

Multi-CH Modular Type Temperature Controller TM Series

USER MANUAL For COMMUNICATION



Preface

Thank you for purchasing an Autonics product.

Please familiarize yourself with the information contained in the Safety Precautions section before using this product.

This user manual contains information about the product and its proper use, and should be kept in a place where it will be easy to access.

User Manual Guide





- Please familiarize yourself with the information in this manual before using the product.
- This manual provides detailed information on the product's features. It does not offer any guarantee concerning matters beyond the scope of this manual.
- This manual may not be edited or reproduced in either part or whole without permission.
- A user manual is not provided as part of the product package.
Visit our web site (www.autonics.com) to download a copy.
- The manual's content may vary depending on changes to the product's software and other unforeseen developments within Autonics, and is subject to change without prior notice.
Upgrade notice is provided through out homepage.
- We contrived to describe this manual more easily and correctly. However, if there are any corrections or questions, please notify us these on our homepage.

Communication Protocol

TM Series is accepted to Modbus RTU Protocol.


Users should be aware that it does not support a broadcast command.


User Manual Symbols

Symbol	Description
 Note	Supplementary information for a particular feature.
 Warning	Failure to follow instructions can result in serious injury or death.
 Caution	Failure to follow instructions can lead to a minor injury or product damage.
 Ex.	An example of the concerned feature's use.
※1	Annotation mark.

Safety Precautions

- Following these safety precautions will ensure the safe and proper use of the product and help prevent accidents, as well as minimizing possible hazards.
- Safety precautions are categorized as Warnings and Cautions, as defined below:

	Warning	Warning	Failure to follow the instructions may lead to a serious injury or accident.
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	Caution	Caution	Failure to follow the instructions may lead to a minor injury or accident.
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Warning

- Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)
Failure to follow this instruction may result in personal injury, fire, or economic loss.
- The unit must be installed on a device panel before use.
Failure to follow this instruction may result in electric shock.
- Do not connect, repair, or inspect the unit while connected to a power source.
Failure to follow this instruction may result in electric shock.
- Check the terminal numbers before connecting the power source.
Failure to follow this instruction may result in fire.
- Do not disassemble or modify the unit. Please contact us if necessary.
Failure to follow this instruction may result in electric shock or fire.



Caution

- Do not use the unit outdoors.
Failure to follow this instruction may result in shortening the life cycle of the unit, or electric shock.
- When connecting the power input and relay output cables, use AWG20 (0.05mm²) cables and make sure to tighten the terminal screw bolt above 0.74N·m to 0.90N·m.
Failure to follow this instruction may result in fire due to contact failure.
- Use the unit within the rated specifications.
Failure to follow this instruction may result in shortening the life cycle of the unit, or fire.
- Do not use loads beyond the rated switching capacity of the relay contact.
Failure to follow this instruction may result in insulation failure, contact melt, contact failure, relay broken, or fire.
- Do not use water or oil-based detergent when cleaning the unit. Use dry cloth to clean the unit.
Failure to follow this instruction may result in electric shock or fire.
- Do not use the unit where flammable or explosive gas, humidity, direct sunlight, radiant heat, vibration, or impact may be present.
Failure to follow this instruction may result in fire or explosion.

- Keep dust and wire residue from flowing into the unit.
Failure to follow this instruction may result in fire or product damage.
- Check the polarity of the measurement input contact before wiring the temperature sensor.
Failure to follow this instruction may result in fire or explosion.
- For installing the unit with reinforced insulation, use the power supply unit which basic level is ensured.

※ The above specifications are subject to change and some models may be discontinued without notice.

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1 Modbus RTU Protocol

1.1 Read coil status(Func 01-01H)

Read output(OX reference, Coil) ON/OFF status in the slave device.

(1) Query (Master)

Slave address	Function	Starting address		No. of points		Error check(CRC16)	
		High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte
← CRC16 →							

(2) Response (Slave)

Slave address	Function	Byte count	Data	Data	Data	Error check(CRC16)	
						Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte
← CRC16 →							

If read the 10 output status(ON: 1, OFF: 0) within coil 000001(0000 H) to 000010(0009 H) on Slave(Address 17) from Master.

▪ Query (Master)

Slave address	Function	Starting address		No. of points		Error check(CRC16)	
		High	Low	High	Low	Low	High
11 H	01 H	00 H	00 H	00 H	0A H	## H	## H

If the values range from coil 000008(0007 H) to 000001(0000 H) on the Slave are "ON-ON-OFF-OFF-ON-ON-OFF-ON", and the values from 000010(0009 H) to 000009(0008 H) are respectively "OFF-ON".

▪ Response (Slave)

Slave address	Function	Byte count	Data (000008 to 000001)	Data (000010 to 000009)	Error check(CRC16)	
					Low	High
11 H	01 H	02 H	CD H	01 H	## H	## H

1.2 Read input status(Func 02-02H)

Read Input ON/OFF status(1X reference) in Slave device.

(1) Query (Master)

Slave address	Function	Starting address		No. of points		Error check(CRC16)	
		High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte
CRC16							

(2) Response (Slave)

Slave address	Function	Byte count	Data	Data	Data	Error check(CRC16)	
						Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte
CRC16							

If read the 10 input status(ON: 1, OFF: 0) within range 100001(0000 H) to 100010(0009 H) in the Slave from the Master.

▪ Query (Master)

Slave address	Function	Starting address		No. of points		Error check(CRC16)	
		High	Low	High	Low	Low	High
11 H	02 H	00 H	00 H	00 H	0A H	## H	## H

If the values range 100008(0007 H) to 100001(0000 H) on Slave are "ON-ON-OFF-OFF-ON-ON-OFF-ON", and the values of 100010(0009 H) and 100009(0008 H) are respectively "OFF-ON".

▪ Response (Slave)

Slave address	Function	Byte count	Data (100008 to 100001)	Data (100010 to 100009)	Error check(CRC16)	
					Low	High
11 H	02 H	02 H	CD H	01 H	## H	## H

1.3 Read holding registers(Func 03–03H)

Read the Binary data of Holding Registers(4X reference) in Slave device.

(1) Query (Master)

Slave address	Function	Starting address		No. of points		Error check(CRC16)	
		High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

← CRC16 →

(2) Response (Slave)

Slave address	Function	Byte count	Data		Data		Data		Error check(CRC16)	
			High	Low	High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

← CRC16 →

If read the 2 values from Holding Register 400001(0000 H) to 400002(0001 H), in Slave(Address 17) from the Master.

▪ Query (Master)

Slave address	Function	Starting address		No. of points		Error check(CRC16)	
		High	Low	High	Low	Low	High
11 H	03 H	00 H	00 H	00 H	02 H	## H	## H

If the value of 400001(0000 H) on Slave is “555(22B H)” and the value of 400002(0001 H) is “100(64 H)”.

▪ Response (Slave)

Slave address	Function	Byte count	Data		Data		Error check(CRC16)	
			High	Low	High	Low	Low	High
11 H	03 H	04 H	02 H	2B H	00 H	64 H	## H	## H

1.4 Read input registers(Func 04-04H)

Read the Binary data of Input Registers(3X reference) in Slave device.

(1) Query (Master)

Slave address	Function	Starting address		No. of points		Error check(CRC16)	
		High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte
← CRC16 →							

(2) Response (Slave)

Slave address	Function	Byte count	Data	Data	Data	Error check(CRC16)	
						Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte
← CRC16 →							

If read the 2 values within the range from Input Register 300001(0000 H) to 300002(0001 H) on Slave(Address 17) from Master.

▪ Query (Master)

Slave address	Function	Starting address		No. of points		Error check(CRC16)	
		High	Low	High	Low	Low	High
11 H	04 H	00 H	00 H	00 H	02 H	## H	## H

If the values of 300001(0000 H) and 300002(0001 H) on Slave are respectively "10(A H)" and "20(14 H)".

▪ Response (Slave)

Slave address	Function	Byte count	Data		Data		Error check(CRC16)	
			High	Low	High	Low	Low	High
11 H	04 H	04 H	00 H	0A H	00 H	14 H	## H	## H

1.5 Force single coil (Func 05–05H)

Turns ON (FF00 H) or OFF (0000 H) of single coil (0X reference) status within slave device.

(1) Query (Master)

Slave address	Function	Starting address		Preset data		Error check (CRC16)	
		High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

← CRC16 →

(2) Response (Slave)

Slave address	Function	Starting address		Preset data		Error check (CRC16)	
		High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

← CRC16 →

If Coil 000001 (0000 H) turns ON of Slave (Address 17) from Master.

▪ Query (Master)

Slave address	Function	Starting address		Preset data		Error check (CRC16)	
		High	Low	High	Low	Low	High
11 H	05 H	00 H	00 H	FF H	00 H	## H	## H

▪ Response (Slave)

Slave address	Function	Starting address		Preset data		Error check (CRC16)	
		High	Low	High	Low	Low	High
11 H	05 H	00 H	00 H	FF H	00 H	## H	## H

1.6 Preset single registers(Func 06–06H)

Read the Binary data of single Holding Registers (4X reference) in Slave device.

(1) Query (Master)

Slave address	Function	Register address		Preset data		Error check(CRC16)	
		High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

CRC16

(2) Response (Slave)

Slave address	Function	Register address		Preset data		Error check(CRC16)	
		High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

CRC16

If write “10(A H)” to Holding Register 400001(0000 H) on Slave(Address 17) from Master.

▪ Query (Master)

Slave address	Function	Starting address		Preset data		Error check(CRC16)	
		High	Low	High	Low	Low	High
11 H	06 H	00 H	00 H	00 H	0A H	## H	## H

▪ Response (Slave)

Slave address	Function	Starting address		Preset data		Error check(CRC16)	
		High	Low	High	Low	Low	High
11 H	06 H	00 H	00 H	00 H	0A H	## H	## H

1.7 Preset multiple registers(Func 16–10H)

Write the Binary data of Holding Registers (4X reference) consecutively in Slave device.

(1) Query (Master)

Slave Address	Function	Starting Address		No. of register		Byte count	Data		Data		Error check (CRC16)	
		High	Low	High	Low		High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

← CRC16 →

(2) Response (Slave)

Slave address	Function	Starting address		No. of register		Error check(CRC16)	
		High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

← CRC16 →

If write "10(A H)" in common to the range of Holding Register 400001(0000 H) to 400002(0001 H) on Slave from Master.

▪ Query (Master)

Slave address	Function	Starting Address		No. of register		Byte count	Data		Data		Error check (CRC16)	
		High	Low	High	Low		High	Low	High	Low	Low	High
11 H	10 H	00 H	00 H	00 H	02 H	04 H	00 H	0A H	00 H	0A H	## H	## H

▪ Response (Slave)

Slave address	Function	Starting address		No. of register		Error check(CRC16)	
		High	Low	High	Low	Low	High
11 H	10 H	00 H	00 H	00 H	02 H	## H	## H

Please use the Single Register Write function rather than Multi Register Write function if you use the slave(device) connecting with external devices such as PLC, Graphic Panel, except in the case of download that presets the minimum/maximum or basic value of parameter by Input specifications in PC Loader Program

1.8 Exception response-error code

If occurs an error, send a response command and transmit each Exception Code after set(1) the highest-level bit of received command(Function).

Slave address	Function +80 H	Exception code	Error check(CRC16)	
			Low	High
1Byte	1Byte	1Byte	1Byte	1Byte
← CRC16 →				

- ILLEGAL FUNCTION (Exception Code: 01 H): A command that is not supported
- ILLEGAL DATA ADDRESS (Exception Code: 02 H): Starting address of queried data is inconsistent with transmittable address from the device.
- ILLRGAL DATA VALUE (Exception Code: 03 H): Numbers of queried data are inconsistent with the numbers of transmittable (transferable) data from the device.
- SLAVE DEVICE FAILURE (Exception Code: 04 H): Not properly completed the queried command (order).

Read the output status of non-existing coil 001001(03E8 H) [ON: 1, OFF: 0] on Slave(Address 17) from Master.

- Query (Master)

Slave address	Function	Starting address		No. of points		Error check(CRC16)	
		High	Low	High	Low	Low	High
11 H	01 H	03 H	E8 H	00 H	01 H	## H	## H

- Response (Slave)

Slave address	Function +80 H	Exception Code	Error check(CRC16)	
			Low	High
11 H	81 H	02 H	## H	## H

2 Modbus Mapping Table

Please be aware that the Parameter Addresses of TM2 series and those of M4 series are totally different.

2.1 Read coil status/force single coil (Func: 01/05, RW: R/W)

No(Address)		Parameter	Description	Setting range	Unit	Factory default
TM2	TM4					
000001(0000)	000001(0000)	CH1 RUN/STOP	CH1 control output Run/Stop	0: RUN 1: STOP	-	0
000002(0001)	000002(0001)	CH1 Auto-Tuning Execute	CH1 auto-tuning execute/sop	0: OFF 1: ON	-	0
000003(0002)	000003(0002)	CH2 RUN/STOP	CH2 control output run/stop	0: RUN 1: STOP	-	0
000004(0003)	000004(0003)	CH2 Auto-Tuning Execute	CH2 auto-tuning execute/stop	0: OFF 1: ON	-	0
-	000005(0004)	CH3 RUN/STOP	CH3 control output run/stop	0: RUN 1: STOP	-	0
-	000006(0005)	CH3 Auto-Tuning Execute	CH3 auto-tuning execute/stop	0: OFF 1: ON	-	0
-	000007(0006)	CH4 RUN/STOP	CH4 control output run/stop	0: RUN 1: STOP	-	0
-	000008(0007)	CH4 Auto-Tuning Execute	CH4 auto-tuning execute/stop	0: OFF 1: ON	-	0
000009(0008) to 000050(0031)	000009(0008) to 000050(0031)	Reserved				

2.2 Read input status (Func: 02, RW: R)

No(Address)		Parameter	Description	Setting range	Unit	Factory default
TM2	TM4					
100001(0000)	100001(0000)	-	CH1 LED(OUT)	0: OFF 1: ON	-	-
100002(0001)	100002(0001)	-	CH2 LED(OUT)	0: OFF 1: ON	-	-
-	100003(0002)	-	CH3 LED(OUT)	0: OFF 1: ON	-	-
-	100004(0003)	-	CH4 LED(OUT)	0: OFF 1: ON	-	-
100005(0004)	-	-	AL1 LED	0: OFF 1: ON	-	-
100006(0005)	-	-	AL2 LED	0: OFF 1: ON	-	-
100007(0006)	-	-	AL3 LED	0: OFF 1: ON	-	-
100008(0007)	-	-	AL4 LED	0: OFF 1: ON	-	-
100009(0008)	-	-	DI-1 input	0: OFF 1: ON	-	-
100010(0009)	-	-	DI-2 input	0: OFF 1: ON	-	-
100011(000A) to 100050(0031)	100011(000A) to 100050(0031)	Reserved				

2.3 Read input register (Func: 04, RW: R)

No(Address)		Parameter	Description	Setting range	Unit	Factory default
TM2	TM4					
300001(0000) to 300100(0063)	300001(0000) to 300100(0063)	Reserved				
300101(0064)	300101(0064)	-	Product number H	-	-	
300102(0065)	300102(0065)	-	Product number L	-	-	
300103(0066)	300103(0066)	-	Hardware version	-	-	
300104(0067)	300104(0067)	-	Software version	-	-	
300105(0068)	300105(0068)	-	Model name 1	-	-	“□□”
300106(0069)	300106(0069)	-	Model name 2	-	-	“□□”
300107(006A)	300107(006A)	-	Model name 3	-	-	“□□”
300108(006B)	300108(006B)	-	Model name 4	-	-	“□□”
300109(006C)	300109(006C)	-	Model name 5	-	-	“□”
300110(006D)	300110(006D)	-	Model name 6	-	-	“□”
300111(006E)	300111(006E)	-	Model name 7	-	-	“□”
300112(006F)	300112(006F)	-	Model name 8	-	-	“□”
300113(0070)	300113(0070)	-	Model name 9	-	-	“□”
300114(0071)	300114(0071)	-	Model name 10	-	-	“□”
300115(0072)	300115(0072)	-	Reserved	-	-	-
300116(0073)	300116(0073)	-	Reserved	-	-	-
300117(0074)	300117(0074)	-	Reserved	-	-	-
300118(0075)	300118(0075)	-	Coil status start address	-	-	0000
300119(0076)	300119(0076)	-	Coil status quantity	-	-	0
300120(0077)	300120(0077)	-	Input status start address	-	-	0000
300121(0078)	300121(0078)	-	Input status quantity	-	-	0
300122(0079)	300122(0079)	-	Holding register start address	-	-	0000
300123(007A)	300123(007A)	-	Holding register quantity	-	-	0
300124(007B)	300124(007B)	-	Input register start address	-	-	0000
300125(007C)	300125(007C)	-	Input register quantity	-	-	0
300126(007D)	300126(007D)	-	Channel quantity	-	-	0
300127(007E) to 300200(00C7)	300127(007E) to 300200(00C7)	Reserved				

2.4 Read input register (Func: 04, RW: R)

No(Address)		Parameter	Description	Setting range	Unit	Factory default
TM2	TM4					
301001(03E8)	301001(03E8)	CH1 Present Value	Present value	Input range by sensor type 31000: OPEN 30000: HHHH -30000: LLLL	°C/°F	-
301002(03E9)	301002(03E9)	CH1 Dot	Sensor decimal point	0: 0 1: 0.0	-	0
301003(03EA)	301003(03EA)	CH1 Unit	Sensor temperature unit	0: °C 1: °F	-	0
301004(03EB)	301004(03EB)	CH1 Set Value	Temperature setting value controlled currently	SV low limit to SV high limit	°C/°F	0
301005(03EC)	301005(03EC)	CH1 Heating_MV	Heating MV	0.0 to 100.0	%	-
301006(03ED)	301006(03ED)	CH1 Cooling_MV	Cooling MV	0.0 to 100.0	%	-
301007(03EE) to 301012(03F3)	301007(03EE) to 301012(03F3)	CH2 Parameter- the same as above CH1				
-	301013(03F4) to 301018(03F9)	CH3 Parameter- the same as above CH1				
-	301019(03FA) to 301024(03FF)	CH4 Parameter - the same as above CH1				
301025(0400)		-	CH1 LED(OUT)	0: OFF 1: ON	-	-
		-	CH2 LED(OUT)	0: OFF 1: ON	-	-
		-	-	Fixed as 0	-	-
		-	-	Fixed as 0	-	-
		-	AL1 LED	0: OFF 1: ON	-	-
		-	AL2 LED	0: OFF 1: ON	-	-
		-	AL3 LED	0: OFF 1: ON	-	-
		-	AL4 LED	0: OFF 1: ON	-	-
		-	DI-1 input	0: OFF 1: ON	-	-
		-	DI-2 input	0: OFF 1: ON	-	-
-	301025(0400)	-	CH1 LED(OUT)	0: OFF 1: ON	-	-
		-	CH2 LED(OUT)	0: OFF 1: ON	-	-
		-	CH3 LED(OUT)	0: OFF 1: ON	-	-
		-	CH4 LED(OUT)	0: OFF 1: ON	-	-
		-	-	Fixed as 0	-	-
		-	-	Fixed as 0	-	-
		-	-	Fixed as 0	-	-
		-	-	Fixed as 0	-	-
		-	-	Fixed as 0	-	-
		-	-	Fixed as 0	-	-
301026(0401)	301026(0401)	Unit Address	Unit address	01 to 31	-	01

No(Address)		Parameter	Description	Setting range	Unit	Factory default
TM2	TM4					
301027(0402)	-	CT1_Heater Current	CT1 heater current value monitoring	0.0 to 50.0	A	-
301028(0403)	-	CT2_Heater Current	CT2 heater current value monitoring	0.0 to 50.0	A	-

- Consists of the 301025(0400) Address bit data

Bit F	Bit E	Bit D	Bit C	Bit B	Bit A	Bit 9	Bit 8
-	-	-	-	-	-	DI-2 input	DI-1 input
0	0	0	0	0	0	0 or 1	0 or 1
1 Byte							

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
AL4 LED	AL3 LED	AL2 LED	AL1 LED	CH4 LED	CH3 LED	CH2 LED	CH1 LED
0 or 1	0 or 1	0 or 1	0 or 1	0 or 1	0 or 1	0 or 1	0 or 1
1 Byte							

2.5 Read holding register(Func 03)/preset single register(Func 06)/preset multiple registers(Func 16)

2.5.1 Monitoring group[Func : 03/06/16, RW : R/W]

No(Address)		Parameter	Description	Setting range	Unit	Factory default
TM2	TM4					
400001(0000)	400001(0000)	CH1 SV	Temperature setting value controlled currently	SV low limit to SV high limit	°C/°F	0
400002(0001)	400002(0001)	CH1 Heating_MV	Heating MV	0.0 to 100.0	%	-
400003(0002)	400003(0002)	CH1 Cooling_MV	Cooling MV	0.0 to 100.0	%	-
400004(0003)	400004(0003)	CH1 Auto-Manual Control	Auto/Manual Control	0: AUTO 1: MANUAL	-	0
400005(0004) to 400050(0031)	400005(0004) to 400050(0031)	CH1 reserved				
401001(03E8) to 401050(0419)	401001(03E8) to 401050(0419)	CH2 parameter – the same as above CH1				
-	402001(07D0) to 402050(0801)	CH3 parameter - the same as above CH1				
-	403001(0BB8) to 403050(0BE9)	CH4 parameter - the same as above CH1				

2.5.2 Control operation group(Func : 03/06/16, RW : R/W)

No(Address)		Parameter	Description	Setting range	Unit	Factory default
TM2	TM4					
400101(0064)	400051(0032)	CH1 RUN/STOP	Control output run/stop	0: RUN 1: STOP	-	0
400102(0065)	400052(0033)	CH1 Multi SV No	Multi SV No. selection	0: SV-0 1: SV-1 2: SV-2 3: SV-3	-	0
400103(0066)	400053(0034)	CH1 SV-0	SV-0 setting value	SV low limit to SV high limit	°C/°F	0
400104(0067)	400054(0035)	CH1 SV-1	SV-1 setting value	SV low limit to SV high limit	°C/°F	0
400105(0068)	400055(0036)	CH1 SV-2	SV-2 setting value	SV low limit to SV high limit	°C/°F	0
400106(0069)	400056(0037)	CH1 SV-3	SV-3 setting value	SV low limit to SV high limit	°C/°F	0
400107(006A) to 400200(00C7)	400057(0038) to 400100(0063)	CH1 reserved				
401101(044C) to 401200(04AF)	401051(041A) to 401100(044B)	CH2 parameter – the same as above CH1				
-	402051(0802) to 402100(0833)	CH3 parameter - the same as above CH1				
-	403051(0BEA) to 403100(0C1B)	CH4 parameter - the same as above CH1				

2.5.3 Control operation group(Func: 03/06/16, RW: R/W)

No(Address)		Parameter	Description	Setting range		Unit	Factory default
TM2	TM4						
400201(00C8)	400101(0064)	CH1 Auto-Tuning Execute	Auto-tuning execute/stop	0: OFF 1: ON		-	0
400202(00C9)	400102(0065)	CH1 Heating_ Proportional Band	Heating proportional band	0.1 to 999.9		°C	10.0
400203(00CA)	400103(0066)	CH1 Cooling_ Proportional Band	Cooling proportional band				
400204(00CB)	400104(0067)	CH1 Heating_ Integral Time	Heating integral time	0 to 9999		Sec.	0
400205(00CC)	400105(0068)	CH1 Cooling_ Integral Time	Cooling integral time				
400206(00CD)	400106(0069)	CH1 Heating_ Derivation Time	Heating derivation time	0 to 9999		Sec.	0
400207(00CE)	400107(006A)	CH1 Cooling_ Derivation Time	Cooling derivation time				
400208(00CF)	400108(006B)	CH1 Dead_ Overlap band	In heating & cooling control mode, dead band	PID-PID, PID-ON/OFF, ON/OFF-PID	-P BAND to +P BAND	Digit	0.0
				ON/OFF-ON/OFF	-999 to 0 to 999 (H) -999.9 to 0 to 999.9(L)		0
400209(00D0)	400109(006C)	CH1 Manual Reset	In proportional control mode, manual reset	0.0 to 100.0		%	50.0
400210(00D1)	400110(006D)	CH1 Heating_ ON Hysteresis	Heating hysteresis	1 to 100(H) 0.1 to 100.0(L)		Digit	2
400211(00D2)	400111(006E)	CH1 Heating_ OFF Offset	Heating OFF offset	0 to 100(H) 0.0 to 100.0(L)		Digit	0
400212(00D3)	400112(006F)	CH1 Cooling_ ON Hysteresis	Cooling hysteresis	1 to 100(H) 0.1 to 100.0(L)		Digit	2
400213(00D4)	400113(0070)	CH1 Cooling_ OFF Offset	Cooling OFF hysteresis	0 to 100(H) 0.0 to 100.0(L)		Digit	0
400214(00D5)	400114(0071)	CH1 MV Low Limit	MV low-limit setting value	Heating, Cooling	0.0 to MV High Limit -0.1	%	0.0
				Heating & Cooling	-100.0 to 0.0		-100.0
400215(00D6)	400115(0072)	CH1 MV High Limit	MV high-limit setting value	Heating, Cooling	MV Low Limit + 0.1 to 100.0	%	100.0
				Heating & Cooling	0.0 to 100.0		100.0

No(Address)		Parameter	Description	Setting range	Unit	Factory default
TM2	TM4					
400216(00D7)	400116(0073)	CH1 Ramp_Up Rate	Ramp up change rate	0(OFF) to 9999	°C/°F/ Digit	0
400217(00D8)	400117(0074)	CH1 Ramp_Down Rate	Ramp down change rate	0(OFF) to 9999	°C/°F/ Digit	0
400218(00D9)	400118(0075)	CH1 Ramp Time Unit	Ramp time unit	0: SEC 1: MIN 2: HOUR	-	1
400219(00DA) to 400300(012B)	400119 to 400150(0095)	CH1 reserved				
401201(04B0) to 401300(0513)	401101(044C) to 401150(047D)	CH2 parameter - the same as above CH1				
-	402101(0834) to 402150(0865)	CH3 parameter - the same as above CH1				
-	403101(0C 1C) to 403150(0C4D)	CH4 parameter - the same as above CH1				

2.5.4 Initial setting group(Func: 03/06/16, RW: R/W)

No(Address)		Parameter	Description	Setting range	Unit	Factory default
TM2	TM4					
400301(012C)	400151(0096)	CH1 Input Type	Input type	0: K(CA).H to 22: DPT100.L	-	0
400302(012D)	400152(0097)	CH1 Unit	Sensor temperature unit	0: °C 1: °F	-	0
400303(012E)	400153(0098)	CH1 Input Bias	Input bias	-999 to 999(H) -999.9 to 999.9(L)	Digit	0
400304(012F)	400154(0099)	CH1 Digital Filter	Input digital filter	0.1 to 120.0	Sec.	0.1
400305(0130)	400155(009A)	CH1 SV Low Limit	SV low-limit value	Input low-limit range to SV high limit -1digit	°C/°F	-200
400306(0131)	400156(009B)	CH1 SV High Limit	SV high-limit value	SV low limit +1digit to Input high-limit range	°C/°F	1350
400307(0132)	400157(009C)	CH1 Operating Type	Control output operation mode	0: HEATING 1: COOLING 2: HEATING & COOLING	-	0
4002308(0133)	400158(009D)	CH1 Control Method	Temperature control type	Heating Cooling	0: PID 1: ONOFF	0
				Heating & Cooling	0: PID-PID 1: PID-ONOFF 2: ONOFF-PID 3: ONOFF-ONOFF	0
400309(0134)	400159(009E)	CH1 Auto-Tuning Mode	Auto-tuning mode	0: TUN1 1: TUN2	-	0
400310(0135)	400160(009F)	CH1 Heating_Control Time	Heating control time	0.1 to 120.0	Sec.	20.0(RY) 2.0(SSR)
400311(0136)	400161(00A0)	CH1 Cooling_Control Time	Cooling control time	0.1 to 120.0	Sec.	20.0(RY) 2.0(SSR)
400312(0137)	-	CH1 Output(SSR_Curr) Type	Control output type	0: SSR 1: CURRENT	-	0
400313(0138)	-	CH1 Current Output Range	Current output range	0: 4-20 1: 0-20	mA	0
400314(0139) to 400400(0189)	400162(00A1) to 400200(00C7)	CH1 reserved				
401301(00514) to 401400(0577)	401151(047E) to 401200(04AF)	CH2 Parameter - the same as above CH1				
-	402151(0866) to 402200(0897)	CH3 Parameter - the same as above CH1				
-	403151(0C4E) to 403200(0C7F)	CH4 Parameter - the same as above CH1				

2.5.5 Control setting group(Func: 03/06/16, RW: R/W)

No(Address)		Parameter	Description	Setting range	Unit	Factory default
TM2	TM4					
400401(0190)	400201(00C8)	CH1 Multi SV	Multi SV no.	0: 1 1: 2 2: 4	Numbers	0
400402(0191)	400202(00C9)	CH1 Initial Manual MV	MV in manual control mode	0: AUTO-MV 1: PRESET-MV	-	0
400403(0192)	400203(00CA)	CH1 Preset Manual MV	Initial MV in manual control mode	Heating, Cooling 0.0 to 100.0	%	0.0
				Heating & Cooling -100.0(Cool) to 100.0(Heat)	%	0.0
400404(0193)	400204(00CB)	CH1 Sensor Error MV	MV in case of occurs an error in sensors	1. Heating, Cooling 1) PID control: 0.0 to 100.0 2) ON/OFF control: 0.0(OFF)/100.0(ON)	%	0.0
400405(0194)	400205(00CC)	CH1 Stop MV	MV in control stop mode	2. Heating & Cooling 1) PID control: -100.0(Cool) to 100.0(Heat) 2) ON/OFF control: -100.0(Cool ON) / 0.0(OFF) / 100.0(Heat ON)	%	0.0
400406(0195)	400206(00CD)	CH1 Stop Alarm Out	Alarm output for control STOP	0: CONTINUE 1: OFF	-	0
400407(0196) to 400500(01F3)	400207(00CE) to 400250(00F9)	CH1 reserved				
401401(0578) to 401500(05DB)	401201(04B0) to 401250(04E1)	CH2 parameter - the same as above CH1				
-	402201(0898) to 402250(08C9)	CH3 parameter - the same as above CH1				
-	403201(0C80) to 403250(0CB1)	CH4 parameter - the same as above CH1				

2.5.6 Communication setting group(Func: 03/06/16, RW: R/W)

No(Address)		Parameter	Description	Setting range	Unit	Factory default
TM2	TM4					
400601(0258)	400301(012C)	Baudrate	Communication speed	0: 2400 1: 4800 2: 9600 3: 19200 4: 38400	-	2
400602(0259)	400302(012D)	Parity Bit	Communication parity bit	0: NONE 1: EVEN 2: ODD	-	0
400603(025A)	400303(012E)	Stop Bit	Communication stop bit	0: 1 1: 2	-	1
400604(025B)	400304(012F)	Response Waiting Time	Response waiting time	5 to 99	ms	20
400605(025C)	400305(0130)	Communication Write	Communication write	0: ENABLE 1: DISABLE	-	0
400606(025D)	400306(0131)	Parameter Initialize	Parameter initialization	0: NO 1: YES	-	0
400607(025E) to 400700(02BB)	400307(0132) to 400350(015D)	Reserved				

2.5.7 Alarm setting group (Func: 03/06/16, RW: R/W)

No(Address)		Parameter	Description	Setting range	Unit	Factory default
TM2	TM4					
400501(01F4)	-	Alarm1 Target Ch	Alarm output 1 target Ch	0: CH1 1: CH2 2: CH1 or CH2 3: CH1 and CH2	-	0
400502(01F5)	-	Alarm1 Mode	Alarm output1 operation mode	0: OFF 1: AL-1 2: AL-2 3: AL-3 4: AL-4 5: AL-5 6: AL-6 7: LBA 8: SBA 9: HBA	-	1
400503(01F6)	-	Alarm1 Type	Alarm output 1 option	0 : AL-A 1 : AL-B 2 : AL-C 3 : AL-D 4 : AL-E 5 : AL-F	-	0
400504(01F7)	-	Alarm1 Low_Ch1	Alarm output 1 Ch1 low-limit value	Deviation alarm: -F.S to F.S Absolute value alarm: Within the temperature range of input type	°C/°F /A	1550
400505(01F8)	-	Alarm1 High_Ch1	Alarm output 1 Ch1 high-limit value	Deviation alarm: -F.S to F.S Absolute value alarm: Within the temperature range of input type	°C/°F	1550
400506(01F9)	-	Alarm1 Low_Ch2	Alarm output 1 Ch2 low-limit value	Deviation alarm: -F.S to F.S Absolute value alarm: Within the temperature range of input type	°C/°F /A	1550
400507(01FA)	-	Alarm1 High_Ch2	Alarm output 1 Ch2 high-limit value	Deviation alarm: -F.S to F.S Absolute value alarm: Within the temperature range of input type	°C/°F	1550
400508(01FB)	-	Alarm1 Hysteresis Ch1	Alarm output 1 Ch1 hysteresis	1 to 100 (H) 0.1 to 100.0 (L)	Digit	1
400509(01FC)	-	Alarm1 Hysteresis Ch2	Alarm output 1 Ch2 hysteresis	1 to 100 (H) 0.1 to 100.0 (L)	Digit	1
400510(01FD)	-	Alarm1 NO/NC	Alarm output 1 contact type	0: NO 1: NC	-	0
400511(01FE)	-	Alarm1 ON Delay Time	Alarm output 1 ON delay time	0 to 3600	Sec.	0
400512(01FF)	-	Alarm1 OFF Delay Time	Alarm output 1 OFF delay time	0 to 3600	Sec.	0
400513(0200)	-	LBA1 Time Ch1	LBA1Ch1 monitoring time	0 to 9999	Sec.	0
400514(0201)	-	Reserved				
400515(0202)	-	LBA1 Band Ch1	LBA1 Ch 1 detection band	0 to 999 (H) 0.0 to 999.9 (L)	°C/°F	3
400516(0203)	-	LBA1 Time Ch2	LBA1 Ch 2 monitoring time	0 to 9999	Sec.	0
400517(0204)	-	Reserved				
400518(0205)	-	LBA1 Band Ch2	LBA1 Ch2 detection band	0 to 999 (H) 0.0 to 999.9 (L)	°C/°F	3
400519(0206)	-	Alarm2 Target Ch	Alarm output 2 target Ch	0: CH1 1: CH2 2: CH1 or CH2 4: CH1 and CH2	-	1

No(Address)		Parameter	Description	Setting range	Unit	Factory default
TM2	TM4					
400520(0207)	-	Alarm2 Mode	Alarm output 2 operation mode	0: OFF 1: AL-1 2: AL-2 3: AL-3 4: AL-4 5: AL-5 6: AL-6 7: LBA 8: SBA 9: HBA		2
400521(0208)	-	Alarm2 Type	Alarm output 2 option	0 : AL-A 1 : AL-B 2 : AL-C 3 : AL-D 4 : AL-E 5 : AL-F	-	1
400522(0209)	-	Alarm2 Low_Ch1	Alarm output 2 Ch1 low-limit value	Deviation alarm: -F.S to F.S Absolute value alarm: Within the temperature range of input type	°C/°F /A	1550
400523(020A)	-	Alarm2 High_Ch1	Alarm output 2 Ch1 high-limit value	Deviation alarm: -F.S to F.S Absolute value alarm: Within the temperature range of input type	°C/°F	1550
400524(020B)	-	Alarm2 Low_Ch2	Alarm output 2 Ch2 low-limit value	Deviation alarm: -F.S to F.S Absolute value alarm: Within the temperature range of input type	°C/°F /A	1550
400525(020C)	-	Alarm2 High_Ch2	Alarm output 2 Ch2 high-limit value	Deviation alarm: -F.S to F.S Absolute value alarm: Within the temperature range of input type	°C/°F	1550
400526(020D)	-	Alarm2 Hysteresis Ch1	Alarm output 2 Ch1 hysteresis	1 to 100 (H) 0.1 to 100.0 (L)	Digit	1
400527(020E)	-	Alarm2 Hysteresis Ch2	Alarm output 2 Ch2 hysteresis	1 to 100 (H) 0.1 to 100.0 (L)	Digit	1
400528(020F)	-	Alarm2 NO/NC	Alarm output 2 contact type	0: NO 1 : NC	-	0
400529(0210)	-	Alarm2 ON Delay Time	Alarm output 2 ON delay time	0 to 3600	Sec.	0
400530(0211)	-	Alarm2 OFF Delay Time	Alarm output 2 OFF delay time	0 to 3600	Sec.	0
400531(0212)	-	LBA2 Time Ch1	LBA2 Ch1 monitoring time	0 to 9999	Sec.	0
400532(0213)	-	Reserved				
400533(0214)	-	LBA2 Band Ch1	LBA2 Ch1 detection band	0 to 999 (H) 0.0 to 999.9 (L)	°C/°F	3
400534(0215)	-	LBA2 Time Ch2	LBA2 Ch2 monitoring time	0 to 9999	Sec.	0
400535(0216)	-	Reserved				
400536(0217)	-	LBA2 Band Ch2	LBA2 Ch2 detection band	0 to 999 (H) 0.0 to 999.9 (L)	°C/°F	3
400537(0218)	-	Alarm3 Target Ch	Alarm output 3 target Ch	0: CH1 1: CH2 2: CH1 or CH2 4: CH1 and CH2	-	0
400358(0219)	-	Alarm3 Mode	Alarm output 3 operation mode	0: OFF 1: AL-1 2: AL-2 3: AL-3 4: AL-4 5: AL-5 6: AL-6 7: LBA 8: SBA 9: HBA	-	1

No(Address)		Parameter	Description	Setting range	Unit	Factory default
TM2	TM4					
400539(021A)	-	Alarm3 Type	Alarm output 3 option	0 : AL-A 1 : AL-B 2 : AL-C 3 : AL-D 4 : AL-E 5 : AL-F	-	0
400540(021B)	-	Alarm3 Low_Ch1	Alarm output 3 Ch1 low-limit value	Deviation alarm: -F.S to F.S Absolute value alarm: Within the temperature range of input type	°C/°F /A	1550
400541(021C)	-	Alarm3 High_Ch1	Alarm output 3 Ch1 high-limit value	Deviation alarm: -F.S to F.S Absolute value alarm: Within the temperature range of input type	°C/°F	1550
400542(021D)	-	Alarm3 Low_Ch2	Alarm output 3 Ch2 low-limit value	Deviation alarm: -F.S to F.S Absolute value alarm: Within the temperature range of input type	°C/°F /A	1550
400543(021E)	-	Alarm3 High_Ch2	Alarm output 3 Ch2 high-limit value	Deviation alarm: -F.S to F.S Absolute value alarm: Within the temperature range of input type	°C/°F	1550
400544(021F)	-	Alarm3 Hysteresis Ch1	Alarm output 3 Ch1 hysteresis	1 to 100 (H) 0.1 to 100.0 (L)	Digit	1
400545(0220)	-	Alarm3 Hysteresis Ch2	Alarm output 3 Ch2 hysteresis	1 to 100 (H) 0.1 to 100.0 (L)	Digit	1
400546(0221)	-	Alarm3 NO/NC	Alarm output 3 contact type	0: NO 1: NC	-	0
400547(0222)	-	Alarm3 ON Delay Time	Alarm output 3 ON delay time	0 to 3600	Sec.	0
400548(0223)	-	Alarm3 OFF Delay Time	Alarm output 3 OFF delay time	0 to 3600	Sec.	0
400549(0224)	-	LBA3 Time Ch1	LBA3 Ch1 monitoring time	0 to 9999	Sec.	0
400550(0225)	-	Reserved				
400551(0226)	-	LBA3 Band Ch1	LBA3 Ch1 detection band	0 to 999 (H) 0.0 to 999.9 (L)	°C/°F	3
400552(0227)	-	LBA3 Time Ch2	LBA3 Ch2 monitoring time	0 to 9999	Sec.	0
400553(0228)	-	Reserved				
400554(0229)	-	LBA3 Band Ch2	LBA3 Ch2 detection band	0 to 999 (H) 0.0 to 999.9 (L)	°C/°F	3
400555(022A)	-	Alarm4 Target Ch	Alarm output 4 target Ch	0: CH1 1: CH2 2: CH1 or CH2 4: CH1 and CH2	-	1
400556(022B)	-	Alarm4 Mode	Alarm output 4 operation mode	0: OFF 1: AL-1 2: AL-2 3: AL-3 4: AL-4 5: AL-5 6: AL-6 7: LBA 8: SBA 9: HBA	-	2
400557(022C)	-	Alarm4 Type	Alarm output 4 option	0 : AL-A 1 : AL-B 2 : AL-C 3 : AL-D 4 : AL-E 5 : AL-F	-	0
400558(022D)	-	Alarm4 Low_Ch1	Alarm output 4 Ch1 low-limit value	Deviation alarm: -F.S to F.S Absolute value alarm: Within the temperature range of input type	°C/°F /A	1550

No(Address)		Parameter	Description	Setting range	Unit	Factory default
TM2	TM4					
400559(022E)	-	Alarm4 High_Ch1	Alarm output 4 Ch1 high-limit value	Deviation alarm: -F.S to F.S Absolute value alarm: Within the temperature range of input type	°C/°F	1550
400560(022F)	-	Alarm4 Low_Ch2	Alarm output 4 Ch2 low-limit value	Deviation alarm: -F.S to F.S Absolute value alarm: Within the temperature range of input type	°C/°F /A	1550
400561(0230)	-	Alarm4 High_Ch2	Alarm output 4 Ch2 high-limit value	Deviation alarm: -F.S to F.S Absolute value alarm: Within the temperature range of input type	°C/°F	1550
400562(0231)	-	Alarm4 Hysteresis Ch1	Alarm output 4 Ch1 hysteresis	1 to 100 (H) 0.1 to 100.0 (L)	Digit	1
400563(0232)	-	Alarm4 Hysteresis Ch2	Alarm output 4 Ch2 hysteresis	1 to 100 (H) 0.1 to 100.0 (L)	Digit	1
400564(0233)	-	Alarm4 NO/NC	Alarm output 4 contact type	0: NO 1: NC	-	0
400565(0234)	-	Alarm4 ON Delay Time	Alarm output 4 ON delay time	0 to 3600	Sec.	0
400566(0235)	-	Alarm4 OFF Delay Time	Alarm output 4 OFF delay time	0 to 3600	Sec.	0
400567(0236)	-	LBA4 Time Ch1	LBA4 Ch1 monitoring time	0 to 9999	Sec.	0
400568(0237)	-	Reserved				
400569(0238)	-	LBA4 Band Ch1	LBA4 Ch1 detection band	0 to 999 (H) 0.0 to 999.9 (L)	°C/°F	3
400570(0239)	-	LBA4 Time Ch2	LBA4 Ch2 monitoring time	0 to 9999	Sec.	0
400571(023A)	-	Reserved				
400572(023B)	-	LBA4 Band Ch2	LBA4 Ch2 detection band	0 to 999 (H) 0.0 to 999.9 (L)	°C/°F	3

2.5.8 Digital input setting group (Func: 03/06/16, RW: R/W)

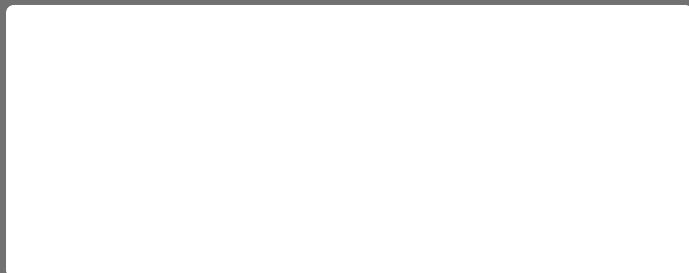
No(Address)		Parameter	Description	Setting range	Unit	Factory default
TM2	TM4					
400573(024C)	-	Digital Input 1 Func	Digital input terminal 1 function	0: OFF 1: STOP 2: AL-RESET 3: MANUAL 4: MULTI-SV	-	0
400574(024D)	-	Digital Input 2 Func	Digital input terminal 2 function	0: OFF 1: STOP 2: AL-RESET 3: MANUAL 4: MULTI-SV	-	0
400575(024E)	-	Digital Input 1 Ch	Digital input terminal 1 target channel	0: CH1 1: CH2	-	0
400576(024F)	-	Digital Input 2 Ch	Digital input terminal 2 target channel	0: CH1 1: CH2	-	1
400577(0250) to 400600(0257)	-	Reserved				

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