User manual

MT100

Digital mold temperature controller

HANYOUNG NUX

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Before You Start

- Thank you for purchasing MT 100 (Mold Temperature Controller).
  This chapter describes the installation of this product and how to use the product.
  The contents of this chapter are as follows.

  1) Check the Contents
  2) Safety Notice

1. Check the contents

1) External Examination

- Once you receive the product, please check for external damage.

2) Product Verification

- Please check whether the product specification is the same as what you purchased.
  (You can check the model specification code on the product's case and carton box)

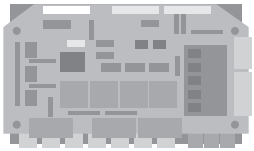
3) Check packing contents

- Please check to ensure that the following contents are included.

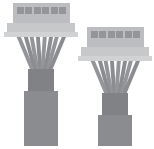
4) Damaged product

- If the product has external damage or some contents are missing,
  please contact the place of purchase or our sales department.

5) Components



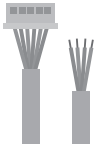
MT100 Main Unit



Connection cable

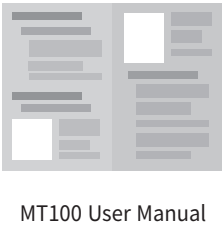
※ Display unit to main unit

MT100 Display Unit



Communication cable

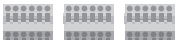
※ For communication option



MT100 User Manual

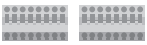
2 pin terminal : 7 Pieces

3 pin terminal : 1 piece



6 pin terminal : 2 or 3 pieces

※ 3 for HB option and 2 for non-HB option



8 pin terminal: 2 pieces

2. Safety notice

1) Safety notice for this user manual

- Please make this manual is delivered to the end user and is placed where it can be easily found.
- Please install and operate this product after reading and fully understanding the manual.
- This manual contains detailed information about the product and any matter not mentioned in this manual cannot be guaranteed.
- This manual is written carefully and believed to be accurate, but please call us if you find any errors, omissions, or have suggestions for improvements.
- The contents of this user manual can be edited with out prior notice for improvement and modification of the product.

2) Safety notice for the product

- For the safety and protection of the system that uses this product, please read and follow the manual with care.
- We are not liable for any damage and safety problems due to disregards of the manual or lack of care in product operation.
- In case the system needs any extra safety circuitry or other safety materials for the safety and protection of the system, please install them outside of the product. Do not modify or add components inside of the product.
- Do not disassemble, repair or reconstruct the product. It may result in electric shock, fire, or malfunction.
- Do not impact the product. It could result in malfunction or damage.

3) Notice about liability

- Unless it is included in the company's terms and conditions for warranty, we are not responsible for any warranties or guarantees.
- We are not liable for any damages and indirect loss of the use or third person due to unpredicted natural disasters.

4) Notice about quality assurance conditions

- The warranty for this product is valid for one year from purchase and we will fix any breakdown and faults from proper uses as it is mentioned in this manual for free of charge.
- After the warranty period, there will be a charge for repair according to our policies
- Under the following conditions, there will be a charge for repairs during the warranty period.
  - Breakdowns due to user misuse.
  - Breakdowns due to natural disaster.
  - Breakdowns due to relocation of the product after installation.
  - Breakdowns due to modification of the product.
  - Breakdowns due to power interruption.
- Please call customer service for A/S.
  - Tel : +82-1577-1047

5) Notice for installation

- Please install the product panel on the panel before you operate it since there is a possibility of electric shock if you do not.
- Please turn off the power of all the units and products before connecting the cables to each other.
- Please do not touch the product with wet hands. It can cause electric shock.
- Never use any gas pipe, lighting rods, or electrical wires as a ground. It can cause ignition and explosion.
- Please do not turn on electricity before installation of this product is completed. It can cause breakdowns.
- It can cause electric shock and fire when improper power source is used.
- Please do not install the product inclined.
- Please avoid installing the product in the following places where.
  - People can touch terminal unintentionally.
  - It is exposed to mechanical shock or vibration.
  - Danger or corrosion or combustion of gas exit.
  - Temperature changes frequently.
  - Temperature is either too high (Over 50 C) or too low (Below 0 C). (If you use our product below 10 C, please warm up for more than 30 minutes)
  - It is exposed to direct sunlight.
  - It is exposed to very high level of electromagnetic waves.
  - Humidity is high (Over 85% humidity)
  - It has many combustible objects.
  - It has dust and salinity.
  - It is exposed to heat radiation by other units.
  - It is exposed to noise caused by other units.

3. Suffix code

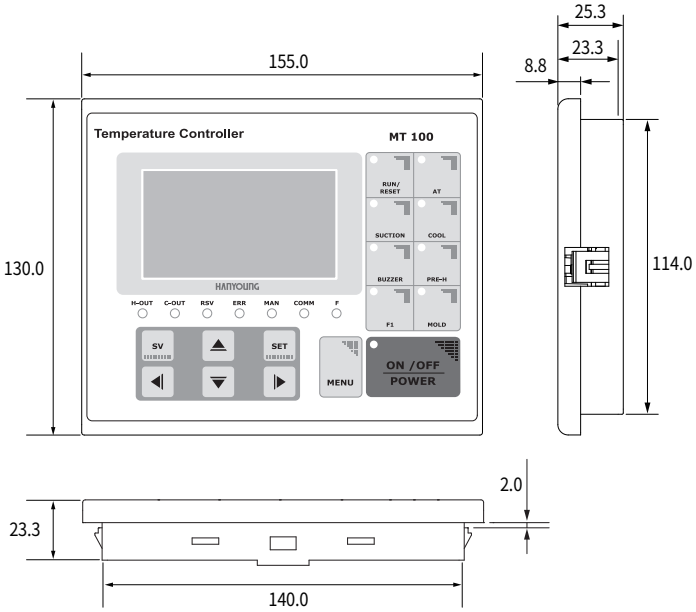
Model	Number			Description
MT100	□	□	□	Mold Temperature Controller
Communication	0			No communication
	1			RS485 / 422
Pressure check		1		Pressure check by input of contact
HB Test			0	No HB
			1	3 HB(s) ※ CT (CTL-6-S) is sold separately

Installation

1. External dimensions and panel cutout

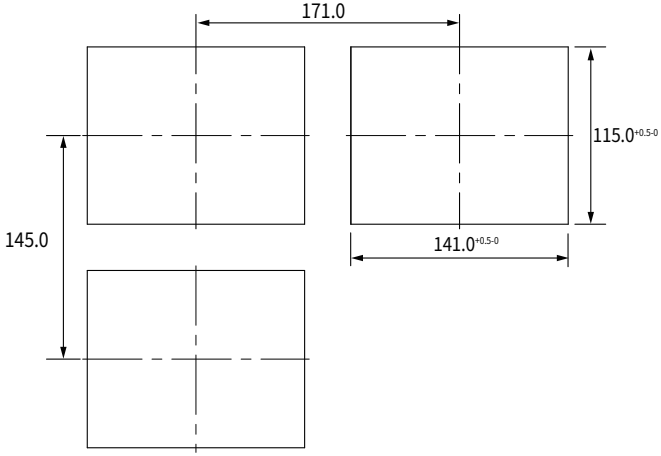
1) External Dimensions

[Unit : mm]



2) Panel Cutout

[Unit : mm]



2. Terminal diagram

⚠ Caution

※ Before connecting cables to the units, turn off the main power of all the units and make sure the cables to be connected are not conducting, then connect the cables to the units.

※ Do not touch the terminals when the power is being supplied to the unit because there is a possibility of electric shock.

※ Make sure the main power has been turned off and connect cables to the units.

1) Noise Elimination Measures

· Cause of Noise
- Relay and Contact
- Motor commutator
- Solenoid Coil, Solenoid Valve
- Phase angle SCR
- Power Line
- Remote Communication equipment
- Inductance Load
- Welding equipment
- Inverter
- High-pressure ignition equipment

· Countermeasure for Noise
- Please allow the input wires some distance from the power circuit and earth circuit.
- Please use the shield wires if there is noise caused by the electrostatic induction.
- Avoid having two grounds. If necessary, connect the shield wire to the earth terminal.
- Please twist input wires closely if there is noise caused by electromagnetic induction.

2) Main Terminal Wiring Diagram

• Sensor Terminal
- 1,2,3 : Terminal for mold sensor
- 4,5,6 : Terminal for MEDI sensor
- 7,8,9 : Terminal for water withdrawal
- 10,11,12 : Terminal for water ENTER sensor
- 13,14 : unused

• DI TERMINAL (Contact Input Terminal)
- 1,2(W.Fill Low) : Input Terminal for checking start of (Lack) of MEDI refilling
- 3,4(W.Fill High) : Input Terminal for checking end of MEDI refilling
- 5,6(Pressure over) : Input Terminal for checking over pressure
- 7,8(Option) : Input Terminal for option input
- 9,10(Pump rev over) : Input Terminal for checking over reverse operation of pump
- 11,12(Pump dir over) : Input Terminal for checking over direct action of pump
- 13,14(Heat over) : Input Terminal for checking overheating

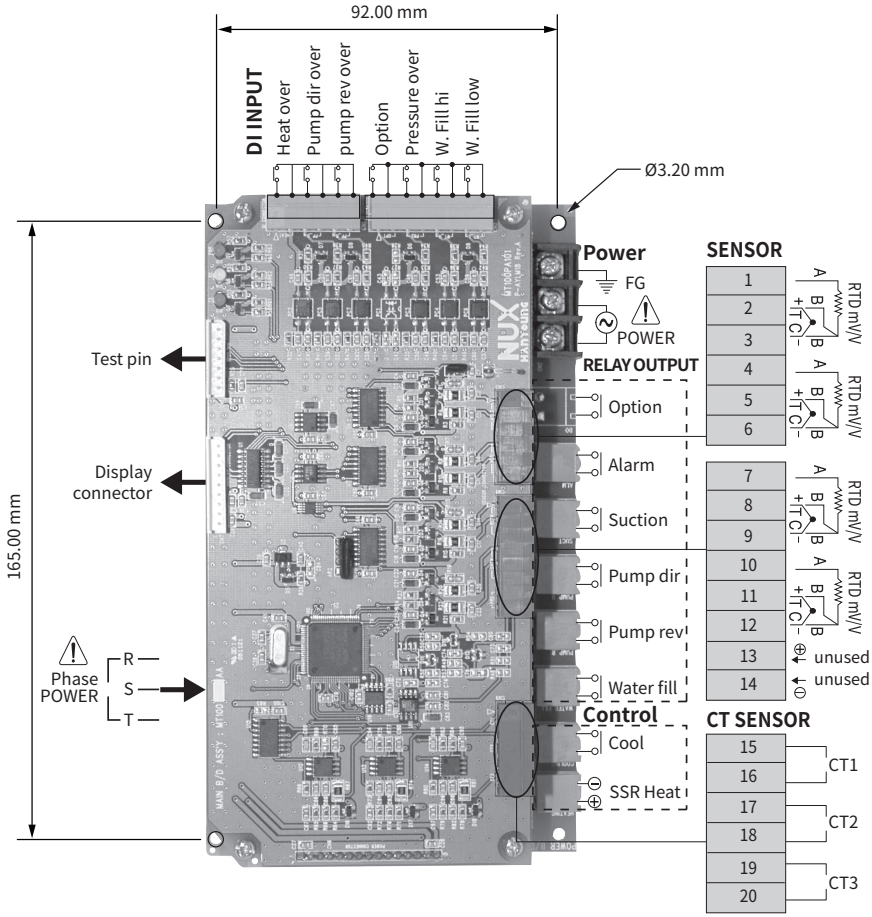
• CT Sensor terminal
- 1,2(CT1) : CT sensor terminal for checking current on R
- 3,4(CT2) : CT sensor terminal for checking current on S
- 5,6(CT3) : CT sensor terminal for checking current on T
(Use CTL-6-S for CT sensor)

• Display CN(Terminal for the connection cable to display)
- Please connect the cable that comes with MT 100

• DO TERMINAL(Relay Contact Output Terminal)
- 1,2(Option) : Output terminal for option
- 3,4(Alarm) : Output terminal for Alarm
- 5,6(Suction) : Output terminal for SUCTION
- 7,8(Pump dir) : Output terminal for Pump Direct
- 9,10(Pump rev) : Output terminal for Pump Reverse
- 11,12(Water fill) : Output terminal for Water Fill

• OUTPUT TERMINAL
- 1,2(Cool) : Output terminal for cooling control
- 3,4(SSR heat) : Output terminal for heating control (Voltage pulse output)

• PHASE CHECK TERMINAL(Phase Detection Terminal)
- 1 : R Connection terminal
- 2 : S Connection terminal
- 3 : T Connection terminal



⚠ Caution

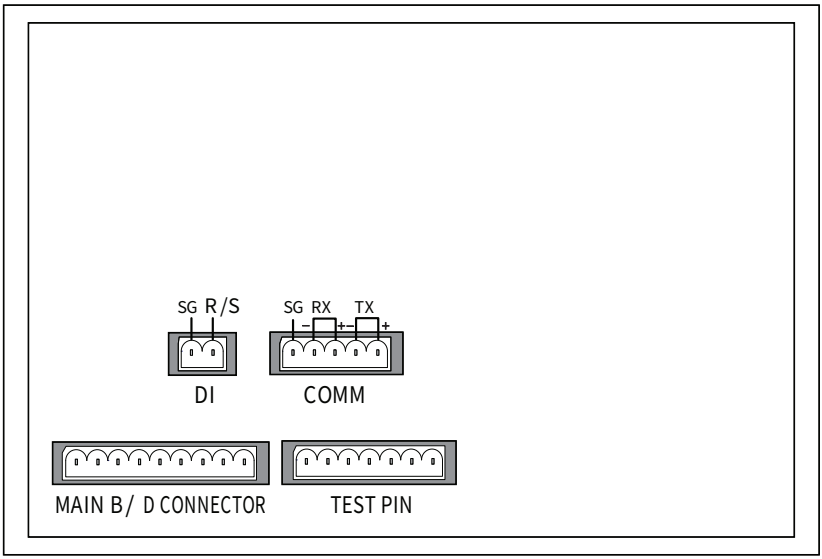
※ Do not connect cables to TEST PIN.

3) Display Terminal Diagram

• DI TERMINAL(Contact Input Terminal)
  - 1,2(R/S) : RUN/RESET Contact Input Terminal.

• COMM TERMINAL(Communication Terminal)
  - 1,2,3,4 : RS422/485 Communication Terminal.
  - 5 : Communication Signal Ground Terminal.

• Main CN(Terminal for connection with MAIN)
  - Please connect the cable that comes with MT 100.

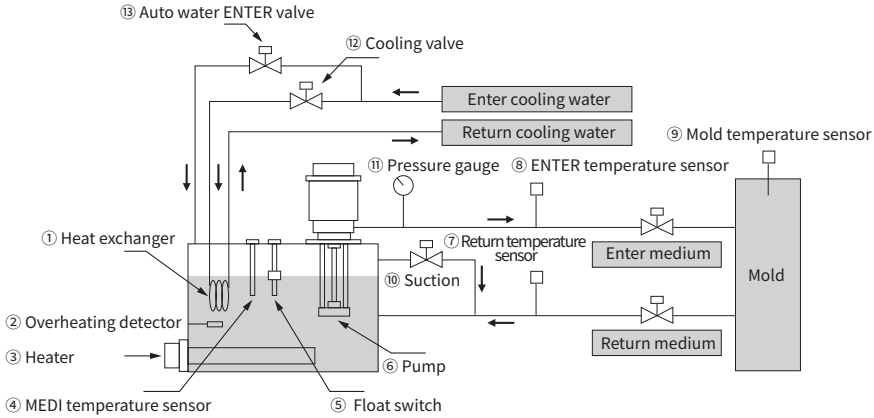


⚠ Caution

※ Do not connect cables to TEST PIN.

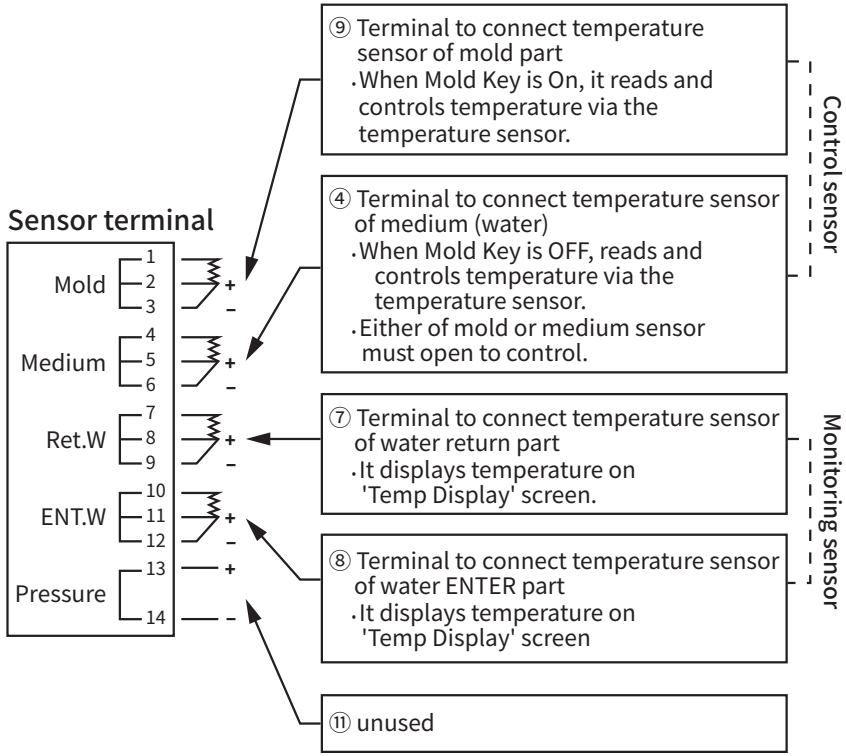
3. Names and functions of parts

※ Following figure illustrates cable connection supposing mold system built as shown below.

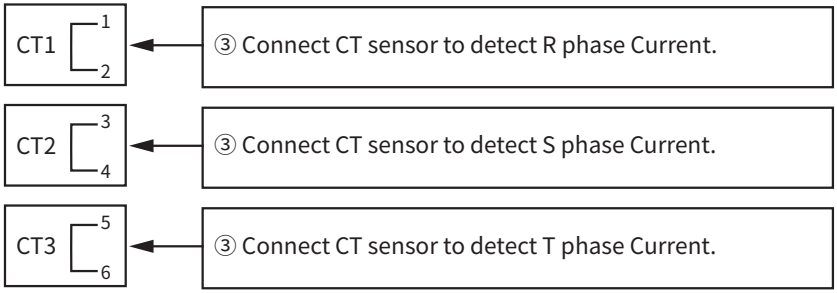


1) Sensor terminal on main board

• Terminals to connect temperature and pressure sensors

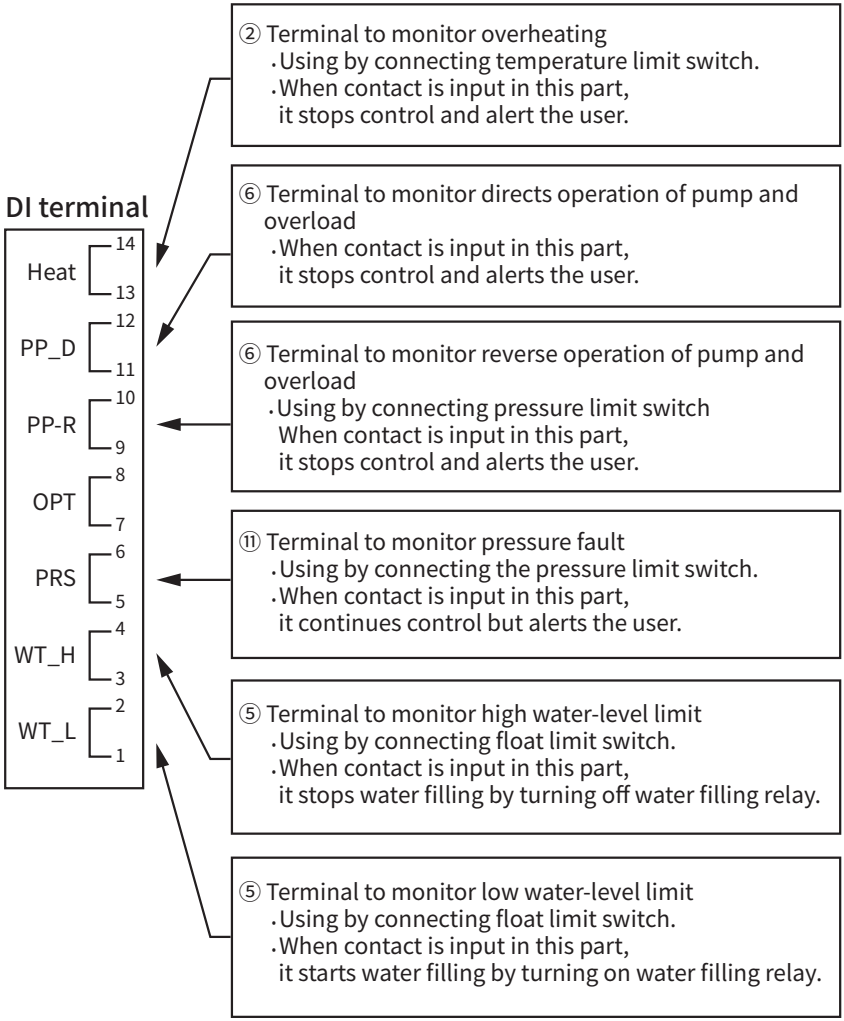


2) CT sensor terminal on main board

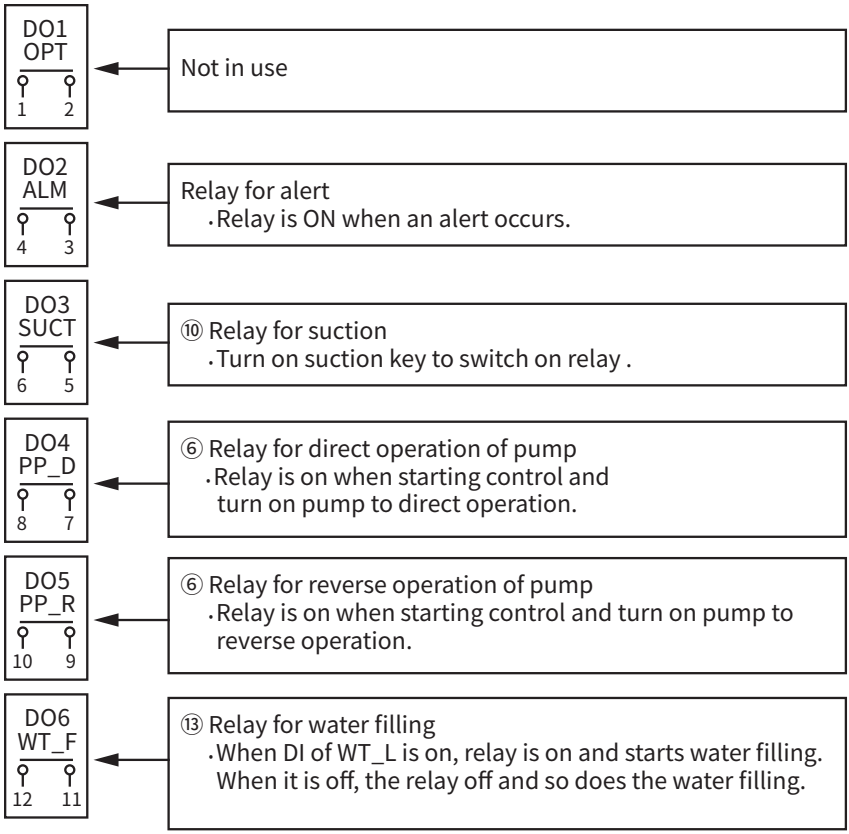


3) Input terminal on main board

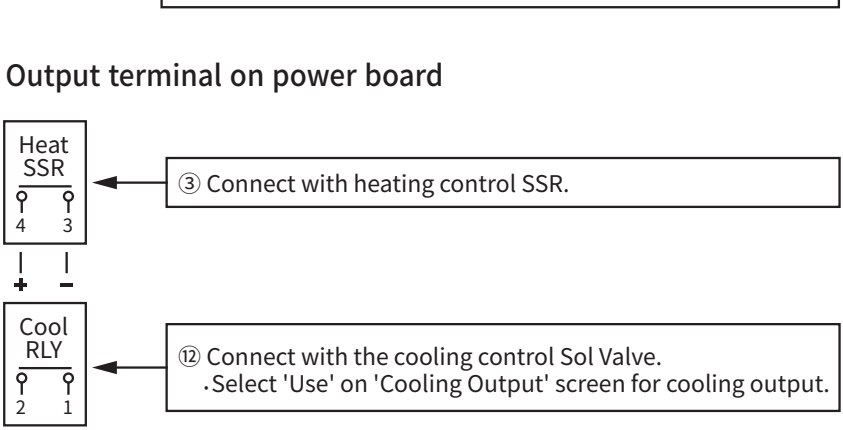
• Input terminal for monitoring system



4) Relay terminal on power board

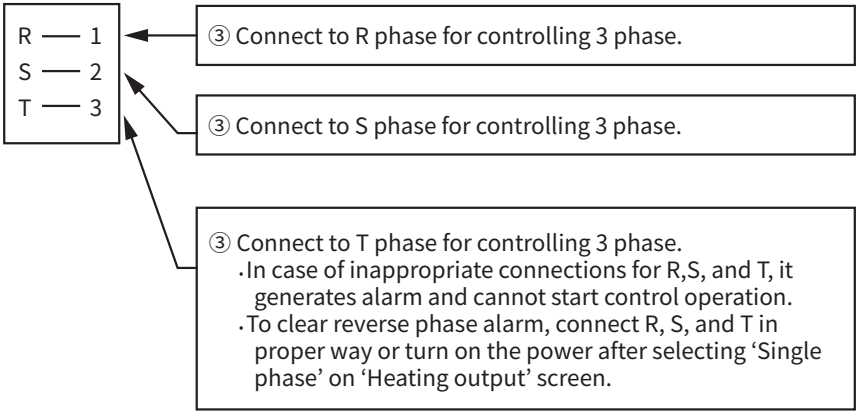


5) Output terminal on power board

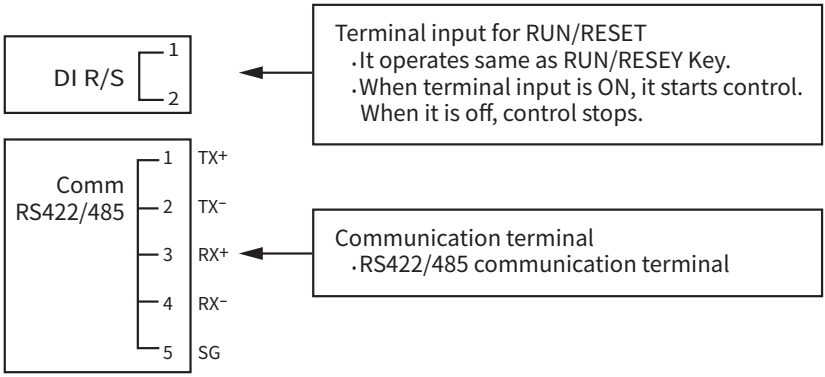


6) Phase detection terminal on power board

Phase check

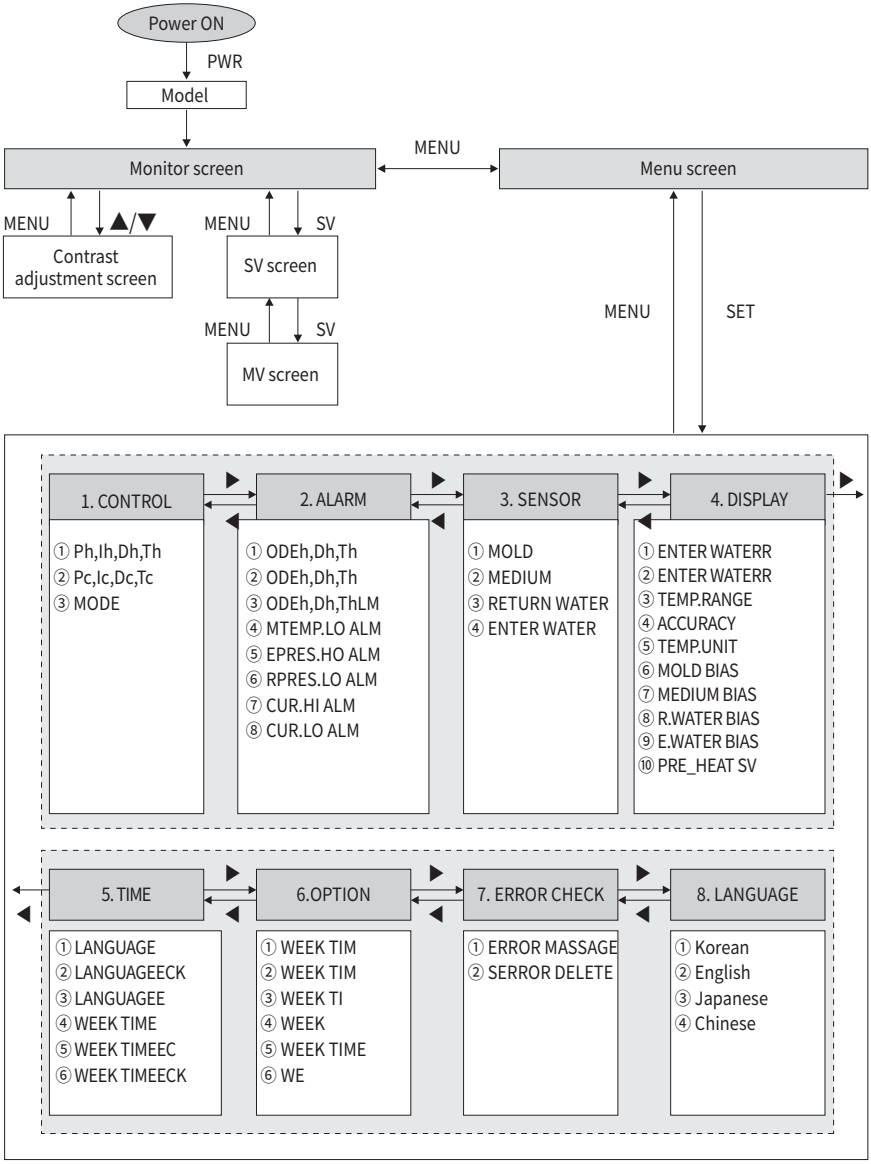


7) Display contact input and communication terminal



Screen & Parameters

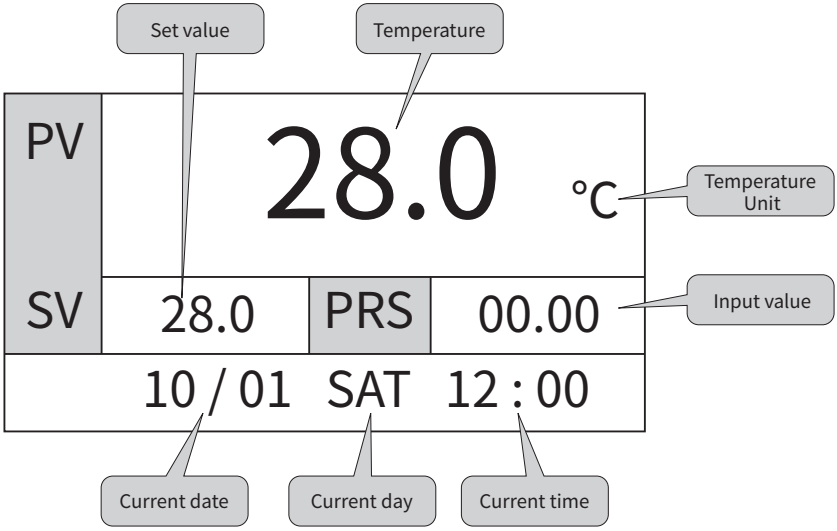
1. Overall screen layout



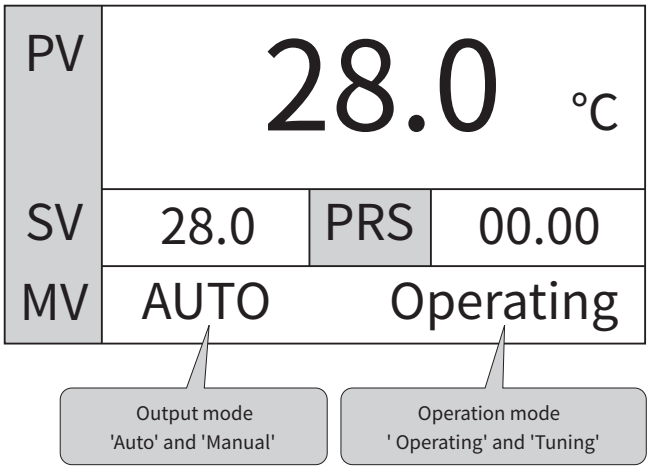
※ Japanese and Chinese versions are currently in development.

2. Monitor screen layout

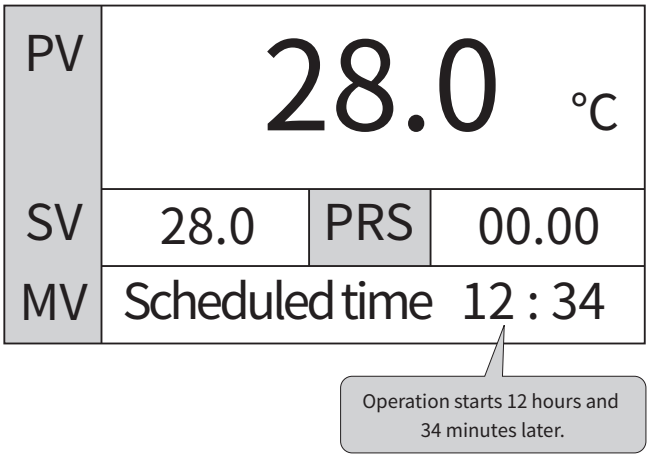
1) Stop screen



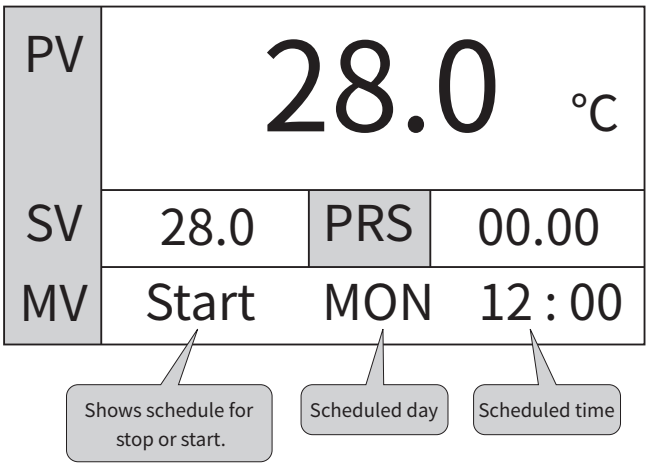
2) Operation screen



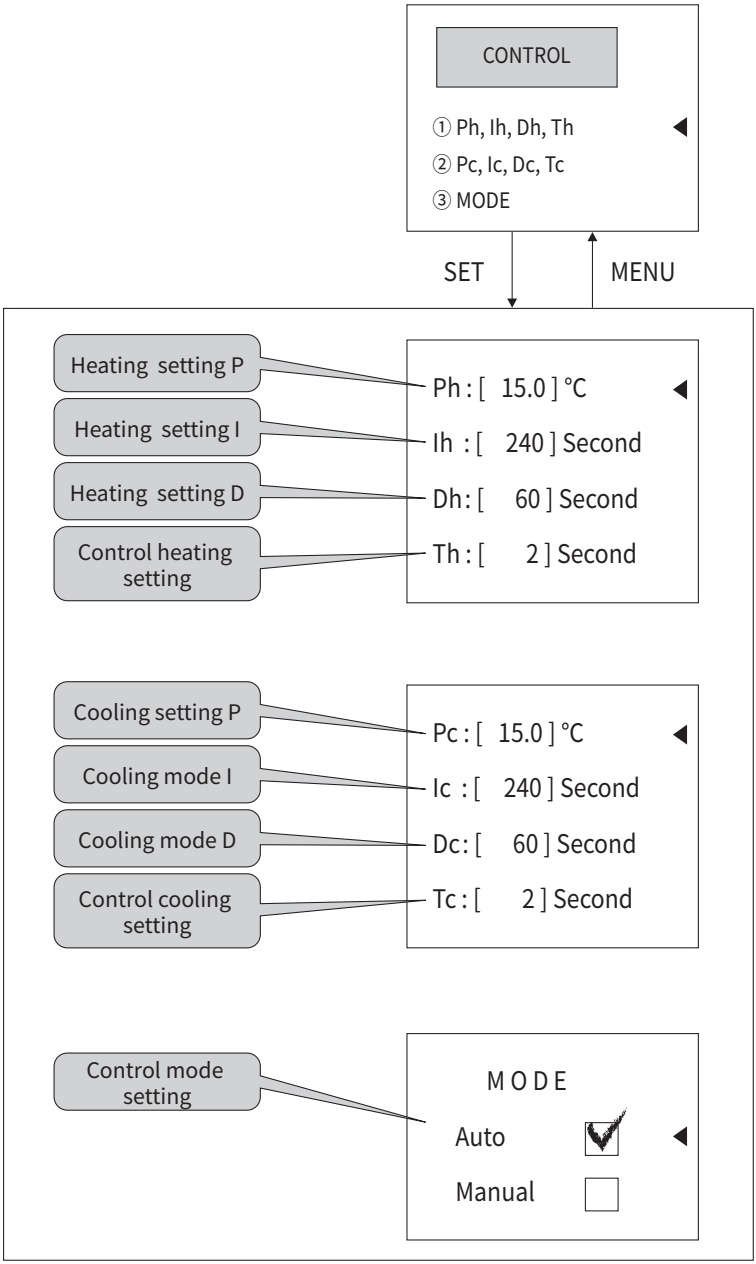
3) Timer screen



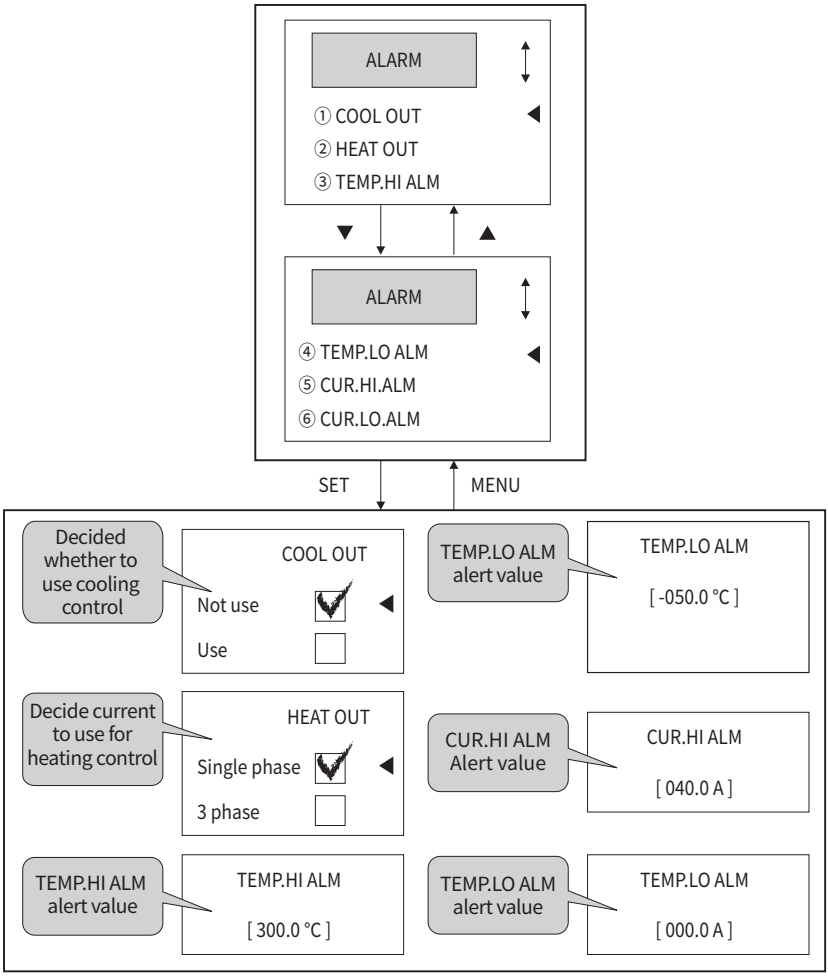
4) Week Timer screen



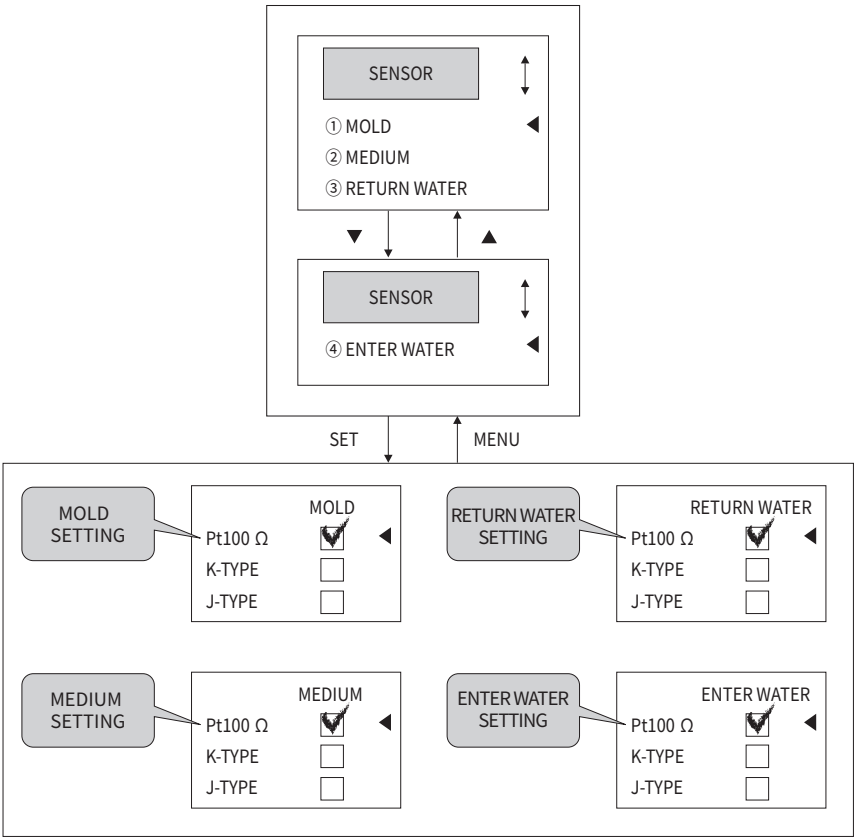
3. Control setting screen layout and structure



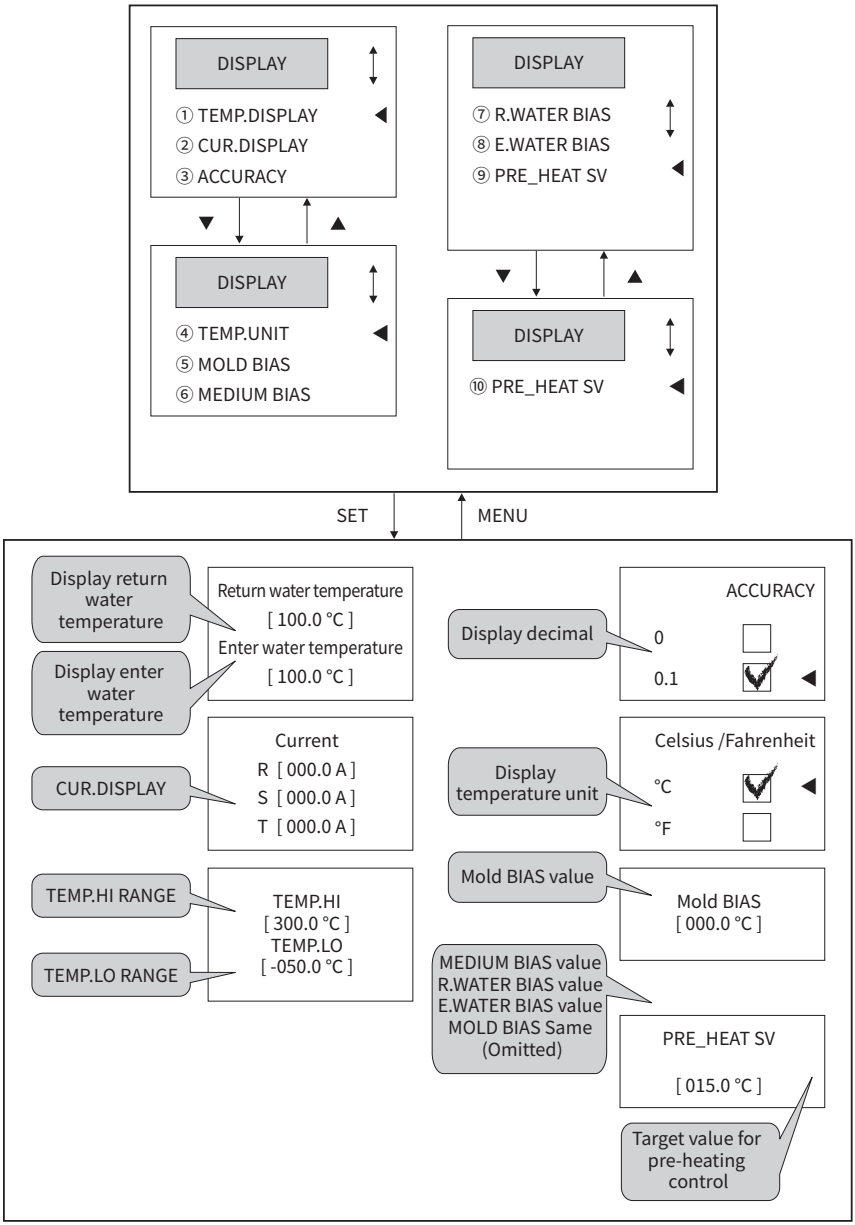
4. Output operation screen layout and structure



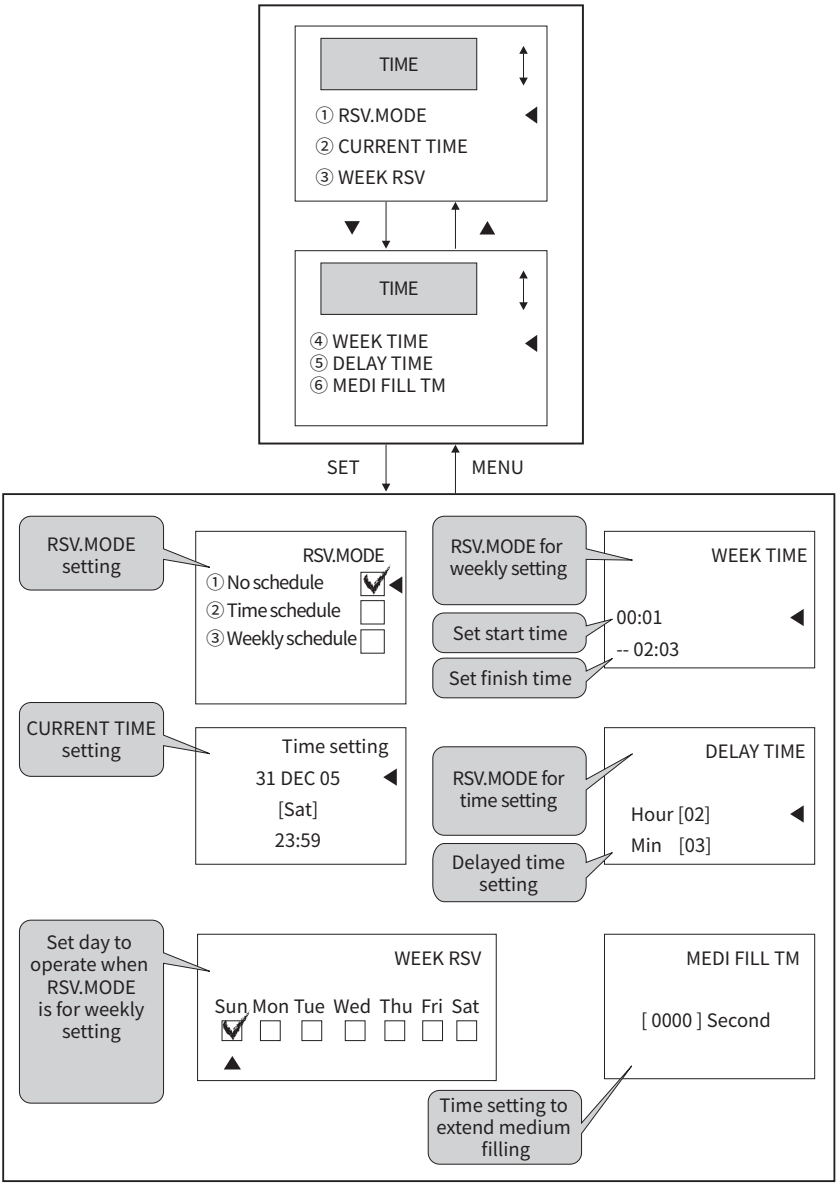
5. Sensor setting screen layout and structure



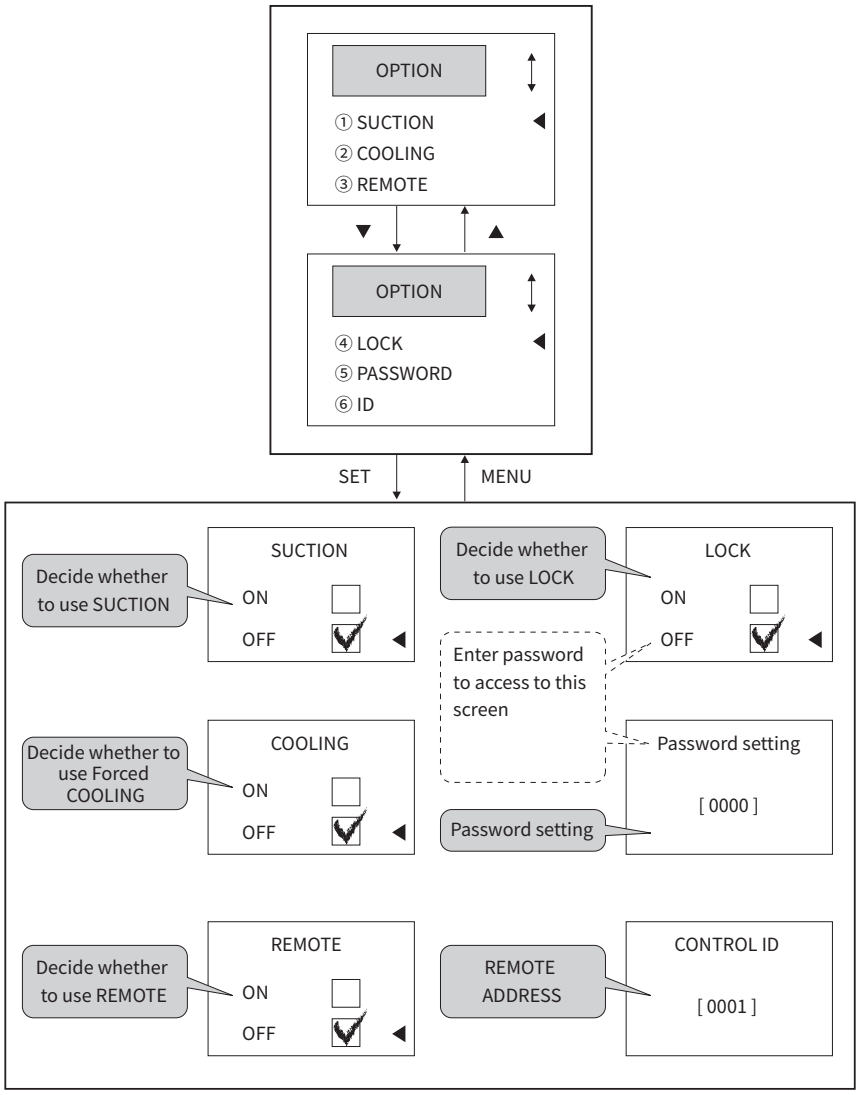
6. Operation screen layout and structure



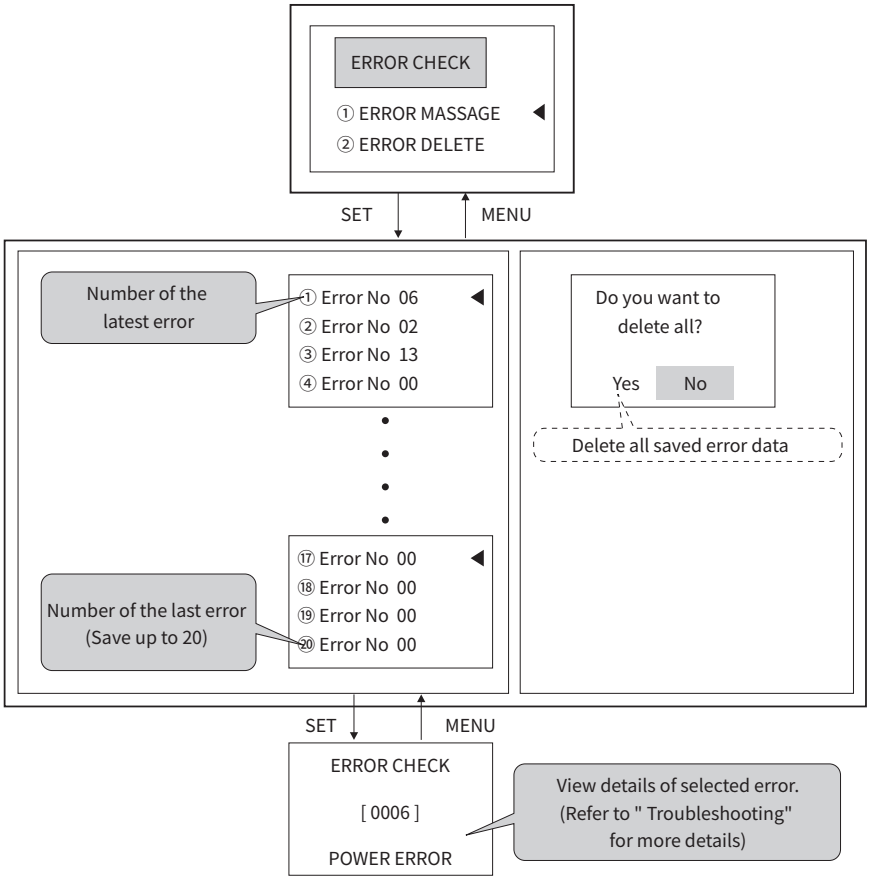
7. Scheduling setting screen layout and structure



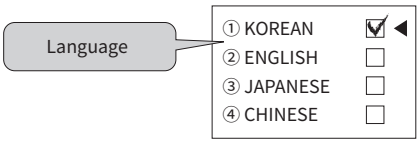
8. Option screen layout and structure



9. Error info screen layout and structure



10. Language setting screen layout and structure



※ Japanese and Chinese versions are under development.

11. Parameters reference table

1) Monitor screen

Name	Display screen	Description	Display	Initial value
PV	Monitor screen	Medium or mold temperature	-50.0 ~ 300.0 °C	-
SV		Target value		-50.0 °C
PRS		Pressure value	-	0.0
Auto/Manual		Auto/Manual control	AUTO, MAN	AUTO
Tuning/Operating		Tuning/Operating	TUNING, OPERATING	OPERATING
Schedule start time		Scheduled operation start time	DAY/HOUR/MINUTE	-
Schedule finish time		Scheduled operation finish time		-
Schedule remaining time		Remaining operation time	23 HOURS 59 MINUTES	-
Current time		Current time	MONTH/DATE/DAY/ HOUR/MINUTE	-

2) SV Screen

Name	Display screen	Description	Display	Initial value
SV	SV	Target value	-50.0 ~ 300.0 °C	-50.0 °C
Pre-heating SV		Pre-heating target value		15.0 °C

3) Output Screen

Name	Display screen	Description	Display	Initial value
HOUT	Output screen	Heating output value	0.0 ~ 100.0 %	0.0 %
COUT		Cooling output value		

4) Operation control screen

Name	Display screen	Description	Display	Initial value
Ph	Ph, Ih, Dh, Th	Heating Proportional Band	0.0 ~ 300.0 °C	20.0 °C
Ih		Heating Integral Time	0 ~3600 s	240 s
Dh		Heating Derivative Time		60 s
Th		Heating Control Cycle	0 ~ 100 s	2 s
Pc	Pc, Ic, Dc, Tc	Cooling Proportional Band	0.0 ~ 300.0 °C	20.0 °C
Ic		Cooling Integral Time	0 ~ 3600 s	240 s
Dc		Cooling Derivative Time		60 s
Tc		Cooling Control Cycle	0 ~ 100 s	2 s
Auto/Manual	MODE	Output mode	AUTO / MAN	AUTO

5) Output operation screen

Name	Display screen	Description	Display	Initial value
Cooling output	COOL OUT	Select whether to use cooling output	USE / NOT USE	NOT USE
Heating output	HEAT OUT	Select power source for heating output	SINGLE PHASE/ THREE PHASE	SINGLE PHASE
TEMP.HI ALM	TEMP.HI	High temperature limit alert	0.0 ~ 300.0 °C	300 °C
TEMP.LO ALM	TEMP.LO	Low temperature limit alert		0.0 °C
CUR.HI ALM	CUR.HI	High current limit alert	0.0 ~ 40.0 A	40.0 A
CUR.LO ALM	CUR.LO	Low current limit alert		0.0 A

6) Sensor setting screen

Name	Display screen	Description	Display	Initial value
MOLD	MOLD	Mold sensor type	Pt 100 Ω, K, J	Pt 100 Ω
MEDIUM	MEDIUM	Medium sensor type		
RETURN WATER	RETURN WATER	Return water sensor type		
ENTER WATER	ENTER WATER	ENTER water sensor type		

7) Time/Schedule screen

Name	Display screen	Description	Display	Initial value
RSV.MODE	RSV.MODE	RSV.MODE	NO REV/TIME REV/ WEEK REV	No REV
Time setting	CURRENT TIME	Current time	Year/Month/Date/ Day/Hour/Minute	0
WEEK RSV	WEEK RSV	Weekly operation	SUN - MON	–
WEEK TIME	WEEK TIME	Week Time	HOUR/MINUTE	0
Scheduled time	DELAY TIME	Time scheduling		
MEDI FILL TM	MEDI FILL TM	Medium refill time	0 - 60 s	

8) Error Check screen

Name	Display screen	Description	Display	Initial value
Error Check	ERROR MASSAGE	Display Error Check	–	0
Delete Error Check	ERROR DELETE	Delete Error Check	Yes, No	No

9) Operation screen

Name	Display screen	Description	Display	Initial value
Return temperature	TEMP.DISPLAY	Return temperature display	0.0 ~ 300.0 °C	0.0 °C
ENTER temperature		ENTER temperature display		
R phase current	CUR.DISPLAY	R phase current display	0.0 ~ 40.0 A	0.0 A
S phase current		S phase current display		
T phase current		T phase current display		
TEMP.HI RANGE	TEMP.RANGE	Max temperature	-50.0 ~ 300.0 °C	300 °C
TEMP.LO RANGE		Min temperature		-50.0 °C
ACCURACY	ACCURACY	Decimal	0, 0.1	0.1
TEMP.RANGE	Celsius/Fahrenheit	Temperature unit	°C, °F	°C
MOLD BIAS	MOLD BIAS	Mold temperature BIAS	−199.9 ~ 300.0 °C	0.0 °C
MEDIUM BIAS	MEDIUM BIAS	Medium temperature BIAS		
R.WATER BIAS	R.WATER BIAS	Return temperature BIAS		
E.WATER BIAS	E.WATER BIAS	ENTER temperature BIAS		
Pre-heating target value	PRE_HEAT SV	Pre-heating target value	-50.0 ~ 300.0 °C	15.0 °C

10) Option screen

Name	Display screen	Description	Display	Initial value
SUCTION	SUCTION	SUCTION	ON/OFF	OFF
COOLING	COOLING	Forced COOLING		
REMOTE	REMOTE	Communication		
LOCK	LOCK	LOCK		
PASSWORD	PASSWORD	PASSWORD	0000 ~ 9999	0000
ID	ID	Communication ID	1 ~ 99	1

11) Language selection

Description	Display	Initial value
Select a language	Korean	Korean
	English	
	Japanese	
	Chinese	

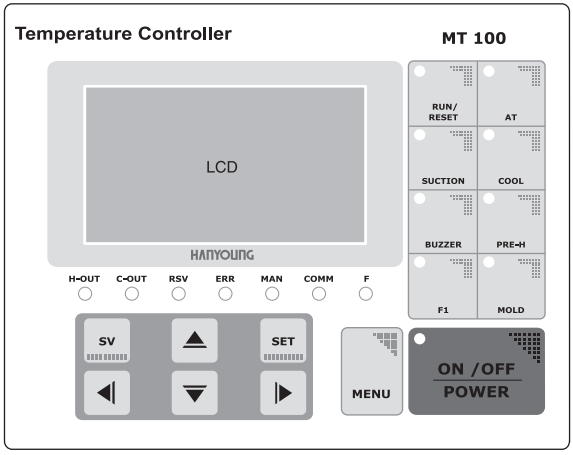
※ Japanese and Chinese versions are currently in development.

Handling and Operating

1. Front panel layout

1) LCD

· Display information on LCD screen



4) Key

- ON/OFF POWER: Key to switch Power ON and OFF
- MENU : Key to switch to LCD Screen
- SV : Key to change setting value
- SET : Key to register parameter
- ▼/▲ : Key to change parameter
- ▶/◀ : Key more cursor
- RUN/RESET : Key for starting & finishing control operation
- AT : Key for starting & finishing AUTO-TUNING
- SUCTION : Key for starting & finishing SUCTION
- COOL : Key for starting & finishing COOLING
- PRE-H : Key for starting & finishing PRE-HEATING
- BUZZER : Key for BUZZER OFF
- MOLD : Key to change control sensor
- F1 : Not in use (for functional expansion)

3) LED

- H-OUT : Heating output display LED
- MAN : Manual control display LED
- C-OUT : Cooling output display LED
- COMM : Communication display LED
- RSV : Reservation registration display LED
- F : Lack of medium alert LED
- ERR : Error Check display LED

2. Power ON/OFF

- After the power is applied to the unit, press "POWER ON/OFF" key. The unit is activated while the initial screen appears.

⚠ CAUTION

※ Please be cautious about the electric shock even when the unit is not activated while the power is applying to the unit.

3. Starting and finishing control

- There are 3 methods to start and finish control.
  - Use "RUN/RESET' key on the front side of DISPLAY.
  - Use contact input for "RUN/RESET' key in back side of DISPLAY. When the contact is on, it starts to control, when the contact is off, it finishes the control.
  - You can command to start and finish control by remote communication.

⚠ CAUTION

※ Please check the following things if it does not start control.
- In case the Unit or System has a problem
  - Please refer to "Troubleshooting" in detail.
- If there is any reservation, it turns into reservation status.

4. Input settings

1) Set temperature input sensor

- You can connect 4 temperature input sensors (Mold, MEDI, Return, and ENTER).
- You can select one of types (Pt100Ω, K(CA), and J) for each sensor.
- Set in "SENSOR"

2) Set temperature

- You can set Max and Min temperature limit.
- All temperature settings and control will be conducted within the configured range.
- Set in " DISPLAY " --> "TEMP.RANGE".

3) Decimal point of temperature

- Select whether to use decimal point.
- Cannot use decimal point if temp unit is Fahrenheit.
- Set in " DISPLAY " --> "Decimal" .

4) Temperature unit

- You can select either C or F.
- When the temp unit changes, "TEMP.RANGE" and all related parameters are initialized.
- Set in "DISPLAY" --> "TEMP BIAS".

5) Temperature BIAS

- You can calibrate the temperature of each sensor.
- Set in "Operation screen" --> "TEMP BIAS".

5. Output settings

1) Set control output cycle

- You can set control cycle of heating or cooling band.
- Output works as "Time proportional" operation along with "Control output cycle".
- Set in "CONTROL" --> "P, I, D, T" --> "Th" (Heating band) or "Tc" (Cooling band).

2) Set control mode

- Control mode has option of "Auto control" and "Manual control".
- In auto control, controller automatically calculates output value by "P, I, D" and manual control is option that user calculates output value.
- In case of manual control, you can set output value in "MONITOR SCREEN"-->"SV SCREEN"-->"OUTPUT SCREEN".
- Set in "CONTROL" --> "MODE".

6. Auto tuning

1) Overview of auto tuning

- Auto tuning is a task to get PID value that is the best fit to current target value
  It repeats ON/OFF actions in 2 and half cycle according to current target value and automatically stops

2) Starting and finishing of auto tuning

- Auto tuning can be started by pressing "AT" key during operation or through communication "AT" LED flashes during auto tuning and turns off when it completes after successful tuning operation, optimum PID value applies to heating and cooling band however, If pressing "AT" key during the operation, tuning will be forced to stop and the previous PID value will remain.

3) Conditions for start of auto tuning

- Tuning is possible during operation.
- When output mode is "AUTO".
- Tuning is not possible during SUCTION, Forced COOLING or Pre-heating.

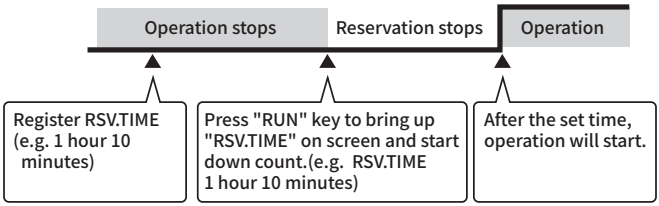
7. Set reservation

1) Set RSV.MODE

- RSV.MODE includes "NO RSV", "DELAY TIME" and "WEEK RSV.".
- Select "NO RSV" if not using reservation function.
- When setting RSV.MODE to ""DELAY TIME" or "WEEK RSV.", set time and start operation to bring up time for "OPERATION START" or "OPERATION FINISH".
- Set in "TIME/RSV"--> "RSV.MODE".

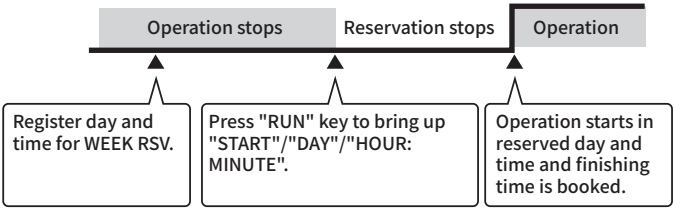
2) Delay Time

- Use this option to start operation after certain period of time based on current time.
- "RSV"LED flashes when delay time is set.
- In delay time mode, "RSV TIME" displays on monitor screen and down counted.
- Set in "TIME" -->"DELAY TIME".

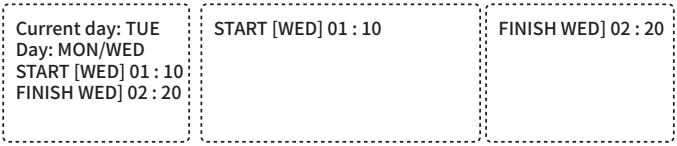


3) WEEK TIME

- Start or finish operation on certain day and time on weekly basis.
- If current status is operation, it books finishing time otherwise it sets start time.
- "RSV" LED flashes when WEEK TIME is set.
- In week time mode, "START/DAY/TIME" or "FINISH/DAY/TIME" is displayed on screen.
- Set DAY in "TIME" --> "WEEK RSV", Set TIME in "TIME" --> "WEEK TIME"



e.g.)



8. Auto medi fill

1) Overview of auto medium filling function

- When there is not enough medium in tank, it detects it and start refilling medium. after refilling medium, it automatically stops filling.

2) Start filling medium

- When user runs controller, it checks if contact input is ON in "Input terminal for starting medium fill" and start medium filling when it is ON.

3) Finish filling medium

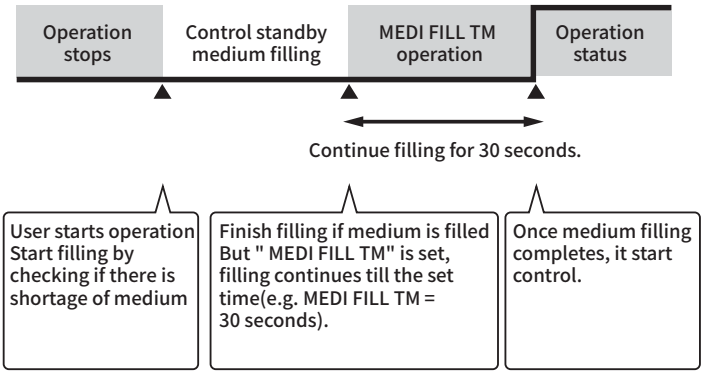
- When "Input terminal for starting medium fill" is OFF and "Input terminal for finishing medium fill" is ON, it stops refilling and start controlling.

4) Extend finishing medium filling

- Even though "Input terminal for finishing medium fill" is ON, set time in "TIME" --> MEDI FILL TM then medium filling continues till set time and finish after that.

5) Control medium filling

- During medium filling, controller stops control process and automatically starts after completion of refilling.



9. Suction

1) Overview of SUCTION

- SUCTION is a function that removes medium such as water or oil on a mold
  Once SUCTION starts, "SUCTION RELAY" and "PUMP REVERSE OPERATION RELAY" starts.

2) Start and finish SUCTION

- You can start and finish SUCTION by "SUCTION" key or communication
  During SUCTION operation, "SUCTION" LED flashes.

3) Conditions for start of SUCTION

- SUCTION function must be ON in OPTION screen.
- SUCTION cannot start during operation.
- SUCTION cannot start during Forced COOLING or PREHEATING.
- vSUCTION cannot start when output mode is "MAN".

10. Forced cooling

1) Overview of forced cooling

- Forced COOLING is a function that reduces temperature. Regardless operation and
  output mode, it stops output of heating band and sets cooling band to 100%.

2) Start and finish Forced COOLING

- You can start and finish Forced COOLING by "COOL" key or communication.

3) Conditions for start of SUCTION

- SUCTION function must be ON in OPTION screen.
- Forced cooling surpasses any other control option and
  all other output settings are discarded.

11. Pre-heating

1) Overview of Pre-Heating

- Pre-Heating is a function for freeze protection in winter target value for pre-heat can be set in Pre-heat SV" on Control screen during pre-heating process, ON/OF control is conducted according to pre-set "Pre-heating SV" (Initial value: 15C). target value for pre-heat can be set in Pre-heat SV" on Control screen.

2) Start and finish Pre-Heating

- You can start and finish Pre-Heating by "PRE-H" key or communication during pre-heating operation, press "RUN/RESET" key to stop pre-heating and immediately start operation. However, if there is reservation, pre-heating continues till reserved time.

3) Conditions for start of Pre-Heating

- Pre-Heating cannot start during operation or SUCTION.
- Pre-heating can be operated during Forced COOLING or Manual Control mode. however, be cautious as the priority for output is on Forced COOLING and Manual Control.

12. Control sensor conversion

- You can connect 4 temperature sensors together (Mold, MEDI, RETURN, ENTER).
- "MEDI sensor" and "MOLD sensor" is for control.
- "RETURN sensor" and "ENTER sensor" is for monitoring you can check temperature in "CONTROL" --> " TEMP.DISPLAY".
- Select whether to use "MEDI sensor" and "MOLD sensor" by using "MOLD" key.
- It is set to "MEDI sensor" by default. If pressing MOLD key, "MOLD" LED flashes and mode changes to "MOLD sensor"

13. Pressure test

1) Test via terminal input

- When terminal input for pressure test is ON, it detects pressure fault, send alert and register it in "ERROR CHECK"..

14. Various functions

1) Alarm

- The controller provides 6 types of alarm. If one of alarm occurs, alarm relay and buzzer is ON and register it in "ERROR CEHCK"
  - Alarm for high/low temperature limit
  - Alarm for high/low pressure limit
  - Alarm for high/low current limit

2) OPTION function

- It needs to turn ON an option in "OPTION" screen.
  - SUCTION option
  - Forced COOLING option
  - REMOTE (communication) option
    (Please refer to "Communication" function for more details)

3) Setting Protection

- Block parameter change by using LOCK function.
- User can use controller by key even though LOCK is ON.
- Enter valid password to access LOCK parameter.

⚠ Caution

※ Default password is set to "0000". user must remember a password after setting new one. as there is no other way to find password if forgot the password, it is required to get technical service from us.

4) ERROR CHECK

- This controller provides error-monitoring function.
  up to 20 latest errors are saved in order. you can check details in "ERROR CEHCK" -->" ERROR MESSAGE". you can delete it in "ERROR CEHCK" -->" ERROR DELETE".

5) LANGUAGE

- This controller supports "Korean" "English" "Japanese" and "Chinese". You can set language in "LANGUAGE".

⚠ Caution

※ "Japanese" and "Chinese" are currently under development.

6) Buzzer

- When an error occurs in controller or system, the BUZZER starts ringing. at the time, you can OFF the buzzer by removing the cause of error or pressing "BUZZER" key. if the "BUZZER" key is pressed, "BUZZER" LED flashes and buzzer does not ring even though error occurs.

7) Contrast adjustment

- On the monitor screen, the contract adjustment screen appears if you press "▲" or "▼". "▲" key will increase CONTRAST but "▼" will decrease CONTRAST, In order to move back the monitor screen, press "SET" or "MENU".

8) Communication

- Communication specifications for this controller are as followings.
  - Communication type : RS485/422 (2 Line Half Duplex / 4 Line Half Duplex)
  - Protocol : PC-LINK With SUM
  - Speed : 9600 bps
  - Spart bit : 1 bit
  - Stop bit : 1 bit
  - Data length : 8 bit
  - Parity : None

15. Trouble shooting

Error	No.	Causes	Alarm	Control status
SYSTEM ERROR	NONE	Controller error	Active	Stop
RJC ERROR	3			Holding state
ADC ERROR	5			Stop
EEPROM ERROR	7			Holding state
BOARD ERROR	9			Stop
AT ERROR	4	Auto tuning is not complete within 24 hours		Holding state
INPUT OPEN	2	Sensor input error		Stop
POWER ERROR	6	Detect negative phase in power source		
PUMP DIRECT ACTION OVER	10	PP_D terminal input ON		
PUMP REVERSE ACTION OVER	11	PP_R terminal input ON		
HEAT OVER	15	HEAT terminal input ON		
PRESSURE OVER	12	PRS terminal input ON		Holding state
TEMPERATURE OVER	13	Temperature max/min alarm ON		
CURRENT OVER	14	Current max/min alarm ON		
PRESSURE OVER	1	Exceed temperature range	Inactive	

Specification

1. Rated specifications

Division		Contents
Power		100 – 240 V a.c.(±10 %) 50/60 Hz
Operating environment	Temperature	0 ~ 50 °C
	Humidity	45 ~ 85 % R.H.(Without condensation)
Display		128 x 64 MONO LCD
Temperature Input	Type	Pt 100 Ω, K(CA), J(IC)
	Number of Input	4 contacts
	Accuracy	± 0.3 % of FS
	Sampling Time	1 s
	Measurement Range	0 ~ 300 °C
Pressure Input	Type	Contact input
	Number of Input	1 contact
	Sampling Time	1 s
Heating Output	Type	Voltage Pulse output : Over 12 V d.c.
	Resolution	0.1 % or 16.667 ms of output, whichever is larger
Cooling Output	Type	Contact output of relay : 250 V a.c. 1 A, 30 V d.c. 1 A
	Resolution	0.1 % or 16.667 ms of output, whichever is larger
Contact Input	Number of input	Max 8 contacts
	ON/OFF Resistance	1 kΩ ~ 10 kΩ
Contact Output	Number of input	Max 6 contacts
	Output Signal	Relay form A contact
	Output Rating	250 V a.c. 1 A, 30 V d.c. 1 A
Communication	Protocol	PC-LINK With SUM
	Communication Type	RS485/422(2 Line Half Duplex / 4 Line Half Duplex)
	Max. Distance	1200 m
	Max. Connect Unit	31 Units

2. Power specification

Power supply voltage	100 - 240 V a.c. (Operating voltage range:+_10% of rate supply voltage)
Frequency	50/60 Hz
Power consumption	Max 6.5 W
Insulation resistance	Above 20 MΩ at 500 V d.c.
Dielectric strength	Measuring terminal - earth terminal : 2300 V a.c. for 1 minute Power terminal - earth terminal : 2300 V a.c. for 1 minute Measuring terminal - power terminal : 2300 V a.c. for 1 minute

3. Temperature input specification

Number of input	4 contacts
Input type	Pt 100 Ω, K(CA), J
Sampling period	1 s
Measurement range	0 ~ 300 °C
Measurement accuracy	(± 0.3 % of F.S)± 1 = digit
Input filter	0 ~ 100 s
Input compensation	- 100 ~ 100 % of F.S
Input resistance	About 1 MΩ
Reference contact compensation error	Max ± 1.5 °C

4. Pressure input specification

Number of inputs	1 contacts
Input type	Contact input
Sampling cycle	1 s

5. Voltage PULSE output specification (Heating output)

Number of outputs	1 contact
Output type	Voltage Pulse
Output capacity	MIN. 12 V and over (Over 600 Ω of load resistance)
Resolution	0.1 % or 16.667 ms whichever is larger

6. Relay output specification

Number of outputs	1 contact
Output type	Relay A contact
Contact capacity	250 V a.c. 1 A, 30 V d.c. 1 A
Measurement accuracy	0.1 % or 16.667 ms whichever is larger

7. Contact input specification

Number of inputs	1 contact
ON/OFF resistance	1 – 10 kΩ

8. Contact output specification

Number of outputs	1 contact
Output type	Relay A contact
Contact capacity	250 V a.c. 1 A, 30 V d.c. 1 A

9. Communication specification

Communication connection	2 Line Half Duplex / 4 Line Half Duplex
Max. connection units	31 units
Max. communication distance	1200 m
Communication sequence	None
Communication speed	9600 bps
Start bit	1 bit
Stop bit	1 bit
Data length	8 bits
Parity	None
Protocol	PC-LINK With SUM

MT100

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