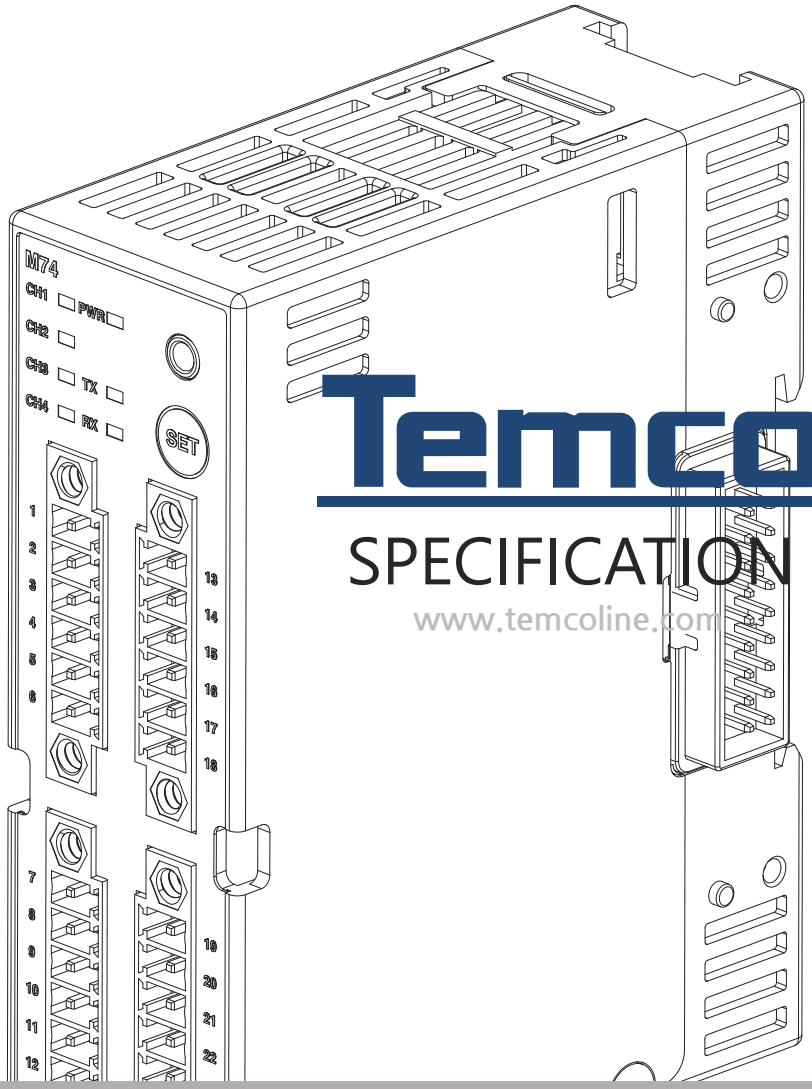
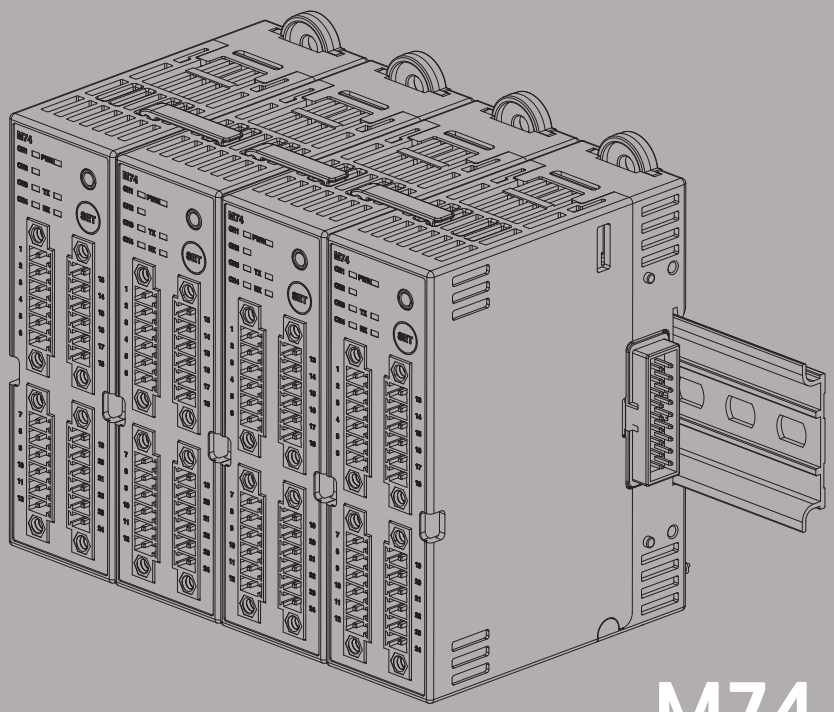


TemcoLine™

SPECIFICATION

M74

www.temcoline.com



M74 SERIES

Contents

Dimensions 2

Product Description 3

Terminal Wirings 4

M74 Series Features 5

Rating and Specifications 6

LED Display Function and SET Key Control 7

1. Status Display after power on 7

2. Basic operation of SET key 8

3. Address Check in operation mode 9

4. Communication parameters Setting 9

1) Address Setting 9

2) Communication Speed (Baudrate) Setting 10

3) Protocol Setting 10

5. System information indication 11

Communication register mapping table 12

Modbus protocol supported function code 12

Communication resister mapping table (Channel integration) ..... 12~13

Communication resister mapping table (all channels) ..... 14~17

Detailed description of M(N)74 Register mapping 18

1. Configuration of Register group 18

2. Configuration of Common register group 18

1) Basic information register 18

2) Main config. register ..... 19~20

3. Essential register settings under initial use ..... 20~21

4. Output ports 21

5. Retransmission outputs 21

6. Simultaneous heating and cooling control 22

7. Ramp control 22

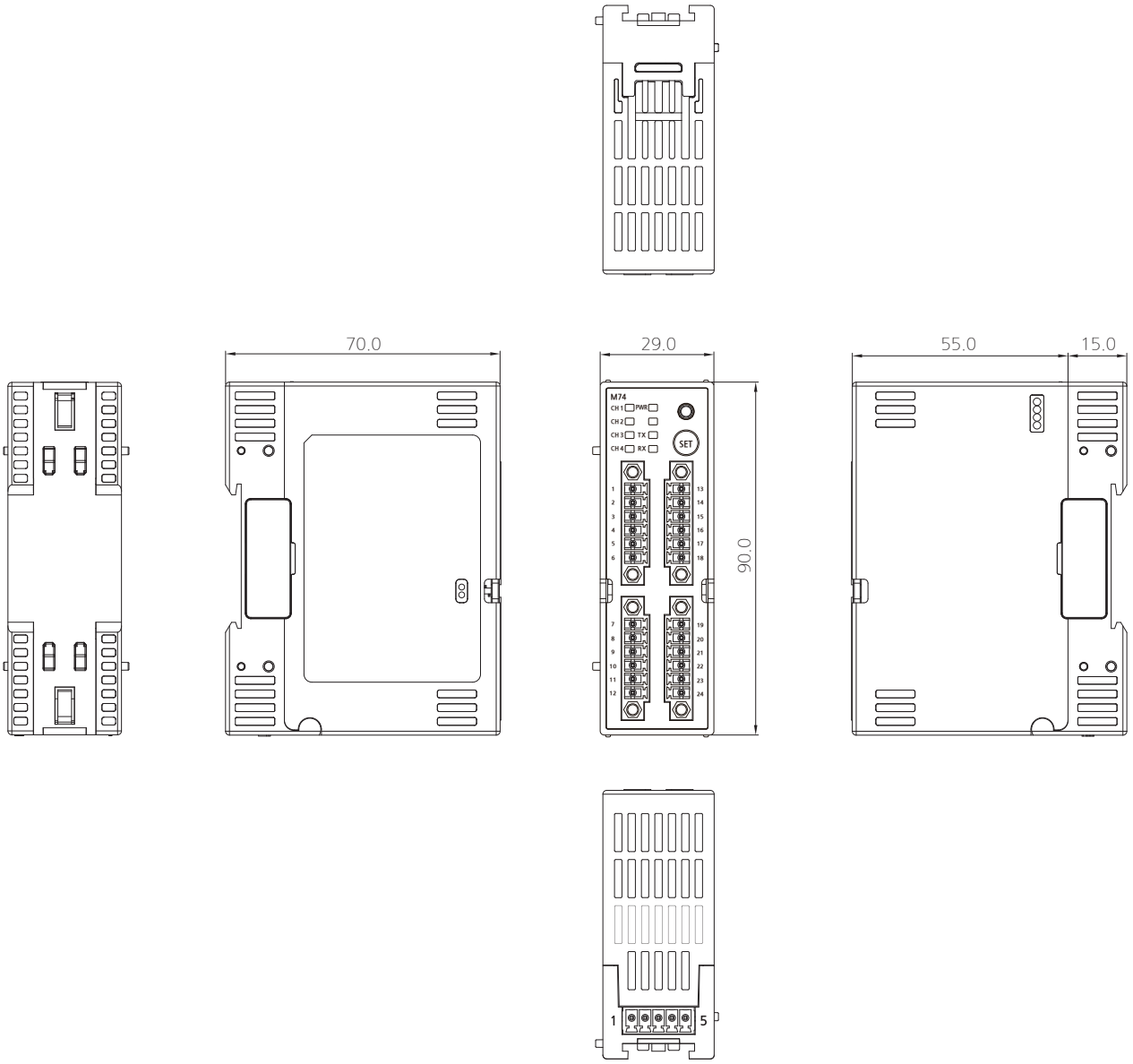
8. Control stability 23

9. Voltage & Current input mode (INP #30 ~36) 24

10. Input correction ..... 24~25

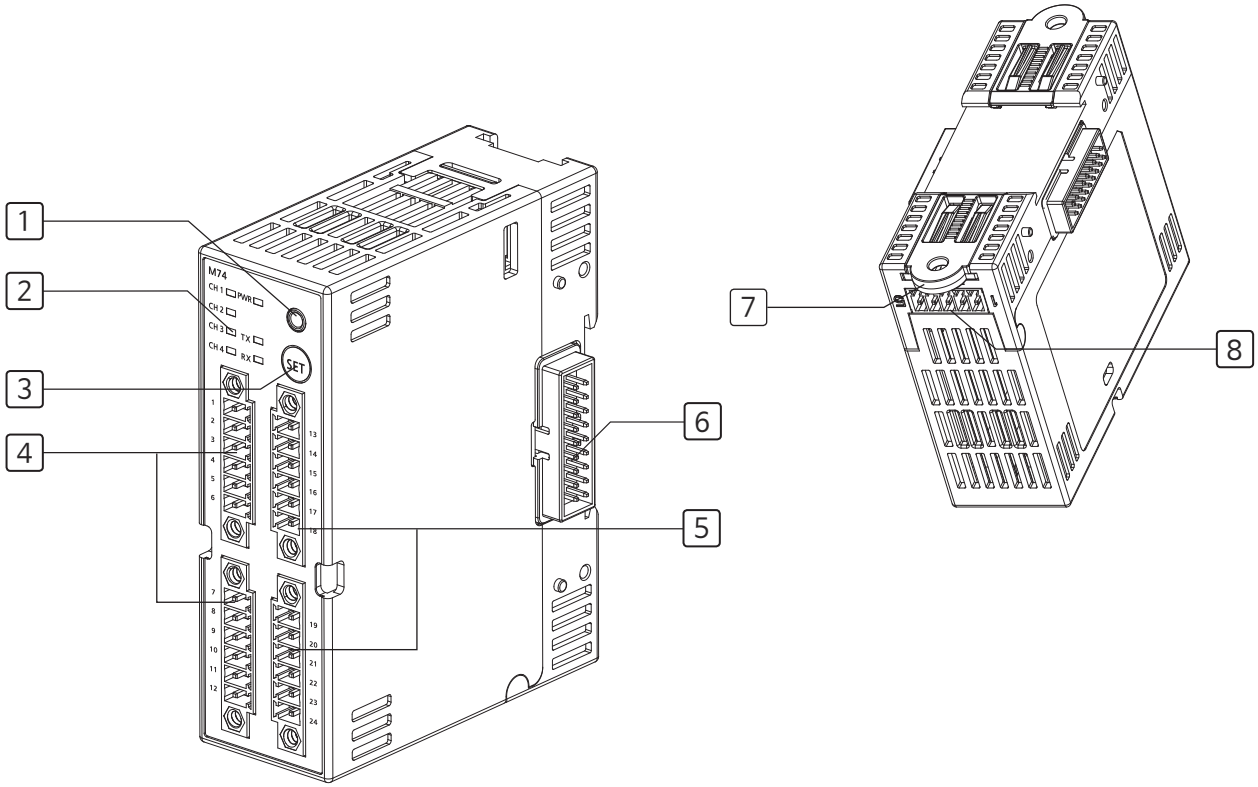
11. Alarm & Event Output ..... 25~26

M74 Series Demensions



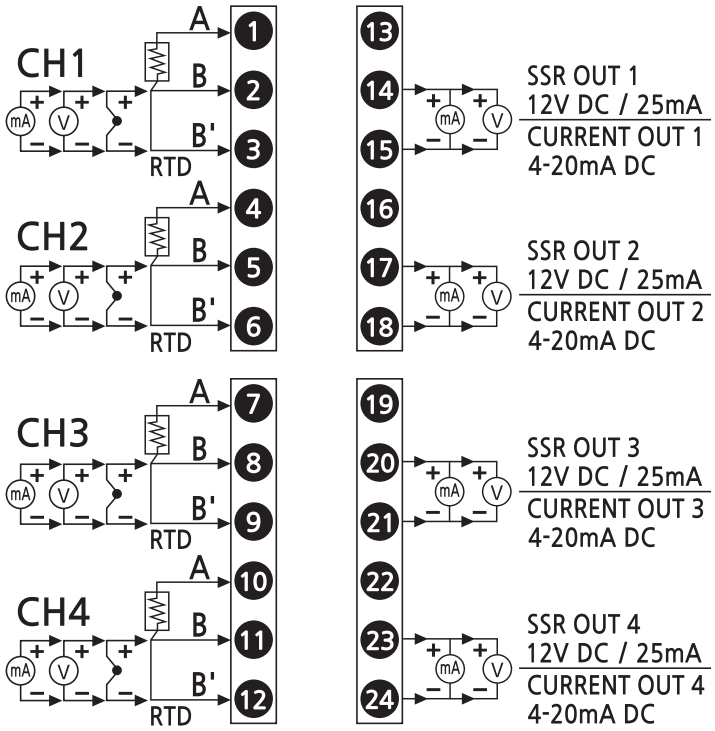
[unit: mm]

Product Description

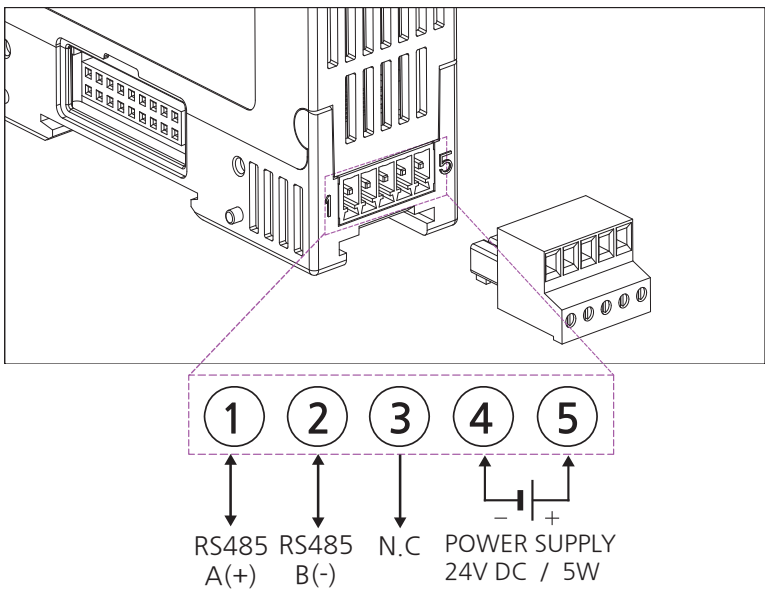


1. PC Loader and Console Port
2. Display LED - Each channel status, power monitoring, communication status(RX/TX)
3. SET Button - To change Communication parameters (Address, Baudrate, Protocol)
4. 1 ~ 4 channel input terminals
5. 1 ~ 4 channel output terminals
6. Extended communication and power supply connection terminals
7. Rail stop lock
8. Main power supply and RS-485 communication terminals

M74 SERIES Terminal Wirings



■ Power supply and communication connection

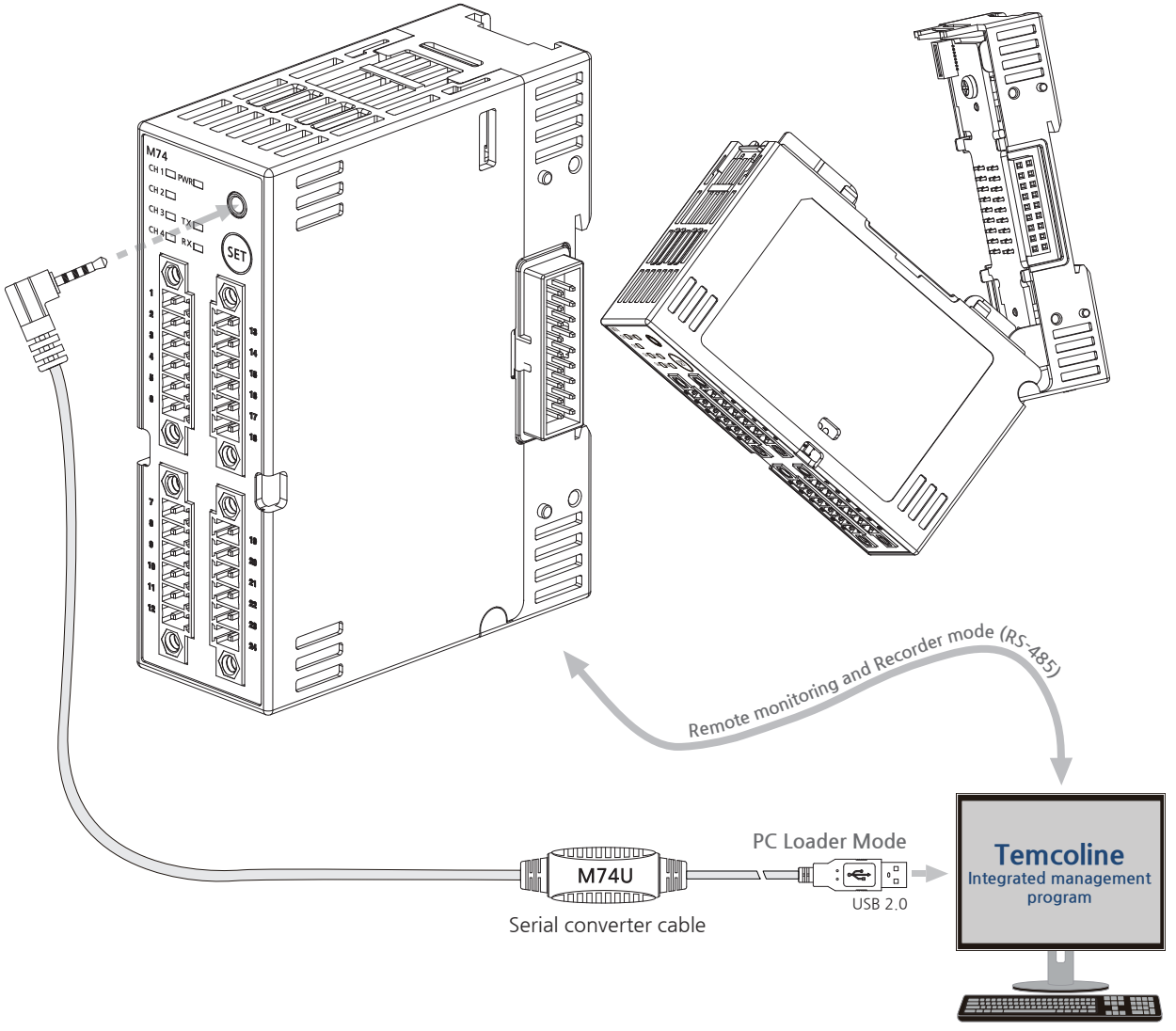


1. Always be careful of the connection direction when connecting power and communication.
2. Use AWG 28 ~ 14 for rail thickness when connecting sensors or Extension wires(cables).
3. Use AWG 24 or higher for rail thickness in case of SSR.

4-channel modular temperature controller- M74 series

Features

1. Efficient securing space and arrangement by realizing the minimum structure and high reliability of existing industries
2. Simple maintenance available with the separation structure between main body and base
3. No communication between modules and power wiring through an extension connector
4. Support of Modbus-RTU/ASCII, PC-Link, TL-Link protocol, and support of high-speed communication up to 115,200 bps
5. Possible to set Simple communication parameters with the front key (Protocol, Baudrate, Address up to 31 settings)
6. Convenient parameter setting in work site by console(Dedicated control display board)
7. Possible to set parameters with PC (USB Loader Cable M74U)
   ※ Device integrated management program is provided for free
8. Realization of fast sampling of 50ms and ±0.3% measurement
9. Basic support of simulative heating and cooling control and manual control available
10. Free wiring and control available with the free setup of alarm and control power port
11. Support Retransmission outputs(RET), SCR(4~20mA or 0~20mA DC), SSR(voltage pulse control power)
12. Designed as complete insulation structure each input and between input/output (Withstanding voltage up to1KVAC)

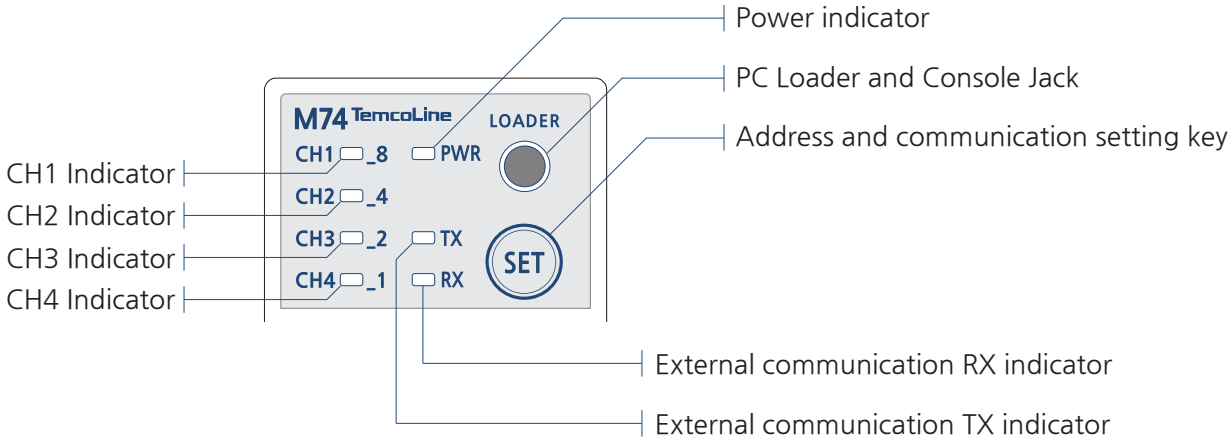


Rating and Specification

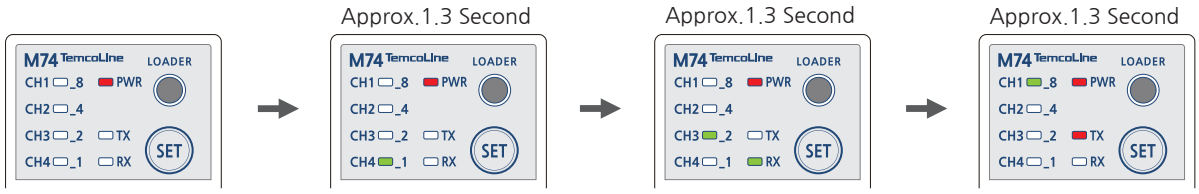
Model : M74

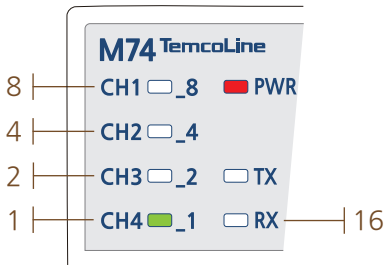
Number of Channels		Control input, output 4 channel			
Power supply		24V DC			
Allowable voltage fluctuation Range		90~110% of power supply voltage			
Power Consumption		5W or less (at full load)			
Display		No display-Parameter setting and monitoring control in external devices (exclusive console, touch panel, PC, PLC, etc.)			
Input Specification		Thermocouple (T.C)	Thermoresistance (RTD)	Analog (variable within the input range)	
		K(CA), J(IC), E(CR), T(CC)	KPT 100(KS)	Voltaget	Electric Current
		R(PR), B(PR), S(PR), L(IC)	JPT 100(JIS)	0~5V, 1~5V, 0~10V	4~20 mA
		N(NN), U(CC), C(W5), D(W3)	PT 100(DIN)	0~100mV, -10~20mV	0~20mA
			Allowable resistance: 10Ω or less (3-wire type 3-wire resistance only in this case)		
Sampling Cycle		Minimum 50 ms (4 channels simultaneous variable sampling control)			
Measurement Accuracy		0.3% FS+1 digit			
Control Method		Simultaneous heating, cooling, heating and cooling control: ON/OFF control, P, PI, PID control (Super 2 degrees of freedom)			
Output	Send	RET (4~20 mA DC), load resistance 500Ω or less (actual resolution 1/6000)			
	Control	SSR (Voltage Pulse)	DC 12V 25mA (built-in short circuit protection circuit) Voltage pulse (time proportional PID output or ON/OFF output)		
		SCR (Current)	DC 4~20mA, 0~20mA (load resistance 500 ohm or less)		
Com-muni-cation	Upper Device	Modbus-ASCII, RTU, PC or TL-Link			
	PC Loader	Console (dedicated display controller), USB Interface Cable (Option)			
Proportional Width (P)		Thermocouple, Thermoresistance: 0.1~999.9 °C, Analog Voltage, Current Input: 0.1~999.9 Digit			
Integral Time (I)		0 ~ 3600 Seconds			
Derivative Time (D)		0 ~ 3600 Seconds			
Control Cycle (CT)		1 ~100 Seconds			
Blackout Compensation		Approx. 10 years (Non-Volatile Semiconductor Memory Method)			
Insulation Resistance		100 MΩ or more (500V DC megger)			
Insulation Type		double insulation or reinforced insulation			
Withstand Voltage		1,000V AC 50/60Hz for 1 minute (between each input terminal, between input and output terminals, between input and power terminals)			
Vibration Resistance		5 to 55 Hz (period of 1 minute) Width 0.75 mm in each X, Y, Z direction for 2 hours			
Noise Immunity		Square wave noise by noise simulator (pulse width 1us) +/-1KV			
Environ-mental Resistance	Operating Temperature	-10 to 50°C, preservation: -20 to 60°C			
	Operating Humidity	35-85% RH, preservation: 35-85% RH			
Weight		Approx. 230g (Approx. 110g)			

M74 LED display function and SET key operation



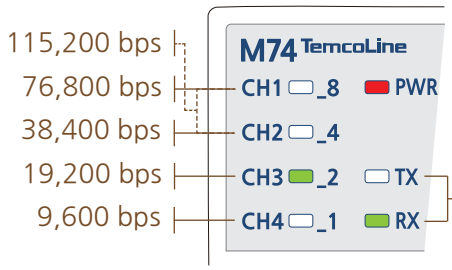
1. Display after power on





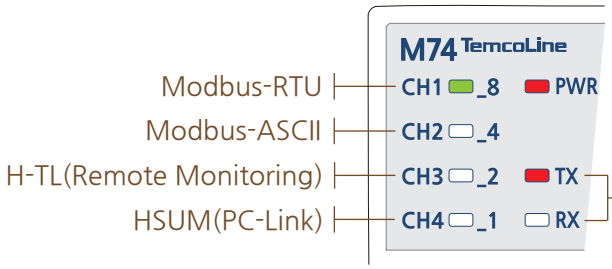
① Address status display (Current address is “1”)

Unit address displayed by binary code format (8421 Code).
The current address is the sum of all 8 4 2 1 numbers at lighting position.
When setting with the front key, maximum of 31 addresses can be set.



② Communication speed (Baudrate) display (currently 19,200 bps)

Able to check the current communication speed.
The currently lighting position is set speed.

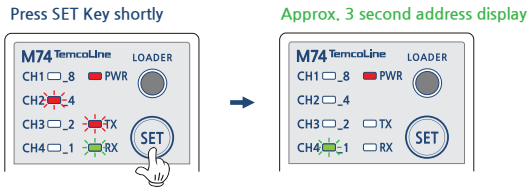


③ Communication protocol display

Able to check communication protocol.
Currently lighting position is set protocol.

2. Basic Operation of SET Key

1) Check current address



▣ LED indicator operation status

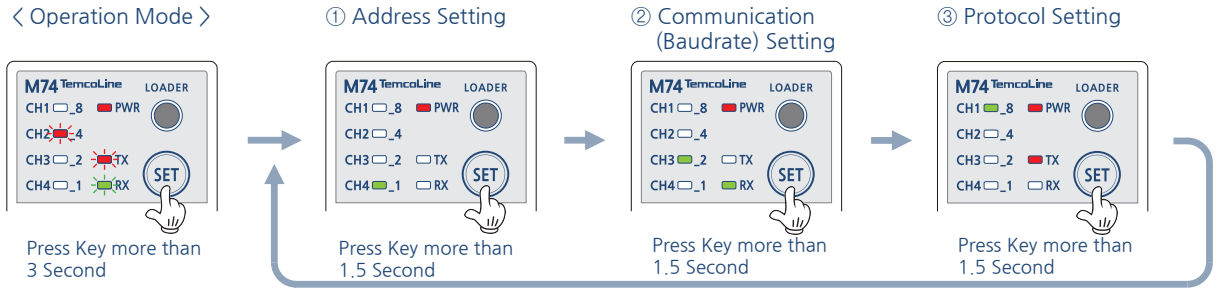
Red		Green		Orange	
Lighting	Blink	Lighting	Blink	Lighting	Blink

When press SET key in operation mode, the current set address is displayed with green LED for about 3 seconds, and then returning to operation mode.

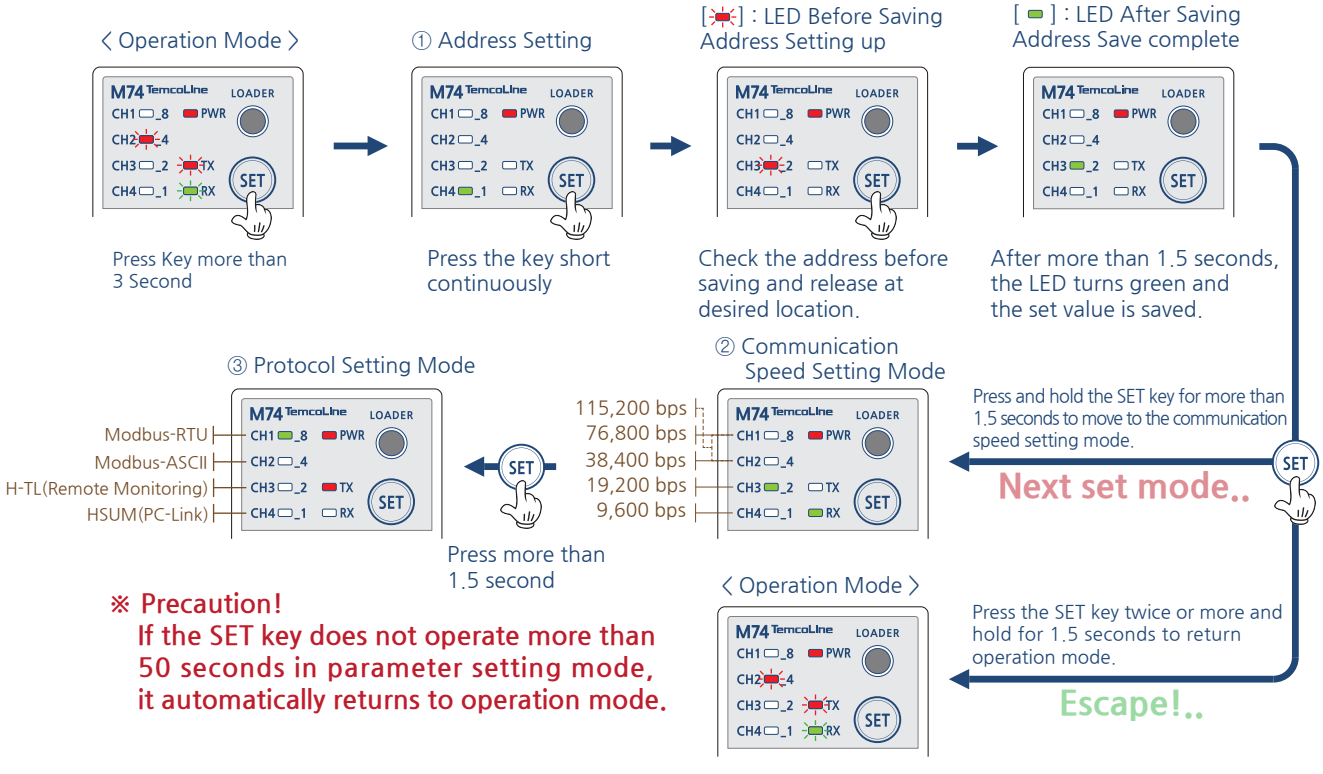
2) Basic Operation of Communication Parameter Setting menu

Communication parameter setting mode is set to communicate with host PC, PLC, touch panel, etc. However, when other communication call is received in this mode, the display turns password input mode. In case of unavoidable setting, must enter password (2112) sequentially to enter the mode.

〈1〉 Parameter Setting Mode



〈2〉 Parameter Value Setting and Saving

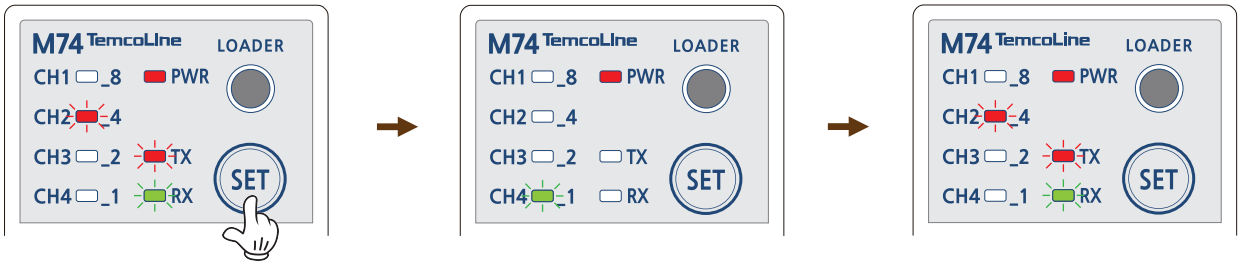


※ Precaution!
If the SET key does not operate more than 50 seconds in parameter setting mode, it automatically returns to operation mode.

3. Address check in operation mode

Press SET key once to display the set address for 3 seconds in operation mode.

Approx. 3 Second Display



① Press SET key once

② Display the set address for 3 seconds while Green LED blinks

③ Returns to operation mode

4. Communication Parameter Setting

Simple communication setting by SET Key.

▣ Factory default of communication parameter

[1] Address : 01
[2] Communication Speed : 19,200 bps
[3] Protocol : Modbus-RTU (ModB)

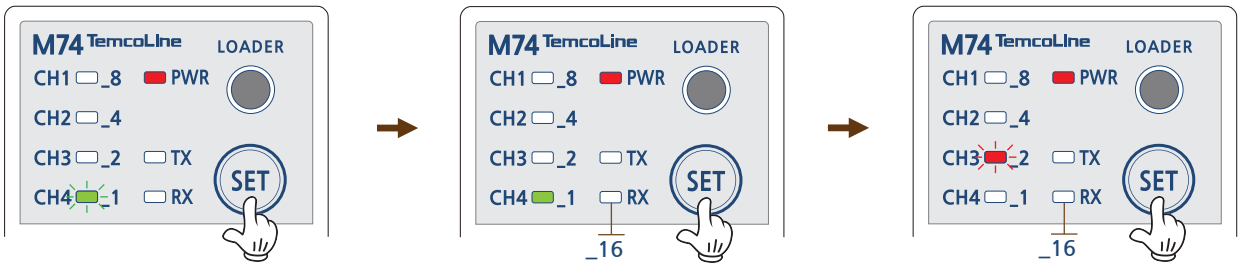
Change by SET key !

[4] Parity bit : Even
[5] Stop bit : 1-bit
[6] Data length : 8-bit

Automatic setting when changing protocol !

1) Address Setting

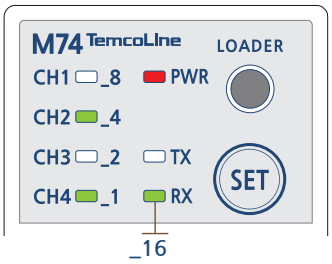
Operation Mode → ① Address Setting Mode



ⓐ Green LED stops blinking when press and hold the SET key for more than 3 seconds

ⓑ The sum of green LED (8421 code) is the current address. When press twice continuously, the LED turns red and the address is counted. While keep pressing SET key, Red LED increases gradually in the order of 1, 2, 3, 4.. Stop when desired address value displays, the LED turns green (after 1.5 second) to save the address.

※ Address Check Tip

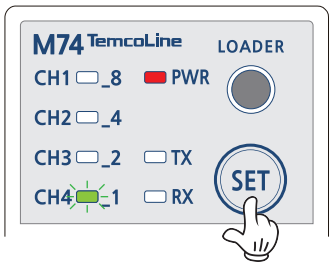


By using SET key, it is able to set three types of parameter. “address.”, “Communication Speed”, “Protocol”. The address setting of the first mode is displayed in binary system, but easy to check with code 8421 as shown on left and the example below.

※ Add all code 16, 8, 4, 2, and 1 which are located at current green position. In other words, 16+4+1 = 21 Current address becomes 21.

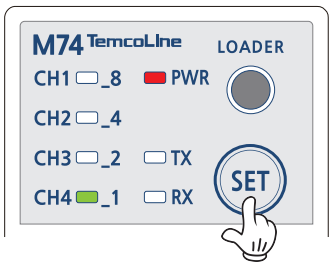
2) Communication (Baudrate) Setting

Operating Mode



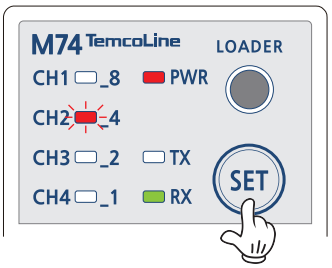
ⓐ Green LED stops blinking when press and hold the SET key for more than 3 seconds

① Address Setting Mode



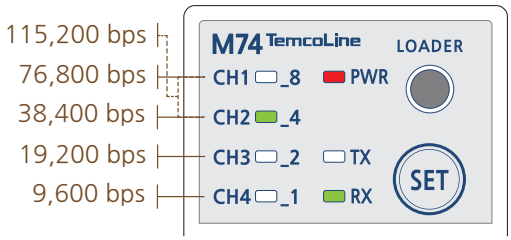
ⓑ In the first address setting mode, press SET key again for more than 1.5 seconds, it goes to the second communication speed setting mode

② Communication (Baudrate) Setting



ⓒ Press SET key twice continuously, Red LED will blink and move around, and release SET key when Red LED is located at the desired communication speed. LED turns green to save it.

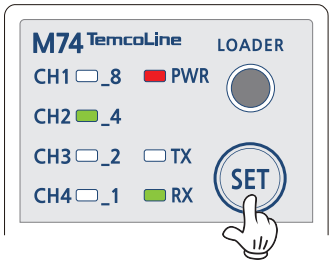
※ Communication Speed (Baudrate) Check



Communication speed (Baudrate) can be set from 9,600 ~ 76,800 bps as shown on left. By pressing SET key twice continuously, Red LED will move around for selection until releasing the key at the desired speed and LED turns green ( ) from red ( ) to save it, and then press SET key for more than 1.5 seconds to move to the next setting mode (protocol) or press SET key more than twice in succession and then hold for long time (more than 1.5 seconds) to return to operation mode.

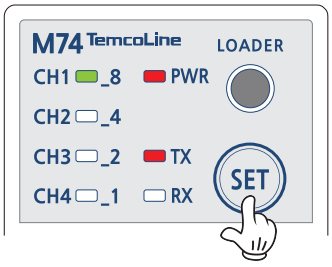
3) Protocol Setting

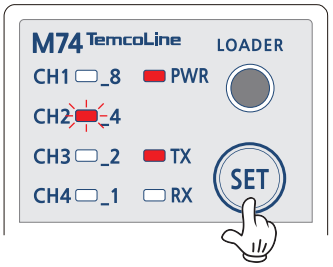
② Communication Speed Setting



ⓐ In communication speed setting mode, press SET key for more than 1.5 seconds to move to protocol setting mode.

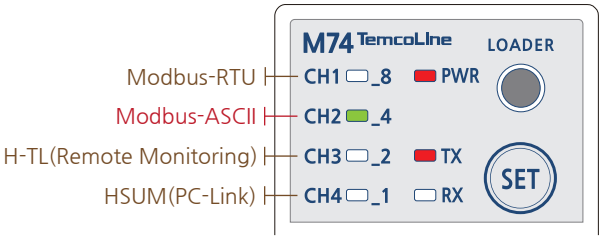
③ Protocol Setting





ⓑ Press SET key twice continuously, Red LED will blink and move around for selection while blinking red from the second, and then release SET key when it is located at the desired protocol, the LED lamp turns green to saves it.

※ Protocol Identify



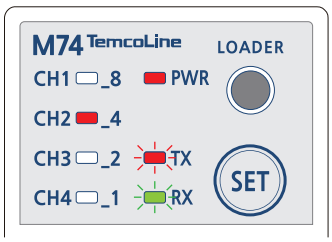
There are 4 types of communication protocol as shown on left, Modbus-RTU, Modbus-ASCII, H-TL (remote monitoring only), and HSUM (PC-Link). By pressing SET key twice continuously, Red LED will blink and start moving around for selection until releasing SET key at the desired protocol and the LED turns green ( ) from red ( ) to save it. To return to operation mode, press SET key more than twice in succession and then press long (more than 1.5 second).

※ Caution!
If SET key has no operation more than 50 seconds in parameter setting mode, it automatically returns to operation mode.

5. System Information Indication

1) Normal Operation Information Indication

Able to check the control output, auto tuning, alarm and operation status, etc. for each channel during operation. Communication status to be monitored on TX and RX LED.



LED status per channel	CH1	CH2	CH3	CH4
Heating Control Output Display	Red LED Lighting			
Cooling Control Output Display	Green LED Lighting			
Auto-Tuning Status Display	Green LED Blinking 0.5 second Interval (Red Control Output Control Indication)			
Alarm or Stop Status	Orange LED Lamp Lighting			

2) Abnormal Operation and Error Information Display

When system becomes abnormal condition, all the LED's display various error information. TX and RX LED as well as all channel LED's indicate error information together.

Error Classification	LED Display of Error	Explanation of LED Display
Internal System Error (All Channels)	TX RX CH1 CH2 CH3 CH4	TX Keep Lighting on RX and Channel LED's Blinking in Red
RJC Error (All Channels)	TX RX CH1 CH2 CH3 CH4	TX, RX light off Orange LED's Blinking
EEP-ROM Error (All Channels)	TX RX CH1 CH2 CH3 CH4	TX, RX light off, Red LED's Blinking
Firmware Error (All Channels)	TX RX CH1 CH2 CH3 CH4	TX, RX light off Green LED Blinking
Internal MCU Communication Error (Each Channel)	TX RX CH1 CH2 CH3 CH4	TX, RX Blinking, by status of each channel Red LED Blinking
RJC Compensation Error (Each Channel)	TX RX CH1 CH2 CH3 CH4	TX, RX Light off, by status of each channel Orange LED Blinking
Auto-Tuning (AT) Error (Each Channel)	TX RX CH1 CH2 CH3 CH4	TX, RX Lighting, by status of each channel Orange LED Blinking
+ Over Input Error (Each Channel)	TX (-) RX (+) CH1 CH2 CH3 CH4	RX (+) Lighting, by status of each channel Orange LED Blinking
- Over Input Error (Each Channel)	TX (-) RX (+) CH1 CH2 CH3 CH4	TX (-) Lighting, by status of each channel Orange LED Blinking
+Burn out Error (Each Channel)	TX (-) RX (+) CH1 CH2 CH3 CH4	RX (+) Lighting, by status of each channel Red LED Blinking
-Burn out Error (Each Channel)	TX (-) RX (+) CH1 CH2 CH3 CH4	TX (-) Lighting, by status of each channel Red LED Blinking

M(N)74 Communication register mapping table

Register Address Range (HEXA)	Explanation	Remark
00000(0000h) ~ 00099(0063h)	Ch1~4 Monitoring and common setting register group	In Modbus communication, can use from 400001 (40001h) address in the 16-bit Holding Reg. range. 400001(40001h) + [Registers address] Ex.) CH1 PV (001) ☞ 400002(40002h)
00100(0064h) ~ 00199(00C7h)	Ch1 Monitoring and common setting register group	
00200(00C8h) ~ 00299(012Bh)	Ch2 Monitoring and common setting register group	
00300(012Ch) ~ 00399(018Fh)	Ch3 Monitoring and common setting register group	
00400(0190h) ~ 00499(01F3h)	Ch4 Monitoring and common setting register group	

M74 Modbus protocol supported function code

Function Code	Characteristics of function codes	Detail of Function
03(03h)	Read Holding Registers	Able to read consecutive resisters up to 32
06(06h)	Write Sigle Register	Able to write desired value each resister one by one
16(10h)	Write Multiple Registers	Able to write up to 25 consecutive resisters

Possible function code of Modbus protocol as address number is 400001 (40001h) ~ 465535 (4FFFFh) in 16-bit holding registers range. In Modbus communication, the address will be designated as 400001 (40001h) (starting address of 16-bit holding register + address of M74 resister.

Ex.) When access CH1 SV, address is 400001(40001h) + 6(0006h) = 400007(40007h).
In decimal number format, the address is 400007, using hexadecimal, the address is 40007h.

※How to check bit information

Ex.) [16-bit]	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
DEC	32768	16384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1
HEX	(8000h)	(4000h)	(2000h)	(1000h)	(800h)	(400h)	(200h)	(100h)	(80h)	(40h)	(20h)	(10h)	(8h)	(4h)	(2h)	(1h)

0 0 0 0 0 0 1 0 1 0 0 1 0 0 1 0 = b9(512) + b7(128) + b4(16) + b1(2) = 658 (292h)
^ ^ ^ ^

Address of M74 Resister (HEXA) CH1	CH2	CH3	CH4	Parameter Display	Function Explanation	Property (R/W)	Setting Range & Descriptions	Unit	Initial Value
00000(0000h)				Reserved.					
001(0001h)	002(0002h)	003(0003h)	004(0004h)	N.PV	Process Value	R	EU (0 ~ 100 %)		—
005(0005h)	006(0006h)	007(0007h)	008(0008h)	N.SV	Target Value	R	EU (0 ~ 100 %)		—
009(0009h)	010(000Ah)	011(000Bh)	012(000Ch)	MV	Control Output	R	-100.0 ~ 100.0	%	—
013(000Dh)	014(000Eh)	015(000Fh)	016(0010h)	CT.A	Heater Current	R	0.0 ~ 80.0 A	A	—
00017(0011h)				Reserved.					
018(0012h)	019(0013h)	020(0014h)	021(0015h)	H.MIN	Heater Running Time (Min)	R	0 ~ 1440 [Minute]	M	—
022(0016h)	023(0017h)	024(0018h)	025(0019h)	H.DAY	Heater Running Time (Day)	R	0 ~ 9999 [Day]	D	—
00026(001Ah)				Reserved.					
027(001Bh)	028(001Ch)	029(001Dh)	030(001Eh)	CH.STS		R	bit 15 : System Error (1) bit 14 : Sub Firmware Error (1) bit 13 : EEP-ROM Error (1) bit 12 : RJC Error (1) bit 11 : System Comm. Error (1) bit 10 : AT Error (1) bit 09 : -Over Input (1) bit 08 : +Over Input (1) bit 07 : -Burn-out (1) bit 06 : +Burn-out (1) bit 05 : RJ Adjust Error (1) bit 04 : Run (1) bit 03 : Manual Control (1) bit 02 : Auto Tuning (1) bit 01 : Output of Heating (1) bit 00 : Output of Cooling (1)		—

Address of M74 Resister (HEXA)				Parameter Display	Function Explanation	Property (R/W)	Setting Range & Descriptions	Unit	Initial Value
CH1	CH2	CH3	CH4						
031(001Fh)	032(0020h)	033(0021h)	034(0022h)	ALM.STS		R	bit 7 : **AT complated (AT mode2 only)** bit 6 : -·- bit 5 : — bit 4 : — bit 3 : ALARM-4 bit 2 : ALARM-3 bit 1 : ALARM-2 bit 0 : ALARM-1/LBA		—
035(0023h)	036(0024h)	037(0025h)	038(0026h)	DP.I	Decimal point location information	R	When INP.1 ~ 29, 0: None 1: 1/10 position When INP.30 over, link with(share) DP-P		—
039(0027h)	040(0028h)	041(0029h)	042(002Ah)	RJC	RJC temperature process value	R	M74 Input terminal temperature (Temperature compensation)	℃	—
043(002Bh)	044(002Ch)	045(002Dh)	046(002Eh)	IN.E	**Input electromotive force (EMF) at INP. 30~36**	R	**M74 voltage, electromotive force in current input mode (EMF)** **INP. 32~34 : 1/100nV), 31 (1/100mA)**	mV mA	—
00047(002Fh)				SYS.I	System Information	R	Model & Firmware Version		—
00048(0030h)				SYS.T	System Speed	R	0.01 ~ 655.35	ms	—
00049(0031h)				PDT.I	Product Information	R	Model and Input Channel Information		—
00050(0032h)				LOCK	Parameter protection	R/W	0 : OFF 1 : Input, Output 2 : Release only address 50~70 3 : All Parameter Write Protected		0
00051(0033h)				COM.C	Control status setting while communication stop	R/W	0 : OFF 1~ 3600	sec.	0
00052(0034h)				EXT.IO	External input. Output setting	R/W	HI/Byte: FFH (COM), FOH(I/O), 00H (OFF) Lo/Byte: b7~4, b3~0 : CH1 (MSB) ~4(LSB) B7~4: ALM(1)/OUT(0), b3~0 : I(1)O(0)		0
053(0035h)	054(0036h)	055(0037h)	056(0038h)	CH.MD	Channel mode setting	R/W	0 : Inactive Mode 1 : Monitoring Mode 2 : Running Mode		2
00057(0039h)				RUN.C	Power failure recovery setting	R/W	0 : Unconditional Stop After Black Out 1 : Return to Running Status		1
00058(003Ah)				All.STP	All channels stop	R/W	1 : ALL-Stop 0 : Release		0
059(003Bh)	060(003Ch)	061(003Dh)	062(003Eh)	RUN	Run/Stop	R/W	1 : RUN 0 : STOP		1
063(003Fh)	064(0040h)	065(0041h)	066(0042h)	MAN.C	Manual control mode	R/W	0 : PID or ON/OFF 1 :Manual control (Manual output control)		0
067(0043h)	068(0044h)	069(0045h)	070(0046h)	MVn.O	MVn Output (manual)	R/W	Heat or Cool Mode: 0~100.0 Heat & Cool Mode: -100.0~ 100.0	%	0
00071(0047h)				EnPO	Output : input cut off	R/W	0: OFF (Prohibit) 1: ON (Permit)		0
00072(0048h)				INIT	Parameter initialization	R/W	1~4: Single Channel, 5: All Channel		0
073(0049h)	074(004Ah)	075(004Bh)	076(004Ch)	INP	Input type setting	R/W	01 ~ 36 [(EX) 01: K(CA), 21: Pt100 etc]		1
00077(004Dh)				UNIT	Input unit setting	R/W	0 : Celsius [℃], 1 : Fahrenheit [℉]		0
078(004Eh)	079(004Fh)	080(0050h)	081(0051h)	FAST	Fast mode	R/W	0 : OFF, 1 : ON		0
082(0052h)	083(0053h)	084(0054h)	085(0055h)	SV	Target value	R/W	EU (0 ~ 100%)		0
086(0056h)	087(0057h)	088(0058h)	089(0059h)	AT	PID auto tuning	R/W	0 : Stop 1 : Start Auto Tuning 2:manual clear		0
090(005Ah)	091(005Bh)	092(005Ch)	093(005Dh)	O.ACT	Select output operation	R/W	0: Reverse(Heat) Operation Control Mode 1: Normal(Cool) Operation Control Mode 2: Heat, cool simultaneous Control Mode		0
094(005Eh)	095(005Fh)	096(0060h)	097(0061h)	OUT1	Select output 1 type (Heating control output)	R/W	1 : SSR (Voltage-Pulse) Mode 2 : SCR (4 ~ 20mA) Mode 3 : RELAY Control Mode		1
00098(0062h)				Reserved.					
00099(0063h)				Reserved.					

Address 400100(0064h) ~ 400499(01F3h) CH1~4 감시 및 제어 설정 레지스터

Address of M74 Resister (HEXA)				Parameter Display	Function Explanation	Property (R/W)	Setting Range & Descriptions	Unit	Initial Value
CH1	CH2	CH3	CH4						
100(0064h)	200(00C8h)	300(012Ch)	400(0190h)	R.SV	Ramp control process value	R	EU (0 ~ 100 %)		—
101(0065h)	201(00C9h)	301(012Dh)	401(0191h)	N.PV	Present value	R	EU (0 ~ 100 %)		—
102(0066h)	202(00CAh)	302(012Eh)	402(0192h)	N.SV	Target value	R	EU (0 ~ 100 %)		—
103(0067h)	203(00CBh)	303(012Fh)	403(0193h)	MV	Control Output	R	-100.0 ~ 100.0	%	—
104(0068h)	204(00CCh)	304(0130h)	404(0194h)	CT.A	Heater Current [A]	R	0.0 ~ 80.0 A	A	—
105(0069h)	205(00CDh)	305(0131h)	405(0195h)	Reserved.					
106(006Ah)	206(00CEh)	306(0132h)	406(0196h)	H.MIN	Heater running time (Min)	R	0 ~ 1440 [Minute]	M	—
107(006Bh)	207(00CFh)	307(0133h)	407(0197h)	H.DAY	Heater running time (Day)	R	0 ~ 9999 [Day]	D	—
108(006Ch)	208(00D0h)	308(0134h)	408(0198h)	Reserved.					
109(006Dh)	209(00D1h)	309(0135h)	409(0199h)	CH.STS		R	bit 15 : System Error (1) bit 14 : Sub Firmware Error (1) bit 13 : EEP-ROM Error (1) bit 12 : RJC Error (1) bit 11 : System Comm. Error (1) bit 10 : AT Error (1) bit 09 : -Over Input (1) bit 08 : +Over Input (1) bit 07 : -Burn-out (1) bit 06 : +Burn-out (1) bit 05 : RJ Adjust Error (1) bit 04 : Run (1) bit 03 : Manual Control (1) bit 02 : Auto Tuning (1) bit 01 : Output of Heating (1) bit 00 : Output of Cooling (1)		—
110(006Eh)	210(00D2h)	310(0136h)	410(019Ah)	ALM.STS		R	bit 7 : ~~AT~~ complated (AT mode2 only bit 6 : — bit 5 : — bit 4 : — bit 3 : ALARM-4 bit 2 : ALARM-3 bit 1 : ALARM-2 bit 0 : ALARM-1		—
111(006Fh)	211(00D3h)	311(0137h)	411(019Bh)	Reserved.					
112(0070h)	212(00D4h)	312(0138h)	412(019Ch)	Reserved.					
113(0071h)	213(00D5h)	313(0139h)	413(019Dh)	AL.LCH	Alarm Latch Setting	R/W	0 : OFF, 1 ~ 4 : Each latch setting, 5: ALL		0
114(0072h)	214(00D6h)	314(013Ah)	414(019Eh)	AL.RST	Alarm reset	R/W	1 : Alarm reset (Alarm Latch Mode)		0
115(0073h)	215(00D7h)	315(013Bh)	415(019Fh)	DI.F	Contact Input Type	R/W	0 : OFF 1 : Target SV select mode 2 : Operation control mode 3 : Stop control mode 4 : Auto/Manual control mode 5 : Alarm reset mode		0
116(0074h)	216(00D8h)	316(013Ch)	416(01A0h)	SV.n	Target SV Select	R/W	0 ~ 3		0
117(0075h)	217(00D9h)	317(013Dh)	417(01A1h)	SV0	Target Setting SV0	R/W	EU (0 ~ 100 %)		0
118(0076h)	218(00DAh)	318(013Eh)	418(01A2h)	SV1	Target Setting SV1	R/W	EU (0 ~ 100 %)		0
119(0077h)	219(00DBh)	319(013Fh)	419(01A3h)	SV2	Target Setting SV2	R/W	EU (0 ~ 100 %)		0
120(0078h)	220(00DCh)	320(0140h)	420(01A4h)	SV3	Target Setting SV3	R/W	EU (0 ~ 100 %)		0
121(0079h)	221(00DDh)	321(0141h)	421(01A5h)	RUN	Run/Stop	R/W	1 : RUN 0 : STOP		1
122(007Ah)	222(00DEh)	322(0142h)	422(01A6h)	MAN.C	Manual Control Mode	R/W	0 : Auto Control (PID or ON/OFF) 1 : Manual Control (Manual Output Control)		0
123(007Bh)	223(00DFh)	323(0143h)	423(01A7h)	MVn.O	MVn Output (Manual)	R/W	H/C : 0 ~ 100.0, H&C : 0 ~ ±100.0	%	0
124(007Ch)	224(00E0h)	324(0144h)	424(01A8h)	AT	PID Auto Tuning	R/W	0 : STOP 1 : Auto Tuning Start 2:manua	clear	0
125(007Dh)	225(00E1h)	325(0145h)	425(01A9h)	AT.M	Auto Tuning Type	R/W	0 : Standard :1 : Low (10%) Tuning		0
126(007Eh)	226(00E2h)	326(0146h)	426(01AAh)	Reserved.					

Address of M74 Resister (HEXA)				Parameter Display	Function Explanation	Property (R/W)	Setting Range & Descriptions	Unit	Initial Value
CH1	CH2	CH3	CH4						
127(007Fh)	227(00E3h)	327(0147h)	427(01ABh)	RLY.CTL	Alarm Output Control (AxTY No.21)	R/W	Only uses bit 0~2 (bit0 : AL2, bit1 : AL3, bit2 : AL4)		0
128(0080h)	228(00E4h)	328(0148h)	428(01ACh)	AL.STP	Operation stop at alarm	R/W	0 : OFF 1 : trigger _once 2:normal(continuity)		0
129(0081h))	229(00E5h))	329(0149h)	429(01ADh)	A1TY	Alarm 1 Type Setting	R/W	00 : OFF 01 : Absolute Upper Limit (Act: H) 02 : Absolute Lower Limit (Act: H) 03 : Upper Limit Deviation (Act: H) 04 : Lower Limit Deviation (Act: H) 05 : Upper Limit Deviation (Act: L) 06 : Lower Limit Deviation (Act: L) 07 : Upper, Lower Limit Deviation (Act: H) 08 : Upper, Lower Limit Deviation in Range (Act: H) 09 : Absolute Upper Limit (Act: L) 10 : Absolute Lower Limit (Act: L) 11 : Absolute Upper Limit with hold (Act: H) 12 : Absolute Lower Limit with hold (Act: H) 13 : Upper Limit Deviation with hold (Act: H) 14 : Lower Limit Deviation with hold (Act: H) 15 : Upper Limit Deviation with hold (Act: L) 16 : Lower Limit Deviation with hold (Act: L) 17 : Upper, Lower Limit Deviation with hold (Act: H) 18 : Upper, Lower Limit Deviation in Range with hold (Act: H) 19 : Absolute Upper Limit with hod (Act: L) 20 : Absolute Lower Limit with hold (Act: L) 21 : Loop break alarm(LBA) operat when heater break alarm(HBA) Turns OFF		0
130(0082h)	230(00E6h)	330(014Ah)	430(01AEh)	A2TY	Alarm 2 Type Setting	R/W	Setting code 1~20 has the same as Alarm 1 code, and #21 is direct output alarm control mode. (Able to control with RLY.CTL)		0
131(0083h)	231(00E7h)	331(014Bh)	431(01AFh)	A3TY	Alarm 3 Type Setting	R/W			0
132(0084h)	232(00E8h)	332(014Ch)	432(01B0h)	A4TY	Alarm 4 Type Setting	R/W			0
133(0085h)	233(00E9h)	333(014Dh)	433(01B1h)	A1DB	Alarm 1 Deadband	R/W	EUS (0 ~ 10 %)		2
134(0086h)	234(00EAh)	334(014Eh)	434(01B2h)	A2DB	Alarm 2 Deadband	R/W	EUS (0 ~ 10 %)		2
135(0087h)	235(00EBh)	335(014Fh)	435(01B3h)	A3DB	Alarm 3 Deadband	R/W	EUS (0 ~ 10 %)		2
136(0088h)	236(00ECh)	336(0150h)	436(01B4h)	A4DB	Alarm 4 Deadband	R/W	EUS (0 ~ 10 %)		2
137(0089h)	237(00EDh)	337(0151h)	437(01B5h)	ALM1	Alarm 1 Value Setting	R/W	EUS (-100.0 ~ 100.0 %)		0
138(008Ah)	238(00EEh)	338(0152h)	438(01B6h)	ALM2	Alarm 2 Value Setting	R/W	EUS (-100.0 ~ 100.0 %)		0
139(008Bh)	239(00EFh)	339(0153h)	439(01B7h)	ALM3	Alarm 3 Value Setting	R/W	EUS (-100.0 ~ 100.0 %)		0
140(008Ch)	240(00F0h)	340(0154h)	440(01B8h)	ALM4	Alarm 4 Value Setting	R/W	EUS (-100.0 ~ 100.0 %)		0
141(008Dh)	241(00F1h)	341(0155h)	441(01B9h)	A1Pn	Alarm 1 Output Port	R/W	0 : OFF 1 : ALM1 Port 2 : ALM2 Port 3 : ALM3 Port 4 : ALM4 Port		1
142(008Eh)	242(00F2h)	342(0156h)	442(01BAh)	A2Pn	Alarm 2 Output Port	R/W	Same as Alarm 1 Output Port Setting		2
143(008Fh)	243(00F3h)	343(0157h)	443(01BBh)	A3Pn	Alarm 3 Output Port	R/W	Same as Alarm 1 Output Port Setting		3
144(0090h)	244(00F4h)	344(0158h)	444(01BCh)	A4Pn	Alarm 4 Output Port	R/W	Same as Alarm 1 Output Port Setting		4
145(0091h)	245(00F5h)	345(0159h)	445(01BDh)	LBA	LBA time Value Setting	R/W	0 : OFF / 1 ~ 7200	sec.	480
146(0092h)	246(00F6h)	346(015Ah)	446(01BEh)	LBW	LBA Change Range Setting	R/W	0.1 ~ 999.9	℃	2.0
147(0093h)	247(00F7h)	347(015Bh)	447(01BFh)	Reserved.					
148(0094h)	248(00F8h)	348(015Ch)	448(01C0h)	HBA	Heater Break Setting	R/W	0 : OFF / 0.1 ~ 80.0	A	0
149(0095h)	249(00F9h)	349(015Dh)	449(01C1h)	HOC	Heater Overcurrent Setting	R/W	0 : OFF / 0.1 ~ 80.0	A	0
150(0096h)	250(00FAh)	350(015Eh)	450(01C2h)	HDB	Heater Alarm Hysteresis band	R/W	0.0 ~ 30.0	A	1.0
151(0097h)	251(00FBh)	351(015Fh)	451(01C3h)	HBS	Heater Break Start Point	R/W	0 ~100	%	20
152(0098h)	252(00FCh)	352(0160h)	452(01C4h)	H.ADJ	Heater Current Value Compensation	R/W	-10.0 ~ 10.0	A	0.0
153(0099h)	253(00FDh)	353(0161h)	453(01C5h)	H.HLD	Heater Current Value Hold	R/W	0 : OFF / 1 : ON		1
154(009Ah)	254(00FEh)	354(0162h)	454(01C6h)	Reserved.					
155(009Bh)	255(00FFh)	355(0163h)	455(01C7h)	Reserved.					

Address of M74 Resister (HEXA)				Parameter Display	Function Explanation	Property (R/W)	Setting Range & Descriptions	Unit	Initial Value
CH1	CH2	CH3	CH4						
156(009Ch)	256(0100h)	356(0164h)	456(01C8h)	P	Proportional Band Setting	R/W	0 : ON/OFF Control 0.1 ~ 999.9 : PID Control		20.0
157(009Dh)	257(0101h)	357(0165h)	457(01C9h)	I	Integral Time Setting	R/W	0 : OFF / 1 ~ 3600	sec.	240
158(009Eh)	258(0102h)	358(0166h)	458(01CAh)	D	Derivative Time Setting	R/W	0 : OFF / 1 ~ 3600	sec.	60
159(009Fh)	259(0103h)	359(0167h)	459(01CBh)	M.R	Manual Reset Setting	R/W	-5.0 ~ 105.0	%	50.0
160(00A0h)	260(0104h)	360(0168h)	460(01CCh)	HC.DB	Heating & Cooling Hysteresis Band	R/W	-100.0 ~ 100.0	%	0.0
161(00A1h)	261(0105h)	361(0169h)	461(01CDh)	Reserved.					
162(00A2h)	262(0106h)	362(016Ah)	462(01CEh)	RIFT	Ramp Control Integral compensation	R/W	0 ~ 100	%	10
163(00A3h	263(0107h)	363(016Bh)	463(01CFh)	RTMU	Ramp Function - Time Unit Selection	R/W	0 : Minute 1 : Hour		0
164(00A4h)	264(0108h)	364(016Ch)	464(01D0h)	UP.RT	Ramp Function - Rise Temperature Setting	R/W	0 : OFF / EUS (0 ~ 100 %)	℃	0
165(00A5h)	265(0109h)	365(016Dh)	465(01D1h)	DN.RT	Ramp Function - Drop Temperature Setting	R/W	0 : OFF / EUS (0 ~ 100 %)	℃	0
166(00A6h)	266(010Ah)	366(016Eh)	466(01D2h)	OUT.P	Output Port	R/W	**(00) OFF, (01) OUT1, (02) OUT2, (03) RET** **CH1(10) ~ (13) OFF, OUT1, OUT2, RET** **CH2(20) ~ (23) OFF, OUT1, OUT2, RET** **CH3(30) ~ (33) OFF, OUT1, OUT2, RET** **CH4(40) ~ (43) OFF, OUT1, OUT2, RET**		1
167(00A7h)	267(010Bh)	367(016Fh)	467(01D3h)	RET	Retransmission Type	R/W	0 : PV 1 : SV 2 : MV		0
168(00A8h)	268(010Ch)	368(0170h)	468(01D4h)	RET.L	Retransmission Lower Limit	R/W	TC or RTD : FR-L ~ FR-H Electric Current, Voltage : SL-L ~ SL-H (Able to set only under condition of, RET.L < RET.H)		EU (0 %)
169(00A9h)	269(010Dh)	369(0171h)	469(01D5h)	RET.H	Retransmission Upper Limit	R/W			EU (100 %)
170(00AAh)	270(010Eh)	370(0172h)	470(01D6h)	O.ACT	Select Output Operation	R/W	0 : Reverse(Heating) Operation Control Mode 1 : Normal(Cooling) Operation Control Mode 2: Heating, Cooling simultaneous Control Mode		0
171(00ABh)	271(010Fh)	371(0173h)	471(01D7h)	OUT1	Select Output1 Type (Heating Control Output)	R/W	1 : SSR (Voltage-Pulse) Mode 2 : SCR (4 ~ 20mA) Mode 3 : RELAY Control Mode		1
172(00ACh)	272(0110h)	372(0174h)	472(01D8h)	OUT2	Select Output2 Type (Cooling Control Output)	R/W	1 : SSR (Voltage-Pulse) Mode 2 : SCR (4 ~ 20mA) Mode 3 : RELAY Control Mode		1
173(00ADh)	273(0111h)	373(0175h)	473(01D9h)	CT	Control Output Cycle	R/W	1 ~100	sec.	SSR : 2 RLY : 20
174(00AEh)	274(0112h)	374(0176h)	474(01DAh)	CTC	Cooling Side Control Output Cycle	R/W	1 ~100	sec.	SSR : 2 RLY : 20
175(00AFh)	275(0113h)	375(0177h)	475(01DBh)	GCO	Cooling Gain Setting	R/W	0.1 ~ 10.0		1.0
176(00B0h)	276(0114h)	376(0178h)	476(01DCh)	HYS.T	Hysteresis Operation (ON/OFF Control)	R/W	0 : NORMAL / 1 : HALF		0
177(00B1h)	277(0115h)	377(0179h)	477(01DDh)	HYS	Hysteresis Setting (ON/OFF Control)	R/W	EUS (0 ~ 10 %)		2
178(00B2h)	278(0116h)	378(017Ah)	478(01DEh)	PO	Control Output Value Setting in case of Input cut off	R/W	-5.0 ~ 105.0	%	0.0
179(00B3h)	279(0117h)	379(017Bh)	479(01DFh)	POC	Cooling Output Value Setting in case of Input cut off	R/W	-5.0 ~ 105.0	%	0.0
180(00B4h)	280(0118h)	380(017Ch)	480(01E0h)	OL-L	Output Value Lower Limit	R/W	-0.5 ~ OL-H	%	0.0

Address of M74 Resister (HEXA)				Parameter Display	Function Explanation	Property (R/W)	Setting Range & Descriptions	Unit	Initial Value
CH1	CH2	CH3	CH4						
181(00B5h)	281(0119h)	381(017Dh)	481(01E1h)	OL-H	Output Value Upper Limit	R/W	OL-L ~ 105.0	%	100.0
182(00B6h)	282(011Ah)	382(017Eh)	482(01E2h)	INP	Input Type Setting	R/W	01 : **[K] -200 ~ 1370 ℃** 02 : [K] -199.9 ~ 999.9 ℃ 03 : [J] -199.9 ~ 999.9 ℃ 04 : [E] -199.9 ~ 999.9 ℃ 05 : [T] -199.9 ~ 400.0 ℃ 06 : **[R] 0 ~ 1700 ℃** 07 : **[B] 0 ~ 1800 ℃** 08 : **[S] 0 ~ 1700 ℃** 09 : [L] -199.9 ~ 900.0 ℃ 10 : **[N] -200 ~ 1300 ℃** 11 : [U] -199.9 ~ 400.0 ℃ 12 : **[C] 0 ~ 2300 ℃** 13 : **[D] 0 ~ 2400 ℃** 14 : [N] -199.9 ~ 999.9 ℃ 15 : **[J] -200 ~ 1000 ℃** 16 : **[E] -200 ~ 1000 ℃** 17 : **[L] -200 ~ 900 ℃** 18, 19 : — 20 : [JPt100] -199.9 ~ 500.0 ℃ 21 : [Pt100] -199.9 ~ 640.0 ℃ 22 : **[JPt100] -200 ~ 500 ℃** 23 : **[Pt100] -200 ~ 640 ℃** 24, 25 : — 26 : — 27 : — 28, 29 : — 30 : **1 ~ 5V DC** 31 : **4 ~ 20mA DC** 32 : **-10 ~ 20mV DC** 33 : **0 ~ 100mV DC** 34 : **0 ~ 200mV DC** 35 : **0 ~ 5V DC** 36 : **0 ~ 10V DC**		1
183(00B7h)	283(011Bh)	383(017Fh)	483(01E3h)	FR-L	Input Lower Limit Setting	R/W	EU (0 ~ 100 %)		EU (0 %)
184(00B8h)	284(011Ch)	384(0180h)	484(01E4h)	FR-H	Input Upper Limit Setting	R/W	EU (0 ~ 100 %)		EU (100 %)
185(00B9h)	285(011Dh)	385(0181h)	485(01E5h)	DP-P	Select Decimal Point	R/W	INP. 30~36, Select Decimal Point (0/1/2/3)		1
186(00BAh)	286(011Eh)	386(0182h)	486(01E6h)	SL-L	Free Scale of Lower Limit	R/W	-1999 ~ (SL-H)-1		0
187(00BBh)	287(011Fh)	387(0183h)	487(01E7h)	SL-H	Free Scale of Upper Limit	R/W	(SL-L)+1 ~ 9999		1000
188(00BCh)	288(0120h)	388(0184h)	488(01E8h)	FILT	Input Filter Setting	R/W	0 : OFF / 1~120 초	sec.	0
189(00BDh)	289(0121h)	389(0185h)	489(01E9h)	BIAS.L	Input Value Compensation at Lower Limit (INP 1 ~ 36)	R/W	EUS (-100 ~ 100 %)		0
190(00BEh)	290(0122h)	390(0186h)	490(01EAh)	BIAS.H	Input Value Compensation At Upper Limit (INP 30 ~ 36)	R/W	EUS (-100 ~ 100 %)		0
191(00BFh)	291(0123h)	391(0187h)	491(01EBh)	EN.BS	Input Band Compensation Function	R/W	0 : OFF 1 : ON		0
192(00C0h)	292(0124h)	392(0188h)	492(01ECh)	BS.P1	Input Band Setting 1	R/W	(SLL) (SLH) FRL ≤ P1 ≤ P2 ≤ P3 ≤ FRH **Setting Range : EU (0~ 100 %)**		EU (100 %)
193(00C1h)	293(0125h)	393(0189h)	493(01EDh)	BS.P2	Input Band Setting 2	R/W			
194(00C2h)	294(0126h)	394(018Ah)	494(01EEh)	BS.P3	Input Band Setting 3	R/W			
195(00C3h)	295(0127h)	395(018Bh)	495(01EFh)	BS0	Input Bias 0	R/W	(SLL) (SLH) FRL——P1——P2——P3——FRH BS0 BS1 BS2 BS3 BS4 **Setting Range : EUS (±30 %)**		0
196(00C4h)	296(0128h)	396(018Ch)	496(01F0h)	BS1	Input Bias 1	R/W			
197(00C5h)	297(0129h)	397(018Dh)	497(01F1h)	BS2	Input Bias 2	R/W			
198(00C6h)	298(012Ah)	398(018Eh)	498(01F2h)	BS3	Input Bias 3	R/W			
199(00C7h)	299(012Bh)	399(018Fh)	499(01F3h)	BS4	Input Bias 4	R/W			

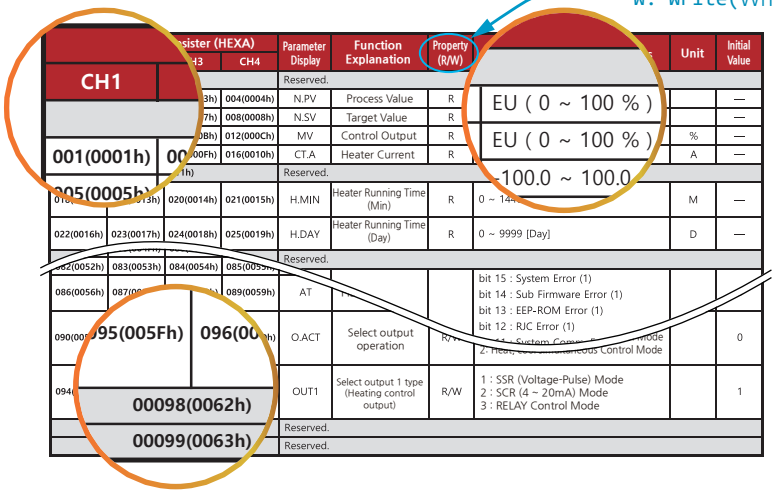
Detailed description of M74 Register mapping

1. Configuration of Register group

The structure of M(N)74 register for TemcoLine consists basically of two groups: Common register group (0 ~ 99 address) and Channel register group (100 ~ 499 address).

1) Common register group (0 ~ 99 address)

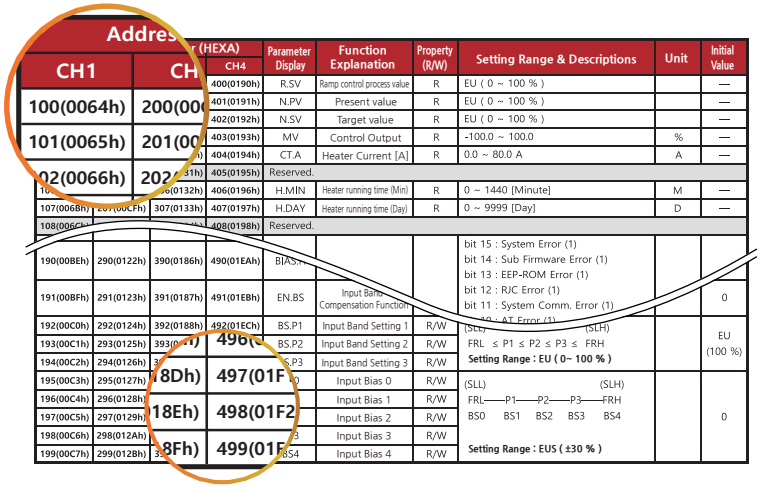
R: Read (Readable)
W: Write(Writable)



Register (HEXA) CH1	CH4	Parameter Display	Function Explanation	Property (R/W)		Unit	Initial Value
		Reserved.					
	004(0004h)	N.PV	Process Value	R	EU (0 ~ 100 %)		—
	008(0008h)	N.SV	Target Value	R	EU (0 ~ 100 %)		—
001(0001h)	012(000Ch)	MV	Control Output	R		%	—
	016(0010h)	CT.A	Heater Current	R	-100.0 ~ 100.0	A	—
		Reserved.					
005(0005h)	021(0015h)	H.MIN	Heater Running Time (Min)	R	0 ~ 144	M	—
022(0016h)	025(0019h)	H.DAY	Heater Running Time (Day)	R	0 ~ 9999 [Day]	D	—
		Reserved.					
086(0056h)	089(0059h)	AT			bit 15 : System Error (1) bit 14 : Sub Firmware Error (1) bit 13 : EEP-ROM Error (1) bit 12 : RJC Error (1)		
095(005Fh)	096(00	O.ACT	Select output operation	R/W	2: Heat, System Comm. Mode 2: Heat, Continuous Control Mode		0
00098(0062h)		OUT1	Select output 1 type (Heating control output)	R/W	1 : SSR (Voltage-Pulse) Mode 2 : SCR (4 ~ 20mA) Mode 3 : RELAY Control Mode		1
00099(0063h)		Reserved.					
		Reserved.					

For the Common register group,
it consists of registers that process commonly used information and parameters, etc., or registers that are commonly used.
Assuming that the order of the Register address uses all channels, it is arranged in order regardless of the channels, so it is useful for places such as PLC where multiple processing is performed at once.
And, it is designed to be able to use only this area for general level of control.

2) Channel register group (100~499 address)



Address (HEXA) CH1	CH	CH4	Parameter Display	Function Explanation	Property (R/W)	Setting Range & Descriptions	Unit	Initial Value
100(0064h)	200(00	400(0190h)	R.SV	Ramp control process value	R	EU (0 ~ 100 %)		—
101(0065h)	201(00	401(0191h)	N.PV	Present value	R	EU (0 ~ 100 %)		—
		402(0192h)	N.SV	Target value	R	EU (0 ~ 100 %)		—
		403(0193h)	MV	Control Output	R	-100.0 ~ 100.0	%	—
02(0066h)	202	404(0194h)	CT.A	Heater Current [A]	R	0.0 ~ 80.0 A	A	—
		405(0195h)	Reserved.					
		406(0196h)	H.MIN	Heater running time (Min)	R	0 ~ 1440 [Minute]	M	—
		407(0197h)	H.DAY	Heater running time (Day)	R	0 ~ 9999 [Day]	D	—
		408(0198h)	Reserved.					
190(00BEh)	290(0122h)	390(0186h)	490(01EAh)	BIAS.1			bit 15 : System Error (1) bit 14 : Sub Firmware Error (1) bit 13 : EEP-ROM Error (1) bit 12 : RJC Error (1)		
191(00BFh)	291(0123h)	391(0187h)	491(01EBh)	EN.BS	Input Bias Compensation Function	bit 11 : System Comm. Error (1) bit 10 : AT Error (1)		0
192(00C0h)	292(0124h)	392(0188h)	492(01ECh)	BS.P1	Input Band Setting 1	R/W	(SLL) (SLH)	EU (100 %)
193(00C1h)	293(0125h)	393(	496(	BS.P2	Input Band Setting 2	R/W	FRL ≤ P1 ≤ P2 ≤ P3 ≤ FRH **Setting Range : EU (0~ 100 %)**	
194(00C2h)	294(0126h)			P3	Input Band Setting 3	R/W		
195(00C3h)	295(0127h)	8Dh)	497(01F		Input Bias 0	R/W	(SLL) (SLH) FRL—P1—P2—P3—FRH BS0 BS1 BS2 BS3 BS4	0
196(00C4h)	296(0128h)				Input Bias 1	R/W		
197(00C5h)	297(0129h)	18Eh)	498(01F2		Input Bias 2	R/W		
198(00C6h)	298(012Ah)			3	Input Bias 3	R/W		
199(00C7h)	299(012Bh)	8Fh)	499(01F	BS4	Input Bias 4	R/W	**Setting Range : EUS (±30 %)**	

For the Channel register group,
the order of Register addresses is arranged based on the channel.
That is, Channel 1 consists of 100 ~ 199, Channel 2 consists of 200 ~ 299 Channel 3 consists of 300 ~ 399, and Channel 4 consists of 400 ~ 499.
Because user can control all the features for each channel, more complex features can be used, which is advantageous for advanced users or interfaces such as HMI, Touch Panel, and PC.

2. Configuration of Common register group

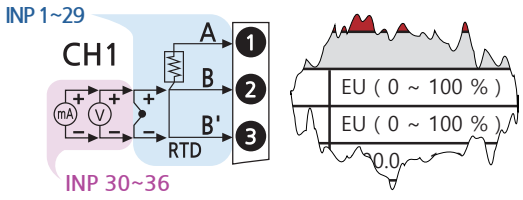
1) Basic information register

001 ~ 004 (N.PV): Displays the measured values that are currently in progress.

005 ~ 008 (N.SV): Displays the target values that user wants to control.

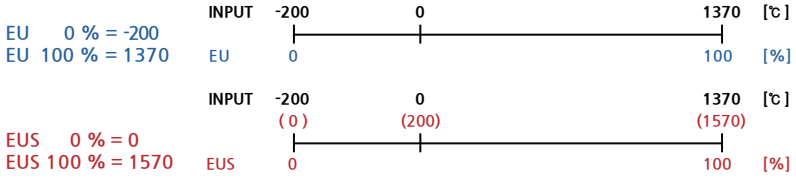
The display and setting range are determined to be EU 0 ~ 100% range according to the setting values of the input setting register number 073 ~ 076(INP) or 182, 282, 382, 482(INP).

[Reference!] EU Industrial unit for input setting



※ EU : Industrial unit for the input range

Ex) Input selection number : 01 (K-TYPE)



009 ~ 012 (MV) : Displays the current control output(Heating operation : 0 ~ 100.0 %, Cooling operation : 0 ~ -100.0 %)
013 ~ 016 (CT.A) : Displays the current flowing through the heater by receiving the input of CT(800:1)
(But, when using the optional module).
018 ~ 021 (H.MIN) : Displays Minute unit by integrating the current flowing through the heater(0 ~ 1440 minutes).
022 ~ 025 (H.DAY) : Displays Day unit by integrating the current flowing through the heater(0 ~ 9999 days).
027 ~ 030 (CH.STS) : Displays values in bits by using a status flag register that shows operation and status of M(N)74.
031 ~ 034 (ALM.STS): Displays the output status of the alarm (event) output function (displayed in bits).
035 ~ 038 (DP.I) : Displays the location information of the decimal point according to the input setting.
When the INP (073-76) setting is 1 ~ 29, DP.I = 0 (no decimal point), DP.I = 1 (1/10 position)
If the INP (073-76) setting is 30 or higher, it is linked to DP-P (185,285,385,485).
039 ~ 042 (RJC) : Measures and displays the temperature of the input terminal of M(N)74
(Compensation for cold points when entering T.C.)
043 ~ 046 (IN.E) : When the INP(073~76) setting is 30~36 (Voltage current input mode), it is displayed as the actual input voltage or current value (Unit of data: 1/100mV for voltage, 1/100mA for current).
047 (SYS.I) : Displays the product model and firmware version.
048 (SYS.T) : Displays the system speed in 1/100 ms (0.01 ~ 655.35 ms)
049 (PDT.I) : Displays the product model and input channel information.

2) Main config. register

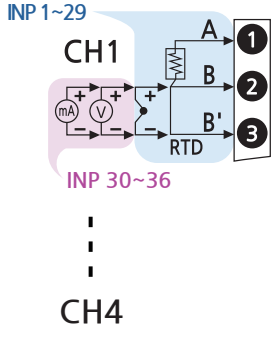
052 (EXT.IO) : It is an external input/output interface setting register that is used only in the N74 model.
In case of M74 model, Hi-byte is fixed as a communication mode (FFh) value and is used as an interface but with the optional module.
In case of the N74 model, the function of each pin of J12 connector (I/O Option) can be set.
※ Please contact us (+85-2-1588-9439) when using the J12 Connector.

063 ~ 066 (MAN.C) : [Manual control mode] Auto control, that is, when manually controlling by entering the control power(MV) value unconditionally without using P.I.D or ON/OFF control automatically according to the input amount, use it as the MVn.O(067~70) register.
067 ~ 070 (MVn.O) : [Manual Output Control] When the Manual Control mode(MAN.C) value is set to “1”, the value of this register is unconditionally output to control power(MV).

071 (EnPO) : [Activation of output in disconnected input] It is a register for activating the function of the control power value setting PO(178,278,378,478) register when the input is disconnected (Register for safety).

072 (INIT) : [Initialization of parameter] It is a register for Factory reset of the Single channel or all channels.
1 ~ 4 : Initializes each channel (default), 5: All channels and Factory reset
※ It must be entered once upon initialization (return to 0 upon completion of execution).

073 ~ 076 (INP) : [Input type setting] It is a register that needs to be set first (default: K-Type 01).



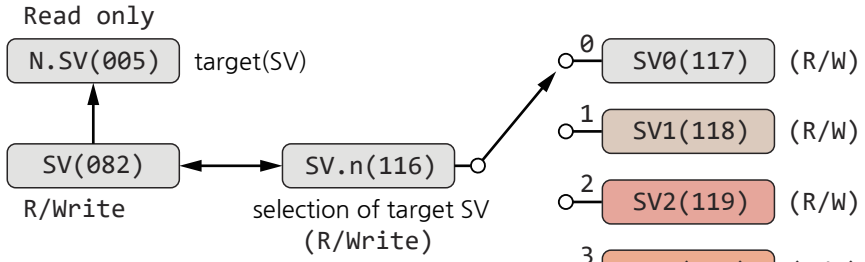
Thermocouple [Unit: ℃]	RTD (Pt100) [Unit: ℃]	Voltage(㎷) Current(㎃)
K-Type(-200~1370): 01(1) ,02(0.1) J-Type(-200~1000): 15(1) ,03(0.1) E-Type(-200~1000): 16(1) ,04(0.1) L-Type(-200~ 900): 17(1) ,09(0.1) N-Type(-200~1300): 10(1) ,14(0.1) T-Type(-199.9 ~ 400.0) : 05(0.1) U-Type(-199.9 ~ 400.0) : 11(0.1) R-Type(0 ~ 1700): 06(1) B-Type(0 ~ 1800): 07(1) S-Type(0 ~ 1700): 08(1) C (W5)(0 ~ 2300): 12(1) D (W3)(0 ~ 2400): 13(1)	Pt100(DIN): 21(0.1) -199.9 ~ 640.0 Pt100(DIN): 23(1) -200 ~ 640 JPt100(JIS): 20(0.1) -199.9 ~ 500.0 JPt100(JIS): 22(1) -200 ~ 500	4 ~ 20 mA : 31 -10 ~ 20 mV : 32 0 ~ 100 mV : 33 0 ~ 200 mV : 34 1 ~ 5 V : 30 0 ~ 5 V : 35 0 ~ 10 V : 36

078 ~ 081 (FAST) : [Fast mode] M(N)74 uses TemcoLine's unique SG-PID variable sampling control for optimal control, so it is usually used with OFF(0). But if very fast system such as pressure, motion, etc. is required, more detailed control is possible by using Fast mode ON(1)

082 ~ 085 (SV) : [Target setpoint] It is the most important register to set target for control. It is a register interlocked with x16(SV.n), x17 ~ x20(SV0~3).

■ Structure of SV register

M(N)74 has a total of 4 SV values. But if the 082~85(SV) register allows user to change the actual target SV value regardless of the target SV selection.



※ An example of SV register CH1

086 ~ 089 (AT) : [PID Auto tuning] It automatically calculates P, I, and D values when controlling PID. When using it for the first time, set the target value(SV) and run AT.

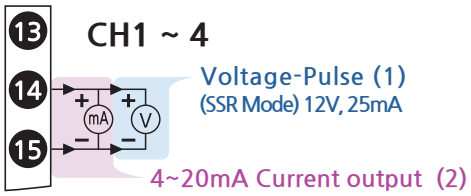
※ When tuning, user must enter once(Return to 0 upon completion of tuning).

090 ~ 093 (O.ACT) : [Selection of output operation] Select the control operation of the controller.

- Negative(heating) operation control mode(0) : It decreases the output when the input rises.
- Positive(cooling) operation control mode(1) : It increases the output when the input rises.
- Simultaneous heating and cooling control mode(2) : Negative(heating) output and Positive(cooling) output are independently and simultaneously controlled.

094 ~ 097 (OUT1) : [Selection of output 1 type] The output type for Negative(heating) and Positive(cooling) mode can be selected.

- SSR(Voltage-Pulse) Mode : 1
- SCR(4~20mA DC) Mode : 2
- RELAY(Option Card) Mode : 3
  (Available when installing the output option module)



3. Essential register settings under initial use

1) Channel mode setting (Default: #2)

053 ~ 056 (CH.MD) : The operation mode for each channel can be set.
There is no big problem in operation without setting up, but if there is an unused input, the indicating lamp of external status does not work normally.
Please set the channel to “Inactive mode(0)” that user do not use.

2) Input type setting (Default : #01)

073 ~ 076 (INP) : Input type can be set. IINP #01 ~ 36 (see Register mapping table).

3) Output 1 type setting (Default : #1)

094 ~ 097 (OUT1) : Output type can be set. OUT1 #1 ~ 3 (SSR, 4~20mA, Relay)

4) Output operation setting (Default : #0)

090 ~ 093 (O.ACT) : Output operation can be set. OUT1 #0 ~ 2 (Heating, cooling, heating and cooling simultaneously)

5) Target value(SV) setting (Default : #0)

082 ~ 085 (SV) : Target value(SV) can be set that use want to control.

6) Execution of Auto tuning(AT)

086 ~ 089 (AT) : Execute Auto tuning(Auto Tuning).

4. Output Ports

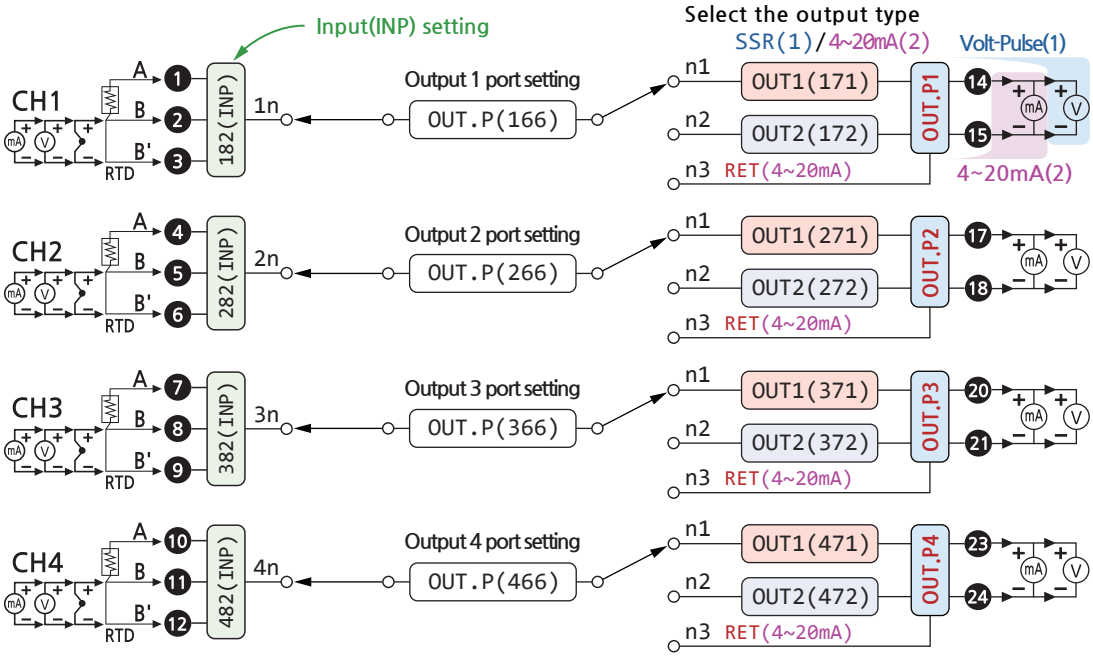
Output port of M(N)74 is configured in multiple ways, allowing user to change the location of control output corresponding to each input channel at user disposal, and can also be used as Transmission Output.

166, 266, 366, 466 (OUT.P) : Output port setting (specified) register (Default : #01)

OUT.P(x66) ➡ Setpoints 0 1

Selection of Port type (0: OFF, 1: OUT1, 2: OUT2, 3: RET)
Selection of Input channel (0: Direct, 1: CH1, 2: CH2, 3: CH3, 4: CH4)

⦿ Structure of Output port



※ For reference, user can easily set by using a communication program for M(N)74 only.

5. Retransmission Outputs

The Retransmission outputs mode has a function of selecting one of measured value(PV), target value(SV), and output value(MV), converting the value into analog output of 4~20 mA constant current, and exporting it. If both control power and transmission outputs must be used on the same channel, the output port of the other channel must be set to the Retransmission(RET) outputs and used. In this case, the control power of the channel is not available.

167, 267, 367, 467 (RET): Retransmission output type

168, 268, 368, 468 (RET.L): Low RET

169, 269, 369, 469 (RET.H): High RET

※ PV(Measured value), SV(Target value), MV(Control output value)



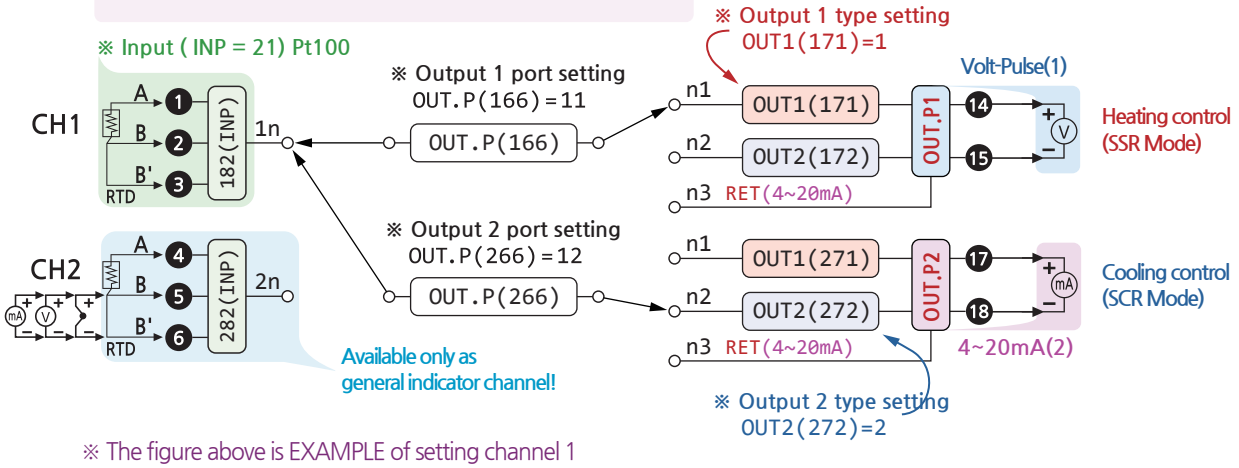
6. Simultaneous heating and cooling control

The M(N)74 SERIES supports Simultaneous heating and cooling control. But in case of the cooling output(OUT2), the Output port of another channel must be used, so the channel can only be used as a temperature indicator.

1) Control mode and Output port settings

`170, 270, 370, 470 (O.ACT)` : Output operation setting register (Default : #0)

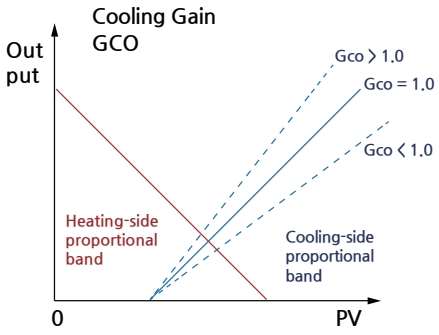
`O.ACT(170) = 2` (Heating/cooling simultaneous control mode setting)



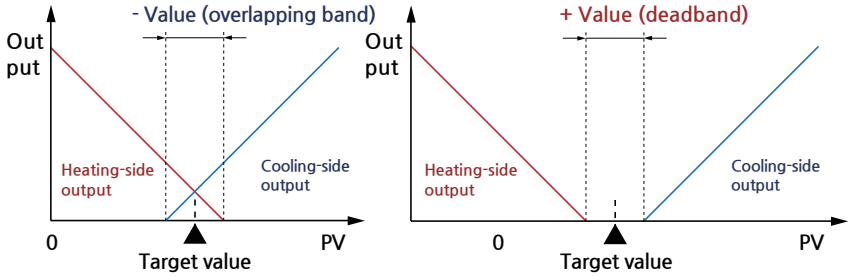
※ The figure above is EXAMPLE of setting channel 1 as Control input, Output port 1 as Heating SSR output, and Output port 2 as Cooling SCR (4~20 mA) output.

2) Main register of simultaneous heating/cooling control

`175, 275, 375, 475 (GCO)` : Cooling gain setting. The Cooling gain can be set from 0.1 ~ 10.0. But it is recommended to use the default(1.0) except for special cases.



`160, 260, 360, 460 (HC.DB)` : Setting the deadband of heating and cooling(%)



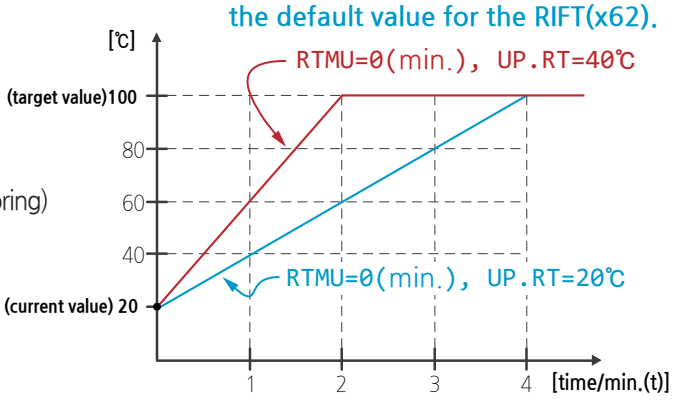
※ The default for operational description according to the deadband value is set to 0.0%, and it does not need to set it for special cases.

7. Ramp control

It refers to the slope of the progress value(R.SV) reaching the target value(SV) from the current value(PV), and the initial rising temperature UP.RT) and falling temperature (DN.RT) and time or minute(RTMU) are set, which refers to the function of inducing a constant slope to the target value.

`100, 200, 300, 400 (R.SV)` : Progress value of Ramp control (monitoring)
`162, 262, 362, 462 (RIFT)` : Ramp integrated compensation(10%)
`163, 263, 363, 463 (RTMU)` : Time unit setting (hour/minute)
`164, 264, 364, 464 (UP.RT)`: Setting Initial rising temperature
`165, 265, 365, 465 (DN.RT)`: Setting Initial falling temperature

※ It is recommended to use the default value for the RIFT(x62).



8. Control stability

The M(N)74 SERIES is applied with precise tuning algorithms, enabling optimal precise control with the execution of Auto tuning only. However, it provides parameter values that can set up separate Control stability to support a wide range of applications, enabling effective and optimal precise control in case of complex and difficult control systems without manual tuning.

161, 261, 361, 461 (STB.C): [1 ~ 10] The default stable value is 1, which is used only when it is not stable and hunting occurs when converging to the Target value after Auto tuning(AT).

156, 256, 356, 456 (P): [Setting range 0 ~ 999.9 ℃] It only works when it deviates from the target in proportional operation.

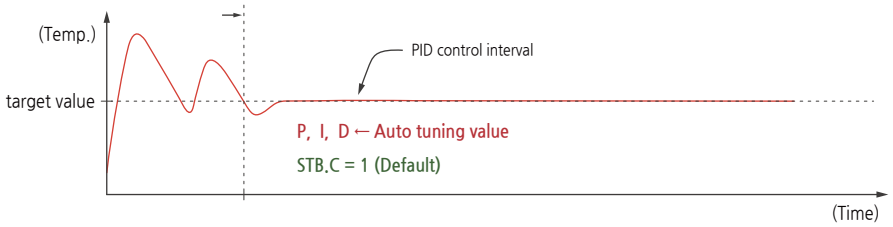
157, 257, 357, 457 (I): [Setting range 0 ~ 3600 sec] Integrate and output based on the set time until the target value is reached due to the integral operation.

158, 258, 358, 458 (D): [Setting range 0 ~ 3600 sec] It only works as negative when the current value changes rapidly due to differential operation.

The Control output(MV) is output as MV Control output[%] by summing (P) + (I) + (D).
Each P, I, D value is automatically set by calculating the optimal value when AT(086~89) is executed.

1) Most of the general direct control systems

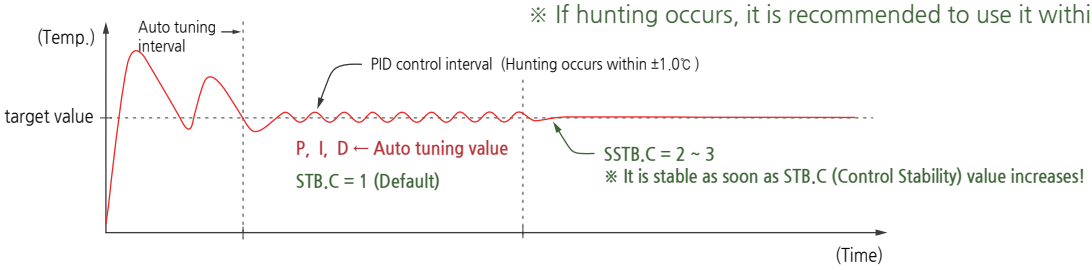
In case of direct control using SSR, TPR, Relay, etc., together with a relatively simple closed loop system (TC or RTD, etc.), heater, thermoelectric cooling element, etc., the execution of Auto tuning (AT) alone enables complete control without problems.



2) Complex form of indirect control system

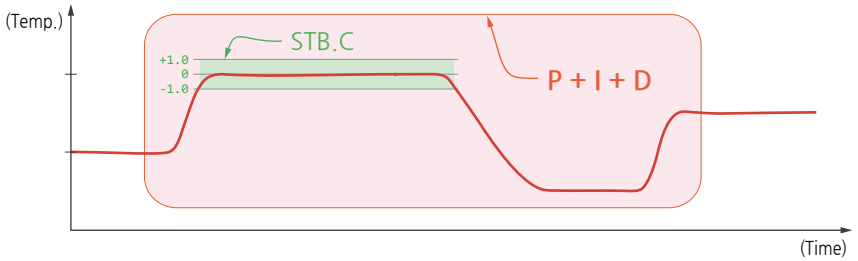
In case of an indirect control system, indirectly input such as voltage and current by using a complex closed loop system, that is a modular input sensor (pressure, humidity, flow rate, non-contact temperature sensor, etc.), and used of variable valves or Actuator, etc. for gas or refrigerant or steam, etc., delivery delays and non-linear factors can lead to unstable by execution of Auto tuning(AT) alone, which can lead to Manual tuning of P, I, and D values.
If hunting occurs within ±1.0℃, the Control stability STB.C function can be useful.

※ If hunting occurs, it is recommended to use it within 2-3, if possible



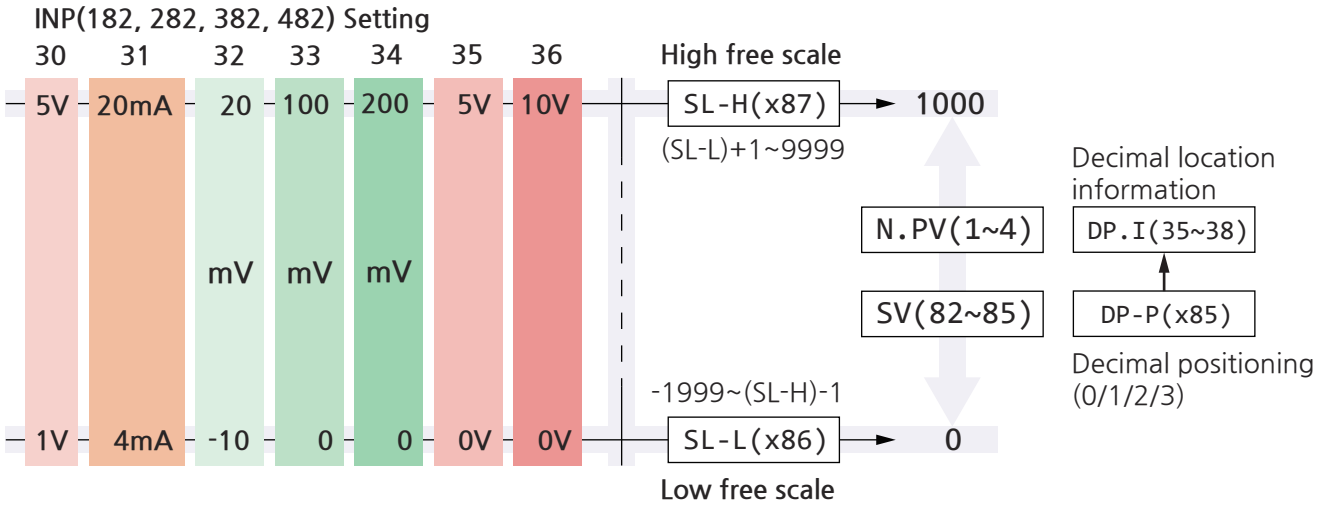
3) Interaction of control system about P, I, D values and STB.C value

In case of P, I, and D Manual tuning, it takes a lot of time and effort, and the response characteristics of the whole change, so tuning to the ideal characteristics is very difficult. But the STB.C value only works within ±1.0℃ for the Target value, ensuring complete control performance by maintaining the AT(Auto Tuning) value and improving only temperature stability.



9. Voltage & Current input mode (INP #30 ~36)

Various external interfaces are possible with the function of converting the Analog input of DC current(mA) or voltage(V) into the desired digital quantity and controlling it by using the desired scale or unit.



10. Input correction

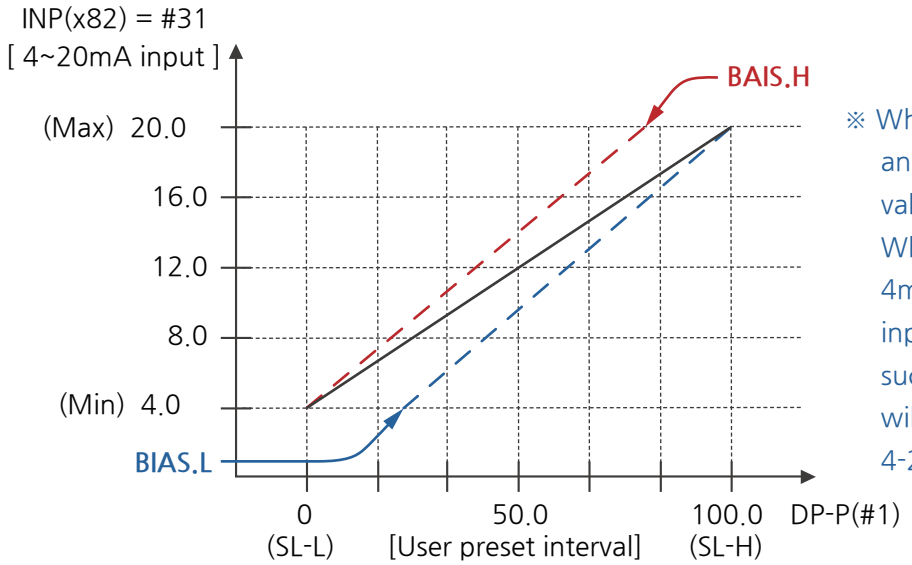
M(N)74 products are precisely corrected according to all types of inputs in the factory and only optimal products are released under strict quality control. And therefore, basically, it is better not to use input correction.
But it has a powerful function to correct indication errors caused by errors such as external modules that interface when entering environment of use, voltage, or current.

1) Low input correction (BIAS.L)

`189, 289, 389, 489 (BIAS.L)` : If the setpoint (input type) of INP(x82) or INP(073~076) is #1-29, it operates only as simple bias value as the correction value.

2) High input correction (BIAS.H)

`190, 290, 390, 490 (BIAS.H)` : Only if the setpoint (input type) of INP(x82) or INP(073~076) is #30-36, the Low and High input can be corrected together to completely correct to a straight value in combination with Low input correction (BIAS.L).



※ When INP(#31) 4~20mA input mode and it is respectively set to the free scale values SL-L(0) and SL-H(1000) DP-P(1), When an error occurs as N.PV is 5.0 for 4mA input and N.PV is 97.0 for 20mA input, If user corrects only the deviation, such as BIAS.L = -5.0, BIAS.H = +3.0, it will be corrected to N.PV 0.0 ~ 100.0 for 4-20 mA input.

3) Input band compensation

It is a function that allows user to adjust each deviation and slope by dividing the input range into 4 intervals. It can be used for non-linear factors such as error occurrence due to mechanical problems or temperature conversion after pressure measurement.

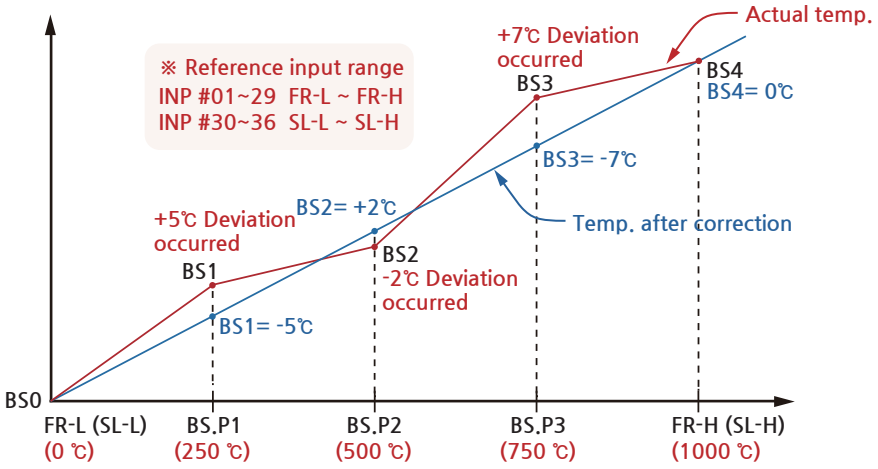
`191, 291, 391, 491 (EN.BS)` : [Input interval correction ON/OFF] When using this function as a register that activates the function of input interval correction, the function of BIAS.L(Low input correction) is ignored when INP #01~29 inputs are used.

Register address display
`x 9 2 (BS.P1)`
- Register address
- `1 ~ 4` Channel address

`x92 (BS.P1)` : [Interval setup1]
`x93 (BS.P2)` : [Interval setup2]
`x94 (BS.P3)` : [Interval setup3]
`x95 (BS0)` : [Bias 0]
`x96 (BS1)` : [Bias 1]
`x97 (BS2)` : [Bias 2]
`x98 (BS3)` : [Bias 3]
`x99 (BS4)` : [Bias 4]

※ Setting range

FR-L ≤ BS.P1 ≤ BS.P1 ≤ BS.P1 FR-H
(SL-L) (SL-H)

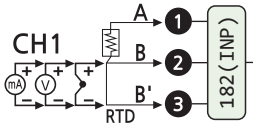


[Input correction by interval(BIAS)]

11. Alarm & Event Outputt

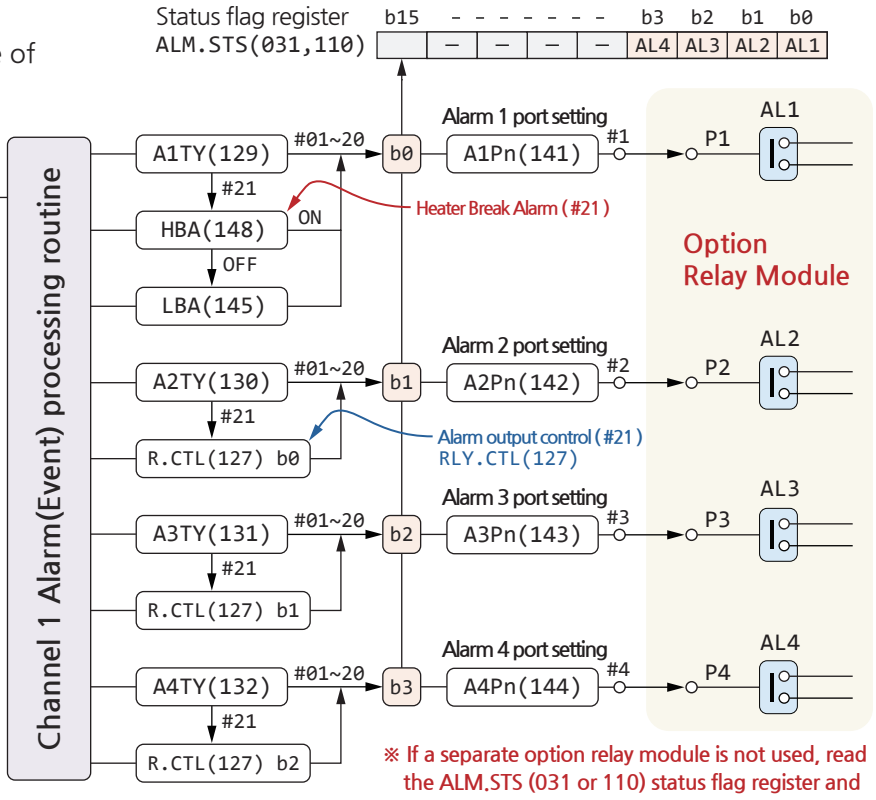
M(N)74 SERIES has 4 independent alarm (event) outputs per channel, 21 operations may be selected, and when the optional relay module is used, both the contact output and the output location can be freely selected.

⊙ Operation and structure of alarm output (EX: CH1)



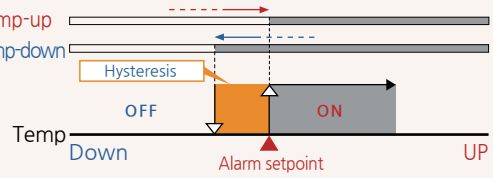
A1TY(129) : Set Alarm 1 type # 01 ~ 21. But #21 is HBA (Heater Break Alarm)

A2~4TY (130 ~ 132) : When Alarm type is set to # 01 ~ 20, RLY.CTL(127) register allows the output of AL2 ~ AL4 to be directly turned ON/OFF.

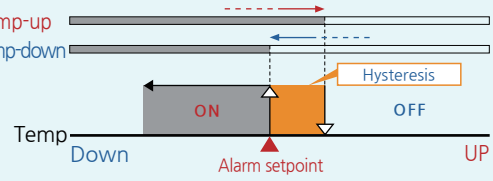


1) Alarm output type and selection code

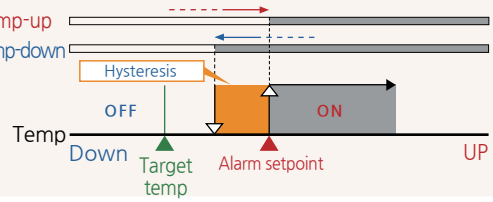
01: Absolute upper(A:Hi)
09: Absolute upper(A:Lo)
11: Absolute upper hold(A:H)
19: Absolute upper hold(A:L)



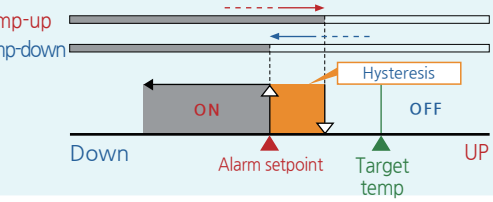
02: Absolute low (A:H)
10: Absolute low (A:L)
12: Absolute low hold(A:H)
20: Absolute low hold(A:L))



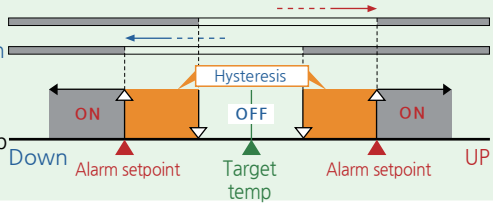
03: Upper deviation (A:H)
05: Upper deviation (A:Lo)
13: Upper deviation hold(A:Hi)
15: Upper deviation hold(A:Lo)



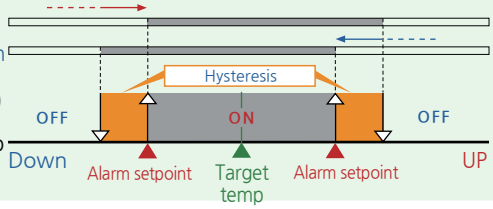
04: Low deviation (A:H)
06: Low deviation (A:Lo)
14: Low deviation hold(A:Hi)
16: Low deviation hold (A:Lo)



07: Upper-Lo deviation
17: Upper-Low deviation (Hold)



18: Upper-Low deviation range(hold)
08: Upper-Low deviation range



Register address display
x 2 9 (A1TY)
Register address
1 ~ 4 4 Channel address

A1TY(x29) : Alarm 1 type setting
01 ~ 20 : General alarm (event) setting
#21 : HBA(Heater Break Alarm) operation

When A1TY(x29) = #21,
HBA(x48) : Activate Heater Break Alarm
0.1 ~ 80.0 A : In case of Break Alarm value setting #0 (OFF), a Loop Break Alarm (LBA) is operated.
The values of LBA(x45) and LBW(x146) are automatically set to optimal values after AT operation.

A2TY ~ A4TY(x30, x31, x32) :
Alarm 2 ~ 4 types setting
01 ~ 20 : General alarm(event) setting
21 : RLY.CTL(Alarm output control) operation

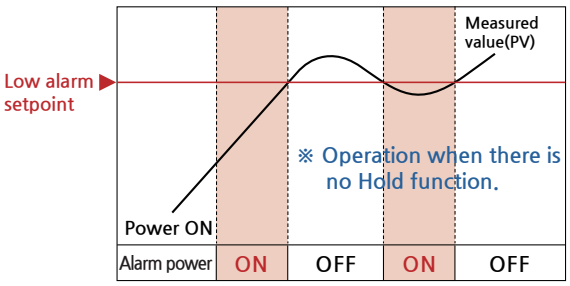
When A2TY ~ A4TY = #21,
RLY.CTL(x27) : Alarm output direct control
User can directly control (ON/OFF) the alarm output using the RLY.CTL(x27) register. It can be used for various purposes such as a power switch.

RLY.CTL (127, 227, 327, 427)
: `bit0(AL2)` Alarm 2 output control
: `bit1(AL3)` Alarm 3 output control
: `bit2(AL4)` Alarm 4 output control

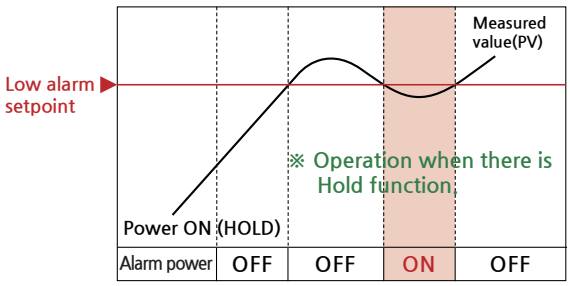
2) Hold function

When power is applied in case of using the Low alarm, an unnecessary Low alarm occurs before the temperature rises. At this point, the Hold function allows user to ignore the Low alarm until the alarm set is out of the Initial Power ON setting once.

〈 Hold function OFF 〉



〈 Hold function ON 〉



TemcoLine™

www.temcoline.com

THE LIV SMART TOWER 1225-28,34 GASAN DIGITAL 2-RO, GEUMCHEON-GU,SEOUL,KOREA 08592
Tel. +82-2-3667-5521
Fax. +82-2-2632-5549