

NOVA100^e SERIES

Instruction Manual SL140^e (Limit Controller)

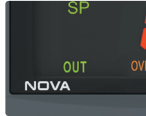


WELCOME

Thank you for purchasing furnace controller production.
Please use after read instruction manual for safety.
Free to contact to our sales O/U for
production inquiry and after service.



Various



SAMWON
Promising the Best

As a limit controller, it supports the transmission output, Over outputs various output and a product with many features such as the display memory after the Min, Max values.

<http://www.samwontech.com>

Being the controller market leader in the 21st century with the best technology



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MSIP-REM-S31-
NOVAESERIES

INSTRUCTION MANUAL



Safety Guide

Used simboll mark in this Instruction manual



- It means the“Handle with care” or “Cautions”

In case of violation of this point, it may cause the death, severe injury or the extreme damage on the product.

- (1) Product : It is marked on the points to be acknowledged certainly to protect the human body and device.
- (2) Instruction manual : It describes the cautions to prevent the cases of endangered situation on the life and body of the user due to the electric shock and so on.



- It means“Ground terminal”

Make the earth with the ground in case of product installation and controlling the product.



- It means the“supplementary explanation”

It describes the points to supplement the explanation.



- It describes the“references”

It describes the information and pages of reference to be referred.

Cautions in this Instruction manual

- Please deliver for the end user to possess always and keep it in the place accessible at any time.
- Use the product after full understanding of this installation manual.
- This installation manual does not warrant any other things because it is a description of the details for the function.
- A part or whole of this manual shall not be edited or copied randomly.
- The descriptions in this manual may be changed randomly without pre notice or warning.
- Even though this manual was made with elaboration, it will be appreciated if you inform to the purchasing point (Dealer shop and etc) or sales team in our company in case of deficiency, mistake or omission in the contents.

Safety Guide

Cautions for the safety and modification (Change) of the product

- Please use this product after full understanding on the safety cautions in this manual for the protection and safety for this product and the system connected to this system.
- Our company is not responsible to the damages occurred by using or handling or unattended using not relying on this installation manual.
- Please install at the outside of this product when the additional protection and safety circuit is installed. Otherwise for the protection and safety for this product and the system connected to this system.
- The internal modification (Change) and addition to this product are prohibited.
- Do not disassemble, repair and modify of this product because it becomes the reasons for electric shock, fire and malfunction.
- In case of changing the part or the consumables of this product, please contact to the sales department of our company.
- Do not contact to the moisture with this product. It may cause the failure on this product.
- Do not apply the strong impact on this product. It may cause the damage and failure on this product.

With regard to the exemption for the responsibility of this product

- We are not responsible for any warranty on this product besides the defined cases in the quality assurance condition of our company.
- We are not responsible for the direct or indirect damages on the user of any third party due to the not expectable defect or the natural disaster in use of this product.

With regard to the quality assurance condition of this product

- The warranty period shall be one year from the purchasing of this product. Free of charge repair is available only for the cases of out of order occurred from normal use conditions.
- The repair due to the out of order occurred after the warranty period shall be repaired at the actual cost according to the defined condition by our company.
- The out of order occurred within the warranty period shall be repaired at the actual cost for the following cases in spite of within the warranty period.
 - (1) Out of order due to the mistake or fault of the user (Ex: Initialization by losing the password and etc.)
 - (2) Out of order due to the natural disaster(Ex: Fire and flood and etc)
 - (3) Out of order due to the movement of product after installation.
 - (4) Out of order due to the random disassemble, change or damage on the product.
 - (5) Out of order due to the electric power instability.
 - (6) Others
- Please contact to the purchasing points or sales part of our company when after sales service is necessary because of the failure on the product.

Safety Guide

Environmental precautions for installation.

- Be sure to operate the controller installed on a panel to prevent electric shock.
- To install the controller, do select a location where:
 - (1) No one may accidentally touch terminal.
 - (2) Mechanical vibrations are minimal.
 - (3) No corrosive gas is present.
 - (4) Temperature fluctuation is minimal.
 - (5) Temperature can be maintained. (50 °C below / 10 °C over)
 - (7) No direct heat radiation is present.
 - (8) No magnetic disturbances are caused
 - (9) No water is splashed.
 - (10) No flammable materials are around.
 - (11) No wind blows. (prevent Dust with salt)
 - (12) No ultraviolet rays are present.

Precautions of Controller Mounting.

- Keep the input circuit wiring as far as possible away from power and ground circuit.
- Keep the controllers in 10°C ~ 50°C/ 20 % ~ 90 % RH, Warming up needed to use controller when temperature is below 10°C in advance.
- Do not mount front panel facing downward.
- Please use the product in the range of 10 ~ 50 °C (Up to 40 °C in close installation) and 20 ~ 85% RH (No condensation). In particular, keep away from devices with high heat.
- To prevent electric shock, be sure to turn off and the source circuit breaker before wiring.
- No work in wet hands (it caused electric shock)
- Follow operation by precaution in the manual to avoid fire, electric shock, loss of life etc.
- Requested to follow mounting and operation methods just indicated in this manual.
- Refer the way of grounding connection, however, keep away for grounding to Gas pipe, water pipe, lightning rod etc.
- Be sure not to power connection before finishing of wiring between each contact point.
- Not close and wrapping the heat hole in back case of controller.

Rated Voltage and Power Consumption



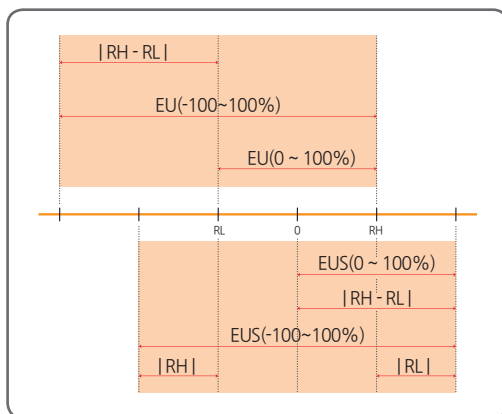
- This product runs on 100 ~ 240V AC, 50/60Hz 10VA Max.
 - It runs on 24VDC, 3.9VA Max when using DC Power.
 - Risk of electric shock and fire if use power source in rating other than specified.
-

Engineering Units - EU, EUS

- EU and EUS are used for the scaling of the parameters of the controller.
- When the sensor type (IN-T) or the high limit, low limit of input range is changed, the parameters expressed in EU(), EUS() are changed in proportion to current data. (However, the high/low range setting data is initialized.)

☞ EU() : Value of engineering unit depending on the range of instrument

☞ EUS() : Value of engineering unit depending on the span of instrument



RL : Low limit of input range

RH : High limit of input range

※ The Range of EU(), EUS()

	Range	Center point
EU(0 ~ 100%)	RL ~ RH	$ RH - RL /2 + RL$
EU(-100 ~ 100%)	$-(RH - RL + RL) \sim RH$	RL
EUS(0 ~ 100%)	$0 \sim RH - RL $	$ RH - RL /2$
EUS(-100 ~ 100%)	$- RH - RL \sim RH - RL $	0

※ Ex) INPUT = TC.K2

RANGE = -200.0°C(RL) ~ 1370.0°C(RH)

	Range	Center point
EU(0 ~ 100%)	-200.0 ~ 1370.0°C	585.0°C
EU(-100 ~ 100%)	-1770.0 ~ 1370.0°C	-200.0°C
EUS(0 ~ 100%)	0 ~ 1570.0°C	785.0°C
EUS(-100 ~ 100%)	-1570.0 ~ 1570.0°C	0.0°C

Displays of the product

Numbers · Character in 7-Segment

- Numbers · Character in 7-Segment LED Display

0	1	2	3	4	5	6	7
0	1	2	3	4	5	6	7
8	9	.	-	/	Half -	Half 1	Half -1
8	9	.	-	/	Half -	Half 1	Half -1

Alphabets in 7-Segment

- Alphabets in 7-Segment LED Display

A, a	B, b	C, c	D, d	E, e	F, f	G, g	H, h
A, a	B, b	C, c	D, d	E, e	F, f	G, g	H, h
I, i	J, j	K, k	L, l	M, m	N, n	O, o	P, p
I, i	J, j	K, k	L, l	M, m	N, n	O, o	P, p
Q, q	R, r	S, s	T, t	U, u	V, v	W, w	X, x
Q, q	R, r	S, s	T, t	U, u	V, v	W, w	X, x
Y, y	Z, z						
Y, y	Z, z						



Precautions
Numeric 5 and alphabet S appear the same way

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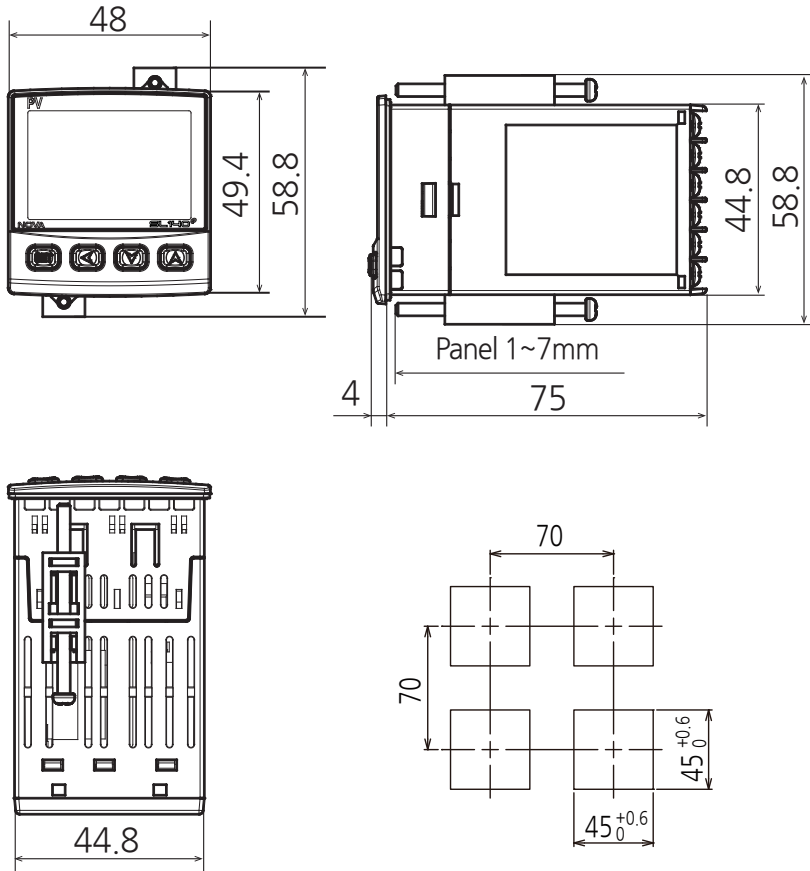
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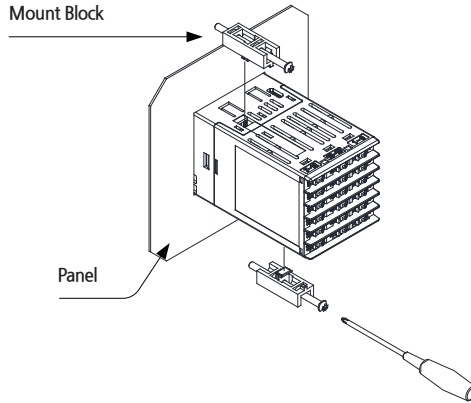
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1. Product Dimensions and Installation

1.1. Dimension and Panel Cutout



1.2. How to install Mount



- 1) Cut the mounting panel. [Refer to 1.1. Dimension and Panel Cutout]
- 2) Insert the controller into the panel cutout with the rear terminal board facing ahead.
- 3) Attach the right and left mount and fix it to the panel. (Use driver)

Caution when fastening the mount



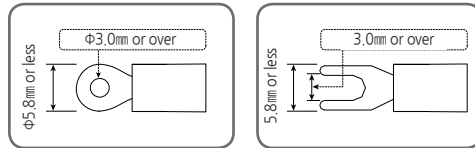
- Do not apply excessive force when fastening the mount on the account that the part may become damaged.
- Max torque when fastening the mount should not exceed 0.25N·m.

1.3. Power Cable Specification

- Vinyl insulated wire 0.9~2.0mm

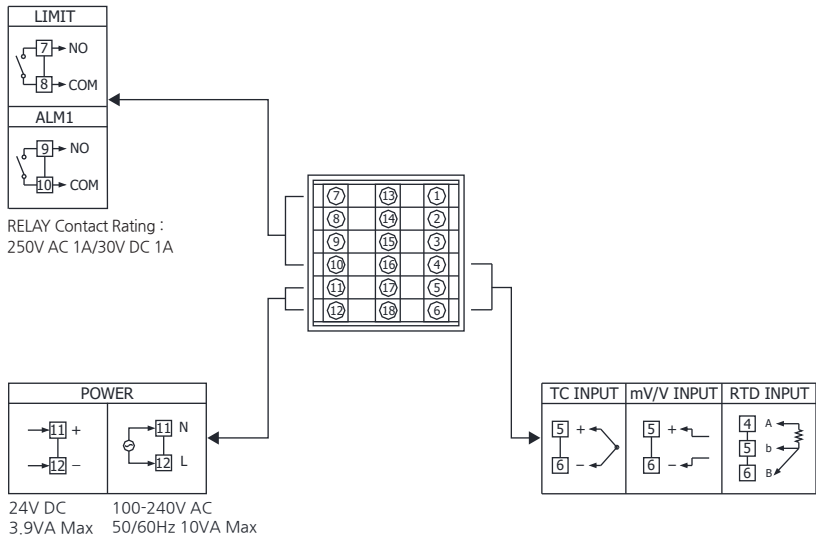
1.4. Terminal Specification

- Use M3 screw-compatible crimp-on terminals with insulating sleeve as shown below.



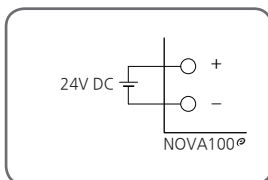
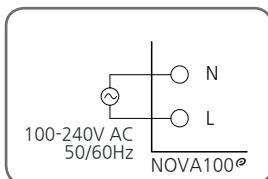
- First Turn off the source circuit breaker, check to ensure that the power cable is not conducting electricity using a tester, and then proceed with wiring in the manner.
 - Never touch the terminal in the rear panel to prevent electric shock when power is supplied to the controller.
 - Be sure to turn off the electric power before wiring.
- Bind the wires connected to the controller terminals neatly together in order to prevent electromagnetic wave radiation.
- Recommended tightening torque : 0.4N·m ~ 0.55N·m

1.5. Dimension and Panel Cutout



1.6. Power Cable Wiring

- Use Vinyl insulation wire 0.9~2.0mm (Allowed Rating Voltage 300V max) or higher leveled cable for power cable connection.
- Use the main power disconnect device in case of abnormal situations occur.



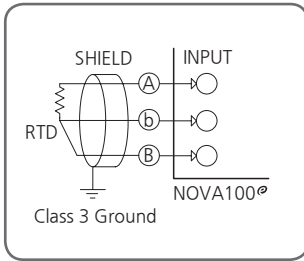
- For power connection, make sure that N-phase and L-phase (+ and - phases for DC Power) are connected.
- Turn off the power of NOVA100[®] when wiring the terminal to prevent electrical shock.
- DC Power will operate at 24V DC, 3.9VA Max.

1.7. Analog Input Wiring

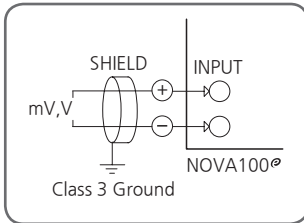


- Be sure to connect to correct polarities, Connecting to a wrong polarity may cause unexpected malfunction.
- Use shielded wires and ground the shielding to an independent grounding point.
- Keep the input circuit wiring as far as possible away from the power and ground circuit.
- Use a wire having a low conductor resistance and no three-wire resistance differential.

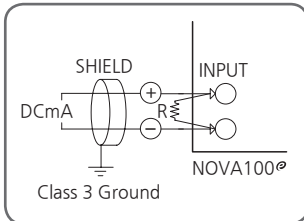
1.7.1. RTD Input



1.7.2. DC Voltage Input



1.7.3. DC Current Input

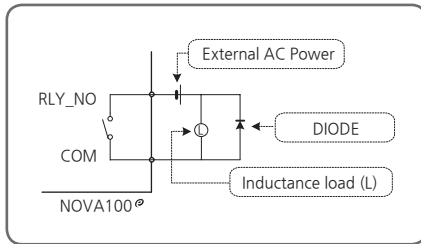


1.8. External Contact Output Wiring(RELAY)

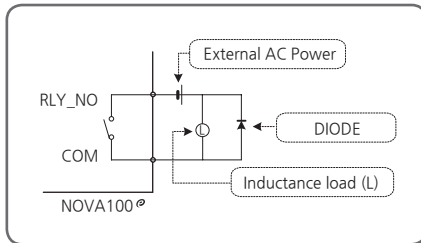
- When using an auxiliary relay or inductance load (L) such as solenoid, be sure to insert a CR filter(for AC) or diode (for DC) in parallel as a surge-suppressor circuit to reject sparks, preventing malfunction or damage. Recommended CR filters are as follows.

- Recommended CR FILTER

- ▶ Seong Hoo Electronics : BSE104R120 25V (0.1 μ +120 Ω)
- ▶ HANA PARTS CO. : HN2EAC
- ▶ Songmi Eolectic co.,Ltd : CR UNIT 953, 955 etc
- ▶ Jiwol Electric Co.,Ltd : SKV, SKVB etc
- ▶ Shinyoug Communications Co.,Ltd : CR-CFS, CR-U etc



▲ In case of DC Power

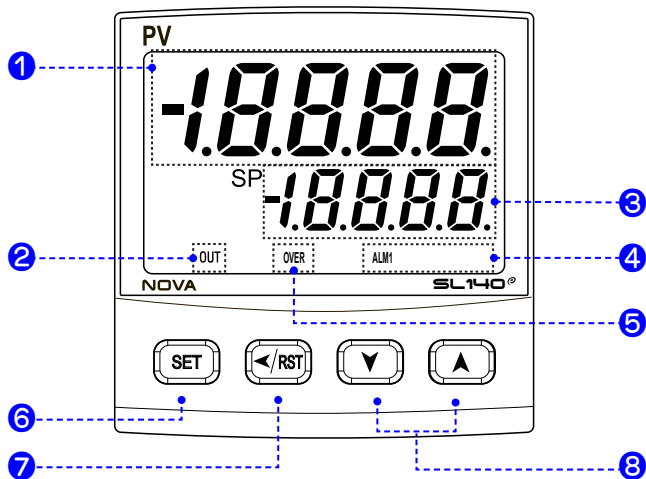


▲ In case of AC Power

- In case resistance load exceeds specification, turn on/off the load using an auxiliary relay.
- Turn off the power of NOVA100[®] when wiring external contact output to prevent electrical shock.
- **DIODE and CR filter connection**
Directly connect to inductance (L) load socket.
- **Auxiliary relay connection**
Auxiliary relay coil rating must be below that of controller contact capacity.
(Relay contact capacity : 250V AC 1A / 30VDC 1A)



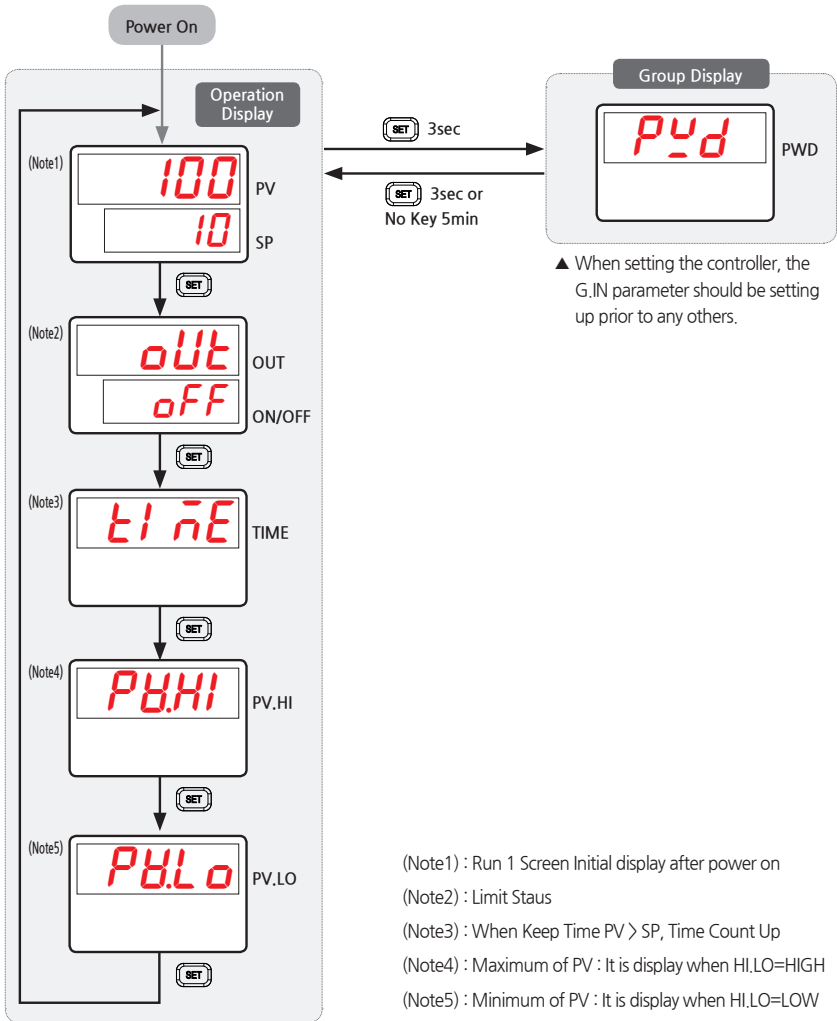
2. Control Keys and Display



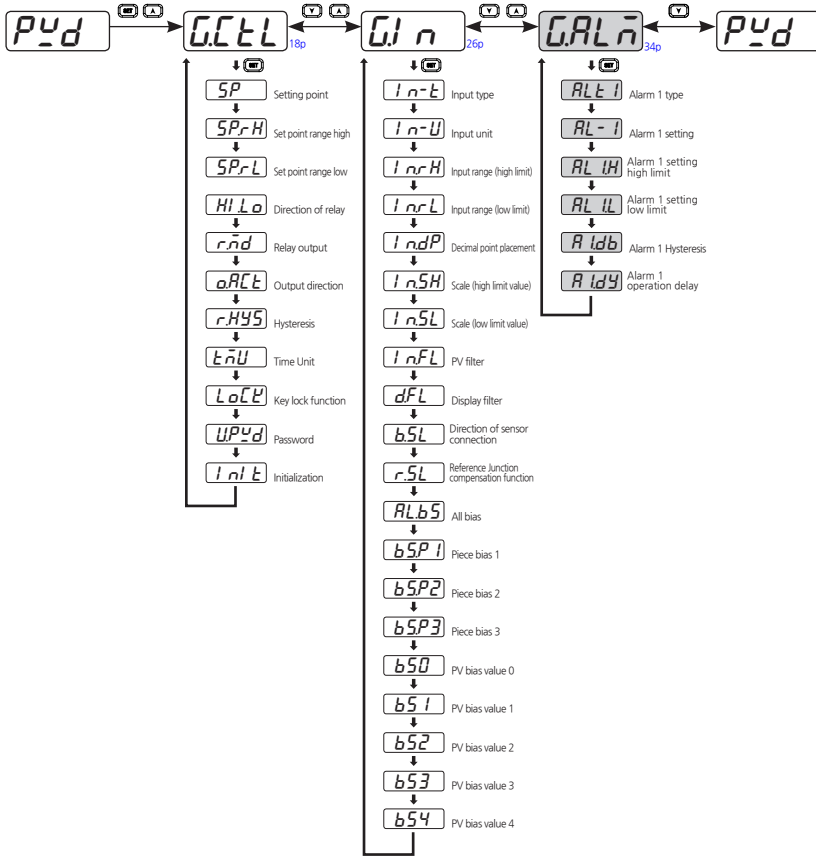
No.	Contents
①	PV display, Parameter Symbol
②	OUT LAMP When MV
③	SP Set, Parameter Set
④	Lights on during ALM
⑤	<ul style="list-style-type: none"> • Lights on When PV input is higher then setting Value(HI.LO=High). • Lights on when PV input is lower then setting Value (HI.LO=High).

No.	Contents
⑥	<ul style="list-style-type: none"> • Used in switching between parameters or registering parameter settings. • Used to change Display screen from RUN screen. • Pressing the SET key for 3 sec from the RUN screen. → Move to the SET screen. • Pressing the SET key for 3 sec from the SET screen. → Move to the RUN screen.
⑦	<ul style="list-style-type: none"> • Used when shifting position to modify value • RST : Pressing when Pattern End (Pressing for 3 sec)
⑧	Used to change the value of parameters. Used to move between Group

3. Flow of Operating Display

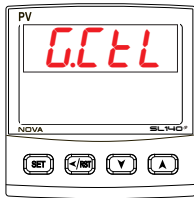


4. Parameter Map



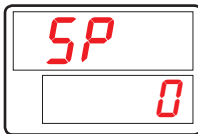
5. Setting Up Parameter in Each Group

5.1. Control Functions Group(G.CTL)



- Parameter for setting control parameters.

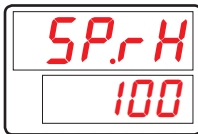
5.1.1. Setting Point Setting



- Parameter for setting SP value for controller of limit operation

Symbol	Parameter	Setting range	Unit	Default	Display
SP	Setting Point	EU(0.0 ~ 100.0%)	EU	EU(0.0%)	Always

5.1.2. PV High/Low Limit Setting



- Parameter for setting High/Low-Limited value when input setting value.
- The SP.RH/SP.RL can initialize when sensor input set or IN.RH (IN.SH/IN.SL When mV, V Sensor input) when changing of IN.RH/IN.RL

Symbol	Parameter	Setting range	Unit	Default	Display
SP.RH	Set Point Range High	EU(0.0 ~ 100.0%)	EU	EU(100.0%)	Always
SP.RL	Set Point Range Low	EU(0.0 ~ 100.0%)	EU	EU(0.0%)	Always

5.1.3. Direction of Relay Setting



- Parameter for setting the status of HIGH LIMIT or LOW LIMIT.
- In case of High, it operates limit when $PV > SP$, In case of LOW, it operates limit when $PV < SP$.

Symbol	Parameter	Setting range	Unit	Default	Display
HI.LO	High or Low Select	LOW, HIGH	ABS	HIGH	Always

5.1.4. Relay Output Setting



- Parameter for setting the operation of Relay Out when Power on.
- In case of R.MD = OFF, Relay out is OFF (ON when it is reset)
- In case of R.MD = ON, Relay out is OFF, Only when it is over temperature.

Symbol	Parameter	Setting range	Unit	Default	Display
R.MD	Restart Mode	OFF, ON	ABS	OFF	Always

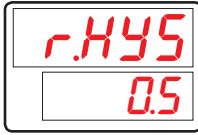
5.1.5. Output Direction Setting



- Parameter for setting normal / reverse direction of control output.
- If O.ACT is set REV and PV is less than SP, control output is increased and vice versa if O.ACT is set FWD.

Symbol	Parameter	Setting range	Unit	Default	Display
O.ACT	Output Direction	REV, FWD	ABS	REV	Always

5.1.6. Hysteresis Setting



- Parameter for setting Hysteresis in case of Off in OVER.

Symbol	Parameter	Setting range	Unit	Default	Display
R.HYS	Reference Hysteresis	EUS(0.0 ~ 10.0%)	ABS	EUS(0.5%)	Always

5.1.7. Time Unit Setting



- Parameter for setting time unit to either hour and minute (HH.MM) or minute and second (MM.SS).

Symbol	Parameter	Setting range	Unit	Default	Display
TMU	Time Unit	HH.MM, MM.SS	ABS	HH.MM	Always

5.1.8. Key Lock Setting



- Parameter to counteract irregular operations due to erroneous input keys.
- If LOCK is ON, all parameter settings become restricted including SP.

Symbol	Parameter	Setting range	Unit	Default	Display
LOCK	Key Lock	OFF, ON	ABS	OFF	Always

5.1.9. Password Setting



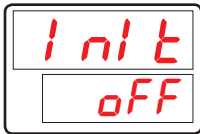
- Parameter for setting controller password.
- Once U.PWD is set, password must be entered to access Control Group (G.CTL). If you set a password and input values do not match, you can not enter the parameters of the group in the future.
- Default U.PWD password is '0'.

Symbol	Parameter	Setting range	Unit	Default	Display
U.PWD	User Password	0 ~ 9999	ABS	0	Always



- Do not forget your password.
- If the password is misplaced, the unit is inaccessible by users. Please send the unit to our service department.

5.1.10. Initialization of The Controller



- Parameter for initiating controller.
- All controller parameters are initialized by switching INIT to ON. (However, communication is not initialized.)

Symbol	Parameter	Setting range	Unit	Default	Display
INIT	Parameter Initialization	OFF, ON	ABS	OFF	Always

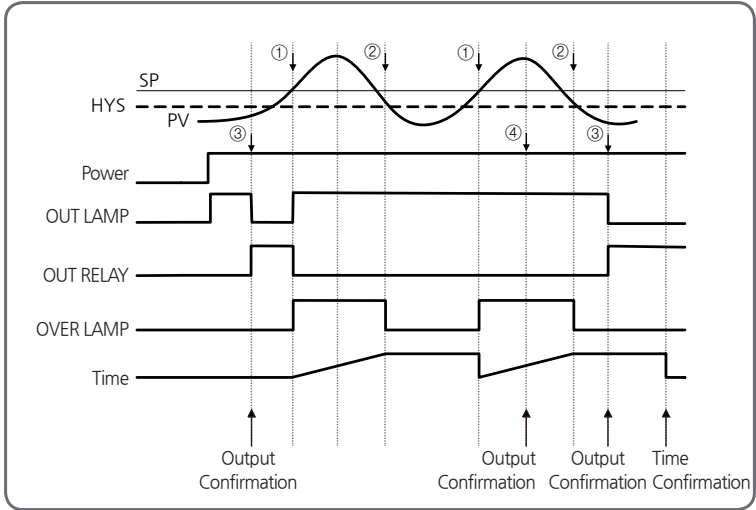


- Switching INIT to ON will initialize all controller parameters to default settings. Please be careful.



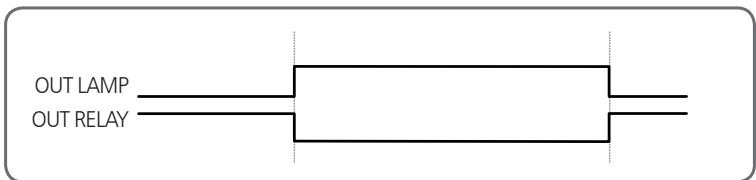
※ HI.LO = HIGH, R.MD = OFF, O.ACT = REV

- If PV value is over then SP value, "OVER" LAMP and "OUT" LAMP is ON .(①)
- PV value returns normal status, "OVER" LAMP is OFF. However, "OUT" LAMP is remaining.(②)
- Operator press "RESET" Key(③) for Confirmation, "OUT" LAMP is OFF, "OUT" Relay is ON.
- When PV value is over SP value, Reset function is not working in.(④)



[Fig.1] Over, Out operation when R.MD = OFF, O.ACT=REV

※ HI.LO = HIGH, R.MD = ON, O.ACT = REV

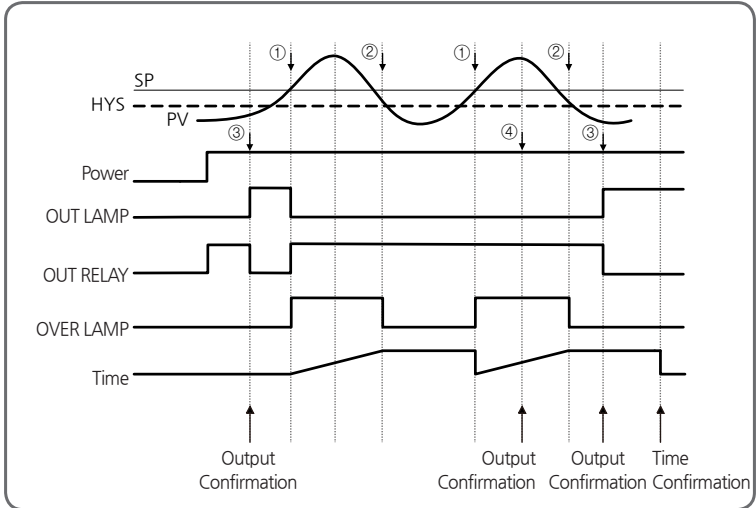


[Fig.2] Out operation when R.MD = ON, O.ACT=REV



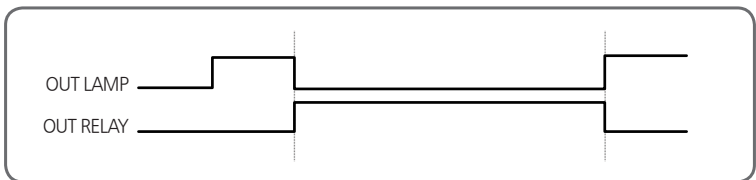
※ HI,LO = HIGH, R,MD = OFF, O,ACT = FWD

- If PV value is over then SP value, “OVER” LAMP and “OUT” Relay is ON .(①)
- PV value returns normal status, “OVER” LAMP is OFF. However,“OUT” Relay is remaining.(②)
- Operator press “RESET” Key(③) for Confirmation, “OUT” LAMP is OFF, “OUT” Relay is OFF.
- When PV value is over SP value, Reset function is not working in.(④)



[Fig.3] Over, Out operation when R,MD=OFF, O,ACT=FWD

※ HI,LO = HIGH, R,MD = ON, O,ACT = FWD



[Fig.4] Out operation when R,MD=ON, O,ACT=FWD



※ Power ON, Operation When $PV < SP$ (Manual reset, When HI,LO = HIGH)

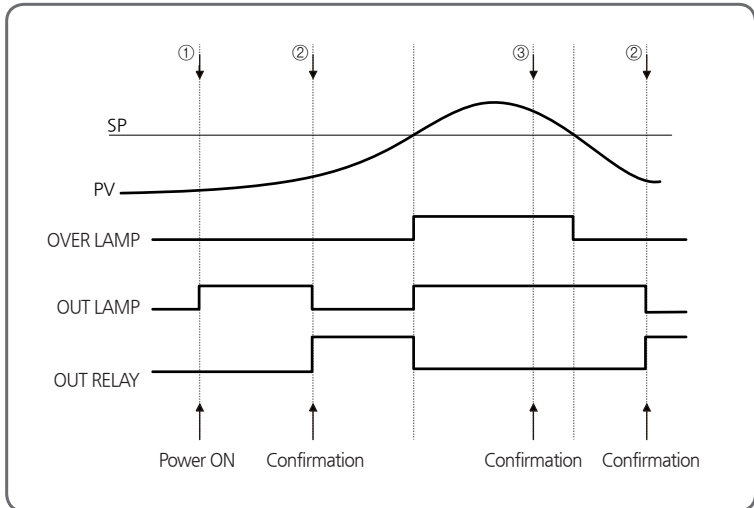
① When Power ON

- * The status of OVER LAMP is OFF.
- * The status of OUT LAMP is ON.
- * The status of OUT RELAY is OFF.

② Confirmation(Manual Reset)

- * When OVER LAMP OFF, Press Manual Reset OUT RELAY is ON.

③ When OVER LAMP ON, Press Manual Reset OUTRELAY is not ON.



[Fig.5] Output Relay operation



※ Power ON, Operation When PV > SP(Manual reset, When HI,LO = LOW)

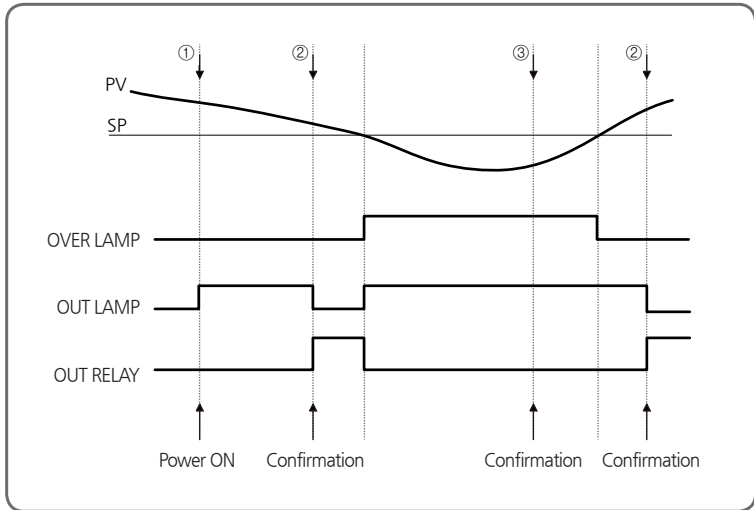
① When Power ON

- * The status of OVER LAMP is OFF.
- * The status of OUT LAMP is ON.
- * The status of OUT RELAY is OFF.

② Confirmation(Manual Reset)

- * When OVER LAMP OFF, Press Manual Reset OUT RELAY is ON.

③ When OVER LAMP ON, Press Manual Reset OUTRELAY is not ON.



[Fig.6] Output Relay operation

※ Confirmation Operation

- OVER status is not the only possible action by the return of OUT RELAY "RESET" KEY.

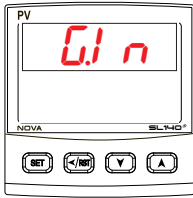
※ Time Operation

- When PV value is over SP value, it counts and displays the Time. (Third operation display)
- Time Count will be clear when power on or press "Reset" key in Time display, and "0.0" displays in LED until PV value is over SP value.
- It can not be cleared TIME when PV value is over the SP value.
- Display Range : 0.0 ~ 999.9 MIN

※ MIN, MAX Function

- It is initialized by pressing "RESET" Key in 'MIN', 'MAX' display.
- It is initialized for MIN/MAX value when Power on, and it is remaining MIN, MAX value in initial PV value.

5.2. Input Group(G.IN)

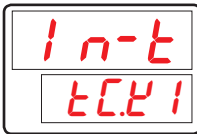


- Group of input parameters.
 - ⇒ Input Type (IN-T) : Thermocouple (TC), Resistive thermal detector (RTD), DC volt (DCV).
 - ⇒ In case of TC or RTD, the sensor type and temperature range should be selected.
 - ⇒ In case of DCV, the input types are classified with the range of input voltage.



Input Group parameter settings must be adjusted first as they can influence initialization of other group parameters.

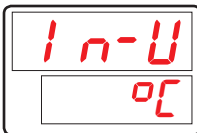
5.2.1. Input Type Setting



- Parameter for setting sensor input types.
- Refer to [Table1] Sensor input types to adjust settings.

Symbol	Parameter	Setting range	Unit	Default	Display
IN-T	Input Sensor Type	For more detail, refer to [Table1] Sensor input types	ABS	TC.K1	Always

5.2.2. Input Unit Setting



- Select “C” or “F” for input unit .
- Changing IN-U will automatically convert temperature ranges in appropriate unit.
- IN-U is only applicable when sensor type (IN-T) is TC or RTD.
- Refer to [Table1] Sensor input types to check temperature settings.

Symbol	Parameter	Setting range	Unit	Default	Display
IN-U	Input Unit	°C / °F	ABS	°C	IN-T = TC or RTD



Once sensor type is changed, all parameters are initialized. (However, communication is not initialized.) Please be careful.

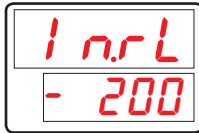
[Table1] Sensor input types

* Display range : -5% ~ +105%

Group	Symbol	Temp.Range(°C)	Temp.Range(°F)	Measurement Range
T/C	TC.K1	-200 ~ 1370	-300 ~ 2500	Range $\pm 0.1\% \pm 1$ digit for temperature greater than 0°C Range $\pm 0.2\% \pm 1$ digit for temperature less than 0°C
	TC.K2	-200.0 ~ 1370.0	-300.0 ~ 1900.0	
	TC.J	-200.0 ~ 1200.0	-300.0 ~ 1900.0	
	TC.E	-200.0 ~ 1000.0	-300.0 ~ 1800.0	
	TC.T	-200.0 ~ 400.0	-300.0 ~ 750.0	
	TC.R	0.0 ~ 1700.0	32 ~ 3100	Temperature range $\pm 0.15\% \pm 1$ digit
	TC.B	0.0 ~ 1800.0	32 ~ 3300	Range $\pm 0.15\% \pm 1$ digit for temperature greater than 400°C Range $\pm 5\% \pm 1$ digit for temperature less than 400°C
	TC.S	0.0 ~ 1700.0	32 ~ 3100	Temperature range $\pm 0.15\% \pm 1$ digit
	TC.L	-200.0 ~ 900.0	-300 ~ 1600	Range $\pm 0.1\% \pm 1$ digit for temperature greater than 0°C Range $\pm 0.2\% \pm 1$ digit for temperature less than 0°C
	TC.N	-200.0 ~ 1300.0	-300 ~ 2400	Range $\pm 0.1\% \pm 1$ digit for temperature greater than 0°C Range $\pm 0.25\% \pm 1$ digit for temperature less than 0°C
	TC.U	-200.0 ~ 400.0	-300.0 ~ 750.0	Range $\pm 0.1\% \pm 1$ digit for temperature greater than 0°C Range $\pm 0.2\% \pm 1$ digit for temperature less than 0°C
	TC.W	0 ~ 2300	32 ~ 4200	Temperature range $\pm 0.2\% \pm 1$ digit
TC.PL	0.0 ~ 1390.0	32 ~ 2500	Temperature range $\pm 0.1\% \pm 1$ digit	
TC.C	0 ~ 2320	32 ~ 4200	Temperature range $\pm 0.2\% \pm 1$ digit	
RTD	PTA	-200.0 ~ 850.0	-300.0 ~ 1560.0	Temperature range $\pm 0.1\% \pm 1$ digit
	PTB	-200.0 ~ 500.0	-300.0 ~ 1000.0	
	PTC	-50.00 ~ 150.00	-148.0 ~ 300.0	Inquire separately
	PTD	-200 ~ 850	-300 ~ 1560	Temperature range $\pm 0.1\% \pm 1$ digit
	JPTA	-200.0 ~ 500.0	-300.0 ~ 1000.0	Temperature range $\pm 0.1\% \pm 1$ digit
	JPTB	-50.00 ~ 150.00	-148.0 ~ 300.0	Inquire separately
DCV	2V	0.400 ~ 2.000V(-10000 ~ 19999)		Temperature range $\pm 0.1\% \pm 1$ digit
	5V	1.000 ~ 5.000V(-10000 ~ 19999)		
	10V	0.00 ~ 10.00V(-10000 ~ 19999)		
	20MV	-10.00 ~ 20.00mV(-10000 ~ 19999)		
	100MV	0.0 ~ 100.0mV(-10000 ~ 19999)		

* Performance at standard operating status at 23 \pm 2°C, 55 \pm 10%RH, and 50/60Hz* When receiving 4~20mA DC signal, select DCV 5V (1~5V DC) and connect 250 Ω resistance.

5.2.3. Input Range Setting



- Parameter for setting high/low limits for sensor input.
- TC, RTD Input
Once sensor type is selected, input range for TC and RTD will be determined according to [Table1] Sensor input types.
Input ranges for IN.RH and IN.RL can be changed within given range.
Decimal placement cannot be changed.
- DCV, mV Input
Determining input range after selecting a sensor type is the same for voltage input. Input ranges for IN.RH and IN.RL can be changed within given range.

Symbol	Parameter	Setting range	Unit	Default	Display
IN.RH	Input Range High	Refer to [Table1] Sensor input types within Input type. (IN.RH > IN.RL)	EU	EU(100%)	Always
IN.RL	Input Range Low		EU	EU(0.0%)	Always

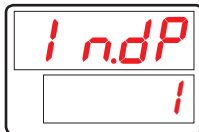


NOTE

Input Range Setting Example

- When using a range of [Table1] Sensor input types to select the thermocouple input range of -200 ~ 1370 °C hereafter in, setting "500" to "-100", Low Range High Range setting items on the setting items, -100 ~ 500 °C this is limited.

5.2.4. Decimal Point Setting



- Parameter for setting decimal placement, if sensor input type is mV or V.

Symbol	Parameter	Setting range	Unit	Default	Display
IN.DP	Input Dot Position	0~3	ABS	1	IN-T = DCV



CAUTION

Changing this parameter will change decimal placement for all parameters pertinent to PV, including those relevant to EU and EUS.

5.2.5. PV Display Range Setting



- Parameter for setting high limit for scale, if sensor input type is mV or V.



- Parameter for setting low limit for scale, if sensor input type is mV or V.

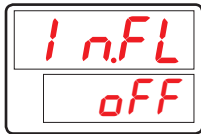
Symbol	Parameter	Setting range	Unit	Default	Display
IN.SH	Input Scale High	- 10000~19999, but INSH > INSL Decimal place will conform to IN.DP	ABS	100.0	IN-T = DCV
IN.SL	Input Scale Low			0.0	IN-T = DCV



PV Display Range Setting Example

- Select the input voltage(V, mV) to the input type, and the range is 1~5V and scaled display need to be 0~100 IN-T : 5V.
- IN.SH : 100(5V input is scaled to "100" display).
- IN.SL : 0(1V input is scaled to "0" display).

5.2.6. Input Filter Setting



- Parameter for setting PV filter to moderate PV run-outs due to disturbance and noise.

Symbol	Parameter	Setting range	Unit	Default	Display
IN.FL	Input Sensor Filter	OFF, 1~120	ABS	OFF	Always

5.2.7. Display Filter Setting



- Parameter for moderating PV run-outs due to delicate sensor reaction under normal operation.

Symbol	Parameter	Setting range	Unit	Default	Display
D.FL	Display Filter	OFF, 1~120	ABS	OFF	Always

5.2.8. PV Direction Setting during Sensor-Open

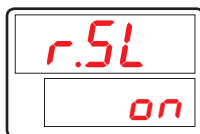


- Parameter for setting sensor direction during sensor-open.
- If B.SL value is UP, PV will operate upwards of sensor input. If B.SL value is DOWN, PV will operate downwards of sensor input.
- B.SL default setting is UP. (However, when input mV and V, it will be initialized to OFF. 10V, 20mV and 100mV will not be S.OPN checked.)

Symbol	Parameter	Setting range	Unit	Default	Display
B.SL	Burn Out Select (Note1)	OFF, UP, DOWN	ABS	UP (DCV=OFF)	Always

* (Note1) : S.OPN(Sensor-Open) = B.OUT(Burn-Out)

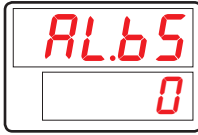
5.2.9. Reference Junction Compensation Setting



- Parameter for setting use of RJC (Reference Junction Compensation), in case the sensor input type is TC (thermocouple).

Symbol	Parameter	Setting range	Unit	Default	Display
R.SL	RJC Select	ON, OFF	ABS	ON	IN-T = TC

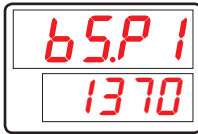
5.2.10. All Bias Setting



- Adjusts offsets of all bias values for PV display.
- PV display value = input value + all bias (AL.BS).

Symbol	Parameter	Setting range	Unit	Default	Display
AL.BS	All Bias Value	EUS(-100.0 ~ 100.0%)	EUS	EUS(0.0%)	Always

5.2.11. Piece Bias Setting



- Parameter for setting piece bias to set BIAS to PV value.
- Up to 4 references can be set for bias.
 - Reference 1 : IN,RL(IN,SL) ↔ BS,P1
 - Reference 2 : BS,P1 ↔ BS,P2
 - Reference 3 : BS,P2 ↔ BS,P3
 - Reference 4 : BS,P3 ↔ IN,RH(IN,SH)
- For more details, refer to [Fig.7] Example of Piece Bias and [Fig.8] Example of Piece Bias Formula .

Symbol	Parameter	Setting range	Unit	Default	Display
BS,P#n	Reference Bias Point	EUS(0.0 ~ 100.0%) IN,RL ≤ BS,P1 ≤ BS,P2 ≤ BS,P3 ≤ IN,RH	EU	EU(100.0%)	Always

#n = 1~3



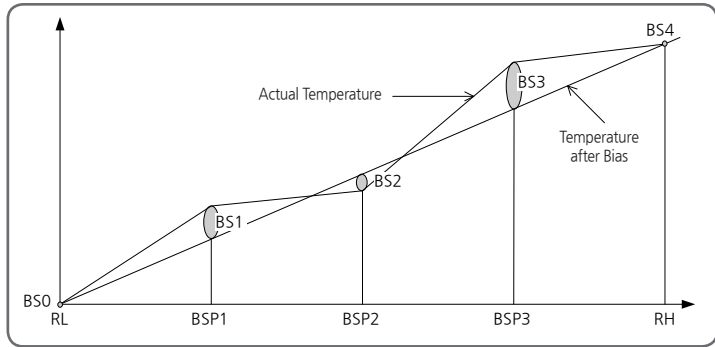
- Parameter for setting the PV value correction value(BIAS) to be applied to domestic correction.
- For more details, refer to [Fig.7] Example of Piece Bias and [Fig.8] Example of Piece Bias Formula .

Symbol	Parameter	Setting range	Unit	Default	Display
BS#n	Bias Value for BS,P Point	EUS(-100.0~100.0%)	EUS	0	Always

#n = 0~4



Example of Piece Bias

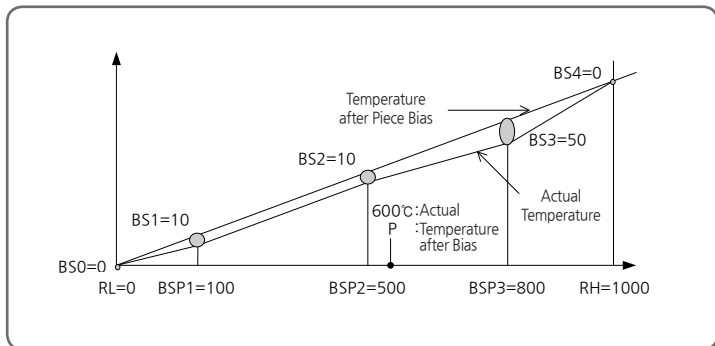


[Fig.7] Example of Piece Bias

- There are +2°C in 25°C, -1°C in 50°C, +3°C in 75°C as temperature deviation in measuring actual temperature in range from 0°C ~100°C, and try to take a Piece Bias, each Bias set value are shown as belows.

RL = 0°C, BSP1=25°C, BSP2=50°C, BSP3=75°C, RH=100°C

BS0 = 0°C, BS1=-2°C, BS2=+1°C, BS3=-3°C, BS4=0°C



[Fig.8] Example of Piece Bias Formula

- Temperature Bias Value = Temperature after Bias - Actual Temperature
- Temperature in 600°C(P) after Bias

$$P = 600 + (600 - \text{BPS2}) \times \frac{\text{BS3} - \text{BS2}}{\text{BSP3} - \text{BSP2}} + \text{BS2}$$



NOTE

Processing PV Input

- If PV is less than EU(-5%) or greater than EU(-105%), PV will be -OVR or OVR.
- For internal operation, PV will be set -5%, 105% .
 - $PV > EU(105\%)$: PV = 105%, PV = OVR
 - $EU(-5\%) \leq PV \leq EU(105\%)$: PV = PV
 - $PV < EU(-5\%)$: PV = -5%, PV = -OVR

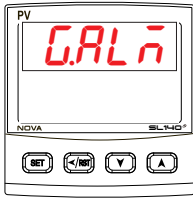
-
- All parameters are reset to change the sensor types.
(However, communication and A/M are not initialized.)
 - If you change the input type and input range, so the parameters, that is unit related to the input range is changed according to the EU or EUS parameters are input range should be set ahead of the sensor type parameter with units of the EU or EUS.



CAUTION

- **Setting Example**
 - Pt100 Ω sensor is used in the range of -50.0~500.0 $^{\circ}$ C and display 1 decimal place.
 - IN-T = PTA \rightarrow PTA (-200.0~850.0 $^{\circ}$ C range) uses a pressure sensor.
 - IN-U = $^{\circ}$ C \rightarrow Display unit is $^{\circ}$ C.
 - IN.RH = 500.0
 - IN.RL = -50.0

5.3. Alarm Group(G,ALM)



■ Group of alarm parameters

- ⇒ Output Direction mode
 - Forward : ON when alarm condition, OFF when alarm off
 - Reverse : OFF when alarm condition, ON when alarm off
- ⇒ The condition of Standby
 - Power On
 - Changing of Alarm Type
 - Changing SP

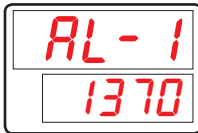
5.3.1. Alarm Type Setting



- Parameter for setting Alarm type.
- Refer to [Table2] Type of Alarm to see alarm types.

Symbol	Parameter	Setting range	Unit	Default	Display
ALT#n	Alarm Type	Refer to [Table2] Type of Alarm	ABS	AH.F	Always

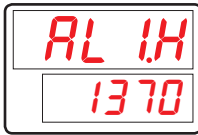
5.3.2. Alarm Point Setting



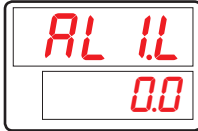
- Parameter for setting alarm point with respect to alarm types set in ALT#n (presents during high/low limit operations).

Symbol	Parameter	Setting range	Unit	Default	Display
AL-#n	Alarm Set Value	EU(-100.0 ~ 100.0%)	EU	EU(100.0%)	Others deviation alarm

5.3.3. High/Low Deviation Alarm Setting



- Illustrates high alarm point within deviation bounds during high limit deviation operation.



- Illustrates high alarm point within deviation bounds during low limit deviation operation.

Symbol	Parameter	Setting range	Unit	Default	Display
AL#n.H	Alarm Set High Deviation	EUS(-100.0 ~ 100.0%)	EUS	EUS(0.0%)	Deviation alarm
AL#n.L	Alarm Set Low Deviation	EUS(-100.0 ~ 100.0%)	EUS	EUS(0.0%)	Deviation alarm

5.3.4. Hysteresis Setting



- Parameter for setting Alarm Hysteresis.

Symbol	Parameter	Setting range	Unit	Default	Display
A#n.DB	Alarm Hysteresis Value	EUS(0.0 ~ 100.0%)	EUS	EUS(0.5%)	Always

5.3.5. Delay Time Setting



- Parameter for setting alarm output delay time during Alarm.

Symbol	Parameter	Setting range	Unit	Default	Display
A#n.DY	Alarm Delay Time	0.00 ~ 99.59 (mm.ss)	TIME	0 sec	Always



NOTE

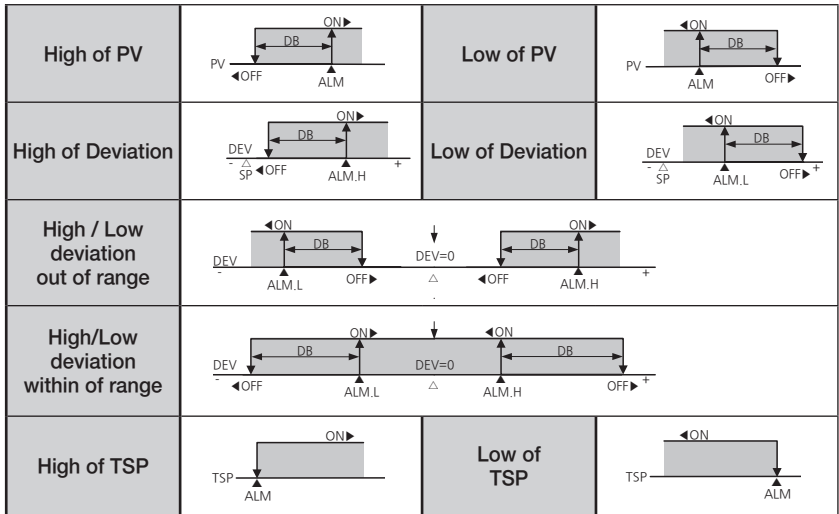
Displays and Types of Alarms

- Output Type
 - Forward : ON when alarm is on, OFF when alarm is off
 - Reverse : OFF when alarm is on, ON when alarm is off
- Standby Condition
 - When power is on
 - When changed alarm type
 - When SP is modified

- Standby off : No Display
Standby on : Display 'S'
- Forward : 'F' Display
Reverse : 'R' Display
- All time indicate Decimal Point.
- High-Limited : 'H' Display
Low-Limited : 'L' Display
Outside Range of Deviation : 'O' Display
Inside Range of Deviation : 'I' Display
- Absolute Value Alarm : 'A' Display
Deviation Value Alarm : 'D' Display

[Table2] Type of Alarm

No.	Type	Output Direct		Standby		Display
		For	Rev	Off	On	
1	High of PV	○		○		AH,F
2	Low of PV	○		○		AL,F
3	High of Deviation	○		○		DH,F
4	Low of Deviation	○		○		DL,F
5	High of Deviation		○	○		DH,R
6	Low of Deviation		○	○		DL,R
7	High/Low deviation out of range	○		○		DO,F
8	High/Low deviation within of range	○		○		DI,F
9	High of PV		○	○		AH,R
10	Low of PV		○	○		AL,R
11	High of PV	○			○	AH,FS
12	Low of PV	○			○	AL,FS
13	High of Deviation	○		○		DH,FS
14	Low of Deviation	○		○		DL,FS
15	High of Deviation		○		○	DH,RS
16	Low of Deviation		○		○	DL,RS
17	High/Low deviation out of range	○			○	DO,FS
18	High/Low deviation within of range	○			○	DI,FS
19	High of PV		○		○	AH,RS
20	Low of PV		○		○	AL,RS
21	High of TSP	○		○		TSP,H
22	Low of TSP	○		○		TSP,L



[Fig.9] Alarm Operation

6. Display Error and Correction

[Table3] Display Error and Correction

Display Error	Error Contents	Correction
E.SYS	Eeprom, Data Loss	Ask Repair
E.RJC	RJC Sensor Failure	Ask Repair
S.OPN	Sensor Open	Sensor Check