mode switch		MANUAL/STOP/AUTO switching
4	Pump mode switch		Select pump No.1, No.1・2, No.2.
5	Menu change button		Changes between menus and LCD panel pages.
6	Up, down buttons		Changes the inverter display and function code display while the head is displayed. Moves up and down through data items when changing settings.
7	SET button		Sets values after settings have been changed.
8	RESET button		Resets the system after faults or warnings have been cleared.
9	Water reservoir tank SELECT button		Selects the No.1 or No.2 water reservoir tank.
10	Inflow valve SELECT button		Selects the inflow valve operation (SINGLE, ALTERNATIVE, PARALLEL).
11	Inflow valve operation change button		Changes the inflow valve operation (OPEN, CLOSED, AUTO).
12	BUZZER button		Turns the buzzer ON or OFF.
13	BACK button		Returns to the previous menu.
14	Status display LEDs	POWER SOURCE (red)	Power Source, No.1, No.2 pump run display, trouble display
		No.1, No.2 RUN (red)	
		No.1, No.2 TROUBLE (orange)	
15	Water level warning display LEDs	ALL (orange)	Water level warning (FULL, LOW, EMPTY.) display
16	Water reservoir tank selection display LEDs	Characters light up (red).	The LEDs for the water reservoir tank for which water level detection is performed light up.
17	Inflow valve selection display LEDs	ALL (red)	The LEDs for the selected operation light up (SINGLE, ALTERNATIVE, PARALLEL).
18	Inflow valve operation change display LEDs	ALL (red)	The LEDs for the selected operation light up (OPEN, CLOSED, AUTO).
19	Inflow valve output display LEDs	ALL (red)	Lights up when performing inflow valve output based on the conditions set at 10, 11.
20	Buzzer LED	The mark lights up (red).	While the mark is lit up, the buzzer sounds when a fault or warning occurs.

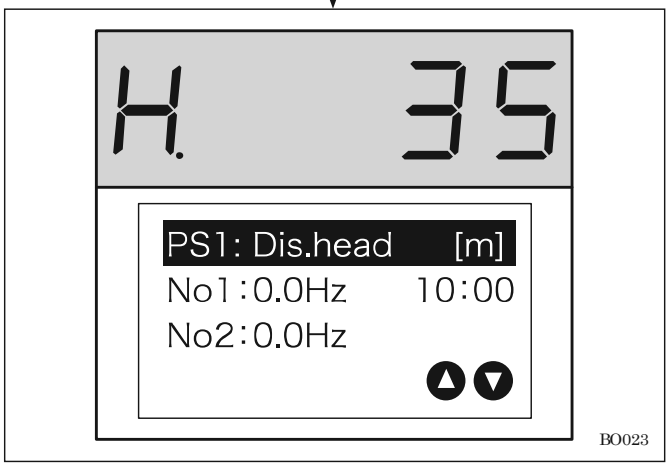
Starting the operation panel

● Turn ON the control panel power supply.
* The LCD panel turns ON, and the display changes in the following order.
* The earth leakage breaker inside the control panel is OFF when shipped from the factory. Operate the operation switches after turning ON the earth leakage breaker.

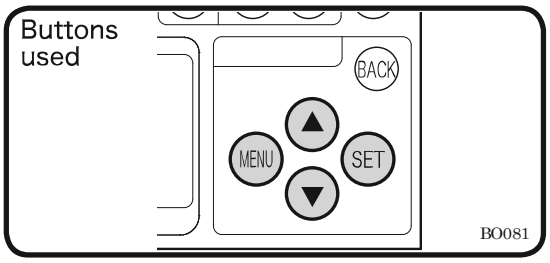




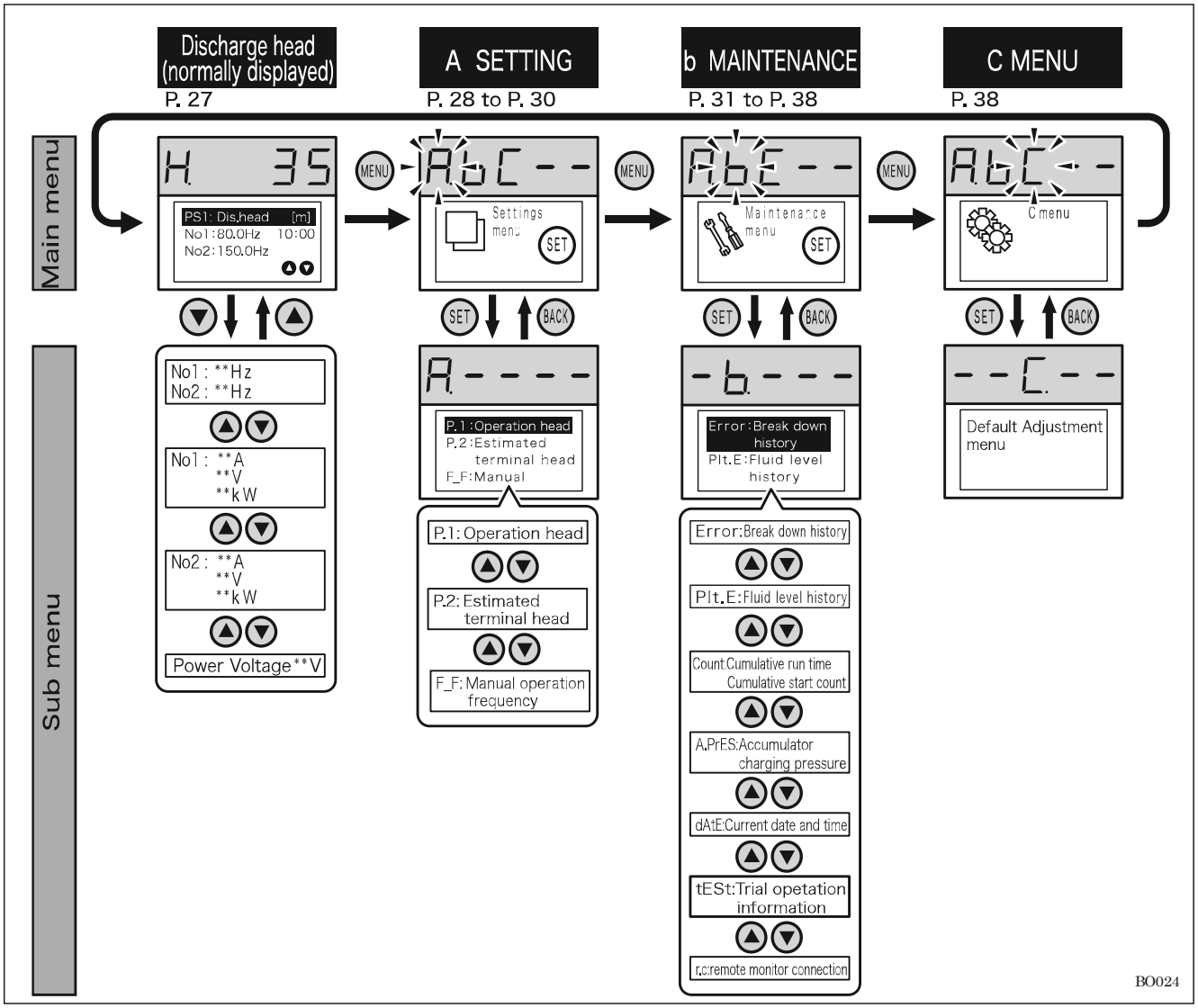
The [PS1: Discharge head (m)] code appears.
* The backlight turns OFF if no operations are performed for 5 minutes.



Menu system and basic operation



■ Main menu and sub menu operation flow



■ Changing the main menu

The main menu changes in the following order each time (MENU) is pressed, and the symbol for the selected menu flashes.

Discharge head → A. SETTING → b. MAINTENANCE → C. MENU → Discharge head

* The display returns to the discharge head (normally displayed) if no operations are performed for 15 minutes.
* The C menu is for adjustments made before the product is shipped, and therefore no adjustments are required here.

■ Selecting the sub menu

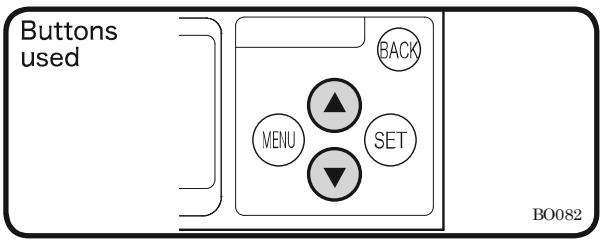
1. By pressing (SET) while the main menu A. <SETTING menu> or b. <MAINTENANCE menu> is selected, the display changes to the sub menu.
2. By selecting the sub menu to be displayed on the LCD panel with (▲)(▼) and pressing (SET), the sub menu settings can be changed.

* By pressing (BACK), the display returns to the main menu.

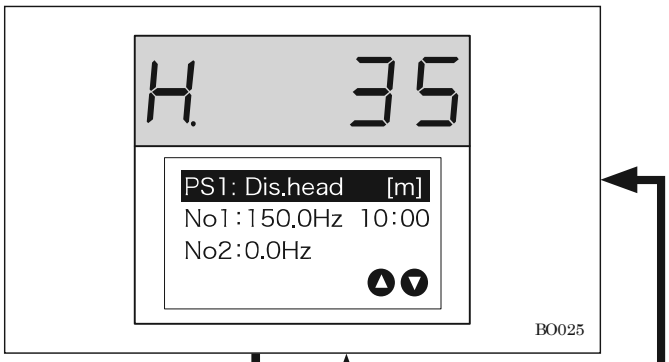
Discharge head <normally displayed> check

Press ▼ while discharge head is selected. Each time ▼ is pressed, the LCD panel changes as follows, allowing the current status to be checked.

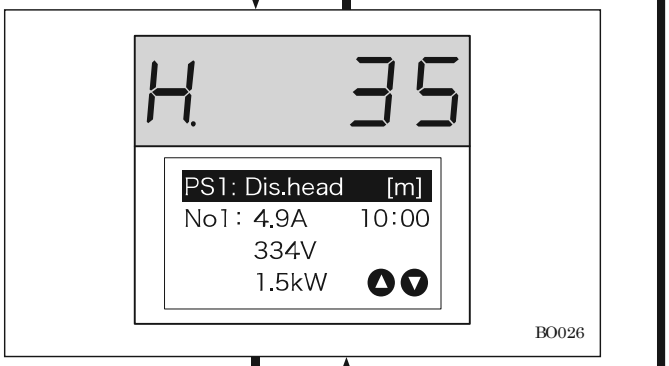
* When ▲ is pressed, the display returns to the previous screen.



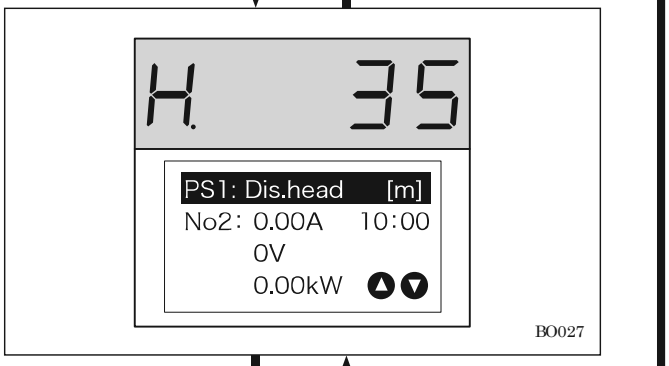
● No.1, No.2 pump operating frequency (Hz)



● No.1 pump output current (A), output voltage (V), power consumption (kW)

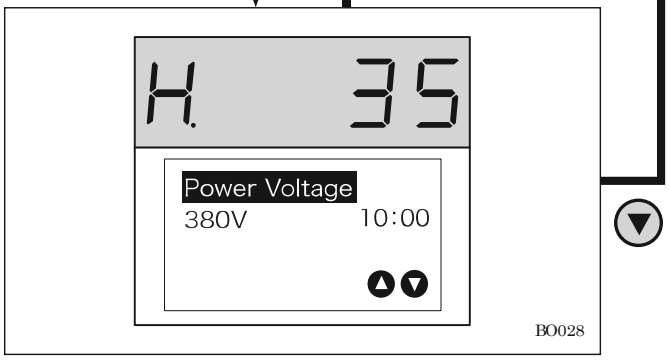


● No.2 pump output current (A), output voltage (V), power consumption (kW)



● Power supply voltage (V)

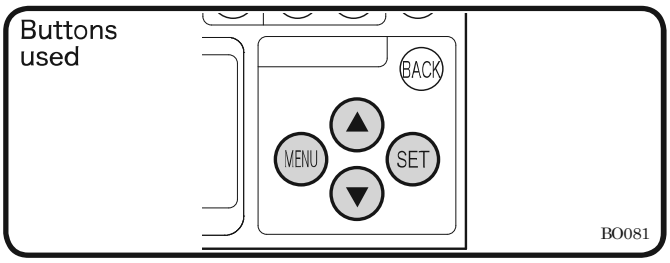
* The display returns to the TOP screen when ▼ is pressed.



Changing the “A. SETTING” menu

■ Changing "P.1: Operation head"

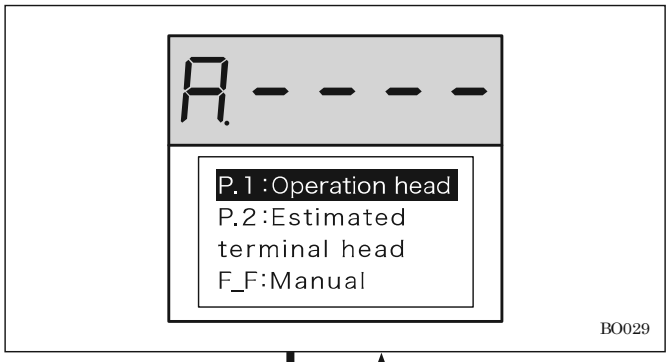
* Refer to the default settings table (P. 39), and set "P.1: Operation head ≥ P.2 Estimated terminal head".



1 Select the sub menu from the A. <SETTING> menu. (See P. 26.)

2 Use the ▲ and ▼ buttons to select sub menu "P.1: Operation head".

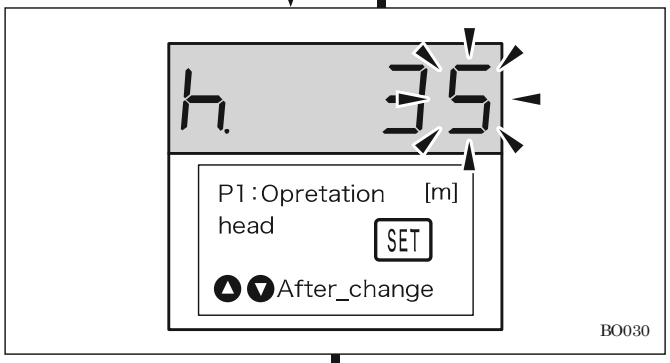
3 Press SET.



The current setting value appears on the 7-segment monitor. (Current setting: 35 m)

4 Use the ▲ and ▼ buttons to change the setting value.

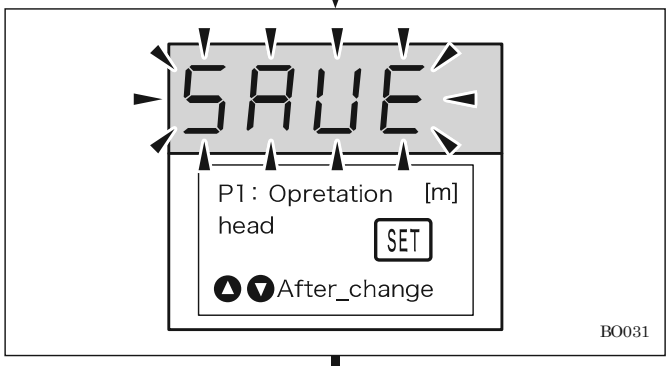
5 Press SET.



SAVE flashes on the 7-segment monitor, and the setting value is saved.

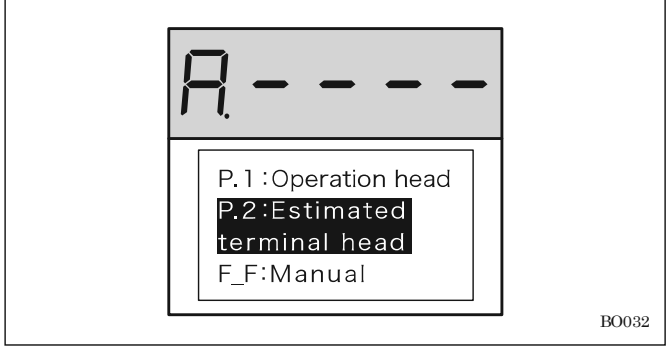
* SAVE appears only if changes are made to the setting value.

* Setting values are not changed even when the power is turned OFF.



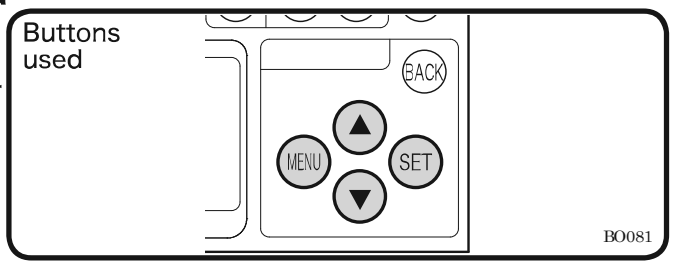
The sub menu advances one screen, and "P.2: Estimated terminal head" is selected.

* By pressing BACK twice, the display returns to the discharge head (normally displayed).



■ Changing "P.2: Estimated terminal head"

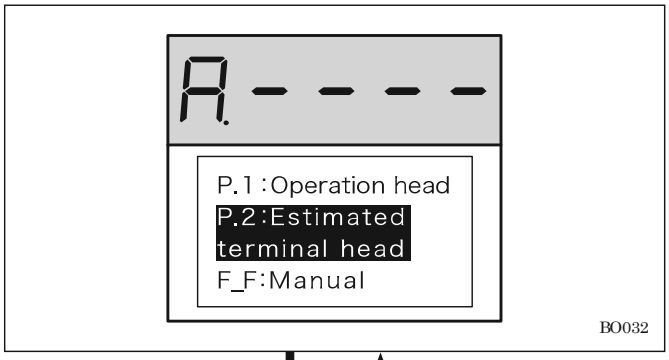
* Refer to the default settings table (P. 39), and set "P.1: Operation head ≥ P.2 Estimated terminal head".



1 Select the sub menu from the A. <SETTING> menu. (See P. 26.)

2 Use the ▲ and ▼ buttons to select sub menu "P.2: Estimated terminal head".

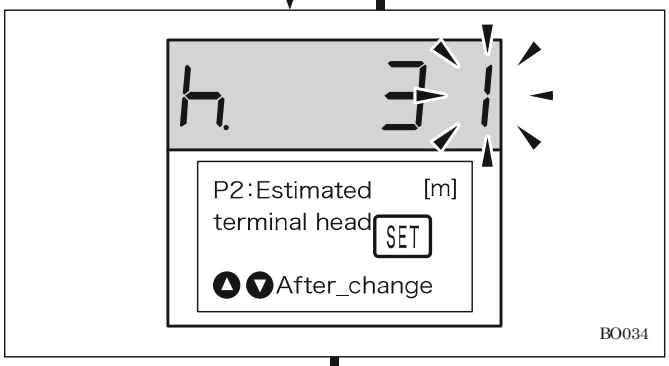
3 Press SET.

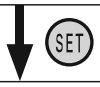


The current setting value appears on the 7-segment monitor. (Current setting: 31 m)

4 Use the ▲ and ▼ buttons to change the setting value.

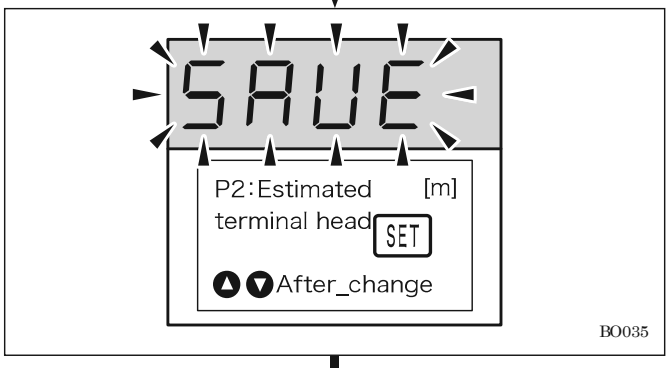
5 Press SET.





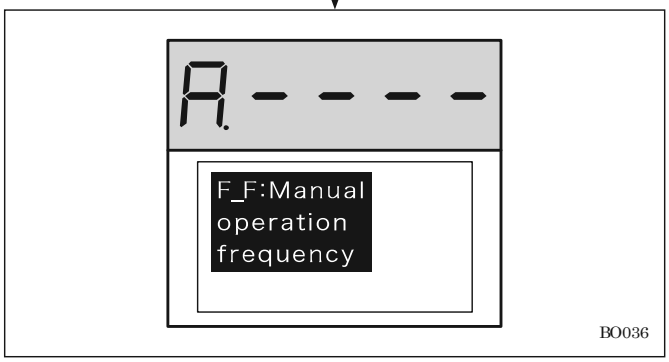
SAVE flashes on the 7-segment monitor, and the setting value is saved.

* SAVE appears only if changes are made to the setting value.
* Setting values are not changed even if the power is turned OFF.

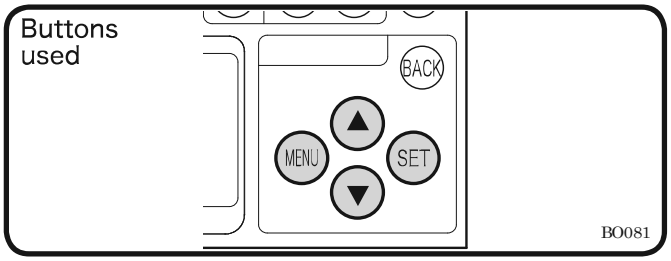


The sub menu advances one screen, and "F_F: Manual operation frequency" is selected.

* By pressing BACK twice, the display returns to the discharge head (normally displayed).



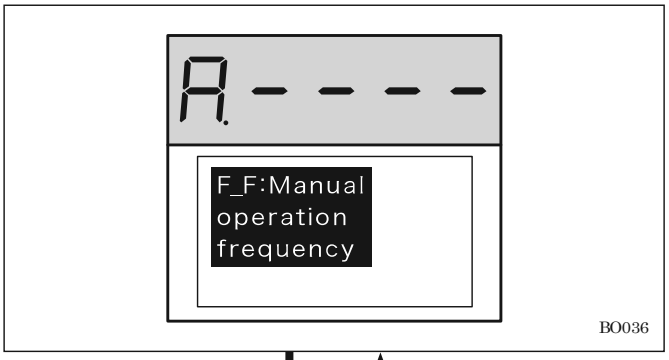
■ Changing "F_F: Manual operation frequency"



1 Select the sub menu from the A. <SETTING> menu. (See P. 26.)

2 Use the ▲ and ▼ buttons to select sub menu "F_F: Manual operation frequency".

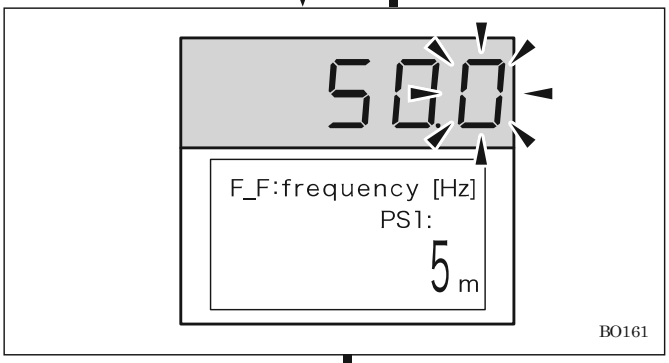
3 Press SET .



The current setting value appears on the 7-segment monitor. (Current setting: 50.0Hz)

4 Use the ▲ and ▼ buttons to change the setting value.

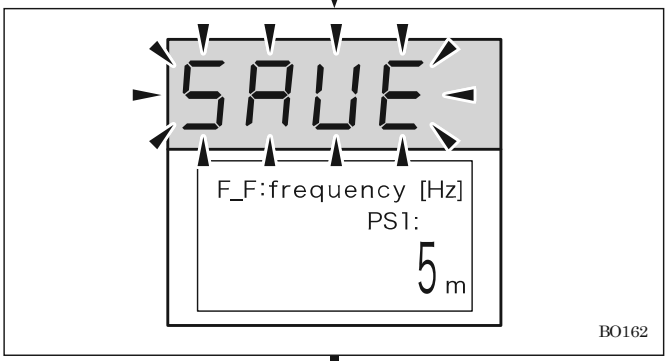
5 Press SET .



SAUE flashes on the 7-segment monitor, and the setting value is saved.

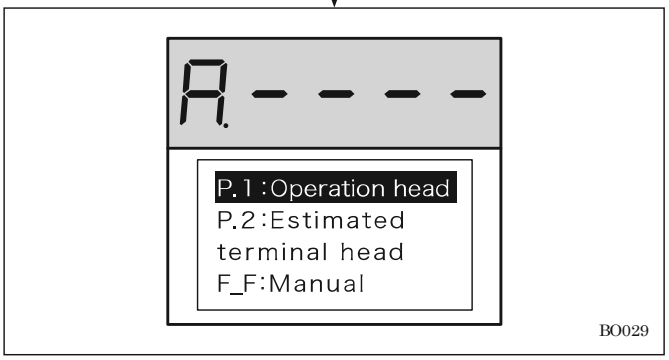
* SAUE appears only if changes are made to the setting value.

* Setting values are not changed even when the power is turned OFF.



The sub menu advances one screen, and "P.1: Operation head" is selected.

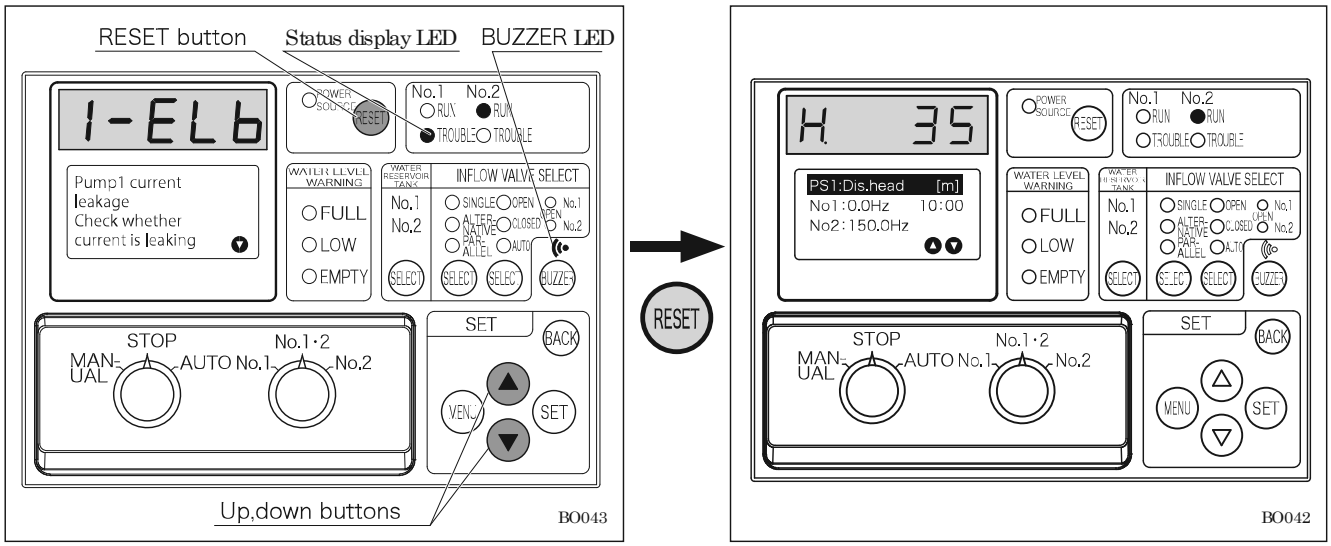
* By pressing BACK twice, the display returns to the discharge head (normally displayed).



Changing the “b. MAINTENANCE” menu

Display when fault occurs

Example: A fault occurs due to electric leakage

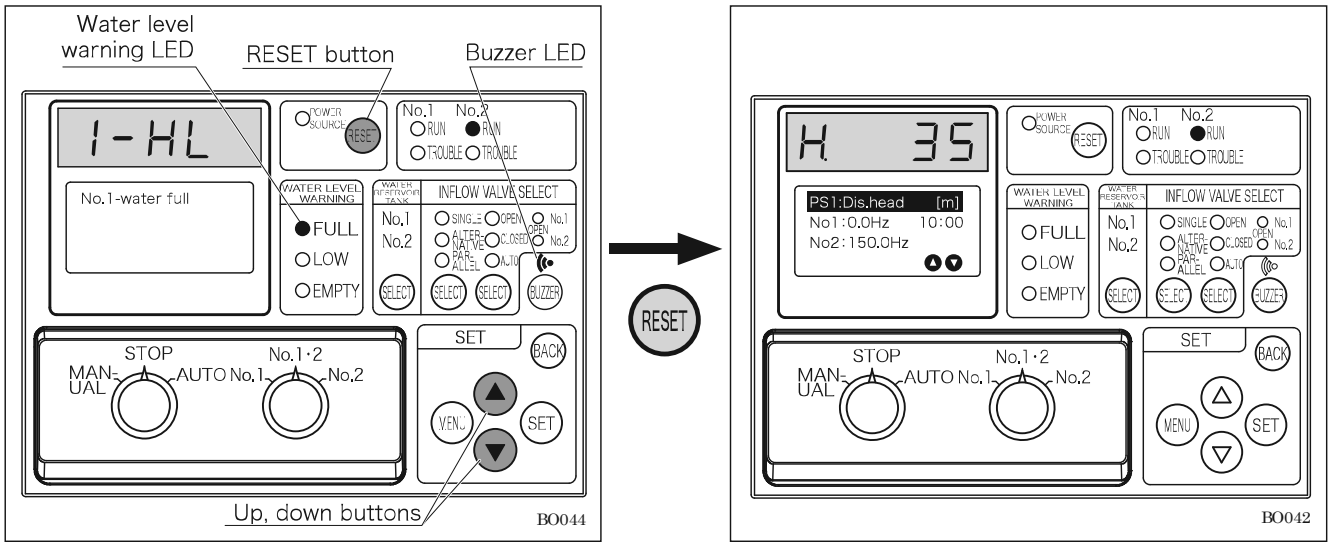


- When a fault occurs, the display changes to the fault display screen automatically, and the status display LED lights up orange.
  While the buzzer LED is lit up, the buzzer sounds when a fault occurs.
- The fault code appears on the 7-segment monitor, and the recovery method appears on the LCD panel.
  Use the ▲ and ▼ buttons to scroll up and down and check.
- Eliminate the cause of the fault and press RESET to recover the system.

* Refer to the Trouble Warning List for fault codes (P48).

Water level warning display

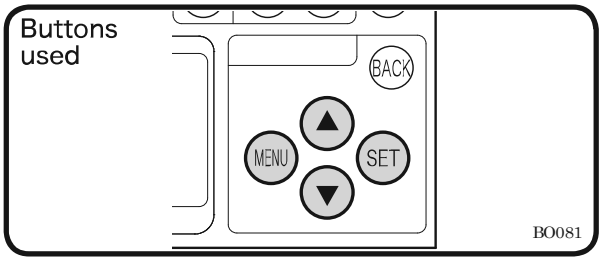
Example: If detected that the water level in the water reservoir tank has reached or is greater than the full level



- When the water level is abnormal, the display changes to the fault display screen automatically, and the water level warning LED lights up orange.
  While the buzzer LED is lit up, the buzzer sounds when the water level is abnormal.
- The fault code appears on the 7-segment monitor, and the warning cause and recovery method appear on the LCD panel.
  Use the ▲ and ▼ buttons to scroll up and down and check.
- Eliminate the cause of the warning and press RESET to recover the system.

* Refer to the Water Level Warning List (P. 48) for a list of fault codes.

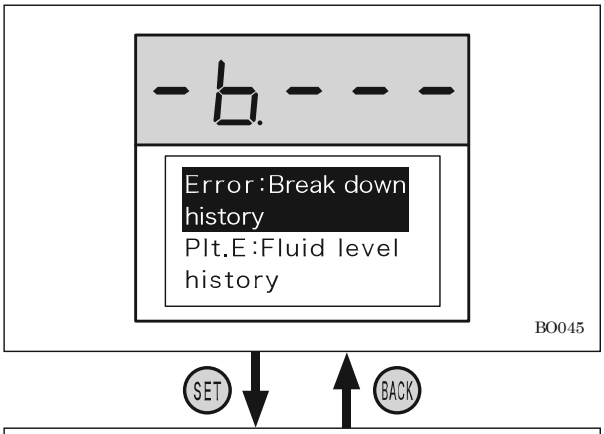
■ "Break down history" check



1 Select the sub menu from the b. <MAINTENANCE> menu. (See P. 26.)

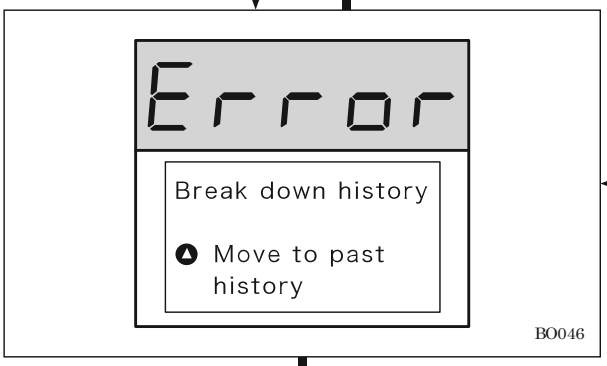
2 Use the ▲ and ▼ buttons to select "Error: Break down history".

3 Press SET.



Error appears on the 7-segment monitor.

4 Press ▲.



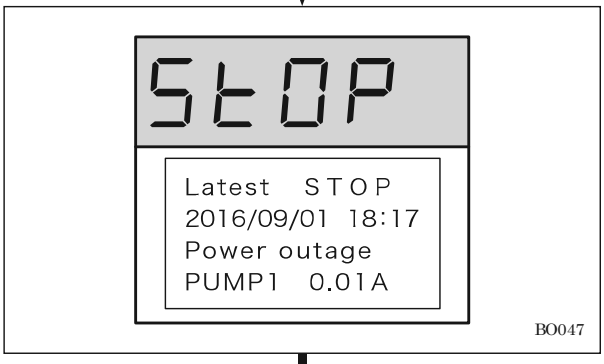
The latest break down history appears.

* Fault details (on 4 rows) are displayed for 4 seconds, and then the display scrolls through one row at a time after 1 second.

5 Each time ▲ is pressed, break down history up to the previous 7 times and the clear screen appears.

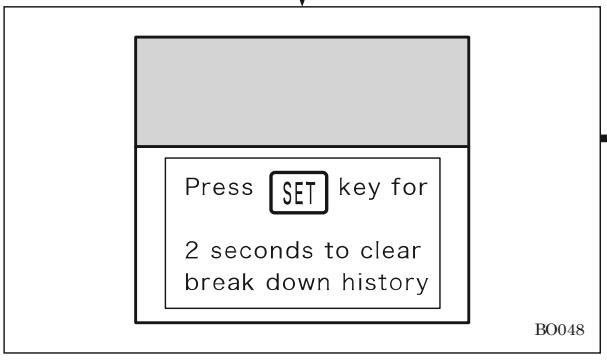
(1 time prior → 2 times prior → 3 times prior....7 times prior → clear screen)

* By pressing ▼, faults are displayed in reverse order.

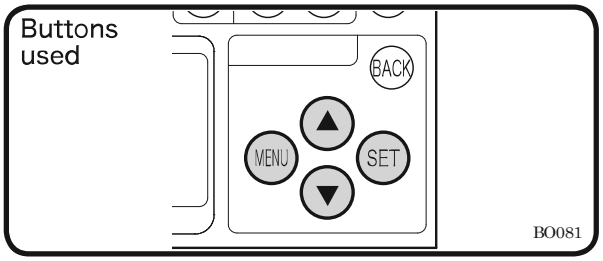


6 By holding down SET for 2 seconds or longer at the clear screen, all break down history is deleted.

* By pressing BACK three times, the display returns to the discharge head (normally displayed).



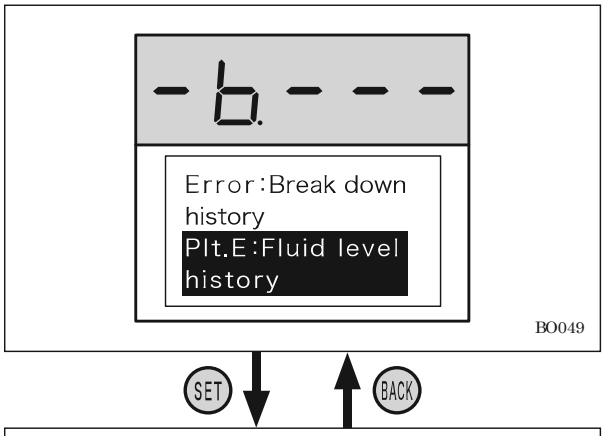
■ "Fluid level history" check



1 Select the sub menu from the b. <MAINTENANCE> menu. (See P. 26.)

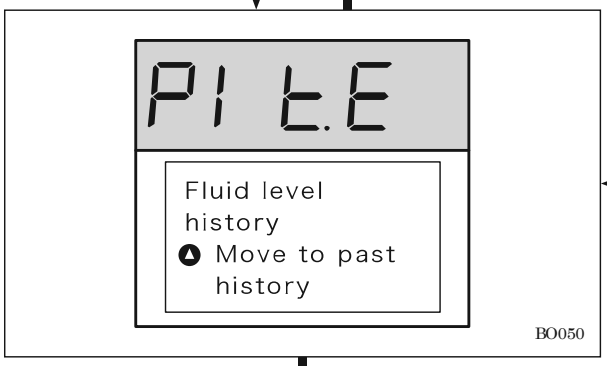
2 Use the ▲ and ▼ buttons to select "PIt.E: Fluid level history".

3 Press SET.



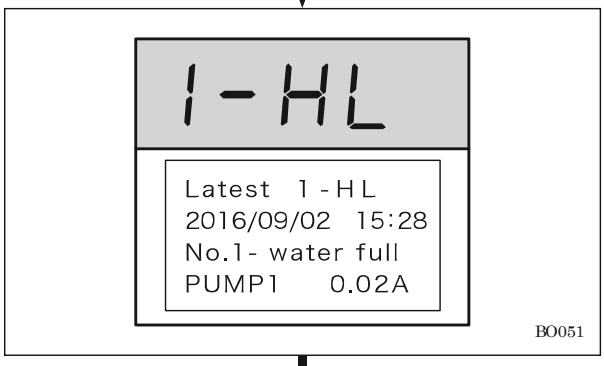
PI t.E appears on the 7-segment monitor.

4 Press ▲.



The latest fluid level history appears.

* Water level details (on 4 rows) are displayed for 4 seconds, and then the display scrolls through one row at a time after 1 second.



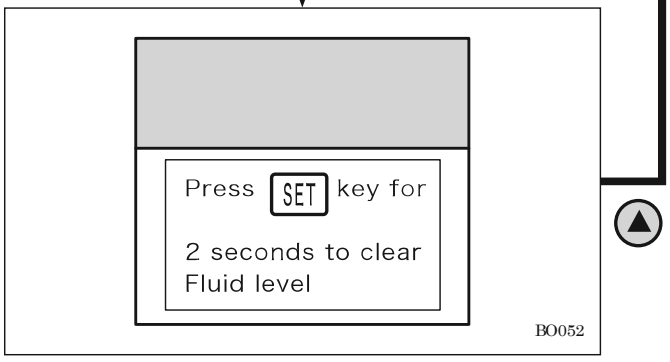
5 Each time ▲ is pressed, fluid level history up to the previous 7 times and the clear screen appears.

(1 time prior → 2 times prior → 3 times prior....7 times prior → clear screen)

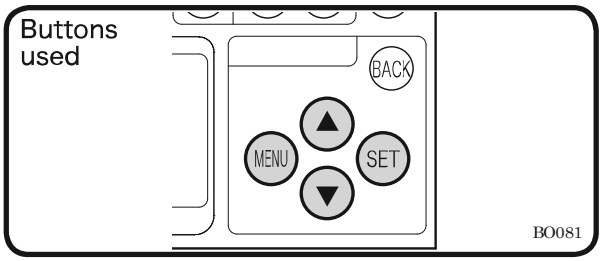
* By pressing ▼, faults are displayed in reverse order.

6 By holding down SET for 2 seconds or longer at the clear screen, all fluid level history is deleted.

* By pressing BACK three times, the display returns to the discharge head (normally displayed).



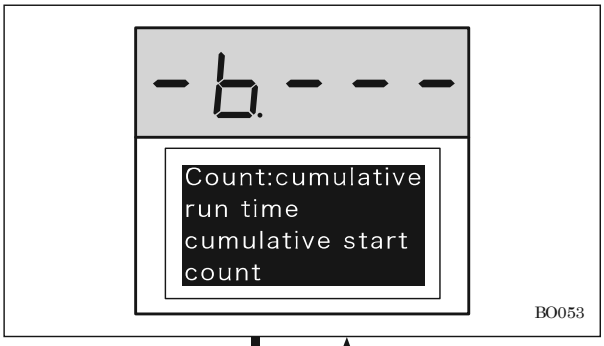
■ Checking the "Cumulative run time", "Cumulative start count"



1 Select the sub menu from the b. <MAINTENANCE> menu. (See P. 26.)

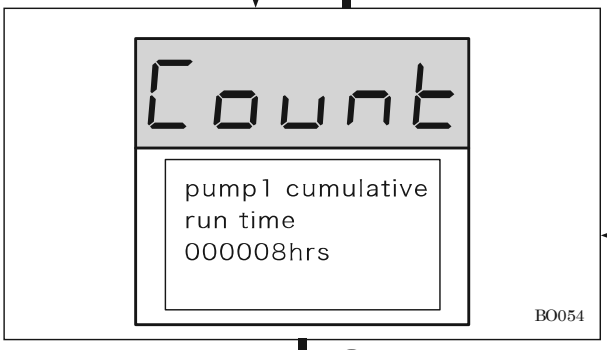
2 Use the ▲ and ▼ buttons to select sub menu "Count: Cumulative run time, Cumulative start count".

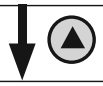
3 Press SET .



The No. 1 pump cumulative run time appears by pressing ▲ button.

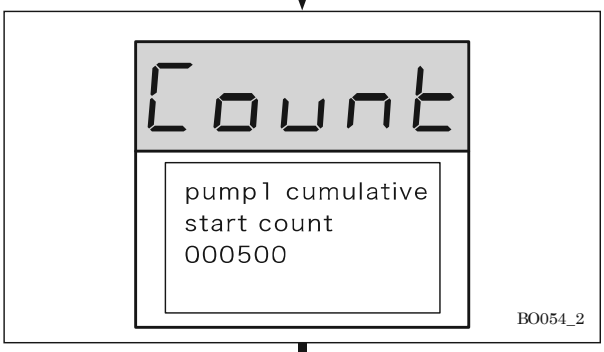
4 Press ▲ .

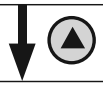




The No. 1 cumulative start count appears by pressing ▲ button.

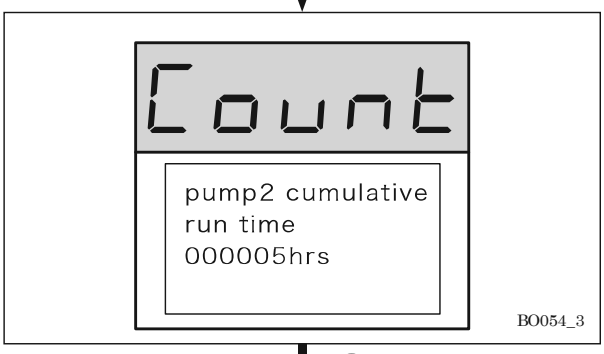
5 Press ▲ .





The No. 2 pump cumulative run time appears by pressing ▲ button.

6 Press ▲ .



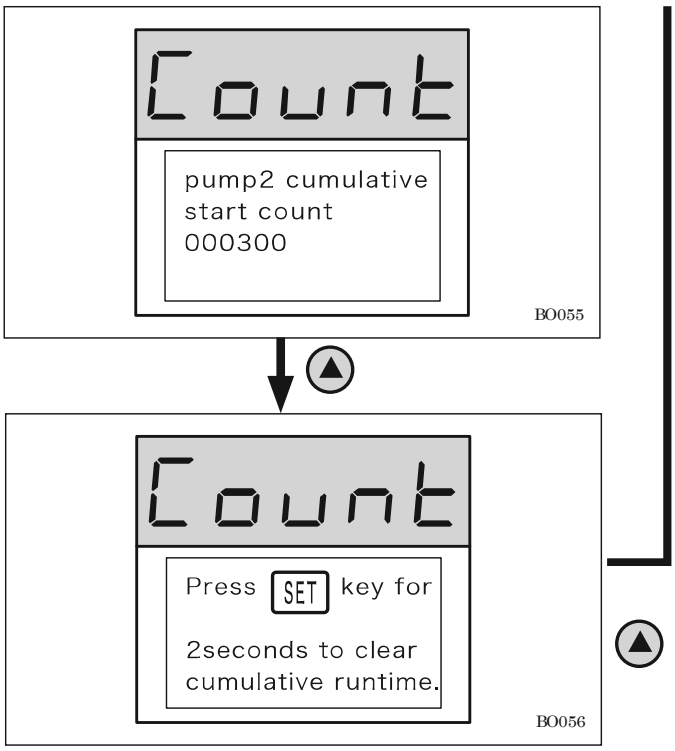
The No. 2 cumulative start count appears by pressing ▲ button.

7 Each time ▲ is pressed, the No.1/No.2 pump cumulative run time and cumulative start count, and the clear screen appears. (No.1 pump → No.2 pump → clear screen)

* By pressing ▼, cumulative run time and cumulative start count are displayed in reverse order.

8 By holding down SET for 2 seconds or longer at the clear screen, all cumulative run time and cumulative start count are deleted.

* By pressing BACK three times, the display returns to the discharge head (normally displayed).

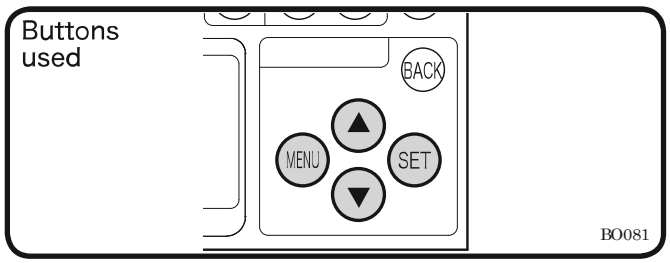


■ Checking the "Accumulator gas charged pressure calculation"

* These are reference value calculated from "P.1: Operation head" and "P.2: Estimated terminal head".

* The accumulator gas charged pressure when the product is shipped is set to a value in the middle of the operation head adjustment range, and may differ from the calculated value.

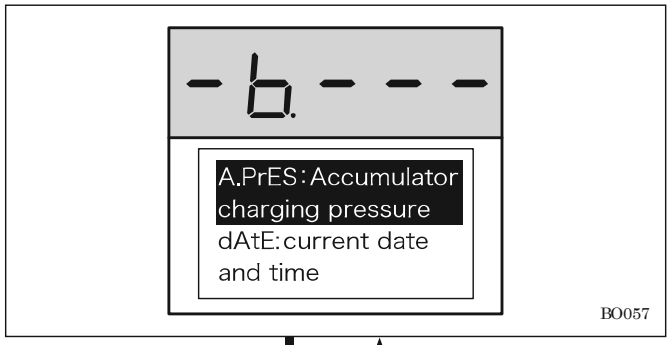
* Use as a reference when replacing the accumulator.



1 Select the sub menu from the b. <MAINTENANCE> menu. (See P. 26.)

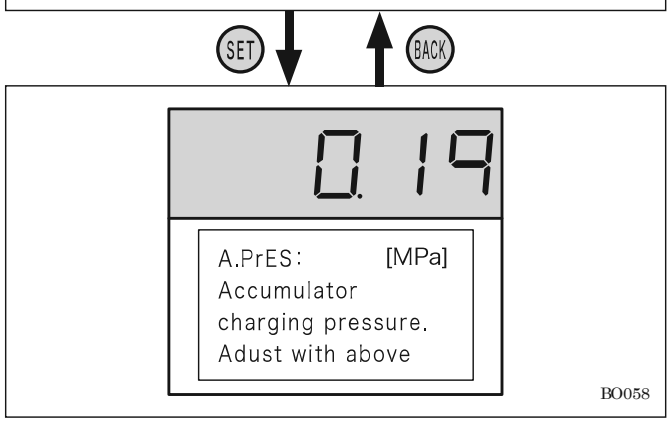
2 Use the ▲ and ▼ buttons to select sub menu "A.PrES: Accumulator charging pressure".

3 Press SET.



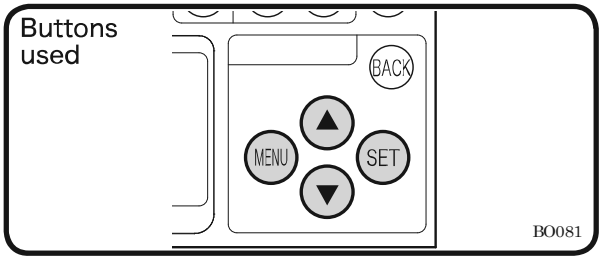
The accumulator gas charged pressure is calculated automatically, and the value appears on the 7-segment monitor.

* By pressing BACK three times, the display returns to the Discharge head (normally displayed).



■ Changing "Date & time info."

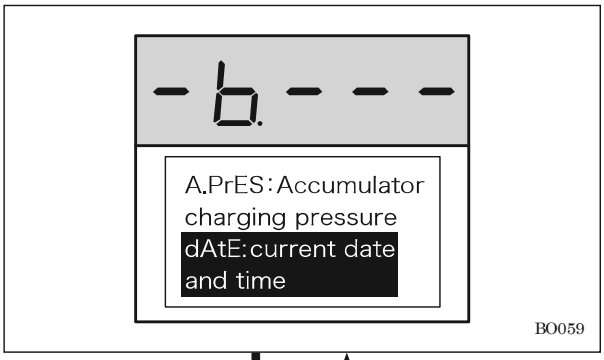
* The date and time are set before the product is shipped.
If the date and/or time are incorrect, correct using the following procedure.



1 Select the sub menu from the b. <MAINTENANCE> menu. (See P. 26.)

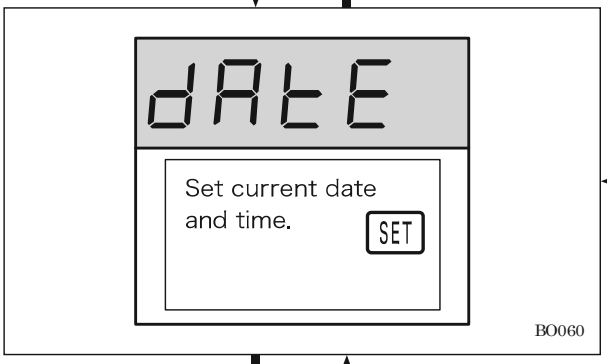
2 Use the ▲ and ▼ buttons to select sub menu "dAtE: current date and time."

3 Press SET .



SET BACK

4 Press SET again at the confirmation screen that appears.



SET BACK

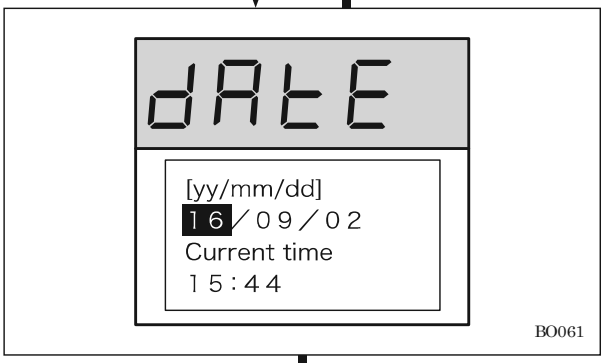
5 Use the ▲ and ▼ buttons to change the "YY", and then press SET .

6 Use the ▲ and ▼ buttons to change the "MM", and then press SET .

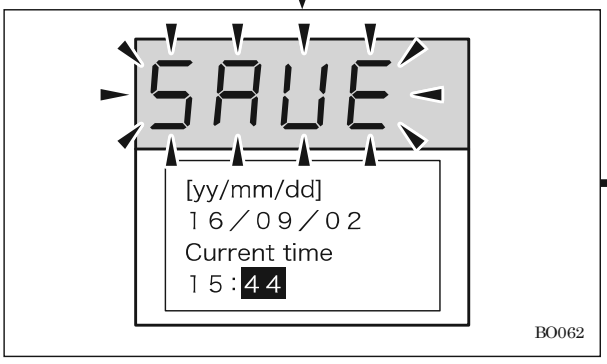
7 Use the ▲ and ▼ buttons to change the "DD", and then press SET .

8 Use the ▲ and ▼ buttons to change the "HR", and then press SET .

9 Use the ▲ and ▼ buttons to change the "MIN", and then press SET .



SET



SET

SAUE flashes on the 7-segment monitor, and the setting value is saved.

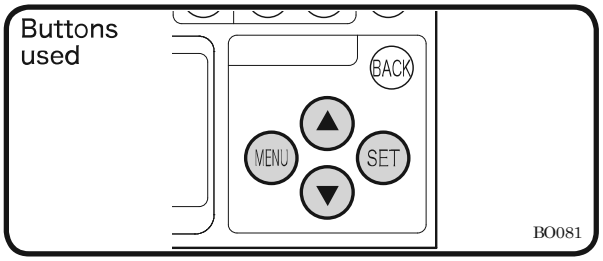
* SAUE appears only if changes are made to the setting value.

* Setting values do not disappear even when the power is turned OFF.

* By pressing BACK three times, the display returns to the Discharge head (normally displayed).

■ "Trial operation info." settings

* The "Setting date", "Work date", and "Next inspection date" can be set. It is recommended that these dates be set for future maintenance.

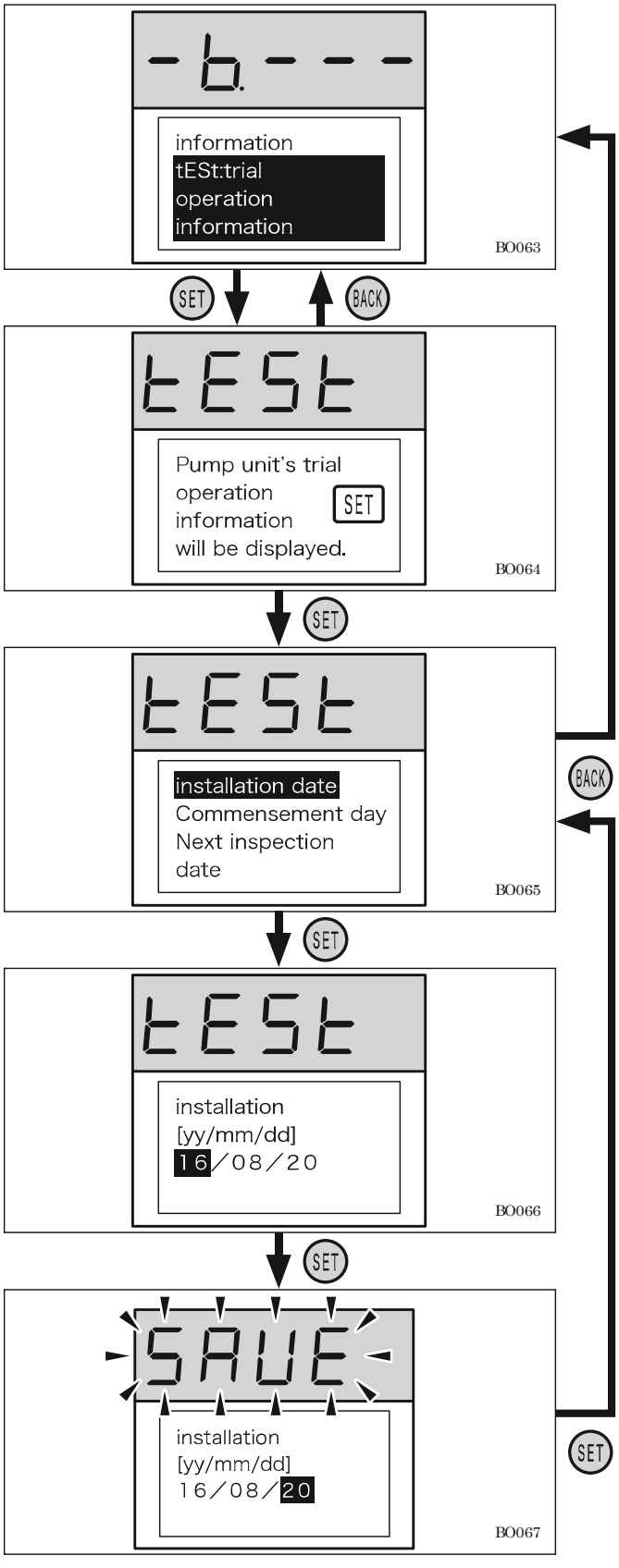


1 Select the sub menu from the b. <MAINTENANCE> menu. (See P. 26.)

2 Use the ▲ and ▼ buttons to select sub menu "tESt: trial operation."

3 Press SET.

4 Press SET again at the confirmation screen that appears.



5 Use the ▲ and ▼ buttons to select sub menu "Install date", and then press SET.

* The date is set to "MM -- DD -- YY --" before the product is shipped.

6 Use the ▲ and ▼ buttons to change the "YY", and then press SET.

7 Use the ▲ and ▼ buttons to change the "MM", and then press SET.

8 Use the ▲ and ▼ buttons to change the "DD", and then press SET.

* The work date and next inspection date can be set in the same manner.

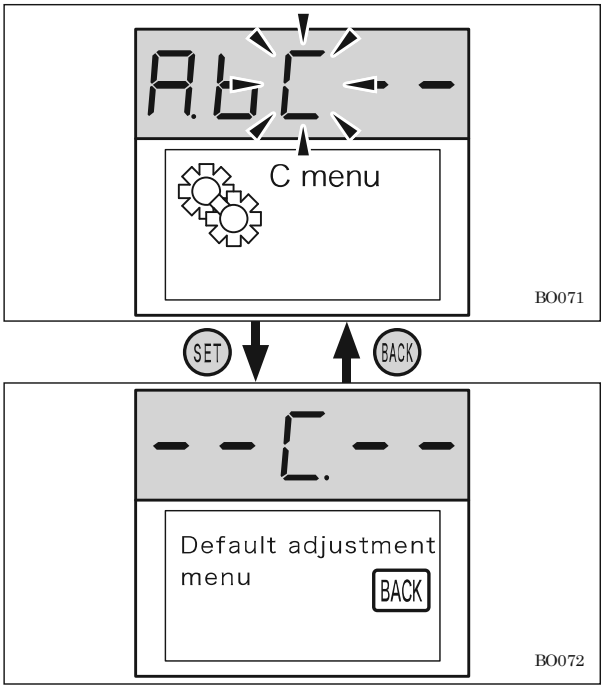
SAUE flashes on the 7-segment monitor, and the setting value is saved.

* SAUE appears only if changes are made to the setting value.
* Setting values do not disappear even when the power is turned OFF.
* By pressing BACK three times, the display returns to the Discharge head (normally displayed).

■ Changing the "C. Menu"

1 Select the sub menu from the C. <MAINTENANCE> menu. (See P. 26.)

2 Press (SET) .



This is an adjustment menu used before shipping the product.

* This is an adjustment menu used by the manufacturer, and therefore no adjustments are required here.
* By pressing (BACK) twice, the display returns to the Discharge head (normally displayed).

Default settings table

Bore		Operation method	Model	Motor	Default setting			Set head Adjustment range
Discharge	Suction				P.1: Operation head	P.2: Estimated terminal head	Accumulator charged pressure	
mm	mm			kW	m	m	MPa	m
40	32	Alternate	KFE32A1.9-F	1.9	67	60	0.32	44 to 67
	40		KFE40A1.5-F	1.5	35	31	0.14	20 to 35
			KFE40A2.2-F	2.2	51	46	0.22	30 to 51
			KFE40A3.7-F	3.7	71	64	0.32	44 to 71
			KFE40A5.5-F	5.5	84	76	0.45	60 to 84
			KFE40A7.5-F	7.5	110	99	0.61	80 to 110
	50		KFE50A2.2-F	2.2	36	32	0.14	20 to 36
			KFE50A3.7-F	3.7	54	49	0.22	30 to 54
			KFE50A5.5-F	5.5	71	64	0.32	44 to 71
			KFE50A7.5-F	7.5	84	76	0.42	56 to 84
50	65		KFE65A3.7-F	3.7	37	33	0.14	20 to 37
			KFE65A5.5-F	5.5	55	50	0.22	30 to 55
			KFE65A7.5-F	7.5	66	59	0.32	44 to 66
40	32	Alternate Parallel	KFE32P1.9-F	1.9 x 2	67	60	0.32	44 to 67
50	40		KFE40P1.5-F	1.5 x 2	35	31	0.14	20 to 35
			KFE40P2.2-F	2.2 x 2	51	46	0.22	30 to 51
			KFE40P3.7-F	3.7 x 2	71	64	0.32	44 to 71
			KFE40P5.5-F	5.5 x 2	84	76	0.45	60 to 84
			KFE40P7.5-F	7.5 x 2	110	99	0.61	80 to 110
65	50		KFE50P2.2-F	2.2 x 2	36	32	0.14	20 to 36
			KFE50P3.7-F	3.7 x 2	54	49	0.22	30 to 54
			KFE50P5.5-F	5.5 x 2	71	64	0.32	44 to 71
			KFE50P7.5-F	7.5 x 2	84	76	0.42	56 to 84
80	65		KFE65P3.7-F	3.7 x 2	37	33	0.14	20 to 37
			KFE65P5.5-F	5.5 x 2	55	50	0.22	30 to 55
			KFE65P7.5-F	7.5 x 2	66	59	0.32	44 to 66

Trial Operation

⚠WARNING

When connecting or disconnecting wires, always turn OFF the power, and ensure that power is not being supplied. Failure to observe this could result in electric shock.

⚠CAUTION

Prohibited

Do not connect a commercial power supply directly to the motor. Failure to observe this could result in fire, faults, or damage. Furthermore, the magnetic force exerted by magnets is powerful, and therefore clock, magnetic cards and pacemakers, etc. must be kept at a distance. Failure to observe this could result in faults or grave danger.

If changing control device settings, consult your dealer or KAWAMOTO. Changing values without prior consultation could result in a device fault or water leakage.

Ensure that there is water inside the pump. Failure to observe this could result in heater wire damage or fire.

If priming or evacuating the pump, ensure that the product is not exposed to water. Failure to observe this could result in electric leakage, electric shock, fire, or faults.

1 Preparing for operation

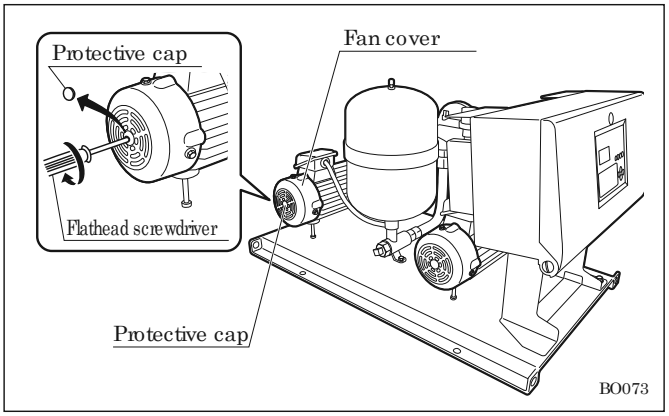
1 Ensure that the pump has been wired correctly, and that none of the terminal screws are loose.

2 Ensure that none of the nuts or bolts are loose.

3 Prime the pump.

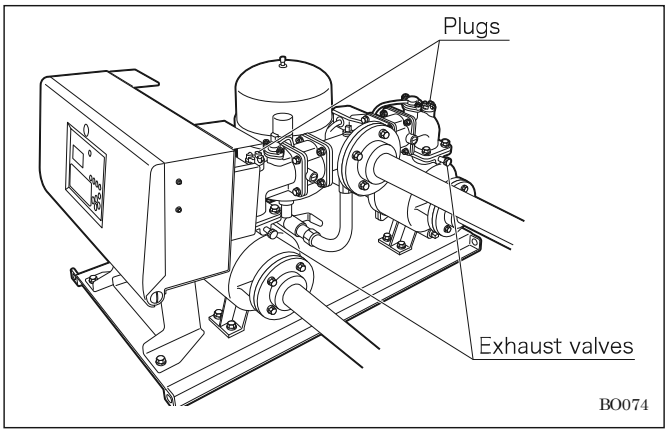
In performing suction operation

(1) Check the water reservoir tank water level.
(2) Remove the motor fan cover protective cap.
(3) Open the exhaust valve, remove the plug, and then prime the pump.
(4) Rotate the end of the motor shaft with a flathead screwdriver in order to release air from inside the impeller.
(5) Priming is complete when there are no more bubbles from the priming cup.
(6) Close the exhaust valve, and then reattach the plug and motor fan cover protective cap.



In performing inflow operation

(1) Check the water reservoir tank water level.
(2) Remove the motor fan cover protective cap.
(3) Open the pump suction sluice valve, and then open the exhaust valve.
(4) Rotate the end of the motor shaft with a flathead screwdriver in order to release air from inside the impeller.
(5) Priming is complete when water flows continuously from the exhaust valve.
(6) Close the exhaust valve, and then reattach the plug and motor fan cover protective cap.



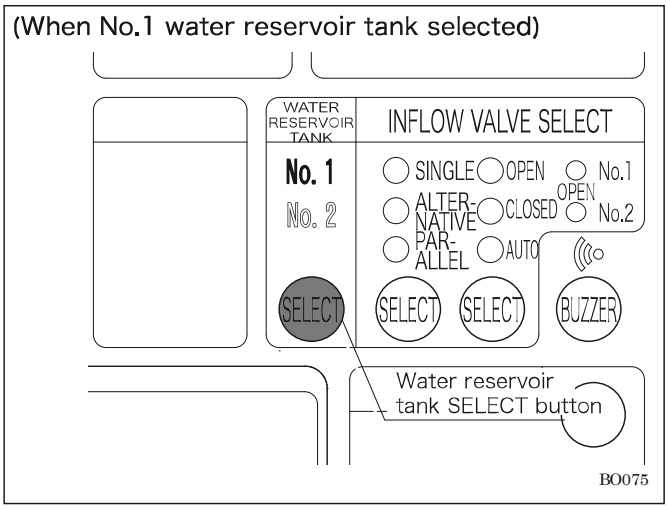
Caution

- Prime the pump properly using the priming procedure. If the pump is not sufficiently primed, idling will be performed, resulting in insufficient pumping or seizure.
- When priming the pump, always turn OFF the source power supply. Failure to observe this could result in injury.

2 Water reservoir tank (water level detection) settings

No.1 and No.2 light up red alternately each time the water reservoir tank selection button (SELECT) is pressed.

* When No.1 lit: The water level in the No.1 water reservoir tank is detected.
  When No.2 lit: The water level in the No.2 water reservoir tank is detected.

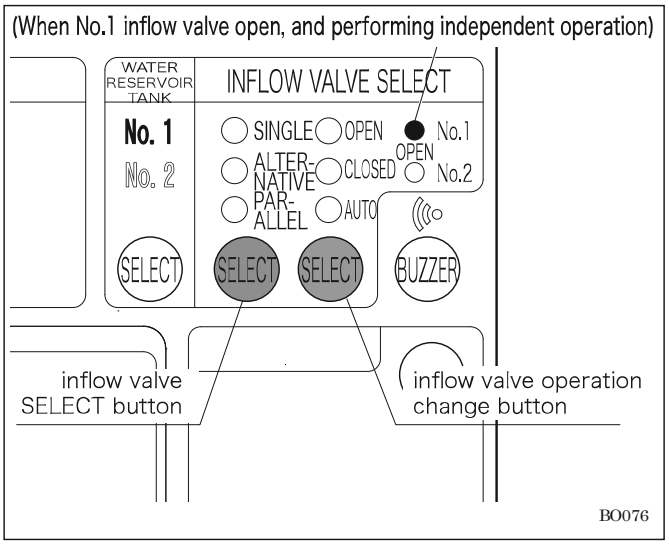


3 Setting when inflow valve selected

(1) Each time the inflow valve (SELECT) button is pressed, inflow valve operation changes from SINGLE to ALTERNATE to PARALLEL in this order.
The selected inflow valve indicator lights up in red.

(2) Each time the inflow valve operation (SELECT) button is pressed, inflow valve operation changes from OPEN to CLOSED to AUTO in this order. The selected inflow valve operation indicator lights up in red.

(3) The inflow valve output indicator LED lights up red when performing inflow valve output based on the conditions at (1), (2).

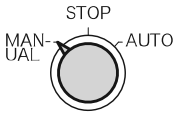


4 Manual operation check

1 Check whether valves are open or closed.

- Discharge port, test pipe sluice valve → CLOSED
- Unit suction port sluice valve (for inflow) → OPEN
- Accumulator sluice valve, pressure transmitter ball valve → OPEN

2 Set the control panel "Pump mode switch" to "No.1", and set the "Operation mode switch" to "MANUAL".
The No.1 pump starts running.

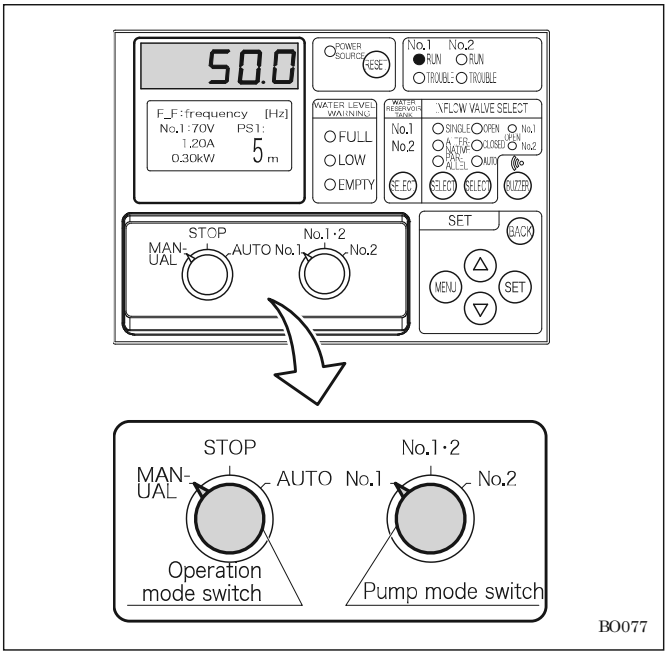


If the "Operation mode switch" is set to "MANUAL", the display automatically changes to the F_F setting. (See P. 30.)

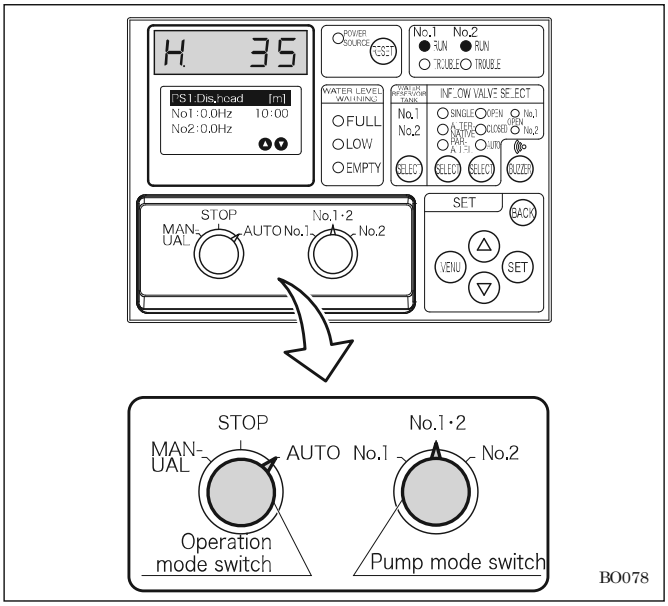
3 Set the manual operating frequency. (See P. 30.)
<1.5 to 3.7kW pump>
* The frequency can be set in the "50Hz" to "150Hz" range.
* The frequency is set to "50Hz" before the product is shipped.
<5.5, 7.5kW pump>
* The frequency can be set in the "100Hz" to "300Hz" range.
* The frequency is set to "100Hz" before the product is shipped.

4 If the pump pressure rises, gradually open the test pipe sluice valve, and confirm that the water is flowing with force from the pipe.
* If no water is pumped even after several minutes, set the "Operation mode switch" to "STOP", and then prime the pump again.

5 After completely pumping, close the test pipe sluice valve, and set the "Operation mode switch" to "STOP".
* Set the "Pump mode switch" to "No.2" for the No.2 pump, and check in the same manner.



5 Automatic operation check



1 Set the control panel "Pump mode switch" to "No.1・2", and set the "Operation mode switch" to "AUTO".

2 Gradually open the test pipe sluice valve.
* One pump starts running. Slowly open and close the sluice valve, and ensure that there is no great change in pressure.

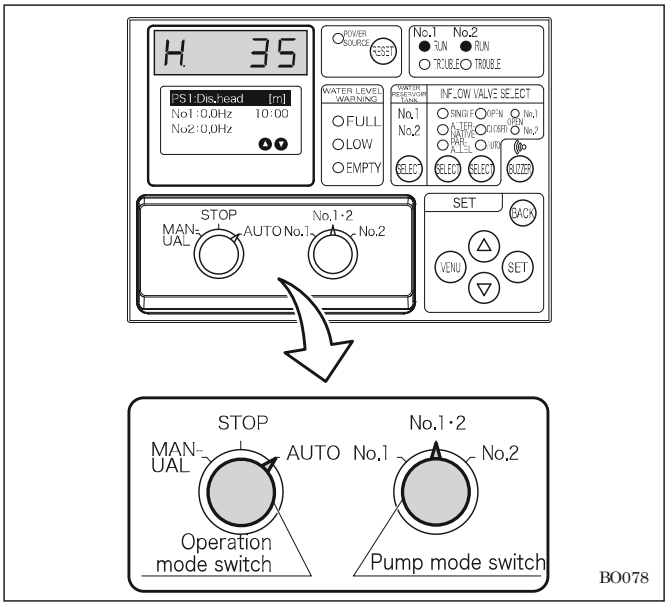
3 Close the sluice valve.
The pump stops after a suitable length of time ranging from approximately 10 to 60 seconds based on the conditions at the site.
* The pump may run at low speed during operation, however, this is to conserve energy and is not abnormal.

4 Start and stop the pump repeatedly.
* Check whether the pump runs alternately in accordance with the operation theory (P. 13).
* When P.1 > P.2: Estimated terminal constant pressure
  When P.1 = P.2: Constant discharge pressure
  When P.1 < P.2: Setting mistake. The RUN LED flashes. (Constant discharge pressure at P.1 value)
* With alternate/parallel type pumps, confirm that the pressure drops when the sluice valve is opened, and the pump (one pump) starts running, and that the pump performs parallel operation (two pumps running) when the sluice valve is opened further.

Caution

- If no test pipe has been installed, check by opening and closing the discharge port sluice valve or faucet, etc.
- The date and time at which test operation is performed can also be recorded at the control panel. (See P. 37.)

6 Normal operation



1 Check whether valves are open or closed.
- Test pipe sluice valve → CLOSED
- Unit suction port, discharge port, accumulator sluice valve → OPEN
- Accumulator, pressure transmitter ball valve → OPEN

2 Check the control panel.
- Set the operation mode switch to "AUTO".
- Set the pump mode switch to "No.1・2".
- Set the emergency operation switch to "OFF" (See P. 44.)

3 When test operation is complete, use a dry cloth to wipe any drops of water from the pump, motor, accumulator, etc.

Caution

Flush valve precaution
If using a flush valve, it will be necessary to expand the number of accumulators. Please contact your dealer or KAWAMOTO.

Emergency Operation

⚠CAUTION

⚠ If no water is being discharged during emergency operation, the pump will heat up, resulting in a risk of burns.

❗ For normal use, set the emergency operation switch to "OFF".
The pump will not run normally.

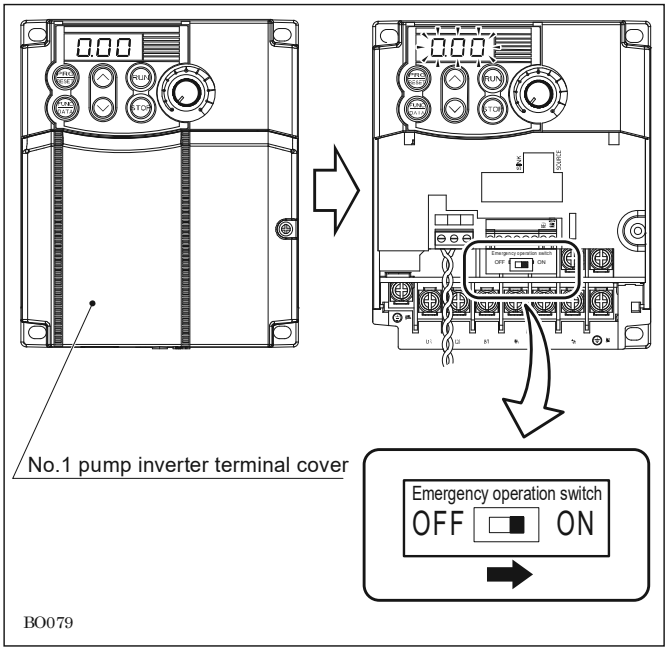
Prohibited The power will be ON during emergency operation, and therefore contact with the terminals and so on must be avoided.
Failure to observe this could result in electric shock.

By turning the emergency operation switch "ON" when a pressure transmitter fault or control board fault occurs, inverter independent operation with the No.1 pump becomes possible. (Automatic operation based on pressure and flow is not performed.)

1 Set the "Operation mode switch" on the control panel to "STOP".
* The pump will not run normally if set to "MANUAL" or "AUTO".

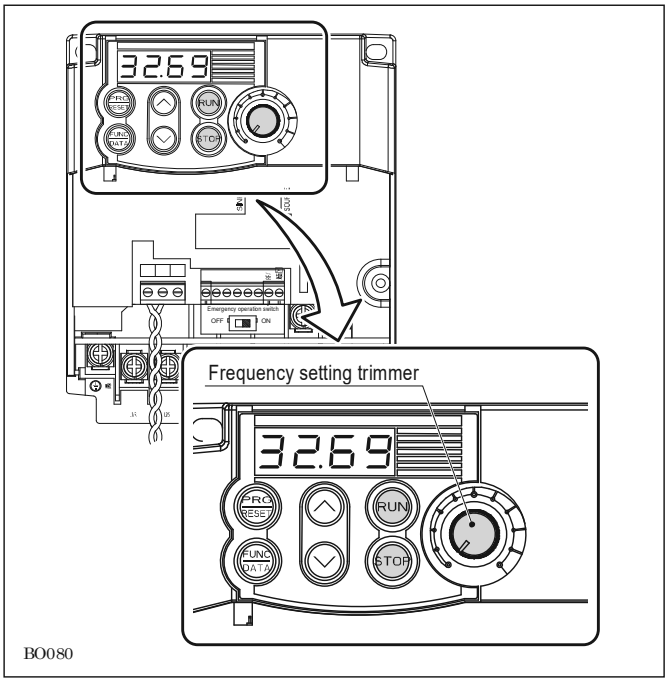
2 Open the control panel. (See P. 8, 9.)

3 Loosen the No.1 pump inverter terminal cover screws, remove the cover in the direction indicated by the arrow, and turn the “Emergency operation switch” to "ON". The inverter display panel LED flashes.
* The emergency operation switch can be reattached to the No.2 pump inverter.



4 Use the "Frequency Setting" trimmer to set the frequency.
<1.5 to 3.7 kW specification>
* The frequency can be set between "0 Hz" and "150 Hz".
* The frequency is set to "0 Hz" when the product is shipped.
<5.5 to 7.5 kW specification>
* The frequency can be set between "0 Hz" and "300 Hz".
* The frequency is set to "0 Hz" when the product is shipped.

5 By pressing RUN, the pump starts, and by pressing STOP, the pump stops.



Maintenance and Inspection

⚠CAUTION

To ensure long-term use with peace-of-mind, it is recommended that both periodic inspections and daily inspections be carried out. Failure to carry out inspection could result in pump faults, or an accident, etc. Contact KAWAMOTO to discuss periodic inspections.

If turning OFF the power because the pump is not being used for a long period of time, the pump must be emptied of all water.
If the power is turned OFF with water still inside, it will not be possible to run the freezing prevention heater, resulting in possible damage if the pump freezes.

Voltage is still applied to the secondary side of the control panel main drive unit inverter, and therefore the source power supply must be turned OFF when performing inspections. Furthermore, the inverter main circuit smoothing capacitor is charged even after turning OFF the power. It takes time for voltage to be discharged to a safe level. If touching the electrical circuits, wait for at least 5 minutes after turning OFF the power, and use a tester to ensure that the the DC voltage across the inverter main circuit P(+) and N(-) terminals has dropped to a safe level (25 VDC or lower).

Carry out an occasional inspection of the following items, and perform maintenance or consumable part replacement if required.

* Refer to P. 47 for details on consumable part replacement.

Daily inspection

It is important to be aware of daily changes in order to quickly discover abnormalities. For that reason, it is recommended that an operation journal be kept.

Item	Check item	Criteria
Pump	Mechanical seal water leak	There should be no dripping.
Motor	Housing temperature	Ambient temperature +70 ° C or lower
	Ball-bearings	There should be no change in operating noise or vibration from the initial state.
	Insulation resistance (Note 1)	1M Ω or higher
Unit	Discharge head	There should be no significant difference from the set head value.
	Current	Nameplate current value or lower
	Voltage	Within +10% -5% of rated voltage
	Water leakage	There should be no water leakage from any parts.

(Note 1) Use an insulation resistance tester suitable for the power supply voltage when performing insulation resistance measurement. (250 V for 200 V models, 500 V for 400 V models) Failure to observe this could result in damage to control PCBs, etc.

6-month inspection

Item	Check item	Criteria
Accumulator	Charged gas pressure	Valued indicated on nameplate (Note 2)
Control panel	Dew condensation inside panel	There should be no dew condensation.
	Relays	There should be no abnormalities such as discoloration.
Pressure transmitter	Operation	Operation (constant pressure characteristics) should be reliable.

(Note 2) Always drain the water in the accumulator before measuring.

Consumable Part Replacement

⚠WARNING

The pump should never be disassembled, repaired, or modified by anyone other than a trained service engineer.
Inadequate repair could result in electric shock, fire, or water leakage.

The following table shows a list of consumable parts. Use the replacement frequency as a guideline for replacing parts.

Part name	Replacement frequency guideline	Part condition guideline
O-rings (packing)	-	When carrying out disassembly and inspection
Mechanical seals	Every year	When visible leakage observed
Ball-bearings	Every 3 years or 12,000 hours, whichever comes first	When bearings heat up, and abnormal noise, vibrations observed
Accumulator	Every 3 years	When pump stop time becomes notably shorter
Pressure transmitter	Every 5 years	When pressure setting is unreliable
Flow sensors	Every 3 years	When operation is unreliable
Check valves	Every 3 to 5 years	When valve operational defect occurs
Electrical components (control I/O PCB)	Every 5 years	When all operations are unreliable
Electrical components (operation display panel)	Every 5 years	When all operations are unreliable
Inverter	Every 7 to 8 years	When operation is unreliable
Fan (for control panel: 3.7kW or greater)	Every 3 years	When abnormal noise sounds, fan does not rotate
Fan (for inverter)	Every 3 years	
Storage battery	Every 10 years	When the time is not retained when the power is turned OFF

Trouble Warning List

Category	7-segment monitor display	Details
Unit protection	StOP	Power failure
	PEd	Discharge pressure transmitter error
	FOP	External interrupt
	CPE	Control PCB error
	*-HdL	Discharge pressure drop
	*-ELb	Earth leakage

* "1" is displayed for the No.1 pump, and "2" for the No.2 pump.

* If a fault warning other than described here is displayed, consult your dealer or KAWAMOTO.

Category	7-segment monitor display	Details
Inverter protection	*-Er8	Inverter communication error Control panel earth leakage circuit breaker "OFF"
	*-OC1	Overcurrent (during acceleration)
	*-OC2	Overcurrent (during deceleration)
	*-OC3	Overcurrent (when running at constant speed)
	*-OU1	Overvoltage (during acceleration)
	*-OU2	Overvoltage (during deceleration)
	*-OU3	Overvoltage (when running at constant speed)
	*-LU	Insufficient voltage
	*-OPL	Output phase-loss
	*-OH1	Inverter abnormal temperature rise
	*-OLU	Overload
	*-OL1	Electronic thermal relay
	*-Er1	Memory error
	*-Er3	CPU error
	*-Erd	Step-out detection
	*-ErF	Data save error when voltage insufficient

* "1" is displayed for the No.1 pump, and "2" for the No.2 pump.

Water Level Warning List

Category	7-segment monitor display	Details
Water level error	*-HL	Water level full
	*-LL2	Water level low
	*-LL1	Water level empty

* "1" is displayed for the No.1 water reservoir tank, and "2" for the No.2 water reservoir tank.

Troubleshooting

⚠WARNING

The pump should never be disassembled, repaired, or modified by anyone other than a qualified service engineer. Cable replacement should be made by a trained service engineer.
Inadequate repair could result in electric shock, fire, or water leakage.

If trouble is discovered, remedy the situation promptly by referring to the following table.
If the error persists even after taking measures, consult your dealer or KAWAMOTO.

	Trouble	Cause	Measure
Automatic operation	<Operation> Lamp flashes.	Pressure setting: P.1 Set head < P.2 Estimated terminal head	Setting change: P.1 Set head ≥ P.2 Estimated terminal head
		Temp. limit protective operation The target pressure is not reached.	Cooling fan fault, ambient temperature rise
Automatic operation not possible	The pump does not restart.	Pressure transmitter insertion defect, or part defect, or the ball valve of pressure transmitter -> "CLOSED"	Check the pressure transmitter. Replace with a new part. or, "OPEN" the ball valve of pressure transmitter.
	The pump does not stop.	Flow sensor part defect (ON state)	Remove the operating side flow rate sensor and check its operation.
		The emergency operation switch is "ON".	Turn the emergency operation switch "OFF".
	Estimated terminal head operation different from P.1 Set head and P.2 Estimated terminal head is performed.	Check the pressure transmitter. Readjust P.1 Set head and P.2 Estimated terminal head.	Check the pressure transmitter. Replace with a new part. Readjust the set head.
	The stop time is too short.	Accumulator charged pressure drop, or accumulator damage	Charge the accumulator with gas. Or, replace with a new part.
	Intermittent operation is performed repeatedly.	Flow sensor insertion defect, or part defect.	Check the flow sensor operation. Or, replace with a new part.
Common	The POWER indicator lamp does not turn ON. The motor does not rotate.	The earth leakage circuit breaker is OFF.	Turn ON the earth leakage circuit breaker.
	The motor rotates, but no water is discharged, or water is discharged, but the pressure does not rise.	There is insufficient water in the water reservoir tank (when performing manual operation).	Supply water to the water reservoir tank.
		The sluice valve is closed, or half open.	Open the sluice valve.
		The pump is not full of water.	Perform priming completely.
	The pump does not stop. The pump runs even though water is not used.	The operation mode switch is set to "MANUAL".	Set the operation mode switch to "AUTO".
		Water is leaking from the piping.	Carry out inspection and repair.
		The emergency operation switch is "ON".	Turn the emergency operation switch "OFF".
	The pump does not perform alternate operation.	The operation mode switch is set to "MANUAL".	Set the operation mode switch to "AUTO".
		The pump mode switch is set to "No.1" or "No.2".	Set the pump mode switch to "No.1/No.2".
	The pump does not perform parallel operation.	The operation mode switch is set to "MANUAL".	Set the operation mode switch to "AUTO".
		The pump mode switch is set to "No.1" or "No.2".	Set the pump mode switch to "No.1/No.2".
	There are too many start/stop operations.	Accumulator charged gas pressure drop	Charge the accumulator with gas. Or, replace with a new part.
		Accumulator damage	Replace the accumulator.
	The pressure does not become constant.	The pressure transmitter ball valve is closed.	Open the ball valve of pressure transmitter.
		Pressure transmitter fault	Replace the pressure transmitter.
	<When heater connected> The heater does not work.	The heater power switch is "OFF".	Turn "ON" the heater power switch.
		The fuse has blown.	Replace the fuse.
	<When using a power supply output terminal block> The inflow motor-operated valve, inflow solenoid valve do not work.	The maintenance switch is "OFF".	Turn "ON" the maintenance switch.
		The fuse has blown.	Replace the fuse.

* A mechanical sound may be heard when the pump starts or stops, but this is not abnormal.
* If the pump is used with a fixed quantity of water, there are rare occasions where the number of pumps used increases or decreases to the influence of air build-up inside pipes, etc., however, this is not abnormal.
* Unexpected trouble may occur. However, it is important that appropriate measures should be taken immediately when abnormalities are discovered.
* If the cause of the trouble is unclear, contact your dealer or KAWAMOTO. When doing so, notify the pump model name, serial No. and the details of trouble (fault).

MEMO

Comfort Earth®

Kawamoto Pump Mfg. Co., Ltd.

https://www.kawamoto.co.jp

Head office : 11-39, Osu 4-Chome, Naka-ku, Nagoya, Aichi460-8650, Japan

Inspection Certificate
KAWAMOTO PUMP
MFG. CO., LTD.

Inspection by

Person in charge of inspection