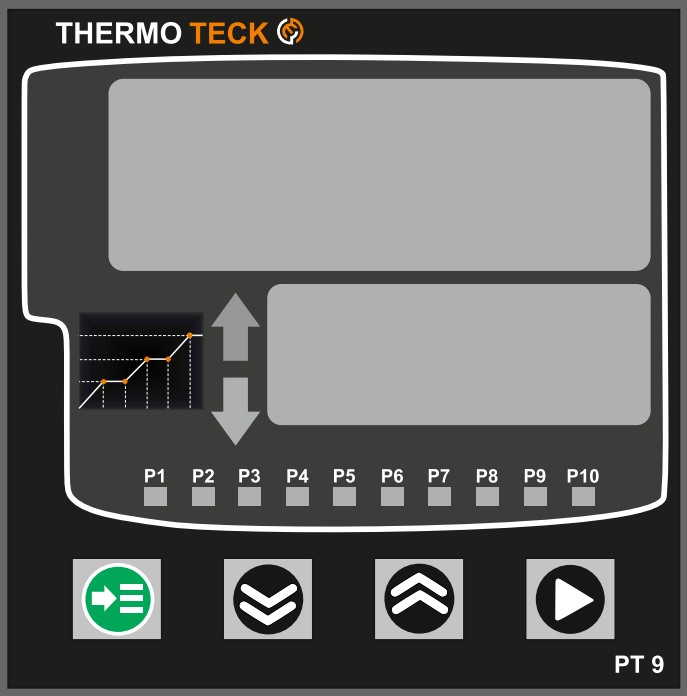
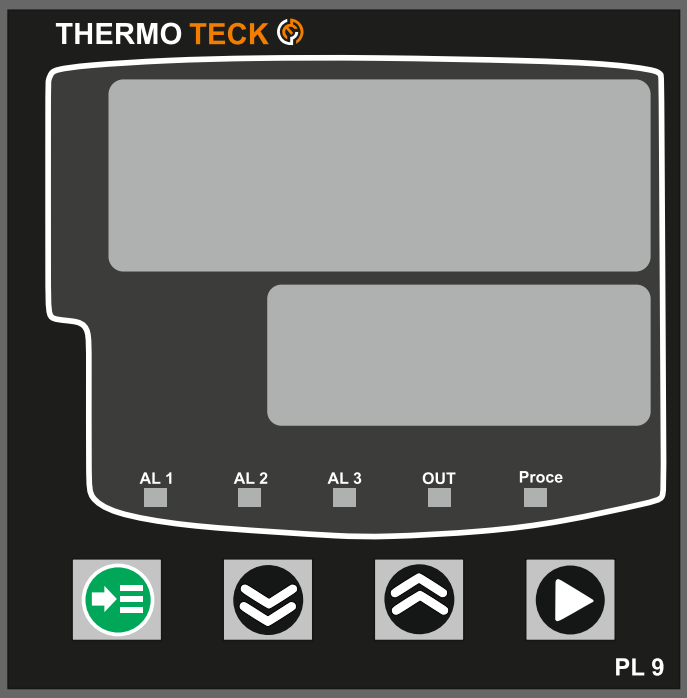
THERMO TECK


THERMO TECK
P1 P2 P3 P4 P5 P6 P7 P8 P9 P10
PT 9


THERMO TECK
AL 1 AL 2 AL 3 OUT Proce
PL 9

- Multi Input
- Programmable
- 10 step /10 pattern
- Alarm Output
- Multi Output
- Relay/SSR
- 3 Set Points
- Heating / Cooling
- 4-20ma/RS485
- IP 65 Front Facia

1 SAFETY INFORMATION

Before using, please read this (SAFETY INFORMATION) and then use this controller.
It is important that the instructions in this manual are followed when using this instrument.

WARNING	There is a possibility of death or heavy injury when handling in wrong way.
CAUTION	There is a possibility of injury or physical damage when handling in wrong way.

WARNING

1. Caution on wiring

This instrument do not have a switch for power and a fuse, so please set them if it is needed.
(Fuse rating 250 V, 0.5 A)

2. Power supply

Use a rated voltage to prevent damage or trouble.

To avoid electrical shock or damage, do not turn ON the power until the wiring is completed.

3. Prohibit use in gas atmosphere

Do not use it at a place exposed to combustible or explosive gas.

4. Handling of unit

To avoid malfunction, electrical shock or fire, this unit must not be disassembled or repaired.

Do not touch the terminals to avoid electrical shock or malfunction.

5. Caution

Turn OFF the power before mounting or removing the instrument.

The warranty period is 1 year only if using in the correct way.

CAUTION

1. Caution on handling

Do not install the instrument under any of the following conditions.

The ambient temperature exceeds 0 ~ 50
The ambient humidity exceeds 45 ~ 85 % RH.
A place where temperature changes suddenly or icing occurs.
A place exposed to corrosive gas or combustible gas.
Vibration or shock is likely to be transmitted to the instrument.
A place exposed to water, oil, chemicals, steam, sunlight.
A place exposed to much dust, salt or iron.
A place with much inductive disturbance, static electricity, magnetism noise.
A place where heat such as radiant heat stays.

2. Installation

Attach the brackets (2 units) on the fixed halls and tighten with a screwdriver.
(Care should be taken not to tighten forcedly)

3. Caution on terminal connections

- Keep input wires away from output wires and use shielded wires to earth.
-Use a compensating cable with thermocouple.
-For R.T.D input use a cable which is a small lead wire resistance and without resistance difference to 3 wires.
-Use non-grounded sensor to R.T.D and thermocouple.

4. For load circuit connection

Use an extra relay when the frequency of operation is rather high. SSR output type is recommended.
- Electromagnetic switch : Proportional cycle time is Min. 30 sec
- SSR : Proportional cycle time is Min. 1 sec
- Contact output life : Mechanical : 10 million times (no load)
- Electrical : 100 thousand times (rated load)
- SSR drive pulse voltage, 4 ~ 20 mA DC are not insulated with internal circuit.

5. For waterproof (Waterproof type)

The instrument has IP65. Use rubber packing when installing the instrument to panel.
Please attach the rubber in correct way.

6. Caution on key operation / trouble

If the input cable is disconnected, the display shows “ EROR”.
When replacing the sensor, please turn OFF the power suppy.

2 ORDERING INFORMATION

Model	code		Description	
PL 9 -	☐	☐	Programmable Controller (96 × 96 mm)	OUT1(Relay/SSR/alarm)
PT 9 -	☐	☐	Process indicators (96 × 96 mm)	OUT1(Relay/SSR/alarm)
	1		OUT2 (2 Relay)	
	2		OUT2(SSR/4-20ma)	
	3		OUT2 (2 Relay) , 3 Alarm contact	
	4		OUT2(SSR/4-20ma),2DI,HBI 2contact	
		0	None	
		1	Rs485	

3 SPECIFICATION

● INPUT

Input	Thermocouple, R.T.D, Direct voltage
Sampling cycle time	750 mS
Input impedance	Thermocouple / Voltage (mV) input : 1 or above 500kΩ
Allowable signal source resistance	Thermocouple : 250Ω or below
Allowable wiring resistance	R.T.D : 200 or below / 1 wire
Allowable input voltage	Thermocouple, R.T.D,Voltage, Direct voltage (mV) : ±10 V
Standard junction temperature	±2.0℃ (15 ~ 35℃), ±2.5℃(15 ~ 50℃)
Accuracy	0.1 % of F.S

● OUTPUT

Relay contact output	Contact capacity : 240 V AC 3 A, 30 V DC 10A Contact structure : 1 c Output action : ON / OFF action Life Expectancy : 100,000 operations at nominal load Output limit : Higher (OH) or lower limit (OL) selectable within 0.0 ~ 100.0 % range. ON / OFF hysteresis : 0 ~ 100 % Time resolution :10 ms
SSR output	ON voltage : 12 V DC min.(Resistance load: 600 min, 30 mA limit when short) OFF voltage : 0.2 V DC max. Output action : Proportional action Proportion cycle time : 1 ~ 1000 sec. Output limit : Higher (OH) or lower limit (OL) selectable within 0.0 ~ 100.0 % range. It is also available in AT and MAN. Time resolution : 10ms

● POWER SUPPLY

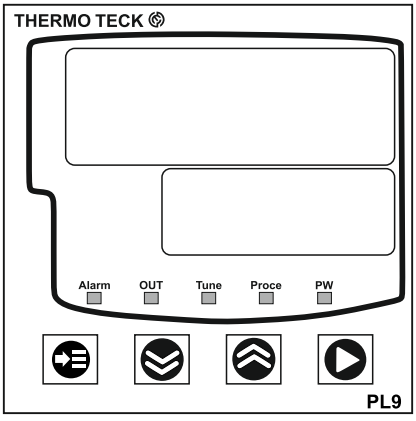
Power supply voltage	Thermocouple, R.T.D, Direct voltage
Frequency	750 mS
Voltage variation	Thermocouple / Voltage (mV) input : 1 or above 500kΩ
Allowable signal source resistance	Thermocouple : 250Ω or below
Allowable wiring resistance	R.T.D : 200 or below / 1 wire
Allowable input voltage	Thermocouple, R.T.D,Voltage, Direct voltage (mV) : ±10 V
Standard junction temperature	±2.0℃ (15 ~ 35℃), ±2.5℃(15 ~ 50℃)
Accuracy	0.1 % of F.S

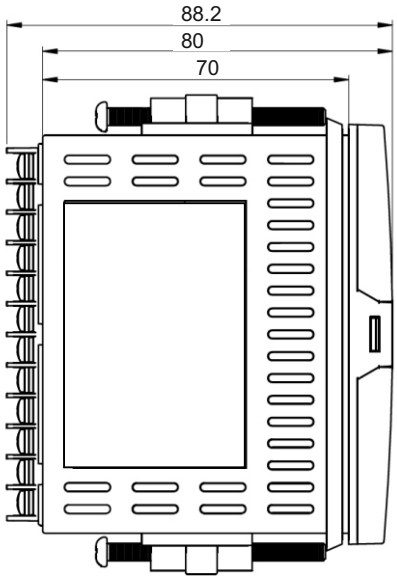
● ALARM OUTPUT

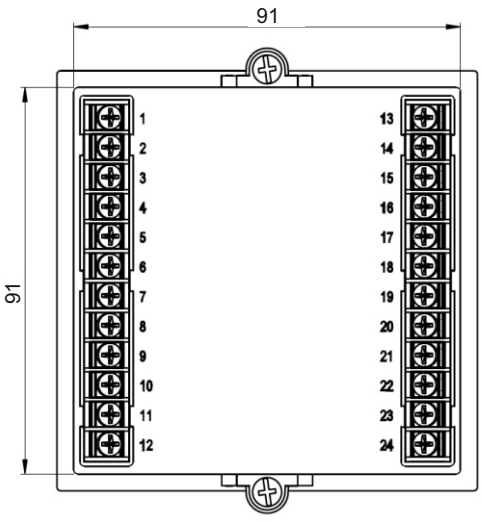
Relay contact output	Output : Relay contact, Output contact : 3 points Contact capacity : 240 V AC 5 A , 30 V DC 10 A Contact structure : 1 a

4 DIMENSIONS & PANEL CUTOUT

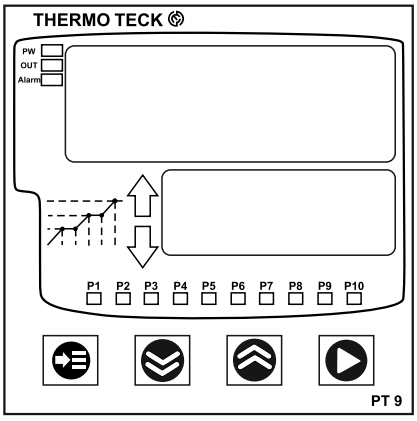
■ PL 9 (96 × 96 mm)

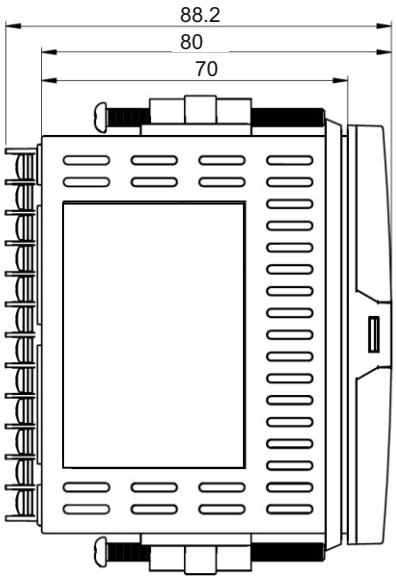


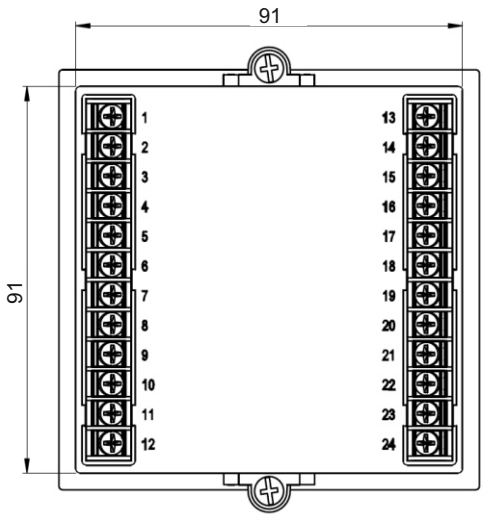




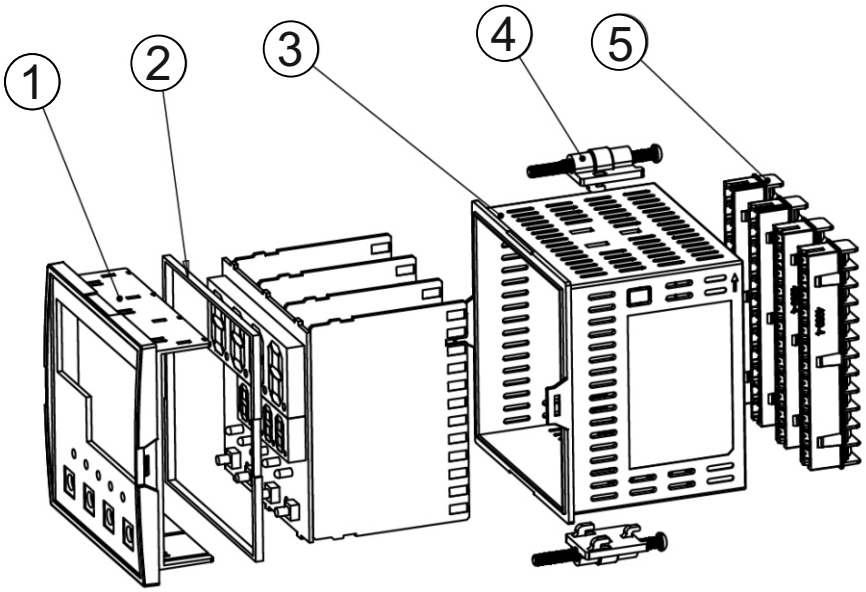
PT 9 (96 × 96 mm)





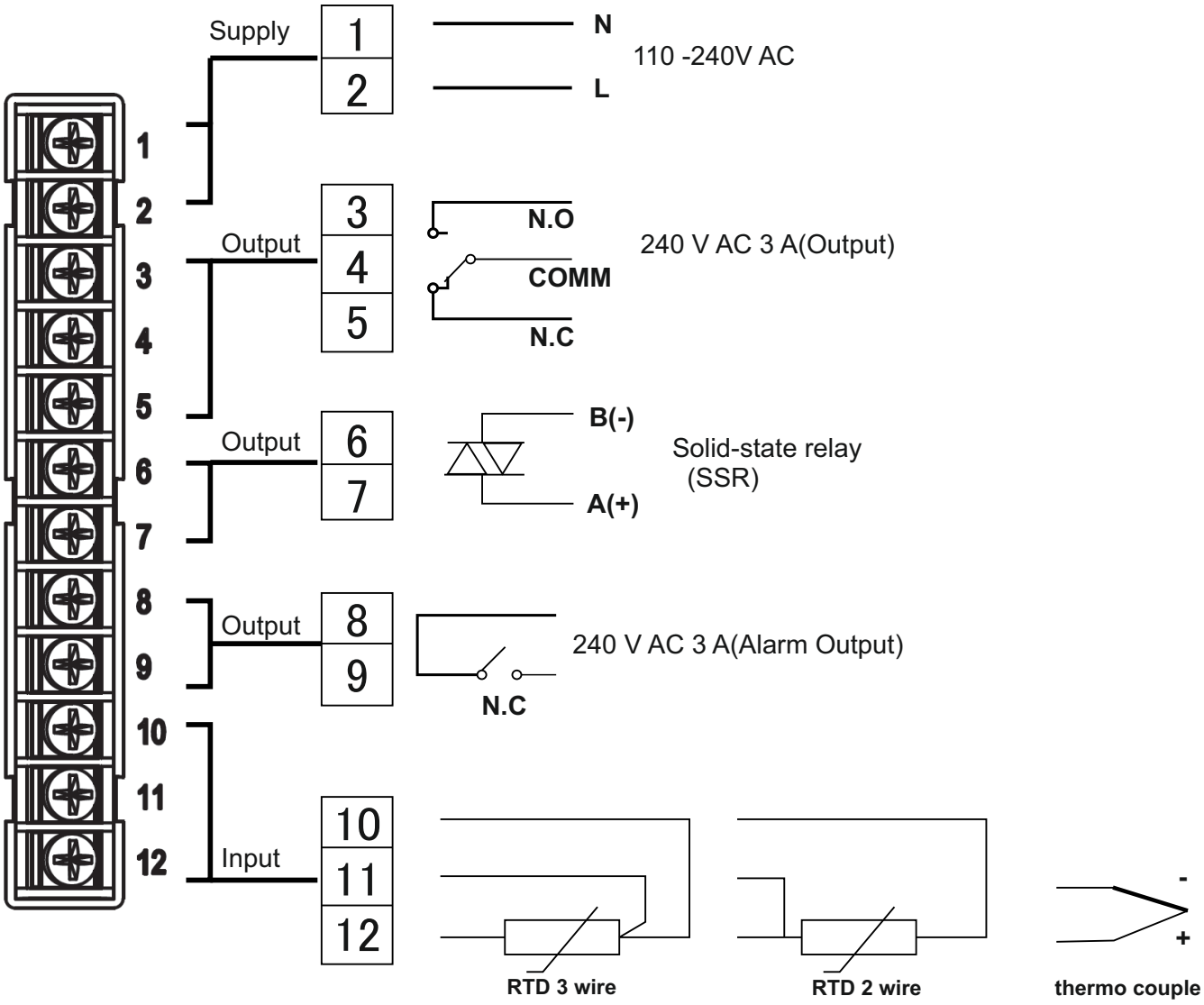


5 Assemble



Item	Name	Description
①	Panel frame	frame that are connected by pins on the display board
②	Rubber packing	panel waterproof protection
③	Product box	The product box where the board goes by rail
④	brackets	the brackets for fixed tighten them evenly with a screwdriver
⑤	terminal connections	Terminal connectors that fit as pins

5 TERMINAL ARRANGEMENT



* CAUTION

*When selected setting **Input type RTD OR TC** must be Change hardware mode According to this form

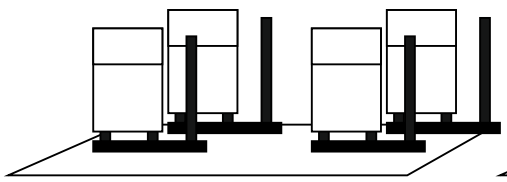


Figure "Input type Pt100 (number9)"

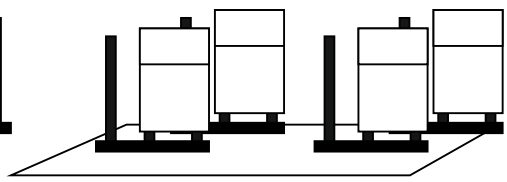
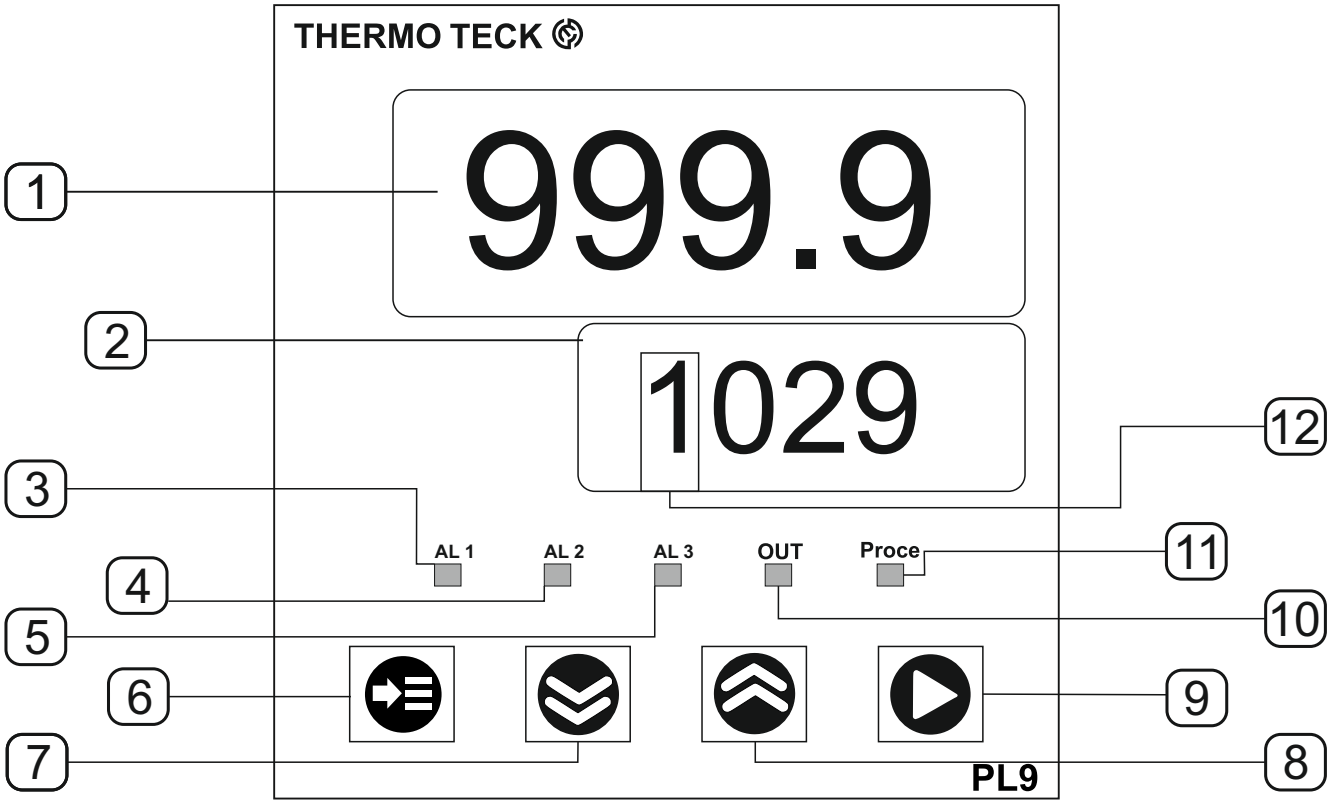


Figure "Input type Tc or DC Voltage"

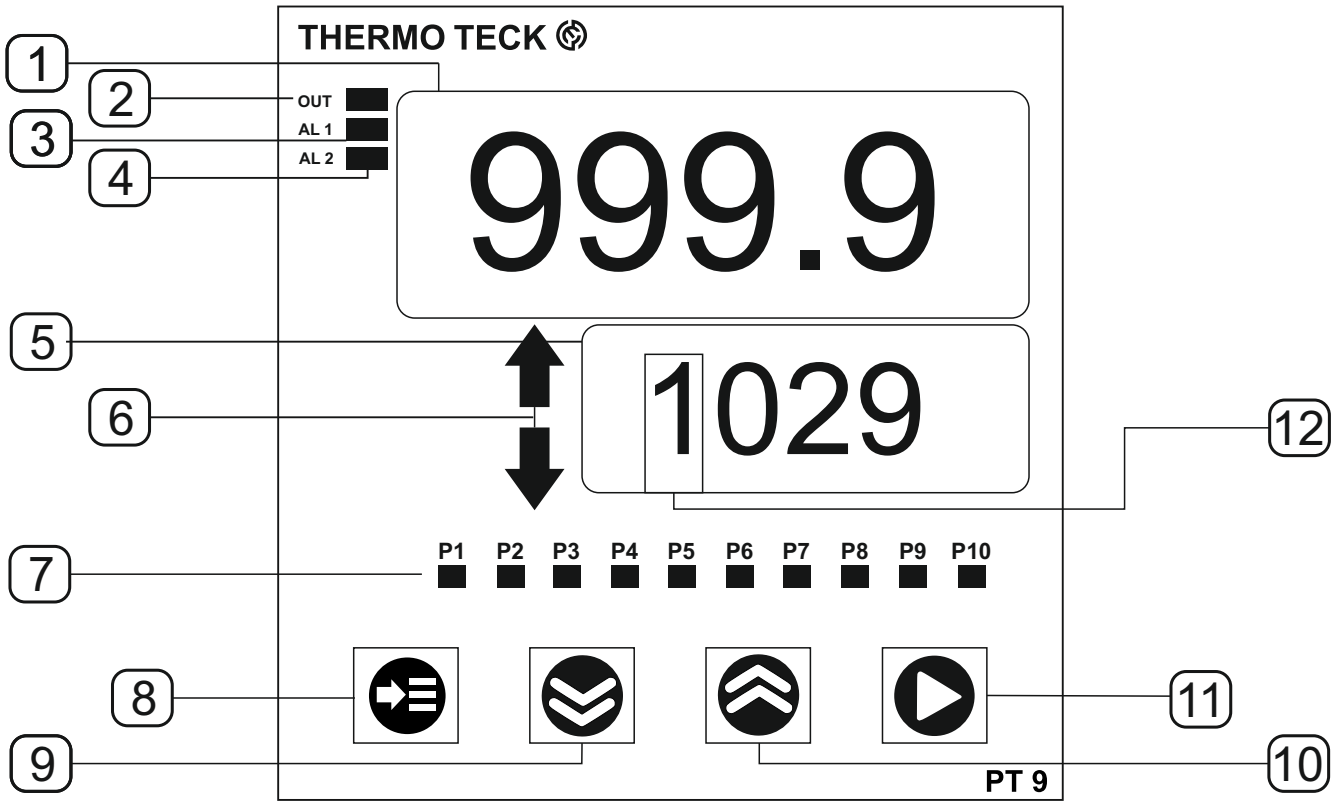
● PL 9-□□(96×96 mm)



● Displays

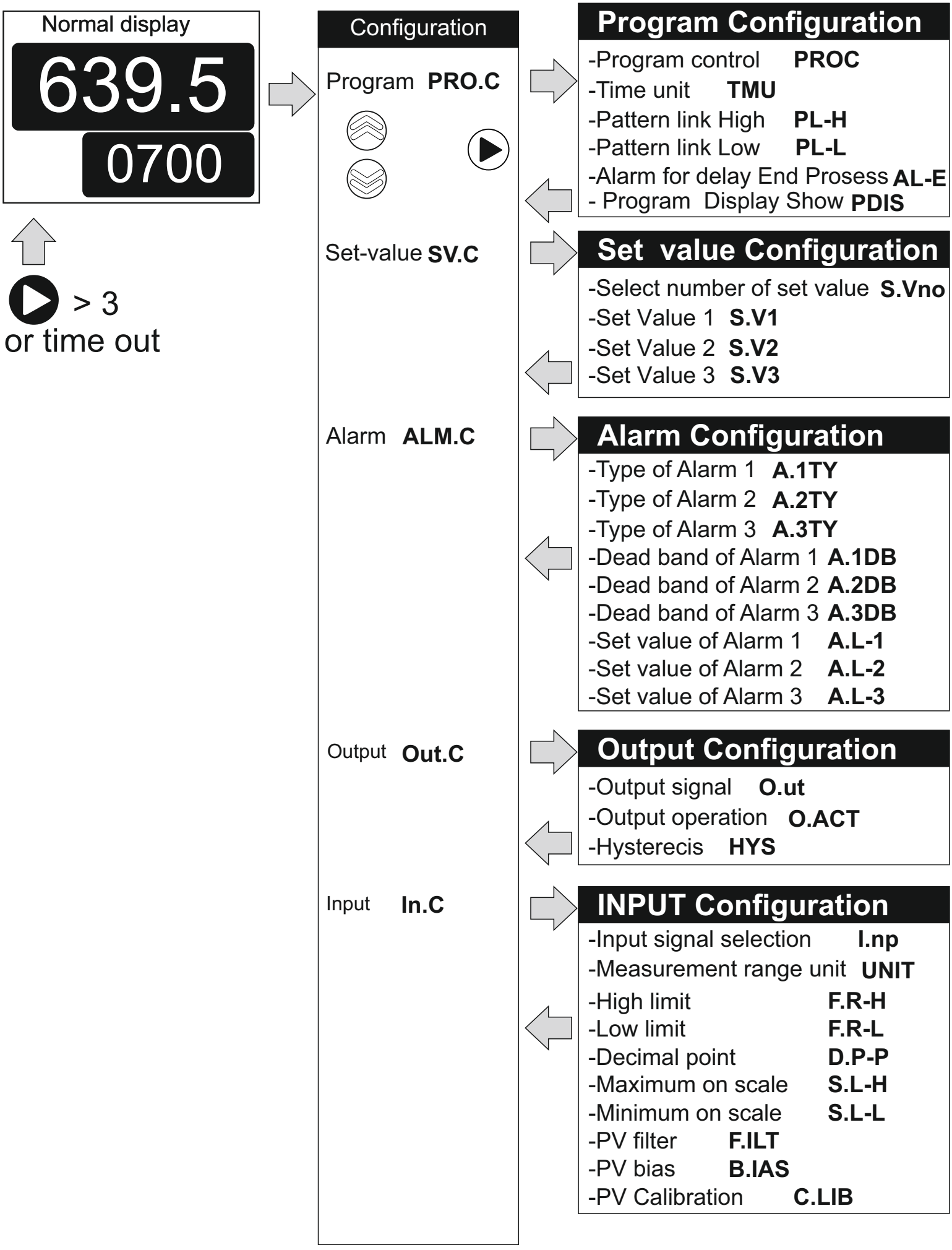
Name of respective parts	Functions
1 Process-value (PV)	Displays the process temperature value.
2 Set-value (SV)	Displays Program , set - value, Alarm SV, and parameter.
3 Alarm 1 indicator	Lights when the alarm 1 operates
4 Alarm 2 indicator	Lights when the alarm 2 operates
5 Alarm 3 indicator	Lights when the alarm 3 operates
6 Key Menu	Used to change from the Program Controller mode to the select pattern. Press this key for 3 sec to display process value and Time. Press this key with key down to display select pattern.
7 Key Down	Used to decrease set-values and to select setting mode.
8 Key Up	Used to increase set-values and to select setting mode.
9 Key Set	Used to change from the operation mode to the setting mode, to select parameters, and to register set-value. Press this key for 3 sec to display setting mode, set-value.
10 Output indicator	when the control output is ON.
11 Process-run	Lights when the Program Controller is Running mode
12 Step	display Step when the Program Controller mode.

● PT 9-□□ (96×96 mm)



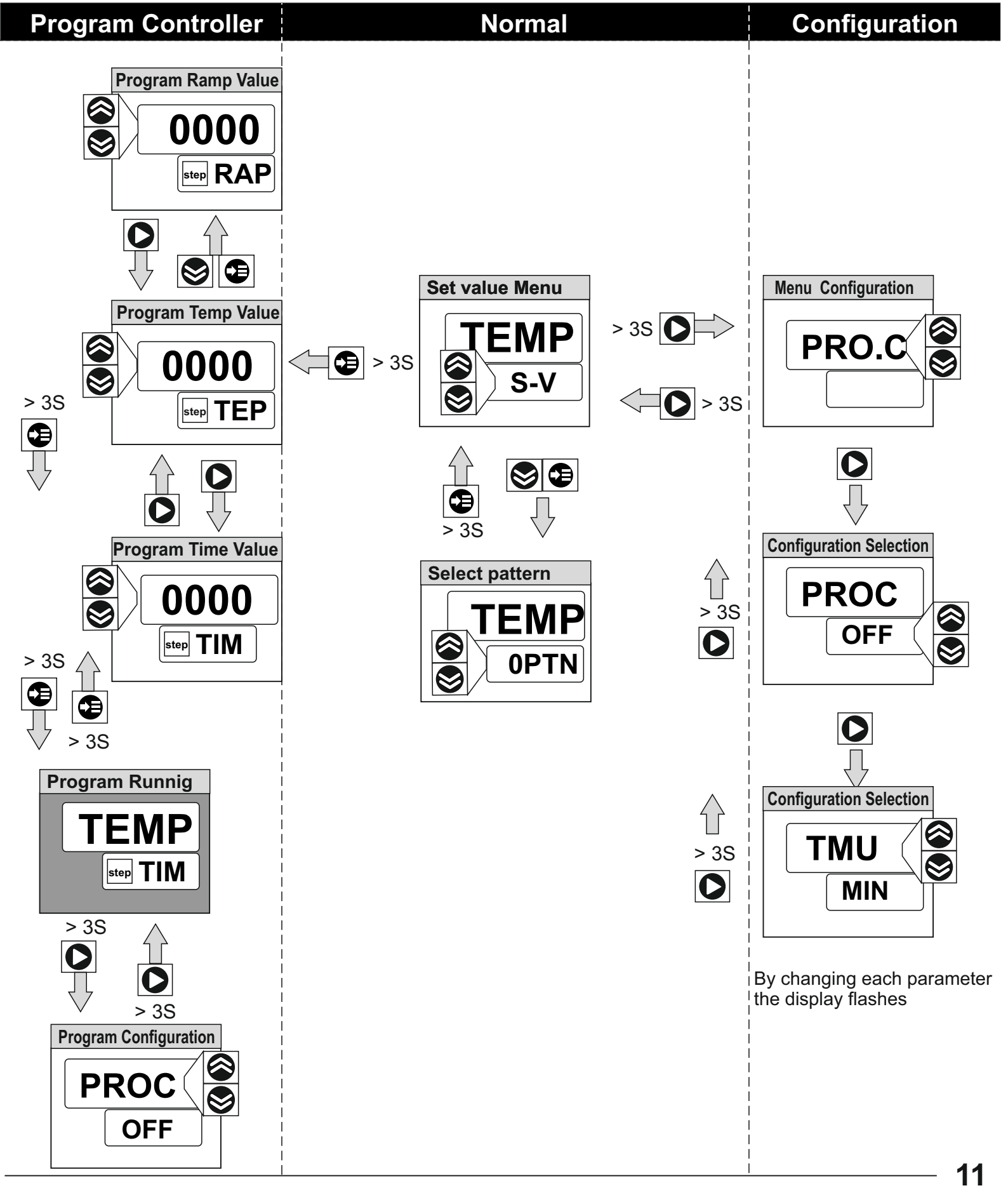
● Displays

Name of respective parts	Functions
1 Process-value (PV)	Displays the process temperature value.
2 Output indicator	when the control output is ON.
3 Alarm 1 indicator	Lights when the alarm 1 operates
4 Alarm 2 indicator	Lights when the alarm 2 operates
5 Set-value (SV)	Displays Program,set - value, Alarm SV, and parameter.
6 Step tatus	Displays the status of the running steps which direction And how much is left of the stage
7 Step indicator	There are 10 the indicators on panel for Program Controller, When the stage is over, the flashing indicator speed increases.
8 Key Menu	Used to change from the Program Controller mode to the select pattern. Press this key for 3 sec to display Program value and Time. Press this key with key down to display select pattern.
9 Key Down	Used to decrease set-values and to select setting mode.
10 Key Up	Used to increase set-values and to select setting mode.
11 Key Set	Used to change from the operation mode to the setting mode, to select parameters, and to register set-value. Press this key for 3 sec to display setting mode, set-value.
12 Step	display Step when the Program Controller mode.


Normal display
639.5
0700
> 3
or time out
Configuration
Program PRO.C
Set-value SV.C
Alarm ALM.C
Output Out.C
Input In.C
Program Configuration
-Program control PROC
-Time unit TMU
-Pattern link High PL-H
-Pattern link Low PL-L
-Alarm for delay End Prosess AL-E
- Program Display Show PDIS
Set value Configuration
-Select number of set value S.Vno
-Set Value 1 S.V1
-Set Value 2 S.V2
-Set Value 3 S.V3
Alarm Configuration
-Type of Alarm 1 A.1TY
-Type of Alarm 2 A.2TY
-Type of Alarm 3 A.3TY
-Dead band of Alarm 1 A.1DB
-Dead band of Alarm 2 A.2DB
-Dead band of Alarm 3 A.3DB
-Set value of Alarm 1 A.L-1
-Set value of Alarm 2 A.L-2
-Set value of Alarm 3 A.L-3
Output Configuration
-Output signal O.ut
-Output operation O.ACT
-Hysterecis HYS
INPUT Configuration
-Input signal selection I.np
-Measurement range unit UNIT
-High limit F.R-H
-Low limit F.R-L
-Decimal point D.P-P
-Maximum on scale S.L-H
-Minimum on scale S.L-L
-PV filter F.ILT
-PV bias B.IAS
-PV Calibration C.LIB

8 Menu Diagram

* select parameter with or
* change to the Process mode with
*Alter value with and
the value alters dynamically with the duration of the key stork.
*Accept the setting with or automatically after 2 sec the value is not accepted



By changing each parameter the display flashes

9 Configuration INPUT

● Input type selection

After power ON and when PV is indicating, press key for 3 sec to be displayed **C.PRO** at PV and empty at SV. when press key or show **C.IN** and then “Input type and range selection” is shown at SV when press . At this time the input and range is selected by or and set key by .

● Display unit (C / F)

After selecting input type and range, press key to select display unit. Press or key to choose **C or F** or and press key when finishing selection.

● Maximum and Minimum range

After selecting display unit, press key to set Maximum and Minimum range using or key. Press key once more to finish.

● Decimal point

After selecting max and min range , press key to set Decimal point using or key. Press key once more to finish.
Parameter is indicated in T.C and R.T.D input Decimal point mode is indicated (set 0 : 0 set 1 : 0.0) but when selecting voltage input Decimal point mode is indicated. (set 0 : 0 ,set 1 : 0.0, set 2 : 0.00, set 3 : 0.000)

● Maximum and Minimum on scale

Parameter is not indicated in T.C and R.T.D input , This mode is indicated when voltage input Maximum and Minimum range scale .

● PV filter

When PV value becomes unstable due to effects of noise, the filter helps suppress the unstable status. (Range: OFF or 1 ~ 120 sec. Initial value: OFF)

● PV bias

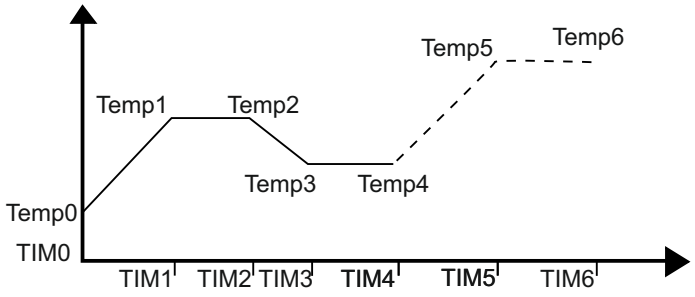
Use this function to adjust PV value in cases where it is necessary for PV value to agree with another recorder or indicator, or when the sensor cannot be mounted in correct location.
(Range : -100.0 ~ 100.0 % of SPAN, Initial value : 0.0 %)
Setting a value using or key and press key to finish.

● PV Calibration

Use this function to calibration PV value in cases As any measurement instrument you want to be accurate, also the temperature sensor needs to be calibrated.
(Range : 1.00 ~ 10.00)
Setting a value using or key and press key to finish.

11 Operation of the Program Controller

If Program mode is selected , the controller becomes a programmable controller with 10 pattern of 10 step.The steps can be executed with 10 divided patterns and they can also be linked together.After setting time and set value, this controller controls automatically.
each pattern is a series of steps.
Each step consists of a SV and time setting . An Increasing or decreasing SV is set for time period, and each time setting is in hours/ minutes or seconds.



● Pattern selection

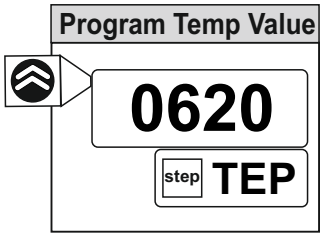
press key in normal menu to enter Select pattern menu and to be displayed **0PTN** at SV. you can press key or By selecting patterns from 0 to 9 Select the desired series of steps press key when finishing selection and Go to Program Temp Value.
There is another option that is displayed **LPTN** .when you were in the Program menu and set link pattern done ,This option is active .

● setting time and set value

This device is designed for easy program access , press key for 3 sec to enter program menu and to be displayed **0000** at PV and **0TEP** at SV , The first step program of set-point(temperature) value. you can press key or To set the set-point values . The set value can only be within the defined range, it must be pre-set in the input configuration.
press key when finishing selection and Go to set the time values .

> PRO.C > F.R-H "Maximum range"

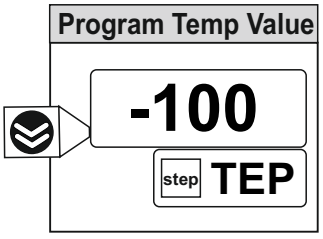
Example:



F.R-H =620

Limited to 620

> PRO.C > F.R-L "Minimum range"



F.R-L = -100

Limited to -100

when press key displayed **OFF** at PV and **0TIM** at SV . this Selected Time setting of zero step .you can press key or To set the Time setting .Here are three ways to Time setting on the step.

1-1~999: The time it takes for the temperature or old step to reach the setpoint ,time setting can be in hours/minutes/ seconds.

2-0: When the program reaches this stage, the process stops and displayed **E** at SV , The program is finished and the time is counted.It will stay in this up to the stop command or new program is activated .

3-OFF: When this option is selected The time locks in the run time, displayed **LOC** at SV , output operates on the setpoint point and stops there.It will stay in this up to the stop command or new program is activated .

● RAMP selection

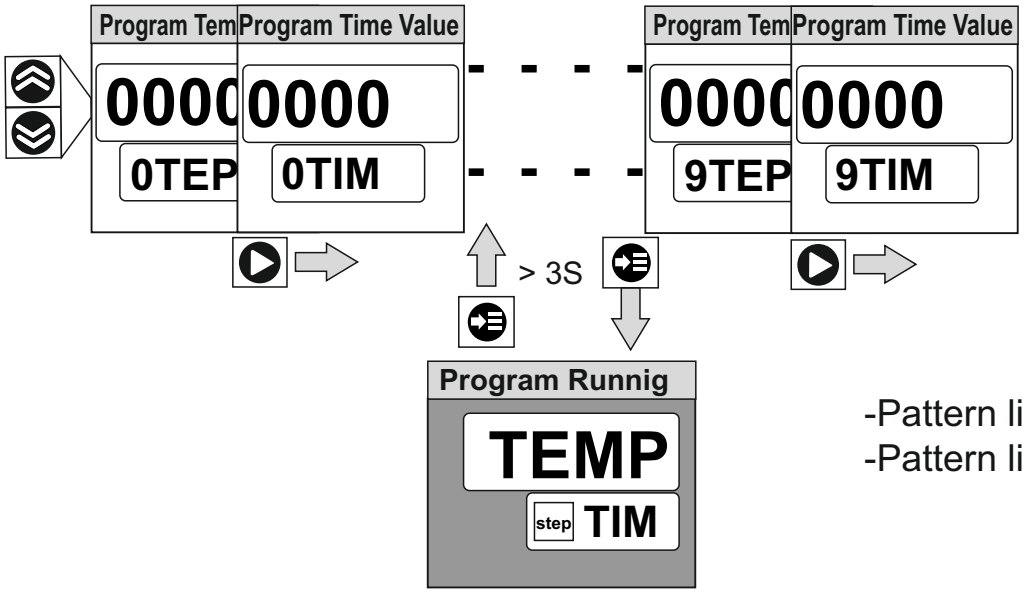
At each step of the program, can be adjusted the ramp option for the same step , for this job You can do it press key to get ramp mode select and to be displayed **(STEP,RAP)** at SV, it can be selected ramp value using or key and pressing key to finish.

RAMP 0 : In this state ,This step does not pass until the temperature reaches the set point Even if the time has finished.

RAMP 1 : After the time has finished , it will Enter on to the next stage and Does not consider Set Point

● Running program mode

The program controller can be run at any stage After setting all the process steps .At each step, if you press key for 3 sec to enter program will start the process controller from the same step.

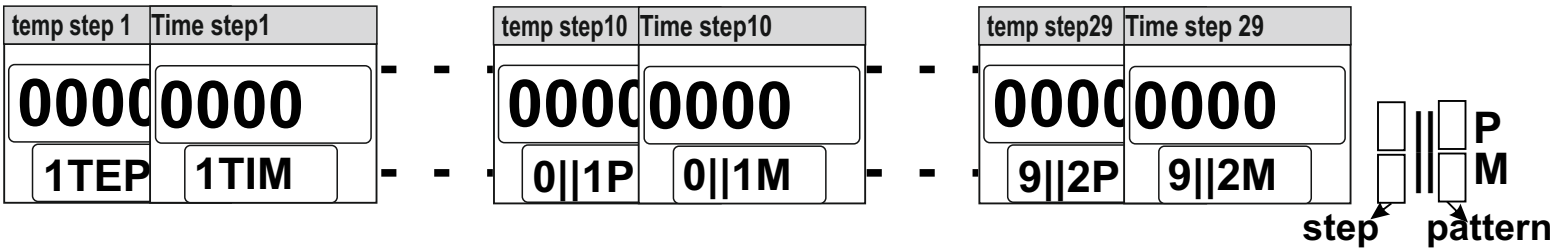


-Pattern link High **PL-H**
-Pattern link Low **PL-L**

Output is controlled when the controller is in program running mode.you can go back to the program area by press key for 3 sec .You can also by press key for 3 sec go to the Program Configuration ,Note that in both modes the program running and if the option is not set and returns to the running process in 30 seconds.

● Link mode

If the **link** option is already enabled via the **Program Configuration** menu Also selected in the **pattern** section. Currently, the program follows the link option and the **"PL-H"** and **"PL-L"** variables. for example PL-L=2 , PL-H=29



10 Input Configuration

Menu	Name	Description	default
IN.C	Input Configuration	Input type and mode selection	
I.np	Input signal selection	input signal and measurement range 1-12 According to the table below	0
U.NIT	Measurement range unit	C / F	C
F.R-H	High limit	input signal and range 0 ~ 9999	1370
F.R-L	Low limit	input signal and range -199.9 ~ 0	-200
D.P-P	Decimal point	point of Thermocouple or R.T.D : 0~1 point of instrument / DC Voltage : 0~3	1
S.L-H	Maximum on scale (on voltage input)	-1999 ~ 9999 Deimal point : according to DP-P	100.0
S.L-L	Minimum on scale (on voltage input)	-1999 ~ 9999 Deimal point : according to DP-P	0
F.ILT	PV filter	OFF / 1 ~ 120 sec	OFF
B.IAS	PV bias	(-100.0 ~ 100.0 %)	0
C.LIB	PV Calibration	Decimal point	1.00

Input No	Input Type	Range (C)	Range (F)	Accuracy
1	K	-199.9~1370	-300~2500	± 0.10% of full-scale
2	J	-199.9~1100	-300~2020	± 0.10% of full-scale
3	E	-199.9~850	-300~1560	± 0.10% of full-scale
4	T	-199.9~400	-300~750	± 0.10% of full-scale
5	R	0~1700	32~3100	± 0.15% of full-scale
6	B	250~1800	480~3300	± 0.15% of full-scale
7	S	0~1700	32~3100	± 0.15% of full-scale
8	N	-199.9~1300	-300~2400	± 0.15% of full-scale
9	Pt100 *	-199.9~640.0	-300~1180	± 0.10% of full-scale
10	-30.00~30.00 mv	-30.00~30.00 mv		± 0.10% of full-scale
11	0~65.00 mv	0~65.00 mv		± 0.10% of full-scale
12	1.000~5.000 v	1.000~5.000 v		± 0.10% of full-scale

* CAUTION

*When selected setting **Input type PT100(number 9)** must be Change hardware mode According to this form

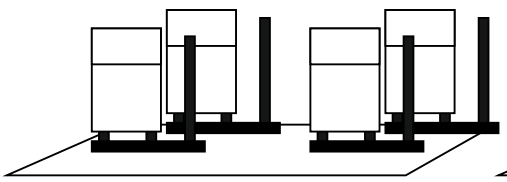


Figure "Input type Pt100 (number9)"

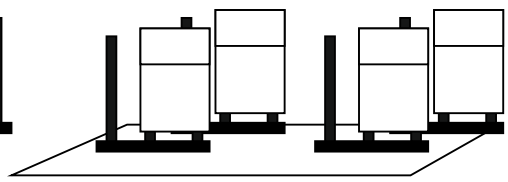


Figure "Input type Tc or DC Voltage"

*Current input :

*Current input : The current input (4 ~ 20 mA DC) is available with input code 30.
You must use the resistance 250 (0.5 W / 0.1 %) on input terminals.

12 Program Configuration

If Program running is selected press key for 3 sec go to the Program Configuration. At this time the Program setting is selected by or and set key by .

● Program

This function is used for the STOP / START / RESET program controller.when selected this option displayed **PROG** at PV and selected STOP displayed **OFF** ,START displayed **ON** ,RESET displayed at **REST** at SV.

● Time unit

This option can set the time based on hours, minutes and seconds.

● Process Link

You can set this option Integrate separate patterns into each other .**PL-H** For high value and **PL-L** For a low value.

● Alarm Limited END

You can enable the output of the alarm when the process is finished.Alarm can be disabled after the selected time has elapsed.

● Process display

This option can display the process by time **"TIM"** or set point value **"TEP"** .

Menu	Name	Description	default
PRO.C	Program Configuration	Input type and mode selection	
PROG	Program	OFF: Reset ON: Start OFF:STOP	ON
TMU	Time unit	hours/minutes/seconds	minutes
PL-H	Process Link	Process Link high 0 ~ 99	9
PL-L		Process Link low 0 ~ 99	0
AL-E	Alarm Limited END	Delay Alarm End Process	1
PDIS	Process display	Temp= Show Set Point process TIM= Show Time process	TIM

13 Set value Configuration

press key, you could set set-value of SV1, SV2, and Sv3.select each set-value from Aarm contact input to operate. After selecting number of set value . set-value is active in the normal menu and displayed at SV.

Note : Set-value works with alarm mode.

Menu	Name	Description	default
SV.C	Set value Configuration	Set value works Alarm mode	
Svno	Select number of set value	1 ~ 3	ON
Sv1	Set SV 1	EU(0.0 ~ 100.0 %)	EU(0.0 %)
Sv2	Set SV 2	EU(0.0 ~ 100.0 %)	EU(0.0 %)
Sv3	Set SV 3	EU(0.0 ~ 100.0 %)	EU(0.0 %)

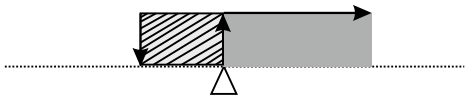
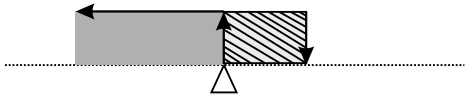
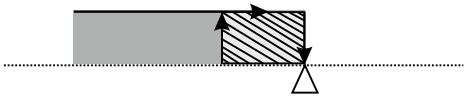
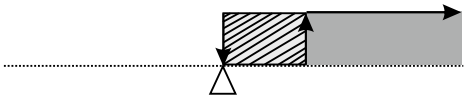
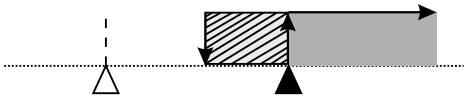
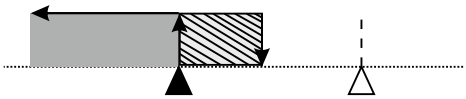
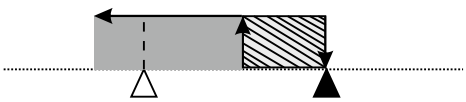
14 Alarm Configuration

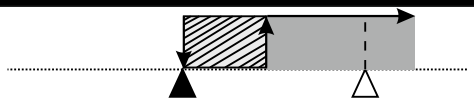
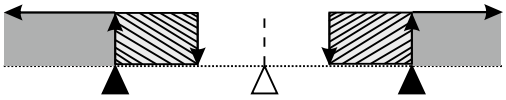
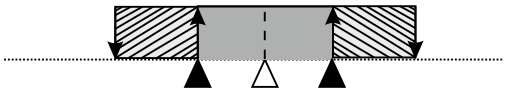
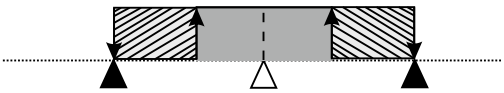
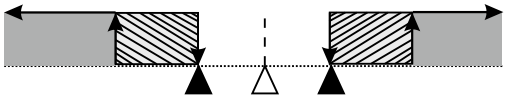
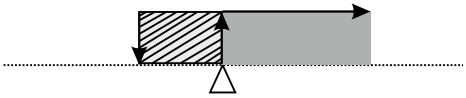
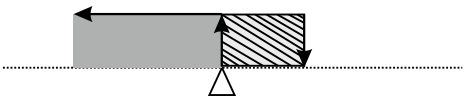
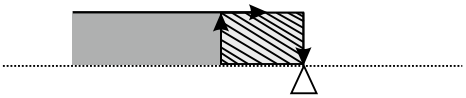
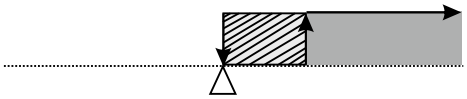
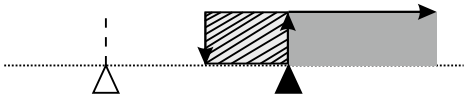
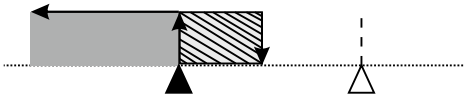
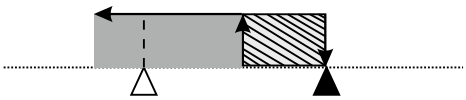
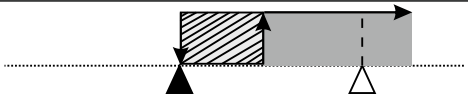
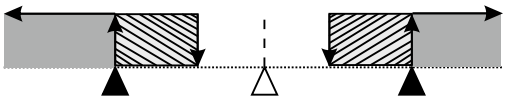
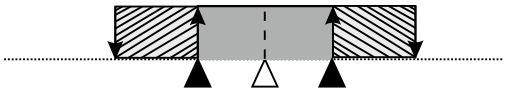
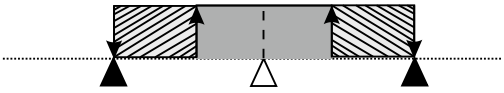
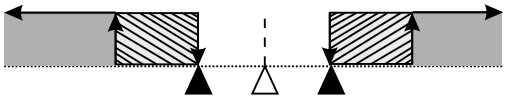
There are 3 set-value for alarm output available per conrtoller. In Alarm Configuration, setting are made for mode, Hysteresis, and Minus Alarm set point of each alarm. Refer chart different types of alarm functions.

Menu	Name	Description	default
ALM.C	Alarm Configuration	Set alarm mode	minutes
A.1TY	Type of Alarm 1	OFF / 1 ~ 24 Refer to Alarm type and code	minutes
A.2TY	Type of Alarm 2		minutes
A.3TY	Type of Alarm 3		minutes
A.1DB	Hysteresis of Alarm 1	EUS (0.0 ~ 100.0 %)	minutes
A.2DB	Hysteresis of Alarm 2		minutes
A.3DB	Hysteresis of Alarm 3		minutes
A.L-1	Minus Alarm set point 1	Deviation alarm EU (-100.0 ~ 100.0 %)	minutes
A.L-2	Minus Alarm set point 2		minutes
A.L-3	Minus Alarm set point 3		minutes

15 ALARM TYPE AND CODE

△ :set-value ▲ : Minus Alarm set point ▨ : Hysteresis

Code NO.	Alarm type	Function
1	High absolute value	
2	Low absolute value	
3	High absolute value figure2	
4	Low absolute value figure2	
5	High deviation value	
6	low deviation value	
7	High deviation value figure2	

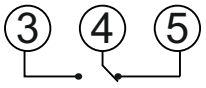
Code NO.	Alarm type	Function
8	Low deviation value figure 2	
9	High Low deviation value	
10	High Low band	
11	High Low band figure 2	
12	Band-pass value	
13	High absolute value (inverted)	
14	Low absolute value (inverted)	
15	High absolute value figure2 (inverted)	
16	Low absolute value figure2 (inverted)	
17	High deviation value (inverted)	
18	low deviation value (inverted)	
19	High deviation value figure2 (inverted)	
20	Low deviation value figure 2 (inverted)	
21	High Low deviation value (inverted)	
22	High Low band (inverted)	
23	High Low band figure 2 (inverted)	
24	Band-pass value (inverted)	

Note : Display lamp will be ON when output OFF in inverted type.

16 OUTPUT GROUP SETTING

This process controller is from Relay , SSR . Output type range (output code) is 0 ~ 1.

Menu	Name	Description	default
Out.C	Output Configuration	Output type	
O.ut	Output signal	0 = Relay Output 1 = Relay SSR	Relay
O.ACT	Output operation	REV: Reverse DIR: Direct action	DIR
HYS	Hysteresis	EUS (0.0 ~ 100.0 %)	0

Note : Wiring for Relay Output 

Wiring for Relay SSR