Modular type PID controller

Control Module

M74 SERIES



Thank you very much for purchasing M74 series of Temcoline.This manual explains the installation method, function, operation and handing. Must read this manual thoroughly before using it. If there is difficulty in using it, please contact our customer service center at 1588-5439.

⊙ Safety Consideration

※ Observe all safety consideration for safe and proper operation to prevent accident or danger.

※ ⚠ symbol indicates caution due to special circumstances in which hazard may occur.

⚠ **Warning** There is possibility of injury or death if the instructions are violated
⚠ **Caution** There is possibility of minor injury or product damage if the instructions are violated

⚠ Warning

1. **In case of using this equipment that have significant impact on human or property (Example: nuclear control device, medical device, ship, vehicle, railway, aircraft, combustion device, safety device, crime/disaster prevention device, etc) double safety device must be installed before using it.**
   May result in fire, personal accident, heavy loss may occur.
2. **Install on a device panel to use.**
   May result in fire.
3. **Do not connect, inspect, and repair while power is connected.**
   May result in fire.
4. **Check the connection diagram before wiring.**
   May result in fire.
5. **Do not modify the product.**
   May result in fire.

⚠ Caution

1. **Use AWG 24 (0.2mm2) or more when wiring the power input terminal. There is a risk of fire due to faulty connection. Use AWG 28~16 if it is bit a dedicated wiring for sensor input and communication wiring.**
   There is a risk of fire or product damage due to faulty connection.
2. **Use it within the rated specification range.**
   There is a risk of fire or product damage.
3. **Clean with a dry towel and do no use water or organic solvent.**
   There is a risk of fire or product damage.
4. **Do not use in environment with flammable/explosive/corrosive gas, highly humidity, direct sunlight, radiant heat, vibration, impact, salinity.**
   There is a risk of fire and explosion.
5. **Don't let metal objects, dust, wiring debris, ect into the product.**
   There is a risk of fire or product damage.

⊙ Caution during use

1. Follow the instruction in caution during use. If not, it may cause unexpected accident.
2. Check the polarity of the terminal before wiring when connecting the temperature sensor. Connect the RTD temperature sensor in 3 wire type and use same wire thickness and length.
3. Keep away from high voltage line or power line to prevent inductive noise. In case installing power line and input signal line closely, use line filter or varistor at power line and shielded wire at input signal line. Do not use near the equipment which generated strong magnetic force or high frequency noise.
4. Do not apply beyond rated pressure when connecting or disconnecting connector.
5. Install the switch or circuit breaker in a convenient portion to supply and block out the power
6. Do not use it for other purpose than temperature controller (voltmeter, ammeter, etc)
7. When changing the input sensor, change the product after turning off the power. Change the relevant parameters after changing the input sensor.
8. Supply power input with an insulated, limited voltage/current or Class 2, SELV power supply.
9. Do not wire communication and power cables together. Make sure to use twisted pair wire for communication lines, Reduce the influence of external noise by connecting circular Ferrite based at the both side end of the wire.
10. Provide prescribed space around the product to allow heat to escape. For accurate temperature measurement, warm up for at least 20 minutes after turning on the power before using it.
11. Make sure to reach the rated voltage within 2 seconds after powering up.
12. Do not wiring to unused terminal.
13. Install the DIN rail vertically to the base ground.
14. This product can be used under the following environment condition.
    1) Indoor 2) Below 2,000m altitude
    3) Pollution Degree 2 4) Installation Category Ⅱ

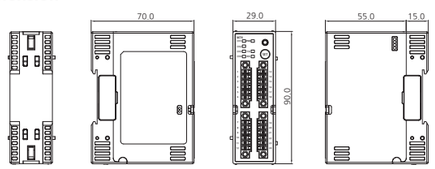
1. Model Composition

M 7 □ □
- Option
- Channel
- Multi channel module PID controller

2. Modular Type PID Controller - M74 series

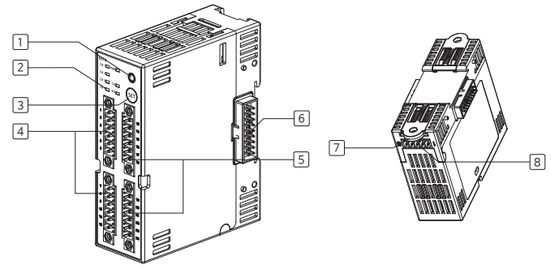
1) Efficient space security and arrangement by realizing the smallest structure and high reliability within the country.
2) Simple maintenance repair is possible with the structure of separating base from the main body.
3) Unnecessary to communication between modules and power wiring through extension connectors.
4) Modbus-RTU/ASCII, PC-Link, TL-Link protocol support high-speed communication up to 115,200 bps.
5) Communication parameters can be set simply with the front key. (protocol, communication speed, station number max. 31 settings)
6) Easy and convenient parameter setting (on-site) by using the console. (dedicated control display board)
7) Able to set Parameter with PC. (USB Loader Cable M74U)
   ※ Provide free of charge device integrated management program.
8) 50ms high-speed sampling and 0.3% FS measurement accuracy.
9) Basic support for heating and cooling simultaneous control and manual control.
10) Free wiring and control is possible with preset function of alarm and control output port.
11) Transmission output (RET), SCR (4~20mA DC control output), SSR (voltage pulse control output) basic support.
12) Designed as complete insulation structure between each input and input/output . (withstanding voltage 1,000V AC or higher)

3. Dimension



unit: mm

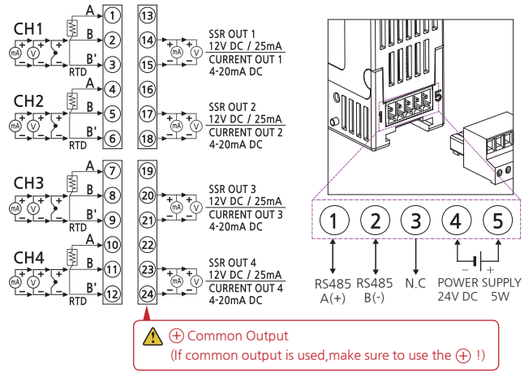
4. Name of Parts



1 PC Loader and Console Port
2 Indicator Lamp- each channel Status, Power monitoring, communication status (RX/TX)
3 Set Button- Change Communication Parameter (Station Number, Communication speed, Protocol)
4 1~4channel input terminal
5 1~4channel output terminal
6 Expansion for Communication and power supply connector
7 Rail Fixed Lock
8 Main power supply and Communication terminal

5. Terminal Wiring Diagram

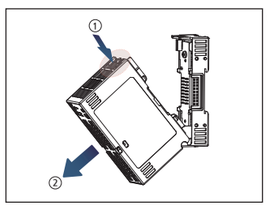
1) Pay attention to the direction of connection when connecting power and communication.
2) When connecting the sensor or compensation wire, use wire thickness of AWG 28~14.
3) For SSR drive output, use AWG 24 or more for line thickness.



⚠ ⊕ Common Output
(If common output is used,make sure to use the ⊕ !)

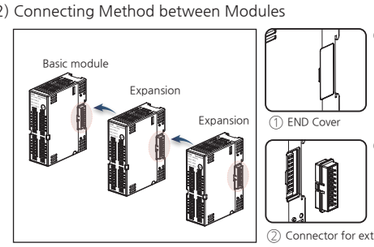
6. Install Method

1) Decoupling Method of Terminal Block



① Slightly press the hook located on the top of the body.
② Remove the body by pulling it forward . (direction of the arrow)

2) Connecting Method between Modules

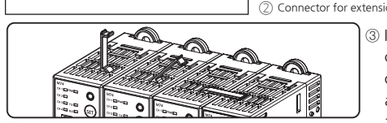


① Remove each END Cover of each module. (Do not remove END Cover each end side)

① END Cover

② After inserting the extension connector, attach the extension module closely.

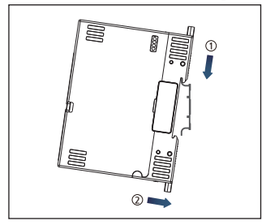
② Connector for extension



③ Module Lock Connector

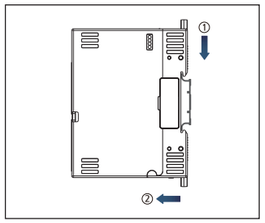
③ Insert the module LOCK connector on the top of the module and attached module together to be fixed.

3) DIN RAIL Install and Decoupling Method



Install Module

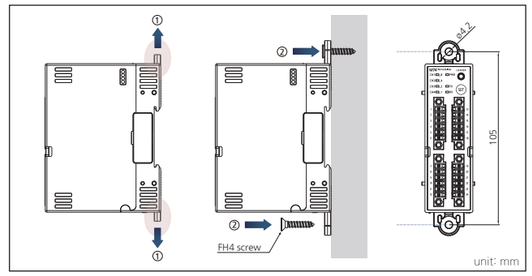
① First, insert the upper lock as it is hanging over the rail and pull it down.
② Push it in the direction of the rail while pulling the module down. The bottom lock goes into the rail.



Separation Method

① Hold the module and pull it down.
② Pull the module down while pulling it down.

4) SCREW Combination Method

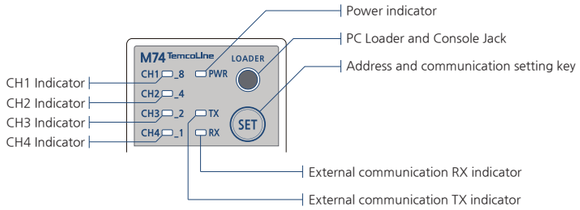


① Pull the upper and lower rail locks up and down.
② Insert the screw into the hole in the upper rail lock and fix it.
Fix the screw to the lower rail lock as same way as the upper one.
(Screw Rating: FH 4x20 Tapping Screw)

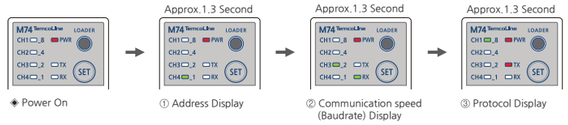
7. Specification

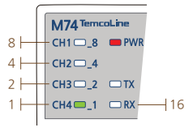
Number of Channels		Control input, output 4 channel
Power supply		24V DC, CLass2
Allowable voltage fluctuation Range		90~110% of power supply voltage
Power Consumption		5W or less (at full load)
Display		No display-Parameter setting and monitoring control in external devices (exclusive console, touch panel, PC, PLC, etc.)
Input Specification		KPT 100(KS), JPT 100(JIS), PT 100(DIN)
Thermoresistance(RTD)		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		0.2% 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)
	Control: 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 (Symbol : ⧈ Voltage withstand between measurement input and power supply : 1KV or higher)
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(Gross unit), Approx. 120g(net unit)

8. M74 Indicator function



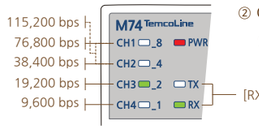
1. Display after power on





① Address status display (Current address is "1")

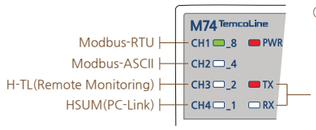
Unit address displayed by binary code format (8421 Code).
The current address is the sum of all 8 4 2 1 numbers at lighting position.
When setting with the front key, maximum of 31 addresses can be set.



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

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

[RX lighting] Communication speed (Baudrate) check mode



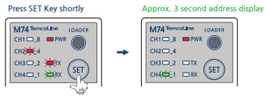
③ Communication protocol display

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

[TX Ramp Lighting] Communication Protocol check mode

2. Basic Operation of SET Key

1) Check current address



▣ LED indicator operation status

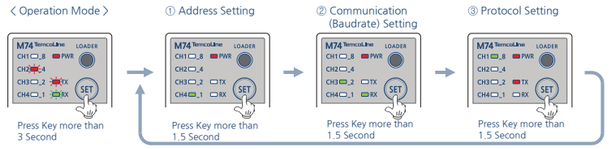
Red		Green		Orange	
Lighting	Blink	Lighting	Blink	Lighting	Blink

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.

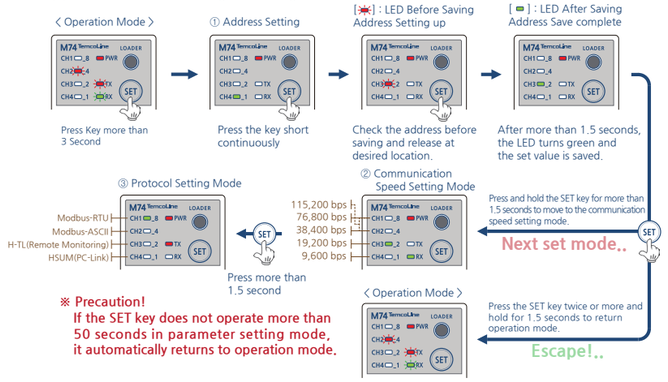
2) Basic Operation of Communication Parameter Setting menu

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



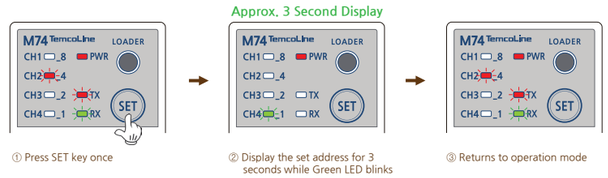
〈2〉 Parameter Value Setting and Saving



※ 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.



4. Communication Parameter Setting

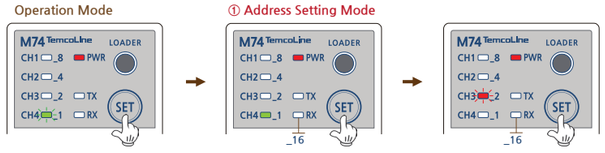
Simple communication setting by SET Key.

▣ Factory default of communication parameter

[1] Address : 01
[2] Communication Speed : 19,200 bps — Change by SET key !
[3] Protocol : Modbus-RTU (ModB)

[4] Parity bit : Even
[5] Stop bit : 1-bit
[6] Data length : 8-bit — Automatic setting when changing protocol !

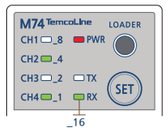
1) Address Setting



ⓐ 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.

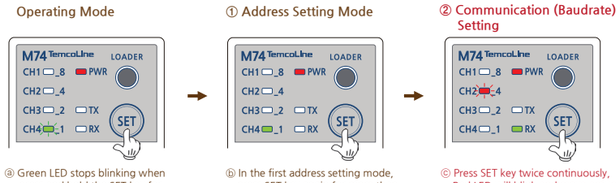
※ Address Check Tip



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

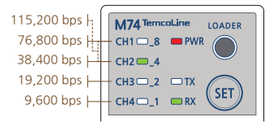


ⓐ Green LED stops blinking when press and hold the SET key for more than 3 seconds

ⓑ 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

ⓒ 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.

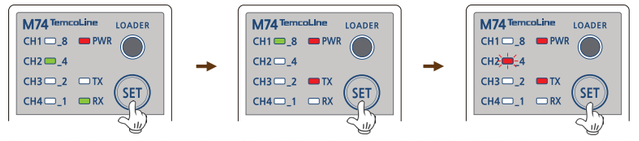
※ Communication Speed (Baudrate) Check



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

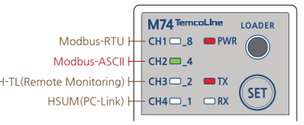
② Communication Speed Setting — ③ Protocol Setting



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

ⓑ 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

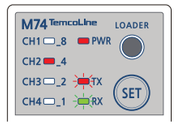


There are 4 types of communication protocol as shown on left, Modbus-RTU, Modbus-ASCII, H-TL (remote monitoring only), and HSUM (PC-Link). By pressing SET key twice continuously, Red LED will blink and start moving around for selection until releasing SET key at the desired protocol and the LED turns 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).

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)	Link state TX RX CH1 CH2 CH3 CH4	RX (+) Lighting, by status of each channel Orange LED Blinking
Burn out Error (Each Channel)	Link state TX RX CH1 CH2 CH3 CH4	RX (+) Lighting, by status of each channel Red LED Blinking

M74 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)
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Address of M74 Resister (HEXA) CH1	CH2	CH3	CH4	Parameter Display	Function Explanation	Property (R/W)	Setting Range & Descriptions	Unit	Initial Value
00000(0000h)				N.PV	Main F/W version	R	F/W version (2-Byte) of Main MCU		—
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 ~ 38.0 A	A	—
00017(0011h)				H/MV	Select H/MV	R/W	Select function for addresses 018 to 025		0
018(0012h)	019(0013h)	020(0014h)	021(0015h)	H.MIN	Heater Running Time (Min)	R	0 ~ 1440 [Minute]	M	H/MV=0
				MV.H	Output of heating control	R	0 ~ 100.0 % (Dual control only)	%	H/MV=1
022(0016h)	023(0017h)	024(0018h)	025(0019h)	H.DAY	Heater Running Time (Day)	R	0 ~ 9999 [Day]	D	H/MV=0
				MV.C	Output of cooling control	R	0 ~ 100.0 % (Dual control only)	%	H/MV=1
00026(001Ah)				DI.STS	M74R D.I (Active - High)	R	3rd Moudle : DI4(b11) ~ DI1(b8) 2nd Moudle : DI4(b7) ~ DI1(b4) 1st Moudle : DI4(b3) ~ DI1(b0)	Open(0) Short(1) Active-H	—
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) CH1	CH2	CH3	CH4	Parameter Display	Function Explanation	Property (R/W)	Setting Range & Descriptions	Unit	Initial Value
031(001Fh)	032(0020h)	033(0021h)	034(0022h)	ALM.STS		R	bit 7 : AT Completed (AT Mode2 Only) bit 6 : — bit 5 : HOC bit 4 : HBA 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), F0H(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) Customer Option : 7F01 ~ 7FFFh (255 types)		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 : AT start mode (AT auto stop when complete) 2 : AT start mode (AT manual stop when complete)		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)				SCR.Z	0~20 mA output when SCR(2) output	R/W	b3: CH4, b2: CH3, b1: CH2, b0: CH1 b3 ~ b0 [SET(1) 0 ~ 20mA output]		00h
00099(0063h)				Reserved.					

CH1~4 Monitoring and Control setting register

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 (1st)	R	0.0 ~ 38.0 A (M74R of the 1st device)	A	—
105(0069h)	205(00CDh)	305(0131h)	405(0195h)	MV.H/CT.A	MV.H or CT.A(2nd)	R	MV.H: 0~100.0 % / M74R(2nd) 0~38.0 A	% / A	Auto
106(006Ah)	206(00CEh)	306(0132h)	406(0196h)	MV.C/CT.A	MV.C or CT.A(3rd)	R	MV.C: 0~100.0 % / M74R(3rd) 0~38.0 A	% / A	Auto
107(006Bh)	207(00CFh)	307(0133h)	407(0197h)	H.MIN	Heater running time (Min)	R	0 ~ 1440 [Minute]	M	—
108(006Ch)	208(00D0h)	308(0134h)	408(0198h)	H.DAY	Heater running time (Day)	R	0 ~ 9999 [Day]	D	—
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 Completed (AT Mode2 Only) bit 6 : — bit 5 : HOC bit 4 : HBA bit 3 : ALARM-4 bit 2 : ALARM-3 bit 1 : ALARM-2 bit 0 : ALARM-1		—
111(006Fh)	211(00D3h)	311(0137h)	411(019Bh)	D.IN	3rd, M74R (D.I)	R	Open(0), Close(1)	Active-H	—
112(0070h)	212(00D4h)	312(0138h)	412(019Ch)	M3.RLY	Relay output of module 3 R1 ~ R8	R/W	[112] R1, R5 [212] R2, R6 [312] R3, R7 [412] R4, R8【 Setting : ON(1), OFF(0) 】		0
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 : AT start mode1 (AT auto stop when complete) 2 : AT start mode2 (AT manual stop when complete)		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.					
127(007Fh)	227(00E3h)	327(0147h)	427(01ABh)	RLY.CTL	Alarm Output Control (AxTY No.21)	R/W	[Direct control] b0(AL2), b1(AL3), b2(AL4) [Run/Stop Interlock] ⊣ b3(1) ⊢⟶ AL2 out		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) 3 : Alarm stops in stop mode		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: L) 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)		0

Address of M74 Resister (HEXA)				Parameter Display	Function Explanation	Property (R/W)	Setting Range & Descriptions	Unit	Initial Value
CH1	CH2	CH3	CH4						
							21 : Loop break alarm(LBA) operat when heater break alarm(HBA) Turns 22 : HBA, HOC, LBA 역 접점 출력	OFF	
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		R/W	Same as Alarm 1 Output Port Setting		2
143(008Fh)	243(00F3h)	343(0157h)	443(01BBh)	A3Pn		R/W	Same as Alarm 1 Output Port Setting		3
144(0090h)	244(00F4h)	344(0158h)	444(01BCh)	A4Pn		R/W	Same as Alarm 1 Output Port Setting		4
145(0091h)	245(00F5h)	345(0159h)	445(01BDh)	LBA		R/W	0 : OFF / 1 ~ 7200	sec.	480
146(0092h)	246(00F6h)	346(015Ah)	446(01BEh)	LBW		R/W	0.1 ~ 999.9	℃	2.0
147(0093h)	247(00F7h)	347(015Bh)	447(01BFh)	A1DY	Alarm 1 output delay	R/W	0 ~ 240 s.	sec.	0
148(0094h)	248(00F8h)	348(015Ch)	448(01C0h)	HBA		R/W	0 : OFF / 0.1 ~ 38.0	A	0
149(0095h)	249(00F9h)	349(015Dh)	449(01C1h)	HOC		R/W	0 : OFF / 0.1 ~ 38.0	A	0
150(0096h)	250(00FAh)	350(015Eh)	450(01C2h)	HDB		R/W	0.0 ~ 30.0	A	1.0
151(0097h)	251(00FBh)	351(015Fh)	451(01C3h)	HBS		R/W	0 ~ 100	%	20
152(0098h)	252(00FCh)	352(0160h)	452(01C4h)	H.ADJ		R/W	0 : OFF / 1 : ON		0
153(0099h)	253(00FDh)	353(0161h)	453(01C5h)	H.HLD		R/W	0 : OFF / 1 : ON		0
154(009Ah)	254(00FEh)	354(0162h)	454(01C6h)	Reserved.					
155(009Bh)	255(00FFh)	355(0163h)	455(01C7h)	Reserved.					
156(009Ch)	256(0100h)	356(0164h)	456(01C8h)	P		R/W	0 : ON/OFF Control 0.1 ~ 999.9 : PID Control		20.0
157(009Dh)	257(0101h)	357(0165h)	457(01C9h)	I		R/W	0 : OFF / 1 ~ 3600	sec.	240
158(009Eh)	258(0102h)	358(0166h)	458(01CAh)	D		R/W	0 : OFF / 1 ~ 3600	sec.	60
159(009Fh)	259(0103h)	359(0167h)	459(01CBh)	M.R		R/W	-5.0 ~ 105.0	%	50.0
160(00A0h)	260(0104h)	360(0168h)	460(01CCh)	HC.DB		R/W	-100.0 ~ 100.0	%	0.0
161(00A1h)	261(0105h)	361(0169h)	461(01CDh)	STB.C	Control stability	R/W	1 ~ 5 (Use only when it is not stable after AT)		1
162(00A2h)	262(0106h)	362(016Ah)	462(01CEh)	RIFT		R/W	0 ~ 100	%	10
163(00A3h	263(0107h)	363(016Bh)	463(01CFh)	RTMU		R/W	0 : Minute 1 : Hour		0
164(00A4h)	264(0108h)	364(016Ch)	464(01D0h)	UP.RT		R/W	0 : OFF / EUS (0 ~ 100 %)	℃	0
165(00A5h)	265(0109h)	365(016Dh)	465(01D1h)	DN.RT		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	Normal Mode : 1 ~ 100 s. Fast Mode : 0.1 ~ 10.0 s.	sec.	SSR : 2 RLY : 20
174(00AEh)	274(0112h)	374(0176h)	474(01DAh)	CTC	Cooling Side Control Output Cycle	R/W	Normal Mode : 1 ~ 100 s. Fast Mode : 0.1 ~ 10.0 s.	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

Address of M74 Resister (HEXA)				Parameter Display	Function Explanation	Property (R/W)	Setting Range & Descriptions	Unit	Initial Value
CH1	CH2	CH3	CH4						
178(00B2h)	278(0116h)	378(017Ah)	478(01DEh)	PO	Output volume at discon sensor	R/W	EnPO(71)=1, 가열측 MV (0.0 ~ 100.0)	%	0.0
				LoMV.H	Lower heating limit	R/W	EnPO(71)=2, Dual control only		
179(00B3h)	279(0117h)	379(017Bh)	479(01DFh)	POC	Output volume at discon sensor	R/W	EnPO(71)=1, 냉각측 MV (0.0 ~ 100.0)	%	0.0
				LoMV.C	Lower cooling limit	R/W	EnPO(71)=2, Dual control only		
180(00B4h)	280(0118h)	380(017Ch)	480(01E0h)	OL-L	Output Value Lower Limit	R/W	-0.5 ~OL-H (H&C : -105.0 ~ 0)	%	0.0
181(00B5h)	281(0119h)	381(017Dh)	481(01E1h)	OL-H	Output Value Upper Limit	R/W	OL-L ~ 105.0 (H&C : 0 ~ 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 : [Pt1000] -199.9 ~ 140.0 ℃ 27 : **[Pt1000] -200 ~ 140 ℃** 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 sec.	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			

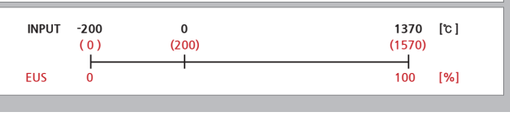
※ EU : An engineering unit in compliance with the input range

Ex.) Input selection no. : 01 (K-TYPE)

EU 0 % = -200
EU 100 % = 1370



EUS 0 % = 0
EUS 100 % = 1570



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