Mold Temperature Controller

GMC (L, H, A) –U

Instruction Manual

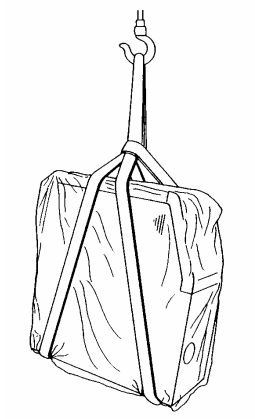
⚠ WARNING

Thank you very much for purchasing our product.
Please carefully read this instruction manual for correct use.
During operation, keep this manual close at hand so that it can be referred to whenever necessary

How to move the main unit of the product

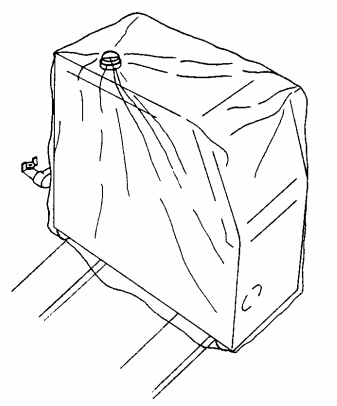
[How to move with a hoist]

As shown below, hangs packing belt (gold jargird belt sling etc.) on the main unit, and move by hoist.



[How to move by a forklift]

As shown below, insert the forks of the forklift into the fixed brackets to move.



⚠ CAUTION

- When unpacking, use work gloves.
- The hoist operator must be qualified for crane operation and slinging skill.
- The fork lift operator must possess a license for driving large and heavy vehicles or be qualified for fork lift operations skill.
- When moving with a hoist, be sure to loop the belt outside the fixed bracket.
- When moving with a fork lift, be sure to insert the fork into the fixed bracket.

MATSUI

Issued in January, 2003

Contents

Since the items marked with ⚠ are especially important, carefully read and understand these items before using the product.

Introduction

1. Product Covered

This document describes how to properly perform the operations and maintenance of your Mold Temperature Controller.

2. Target Readers

This document is intended for use not only by those who are using the Mold Temperature Controller made by MATSUI MFG. CO., LTD. for the first time, but also by those who had experience in using the Mold Temperature Controller and wish to ascertain any information.

3. Warranty

This product was manufactured by making the full use of the state-of-the-art designing technology and best craftsmanship of MATSUI MFG. CO., LTD.
If the products should have any defect that is recognizable by us, such defective part would be repaired or replaced in accordance with the applicable conditions shown below:

1) Scope

The quality of our machines and devices is warranted and we will repair them and/or change parts when something should go wrong with any of them. However, there is NO warranty on the products made with our machines or devices. Any products that you cannot make perfectly when using our machines or devices, are NOT our responsibility, either.
However, if while you are operating our machine or device in a normal way, there is a problem caused obviously as a result of a defect in design or in production of our machine or device, we will repair it or replace the parts free of charge within the following period.

1)-A. The relevant defective part shall be returned to us.

1)-B. This warranty shall remain valid for twelve (12) months starting on the date when the new products you purchased leave our facility.

1)-C. Only the following parts are subject to the warranty period of six (6) months after such delivery date:
1. Electrical components and parts; 2. Sealing materials; 3. Bearings; and 4. Level gauges.

2) Exceptions to which this warranty shall not be applicable

2)-A. This warranty shall not be applied to the following exceptions:

1. Any problem resulting from an environmental change;
2. Any damage or loss attributable to a failure in the delivered our products;
3. Any deterioration (in paint or plating) as may occur from a time-course change;
4. Any sensuous phenomenon which is considered to have no effect on the quality and functions;
5. Any problem resulting from your own modification; and
6. Any lamp, fuse, and other consumable part.

2)-B. Any failure or damage attributable to any of the following causes shall not be compensated for under this warranty:

1. Acts of God such as earthquake, typhoon, and flood; accidents; and fire:
2. Use of the products in any place other than the general installation sites;
3. Failure, by intention or negligence, in observing the instructions and maintenance shown in this document;
4. Improper or wrong maintenance, service, or handling; and
5. Your own transportation, repositioning, or reinstallation of the products.

Chapter 1 For safe use

This chapter describes precautions for operation, maintenance inspection and repair, identification of headings of precautions and labels affixed to the product for using this product correctly and safely.

⚠ WARNING

When performing operation and maintenance inspection of this product, be sure to follow the safety precautions described in this manual.
We shall assume no liability for any injury or accident caused by failing to follow these precautions.

1. Precaution headings and their meanings

In this manual, indications are classified according to the degree of danger as follows:

Heading	Meaning
⚠ DANGER	This heading is used for cases where there is a possibility that mishandling will lead to the user's death, and precautions to avoid any such occurrence are described below the heading.
⚠ WARNING	This heading is used for cases where there is a possibility that mishandling will lead to the user serious injury, and precautions to avoid any such occurrence are described below the heading.
⚠ CAUTION	This heading is used for cases where there is a possibility that mishandling will lead to the user slight injury or damage to the product, and precautions to avoid any such occurrence are described below the heading.
NOTE	Operating procedures and explanations requiring special attention and emphasized information are described below this heading.
⚠	This mark is used for handling procedures requiring special attention.
※	This mark is used for exceptional conditions and notes in figures and tables.

2. Safety rules

WARNING

1) No modification

Never modify this product on your own without our prior approval.
We shall assume no liability for any modifications made without our prior approval.

2) Checking the Electromagnetic contactor (Heater Relay)

Functioning part (connecting point) will wear with years of use, which can cause critical **accidents (e.g. fire break out) due to a seizing contact point** that **keeps the heater circuit energized.**
Great attention should therefore be given to the Electro magnetic contactor.
Refer to **Chapter 9. Maintenance and Check** for further information.

3) Machine stopping procedure

When finishing production or performing maintenance, stop the main machine as follows:

Turn **OFF** the operation RUN / STOP (R/S) switch.

⇩

Turn off the power breaker of your distribution facility.
(Make sure to do this.)

⇩

If you must close the medium feed valve, medium return valve, water supply valve and water discharge valve unavoidably, close them last. **When restarting operations, make sure to fully open the medium feed valve, medium return valve, water supply valve and water discharge valve before starting the device.**

※Since operating with the valves closed will create an airtight condition, which is a dangerous condition wherein pipe pressure will rise, possibly causing an explosion, fully open the valves normally.

4) Piping

(1) Discharge Pipe (Water type model) , (pictured on pg. 14)

Overflow Pipe (Oil type model)

The discharge port on the water models (L, H), and the discharge overflow port of the oil models (A) both serve as a pressure release pipe in the tank. If you shut / block the discharge port, or overflow port, the tank becomes a fully closed condition, which would be dangerous should internal pressure build up inside of the heater tank.

The discharge pipe also functions as an inner pressure-releasing pipe.

The medium tank will be completely sealed if you block the outlet. **The discharge port needs atmospheric discharge. Display a label reading "Normally Full Open"** and lock the handle if installing a water-stop (ball) valve on this pipe.

Be sure to install an oil over-flow release pan / can outside (oil-type temperature controller), and do not close the overflow discharge pipe.

(2) Piping from the Mold Temperature Control Unit

Check the condition of the rubber hoses that are engaged to / from the Molding Machine **every day** before the operation, especially for looseness of fittings and degradation of hoses.

Replace any damaged hose(s) promptly.

5) Never use near gas

Never use this product near combustible, explosive gas or vapor, as it is very dangerous.

6) Electric power

Do not check or exchange without a certified electrician, or an employee in your company who has ample knowledge about electricity, and the danger it poses.

7) Never touch inside of this product

Never touch inside of this product without Matsui's advice, or your recognized service staff, because there is high voltage, and high temperatures inside of the machine's body.

CAUTION

1) Power source

- Make sure to check the specifications on the name plate of the device.
- That of different supply voltage and/or frequency cannot be used.
- Securely ground the unit.
- Use within the allowable voltage regulation (+/-10% of the rating).
  Use outside of the allowable voltage range will cause malfunction, poor operation, or other problems.

NOTE

1) Check and Overhaul

For a long-used device, it is recommended that the product undergo our service department's inspection and overhaul (at cost) for safe equipment once every 4 to 5 years, even if you do not have any problem with its use. For inspection and overhaul questions, contact Matsui.

2) Wiping

Do not wipe with petroleum base solvents. Benzene, thinner, polishing powder, etc., will damage the surface. If contamination is heavy, wipe with a soft cloth thoroughly squeezed after being moistened with 104°F (40°C) or less warm water.

3. Label Information

Labels are affixed to this product at places requiring special attention according to the degree of danger. Make sure to thoroughly understand the descriptions of warnings and cautions before performing operation.

1) Handling of labels

- Keep them legible until disposal of this product.
- If any label is dirty, wipe it with a soft cloth thoroughly squeezed after being moistened with warm water. Never use petroleum base solvents or thinner.

2) Labeling positions

- For labeling positions and descriptions of warnings and cautions, see the attached drawings.

Chapter 2 Precautions for use

This chapter explains precautions specific to the product.
To prevent the occurrence of danger, precautions are described with headings (Refer to “Chapter 1, Item 1”) for the most important items.

1. Common Information for all models

⚠ WARNING

- Internal temperature

  High-voltage and hot locations exist inside the operating product.
  Since operation with the outer panels removed could lead to problems or an accident, avoid removing the panels when operating.

- Cautions on operation

  The valve and piping sections rise to high temperatures over 212°F (100°C).
  Never touch with your bare hands. (Touch with the gloved hands.)
  In the case of an accidental burn, see a doctor after cooling the injury with cold, clean water.

⚠ CAUTION

- Environmental conditions

  Use the product in a place where the ambient temperature is between 32°F (0°C) and 104°F (40°C) and humidity is 85% or less.
  Use outside of the above conditions may cause problems, or an accident.

- Initial Supply water (supply oil)

  Be sure to open the supply water (supply oil) port and air vent port, and send supply water (supply oil), especially when the pump employs a cooling roll jacket etc. which has over 20 L capacity.

⚠ CAUTION

- Operation condition

  This unit controls temperature by the continuous circulation of medium (water/oil) which is fed from a pump. This unit can not be used when the circulation end (return side) is open (such as a water tank), or uses an ON-OFF control valve. Establish an air-releasing port to release air, when using this unit for a Roll jacket supply. **The unit may not operate if air is not released.**

- Control panel

  ❍ The control panel is a non-watertight structure. Do not splash it with water or oil. This may cause a controller malfunction / failure.
  ❍ Do not open the control panel unnecessarily.

- Protection devices

  All protection devices included in this unit have been adjusted before shipping. Do not touch any devices, further adjustment is unnecessary.

- Temperature-sensing element

  Use a thermocouple type K (CA), non-contact type, as the temperature-sensing element only.

- Primary cooling water feeding and draining pressure

  ❍ Set the drain side pressure below 0.09MPa.
  ❍ Feed water pressure should be 0.05MPa~0.3MPa higher than the drain side pressure. A pressure decrease valve should be provided when feed water pressure exceeds 0.3MPa.
  ❍In case of L type, drain side pressure should be used between 0.05MPa~0.09Mpa.
  ※ **If the drain side pressure becomes low, pump cavitations may occur at 176°F / (80°C) or higher.**

⚠ CAUTION

- Pump pressure during use

Use the pump with recommended pressure (or less) that is indicated below. See table 2.1. Adjust the pressure by turning the regulator valve that is located on the rear panel.

Table 2.1

MODEL	Recommended pressure (50/60 Hz)
GMC-25	0.1-0.40 MPa (1~ 4 kgf/cm2 or 15~58 P.S.I.)
GMC-55	0.1-0.40 MPa (1~ 4 kgf/cm2 or 15~58 P.S.I.)
GMC-88	0.1-0.40 MPa (1~ 4 kgf/cm2 or 15~58 P.S.I.)

❍The pressure is affected by the drain-port pressure (back pressure) and supply pressure of cooling water. (L type)

As a result,
L-type models:

[Pressure gauge value] = [pump pressure] + [discharge back- pressure]
Subtracting the back-pressure, or supply-water pressure, from the pressure gauge is the actual [pump pressure] value.

※The supply water pressure of the cooling water can be observed when the solenoid valve is opened during a cooling cycle. The back (discharge) pressure is indicated on the pressure gauge value when the unit is idle / stopped.

※If the medium temperature becomes over 80°C / 176 F, pump cavitation may occur by the steam pressure of water and relation of pump NPSH.
If the drain side is pressure 0.05-0.09 MPa (7.3~10.2 P.S.I.), there is no problem.

❍So the pump is affected by the vapor pressure of the rising water temperature in the hermetic circuit. (H type)

As a result,
H-type models:
[Pressure gauge value] = [pump pressure] + [steam pressure]
Subtracting the [steam pressure] from the pressure gauge value is the actual [pump pressure] value.
[Steam pressure] is indicated on the pressure gauge while the unit is idle / stopped.

2. GMCL and H type (Mold temperature controller for water)

WARNING

- Temperature range of medium

  Control the temperature within the range of the table 2.2.

  Operating out of this range may cause damage or an accident.

Table 2.2

Type	Medium	Operating temperature range
GMCL	Soft water	10°~95°C / 50°~203° F (Max.)
GMCH	Soft water	10°~95°C / 50°~248° F (Max.)

CAUTION

- Hose ratings

Referring to Table 2.3, choose suitable hose material according to the working temperature.

Table 2.3 [Reference] Sold separately (option)

Hose material	Usable temperature	Minimum bend radius (mm)	※2 Life (hours)
Rubber Hose (for L type) Hot water use only	95° C / 203° F	110	4000 (about 1 Year)
Rubber Hose (for H type) Hot water use only	120° C / 248° F	110	4000 (about 1 Year)
※1 Teflon Hose High temp. water or Oil	200° C / 392° F	110	6000 (about 1.5 Years)

※1: We have 3 types as follows;
- -Teflon hose only
- -Teflon hose + SUS braid
- -Teflon hose + SUS braid + SUS spring guard

※2: After life-span, check the hose condition and replace them timely.

Carefully read the instructions enclosed with the hose for installation.

CAUTION

- Medium quality

Use clean soft water including no impurities such as sand, clay or refuse while satisfying the water quality standards shown in Table 2.4.
Less than 50uS/cm conductivity water, like purified water, can not be used as medium.

Low water quality will result in problems such as:

❍Drop in heat exchanger effectiveness due to scales sticking to the heater and breakage of the heater wire

❍Breakage or stoppage of the pump due to scales caught in it

❍Decrease in water quantity due to blocked watercourse in piping

❍Abnormal wear of the mechanical seal of the pump

Problems caused by water quality shall be repaired at your cost even during the warranty period.

Table 2.4 Water quality standards (by JRA 9001-1980)

Item			Feeding water	Trends	
				Corrosion	Scale
pH	[25° C / 77° F]		6.0-8.0	❍	❍
Conductivity	[25°C / 77° F]	(uS/cm)	50-200	❍	❍
Total hardness		($mgCaCO_3/L$)	less 50		❍
Chloride	Cl^-	($mgCl^-/L$)		❍	
Sulfuric acid	SO_4^{2-}	($mgSO_4^{2-}/L$)		❍	
Iron	Fe	(mgFe/L)	less 0.3	❍	❍
Acid consumption	[pH4.8]	($mgCaCO_3/L$)	less 50		❍
Ionic silica	SiO_2	($mgSiO_2/L$)	less 30		❍
Sulfide	S^{2-}	(mgS^{2-}/L)	Not to be detected.	❍	
Ammonium	NH_4^+	($mgNH_4^+/L$)		❍	

3. GMCA type (Mold temperature controller for oil)

⚠ WARNING

- Inflammable

  Don't use fire or sparks around the unit! (For using thermal Oil)

  Wipe up well when you spill oil at filling. Tighten screws or replace gasket, in case of leaking from joint or packing.

- Temperature range of medium

  Control the temperature within the range of the table 2.5.

  Using beyond these ranges may cause damage or an accident!

Table 2.5

Type	Medium	Operating temperate range
GMCA	Thermal oil	60°C -160°C / 140°F~ 320° F (Max.)

Do not use at less than 60°C / 140° F due to the viscosity of the oil.

⚠ CAUTION

- Piping material

Referring to Table 2.6, choose suitable piping material according to the working temperature.

Table 2.6 [Reference] Sold separately (option)

Piping material	Usable temperature	Minimum bend radius (mm)	※2 Life (hour)
※1 Teflon Hose High temp. water or Oil	200° C / 392° F	110	6000 (about 1.5 Years)

※1: Sold separately (option)
- ◆Teflon hose only
- ◆Teflon hose + SUS braid
- ◆Teflon hose + SUS braid + SUS spring guard

※2: Beyond the life-span, check the hose condition and replace them timely.

⚠ Carefully read the instructions enclosed with the hose for installation.

CAUTION

- Medium quality

Use the supply thermal oil which foreign body or contaminant is not mixed in.
If using thermal oil which has small amounts of contamination, be sure to remove it with a screen or filter before filling the unit.

◆Attachment oil-----Idemitsu Dafny Thermic Oil 68
(Viscosity Grade: ISO VG68)

Be aware that the ambient temperature varies with thermal oil.

◆Replacement guide line----Total oxide value reach 0.5mgKOH/g or more, replace the medium.
<Reference> Replace every month in high frequency of use.
Replace all every year even in seldom use.

- Volume of filling thermal oil

Do not fill thermal oil over the recommended volume.
If operating after filling the oil beyond the prescribed volume, due to the thermal expansion of oil as the temperature increases, the thermal oil will become larger than the expansion tank capacity and will drain out of the overflow discharge pipe.
If such a phenomenon occurs, put a vessel at the overflow outlet to prevent splashes of the thermal oil and collect it.
Add a reserve tank when the total volume of oil is exceeded.
Be careful also when replacing the mold, the thermal oil in the hose may drain out of the overflow outlet as mentioned above.

Table 2.7

Model	Volume of filling thermal oil for main body
GMCA-25	Approx. 4.5L
GMCA-55	Approx. 5.0L
GMCA-88	Approx. 8.0L

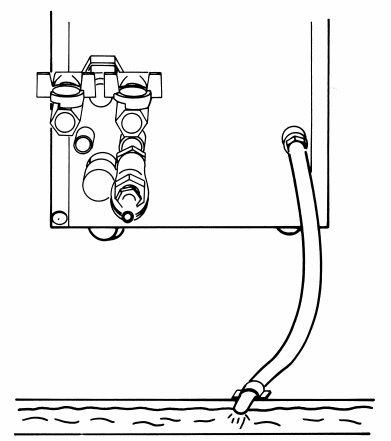
4. Single way water supply and draining to atmosphere.

CAUTION

- Securing the water discharge piping

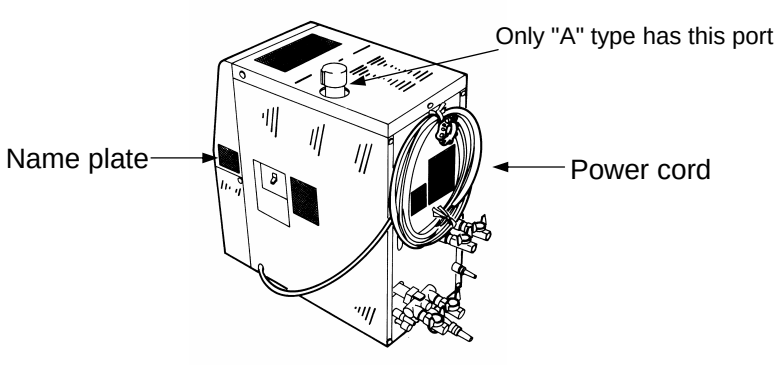
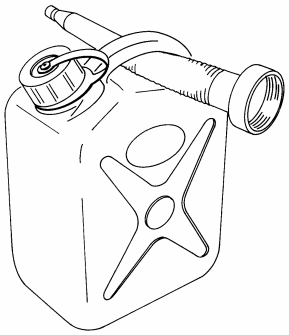
When you are using a one way water supply (not common).If H and A type are used at high temperature, steam may shoot from the water discharge port upon cooling, therefore secure the water discharge piping to the water discharge ditch to prevent accidents.

Figure 2.2



Chapter 3 Checking of supplies

Make sure that the model number is correct.
(Check the nameplate of the unit.)

Equipment name	Delivery condition
Main body of unit ※With power cord 4m	Remove the polyester cover and make sure it is the correct model per your order. Figure 3.1 
Thermal oil (sold separately) (Only A type) Name: Thermal oil Capacity: 5L (GMCA-25) : 10L (GMCA-55 / 88)	There is in the polyethylene tank. Figure 3.2 
Hose: Sold separately (option)	**NOTE** 1. The hoses are sold separately (option). They are usually in a cardboard box. 2. Open the box and confirm that the hoses specified match the model to be used. "The hose instruction manual" is included in the corrugated cardboard. Use them after reading the carefully.

Chapter 4 Name of each part

Main unit

Figure 4.1

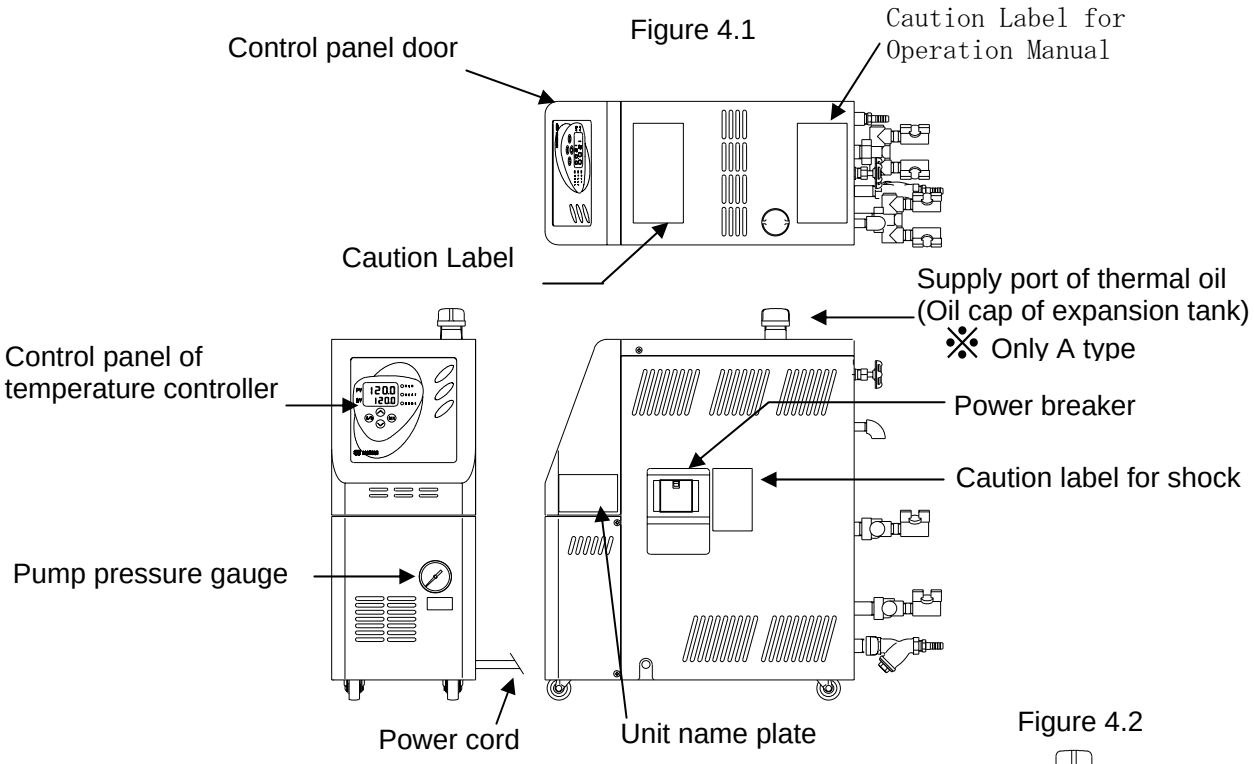


Figure 4.2

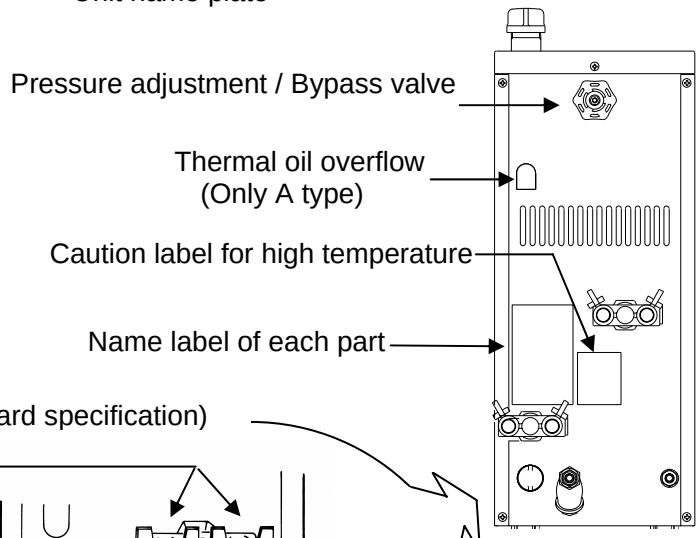
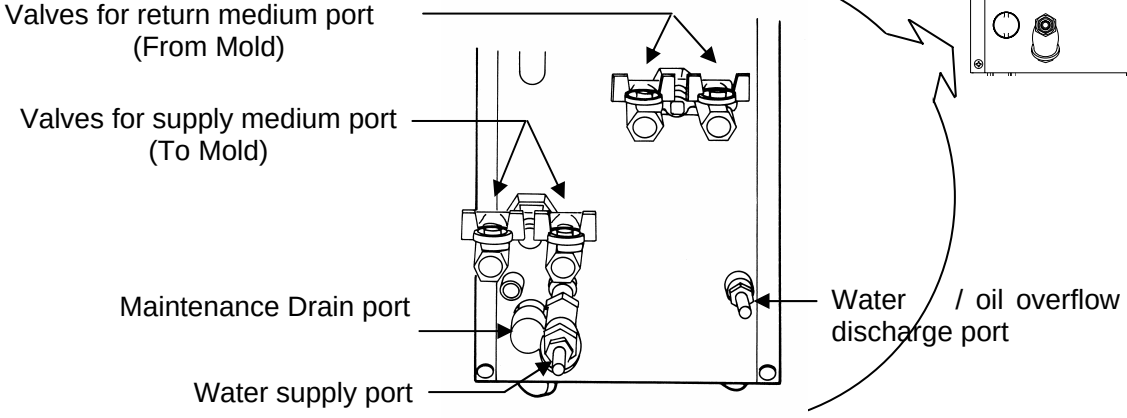
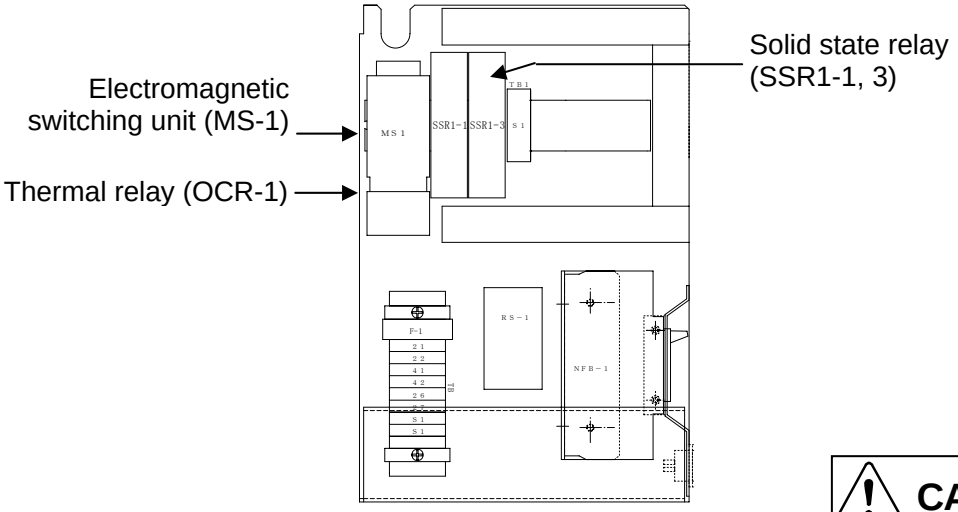


Figure 4.2.1 (Standard specification)



Inside of control panel

Figure 4.3



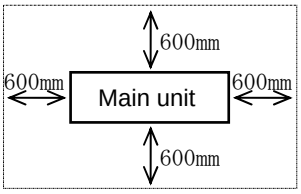
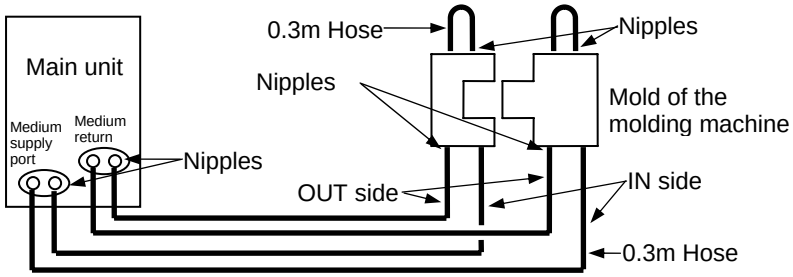
CAUTION

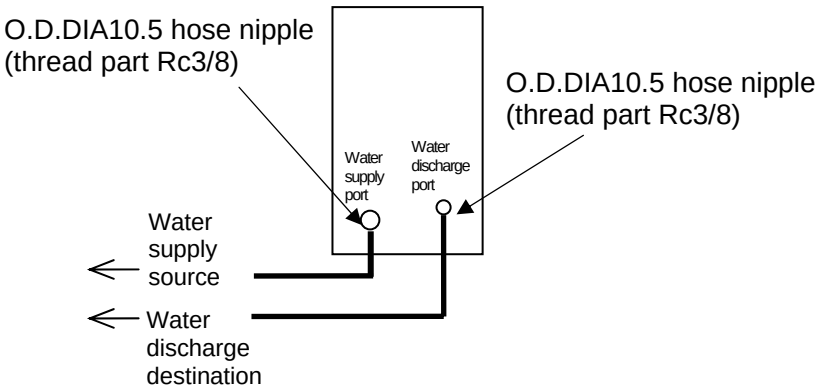
Don't open out the control panel on power ON.

※Each parts names are standard type.

Chapter 5 Installation

This chapter describes the method of installing the product step by step.

Step	Item	Description
1	Installation of the main unit	Install the main unit on a stable level floor. At the installation location, secure space to perform maintenance inspection as shown in Fig. 5.1. Figure 5.1 
2	Connection of piping hoses	● Connection of sell separately of hose (option) "Fully close" each valve of the medium feed port and medium return port, and connect as shown in Fig. 5.2. Apply sealing agent to the thread part of each hose connecting nipple, mount it to the medium feed port and the medium return port of the main unit and the mold, and then securely tighten the hose fittings. Figure 5.2  CAUTION ❍ Do not connect the hoses as they are bent at a bending radius smaller than the minimum, folded or twisted. ❍ Do not allow the hoses to interfere with other sections. ❍ Provide safety covers such as shielding plates to prevent the hoses from being trampled or crushed by an object.

Step	Item	Description
2	Connection of piping hoses	● Connection of water supply and water discharge hoses -Connect the water supply port of the main unit with a rubber hose to the water supply source of your facility. -Connect the water discharge port of the main unit to the water discharge destination of your facility with a heat-resistant rubber hose or SUS flexible hose. Figure 5.3  **CAUTION** ❍ Do not connect the hoses as they are bent at a bending radius smaller than the minimum, folded or twisted. ❍ Do not allow the hoses to interfere with other sections. ❍ Provide safety covers such as shielding plates to prevent the hoses from being trampled or crushed by an object. ❍ <u>In cases using H or A models at high temperatures, steam may shoot from the water discharge port upon cooling, therefore secure the water discharge hose to the water discharge pipe to prevent accidents.</u>

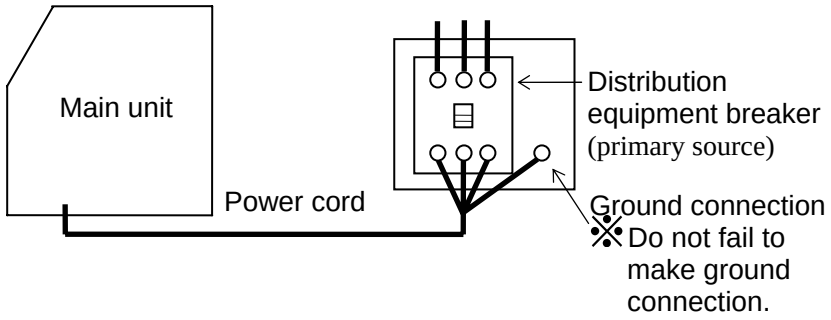
CAUTION

● Installation of drain pan
- ❍ Temperature control unit for water----Install a drain pan if dew fall occurs.
- ❍ Temperature control unit for oil-------Installation of drain pan is recommended because of small oil leakage from the mechanical seal.

[Reference]
The mechanical seal can not seal completely, about 5-6 drops of oil may leak per 1 hour.

● In the case of roll jacket

Install the unit on higher position than the roll jacket to prevent back flow of medium.

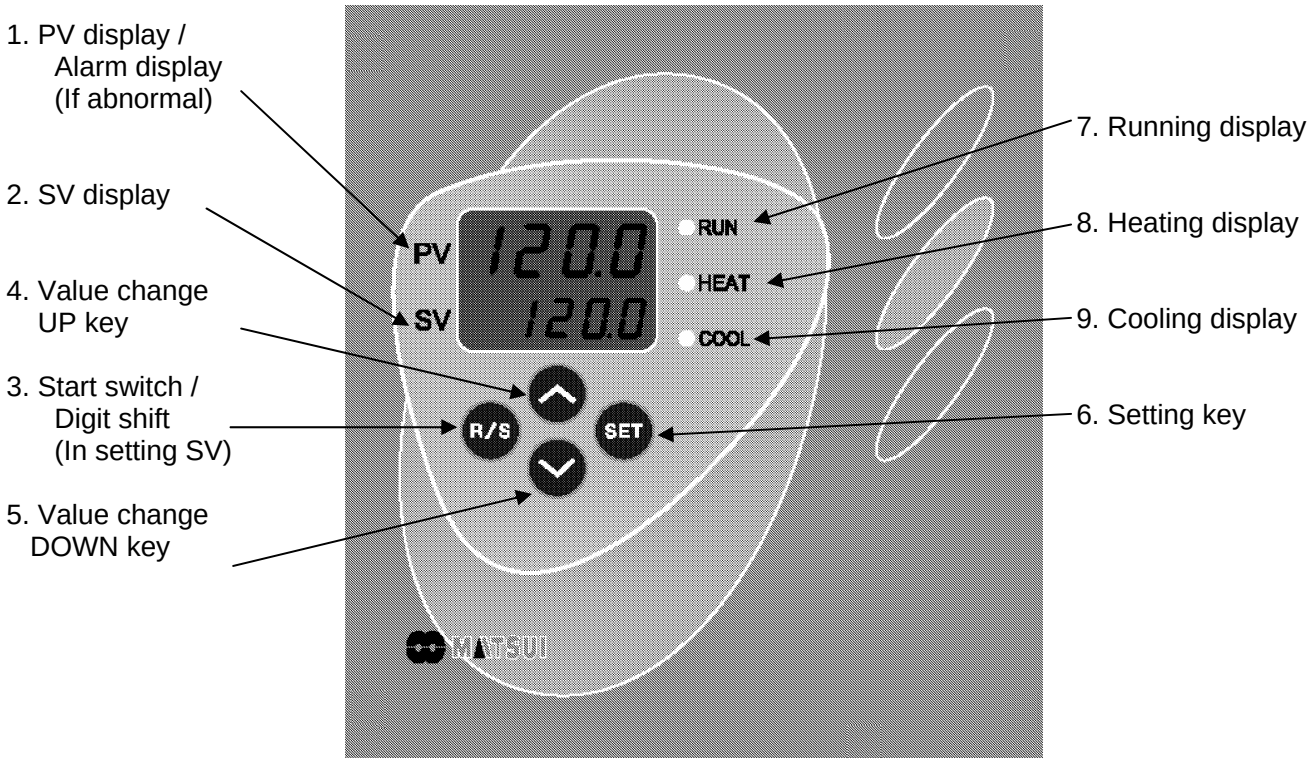
Step	Item	Description
3	Connection of power cord	Turn off the power breaker on the main power supply. Connect power cord (4m) from device to the primary source of equipment. R phase -------- Red Power cord D phase --------- White -------Primary source T phase ---------- Black E ---------- Green ----------For grounding Figure 5.4  **WARNING** ❍ Do not fail to turn off device power breaker before connecting power cord. ❍ Connection must be carried out by personnel qualified for Class II or higher electrician. ❍ Do not fail to make a proper ground connection.

Step	Item	Description
4	Checking for positive or reversed phases	Turn ON the power breaker of the unit. ⇩ Turn ON the primary power of your facilities. ⇩ Confirm whether or not reverse phase  indication on the control panel blinks. ⇩ No indication of reversed phase means positive phase, or the completion of power cord connection. If the reverse phase alarm appears, turn OFF the primary power source and exchange the R phase (red) and T phase (black) power cords of the three with each other. Turn ON the primary power source again to ensure reverse phase is not shown.

Chapter 6 How to operate temperature controller (MR-90)

1. Each part names of control panel

Figure 6.1 Control panel part of temperature controller

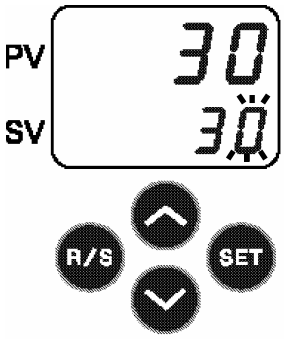
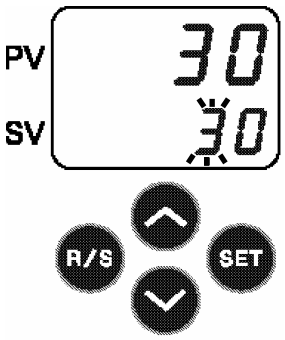
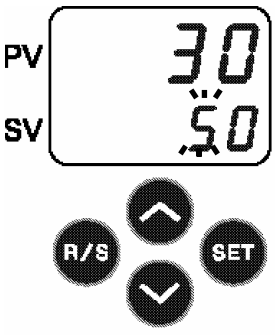


2. Each part names and function (Use)

No.	Symbol Mark	Name	Function(Use)
1.	AL 1	Reverse phase display	Displayed when the power cord has reversed phases.
	AL 2	Pump overload display	Displayed when the pump is overloaded and the thermal relay is tripped.
	AL 3	Sensor abnormal display	Displayed when the temp. sensor is broken.
	AL 4	Upper limit alarm display	Displayed when temperature exceeds the preset upper limit value.
	AL 5	Lower limit alarm display	Displayed when the temperature drops below the preset upper limit value.
		PV display	Displays the present value of the control temperature.
	L d.r	Medium level low alarm	Displayed when the medium level is low.
2.		SV display	Displays the setting value of the control temperature.
3.	R/S	Shift Digits / Run / Stop switch	Shifts digits in the setting mode. Run / Stop operation switch.
4.	^	Value change UP key	Used to increase the value in the setting operation.
5.	v	Value change Down key	Used to decrease the value in the setting operation.
6.	SET	Setting key	Used to unlock and set any values in the setting operation.
7.	RUN	Running display	Illuminated when the pump is operating.
8.	HEAT	Heating display	Illuminated when the heater is on.
9.	COOL	Cooling display	Illuminated during the cooling cycle.

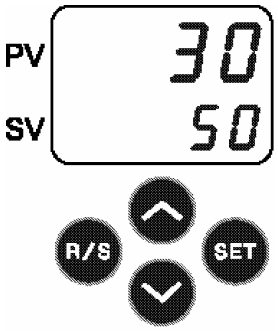
3. Setting and operation of the temperature control unit

This is an example of how to change the set temperature (SV) from 30° to 50°.

Step	Operation Item	Content of Operation
1	Switching to set mode.	 Press SET KEY. ⇩ The lowest digit blinks.
2	Shift blinking digit	 Press R/S key. Shift the digit to the left ⇩ The left digit blinks.
3	Value inputting	 Press ^ key. Increase to “5”.

(Continued from previous page)

⇩

Step	Operation Item	Content of Operation
4	Entering the setting value	 After inputting the value; Press SET key. ⇩ All the digits in set value are solid.

NOTE

Make sure to hit the “SET” key when finishing, otherwise the value will not be locked in.

The display will default back to the original display screen within a minute, if you hit the “SET” key and do not hit any other keys. Any value changes will be reverted also without hitting the “SET” key again.

Chapter 7 Preparation for operation

This section describes preparatory operations necessary for starting the device.

1. SV value setting of temperature controller (MR-90)

Setting Items	Setting contents
SV	Set control temperature using SV.

2. Using the “external start” function (option)

Wire the operation signal at your facility / molding machine. Refer to the wiring schematic for details.

3. Using a roll jacket (not common)

(In cases where the capacity is over approx. 20L, or a possibility of air accumulation.)

When using a roll jacket, because of large water volume and air accumulation, feed the water from the roll jacket side and vent the air from an air vent.

Likewise, for oil, feed the oil from the roll jacket side and vent the air. There is a method also to feed the oil after vacuuming. Consult with the roll jacket maker about the details.

※In cases where the roll jacket position is higher than the unit, there is a possibility for back-flow.
In this case, install the unit on the roll jacket.

Chapter 8 Operation

This section describes different operation, from starting to stopping, using the timers in sequence.

NOTE

Carry out the operations described in Chapter 7 “Preparation for Operation” before starting the running operations.

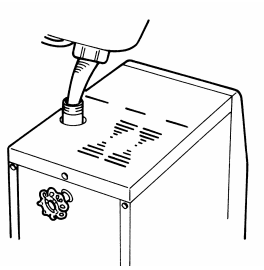
1. Operating procedure for L, H type (Medium is water type)

Step	Operation	Confirmation
1	Open the bypass / pressure control valve to full open position.	
2	Open your water supply valve.	No water leak is at hose or connection. Unit pressure gauge indicates “O”.
3	“Fully open” the feed / return medium valves.	
4	Press R/S key. ⇩ Medium supply will start. ⇩ Pump runs after medium fills. **NOTE** While filling the medium, the pump starts and stops intermittently, which is normal, because automatic filling occurs to make up the medium loss as the amount of the medium is sent into the hoses. ⇩ **CAUTION** For a roll jacket etc., the feed water also fills from the roll jacket side, so be sure to vent the air. ⇩ Continue to next page.	RUN lights up. ⇩ Ldr is displayed on SV value display. (Ldr **Operating on medium level low**) ⇩ Ldr is turned off when the medium supply completes. ⇩ Continue to next page.

Step	Operation	Confirmation
	⇩ If the medium temperature is less than 45°C / 113° F, the medium fills for 15 seconds (blow timer L type). Also, the heater is delayed for 10 seconds. During these modes, the temperature control (heating, cooling control) does not operate during operation. The controller starts after all timers have finished. **NOTE** ❍Do not change the setting values of the medium blow and the heater delay time. ❍The medium blow operation is only on initial power supply. ❍If a power failure occurs less than 20 ms and after power is reapplied, the unit will keep operating. (A power failure over 20 ms resets the unit to idle.**)**	⇩ Ensure there are no water leaks in the feeding medium hoses, the supply / return hoses, and fittings. Observe the pressure gauge and make sure it is within the range of: 0.1-0.40 MPa (1~ 4 kgf/cm² or 15~58 P.S.I.).
5	Press R/S key again, operation stops. **NOTE** If the external start contact is used, pressing the "RUN / STOP" does not influence the panel in an ON condition. When operation is stopped, RUN blinks.	RUN light turns off. SV value displays STOP
6	Be sure to turn off the power breaker for any prolonged periods of inactivity.	

※Turn "ON" the operation signal of your facilities when there is an external signal of the optional function.

2. Operating procedure for A type (Medium is thermal oil type)

Step	Operation	Confirmation
1	Confirms that the or not the drain cap is tightening up surely.	
2	Open the pressure control valve to be half position.	
3	Open your water supply valve.	No water leak is at hose or connection.
4	“Fully open” the feed / return medium valves.	Unit pressure gauge indicates “O”.
5	Press R/S key.	
6	Removes the oil plug on the expansion tank as in figure 8.1 and fill the thermal oil. Figure 8.1  The pump starts when thermal oil is supplied in constant quantity. At low temperature time, the viscosity of thermal oil is high, and time takes little to permeate through in the pump. When the pressure doesn't rise after pump operation, resumes operation 1-2 minute later once in the operation, cutting a switch. ⇩ Continue to next page.	In during feeding medium, L d.r is displayed. **WARNING** Be sure to wipe up the spilled over oil in refueling.

Step	Operation	Confirmation
6	**NOTE** When the thermal oil refuels, the oil in unit decreases only about the pump supply volume of medium and becomes the medium level low. Supply the thermal oil. For the prevention that the thermal oil supplies over too much, be sure to refuel when the pump stops in every time. ⇩ If the pump operation is stable, the medium supply is completion. Stop the refueling of thermal oil. Performs the air release in the refueling place (roll jacket). ⇩ After the heater control delay for 10 seconds, the temperature control starts. And the temperature control (heating, cooling control) does not operate during the heater control delay, **NOTE** ❍Do not change the setting value of the medium blow and the heater delay time.	⇩ PV value display is displayed present control temperature (actual value). There are no water leaks in the feeding medium, the returning medium hose, or the connection points. The pressure of this unit pressure gauge becomes below the standard pressure value.
7	Press R/S key again, operation stops. When setting the stop preparation time, the operation stops after the stop delay time. **NOTE** If external start contact is used optionally, ke R/S ssed external start contact in ON condition. When operation is stopped, RUN shed.	RUN is light off. SV value display is SToP displayed.
8	Be sure to block off the power breaker in stopping case.	

※Turn "ON" the operation signal of your facilities when there is an external signal of the optional function.

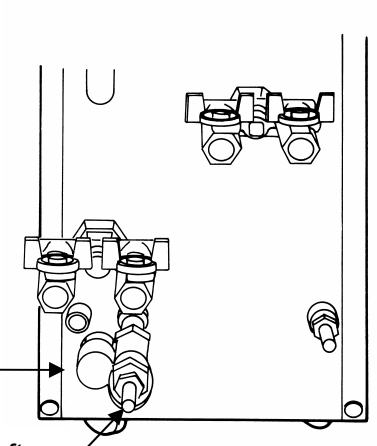
Chapter 9 Maintenance and checkpoints

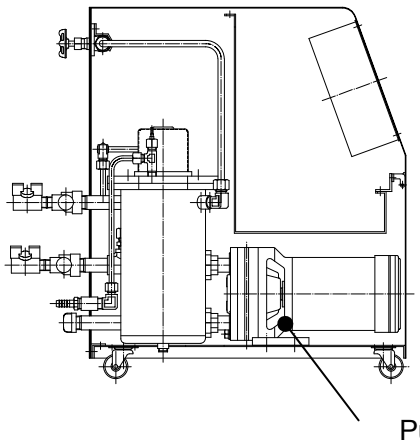
This chapter describes the possible causes of troubles you may encounter and the actions to be taken against them

⚠ WARNING

Never fail to examine the causes of any trouble and take remedies after allowing the molder to cool for 5 hr after stopping. (Use gloves.)
It is very dangerous during and immediately after operations becomes it is very hot.
Should any burn occur due to negligence of the above, immediately cool the very part with cold fresh water and seek prompt medical treatment.
Checking operations should be made only by authorized personnel.

1. Monthly maintenance and check

Items	Content of Operation
Medium check for GMCL, H type	Collect a proper amount of medium (water) from the drain port and check the water contamination. Set a collecting vessel under the drain port, and drain and exchange the medium. Figure 9.1 
Medium check for GMCA type	Pull out oil of the unit and check for dirty condition. Exchange if the total acid value is more than 0.5mgKOH/g. <Reference> If the machine runs frequently, check monthly. If the machine is seldom used, check every 6 months.

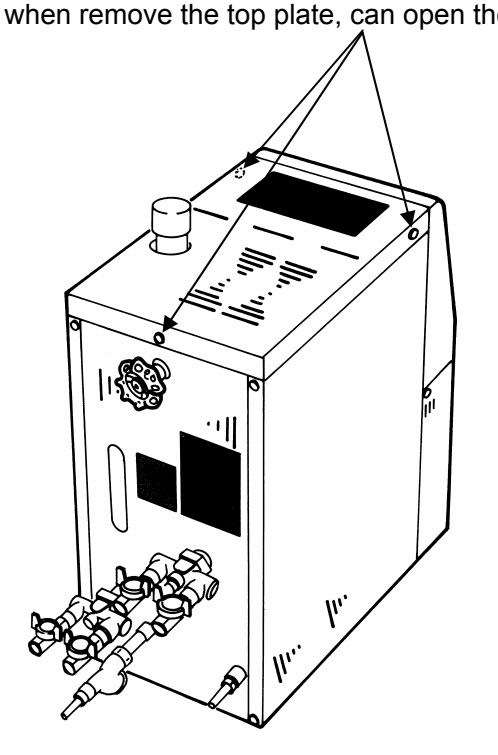
Items	Content of Operation
Hose check	Check the medium leakage from the vicinity of joint hardware, deformations (crush or bulge), flaws, cracks, wear and abnormal hardening. Replace the hose if the medium leakage occurs by flaws. ※The available temperature of each hose is as follows. ❍Rubber hose for L (Use only for hot water) : 95°C ❍Rubber hose for H (Use only for hot water) :120°C ❍Teflon hose (Use for high temperature water, oil) :200°C The hose will wear and tear early if use the hose around the temperature as described above (from temperature 20°C lower than the above to the above temperature). Replace the hose if abnormal conditions are found at the time of check. Replace every hose within a year (Teflon hose: within 1.5 years) as a guideline, if also using under lower temperature than it.
Cleaning of pump mechanical drain	Figure 9.2  Pump mechanical drain Remove the left side boards of unit and clean the medium accumulated in the pump mechanical drain. <Reference> The pump mechanical seal can not seal completely, about 4-5 drops of medium may leak per hour.

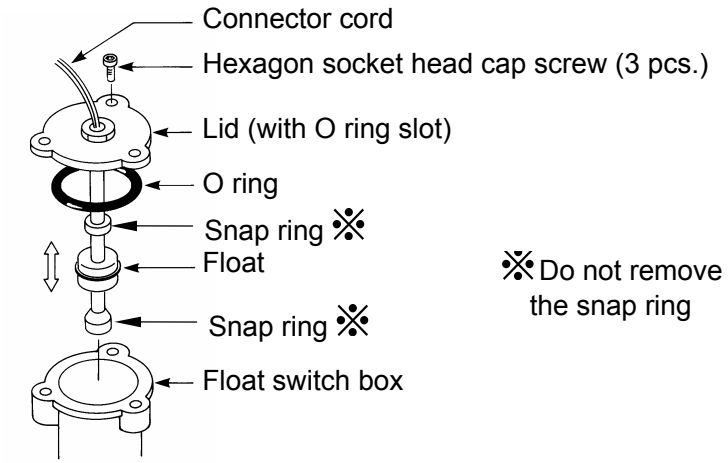
2. Maintenance and check for every three months

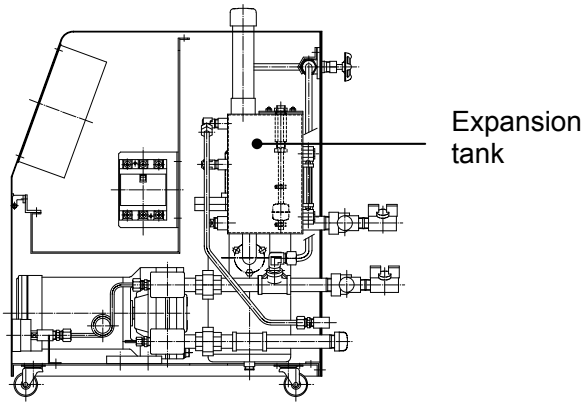
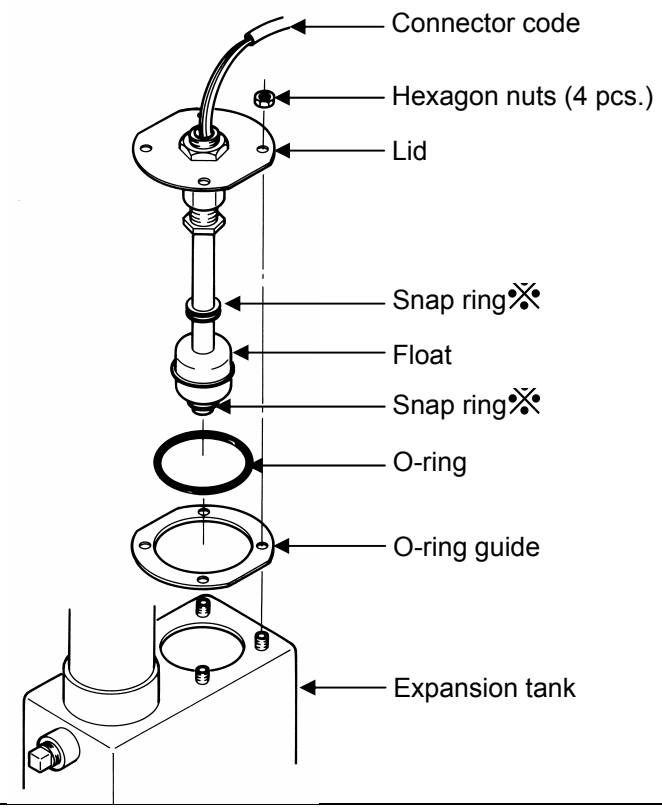
When checking the float switch (L, H type) and the float switch of expansion tank (A type), remove the top plate according to the following procedure:

Figure 9.3

When the eyebolts (3 pcs.) remove, can remove the top plate.
Also when remove the top plate, can open the control panel door.



Items	Content of Operation
Float switch check (GMCL, H type)	Check a float switch by the following procedure. Remove the lid after remove the connector cord of float switch box, and check the internal contamination of the float switch and whether the float moves smoothly. Figure 9.6  Take out the float switch and clean it up if the float does not move smoothly because of depositing impurities to the float part. It is need to replace the float switch when the float switch does not move smoothly by the deformation of the float. (Model; OLV-25S-1P L75) And replace the O ring of the lid if it becomes deformed or hardened (the state lacking elasticity and being cracked when bending).

Items	Content of Operation
	
	
Float switch check (GMCA type)	Check the float switch of expansion tank by the following procedure. Figure 9.6

	⇩ Check for contamination inside the float switch and smooth move of the switch after detaching the connector cord and removing the lid. Figure 9.7 ※Don’t remove the Snap ring.

Items	Content of Operation
Float switch check (GMCA type)	Take out the float switch and clean it up if the float does not move smoothly because of depositing impurities to the float part. It is need to replace the float switch when the float switch does not move smoothly by the deformation of the float. (Model; OLV-25S-1P L170) And replace the O ring of the lid if it becomes deformed or hardened (the state lacking elasticity and being cracked when bending).
Bolts and nuts of each unit	Look for bolts and nuts of each unit that have worked loose. Tighten the loosened ones.
Terminals for loose connection	After remove the top plate of unit, open the control panel door. ⇩ Performs to rising fastens after check that the wiring of control panel and heater part loosens.

3. Check of the heater contractor

The heater contactor is using SSR.

However, it sometimes damages by the electric impact (short) and the environment temperature rising.

In case of the abnormal occurrence, surely check by the following point. Also, do periodic inspection.

Items	Content of Operation
Heater contactor	Make the power breaker of the unit in "ON" (power lamp lighting-up) and make the operation switch in "OFF". If the heater contactor is normal, in this condition, the electric current to the heater circuit isn't flowing. Measure the electric current of the heater circuit using the clamp meter. When the electric current is flowing to the heater circuit, exchange SSR because SSR is breakdown. Repair and replace contact MATSUI S.D.I.

Chapter 10 Protection devices

This chapter describes the protective devices provided with the product: especially alarm monitor indication on PV display when any protective device becomes actuated along with troubleshooting.

⚠ WARNING

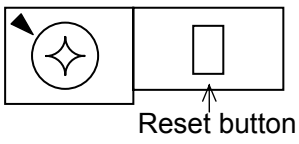
Never fail to examine the causes of any trouble and take remedies after allowing the molder to cool for 5 hr after stopping. (Use gloves.)
It is very dangerous during and immediately after operations becomes it is very hot.
Should any burn occur due to negligence of the above, immediately cool the very part with cold fresh water and seek prompt medical treatment.

- Power breaker with SHT

  The power breaker does a trip when overheat becomes abnormal.
  When the power breaker is trip, be sure to check the electromagnetic contact unit for heater.

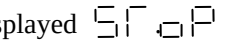
- Alarm monitor

Alarm indicator	Cause of failure/Interlock	remedy
AL 1 Negative phase	(Abnormal) Power cord is connected in negative phase. (Interlock) Starting becomes disabled. (Alarm reset)Turn OFF the primary source of distribution equipment. **NOTE** In press R/S , Once, can be ALARM reset (alarm cancellation). However, in the negative phase condition, once again, displays in ALARM.	Turn OFF primary source of distribution equipment, and exchange R phase power cord (red) with T phase (black) of tree to change to positive phase. ⇩ Turn ON primary source again. Confirm non-display of AL 1.

Alarm indicator	Cause of failure/Interlock	remedy
AL 2 Alarm for pump overload	(Abnormal)The pump motor works overload and the thermal relay trips. (Interlock) The operation will stop automatically. ※Estimated cause of failure -Different frequency (number of revolutions increase). Different to pump with 50 Hz/60 Hz. -Over pressure operation of pump -The specific gravity, the viscosity of the thermal oil is large. -Defective pump -Defective pump motor -Defective thermal -The mixing of foreign matter into pump	SV value display is displayed STOP ⇩ Blocked off the power breaker. ⇩ Remove causes. ⇩ Opens the control panel door, and press the reset button of thermal relay. ⇩ Closes the control panel door, and the power breaker is ON. ⇩ Conforms AL 2 of non-displaying. ⇩ Press R/S key, if the operation can be Restart, the measure is completion. RUN is light up.
	NOTE In press R/S, Once, can be ALARM reset (alarm cancellation). However, in condition that the reset button of thermal relay, once again, displays in ALARM. Figure 10.1 Thermal relay  	

Alarm indicator	Cause of failure/Interlock	remedy
L d.r Alarm for medium level low	(Abnormal)Medium decrease under the prescribed volume. (Interlock) The operation will stop automatically. ※Estimated cause of failure -Lacking in medium -Leaking of medium -Malfunction of float switch (Refer to "Chapter 9. Maintenance and check. Item 3".)	SV value display is displayed SToP ⇩ Blocked off the power breaker. ⇩ Remove causes. ⇩ The power breaker is ON. ⇩ Pressed R/S key, L d.r is displayed. The feeding medium (water supply) is doing automatically in case of L, H types. Fill the thermal oil if using A type model. ⇩ If medium returned the prescribed volume, the operation can be restarted automatically. In this, the measure is completion.

<table>
<tr><th>Alarm indicator</th><th>Cause of failure/Interlock</th><th>remedy</th></tr>
<tr><td rowspan="2"> 
Alarm for sensor failure</td><td>(Abnormal)The case that a sensor is broken or installation of the sensor is improper.

(Interlock)The operation will stop automatically.</td><td>SV value display is displayed 
⇩
After block off the power breaker, check the connection of sensor and a sensor.
When abnormal, repair and exchange.</td></tr>
<tr><td colspan="2">NOTE

In press R/S Once, can be ALARM reset (alarm cancellation).
However, in condition that does not repair or exchange the sensor, once again, displays in ALARM.</td></tr>
</table>

Alarm indicator	Cause of failure/Interlock	remedy
AL 4 Alarm for temperature upper limit	(Abnormal)Lacking in balance between the load in mold and the cooling capacity of this unit and lacking of cooling water on the high temperature of cooling water cause that the control temperature increase over the upper limit setting value. (Interlock) The operation will continue. ※Estimated cause of failure -Lacking of the cooling water -Lacking of the cooling capacity -Failure of the cooling electric valve -Heater power supply can not cut off. -Faulty working in the temperature control gauge	Press R/S key to stop the operation when replace the cooling solenoid valve, heater and temperature control gauge. SV display is displayed SI oP. ⇩ Replace after block off the power breaker. **NOTE** ❍The alarm does not work when the caution for upper limit setting value is "0". The alarm display may appear at the time of temperature rise according to the operating conditions, if set the setting value to 3℃ or below. ❍The alarm is reset when change the upper limit setting value to larger value (within 20℃) than the present situation.

Alarm indicator	Cause of failure/Interlock	remedy
AL 5 Alarm for temperature lower limit	(Abnormal)Lacking in balance between the load in mold and the cooling capacity of this unit and lacking of cooling water on the high temperature of cooling water cause that the control temperature increase over the upper limit setting value. (Interlock) The operation will continue. ※Estimated cause of failure -Lacking of the heating capacity -Full open the feeding water valve and cooling electric valve. -Heater power supply can not turn on. -Faulty working in the temperature control gauge	Press R/S key to stop the operation when replace the cooling solenoid valve, heater and temperature control gauge. SV display is displayed SL oP . ⇩ Replace after block off the power breaker. **NOTE** ❍The alarm does not work when the caution for lower limit setting value is "0". The alarm display may appear at the time of temperature rise according to the operating conditions, if set the setting value to 3°C or below. ❍The alarm is reset when change the lower limit setting value to larger value (within 20°C) than the present situation.
PV value display Blink display of actual temperature.	(Abnormal)Medium temperature exceeds the upper limit due to overshoot or capacity deficiency. ※Upper limit value GMCL type : 95°C GMCH type : 120°C GMCA type : 160°C (Interlock)Continues the operation.	-In case of overshoot, this alarm is automatically canceled as temperature control becomes stabilized. ⚠ **CAUTION** Increase in temperature implies capacity deficiency. Stop the unit operating.

Chapter 11 Troubleshooting

This section describes product abnormalities, their causes, and remedies. Check these before calling for repairs.

⚠ WARNING

- Before checking operations, always press the R/S key to stop running (SV display: STOP) and turn OFF the primary power source of distribution. Then, open the control panel door to turn off the power breaker.
  Be careful to make any checks before allowing the unit to cool for 5 hrs. It is very dangerous immediately after stopping because the unit components and medium are very hot.
  Should any burn occur due to negligence of the above points, immediately cool the burn with cold fresh water and seek prompt medical treatment.
- Checking operations should be made only by authorized personnel. Parts should be replaced only by servicemen from MATSUI service dept. or your authorized personnel.

Temperature controller control panel does not light up		
Check point	Remedy	Remarks
Check that the unit is plugged in. Check that the power breaker is ON.	Turned "ON" the power breaker. ⇩ ❍If immediately turns OFF, it implies a short circuit. ❍If turns ON once, check if the unit operates normally, and also check the SSR for the heater.	Durable switching times: 10,000 (measure) If switching function does not operate properly, replace power breaker. For short circuit, contact the MATSUI Service dept.
Open control panel door to check glass tube fuse (F1) is not blown.	If blown, replace.	The Fuse type is 250V-2A (DIA6.4×L30mm). If the fuse is blown again, contact the MATSUI Service dept. because it implies a short circuit.
Check if the temperature control gauge functions well.	Replace the controller as defective.	Contact MATSUI Service dept. for inspection and replacement.

Water not supplied.		
Check point	Remedy	Remarks
Check your water supply facilities (primary side cooling water). -Water supply valve -Drain system valves -Cooling tower pump	-Open the valve etc. sure. -Ensure the feeding pressure of primary side cooling water and drain side pressure are as specified. -Check for air-pocket at float switch.	PV display continues to display  For other checkpoints contact MATSUI Service dept.
Check whether the water supply solenoid valve functions well.	Repair or replace the water supply solenoid valve.	Contact MATSUI Service dept. for repair or replacement.
Check whether the solenoid valve for releasing air works normally.	Repair or replace the releasing air solenoid valve.	Contact MATSUI Service dept. for repair or replacement.

Pump does not run.		
Check point	Remedy	Remarks
Check whether the power cable connection terminals are tightened enough. (Not single phase)	Retighten the terminals.	Perform only after turning off the primary power supply at your facility.
Open the control panel door and check whether the magnetic switch (MS-1) functions well.	-Check voltage supplied to contactor coil. (Only qualified personnel should attempt). -Replace the magnetic switch (MS-1) with new one.	Durability switching times : 1,000,000 times or less than one year Contact MATSUI Service dept. for repair or replacement.
Check the contamination of medium. And check for foreign material / scale in the pump.	Replace the medium. Clean up the pump.	For other checkpoints contact MATSUI Service dept.

Pump pressure does not increase.		
Check point	Remedy	Remarks
-Check whether the pressure gauge functions well. -Check that the pump rotation is correct	-Replace the pressure gauge with new one.	

Pump pressure does not decrease.		
Check point	Remedy	Remarks
Check whether the supply medium valve and return medium valves are fully open.	Fully open the supply medium valve and return medium valves.	
Check whether there is pressure loss in the piping.	Use larger-diameter pipes and change their route. Installs the bypass on piping.	
Check whether the pressure gauge functions well.	Replace the pressure gauge with new one.	

1.Temperature does not rise 2.Temperature does not decrease 3.Big change of temperature		
Check point	Remedy	Remarks
Open the control panel door and check whether the electromagnetic contact unit works normally.	Replace SSR.	For replacing procedure and type of the parts, contact MATSUI S.D.I.
Check whether the heater contains a broken wire.	Replace the heater.	For replacement, contact MATSUI S.D.I. ※Applies to1.
Check whether the sensor contains a broken wire. (Confirmation by ALARM display)	Replace the sensor.	For replacement, contact MATSUI S.D.I.
Check the pressure loss in piping.	Use the large diameter piping and change the piping channel.	
Check whether the feeding water solenoid valve works normally. ※Only L, H type	Repair or replace the feeding water solenoid valve.	For repair and replacement, contact MATSUI Service Dept.
Check whether the cooling solenoid valve works normally. ※Only H, A type	Repair or replace the cooling solenoid valve.	For repair and replacement, contact MATSUI Service dept.
Check whether the releasing air solenoid valve works normally. ※Only H type	Repair or replace the releasing air solenoid valve.	For repair and replacement, contact MATSUI Service Dept. ※Applies to1, 2.
Check whether the relief valve works normally. ※Only H type	Repair or replace the relief valve.	For repair and replacement, contact MATSUI Service Dept. ※Applies to1.

Power breaker is tripped.		
Check point	Remedy	Remarks
Check whether the short circuit condition of electric circuit. Check whether the short circuit breaker of option is not ground faulted in the place.	Remove the short circuit.	Repairs should be made only by authorized personnel, or MATSUI Service dept.
Breaker is tripped by overheat thermostat.	Replace the temperature control gauge and the electromagnetic contact unit. Check the heater and the float switch for burning.	Repairs should be made only by authorized personnel, or MATSUI Service dept.

The unit's SV and PV displays differ excessively.		
Check point	Remedy	Remarks
Check the thermocouple.	Replace the thermocouple as necessary.	Check for scale or sludge which insulates the sensor.
Check whether the sensor is installed properly.	Securely insert the sensor and its position.	
Check whether the temperature control gauge functions well.	Replace the control gauge if defective.	Contact MATSUI Service dept. for repair or replacement.

Chapter 12 Specifications

GMCL, H, A-25U

Model		GMCL-25U	GMCH-25U	GMCA-25U
Power supply		Specified on the nameplate. NOTE 1		
Medium		Fresh water (Soft water) NOTE 2		Thermal oil
Cooling water quantity		Approx. 0.1Mpa-0.3Mpa over 7L/min		
Range of Using temperature		Feeding water temperature +10--95℃	Feeding water temperature +10--120℃	+60--160℃
Pump	Motor	300W 2P		
	Draining quantity	Refer to “Chapter 13. Pump performance diagram”.		
	Pump flow rate			
Heater	Heater capacity	3 Kw		
	Watt density	7.0 W/cm^2		3.0 W/cm^2
Heater box	Material	SUS 304		
	Heater capacity	1.5L	3.3L	
Temperature controller	Control operation	Heating, Cooling, PID operation		
	Input	K type Thermo couple		
	Setting / Display	Digital setting, Digital display		
	Protection functions of medium temp.	Possible to set a limiter with setting temperature.		
	Alarm indicator	Negative phase, Pump overload, Sensor abnormal, Medium level low, Upper limit, Lower limit, Displayed by each alarm number.		
Overheat protection		Circuit breaker with shunt coil (SHT) +Fixed thermostat		
Water level detector		Float switch		
Pressure gauge		DIA50 × 1MPa		
Piping NOTE 4	Supply port	3/8 B×1	Hose nipple + strainer	
	Drain port	3/8 B×1	Hose nipple	
	Feed medium port	Rc (PT) 3/8B×2	Ball valve	
	Return medium port	Rc (PT) 3/8B×2	Ball valve	
Outer dimensions		(W) 230 × (D)495 × (H)580 mm NOTE 3		
Weight		Approx. 45 kg		Approx. 50 kg

NOTE

1. This system is intended for 50Hz, 60Hz only. It is impossible to use another cycle.
2. Water quality: The extent of standard quality of makeup water of The Japan Refrigeration and Air Conditioning Industry Association Standard.
   (PH=6-8 calcium, silica, chlorine and iron are not included so much)
3. Outer dimensions do not include piping.

GMCL, H, A-55U

Model		GMCL-55U	GMCH-55U	GMCA-55U
Power supply		Specified on the nameplate. NOTE 1		
Medium		Fresh water (Soft water) NOTE 2		Thermal oil
Cooling water quantity		Approx. 0.1Mpa--0.3Mpa over 7L/min		
Range of Using temperature		Feeding water temperature +10--95℃	Feeding water temperature +10--120℃	60--160℃
Pump	Motor	600W 2P		
	Draining quantity	Refer to “Chapter 13. Pump performance diagram”.		
	Pump flow rate			
Heater	Heater capacity	5 kW		
	Watt density	7.0 W/cm^2		3.0 W/cm^2
Heater box	Material	SUS 304		
	Heater capacity	2.0L	4.4L	
Temperature controller	Control operation	Heating, Cooling, PID operation		
	Input	K type Thermo couple		
	Setting / Display	Digital setting, Digital display		
	Protection functions of medium temp.	Possible to set a limiter with setting temperature.		
	Alarm indicator	Negative phase, Pump overload, Sensor abnormal, Medium level low, Upper limit, Lower limit, Displayed by each alarm number.		
Overheat protection		Circuit breaker with shunt coil (SHT) +Fixed thermostat		
Water level detector		Float switch		
Pressure gauge		DIA50 × 1MPa		
Piping NOTE 4	Supply port	3/8 B×1	Hose nipple + strainer	
	Drain port	3/8 B×1	Hose nipple	
	Feed medium port	Rc (PT) 3/8B×2	Ball valve	
	Return medium port	Rc (PT) 3/8B×2	Ball valve	
Outer dimensions		(W) 230 × (D)547 × (H)600 mm NOTE 3		
Weight		Approx. 55 kg		Approx. 60 kg

NOTE

1. This system is intended for 50Hz, 60Hz only. It is impossible to use another cycle.
2. Water quality: The extent of standard quality of makeup water of The Japan Refrigeration and Air Conditioning Industry Association Standard.
   (PH=6-8 calcium, silica, chlorine and iron are not included so much)
3. Outer dimensions do not include piping.

GMCL, H, A-88U

Model		GMCL-88U	GMCH-88U	GMCA-88U
Power supply		Specified on the nameplate. NOTE 1		
Medium		Fresh water (Soft water) NOTE 2		Thermal oil
Cooling water quantity		Approx. 0.1Mpa--0.3Mpa over 7L/min		
Range of Using temperature		Feeding water temperature +10℃ --95℃	Feeding water temperature +10℃ --120℃	60℃ --160℃
Pump	Motor	1W 2P		
	Draining quantity	Refer to “Chapter 13. Pump performance diagram”.		
	Pump flow rate			
Heater	Heater capacity	8 kW		
	Watt density	7.0 W/cm^2		3.0 W/cm^2
Heater box	Material	SUS 304		
	Heater capacity	2.6L	5.8L	
Temperature controller	Control operation	Heating, Cooling, PID operation		
	Input	K type Thermo couple		
	Setting / Display	Digital setting, Digital display		
	Protection functions of medium temp.	Possible to set a limiter with setting temperature.		
	Alarm indicator	Negative phase, Pump overload, Sensor abnormal, Medium level low, Upper limit, Lower limit, Displayed by each alarm number.		
Overheat protection		Circuit breaker with shunt coil (SHT) +Fixed thermostat		
Water level detector		Float switch		
Pressure gauge		DIA50 × 1MPa		
Piping NOTE 4	Supply port	3/8 B×1	Hose nipple + strainer	
	Drain port	3/8 B×1	Hose nipple	
	Feed medium port	Rc (PT) 3/8B×4	Ball valve	
	Return medium port	Rc (PT) 3/8B×4	Ball valve	
Outer dimensions		(W) 295 × (D)574 × (H)740 mm NOTE 3		
Weight		Approx. 70 kg		Approx. 75 kg

NOTE

1. This system is intended for 50Hz, 60Hz only. It is impossible to use another cycle.
2. Water quality: The extent of standard quality of makeup water of The Japan Refrigeration and Air Conditioning Industry Association Standard.
   (PH=6-8 calcium, silica, chlorine and iron are not included so much)
3. Outer dimensions do not include piping.

Chapter 13 Technical manual

1. Pump Performance

Figure 13.1 (50Hz)

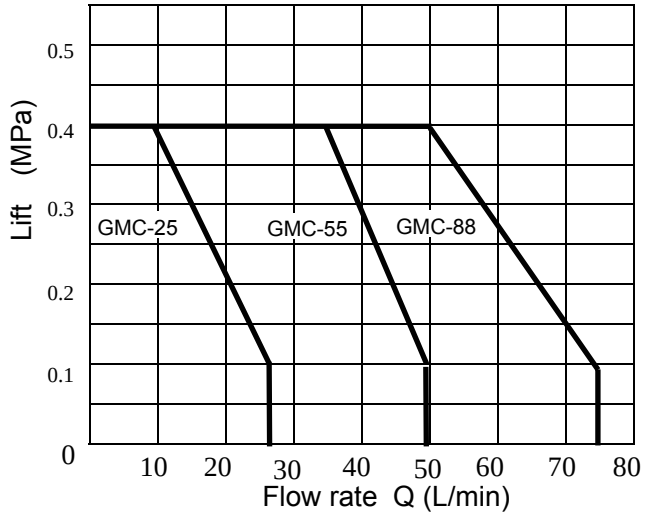
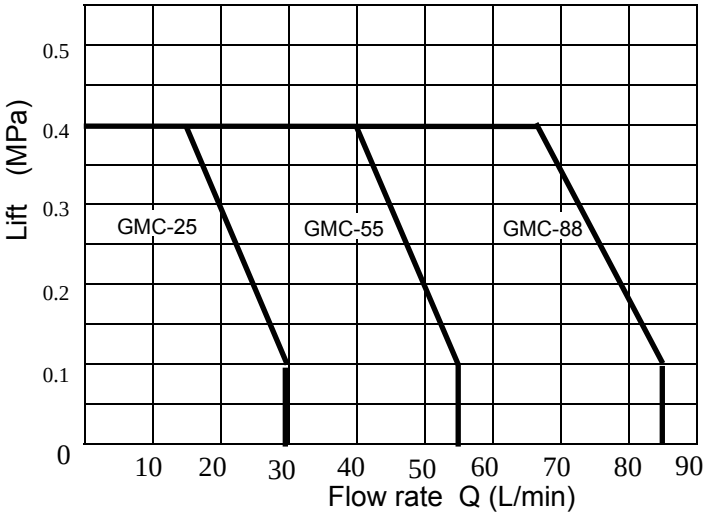


Figure 13.2 (60Hz)



※The Pump performance curve is under 30-40°C water condition.
Pump performance drops as specific gravity down.
As specific gravity up, Performance goes better, but the pump apt to overload.

Pump discharge pressure for GMCH type

GMCH type is airtight structure.
Internal pressure of heater tank in operation becomes following value for influence of steam pressure.

Water temp.	Internal pressure in heater box	Setting pressure of relief valve
90°C	0.071MPa	0.25MPa
100°C	0.10MPa	
110°C	0.15MPa	
120°C	0.20MPa	

※Change by the water supply pressure, pipes drain back pressure etc.

As a result, the pressure that adds the internal pressure of heater box to the pump discharge pressure is indicated on the pressure gauge of the front of unit.
For that real discharge pressure, once stop the operation and confirm the real internal pressure of hater box by the pressure gauge after the operation start and the medium temperature become the prescribed temperature, and determine the pump discharge real pressure by using the follow formula.
Adjust the pump discharge pressure within the permissible limit of the pump performance diagram by the pressure regulating valve as indicated Figure 13.1, 13.2.

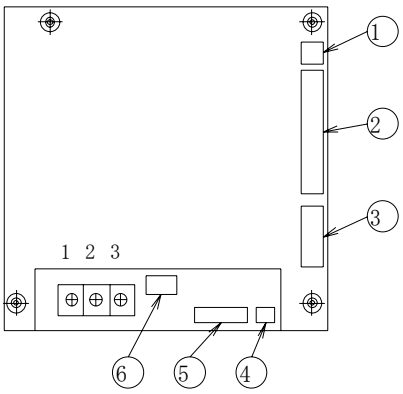
[Pump discharge real pressure] = [Pressure during operation] – [Pressure at stop operation]
[Operation pressure] = [Pump discharge pressure] + [Pressure while pump is stopped / idle]

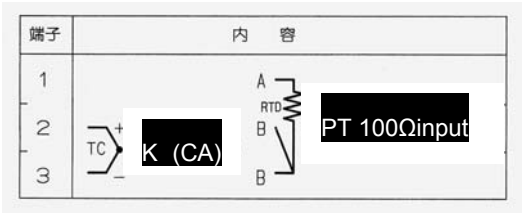
However, the calculation of real pressure GMCA type is,

$$\text{Real pressure} = \frac{\text{Gauge pressure}}{\text{Specific gravity of oil}}$$

Determine flow rate from the real pressure with performance curve.
Specific gravity of oil = Approx. 0.8.

2. Terminal / connector part of temperature control gauge





1.Power connector CN202	
Pin No.	Signal
1	Power S phase
2	Power R phase

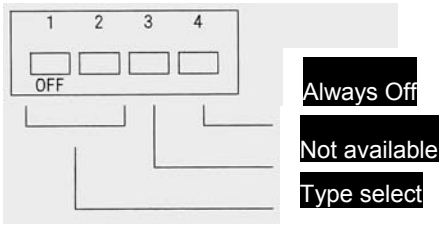
2.Output connector 1 CN204	
Pin No.	Signal
1	General Alarm(make switch)
2	
3	Out of use
4	Pump(R phase)Relay Output
5	Pump(S phase)Relay Output
6	Cooling(R phase)SSR Output
7	Cooling(S phase)SSR Output
8	Out of use
9	Heating(R phase)SSR Output
10	Heating(S phase)SSR Output

3.Phase reverse detection(3phase) CN203	
Pin No.	Signal
1	R phase Input
2	Out of use
3	S phase Input
4	Out of use
5	T phase Input

4.External Input 1(make switch) CN3	
1	External Start Signal
2	

5.External Input 2(make switch) CN4	
1	FS-1 Medium Full
2	
3	FS-2 Medium Low
4	
5	OCR-1 Pump Overload
6	

6.Dip Switch Setting



Type selection		
Switch No.		Type
1	2	
OFF	OFF	L(Standard)
ON	OFF	H,A(Standard)
OFF	ON	Out of use
ON	ON	Out of use

Chapter 14 Parts list

Code No.	Parts name	Maker	Model / Material	Qty.	Replace term	Remarks (application)
	Mechanical Seal	Matsui	For GMC-25	1	1 year	GMC-25
			For GMC-55/88	1		GMC-55/88
	Bearing(Load side)	Matsui	6204ZZC3-EA7	1	1 year	
	Bearing (Un-load side)	Matsui	6202ZZNCXC3-EA7	1	1 year	GMC-25
			6202ZZNCXC3-EA7	1		GMC-55
			6202ZZNCXC3-EA7	1		GMC-88
	-ring(Pump cover)	Commercial	G80 4grade D	1	1 year	GMC-25
			G90 4grade D	1	1 year	GMC-55
			G95 4grade D	1	1 year	GMC-88
10627	O-ring (Heater)	Commercial	G80 4grade C	1	1 year	L,H
10699	O -ring (Heater box)	Commercial	G135 4grade C	1	1 year	L,H
10628	O -ring (Heater)	Commercial	G80 4grade D	1	1 year	A
10700	O -ring (Heater box)	Commercial	G135 4grade D	1	1 year	A
	O -packing (Float switch)	Matsui	T3 DIA23 DIA13.2	1	1 year	----------
	O -ring (Lid of float switch)	Commercial	P50 4grade D	1	1 year	L,H
	Gasket (Expansion tank)	Matsui	DIA66×DIA18×t1.5 Non-Asbestos	1	1 year	A
	Electromagnetic switch unit	Mitsubishi Electric	MSO-N10 2-3A	1	1 year	GMC-25 AC230V
		Mitsubishi Electric	MSO-N10 2.8-4.4A	1	1 year	GMC-55 AC230V
		Mitsubishi Electric	MSO-N10 4-6A	1	1 year	GMC-88 AC230V
	SSR for heater	OMRON	G3PB-215-VD	2	10 years	GMC-25 AC230V
		OMRON	G3PB-225-VD	2	10 years	GMC-55 AC230V
		OMRON	G3PB-245-VD	2	10 years	GMC-88 AC230V
	Electromagnetic switch unit	Mitsubishi Electric	MSO-N10 1-1.6A	1	1 year	GMC-25 AC460V
		Mitsubishi Electric	MSO-N10 1.7-2.5A	1	1 year	GMC-55 AC460V
		Mitsubishi Electric	MSO-N10 2.8-4.4A	1	1 year	GMC-88 AC460V
	SSR for heater	OMRON	G3PA-420B	2	10 years	GMC-25 AC460V
		OMRON	G3PA-420B	2	10 years	GMC-55 AC460V
		OMRON	G3PA-430B	2	10 years	GMC-88 AC460V
01573	Glass Tube Fuse	Commercial	250V-2A (DIA6.4×L30)	1	6 month	
13032	Relief valve	Matsui	1/4B 2.5k	1	3 years	GMCH