# **MOLD TEMPERATURE CONTROLLER**

GMC-L/H/A 25,55,88 MCL/H/A200, 350

# **INSTRUCTION MANUAL**

# **!** WARNING

Thank you for choosing MATSUI product.
Please read this manual carefully and
keep this manual near machine for
easy access whenever required.

# How to move the main unit of the product

When moving the product, be careful not to overturn.

Also, when moving the product, be careful to prevent vibration and impacts.



- When unpacking, use work gloves.
- The hoist operator must be qualified for crane operation and slinging skill.
- When moving with a hoist, be sure to loop the belt inside the casters.



# INTRODUCTION

Thank you for choosing MATSUI product. Please carefully read this instruction manual for correct and safe use. In addition, this page of this instruction manual serves as the product warranty.

# 1. Warranty Period

Warranty of this product covers repair or replacement of parts free of charge if any failure occurs even when this product is normally used according to the operation procedures, etc., within the warranty period.

In addition, products which have been claimed to fail, shall be returned to us.

- 1)The warranty period shall be twelve months after installation or fifteen months after the date of invoice, whichever is earlier.
- 2)The warranty period for parts replaced during repairs shall be three months from the date of repairs.

#### 2. Scope

The following items, if applicable, are not covered by the free warranty even within the warranty period.

- 1) Failure or damage caused by modifications or repairs carried out by any person other than Matsui
- 2) Failure or damage caused by natural disasters such as earthquake, typhoon, flooding, etc., and accident or fire
- 3)Failure or damage caused by use exceeding the limits of specifications described in this instruction manual, catalog, etc., or by installation environment
- 4) Failure or damage caused by improper use or handling
- 5)Effect on products caused by external factors
- (Paint peeling due to generated gas, malfunction due to electrical noise, etc.)
- 6)Failure or damage caused by use of parts other than genuine parts (oil, medium, filter, etc.)
- 7) Consumables (hoses, filters, packings, O-rings, magnetic contactors, mechanical seals, etc.)
- 8) When the product is transferred or leased to third party
- The scope of warranty includes up to repair or replacement of parts of our products, and does not include products manufactured by use of our products and damage to other products due to failure or use of our products. In addition, "transportation expenses," "customs duties," "travel expenses" and "commuting expenses" associated with the repair or replacement of parts shall not be covered.
- The product price does not include the following service expenses. They are separately charged. (However, this
  does not apply if the contract includes the following)
  - 1)Technical guidance and technical education
  - 2)Installation adjustment guidance and trial operation attendance
  - 3) Maintenance and inspection, adjustment and repair

#### 3. After warranty period

If performance can be maintained by repairs, repair the equipment shall be done on paid basis.

#### 4. Spares Availability

Functional parts for repairs can be supplied for eight years only.

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The chapters identified with the mark 1 contain critical information. You must carefully read and well understand them before you can start using this product.

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# **CHAPTER-1: SAFETY PRECAUTIONS**

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



When performing the operations, maintenance, & services of the products, make sure to observe the safety precaution included in this document. We shall take no responsibility and/or liability for any injury or accident attributable to your failure in observing such precaution.

# 1. Hazardous Level Marks and Their Meanings

This manual uses the following convention for the hazardous level marks:

Mark	Meaning
<b>▲</b> DANGER	Improper handling might lead to your death. This mark is followed by the information provided to avoid such a result.
<b>! WARNING</b>	Improper handling might lead to your serious injury. This mark is followed by the information provided to avoid such a result.
( CAUTION	Improper handling might lead to your slight injury or damage on the products. This mark is followed by the information provided to avoid such a result.
NOTE	This mark is followed by the information provided to call for user's particular attention in the context of operation procedures and explanatory statements.
A	This mark is used to indicate a point to which user should pay particular attention in handling something.
*	This mark is used to indicate an exceptional condition or description in figures and tables.

#### 2. Safety Precautions

Be sure to observe the following precautions when operating this equipment.



Perform operation after turning OFF the primary side power.



## 1)Simplified boiler (once-through hot water boiler)

This machine is a once-through hot water boiler specified in the Industrial Safety and Health Act, and classified as "simplified boiler." This is not subject to the "Ordinance on Safety of Boilers and Pressure Vessels."

Notification and filing of application for approval of use, etc., to the supervisory authorities are unnecessary.

Model	25	55	88
Max. allowable working pressure	0.3 Mpa	0.3 Mpa	0.3 Mpa
Heat-transfer area	0.2 m²	0.3 m <sup>2</sup>	0.45 m²

#### 2)No modification

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

# 3) Machine stopping procedure

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

Press RUN key on the control panel to stop operation



Shutdown the disconnect switch of the unit or the power breaker. (Make sure to do this.)



When unavoidably closing the medium feed and return valves, water supply side valve, and the drain side valve, close them at last. However, when restarting operation, never fail to fully open the medium feed and return valves, water supply side valve, and the drain side valve before starting the unit.

### \* NEVER OPERATE WITH VALVES COMPLETELY CLOSED.

This will create a totally-enclosed condition creating a dangerous situation. Increasing pressure inside the unit's pipes could cause an explosion. Fully open the valves during operation.

## 4)Piping

# (1)Drain Piping

The water drain port is also used as a heater box internal pressure relief pipe. If the water drain port is closed, the heater box is completely and hermetically closed.

When installing a check valve in the drain piping, always indicate normal fully open, and use the hand-lock without fail.

# (2)Piping from machine

Before starting operation every day, check for any deterioration of the rubber hoses to the molding machine mold, etc. In particular, carefully check for looseness of the mouth ring and damage of hoses. If any abnormality is found, immediately replace with a new one.

#### 5) Never operate in an environment with abnormal gases

Never use this product in an environment that may contain combustible / corrosive gases and vapors. It is very dangerous to use this product in such environments.

#### 6) Electrical Power

Never carry out an electrical inspection or repair without the proper personnel. Either our technical service representative or an employee of your company with sufficient knowledge about electricity should be present. These operations include the risk of a shock and injury.

### 7) Inside of the Product

The product contains high-voltage and high-temperature areas, which could cause shock, burns or injury. Therefore, no one other than our service division staff, or someone who fully understands the product, should touch the inside of the product.



## 1)Disposal of the product and it part

When disposing of the product or its' parts, comply with applicable laws of the region.

#### 2) Power Supply

- Make sure to check the specifications on the nameplate of the unit.
- Power supplies of different voltage and frequency cannot be used.
- Secure a good ground (earth) connection.
- Use within the allowable voltage range (±10% of the rating).

Use outside the allowable voltage range will cause malfunction, poor operation or a breakdown.

# **NOTE**

## 1)Inspection and Overhaul

For a long-used unit, we recommend to perform inspection and overhaul of safety equipment (with charge) every 4 to 5 years, even if you do not have any problem with its use. Contact our service division for inspection and overhaul.

## 2)Wiping

Do not wipe with petroleum base solvents. Benzene, thinner, polishing powder, etc., will damage the surface. In case of heavy dirt, wipe with a soft cloth thoroughly squeezed after dipped into hot water which temperature is below 40°C.

#### 3) Machine labels

Labels are affixed at places requiring special attention and 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 label is dirty, wipe it with a soft cloth thoroughly squeezed after dipped into hot water which temperature is below 40°C. Never use petroleum based solvents or thinners.

#### 2) Labeling Positions

For label positions and descriptions of warnings and cautions, see the attached drawings

# **CHAPTER-2: PRECAUTIONS FOR USE**

This chapter explains precautions specific to this product.

To prevent dangerous situations, precautions are described with headings (See Section 1, Chapter 1) from the most important items.



## 1. Available temperature range

Control the medium temperature within the available temperature range as shown in Table 2.1.

Operation outside of the recommended temperature range will lead to a breakdown or an accident. Therefore do not attempt this.

Table 2.1

Model	Medium	Available temperature range
GMC-L	Soft Water	Water supply temperature +10°C to 95°C (Max.)
GMC-H	Soft Water	Water supply temperature +10°C to 120°C (Max.)

## 2. Inside of the product

High-voltage and high temperature locations exist inside the operating product. Therefore, do not operate with the front panel opened or with the outer panels removed. It could lead to a breakdown or an accident.

## 3. Cautions during operation

The valves and piping sections will become hot, over 100°C.

Never touch these areas with your bare hands. (Touch only with gloved hands.) In addition, note that improper valve operation causes high temperature medium to blow out.

#### 4. Drain Port

When running at 60°C or above, hot water or steam will escape from the drain port. Refer to "Item of Install" about piping installation



#### 1. Environmental conditions

Use the product where ambient temperature is higher than 0°C and lower than 40°C and humidity less than 85%. Use outside of these conditions may cause a breakdown or an accident.

## 2. Initial water supply

If the product is used for anything having a volume of 20 L or more, such as a roll jacket, make sure to install a water supply port and air vent port on the roll jacket side. Supply water from there.

#### 3. Conditions of use

This product discharges water by pump, and controls the temperature while circulating it continuously. It cannot be used if circulation destination is open (open thing such as water tank) or if there is an "ON-OFF" control valve. When using this product for a roll jacket etc., make sure to install an air vent port to vent air when supplying medium. This may not be used unless air is vented.

#### 4. Control Panel

- Because of non-waterproof structure, be careful not to splash water or oil. Failure to do so may cause a breakdown.
- Do not open the control panel unnecessarily except for maintenance and inspection. Otherwise it may lead to a breakdown or an accident.
- Periodically clean so as to prevent the accumulation of dust in the control panel.

#### 5. Protection devices

All protection devices included in this unit have been adjusted at factory prior to shipping. Readjustment is unnecessary. So, please do not touch.

#### 6. Temperature sensor

Use K (CA) non-contact type thermocouple as the temperature sensor.

### 7. Water supply pressure and drain pressure

- Water supply pressure and drain pressure (L95, H120 type)
- Supply water at a pressure within the range of 0.1 MPa to 0.3 MPa.
- When water supply pressure is higher than 0.3 MPa, install a reducing valve and adjust pressure to 0.3 MPa.
- Set drain side pressure to be lower than 0.1 MPa.
- Always set water supply pressure higher than drain pressure 0.05 MPa to 0.3 MPa.
- In case of using L type at medium temperature 85°C to 95°C, drain pressure must be 0.03 MPa to 0.1 MPa.
- In case of using H type at medium temperature 100°C to 120°C, drain pressure must be 0.2 MPa to 0.3 MPa.
- If sufficient water supply quantity cannot be secured, water pressure may decrease when cooling. Insure sufficient water supply. If water supply pressure decreases when medium temperature is higher than 100°C, pump will run dry and it may be damaged.
- For H type, cooling water always flows from the drain port

Table 2.2 Water supply pressure and steam pressure

Operating temperature (°C)	100	110	120	130
Water supply pressure (Mpa)		0.2 to 0.3		0.3 to 0.4
Steam pressure (MPa)	0	0.04	0.10	0.17



# 8. Piping Material

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

Table 2.3 [Reference] (Optional accessories)

Piping Material	Available temperature (°C)	Minimum bending radius (mm)	*3 Service life (h)
*1 Rubber hose (for L) for warm water only	95	110	4000
Rubber hose (for H) for warm water only	120	110	4000
*2Teflon hose for hot water	200	110	6000

<sup>\*1: -</sup> B set hose for L

Three types above are available.

# Carefully read the instructions enclosed with the hose for fitting

### 9. Long-term storage and at time of relocation

When storing this machine in stopped condition for long time or relocating, completely drain medium from machine. Any water remaining in pump or tank will result in failure of machine due to freezing and rusting. To drain water, remove plug at bottom of tank and blow air from medium feed/return ports and water supply/discharge ports.

#### 10. Pump pressure

Use pump pressure lower than specified pressure in Table 2.4. Adjust pressure by using pressure regulating valve at back of machine.

Table 2.4

Model	Specified pressure (50 Hz/60 Hz)
GMC-L/H	0.40MPa

• Pump pressure added with internal pressure is displaying at pressure gauge on front panel of machine. Checks pump pressure by deducting internal pressure from pressure during operation. (However, check the value on the pressure gauge when not performing cooling control.)

<u>Pump pressure = Pressure during operation - Pressure during stoppage (internal pressure)</u>

<sup>\*2: -</sup> Teflon hose only

<sup>-</sup>Teflon hose + SUS blade

<sup>-</sup>Teflon hose + SUS blade + SUS spring

<sup>\*3:</sup> Guidelines on the operating life are listed above, however, check deterioration status of the hose every day, and replace the hose if it is deteriorated.



## 11. Pressure regulating valve

If OPEN pressure regulating valve, a lot of water will flow in bypass piping inside machine and discharge pressure will drop. But flow rate of medium feed side will decrease.

If CLOSE pressure regulating valve, flow rate will increase but if discharge pressure increase higher than o.4 MPa (based on pump pressure), overload operation will occur. Please adjust pressure to be lower than 0.4 MPa.

## 12. Quality of medium

Use clean soft water with no impurities such as sand, clay or refuse. Water used should satisfy quality standards shown in Table 2.5. Water with electric conductivity less than 50  $\mu$ S/cm such as pure water and distilled water cannot be used as a medium.

Low water quality will result in problems such as:

- Heat exchange efficiency drop due to scale adhesion at heater or heater burnout.
- Pump damages or stops due to scale biting.
- Water flow rate downs due to clogging inside pipes.
- Abnormal wear of the pump's mechanical seal.

### Problems caused by water quality shall be repaired with charge even during the warranty period.

Table 2.5 Water quality standards (The Japan Refrigeration and Air Conditioning Industry Association Standard: Guidelines on Water Quality for Refrigeration and Air Conditioning Equipment

JRA-GL-02-1994)

	Item		Food Water	Trends	
			Feed Water	Corrosion	Scale
	рН	[25oC]	6.0 to 8.0	0	0
ဟ	Conductivity	(µS/cm) (25oC)	50 to 300	0	0
em	Chloride ion	(mgCl <sup>-</sup> /L)	Less than 50	0	
Standard items	Sulfuric acid ion	(mgSO <sub>4</sub> <sup>2-</sup> /L)	Less than 50	0	
dar	Acid consumption	(pH 4.8) (mgCaCO <sub>3</sub> /L)	Less than 50		0
tan	Total hardness	(mgCaCO <sub>3</sub> /L)	Less than 70		0
0	Calcium hardness	(mgCaCO <sub>3</sub> /L)	Less than 50		0
	lon-shape silica	$(mgSiO_2/L)$	Less than 30		0
	Iron	(mgFe/L)	Less than 0.3	0	0
items		(mgCu/L)	Less than 0.1	0	
ite	Copper	(mgS <sup>2-</sup> /L)	Not to be detected	0	
nce	Sulfuret ion	(mgNH <sub>4</sub> <sup>+</sup> /L)	Less than 0.1	0	
Reference	Ammonium ion	(mgCl/L)	Less than 0.3	0	
Ref	Residual chlorine	(mgCO <sub>2</sub> /L)	Less than 4.0	0	
	Isolation carbonic acid		-	0	0

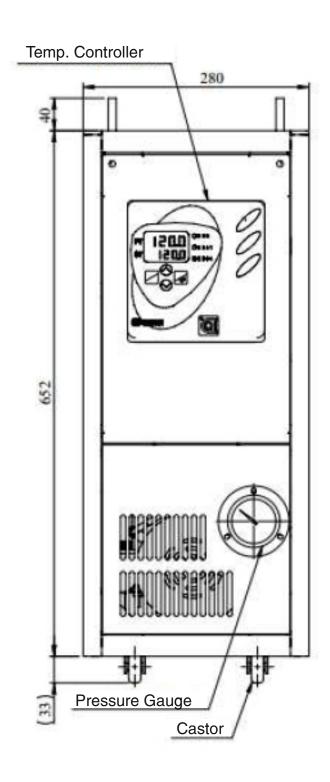
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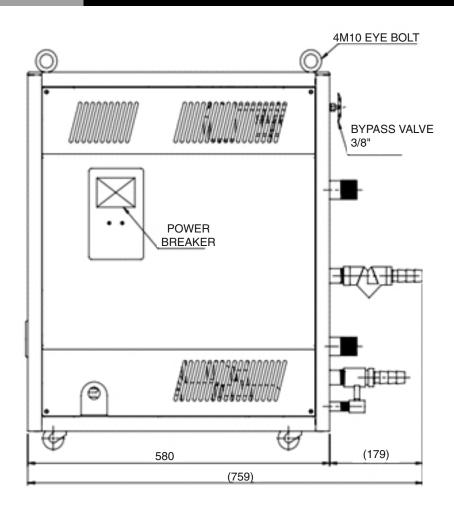
# **CHAPTER-3: CHECKING OF SUPPLIES**

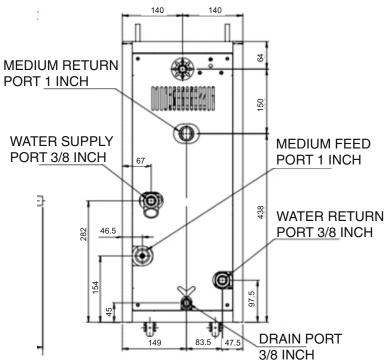
Check nameplate and make sure that machine is the type you purchased.

Name of equipment	Delivery Condition
Main body of machine	Remove polyester cover and check to be sure that it is the model which you purchased
*With power cord 5 m	Figure 3.1 (Model G3-88)
	Power cord
	Disconnect switch

Name of equipment	Delivery Condition
Main body of machine *With power cord 5 m	Figure 3.2 (Model G1-88) Power breaker
	Power cord
	<ul> <li>Disconnect switch was installed at front of model G3, breaker was install at side of model G1.</li> <li>Figure 3.1 and Figure 3.2 is model 88. In case of model 25 and model 55, external dimension etc. will be different.</li> <li>Please refer to attached drawing for details.</li> </ul>







# **CHAPTER-5: INSTALLATION**

This chapter describes method of installing the product step by step. The machine appearances shown in this chapter and subsequent chapters are model G3-88.

Step	Item	Working Contents
1.	Installation of machine body	Install machine on stable and horizontal floor space.  Maintain space between machine for performing maintenance and inspection works as shown in Figure 5.1.
		600mm 600mm
		600mm
2.	Connection of hoses (Medium feed/ return)	Connection of hoses (Option)  "Fully close" each valve of the medium feed port and medium return port, and connect as shown in Figure 5.2
		Apply sealant to threaded part of each hose connecting nipple, mount it to medium feed port and medium return port of machine
		and mold, and then securely tighten hose fittings  Figure 5.2  Medium return port
		Medium feed port *Equipment
		• Do not connect hoses if they were bent smaller than minimum
		bending radius, folded or twisted.
		Do not allow hoses to interfere with other sections.
		<ul> <li>Attach safety covers such as shielding plates to prevent hoses from being trampled or crushed.</li> </ul>

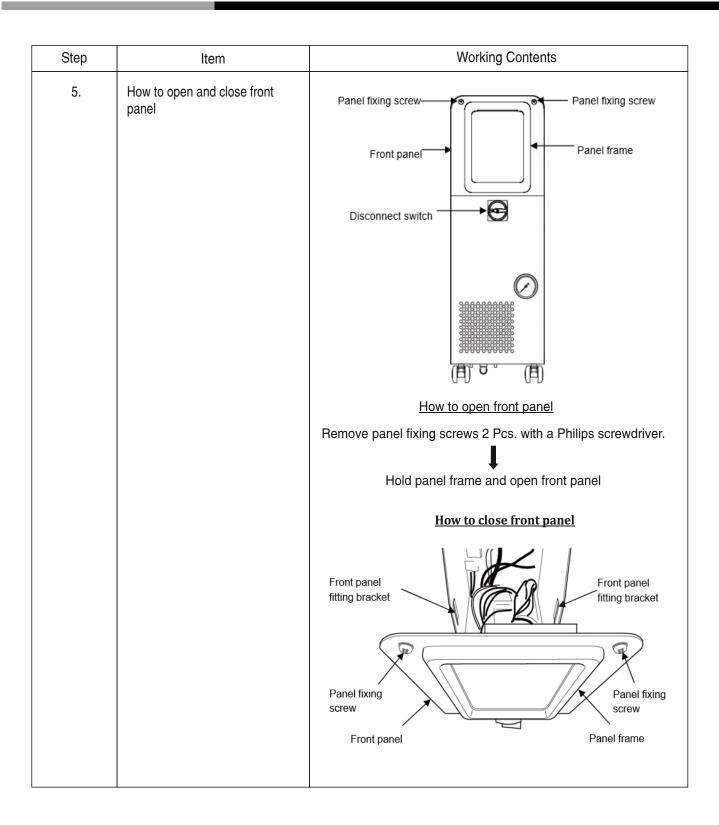
Item	Working Contents
Connection of hoses	Connection of water supply/drain hoses
(Water supply/drain)	-There are two kinds of water systems as Circulation System which use cooling tower and reuse cooling water and Closed System which drain used cooling water to drain ditchConnect water supply port of main unit to water supply source of your facility with rubber hoseConnect drain port of main unit to drain destination of your facility with heat-resistant rubber hose or SUS flexible hose.  Figure 5.3
	Drain port
	Outside Diameter $\phi$ 10.5 hose nipple (thread part $Rc^3/8$ )  Water supply source
	( CAUTION
	Do not connect hoses if they were bent smaller than minimum
	bending radius, folded or twisted.
	• Do not allow the hoses to interfere with other sections.
	Attach safety covers such as shielding plates to prevent the
	hoses from being trampled or crushed.
	● In case of using H type at high temperature and drain side is
	opened type, sometimes steam may blow out while cooling.
	Please fix drain hose at drain destination to prevent accidents.
	Figure 5.4
	Drain port
	Drain hose
	Fix to drain destination

# NOTE

# 1. Roll Jacket

If position of Roll Jacket is higher than machine, reverse flow may occurs when machine stopped. Install machine at higher position than roll jacket.

Step	Item	Working Contents
4.	Connecting Power	Shutdown the primary power supply of your facility and shutdown the disconnect switch or power breaker of machine.  Connect power cord 5 M. from machine to the primary power supply of your facility.
		R phaseRed (Black)  Power Cord S phaseWhite(Black) Primary Power Supply  T phaseBlack(Black)  EGreen(Green/Yellow) For grounding
		* The power cord of MAI specification (American specifications) will be black, black, black, green/yellow.
		Figure 5.5  Your distribution facility breaker (primary power supply)  Earth connection  * Be sure to establish earth connection.
		<ul> <li>CAUTION</li> <li>Be sure to shut down disconnect switch of or power breaker of machine before connecting power cord.</li> <li>Connection must be carried out by qualified personnel (a person who has knowledge of electricity at level higher than 2<sup>nd</sup> class electrician.)</li> <li>Be sure to establish earth connection.</li> </ul>

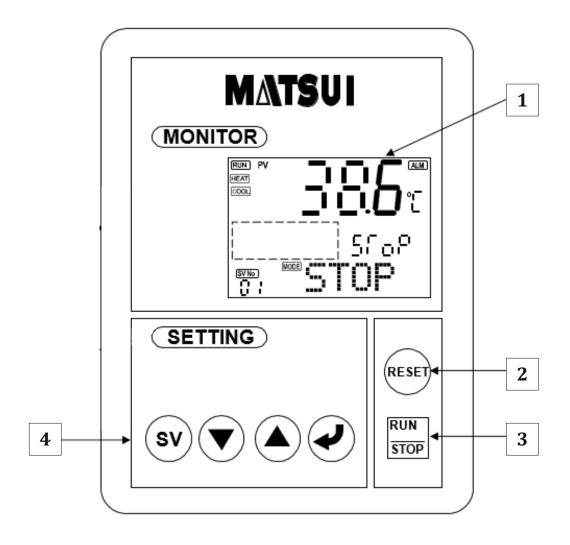


Step	Item	Working Contents
6.	How to open and close front panel	Hold panel frame and close panel.
		Fit front panel into right and left fitting brackets inside machine body
		Tighten panel-fixing screws to fix the panel.
7.	Type check	Turn "ON" power at the primary side of your electric equipment.
		Turn "ON" disconnect switch or power breaker of machine
		After power is turned on, model, temperature unit, input specifications and control CH will be displayed on display area of control panel of temperature controller for three seconds. Please check that each displayed contents meet specifications
		1)Temperature unit °C → C, °F→F
		2)Model L,LX,H,HX
		3)Control CH CoNTL1,CoNTL2
		4)CH1 input specification1RTd,1TCK,1TCJ
		5)CH2 input specification2RTd,2TCK,2TCJ (in message display area)
		Sensor type RTd: Pt100Ω TCK: K TCJ: J

Step	Item	Working Contents
8.	Checking electrical phase	Please check that pump reverse monitor is shown on display area of control panel of temperature controller after type confirmation screen.
		5 <u>0</u> 5
		PUMP Reverse
		1
		If pump reverse phase alarm monitor not display, this means normal phase. So, power connection is complete.
		If the pump reverse phase alarm displayed, turn "OFF" the primary power supply. Then change connection of R Phase
		(Red (Black)) and T Phase (Black (Black)) of 3 power cords.
		Turn "ON" the primary power supply again, and confirm that the pump reverse phase alarm monitor not display.

# 1. Each part name of the control panel

Figure 6.1 Control panel of Temperature Controller



No.	Name	Function	
1	Display area	Refer details of display area in item 2.2.	
2	RESET key	Alarm and buzzer reset key	
3	RUN/STOP key	Key to start and stop operation	
	SV key	Key to switch set mode indication on monitor display area	
4	<b>▲</b> /▼ key	Key to switch setting display and to change set value	
	<b>√</b> key	Key to "enter" values in setting operation	

# 2. Detailed content of display area

1. Status display area

2. PV display area

3. Monitor display area

5. Number display area

5. Message display area

5. Message display area

S.No.	Display area	Displayed description
1.	Status display area	Inform control status of MR16 by lamp.
2.	PV display area	Display PV value or alarm number. Display alarm number in red.
3.	Monitor display area	Display area which would be able to confirm input information of controller by pressing $\triangle$ key. There are heating output, cooling output and analog input information etc.
4.	SV display area	SV value of selected SV number is displayed. Status of machine is also displayed.
5.	Number display area	SV number which is being used is displayed during fixed value operation.  Step number is displayed at the time of programmed operation.
6.	Message display area	Display alarm message, alarm history message and parameter names etc., by scrolling alphabets.

# 3. Page No. and parameters

Parameters are registered in hierarchically classified memories. Each hierarchy is called a page, and it is divided into three hierarchies. Operate SV key and RESET key to move to each hierarchy.

Page No. and parameters are shown below.

Level No.	Page No.	Category	Parameters belonging to each page
_	_	Monitor	Screen status during normal operation and stop
SV key  Level 0		Main Setting	Change of current SV value SV Timer setting TIME Change of SV No. Sv Sr
Hold SV key Level 1	PG01~PG07	Temperature Setting	Change of SV value Sv01~Sv64
	PG08	Weekly Timer	Weekly timer function
	PG09	Program	Program operation function
	PG2I	Ok Signal	Upper and lower limit temperature alarm ∆t OK judgement Temperature OK judgement
	PG22	Functional Selection	∆t selection Start selection SV1/SV2 switching selection Timer function selection Operation when upper limit alarm occurs Setting lock
	PG23	Restriction	Auto tuning Setting limiter upper limit and lower limit (SLH SLL) HL switching point temperature, hysteresis width PV bias (medium, mold) Temperature upper limit output, hysteresis width SV change rate limiter up, down
	PG24	Stop Time	Medium blow time Stop delay time Stop delay time (for HD, HC) SV switching slope time Molding cycle time

		Maintenance	Oil replacement time Hose replacement time Float SW inspection time Strainer cleaning time			
Hold Reset key	PG25	Date and Time	Date and Time Setting			
Level 2  To main screen by holding SV key	Pressurizing pump		Air purge function Medium full, medium decrease delay time Float SW OFF delay time Setting system limiter (SSL) LBA time LBA dead band Cooling output limiter Drain pulse relationship Number of air vent times Pump ON/OFF time Water supply pressure abnormal delay Stop mode selection (slow cooling mode function) Stop mode timer relationship (Slow cooling function) Up/down stable ON time Pressurizing pump drive OFF time Number of pressurizing pump ON/OFF abnormal times Forced pressurizing pump operation relationship			
	PG52		CH1 (medium) low temperature parameter relationship			
	PG53	PID Constant	CH1 (medium) high temperature parameter relationship			
	PG54	TID Constant	CH2 (mold) low temperature parameter relationship			
	PG55		CH2 (mold) high temperature parameter relationship			
	PG56	Basic function	Type selection TC/RTD input type switching °C/°F switching 1/0.1 resolution switching Temperature alarm setting resolution switching Reverse phase detecting operation selection Optional DO1, DO2 DI function allocation Japanese/English switching Digital filter Output limiter upper limit and lower limit Operation cumulative time			

		ROM version Cooling output limiter 1, 2 Saturation steam pressure correction value
PG57	Communication	COM1 communication setting
PG58	function	COM2 communication setting
PG60		Alarm history 1
PG61	Alarm Function	Alarm history 2
PG62		Alarm history 2
PG63	Prediction function	Alarm history optional setting
PG64	Frediction function	Set temperature reach prediction function selection
PG7I		Analog input function setting
PG72		Al1 to Al3 alarm relationship setting
PG73	Analog function	Differential pressure-flow rate conversion equation third order equation factor
PG74		Al3 flow rate alarm function
PG75		Analog output function setting

# 4. Details of display area

4-1. Sequence mode indication (monitor status)

Mode during operation is displayed at SV display area.

And measured value of controlled temperature is displayed in PV display area.

Mr16 sequence outline is as follows

### Sequence flow

Operating status	Stop	Timer	Medium refill	Air vent	Medium blow	Temperature Controller	Slow Cooling	Stop Preparation	Stop
		-			-			•	

Press RUN/STOP button.

Press RUN/STOP button.

Display area	Sequence mode	Message display area	Monitor display area
SVNG  Message display area	Stop mode Mode during stoppage.	STOP	
45959 500  Message display area	Timer mode  Mode when activating start timer or stop timer.	TIMER	Display set time of start timer and remaining time until start, or set time of stop timer and remaining time until stop.
Display area	Sequence mode	Message display area	Monitor display area

Display area	Sequence mode	Message display area	Monitor display area
Message display area	Medium replenishment mode  When quantity of medium decreased to level which is necessary to refill.	Medium Low Level	
EVIDO Message display area	Air vent mode  When pump repeat ON/OFF and perform air vent.	Air Vent	

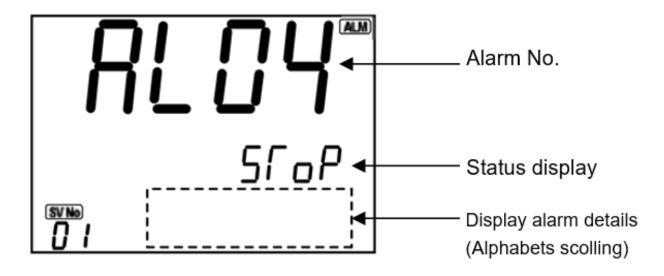
<sup>\*1</sup>Display SV No. and display using conditions of SV set value.

Display area	Sequence mode	Message display area	Monitor display area
Message display area	Medium blow mode When medium blow	Medium blow	
MH: IDD SOOT	Temperature control mode Display at the time of temperature control.	RUN	Display Control output. *2
PV SSSI SV SV Message display area	Slow cooling	Slow cooling	Display time related to slow cooling mode.
PV	Stop preparation mode Display while preparing to stop.	STOP delay	

<sup>\*2 :</sup> MH display lamp lights during output from heating side and MC display lamp lights during output from cooling side.

# 4-2. Alarm monitor

When alarm occurred, it will switch to alarm monitor unconditionally.



Alarm No.	Message	Type of Alarm
1.	Data Error, RAM Error, PV Error	Instrument error
2.	Sensor Error	Sensor abnormality
3.	PUMP Reverse	Reverse phase
4.	PUMP Overload	Pump overload
5.	Over Heat	Overheat alarm
	WaterPR AL	Water supply pressure abnormality
6.	Heater Break	Heater break
	Contact Welding	Contact welding
7.	Medium Low Level	Medium level decreased
8.	System Alarm	System upper limit
9.	High Alarm	Temperature upper limit alarm
10.	Low Alarm	Temperature lower limit alarm
11.	Loop Break Alarm	LBA (loop disconnection alarm)
12.	Pressure Alarm	Al pressure abnormality
13.	Flow Rate Alarm	Al flow rate abnormality
14.	Pressure1 Alarm	Pressure 1 abnormality (AI1)
15.	Pressure2 Alarm	Pressure 2 abnormality (AI2)

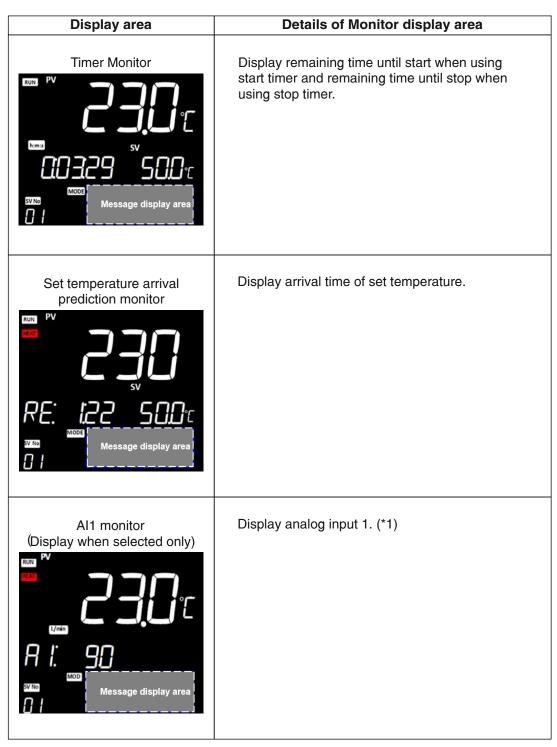
<sup>\*</sup> When instrument error occurs, "Error" will be displayed at alarm No. and error details will be is displayed at status display.

# 5. Details of monitor display area

Each time (A) key is being pressed from initial screen, it will switch to monitor display as follows

Display area	Details of Monitor display area
PV2 monitor (Display at 2CH specification only)  PV  SV  Mood  Message display area	Display measured value of PV2. (*1)
AT monitor  PV  SVNo  Message display area	Display value of PV2-PV1. (*1)
MV monitor  PV  SV  MH: IDDD 300°C  Model  Message display area	Display output % of MH (heating) and MC (cooling) at the time of temperature control.

<sup>\*1</sup> is for G3 only.



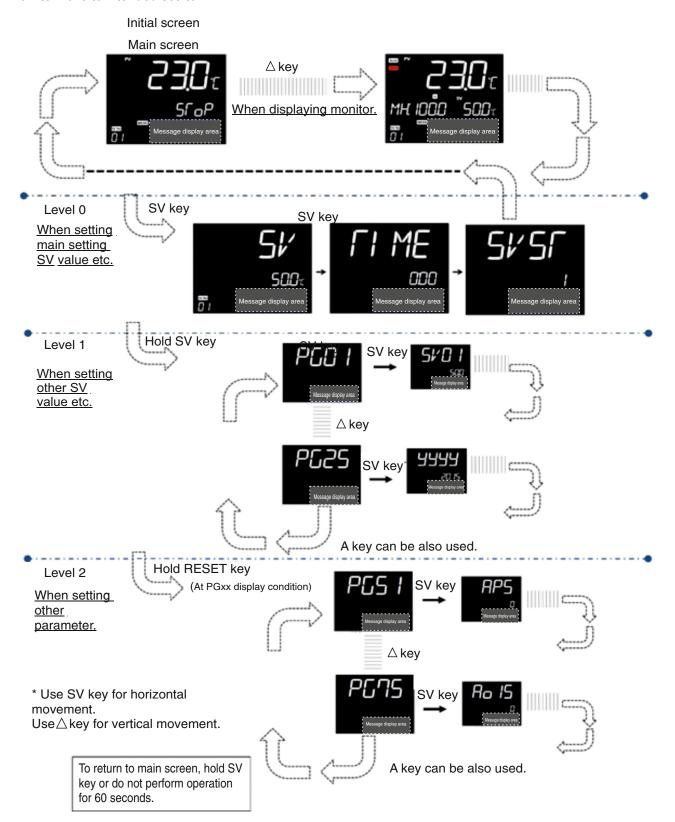
<sup>\*1</sup> is for G3 only



<sup>\*1</sup> is for G3 only

# 6. How to perform basic operation of MR16

### 6-1. How to move to intended set item



# 6-2. How to change parameter

All parameters are set by operation methods shown below. How to set SV value (main set value) is explained here as an example

SV value (main set value) setting screen



Press ENT key.

SV value in SV display area is flashing.

Change SV value by O key or A key.

Confirm SV value by ENT key. SV value in SV display area changes from flashing to lighting at this time. If disabling input SV value, press SV key before pressing ENT key, then input SV value will be disabled.

# 6-3. Temperature controller model for each equipment

Each equipment is being equipped with temperature controller of following models.

Note that there are some functions which cannot be used depending on model of temperature controller.

Equipment type	Temperature controller model	
GMC- <b>G1</b> -25,55,88 <b>L</b> 95/ <b>H</b> 120	MR16-AN	

# **CHAPTER-7: PREPARING FOR OPERATION**

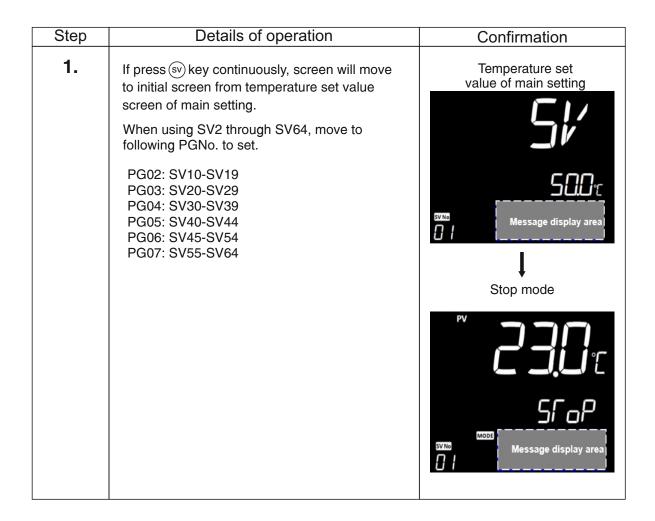
This section describes preparation needed for starting.

# 1. Setting SV of Control Panel (MR16)

Set control temperature by using SV1

Depending on the purpose, when multiple control temperatures are applied, set setting temperatures in SV2 to SV64 as well.

Step	Details of operation	Confirmation
1.	Press sv key  Screen will move to temperature set value screen of main setting.	Stop mode  PV  SIND  Message display area  Temperature set value of main setting  Message display area  Message display area
2.	Press key on temperature set value screen of main setting to set display to flashing condition.  After pressed key and key to enter numerical value, press key to confirm.	



### 2. In case of roll jacket

(In case of internal capacity is higher than 20L or air accumulation would occur.) In case of roll jacket, there will be a lot of internal capacity and air accumulation. Therefore, in case of water, please supply water from roll jacket side and bleed air from air vent.

★ If position of Roll Jacket is higher than machine, reverse flow may occurs when machine stopped. In this case, please install machine higher than roll jacket.

#### 3. Checking drain pressure (L type)

Pressure, which needle of pressure gauge at front of machine is pointing when connected to water supply /drain ports and machine stopped, is drain pressure.

Table 7.1 Specified pressure (L type only)

Working temperature	Drain pressure				
85 to 95°C	0.03 to 0.1 MPa				

NOTE

If drain pressure is lower than specified, pump may run dry and damage.

### 4. Checking water supply pressure (H type)

Open water supply source and water supply pressure.

Pressure, which needle of pressure gauge at front of machine is pointing when machine stopped, is water supply pressure

Table 7.2 Specified pressure (H type only)

Working temperature	Drain pressure
100 to 120°C	0.2 to 0.3 MPa

NOTE

If water supply pressure is lower than specified, pump may run dry and damage.

# **CHAPTER-8: OPERATION**

This section describes operations from starting to end in sequence

### NOTE

Carry out operations described in **Chapter 7 "Preparation for Operation"** before driving operations.

### 1. OPERATION

Step	Details of operation	Confirmation
1.	"Half open" pressure regulating valve.	
2.	Open valve at water supply side of your facility.	No water leak from hoses or connected parts. Pressure gauge of machine is displaying specified pressure.
3.	"Fully open" medium feed valve and medium return valve.	
4.	Start to refill medium.  When water supply finished, pump will start  NOTE  Pump performs start/stop continually until finish medium refill. This situation occurs because of medium auto refill for medium quantity which was delivered inside pipe, it is not breakdown.  CAUTION  In case of roll jacket, please also supply water from roll jacket side. Please surely perform air vent.  Continued on the next page	During medium supply, medium refill mode is being displayed on monitor.  RUNI PV  Message display area  Continued on the next page

ļ	RUN PV
If medium temperature is lower than 60°C, air vent will go into operation. (5 seconds ON, 3 seconds OFF repeat for 5 times.)	
If medium temperature is lower than 60°C, medium supply (medium blow) will go into operation.	Message display area
During these operations, temperature control (heating/cooling control) is not performed. Temperature control will start after operations finished	<b></b>
NOTE	Message displayarea
Do not change set values of air vent operation and medium blow time.	When temperature control starts, temperature control mode is being displayed on monitor.
	MH: IDDD SDD°C  Message display area
	PV display will display current control temperature (measured value). No water leak from medium feed and medium return hoses and connected parts. Pressure gauge of machine is displaying specified pressure.
	will go into operation. (5 seconds ON, 3 seconds OFF repeat for 5 times.)  If medium temperature is lower than 60°C, medium supply (medium blow) will go into operation.  During these operations, temperature control (heating/cooling control) is not performed. Temperature control will start after operations finished  NOTE  Do not change set values of air vent operation and

Step	Details of operation	Confirmation
5.	If press RUN STOP key again, operation will stop.  In case of stop preparation time was set, operation will stop after stop delay time	Stop preparation operation mode is being displayed on monitor.  PV  Message display area  When operation stops:  PV  Message display area  Message display area
6.	Be sure to shut off disconnect switch or power breaker when stop.	

### 2. How to reset maintenance alarm

This is method for removing alarm.

Maintenance alarm for float switch and strainer is enabled.1

How to reset maintenance alarm for float switch is explained below as an example.

Step	Details of operation	Confirmation
1.	Move to float switch inspection time screen of PG24. Cumulative time will be displayed on float switch inspection time screen. (It is 0 in right figure, but number will be displayed in this area.)	Stop mode
	If press RESET key for five seconds on this screen, cumulative time will be reset and alarm will be cancelled.	Float switch inspection time screen
	★ In case of reset maintenance alarm of strainer, similarly move to strainer cleaning time screen of PG24 and remove alarm by same procedure.	Strainer cleaning time screen
		Message display area

# **CHAPTER-9: STANDARD FUNCTION**

### 1. Run/Stop timer function

This is timer function to operate or stop after arbitrary time.

Parameter to set: Level 1\_PG22 (Timer function selection), Level 0 (Timer time setting)

Step	Details of operation	Confirmation
1.	Move to timer function selection screen of PG22. The initial value on the timer selection function screen is 0. Select which timer to use.  [Setting range] 0: Run timer 1: Stop timer	PG22  Message display  Timer function selection screen  Message display  Strainer cleaning time screen
2.	Move to timer time setting screen of level 0. Set operation time or stop time on timer time setting screen.  [Setting range] 0:00-99:59 (hour:min)	Timer time setting screen  Control  Message display area

Step	Details of operation	Confirmation
2.	Return to main screen after set timer time.	Main screen  PV  SVING  Message display area
3.	Press RUN STOP key  Run or Stop timer starts counting down and when time is up, operation will start or operation will stop. When run timer was used, remaining time will be displayed on monitor display area of main screen.  When Stop timer was used, pres key from main screen to move to timer monitor screen, then remaining time will be displayed on monitor display area.  Time will be displayed as (hour:min:sec).	Main screen (Timer mode)  NUM PV  LINE SUN PV  Message display area  Timer monitor screen
	To perform Run/Stop without using timer, set timer set value to 0:00 before operation.	SV NO Message display area

# 2. Weekly timer function:G3 only

Operation can be automatically started/stopped according to set time. Settings for one week (Sunday to Saturday) can be scheduled.

Parameter to set: Level 1\_PG08 (all items in PG08)

Step	Details of operation	Confirmation
1.	Move to weekly timer function selection screen of PG08. The initial value on the weekly timer function selection screen is 0.  When using weekly timer, set to 1.  [Setting range] 0: Weekly timer function is not used. 1: Weekly timer function is used.	Message display area  Weekly timer function selection screen  Message display area
2.	Move to operation time start and operation time stop screens of PG08.  Set operation start and operation stop time on these screens.  [Setting range] 0:00-23:59 (hour:min)	Operation time start screen  Message display area  Operation time stop screen  Message display area

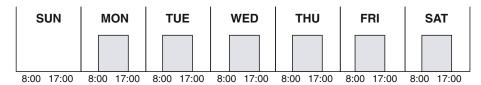
Step	Details of operation	Confirmation		
3.	Move to operation time start and operation time stop screens of PG08  At step 2, Set what day of the week to let operation start time and operation stop time reflect.  There are parts of each day on operation start/operation stop selection screens.  [Setting range]  0: Not set yet	Operation start Monday selection screen  Message display area		
	1: Operation start/operation stop  Operation will be performed according to set time and day of the week.  Weekly Timer (Fix) will be displayed in message display area during weekly timer operation.  When program operation function is being used, Weekly Timer (Prg) will be displayed in message display area.  * If operation start time and operation stop time were set to be same time, operation stop time will be enabled.	Operation stop Monday selection screen  Message display area		
	Chabled	Operation stop  SUN SUST SUSP  MON MOST MOSP  TUE TUST TUSP  WED WEST WESP  THU THST THSP  FRI FRST FRSP  SAT SAST		

### [Operation example 1]

Operation will be started at 8:00 and operation will be stopped at 17:00 every day from Monday to Friday.

	Day of the week selection						
	SUN MON TUE WED THU FRI					SAT	
Operation Start	0	1	1	1	1	1	0
Operation Stop	0	1	1	1	1	1	0

#### Operation

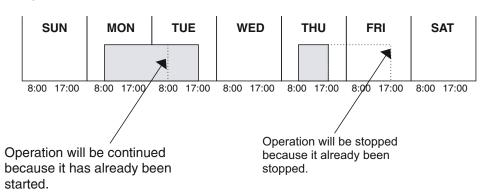


### [Operation example 2]

If operation start was set on Monday, operation start and operation stop were set on Tuesday, operation start and operation stop were set on Thursday, and operation stop was set on Friday, operations will be performed continually from 8:00 on Monday to 17:00 on Tuesday and from 8:00 to 17:00 on Thursday.

		Day of the week selection						
		SUN MON TUE WED THU FRI				SAT		
	Operation Start	0	1	1	0	1	0	0
	Operation Stop	0	0	1	0	1	1	0

#### Operation



### 3. External start/stop function

Machine can be started/stopped by external signal.

Operation will start by signal which was input from external, and operation will stop if signal was not input from

Parameter to set: Level 1\_PG22 (Start selection)

Step	Details of operation	Confirmation
1.	Move to start selection screen of PG22. The initial value on the start selection screen is 0. When using external start/stop, set to 1. [Setting range] 0: Key (Operation stop by front key) 1: DI (Operation stop by external signal)	Message display area  Start selection screen  Message display area
2.	Refer to attached electrical drawing to perform wiring	

### 4. SV1/SV2 switching function (external signal): G3 only

SV1/2 can be switched by external signals.

If signal was input from external, it will be SV2. If signal was not input from external, it will be SV1. Parameter to set: Level 1\_PG22 (SV1/SV2 switching selection)

Step	Details of operation	Confirmation
1.	Move to SV1/SV2 switching selection screen of PG22. The initial value on the SV1/SV2 switching selection screen is 1.  When using weekly timer, set to 2. [Setting range]  1: Key (SV switching by front key)  2: DI (SV switching by external signals) 3: AUTO  3: AUTO determines operation/stop of molding machine from condition that external signals periodically turn ON/OFF and will perform switching automatically.	Message display area  Start selection screen  Message display area
2.	Refer to attached electrical drawing to perform wiring	

### 5. Set temperature reach prediction function

Time to reach target value (≠ SV value) will be calculated at time of switching to temperature control. Parameter to set: Level 2\_PG63 (Set temperature reach prediction function selection)

Step	Details of operation	Confirmation
1.	Move to set temperature reach prediction function screen of PG63.  The initial value on set temperature reach prediction function selection screen is 0.  When using set temperature reach prediction function, set to 1.  [Setting range] 0: Not used  1: Used	Message display area  Set temperature reach prediction function selection screen  Message display area
2.	Time to reach target value (≠SV value) will be calculated at time of switching to temperature control. Press ♠ key on main screen to move to set temperature reach prediction monitor screen, then predicted time will be displayed in monitor display area. Time will be displayed as (hour:min:sec).  Reach prediction function will be ended at time of reaching target value.  This function will disable when program operate.	Set temperature reach prediction monitor screen  RUN PV SV SV SV MODE MODE Message display area

### [Target value]

	Temperature OK judgment set value ≥ 1.0°C [2.0°F]	Temperature OK judgment set value < 1.0°C [2.0°F]
Up	SV value - Temperature OK judgment set value	SV value - 1.0°C [2.0°F]
Down	SV value + Temperature OK judgment set value	SV value + 1.0°C [2.0°F]

The initial value of temperature OK judgment set value is 10.0°C.

### 6. Program operation function

This is program control function to preset time when SV value changes and automatically operates. Settings of SV value can be registered at Maximum 20 steps, and will be able to operate lamp ramp, soak and step.

Parameter to set: Level 1\_PG09 (All items in PG09), Level 1\_PG06,07 (Setting of SV value)

Lamp operation: Operation when target value is always changed.

Soak operation: Operation when target value is constant.

Step operation: Operation when target value is always changed in step-like manner.

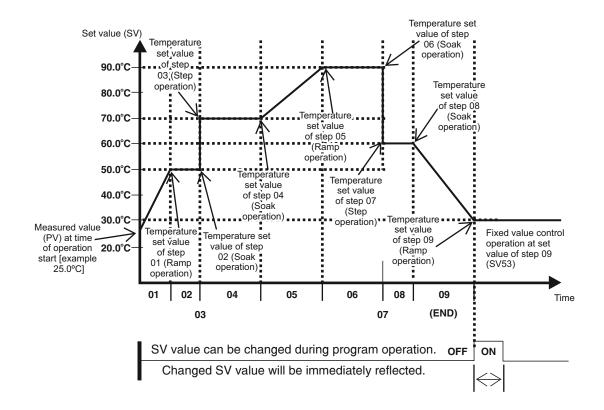
Step	Details of operation	Confirmation
1.	SV values used in program operation are SV45-64. They are stored in PG06 and PG07, therefore, set SV values for required number of steps. See operational example for contrast with step No.	See Chapter 7, section 1. Set SV value.
2.	Move to temperature control operation selection screen of PG09.  The initial value on the temperature control operation selection screen is 0.  When using program operation, set to 1.  [Setting range]  0: Fixed value operation  1: Program operation	PG09  Message display area  Temperature control operation selection screen  Message display area

Step	Details of operation	Confirmation
3.	Move to setting time (step 1) screen of PG09. The initial value on the setting time screen of each step is END. Set time for required number of steps.  Example. If 9 steps are required, set time on setting time screens of steps 1 to 9, and set END on the setting time screen of step 10.  [Setting range] 0:00-99:59 (hour:min) END: Program end	Setting time (step 1) screen  ENG  Message display area
2.	Move to wait zone (up) screen of PG09. Set deviation on wait zone (up) screen.  [Setting range] 0.0-100.0 (°C)  Also set similarly on wait zone (up) screen of PG09.  Wait zone: If operation cannot follow up progress of program operation at the time of temperature up or down, keep program step in waiting, and prevent it from moving to next step.  This allows temperature control slope to be changed and allows reach time to SV value to be extended.  If wait zone is not required, it is unnecessary to set.  After set wait zone, return to main screen.	Wait zone (up) screen  Message display area  Wait zone (down) screen  Message display area

Step	Details of operation	Confirmation
5.	When machine is being operated, operation will start with set program control.  STEPNo will be displayed in number display area of main screen.  Program will be displayed in message display area.  When using weekly timer, Weekly Timer (Prg) will be displayed in message display area.  If press STOP key during program operation, it will be able to stop program operation.  However, STEPNo in number display area switches to SVNo display of current number of steps, and displays SV value which has so far controlled temperature in program operation. When re-started, operation will be started from the step 01.	Main screen (program operation)  PV  COST  SV  SV  Message display area  Message display area

#### Operation example

#### When setting up to step 09 and performing program operation



#### Set value of each step

	Step 01	Step 02	Step 03	Step 04	Step 05
(SY memory No)	(Sv45)	(Sv46)	(Sv47)	(Sv48)	(Sv49)
Temperature set value (°C)	50.0	50.0	70.0	70.0	90.0
Set time (hour: minute)	00:10	00:10	00:00	00:20	00:20
	Step 06	Step 07	Step 08	Step 09	Step 10
(SY memory No)	(Sv50)	(Sv51)	(Sv52)	(Sv53)	(Sv54)
Temperature set value (°C)	90.0	60.0	60.0	30.0	50.0
Set time (hour: minute)	00:20	00:00	00:10	00:20	END

There is no follow-up function with current value.

### 7. Change rate limiter function when set value is changed

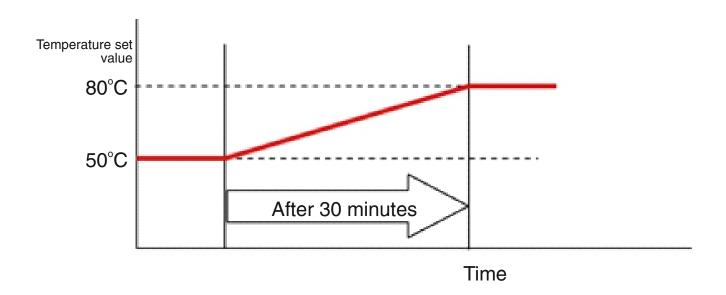
When there are some changes of temperature set value, this function does not change set value in a step-like manner, but will change it in variation of set value per unit time. This can be set respectively for up/down. This function does not work in SV1/2 switching, program operation and slow cooling mode

★ The other limiter function works in SV1/2 switching.

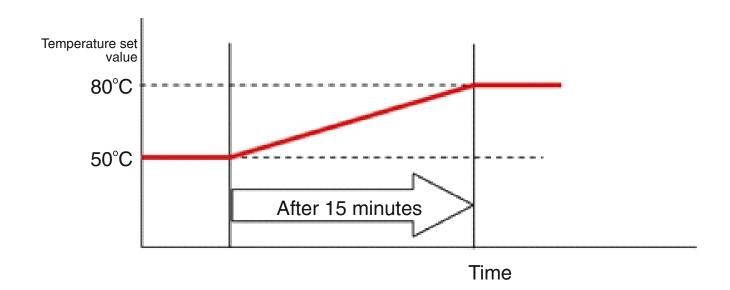
Parameter to set: Level 1\_PG23 (SV change rate limiter up, SV change rate limiter down)

Step	Details of operation	Confirmation
1.	Move to SV change rate limiter up screen of PG23.  The initial value on the SV change rate limiter up screen is 0. Set it to an arbitrary change rate.  Also set similarly on SV change rate limiter down screen.	PG23
	[Setting range] 0.0-400.0 (°C/min)	Message display area  SV change rate limiter up screen
	When set value is 0, function is turned OFF	ンドーに
	There is no follow-up function with current value.	Message display area
		SV change rate limiter down screen
		Message display area

Example: Set value is changed from 50°C to 80°C. SV change rate limiter up: 1.0°C/min SV change rate limiter down: 2.0°C/min



Example: Set value is changed from 80°C to 50°C. SV change rate limiter up: 1.0°C/min SV change rate limiter down: 2.0°C/min



### 1. Slow cooling mode function

This mode operates after operation stop started and can select 3 types of slow cooling operations of [slow cooling operation], [slow cooling  $\cdot$  stop operation] and [timer temperature drop  $\cdot$  stop operation]. All of slow cooling operations are operations to set some SV values, some timers and control temperature according to them. There is also mode to stop machine after slow cooling operation and mode not to stop.

Parameter to set: Level 2\_PG51 (Stop mode selection, Timers for stop mode T1-T4), Level 1\_PG01 (Setting of SV value)

Step	Details of operation	Confirmation
1.	Move to stop mode selection screen of PG51. The initial value on the stop mode selection screen is 0. When using slow cooling mode, select from setting range.  [Setting range] 0: Not used 1: Slow cooling mode 2: Slow cooling · Stop mode 3: Timer temperature drop · Stop mode	Setting time (step 1) screen  Message display area  Stop mode selection screen  Message display area
2.	SV values which are being used in slow cooling mode are SV3-5.  They are stored in PG01, therefore, set SV values according to selected slow cooling mode.  Timers which are being used in slow cooling mode are 1-4. Set timers according to slow cooling mode selected on timer T1-4 screen for stop mode of PG51.  [Setting range] 0-3600 (sec)	Timer T1 screen for stop mode  Message display area

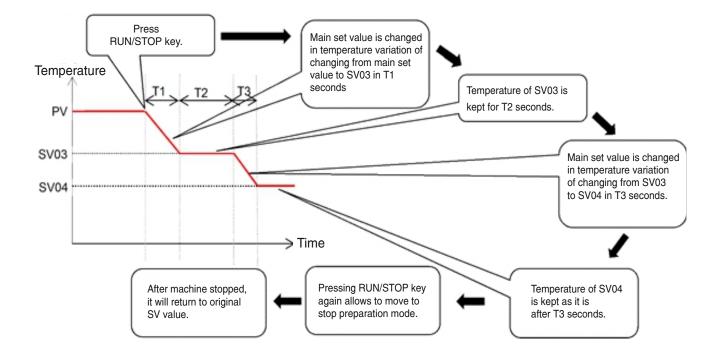
### Parameter comparison table for each mode

Stop mode selection	SI	SV No. used Timer used			Content of operation			
1.	Sv03	Sv04	-	T1	T2	Т3	-	Moves to slow cooling operation
2.	Sv03	Sv04	Sv05	T1	T2	Т3	T4	Moves to slow cooling, stop operation
3.	SV03	SV04	-	T1	-		-	Moves to timer temperature drop, stop operation

### Behaviors of various slow cooling modes

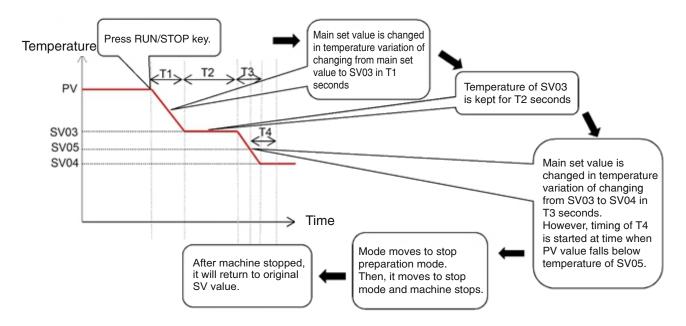
Slow cooling operation (Stop mode=1)

This is slow cooling function in run/stop operation.



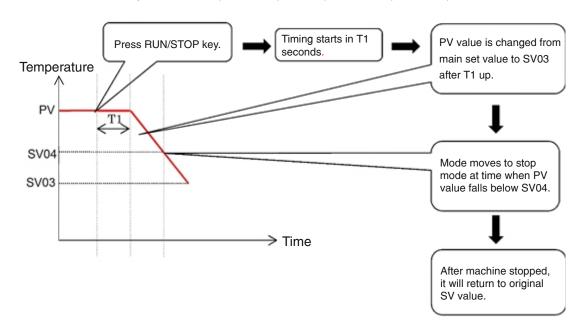
#### Slow cooling, stop operation (Stop mode=2)

This is slow cooling, stop function in operation stop.



#### Timer temperature drop, stop operation (Stop mode=3)

Delay timer starts temperature drop, and stops at time of operation stop.



### 9. Communication function: G3 only(OPTIONAL)

Parameter to set: Level 2\_PG58/59 (all items in PG58/59)

\* When using 2 ports, also set PG59.

Step	Details of operation	Confirmation
1.	Move to Com1 communication type switching screen of PG58. The initial value on Com1 communication type switching screen is 0. Set at using communication type.  [Setting range] 0: SPI 1: MODBUS 2: Communication function for power	PG58  Message display area  Com1 communication type switching screen  Message display area
2.	Move to Com1 communication speed screen of PG58. The initial value on Com1 communication speed screen is 1. Set at using communication speed.  [Setting range] 0: 4800 bps 1: 9600 bps 2: 19200 bps 3: 38400 bps	Com1 communication speed screen  Message display area

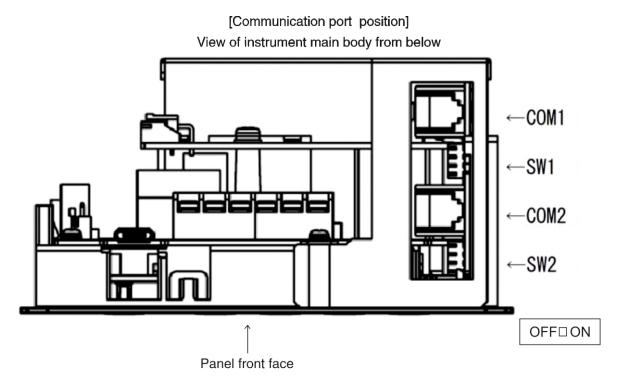
Step	Details of operation	Confirmation
3.	Move to Com1 instrument address screen of PG58. The initial value on Com1 instrument address screen is 32. Set at using instrument address.	Com1 instrument address screen
	[Setting range] When SPI is selected: 32-255 When MODBUS is selected: 1-255 When communication function for power is selected: 1-99	Message display area
4.	Move to Com1 data bit configuration screen of PG58. The initial value on Com1 data bit configuration screen is 0. Set at using data bit configuration.  [Setting range] 0: 8n1 (8 bit, no parity, stop bit 1) 1: 8n2 (8 bit, no parity, stop bit 2) 2: 8e1 (8 bit, even-number parity, stop bit 1) 3: 8e2 (8 bit. even-number parity, stop bit 2) 4: 8o1 (8 bit, odd-number parity, stop bit 1) 5: 8o2 (8 bit, odd-number parity, stop bit 2)	Com1 data bit configuration screen
5.	Move to Com1 timeout time screen of PG58. The initial value on Com1 timeout time screen is 5. Set at using timeout time.  [Setting range] 1-10 (sec)	Com1 timeout time screen

Step	Details of operation	Confirmation
6.	Move to Com1 transmission delay screen of PG58. The initial value on Com1 transmission delay screen is 10. Set at using transmission delay timeout time.  [Setting range] 0-500 (ms)	Com1 transmission delay screen

### **Communication interface setting**

At time of shipment, RS-422A is set (ports 1 and 2 of SW1 are OFF). To change setting to RS-485, turn ON ports 1 and 2 of SW1.

### \* Communication is available for G3 only.



★ Fitting connector: 5-641337-3 manufactured by TE Connectivity, etc

# **CHAPTER-10: STANDARD OP FUNCTION**

### 1. $\triangle T$ display function: G3 only

Install sensor at CH2 and display value of PV2 (CH2)-PV1 (CH1) at temperature controller MR16

Step	Details of operation	Confirmation
1.	Press key on initial screen to move to $\triangle T$ monitor screen, then $\triangle T$ will be displayed on monitor display area.	AT monitor screen  PV  SV  SV  MODE  Message display area

### 1. Optional signal function: G3 only

Assign optional signals to DO1 and DO2 for outputting signals. (See drawing No.D06015.)

- 1.  $\triangle$ T OK signal : Signal which output when value of PV2 (CH2)-PV1 (CH1) is within set deviation range. (Enabled when  $\triangle$ T is being used)
- 2. Temperature OK signal: Signal which output when PV value is within set deviation range for SV value. Temperature rise completion signal: Signal which output when PV value rises above set value.

Deviation and set value of each optional signal can be changed.

# Applicable parameter : Level 1\_PG21 ( T\OK judgment, temperature OK judgment), Level 1\_PG23 (Temperature upper limit output)

Step	Details of operation	Confirmation
1.	(1) In case of changing deviation of △T OK, move to △T OK judgment (deviation) screen of Pg21. The initial value on △T OK judgment (deviation) screen is10.0.	PG21
	[Setting range] 0.0-20.0 (°C)	Message display area   ΔΤ ΟΚ judgment
	(2) In case of changing deviation of temperature OK,move to temperature OK judgment (deviation) screen of PG21. The initial value on temperature OK judgment (deviation) screen is 10.0.	(deviation) screen
	[Setting range] 0.0-20.0 (°C)	Temperature OK judgment (deviation) screen

Step	Details of operation	Confirmation
2.	(3) In case of changing set value of temperature rise completion signal, move to temperature upper limit output screen of PG23. The initial value on temperature upper limit output screen is 85.	Pg23
	[Setting range] Lower limit to upper limit value of machine type (°C)	Message display area  Temperature upper limit output screen
		ΓLIP
		Message display area

### 3. Flow rate monitor function: G3 only(OPTION)

By installing flow rate sensor, flow rate can be displayed on temperature controller MR16. Flow rate lower limit alarm can be set.

Applicable parameter: Level 2\_PG74 (all in items of PG74)

Step	Details of operation	Confirmation
1.	Press key on initial screen to move to Al3 monitor screen, then flow rate (L/min) will be displayed in monitor display area.	Al3 monitor screen
2.	In case of using flow rate lower limit alarm, Move to Al3 flow rate lower limit alarm screen of PG74.  The initial value on Al3 flow rate lower limit alarm screen is 0 (alarm operation OFF).  [Setting range] 0.0-120.0 (°C)  When [standard flow rate value]-[current flow rate value] is lower than Al3 flow rate lower limit alarm value, it will be alarm condition.  Set machine operation when it is next alarm condition. Move to operation screen when PG74 flow rate lower limit occurs. The initial value on Al3 flow rate lower limit alarm screen is 0.  [Setting range] 0: Continue (Machine operates continually when alarm occurs.) 1: STOP (Machine stops when alarm occurs)	Al3 flow rate lower limit alarm screen  Message display area  Operation screen when Al3 flow rate lower limit occurs  Message display area

Step	Details of operation	Confirmation
1.	There are 2 types of Al3 flow rate lower limit alarm standard value setting method.  (1) Move to Al3 flow rate lower limit alarm standard value screen of PG74. The initial value on flow rate lower limit alarm standard value screen is 0.0. Set Al3 flow rate lower limit alarm standard value.  (Manual setting)  [Setting range] 0.0-999.9 (L/min)  (2)In case of initial value is 0.0, measurements will be made 10 times at every set time from start temperature control mode to [Al3 flow rate lower limit alarm standard value measurement sampling period] and averaged value will be used as standard value.  (Automatic setting)  Al3 flow rate lower limit alarm standard value measurement sampling period setting method Move to Al3 flow rate lower limit alarm standard value measurement sampling period timer function selection screen of PG74. The initial value on Al3 flow rate lower limit alarm standard value measurement sampling period timer function selection screen is 6.	Al3 flow rate lower limit alarm standard value screen  Message display area  Al3 flow rate lower limit alarm standard value measurement sampling period timer function selection screen  Message display area
	[Setting range] 0-600 (sec)  Move to Al3 flow rate lower limit alarm operation gap screen of PG74. The initial value on Al3 flow rate lower limit alarm operation gap screen is 1.0. [Setting range] 0.0-100.0  Al3 flow rate lower limit alarm operation gap is % setting for [flow rate upper limit scale]-[flow rate lower limit scale].	Al3 flow rate lower limit alarm operation gap screen  Message display area

### 4. Water supply pressure abnormality function: G3 only

By installing pressure sensor, water supply pressure will be displayed at temperature controller MR16 and when it is lower than set value, machine will stop.

Step	Details of operation	Confirmation
1.	Press key on initial screen to move to Al1 monitor screen, then water supply pressure (MPa) will be displayed in monitor display area.  When water supply pressure becomes lower than 0.18MPa, machine will stop.  In case of using H type, set water supply pressure to be always higher than 0.2MPa.	All monitor screen

### **CHAPTER-11: Maintenance and Inspection**

This chapter explains maintenance · inspection items, and methods to keep product in good condition.

#### \* Refer to maintenance manual for details



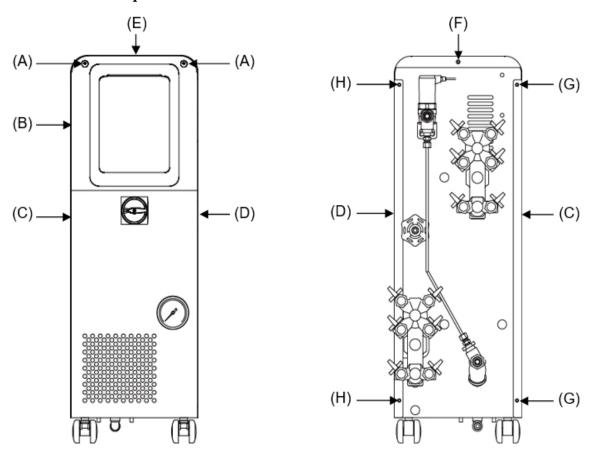
Be sure to perform maintenance and inspection after cooled down for 5 hours after stopped operation. (Use gloves.)

Temperature is very high during operation and immediately after stopped, it is very dangerous.

When you got burned, cool that position immediately with pure cooled water and get medical attention.

Inspection should be performed by qualified personnel only.

### 1. How to remove outer panels



- (A)Panel fixing screw (C)Left side plate
- (E) Top plate
- (G) Left side plate mounting screw

- (B)Front panel
- (D) Right side plate
- (F) Top plate mounting screw (H) Right side plate mounting screw

Step	Item	Working Details
1.	Open front panel	Remove two panel fixing screws with Philips screwdriver
		Hold panel frame and open front panel
		Panel fixing screw Panel frame Panel fixing screw Front panel
2.	Remove top plate	Loosen two hexagon nuts inside main body.  Hexagon nut  Top plate  Hexagon nut  Remove top plate fixing screws on the back of machine  Lift up top plate to remove it.  Top plate  Hexagon nut

Step	Item	Working Details
3.	Remove right and left side plates	Remove each mounting screw to remove right and left side plates.

### 2. Daily maintenance and inspection items

Item	Working Details
Check operating pressure	Check pump pressure for variations and check to see that pump pressure is not over 0.05 MPa.  If you find other abnormalities, stop machine.
Check Leak	Check leak not only at machine but also check at hoses, pipe joints, mold side couplers, etc. If there are some leaks, tighten or replace parts as needed.

# 3. Monthly maintenance and inspection items

Item	Working Details
Check Medium	Collect water sample from drain port and inspect contamination.  If contamination is severe, flush and replace all water in system.
Check Hose	Check if there are any medium leaks from nearly joint fittings or not and also inspect that there are some deformations (crushing or bulging), flaws, cracks, wear and abnormal hardening or not.  Replace hoses if leakage of medium occurred as a result of damage  *The maximum service temperature of each hose type is as follows. (Optional Accessories).  Rubber hose for L (for warm water only): 95°C  Rubber hose for H (for warm water only): 120°C  In case of hoses had been used at nearly above temperature (20°C lower than above temperature), it will run out quickly and drop in quality. Replace hoses if abnormal conditions are found during inspection.  Although, each hose is being used at temperature lower than specified, please replace it within a year as a guideline.

Item	Working Details
Cleaning pump mechadrain	Remove outer panel of machine and clean accumulated medium in pump mechadrain.  [Reference]  Because of pump mechanical seal structure, it will not be able to seal perfectly.  Sometimes, medium may leak around 4 drops in 1 hour.

### 4. Maintenance and inspection items should be performed every 3 months

When inspecting electrode unit and float switch, remove outer panel of machine.

#### \*Refer to maintenance manual for details.

Check terminals for looseness.

### 5. Check Solid State Relay (SSR)

SSR can be broken because of electrical impact (short circuit) or high environmental temperatures. When circuit breaker trips, carry out inspection according to following procedures. Also, periodically conduct inspections.

Item	Working Details
SSR	Turn ON disconnect switch or power breaker, and check that machine is stopped.  If SSR is normal, electric current will not flow to heater circuit. Use clamp meter to measure electric current in the heater circuit.  If electric current flows to the heater circuit, SSR is in failure, so please replace SSR.  Contact our service division for repair and replacement.

# **CHAPTER-12: PROTECTIVE DEVICES**

This chapter describes protective devices provided with product. Alarm monitor indicator will show when any protective device becomes actuated, along with causes and remedies.



Be sure to perform maintenance and inspection after cooled down for 5 hours after stopped operation. (Use gloves.)

Temperature is very high during operation and immediately after stopped, it is very dangerous.

When you got burned, cool that position immediately with pure cooled water and get medical attention.

#### Power breaker with SHT

When temperatures rise abnormally, power breaker will trip. When power breaker trips, check heater contactor (SSR) first.

#### Alarm Monitor

Alarm monitor display	Cause of abnormalities /interlock	Remedy
PUMP Reverse	[Abnormality] In case of power cord wires connection reversed or phase loss.  [Interlock] Machine becomes inoperable.  [ALARM Reset] Turn OFF primary power supply  NOTE  ALARM can be reset (alarm cancel) by pressing key continually longer than 5 seconds. However, if reverse phase still occurs, ALARM will display again.	Turn OFF primary power supply, and exchange R phase wire (red) with T phase wire (black) to change to positive phase.  Turn ON the primary power supply again and check that "PUMP Reverse" is not displayed

Pump overloaded, thermal relay tripped.
Reset button

Alarm monitor display	Cause of abnormalities /interlock	Remedy
MEDIUM LOW LEVEL	[Abnormality] In case of medium level is lower than specified quantity.  [Interlock] Pump will stop and moves to medium replenishment mode but operation will be continued.  When [OPEN] water supply valve, medium refill operation will be performed as it is and when medium quantity returns to specified quantity, operation will be resumed automatically.  ★ Possible causes of abnormalities:  • Medium insufficient  • Medium leaks  • Foreign matter adhering to electrode  • Water with electric conductivity less than 5.0 μS/cm such as pure water and distilled water cannot be used as a medium.  ★ In case of electrode type  • Foreign matter adhering to floatless switch  • Clogging of water supply strainer	Shutdown disconnect switch or power breaker  "CLOSE" water supply valve  Eliminate causes of medium level drop  Turn "ON" disconnect switch or power breaker.  Medium Low Level is displayed by pressing RUN STOP  "OPEN" water supply valve. Medium supply (water supply) will be performed.  When medium quantity returns to specified quantity, operation will be resumed automatically, it means remedy has been completed.
Sensor Error	[Abnormality] In case of sensor is disconnecting or sensor installation etc. is improper. [Interlock] Operation will stop automatically.  NOTE  ALARM can be reset (alarm cancel) by pressing RESET key continually longer than 5 seconds. However, if do not repair or change sensor, ALARM will display again.	Shutdowns disconnect switch or power breaker and check sensor connections and sensors. If abnormality is found, repair or change.

Alarm monitor display	Cause of abnormalities /interlock	Remedy
HIGH ALARM	[Abnormality] In case of controlled temperature became higher than upper limit of set value due to cooling capacity balance of injection molding machine load and this machine is not good or cooling water shortage, water supply temperature was high etc.  [Interlock] It will differ by operation selection conditions while upper limit alarm is occurring. When selecting Continue, operation will continue. When selecting STOP, it will stop.  * Possible causes of abnormalities:  • Cooling water deficiency.  • Cooling capacity deficient.  • Failure of Drain solenoid valve.  • Heater not powered off.  • Malfunction of temperature controller.	Press RUN STOP key to stop operation when changing solenoid valve, heater or temperature controller.  Please change parts after shut down disconnect switch or power breaker.  NOTE  If upper limit alarm set value is "0," alarm will not be actuated. If set value is lower than 3 C, alarm may display upon temperature rise in normal operation under some using conditions.
Low Alarm	[Abnormality] In case of controlled temperature became lower than lower limit of set value due to heating capacity balance of injection molding machine load and this machine is not good or heater failure etc.  [Interlock] Operation will continue.  * Possible causes of abnormalities:  • Heating capacity deficient.  • Solenoid valves left open.  • Heater not powered on.  • Malfunction of temperature controller.	Press RUN STOP key to stop operation when changing solenoid valve, heater or temperature controller.  Please change parts after shut down disconnect switch or power breaker  NOTE  If lower limit alarm set value is "0," alarm will not be actuated. If set value is lower than 3 C, alarm may display upon temperature drop in normal operation under some using conditions.

Alarm monitor display	Cause of abnormalities /interlock	Remedy
DATA Error	[Abnormality] In case of abnormality occurred with Control panel (MR16).	Press (RESET) key to stop buzzer
RAM Error	[Interlock] Operation will stop automatically.	Change controller (MR16) after shutdown disconnect switch or power breaker.
PV Error	<ul> <li>★ Possible causes of abnormalities:</li> <li>Data Error, RAM Error</li> <li>◆Board defective PV Error</li> <li>◆Temperature sensor defective</li> <li>◆Board defective</li> </ul>	Contact our service division for inspection and replacement
PV display FFFF flashing	[Abnormality] In case of temperature sensor switched to mold side when mold sensor is not installed.  [Interlock] Operation will stop automatically.	Install mold sensor or use after changed temperature control sensor to medium side.
PV display actual temperature flashing	[Abnormality] In case of medium temperature was over than upper limit value.  * Upper Limit Value L type: 95°C H type: 120°C	When overshoot, if temperature control becomes stable, it will be cancelled automatically.  CAUTION  In case of temperature is going up,
	[Interlock] Operation will continue.  ★ Possible causes of abnormalities :  • Overshoot	capacity is not enough. Please stop machine operation.

# **CHAPTER-13: CAUSES AND REMEDIES OF ABNORMAL CONDITION**

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

Before performing inspection, never fail to press RUN STOP key to stop operation and turn OFF the primary power supply of your distribution facility. Then, shutdown disconnect switch or power breaker.
 Please perform inspection works after cooled down for 5 hours.
 Machine and medium temperature is very high immediately after stopped, it is very dangerous.

When you got burned, cool that position immediately with pure cooled water and get medical attention.

• Inspection should be performed by your qualified personnel. Parts should not be replaced by people other than our service division staff or your qualified personnel.

Display of Temperature controller control panel does not light up		
Check point	Remedy	Precautions
Check that disconnect switch or power breaker is ON or not.	Turn "ON" the disconnect switch or the power breaker.	Open/Close durability 10,000 times  (Reference)  (Power Breaker)
	<ul> <li>If it becomes OFF immediately, it implies electric short circuit.</li> <li>If it becomes ON at once, check</li> </ul>	If open/close function does not operate properly, please replace power breaker.
	that operation is normal or not and also check SSR (VM-1,2).	In case of electric short circuit, contact our service division.
Open front panel to check that glass tube fuse (F1) is blown or not.	Replace glass tube fuse.	Model of cartridge glass tube fuse is 250 V-2A (φ 6.4 x L30 mm)
		When fuse is blown again, it is due to short circuit of circuit. Contact our service division.
Check that temperature controller is operating normally or not.	If not good, replace it.	Contact our service division for inspection and replacement.

Water not supplied.		
Check point	Remedy	Precautions
Check your water supply(primary side cooling water). Water supply valve Drain valve Water supply strainer Cooling tower pump, etc.	Surely open valve etc. Check that water supply pressure of primary side cooling water and pressure at drain side are same as specified or not. Check that there are some dusts accumulating at stainer or not.	Medium Low Level display is continuing at monitor display. Contact our service division if you have any questions.

Pump does not run.		
Check point	Remedy	Precautions
Check that connecting terminals of power cord are tightened securely or not.  (Whether single-phase operation is occurring or not.)	Tighten terminals securely	Turn off primary power supply of your distribution facility before performing
Open front panel to check that magnetic switch (KM-1) is operating normally or not.	Replace magnetic switch (KM-1).	Open/Close durability 10,000 times or the periods of use: within a year Contact our service division for replacement procedures.
Check that medium is dirty or not.  Check that foreign matters are coming into pump or not.	Replace medium. Clean pump.	Contact our service division if you have any questions.

Pump pressure does not increase		
Check point	Remedy	Precautions
Check that pressure gauge is operating normally or not.	Replace pressure gauge with a new one.	Contact our service division for replacement procedures.
Check that medium feed pump is operating normally or not.	Replace pump or impeller.	Contact our service division for replacement procedures.
Check that pump rotating direction is correct or not.	Wiring pump wires correctly.	The correct pump rotation direction is clockwise as seen from the fan side.
Check that pressure adjustment valve is fully open or not	Check pressure adjustment valve.	

Pump pressure does not increase		
Check point	Remedy	Precautions
Check that medium feed and medium return valves are fully open or not.	Fully open medium supply and medium return valves.	
Check that if there is pressure loss in pipe or not.	Use bigger diameter pipe or change the piping route. Adjust with bypass valve.	
Check that pressure gauge is operating normally or not.	Replace pressure gauge with a new one.	Contact our service division for replacement procedures

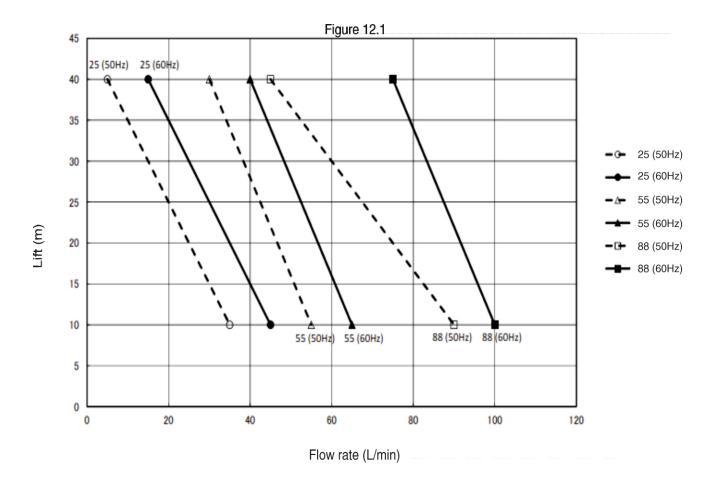
# [1] Temperature does not increase. [2] Temperature does not decrease. [3] Significant change in temperature.

	0 1	
Check point	Remedy	Precautions
Open front panel and check that heater contactor (SSR) (VM-1,2) is operating normally or not.	Replace heater contactor (SSR) (VM-1, 2).	Contact our service division for replacement procedures and models.
Check that heater is broken or not.	Replace heater.	Contact our service division for replacement.  * Apply for [1].
Check that temperature sensor is broken or not.  (Confirm by ALARM monitor display)	Replace sensor.	Contact our service division for replacement.
Check that there is pressure loss in pipe or not.	Use bigger diameter pipe or change the piping route.	
Check that water-supply cooling solenoid valve is operating normally or not.	Repair or replace solenoid valve	Contact our service division for repair and replacement.
Check that open relief valve is operating normally or not.	Repair or replace relief valve.	Contact our service division for repair and replacement.  * Apply for [1].

Power breaker trip		
Check point	Remedy	Precautions
Check that electric circuit is short-circuited or not.	Remove short circuit.	Repair should be performed by authorized personnel in your company or our service division staff.
Breaker trips by activation of safety device (overheat thermostat).	Replacement and repair of temperature controller and heater contactor (SSR) (VM-1, 2). Check heater and floatless switch for boiling dry.  In case of H type, check leakage	Repair should be performed by authorized personnel in your company or our service division staff.
	of open relief valve or water-supply cooling solenoid valve, and replace it.	

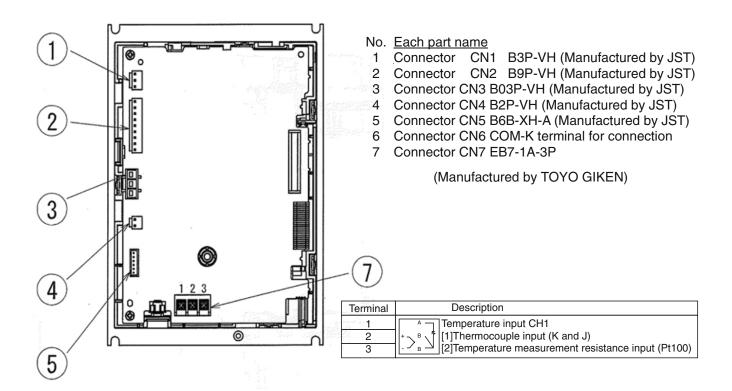
Strinkingly different of display temperatures between actual temperature (SV Value) and measured value (PV Value)					
Check point	Remedy	Precautions			
Check that sensor is installed properly or not.	Certainly insert sensor in designed position.				
Check sensor type.	Set parameters according to the sensor type.	Contact our service division for replacement and models.			
Check that temperature controller is operating normally or not.	If not good, replace it.	Contact our service division for inspection and replacement.			

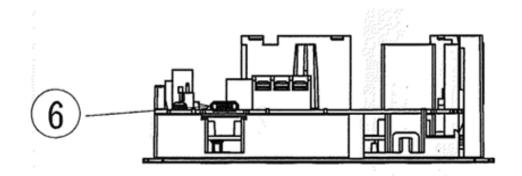
# 1. Pump performance chart



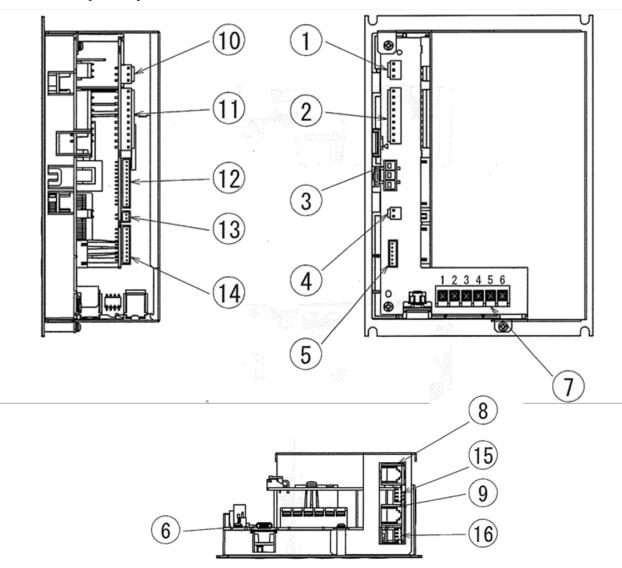
### 2. Terminal section and connector section of temperature controller

#### 2-1. MR16-AN (for G1)





#### 2-2. MR16-CT (for G3)



#### No. Each part name

110.	<u>Laon part</u>	Hallio	
1	Connector C	CN1	B3P-VH (Manufactured by JST)
2	Connector C	CN2	B9P-VH (Manufactured by JST)
3	Connector C	CN3	B03P-VL (Manufactured by JST)
4	Connector C		B2P-VH (Manufactured by JST)
5	Connector C	CN5	B6B-XH-À (Manufactured by JŚT)
6	Connector C	NE	COM-K terminal for connection

Connector CN6 COM-K terminal for connection EB7-1A-6P (Manufactured by TOYO GIKEN) Connector CN6 Connector CN7

- Connector CN101 TM5RE3-66 (Manufactured by HIROSE)
  Connector CN102 TM5RE3-66 (Manufactured by HIROSE)
- 9 Connector CN102 IMSHE3-66 (Manufactured by HIRC
  10 Connector CN201 B3PS-VH (Manufactured by JST)
  11 Connector CN202 B10PS-VH (Manufactured by JST)
  12 Connector CN203 S12B-XH-A (Manufactured by JST)
  13 Connector CN204 S2B-XH-A (Manufactured by JST)
  14 Connector CN205 S9B-XH-A (Manufactured by JST)
  15 DIP switch SW116 DIP switch SW117 DIP switch SW218 DIP switch SW219 DIP switch SW219 DIP switch SW210 DIP switch SW210 DIP switch SW210 DIP switch SW211 DIP switch SW212 DIP switch SW213 DIP switch SW214 DIP switch SW215 DIP switch SW2-

- 16 DIP switch SW2-

)	Terminal	Description
'	1	Temperature input CH1
	2	+ √ ₽ √ †  [1]Thermocouple input (K and J)
	3	$\lfloor \frac{2}{2} \rfloor$ [2]Temperature measurement resistance input (Pt100)
	4	Temperature input CH2
	5	+ S [1]Thermocouple input (K and J)
	6	[2] Temperature measurement resistance input (Pt100)

# **CHAPTER-15: CONSUMABLE PARTS LIST**

# 1. GMC-25 Consumable parts list

No.	Name	Quantity	Recommended replacement cycle
	Machine		
1	Solenoid Valve (L)	1	1 year
2	Solenoid Valve (H)	1	1 year
3	Solenoid Valve (L)	1	1 year
4	Solenoid Valve (H)	1	1 year
5	Mechanical seal (pump)	1	1 year
6	O-ring (pump)	1	1 year
7	Relief Valve	1	3 year
8	Overheat thermostat (fixed type) (L)	1	2 year
9	Overheat thermostat (fixed type) (H)	1	2 year
10	Rubber Hose (L)	1	1 year
11	Rubber Hose (H)	1	1 year
12	Teflon Hose	1	1 year
	Electrical	•	
13	Solid State Relay	2	5 year
14	Magnetic switch (200-220V)	1	1 year
15	Magnetic switch (380-480V)	1	1 year
16	Magnetic switch (230V)	1	1 year
17	Magnetic switch (460V)	1	1 year

<sup>1.</sup> The recommended replacement cycle varies depending on environment and conditions for use.

<sup>2.</sup> When replacing overheat thermostat item 8 and 9, make sure to contact the nearest service division because it is safety device component.

<sup>3.</sup> Item 3,4, 16 and 17 are parts for MAI specification (American specifications), which operation power supplies 100V.

# 2. GMC-55 Consumable parts list

No.	Name	Quantity	Recommended replacement cycle
	Machine	•	•
1	Solenoid Valve (L)	1	1 year
2	Solenoid Valve (H)	1	1 year
3	Solenoid Valve (L)	1	1 year
4	Solenoid Valve (H)	1	1 year
5	Mechanical seal (pump)	1	1 year
6	O-ring (pump)	1	1 year
7	Relief Valve	1	3 year
8	Overheat thermostat (fixed type) (L)	1	2 year
9	Overheat thermostat (fixed type) (H)	1	2 year
10	Rubber Hose (L)	1	1 year
11	Rubber Hose (H)	1	1 year
12	Teflon Hose	1	1 year
	Electrical		
13	Solid State Relay	2	5 year
14	Magnetic switch (200-220V)	1	1 year
15	Magnetic switch (380-480V)	1	1 year
16	Magnetic switch (230V)	1	1 year
17	Magnetic switch (460V)	1	1 year
18	Magnetic switch (460)	1	1 year

<sup>1.</sup> The recommended replacement cycle varies depending on environment and conditions for use.

<sup>2.</sup> When replacing overheat thermostat item 8 and 9, make sure to contact the nearest service division because it is safety device component.

<sup>3.</sup> Item 3,4, 17 and 18 are parts for MAI specification (American specifications), which operation power supplies 100V.

## 3. GMC-88 Consumable parts list

No.	Name	Quantity	Recommended replacement cycle
	Machir	ne	
1	Solenoid Valve (L)	1	1 year
2	Solenoid Valve (H)	1	1 year
3	Solenoid Valve (L)	1	1 year
4	Solenoid Valve (H)	1	1 year
5	Mechanical seal (pump)	1	1 year
6	O-ring (pump)	1	1 year
7	Relief Valve	1	3 year
8	Overheat thermostat (fixed type) (L)	1	2 year
9	Overheat thermostat (fixed type) (H)	1	2 year
10	Rubber Hose (L)	1	1 year
11	Rubber Hose (H)	1	1 year
12	Teflon Hose	1	1 year
	Electric	al	•
13	Solid State Relay (200-230V)	2	5 year
14	Solid State Relay (380-480V)	2	5 year
15	Magnetic switch (200-220V)	1	1 year
16	Magnetic switch (220V 50Hz)	1	1 year
17	Magnetic switch (380-415V)	1	1 year
18	Magnetic switch (460V)	1	1 year
19	Magnetic switch (230V)	1	1 year
20	Magnetic switch (460V)	1	1 year

<sup>1.</sup> The recommended replacement cycle varies depending on environment and conditions for use.

<sup>2.</sup> When replacing overheat thermostat item 8 and 9, make sure to contact the nearest service division because it is safety device component.

<sup>3.</sup> Item 3,4, 17 and 18 are parts for MAI specification (American specifications), which operation power supplies 100V.

# 4. MCL/HX-200 Consumable parts list

No.	Parts Name	Maker	Model / Material	Qty.	Recom- mended service life	Remarks (Applicable)
1	Mechanical Seal	Matsui	T-2100-25 PSIC+PSIC	4	1	LX / HX
'	wechanical Seal	Matsui	EA-560-25 ES-4 x ES3-FKM	1	1 year	Α
2	Bearing (Primary Load)	Matsui	6206 ZZC3-EA7	1	1 year	200
3	Bearing (Primary Load)	Matsui	6206 ZZC3-EA7	1	1 year	350
4	Pagring (Primary anti-load)	Matari	6206 ZZNCXC3-EA7	4	1 year	200
4	Bearing (Primary anti-load)	Matsui	6206 ZZNCXC3-EA7	1	1 year	350
			G195 4D		1 year	Pump Casing
5	O ring (Pump)	Part of Commerce	G55 4D	1		Protude
			G85 4D			Suck
6	O ring (Heater)	Part of Commerce	G80 4D	1	1 year	For LX and HX
7	O ring (Heater)	Part of Commerce	G185 4D	1	1 year	For HX
8	O ring (Heater)	Part of Commerce	G80 4D	1	1 year	For A
9	O ring (Heater)	Part of Commerce	G135 4D	1	1 year	For A
10	O ring (Float Switch) Matsui t3 φ23 φ13.2		1	1 year	For LX and HX	
11	O ring (Float Switch Cover) Part of Commerce G50 4D		1	1 year	For LX and HX	
12	Sealing (Float switch cover)	Matsui	φ22 x φ14 x 2 Non asbestos	1	1 year	For A

# **CHAPTER-16: CHANGE PARTS LIST BY VOLTAGE**

# PREVENTIVE MAINTENANCE ADVISORY & PARTS REPLACEMENT FREQUENCY

Sr. No.	Descriptions	Preventive Maintenance Schedule	Replacement Frequency	Remarks
1	Clean Inlet water Strainer	Weekly		GMC-L/H/A-LX/HX
2	Float Switch box and heater tank Cleaning	Every 2 Year		GMC-L/H/A-LX/HX
3	Float Switch functioning & replacement	Every 1 Year	Every 2 Year	GMC-L/H/A-LX/HX
4	To be check heater and heater flange gasket condition & replace.	Every 1 Year	Every 1 Year	GMC-L/H/A-LX/HX
5	To be check leakages of pump mechanical seal.	Half yearly	Every 1 Year	GMC-L/H/A-LX/HX
6	Check CT water inlet pressure 3 Kg/ 15~20 LPM each MTC.	Daily		GMC-L/H/A-LX/HX
7	Clean all Solenoid valve Coil	Every 6 month	Every 3 Year	GMC-L/H/A-LX/HX
8	Descaling cooling Coil	Every Year	Every 1 Year	GMC-H/A
9	Control Card functioning & Parameter checking	Half yearly		GMC-L/H/A-LX/HX
10	Electrical Contactor cleaning & replacement	Half yearly	Every 1 Year	GMC-L/H/A-LX/HX
11	Check Power voltage ( AC380 - 415V 3 PH ).	Daily		GMC-L/H/A-LX/HX
12	Check looseness of Electrical and Mechanical parts	Every Year		GMC-L/H/A-LX/HX

# **ELECTRICAL PART LIST**

Marker : AC200V/220V 3φ 50Hz/60Hz

No.	Code	Name	Specification	Number		
			NKS100R015AC3P GMC-25	1		
1	NFB-1	Dwookov	NKS100R015AC3P GMC-55	1		
I	INFB-1	Breaker	NKS100R015AC3P GMC-88	1		
			SHT AC200V	1		
2	MS-1	Contact (water pump)	LC1E0910M5 Ac200 1b	1		
	1013-1	Aux contact unit	LAEN 11	1		
			LRE06	1		
3	OCR-1	OCR-1 Thermal Overload Relay	LRE08	1		
			LRE10	1		
	MC-1 Contactor (heater)				LC1E0901M5	1
4		Contactor (heater)	LC1E1801M5	1		
			LC1E1801M5	1		
5	F-1	Fuse	TFB-101N 3A	1		
6	TC-1	Control	MR-16G1	1		
7	HY-2	Check Board	HY-2	1		
8	CR-3/4	Relay	RU2S-A220 (GMC-H TYPE)	2		
9	T-1	Timer	H3DKZ-A2 (GMC-H TYPE)	1		
10	PR-1	Reverse relay	K8AB-PH1 200/500V AC	1		

Marker: AC380V/415V 3 \$\phi\$ 50Hz/60Hz

No.	Code	Name	Specification	Number	
			NKS100R015AC3P GMC-25	1	
1	NFB-1	NED 4	Breaker	NKS100R015AC3P GMC-55	1
'	INFD-1	NFB-1 Breaker	NKS100R015AC3P GMC-88	1	
			SHT AC200V	1	
2	MS-1	Contact (water pump)	LC1E0910M5	1	
	1013-1	Aux contact unit	LAEN 11	1	
			LRE06 GMC-25	1	
3	OCR-1	OCR-1 Thermal Over	Thermal Overload Relay	LRE08 GMC-55	1
			LRE10 GMC-88	1	
	MC-1		LC1E0901M5	1	
4		MC-1	MC-1 Contactor (heater)	LC1E0901M5	1
			LC1E1801M5	1	
5	Tr-1	Transformer	AC415,400,380/200V	1	
6	F-1	Fuse	TFB-101N 3A	1	
7	TC-1	Control	MR-16G1	1	
8	HY-2	Check Board	HY-2	1	
9	CR-3/4	Relay	RU2S-A220 (GMC-H TYPE)	2	
10	T-1	Timer	H3DKZ-A2 (GMC-H TYPE)	1	
11	PR-1	Reverse relay	K8AB-PH1 200/500V AC	1	

Type: MC-200/350(L X H X A)

No.	Code	Name	Spec	ification	Number
			NKS100R032A	C MC-200	1
1	NFB-1	Breaker	NKS100R040A	C MC-350	1
			SHT AC200V		1
		Contact (water pump)	LC1E09M7 MC	C-200	1
2	MS-1	Contact (water pump)	LC1E18M7 MC	C-350	
		Aux contact unit	LAEN 11		1
3	OCR-1	Thermal Overload Relay	LRE10 MC-200	)	1
3	OCH-1	memai Ovendad nelay	LRE14 MC-350		1
			LC1E25M7	MCLX,HX A-200A	1
4	MC-1	Contactor (heater)	LCTE25IVI7	MCLX,HX A-350A	1
			LC1E18M7 MCA-350A		2
5	F-1	Fuse	TFB-101N 3A/TFBR-101		1
6	TC-1	Control	MR-16G1		1
7	HY-2	Check Board	HY-2		1
8	TB-1	Terminal Block	10 A		1
9	CR-3/4	Relay	RU2S-A220 (M	C-HX TYPE)	1
10	T-1	Timer	H3DK (MC-HX	TYPE)	1
			CH-15-165 (MC	C-A)	1
11	TH-1	Thermal Relay	CH-15-140 (MC-HX)		1
			CS-7SA-100 (N	ЛС-LX)	1
12	K	Sensor	T-35K Type ф3.2 x 100 x 1A		1
10	PS-1	Floating Switch	OLV-25S-1P-75	L (MC-LX/HX)	1
13	P3-1	Floating Switch	OLV-25S-1P-170L (MC-A)		1
14	Tr-1	Transformer	JBK3-150 AC4	15,400,380/200V	1
15	PR-1	Reverse relay	APR-3L AC110	)~480V	1

Type: MC-200/350(L X H X A)

Marker: AC380V/415V 3φ 50Hz

No.	Code	Name	Specification	Number	
	NED 4	Dun alian	NKS100R050AC MC-200	1	
1 NFB-1		Breaker	NKS100R063AC MC-350	1	
		Contact (water numn)	LC1E09M7 MC-200	1	
2	MS-1	MS-1 Contact (water pump)	LC1E18M7 MC-350		
		Aux contact unit	LAEN 11	1	
3	OCR-1	Thermal Overload Relay	LRE14 MC-200	1	
3	OCH-1	memai Ovenoad neiay	LRE21 MC-350	1	
			LC1E40M7 MC-200	1	
4	MC-1	Contactor (heater)	LC1E50M7 MCLX,HX-350A	1	
				LC1E40M7 MCA-350A	1
5	F-1	Fuse	TFB-101N 3A/TFBR-101	1	
6	TC-1	Control	MR-16G1	1	
7	HY-2	Check Board	HY-2	1	
8	TB-1	Terminal Block	10 A	1	
9	CR-3/4	Relay	RU2S-A220 (MC-HX TYPE)	2	
10	T-1	Timer	H3DK (MC-HX TYPE)	1	
			CH-15-165 (MC-A)	1	
11	TH-1	Thermal Relay	CH-15-140 (MC-HX)	1	
			CS-7SA-100 (MC-LX)	1	
12	K	Sensor	T-35K Type ф3.2 x 100 x 1A	1	
10	PS-1	Flooting Switch	OLV-25S-1P-75L (MC-LX/HX)	1	
13	19-1	Floating Switch	OLV-25S-1P-170L (MC-A)	1	
14	Tr-1	Transformer	JBK3-150 AC220V/200V	1	
15	PR-1	Reverse relay	APR-3L AC110~480V	1	

# **CHAPTER-17: SPECIFICATION**

Model				GMC-G3-25L95	GMC-G3-55L95	GMC-G3-88L95		
Power supply				Specified on machine nameplate				
Operation voltage	<del></del>				200/220V(100V)	NOTE 1		
	200V 50/6	0Hz		5.5kVA	8.0kVA	11.8kVA		
	220V 50Hz			5.4kVA	8.0kVA	11.7kVA		
	220V 60Hz			5.7kVA	8.2kVA	12.0kVA		
Apparent power	230V 60Hz			5.8kVA	8.3kVA	12.1kVA		
NOTE 2	380V 50/6			6.2kVA	8.6kVA	12.6kVA		
NOTE 2	400V 50/6			6.4kVA	8.8kVA	12.7kVA		
	415V 50H			6.4kVA	8.9kVA	13.2kVA		
	460V 60H			6.5kVA	8.9kVA	13.0kVA		
Medium	1001 0011	_			lear water (soft water)	NOTE 3		
iviedium				5.0L/min (At 0.1MPa)~	7.0L/min(At 0.1MPa)~	9.0L/min(At 0.1MPa)~		
Maximum Cooling	g Water Qua	ıntity		9.0L/min(At 0.3MPa)~	11.0L/min(At 0.1MPa)~	14.0L/min(At 0.1MPa)~		
Cooling water fla	roto			, ,	0.1 MPa ~ 0.3 Mpa, 20 L/mi	, ,		
Cooling water flow Working tempera					er supply temperature +10 ~			
vvoiking tempera					600W 2P			
	Motor		- 4	300W 2P	000VV 2P	1000W 2P		
Pump		Discharge amount		* R	efer to pump performance of	chart		
	Total lift							
	Material				· · ·	ller : BC6		
Heater	Capacity			4kW	6kW	9kW		
	Watt densi	ity		7.9W/cm <sup>2</sup>	8.1W/cm <sup>2</sup>	7.5W/cm <sup>2</sup>		
Heater box	Material			4.61	SUS304	0.01		
	Capacity	Capacity Difference 1		1.5L	2.0L	2.6L		
Cooling capacity	Difference	rence		2.4/3.3 kW	2.9/4.1 kW	3.6/4.9 kW		
(Cooling water	between me		30°C	7.2/9.8 kW	8.6/12.4 kW	10.7/14.7 kW		
pressure: 0.2 MPa/0.3 MPa)	temp. and o water inlet t		60°C	14.5/19.6 kW	17.2/24.7 kW	21.4/29.5kW		
	Control mo	tion		Heating . cooling, PID action				
	Input			Type K (CA) thermocouple				
	Setting · display method			Digital setting, digital <del>indication</del> display (with AT function) Setting temperature: SV1- SV64 (memory function)				
	Medium temperature protection function			Medium feed temperature limiter set by model				
				Start timer: Setting range 0 ~ 99 Hrs. 59 Mins, switched ON after setting.				
	Timer func	tion		Stop timer: Setting range 0 ~ 99 Hrs. 59 Mins, switched OFF after setting.				
Temperature	Timor rano			Either timer can be actuated by selecting function (START/STOP).				
controller		Oper	ation		rature control display SV No	· · · · · · · · · · · · · · · · · · ·		
(MR16- CT)		displa			splay (MH) % - Cooling out			
(IVIN 10- C1)	LCD	Alarr			· · · · · · · · · · · · · · · · · · ·			
	message	displ		Reverse phase, pump overload, sensor abnormality, medium level drop, temperature rise, temperature drop				
	display		_	THOUGHT TOVO				
		Before	I	\Mate	er level detector, cleaning st	rainor		
		l	enance	vvale	or level detector, clearing St	ranioi		
	<u> </u>	displa	у	Madium blaufum -	ian (whom novem in trumin-	ON) communication		
Occasional distribution		ners			tion (when power is turning			
Overheat protecti				Breaker w	vith shunt coil (SHT) + Fixed			
Water level detec	tor				Electrode type or float type	NOTE 5		
Pressure gauge					ф50 х 1.0 МРа			

	Model	GMC-G3-25L95	GMC-G3-55L95	GMC-G3-88L95			
	Water supply port		Ф10.5 hose nipple				
Piping	Drain port		ф10.5 hose nipple				
i ipilig	Medium feed port	3/8B x 2 ways	3/8B x 4 ways	3/8B x 6 ways			
	Medium return port	3/8B x 2 ways	3/8B x 4 ways	3/8B x 6 ways			
Outer dime	ensions(mm) NOTE 6	W232.5 x D450 x H524	W232.5 x D500 x H564	W232.5 x D560 x H674			
Weight		Approx. 40 kgs.	Approx. 50 kgs.	Approx. 60 kgs.			
Option	NOTE 7	Leakage breaker, external start/stop, general alarm output, alarm buzz revolving lamp, tower lights (red+green), optional selection signal, water supply pressure abnormality, flow rate monitor, medium return sensor, mold sensor, water supply filter, multi-directions manifold, air purge (manual)					

- 1. Operation voltage 100 V is for MAI specification (American specifications) only.
- 2. The apparent power is for power supply voltage 200V 50Hz and 200/220V 60Hz and it will differ depending on voltage.
- 3.Water quality : equivalent grade of Japan Refrigeration and Air Condition Industry Standards for makeup water. (pH = 6 to 8, Electric conduction rate 50  $\sim$  200  $\mu$ S/cm, not containing large amounts of calcium, silica, chlorine, and iron)
- 4. When this product is used at medium temperature of 85°C ~ 95°C, required drain pressure is 0.03 ~ 0.1 MPa.
- 5.Liquid level detector is selectable.
- 6. Outer dimensions do not include piping.
- 7.MAI specification (American specifications) is not compatible with some options

1	Model			GMC-G1-25L95	GMC-G1-55L95	GMC-G1-88L95		
Power supply				Specified on machine nameplate				
Operation voltage	9				200/220V(100V)	NOTE 1		
	200V 50/6	)/60Hz		5.5kVA	8.0kVA	11.8kVA		
	220V 50Hz	<u>z</u>		5.4kVA	8.0kVA	11.7kVA		
	220V 60Hz	<u>z</u>		5.7kVA	8.2kVA	12.0kVA		
Apparent power	230V 60Hz	Z		5.8kVA	8.3kVA	12.1kVA		
NOTE 2	380V 50/6	0Hz		6.2kVA	8.6kVA	12.6kVA		
	400V 50/6	0Hz		6.4kVA	8.8kVA	12.7kVA		
	415V 50Hz	Z		6.4kVA	8.9kVA	13.2kVA		
	460V 60Hz	<u> </u>		6.5kVA	8.9kVA	13.0kVA		
Medium				С	lear water (soft water)	NOTE 3		
Maximum Cooling	n Water Oua	ntity		5.0L/min (At 0.1MPa)~	7.0L/min(At 0.1MPa)~	9.0L/min(At 0.1MPa)~		
Waximum Cooling	y water Qua	intity		9.0L/min(At 0.3MPa)	11.0L/min(At 0.3MPa)	14.0L/min(At 0.3MPa)		
Cooling water flow	w rate				0.1 MPa ~ 0.3 Mpa, 20 L/mi			
Working tempera	ture range			Wate	er supply temperature +10 ~	95°C NOTE 4		
	Motor			300W 2P	600W 2P	1000W 2P		
Pump	Discharge	amou	nt	* B	efer to pump performance of	hart		
i unip	Total lift			011	elei to pump periormance c	ilait		
	Material			С	asing : FC200 Impel	ler : BC6		
Heater	Capacity			4kW	6kW	9kW		
пеацеі	Watt densi	ty		7.9W/cm <sup>2</sup>	8.1W/cm <sup>2</sup>	7.5W/cm <sup>2</sup>		
Heater box	Material				SUS304			
Healer DOX	Capacity			1.5L	2.0L	2.6L		
Cooling capacity	Difference		10°C	2.4/3.3 kW	2.9/4.1 kW	3.6/4.9 kW		
(Cooling water	between me	edium	30°C	7.2/9.8 kW	8.6/12.4 kW	10.7/14.7 kW		
pressure: 0.2 MPa/0.3 MPa)	temp. and c	-	60°C	14.5/19.6 kW	17.2/24.7 kW	21.4/29.5kW		
,	Control mo		•	Heating . cooling, PID action				
	Input			Type K (CA) thermocouple				
	Setting · dis	play m	ethod	Digital setting, digital display (with AT function) Setting temperature: SV1- SV64 (memory function)				
	Medium ter	mpera functio	ture	Medium feed temperature limiter set by model				
				Start timer: Setting rar	nge 0 ~ 99 Hrs. 59 Mins, swi	tched ON after setting.		
	Timer func	tion		Stop timer: Setting range 0 ~ 99 Hrs. 59 Mins, switched OFF after setting.				
Temperature				Either timer can be actuated by selecting function (START/STOP).				
controller		Opei	ation		ature control display SV No			
(MR16- AN)		displ	ay	Heating output di	splay (MH) % - Cooling outp	out display (MC) %		
	LCD message	Alarr displ		Reverse phase, pump overload, sensor abnormality, medium level drop, temperature rise, temperature drop				
	display	Before	Э					
		maint displa	enance y	Wate	er level detector, cleaning str	rainer		
	Medium blo	<u> </u>	-					
(when turning power ON)			wer	Medium blow function (when power is turning ON)				
0 1		N)						
Overheat protecti				Breaker with shunt coil (SHT) + Fixed type thermostat				
Water level detec	tor				Electrode type or float type	NOTE 5		
Pressure gauge					ф50 х 1.0 МРа			

	Model	GMC-G1-25L95	GMC-G1-55L95	GMC-G1-88L95			
	Water supply port		Ф10.5 hose nipple				
Piping	Drain port	ф10.5 hose nipple					
i iping	Medium feed port	3/8B x 2 ways	3/8B x 4 ways	3/8B x 6 ways			
	Medium return port	3/8B x 2 ways	3/8B x 4 ways	3/8B x 6 ways			
Outer dime	nsions(mm) NOTE 6	W232.5 x D450 x H524	W232.5 x D500 x H564	W232.5 x D560 x H674			
Weight		Approx. 40 kgs.	Approx. 50 kgs.	Approx. 60 kgs.			
Option	NOTE 7	Leakage breaker, external start/stop, general alarm output, alarm buzze revolving lamp, tower lights (red+green), optional selection, water supply pressure abnormality, flow rate monitor, medium return sensor, mold sensor, water supply filter, multi-directions manifold, air purge (manual)		selection, water supply eturn sensor, mold			

- 1. Operation voltage 100 V is for MAI specification (American specifications) only.
- 2. The apparent power is for power supply voltage 200V 50Hz and 200/220V 60Hz and it will differ depending on voltage.
- 3.Water quality : equivalent grade of Japan Refrigeration and Air Condition Industry Standards for makeup water. (pH = 6 to 8, Electric conduction rate 50  $\sim$  200  $\mu$ S/cm, not containing large amounts of calcium, silica, chlorine, and iron)
- 4. When this product is used at medium temperature of 85°C ~ 95°C, required drain pressure is 0.03 ~ 0.1 MPa.
- 5.Liquid level detector is selectable.
- 6. Outer dimensions do not include piping.
- 7.MAI specification (American specifications) is not compatible with some options.

Model				GMC-G3-25H120	GMC-G3-55H120	GMC-G3-88H120		
Power supply				Specified on machine nameplate				
Operation voltage	)				200/220V(100V)	NOTE 1		
	200V 50/6	0Hz		5.5kVA	8.0kVA	11.8kVA		
	220V 50Hz			5.4kVA	8.0kVA	11.7kVA		
	220V 60Hz			5.7kVA	8.2kVA	12.0kVA		
Apparent power	230V 60Hz			5.8kVA	8.3kVA	12.1kVA		
NOTE 2	380V 50/6			6.2kVA	8.6kVA	12.6kVA		
	400V 50/6			6.4kVA	8.8kVA	12.7kVA		
	415V 50Hz			6.4kVA	8.9kVA	13.2kVA		
	460V 60Hz			6.5kVA	8.9kVA	13.0kVA		
Medium	100 1 001 12				lear water (soft water)	NOTE 3		
Massinas on On aline	. \\/ata= \\			9.0L/min (At 0.2MPa)~	10.0L/min(At 0.2MPa)~	12.0L/min(At 0.2MPa)		
Maximum Cooling	y water Qua	ıntıty		11.0L/min(At 0.3MPa)	12.0L/min(At 0.3MPa)	15.0L/min(At 0.3MPa)		
Cooling water flow	v rate			Approx.	0.1 MPa ~ 0.3 Mpa, 20 L/r	min or more		
Working tempera				Wate	er supply temperature +10	~ 120°C NOTE 4		
	Motor			300W 2P	600W 2P	1000W 2P		
Dumm	Discharge	amou	nt	J. D	ofor to numer nortormonos	a a la a set		
Pump	Total lift			* H	* Refer to pump performance chart			
	Material			С	asing : FC200 Imp	eller : BC6		
	Capacity			4kW	6kW	9kW		
Heater	Watt densi	ty		7.9W/cm <sup>2</sup>	8.1W/cm <sup>2</sup>	7.5W/cm <sup>2</sup>		
	Material				SUS304			
Heater box	Capacity			1.5L	2.0L	2.6L		
Cooling consoity	Difference		10°C	2.4/3.3 kW	2.9/4.1 kW	3.6/4.9 kW		
Cooling capacity (Cooling water			30°C	7.2/9.8 kW	8.6/12.4 kW	10.7/14.7 kW		
pressure: 0.2 MPa/0.3 MPa)	temp. and c	ooling		14.5/19.6 kW	17.2/24.7 kW	21.4/29.5kW		
0.2 NIFa/0.3 NIFa)	water inlet t				I Heating . cooling, PID act	ion		
		HOH		Type K (CA) thermocouple				
	Input			Digital setting, digital display (with AT function)				
	Setting · display method			Setting temperature: SV1- SV64 (memory function)				
	Medium temperature protection function			Medium feed temperature limiter set by model				
	protection	runctic	n					
				Start timer: Setting range 0 ~ 99 Hrs. 59 Mins, switched ON after setting.				
	Timer func	tion		Stop timer: Setting range 0 ~ 99 Hrs. 59 Mins, switched OFF after setting.				
Temperature				Either timer can be actuated by selecting function (START/STOP).				
controller (MR16- CT)		Oper displ	ation ay	Temperature control display SV No. display Heating output display (MH) % - Cooling output display (MC) %				
,	LCD	Alarr displ		Reverse phase, pump overload, sensor abnormality, medium level drop, temperature rise, temperature drop				
	message display			modium level	arop, tomporature rise, te			
	-17	Before	enance	\Mate	er level detector, cleaning	strainer		
		displa		vvaic	or level detector, clearing	Strainer		
Before Maintenance Display		ance	Medium blow function (when power is turning ON), communication					
Overheat protecti	on			Procker with chunt coil (CUT) + Fixed tune thermostat				
·				Breaker with shunt coil (SHT) + Fixed type thermostat  Electrode type or float type NOTE 5				
Water level detector				Electrode type or float type NOTE 5 Φ 50 x 1.6 MPa				

	Model	GMC-G3-25H120	GMC-G3-55H120	GMC-G3-88H120			
	Water supply port	Ф10.5 hose nipple					
Piping	Drain port		ф10.5 hose nipple				
i iping	Medium feed port	3/8B x 2 ways	3/8B x 2 ways	3/8B x 2 ways			
	Medium return port	3/8B x 2 ways	3/8B x 2 ways	3/8B x 2 ways			
Outer dime	nsions(mm) NOTE 6	W232.5 x D450 x H524	W232.5 x D500 x H564	W232.5 x D560 x H674			
Weight		Approx. 40 kgs.	Approx. 50 kgs.	Approx. 60 kgs.			
Option	NOTE 7	Leakage breaker, external start/stop, general alarm output, alarm buzzer evolving lamp, tower lights (red+green), optional selection, water supply pressure abnormality, flow rate monitor, medium return sensor, mold sensor, water supply filter, multi-directions manifold, air purge (manual)		selection, water supply return sensor, mold			

- 1. Operation voltage 100 V is for MAI specification (American specifications) only.
- 2. The apparent power is for power supply voltage 200V 50Hz and 200/220V 60Hz and it will differ depending on voltage.
- 3.Water quality : equivalent grade of Japan Refrigeration and Air Condition Industry Standards for makeup water. (pH = 6 to 8, Electric conduction rate 50  $\sim$  200  $\mu$ S/cm, not containing large amounts of calcium, silica, chlorine, and iron)
- 4. When this product is used at medium temperature of 100°C ~ 120°C, required drain pressure is 0.2 ~ 0.3 MPa.
- 5. Liquid level detector is selectable.
- 6. Outer dimensions do not include piping.
- 7.MAI specification (American specifications) is not compatible with some options.
- **★** Cooling water of approx. 2.0 ~ 3.0L/min always flow from drain port.
- \* Please prepare the quantity of cooling water more than maximum cooling water quantity

]	Model			GMC-G1-25H120	GMC-G1-55H120	GMC-G1-88H120		
Power supply				Specified on machine nameplate				
Operation voltage	<del></del>				200/220V(100V)	NOTE 1		
	200V 50/6	0Hz		5.5kVA	8.0kVA	11.8kVA		
	220V 50Hz			5.4kVA	8.0kVA	11.7kVA		
	220V 60Hz			5.7kVA	8.2kVA	12.0kVA		
Apparent power	230V 60Hz	Z		5.8kVA	8.3kVA	12.1kVA		
NOTE 2	380V 50/6	0Hz		6.2kVA	8.6kVA	12.6kVA		
	400V 50/6	0Hz		6.4kVA	8.8kVA	12.7kVA		
	415V 50Hz	Z		6.4kVA	8.9kVA	13.2kVA		
	460V 60Hz	Z		6.5kVA	8.9kVA	13.0kVA		
Medium				C	lear water (soft water)	NOTE 3		
Maximum Cooling	g Water Qua	ntity		9.0L/min (At 0.2MPa)~ 11.0L/min(At 0.3MPa)	10.0L/min(At 0.2MPa)~ 12.0L/min(At 0.3MPa)	12.0L/min(At 0.2MPa)~ 15.0L/min(At 0.3MPa)		
Cooling water flow	w rate				0.1 MPa ~ 0.3 Mpa, 20 L/mi	, ,		
Working tempera				Wate	er supply temperature +10 ~	120°C NOTE 4		
	Motor			300W 2P	600W 2P	1000W 2P		
Dumn	Discharge	amou	nt	т D	ofor to numn norformance of	hort		
Pump	Total lift			* Refer to pump performance chart				
	Material			C	Casing : FC200 Impeller : BC6			
Hootor	Capacity			4kW	6kW	9kW		
Heater	Watt densi	ty		7.9W/cm <sup>2</sup>	8.1W/cm <sup>2</sup>	7.5W/cm <sup>2</sup>		
Heater box	Material				SUS304			
Healer DOX	Capacity			1.5L	2.0L	2.6L		
Cooling capacity	Difference		10°C	2.4/3.3 kW	2.9/4.1 kW	3.6/4.9 kW		
(Cooling water	between me	edium	30°C	7.2/9.8 kW	8.6/12.4 kW	10.7/14.7 kW		
pressure: 0.2 MPa/0.3 MPa)	temp. and o	-	60°C	14.5/19.6 kW	17.2/24.7 kW	21.4/29.5kW		
	Control mo	tion	'	Heating . cooling, PID action				
	Input			Type K (CA) thermocouple				
	Setting · dis	play m	ethod	Digital setting, digital display (with AT function) Setting temperature: SV1- SV64 (memory function)				
	Medium te	mpera functio	ture	Medium feed temperature limiter set by model				
				Start timer: Setting range 0 ~ 99 Hrs. 59 Mins, switched ON after setting.				
	Timer func	tion		Stop timer: Setting range 0 ~ 99 Hrs. 59 Mins, switched OFF after setting.				
Temperature				Either timer can be actuated by selecting function (START/STOP).				
controller (MR16- AN)		Opei displ	ation av	Temperature control display SV No. display Heating output display (MH) % - Cooling output display (MC) %				
(IVIT) IO- AIN)	LCD	Alarr			,			
	message	displ		Reverse phase, pump overload, sensor abnormality, medium level drop, temperature rise, temperature drop				
	display	Before	Э					
		maint displa	enance y	Wate	er level detector, cleaning st	rainer		
	others			Medium blow function (when power is turning ON)				
Overheat protecti	on			Proplet with about add (CLIT)   Fixed time the man-t-t-t				
Water level detec				Breaker with shunt coil (SHT) + Fixed type thermostat  Electrode type or float type NOTE 5				
Pressure gauge					ф 50 x 1.6 MPa	110120		
i ressure gauge					Ψ 50 λ 1.0 ΙΝΙΙ α			

	Model	GMC-G1-25H120	GMC-G1-55H120	GMC-G1-88H120				
	Water supply port		Ф10.5 hose nipple					
Piping	Drain port		ф10.5 hose nipple					
i ipilig	Medium feed port	3/8B x 2 ways	3/8B x 4 ways	3/8B x 6 ways				
	Medium return port	3/8B x 2 ways	3/8B x 4 ways	3/8B x 6 ways				
Outer dime	nsions(mm) NOTE 6	W232.5 x D450 x H524	W232.5 x D500 x H564	W232.5 x D560 x H674				
Weight		Approx. 40 kgs.	Approx. 50 kgs.	Approx. 60 kgs.				
Option	NOTE 7	Approx. 40 kgs. Approx. 50 kgs. Approx. 60 kgs.  Leakage breaker, external start/stop, general alarm output, alarm buzze revolving lamp, tower lights (red+green), optional selection, water supp pressure abnormality, flow rate monitor, medium return sensor, mold sensor, water supply filter, multi-directions manifold, air purge (manual)						

- 1. Operation voltage 100 V is for MAI specification (American specifications) only.
- 2. The apparent power is for power supply voltage 200V 50Hz and 200/220V 60Hz and it will differ depending on voltage.
- 3. Water quality : equivalent grade of Japan Refrigeration and Air Condition Industry Standards for makeup water. (pH = 6 to 8, Electric conduction rate 50 to  $\sim$  200  $\mu$ S/cm, not containing large amounts of calcium, silica, chlorine, and iron)
- 4. When this product is used at medium temperature of 100°C ~ 120°C, required drain pressure is 0.2 ~ 0.3 MPa.
- 5. Liquid level detector is selectable.
- 6. Outer dimensions do not include piping.
- 7.MAI specification (American specifications) is not compatible with some options.
- ★ Cooling water of approx. 2.0 ~ 3.0L/min always flow from drain port.
- \* Please prepare the quantity of cooling water more than maximum cooling water quantity.

#### MCLX, HX, A-200A

Mo	odel	MCLX-200A	MCHX-200A	MCA-200A	
Power Supply		Spell out exactly on the nameplate of system			
Medium		Fresh Water (so	ft water) Note 2	Heating medium Oil	
Cooling Water		About 0.1 Mpa- 0.3 Mpa 20L/min above	About 0.4 Mpa 20L/min above	About 0.1 Mpa- 0.3 Mpa 20L/min abov	
Ambient temperat	ure in use	Temp. of food water +10 to 90°C	Temp. of food water +10 to 130°C	+60 to 160°C	
	Motor		2.2 Kw 2P	•	
Pump	Draining Quantity	* Pofo	r to [Dumn Parformance Di	agram]	
	Pump head	* Refer to [Pump Performance Diagram]			
Heater	Heater Capacity		12 kW		
Heater box	Material		SUS304		
nealer box	Volume	2.	6L	11.7L	
	Adjustment	Heating cooling and PID operation			
	Input	K type			
Temperature	Setting & Display	Di	gital setting and digital displ	lay	
Controller	Medium temperature protection function	Supply medium temperature upper and low limit preset by models			
Alarm Indicator		Reverse phase, Pump overload, sensor failure, Medium level drop highest limit and lowest limit can be displayed by alarm numbers			
Overheat Protection	on	Circuit breaker with shunt coil (SHT) + Fixed thermostat			
Water level switch	1	Float Switch			
Pressure Gauge		Ф 60 x 1.0 MPa			
	Water inlet	1/2 hose nipple			
Dining	Water Outlet	1/2 hose nipple			
Piping	Medium feeding port	32A (11 / 4B) Gate Valve			
	Medium returning port				
Outer Dimensions		Refer to whole diagram Note 3			
Weight		115 kg			
Capacity of	AC200~220V	50			
power breaker (A)	AC380~415V	32			
Capacitance KVA	(Max)	15.54			

- 1. This system is intended for 50 Hz only. It is impossible to use another cycle.
- 2. Water quality: The extent of standard quality of makeup water of the The Japan Refrigeration and Air. Conditioning Industry Association Standard {pH=0.8 calcium, slica chlorine and iron are not included so much. Electric conductivity:  $50-200~\mu$  S/cm

#### MCLX, HX, A-350A

M	odel	MCLX-350A	MCHX-350A	MCA-350A	
Power Supply		Spell out exactly on the nameplate of system Note 1			
Medium		Fresh Water (so	oft water) Note 2	Heating medium Oil	
Cooling Water		About 0.1 Mpa- 0.3 Mpa 20L/min above	About 0.4 Mpa 20L/min above	About 0.1 Mpa- 0.3 Mpa 20L/min above	
Ambient tempera	ture in use	Temp. of food water +10 to 90°C	Temp. of food water +10 to 130°C	60 to 160°C	
	Motor		3.7 Kw 2P		
Pump	Draining Quantity	* Pofo	r to [Pump Performance Dia	agrami	
	Pump head	11616	i to [i dilip i ellolillalice Di	agramj	
Heater	Heater Capacity		14 kW		
Llootor boy	Material		SUS304		
Heater box	Volume	2.0	6L	11.7L	
	Adjustment	Heating cooling and PID operation			
	Input	K type			
Temperature	Setting & Display	Di	gital setting and digital disp	ay	
Controller	Medium temperature protection function	Supply medium temperature upper and low limit preset by models			
	Alarm Indicator	Reverse phase, Pump overload, sensor failure, Medium level drop highest limit and lowest limit can be displayed by alarm numbers			
Overheat Protect	ion	Circuit breaker with shunt coil (SHT) + Fixed thermostat			
Water level switc	h	Float Switch			
Pressure Gauge		Ф 60 x 1.0 MPa			
	Water inlet	1/2 hose nipple			
Dining Note 4	Water Outlet	1/2 hose nipple			
Piping Note 4	Medium feeding port	40A (11 / 4B) Gate Valve			
	Medium returning port		40A (11 / 2B) Gate Valve		
Outer Dimensions		Refer to whole diagram Note 3			
Weight		115 kg			
Capacity of	AC200~220V	63			
power breaker (A	AC380~415V	40			
Capacitance KVA	(Max)	19.55			

- 1. This system is intended for 50 Hz, 60 Hz only. It is impossible to use another cycle.
- 2. Water quality: The extent of standard quality of makeup water of the The Japan Refrigeration and Air. Conditioning Industry Association Standard {pH=6-8 calcium, silica chlorine and iron are not included so much. Electric conductivity:  $50-200~\mu$  S/cm
- 3. Outer dimensions do not include piping.

#### 1. Sensor (As an additional sensor, either mold sensor or medium return sensor can be installed.)

#### 1-1. Medium return sensor (mold sensor)

Install medium return sensor or mold sensor at terminals (4, 5, 6) on the back of mold temperature controller.

For mold sensor, connect it to connector.

Refer to technical manual in Chapter 14, Section 2.

#### 1-2. $\wedge$ T indication

While controlling medium feed temperature: Temperature difference between medium return temperature (PV2) and medium feed temperature (PV 1) can be monitored ( $\triangle T$ ).

#### 2. Leakage breaker

Earth leakage breaker is installed at power breaker to protect from ground fault, overload and short circuit and to prevent electric shocks.

- \*No fuse breaker (QF-1) will not be installed when earth leakage breaker is installed.
- \*Earth leakage breaker will also be turned off when overheat warning occurs.



Establish ground without exception.

#### 3. Alarm Indicator

When alarm is activated, alarm indicator lights for extensive notification.

\*When overheat alarm occurs, it will not light because breaker turns off.

Revolving lamp: It will light up in red when alarm is occurring.

Tower lights (2 levels): It will light up in red when alarm is occurring and light up in green during operation.

\*In case of tower lights has been installed, signal will not be able to use during operation.

#### 4. Alarm Buzzer

When alarm is activated, buzzer sounds for notifying surrounding area.

\* When overheat alarm is occurring, breaker will turn off, buzzer will not sound.

#### 5. General Alarm Output

General alarm will output at connector (CN12) on the right side.

Contact will turn ON at the time of alarm output.

(No-voltage relay outputResistance loadAC 250 V1 A Max.)

#### 6. Optional selection signal

Up to 2 signals among  $\triangle TOK$  signal, temperature OK signal, temperature rise completion signal can be selected.  $\star \triangle TOK$  signal requires a medium return sensor.

#### 7. External start/stop

Run and stop can be performed by external signal. (For external start signal, prepare no-voltage A contact, contact capacity AC250V 20 mA or more.)

Connect external start signal to connector (CN11) on front panel.

#### 8. Flow rate monitor

Flow rate of medium can be temperature controller and alarm can also be output when medium becomes lower than set flow rate or can bring machine to stop.

#### 9. Water supply pressure abnormality

When water supply pressure is abnormal, it can bring machine to stop.

#### 10. Water supply pressure reducing valve

This valve will reduce water supply pressure to specified pressure for protecting machine.

\* In case of water supply filter was installed, it will be supplied part.

#### 11. Water supply filter

This filter will remove impurities in water, protect machine and decreases number of times of maintenance.

★ This filter can be used when water supply pressure at the primary side is lower than 0.4 MPa only.

#### 12. Multi-directions manifold

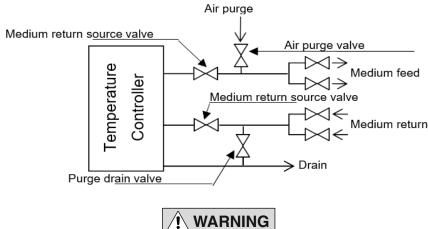
This manifold will be used to distribute medium in multi-directions.

#### 12. Air purge typeMedium release (Manual)

Water in mold will be purged by air purge.

[Operation procedures]

- [1] Decrease set temperature to decrease medium temperature to be lower than 45°C.
- [2] If temperature decreased, it will bring machine to stop, then turn "OFF" disconnect switch or power breaker.
- [3] Close medium feed/return source valves, open purge drain valve, then open air purge valve, and perform air purge.
- [4] In case of manifold has been installed, it will be better to purge water line by line, water will be purged efficiency.
- [5] Air purged water will be purged from drain port of machine.
- [6] After purged water, close air purge valve and purge drain valve and open medium feed/return source valves.



Plug air purge port when not using it. It is dangerous if valve is improperly opened during operation.



Connect air purge hose when using air purge.

If hose is continuously installed, water will run around air side due to leakage from valve.

