I/O Module

M74R (M74 option module)



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. 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.
3. Do not apply beyond rated pressure when connecting or disconnecting connector.
4. Install the switch or circuit breaker in a convenient portion to supply and block out the power.
5. Do not use it for other purpose than temperature controller (voltmeter, ammeter, etc)
6. Supply power input with an insulated, limited voltage/current or Class 2, SELV power supply.
7. 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.
8. 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.
9. Make sure to reach the rated voltage within 2 seconds after powering up.
10. Do not wiring to unused terminal.
11. Install the DIN rail vertically to the base ground.
12. 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 □ □

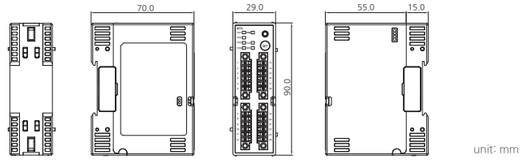
- Option
- Channel
- Multi channel module PID controller

2. Main features of M74R Input & Output Option Module

M74R is an option module to expand input & output of M74 series of 4 channel PID temperature controller, furthermore, independently usable as general-purpose input & output device by connecting to PC, PLC, or Touch Panel. Built-in 4 points of CT input, 5 points of DI input and 8 points of relay contact output and expandable up to 3 units on the right side of M74, and expandable up to 31 units.

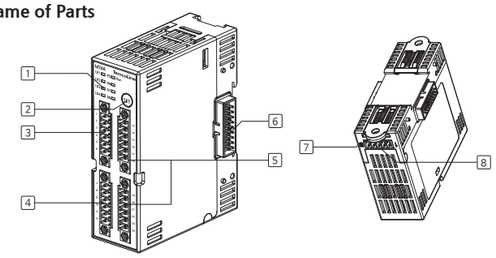
1. Efficient space secure and arrangement through the industry's smallest structure and high reliability.
2. Various input & output per module (CT 4 points, DI 4 points, single contact output 3 points, common contact output 5 points supported.
3. Easy expandability (Automatically recognized when installed on the right side of M74, and all inputs and outputs are usable.
4. M74R can be independently used as general-purpose input & output device by connecting to PC, PLC, or Touch Panel.
5. Modbus-RTU/ASCII, PC-Link, TL-Link protocol supports high speed communication up to 115,200 bps.
6. Easy setting of communication parameter through front control key. (protocol, baud rate, station number up to 31 setting)
7. Designed as fully insulation structure between each input and input/output. (withstanding voltage 1,000V AC or higher)

3. Dimension



unit: mm

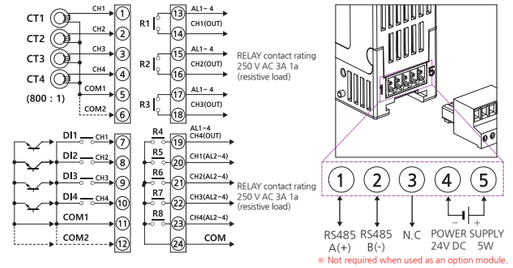
4. Name of Parts



1 Indicator Lamp- each channel Status, Power monitoring, communication status (RX/TX)
2 Set Button- Change Communication Parameter (Station Number, Communication speed, Protocol)
3 C.T(Current Transformer) 800 : 1 input terminal
4 Digital input terminal
5 Relay1 ~ 8 ch 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) Check the polarity when connecting power or communication.
2) Use AWG 28 ~ 14 cable when connecting power input and CT.
3) Use AWG 24 cable or over in case of reply output.



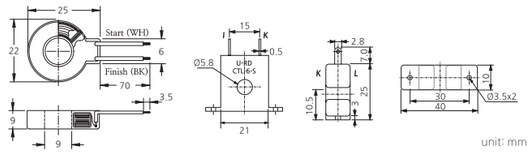
※ Not required when used as an option module.

※ Digital input
ON : 1KΩ or less
OFF : 100KΩ or more

※ Communication lines and power supply are not required when used with M74 module. but required only for Input & Output control using external communication with M74R module.

6. CT option

CT: Use 800:1 CT (TS-9W or CTL-6)

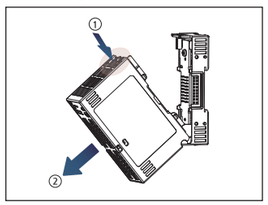


unit: mm

TS-9W (Temcoline) CTL-6-S (U-RD)

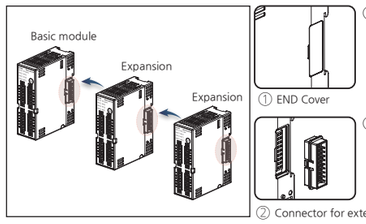
7. Install Method

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

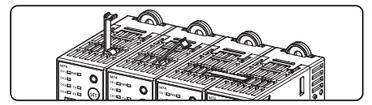


① END Cover

② Connector for extension

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

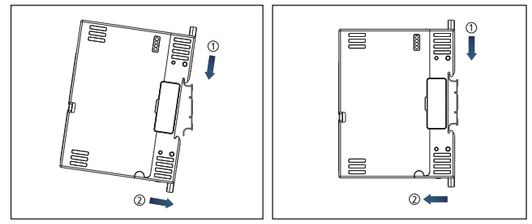
② After inserting the extension connector, attach the extension module closely.



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



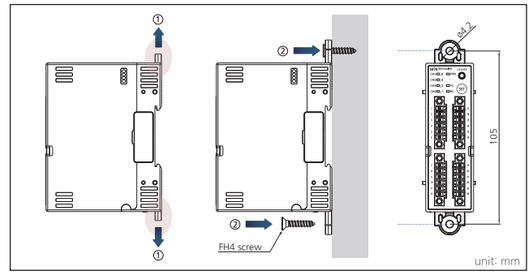
Install Module

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)

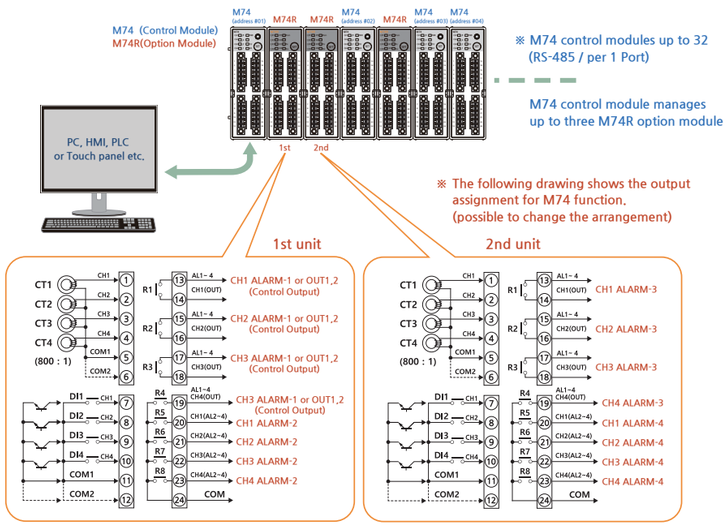
8. Specification

Product Description	M74R input/output option module (CT input 4 points, DI 4 points, relay contact output 8 points)	
Power supply	24V DC	
Allowable voltage fluctuation Range	90 to110% 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	C.T (Current Transformer)	4 input, CT ratio : 1 / 800, current range : 0.0 ~ 38.0 A (±3% FS+1Digit)
	D.I (Digital Input)	4 input, npn-contact or contact (ON: 1KΩ or less, OFF: 100KΩ or more)
Output Specification	Single Contact Output	3 output, 1a 250 V AC 3A(resistance load) Mechanical 10 million times or more
	Common Contact Output	5 output, 1a 250 V AC 3A(esistance load) Mechanical 10 million times or more
Measurement accuracy (CT input)	Current range : 0.0 ~ 38.0 A (±3% FS+1Digit)	
Control Method	Controlled by M74 or upper device such as PLC, PC, Touch, etc.	
Communication (RS-485)	Modbus-ASCII, RTU, PC or TL-Link, Baudrate 9,600 ~ 115,200 bps (when using a higher-level device)	
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: ⊡ Withstand voltage between measuring input and power supply: 1KV or more)	
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)	

9. M74R General usage & Connection

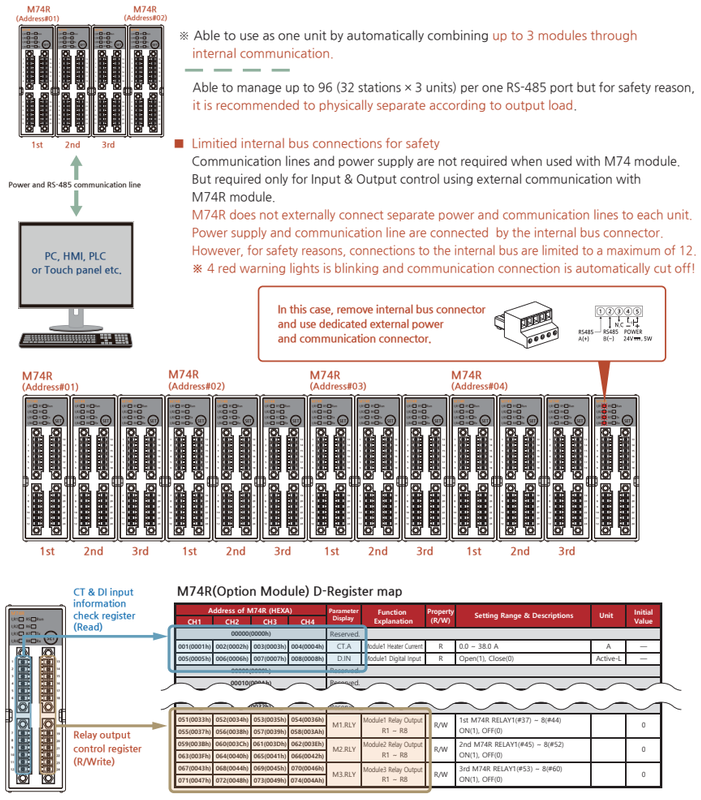
1. General Usage

It is connected to the right side of the M74 control module and used as an input & output expansion module and M74 unit will automatically control the option module (M74R) by internal communication line.



2. Sole usage

Possible to control through external RS-485 communication. (General purpose input & output module)



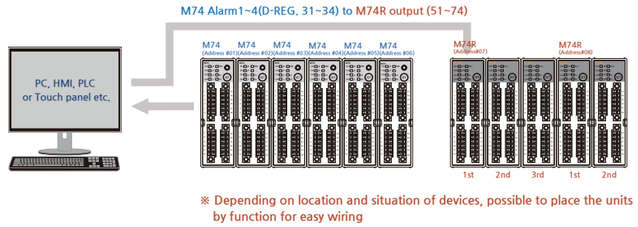
M74R(Option Module) D-Register map

CT & DI input information check register (Read)

Relay output control register (R/Write)

Address of M74R (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)	CT.A	Module1 Heater Current	R	0.0 ~ 38.0 A	A	—
005(0005h)	006(0006h)	007(0007h)	008(0008h)	D.IN	Module1 Digital input	R	Open(0), Close(1)	Active-L	—
00009(0009h)				Reserved.					
00010(000Ah)				Reserved.					
051(0033h)	052(0034h)	053(0035h)	054(0036h)	M1.RLY	Module1 Relay Output R1 ~ R8	R/W	1st M74R RELAY1(#37) ~ 8(#44) ON(1), OFF(0)		0
055(0037h)	056(0038h)	057(0039h)	058(003Ah)						
059(003Bh)	060(003Ch)	061(003Dh)	062(003Eh)	M2.RLY	Module2 Relay Output R1 ~ R8	R/W	2nd M74R RELAY1(#45) ~ 8(#52) ON(1), OFF(0)		0
063(003Fh)	064(0040h)	065(0041h)	066(0042h)						
067(0043h)	068(0044h)	069(0045h)	070(0046h)	M3.RLY	Module3 Relay Output R1 ~ R8	R/W	3rd M74R RELAY1(#53) ~ 8(#60) ON(1), OFF(0)		0
071(0047h)	072(0048h)	073(0049h)	074(004Ah)						

3. Other application usage



10. M74R Warning & Status Indicator Lamps

1. Communication status display

ⓐ Communication Failure

I,R1~4 LED lamps blink in orangel

There is no connection or abnormal communi-cation status.

ⓑ Ongoing Internal Communication

R5(Run) LED lamp blink in red

Communication processing between M74 or M74R modules.

ⓒ Ongoing External RS-485 Communication

R7(Tx), R8(Rx) lamp blink in red

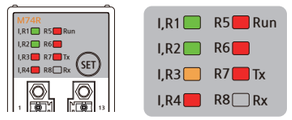
Communication processing with host device PC, PLC, HMI, etc

ⓓ Connection Limit

I,R1~4 LED lamp blink in red

To limit communication for safety when more than 12 Unit are connected in series

2. Display Input & Output status during normal operation



I,R1~4, R5~8 LED lamp indicate status of DI (Digital Input) and RY (Relay output).

- Green lamp: Display Close status of digital input DI1 ~ 4
- Red lamp: Display ON status of relay output R1 ~ 8
- Orange lamp: Display simultaneous operation of input (DI) & output (RY)

Everything related to M74 interface is done automatically by M74R itself. The number of connection and arrangement of input and output are automatically arranged according to requirement of M74 unit by default. Also, possible to reorganize auto arrangement as you want by changing M74 alarm output port.

When used as general-purpose input & output device, address number, communication speed, communication protocol, etc. can be separately set according to upper level (PC, HMI, PLC, etc.) RS-485 communication condition.
External communication RS-485 default value is shown on right.

▣ Factory Default Communication Setting

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

Able to change with front key!

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

Automatic setting when changing protocol!

※ For communication parameter setting method, refer M74 Manual Page 7~10 section of front display lamp and function operation.

[Notes]
M74R smart I/O module is basically an optional input & output module that used in connection with M74 (4CH PID Controller). And it is designed to be also used independently as general-purpose input & output device. Switching internal communication and external RS-485 communication is automatically selected.

M74R(Option Module) Communication register mapping table

Register Address Range (HEXA)	Explanation	Remark
00000(0000h) ~ 00099(0063h)	Ch1~4 Monitoring and common setting register group	It is absolute address of M(N)74. In case of Modbus communication, it is used from address 40001(40001h), which is in range of 16-bit Holding Registers.
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	

M74R(Option Module) Modbus protocol supported function code

Function Code	Characteristics of function codes	Detail of Function
03(03h)	Read Holding Registers	Consecutive register can be read up to 32
06(06h)	Write Sigle Register	Able to write the desired value of each register one by one
16(10h)	Write Multiple Registers	Consecutive register can be written up to 25

The serviceable function code of Modbus protocol uses the address of 400001(40001h) ~ 465535(4FFFFh) which is in range of 16-bit Holding Registers. In Modbus communication, the address will be designated as 400001 (40001h) (starting address of 16-bit holding register + address of M74 resister. Please note that address may be pushed to +1 or +0 depending on the address mode of the upper device.

Ex.) When accessing CH3 PV [Heater current measurement (Address 003)] by Modbus protocol,
Decimal notation 400004 address, Hexadecimal notation 40004h address
Decimal notation 400003 address, Hexadecimal notation 40003h address

※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 M74R (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)	CT.A	Module1 Heater Current	R	0.0 ~ 38.0 A	A	—
005(0005h)	006(0006h)	007(0007h)	008(0008h)	D.IN	Module1 Digital input	R	Open(0), Close(1)	Active-H	—
00009(0009h)				Reserved.					
00010(000Ah)				Reserved.					
011(000Bh)	012(000Ch)	013(000Dh)	014(000Eh)	CT.A	Module2 Heater Current	R	0.0 ~ 38.0 A	A	—
015(000Fh)	016(0010h)	017(0011h)	018(0012h)	D.IN	Module2 Digital input	R	Open(0), Close(1)	Active-H	—
00019(0013h)				Reserved.					
00020(0014h)				Reserved.					
021(0015h)	022(0016h)	023(0017h)	024(0018h)	CT.A	Module3 Heater Current	R	0.0 ~ 38.0 A	A	—
025(0019h)	026(001Ah)	027(001Bh)	028(001Ch)	D.IN	Module3 Digital input	R	Open(0), Close(1)	Active-H	—
00029(001Dh)				DI.STS	M74R D.I (Active - High)	R	3rd Module: DI4(b11) ~ DI1(b8) 2nd Module: DI4(b7) ~ DI1(b4) 1st Module: DI4(b3) ~ DI1(b0)	Open(0) Short(1) Active-H	—
00030(001Eh)				OUT1	Module1 output	R	R8(b7) ~ R1(b0), ON(1), OFF(0)	bit	—
00031(001Fh)				OUT2	Module2 output	R	R8(b7) ~ R1(b0), ON(1), OFF(0)	bit	—
00032(0020h)				OUT3	Module3 output	R	R8(b7) ~ R1(b0), ON(1), OFF(0)	bit	—
00033(0021h) ~ 46(002Eh)				Reserved.					
00047(002Fh)				SYS.I	System information	R	Model and Firmware Version		—
00048(0030h)				SYS.T	System speed	R	0.01 ~ 655.35	ms	—
00049(0031h)				PDT.I	Production information	R	Model and Input channel information		—
00050(0032h)				Reserved.					
051(0033h)	052(0034h)	053(0035h)	054(0036h)	M1.RLY	Module1 Relay Output R1 ~ R8	R/W	1st M74R RELAY1(#51) ~ 8(#58) ON(1), OFF(0)		0
055(0037h)	056(0038h)	057(0039h)	058(003Ah)						
059(003Bh)	060(003Ch)	061(003Dh)	062(003Eh)	M2.RLY	Module2 Relay Output R1 ~ R8	R/W	2nd M74R RELAY1(#59) ~ 8(#66) ON(1), OFF(0)		0
063(003Fh)	064(0040h)	065(0041h)	066(0042h)						
067(0043h)	068(0044h)	069(0045h)	070(0046h)	M3.RLY	Module3 Relay Output R1 ~ R8	R/W	3rd M74R RELAY1(#67) ~ 8(#74) ON(1), OFF(0)		0
071(0047h)	072(0048h)	073(0049h)	074(004Ah)						

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