

Multi -channel modular temperature controller

TM Series

User Manual

For Communication



Preface

Thank you for purchasing an Autonics product.

Please store this manual in a place where user can find easily, because it contains the guidance for the product and how to correctly use it.

User Manual Guide

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

- 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.
Please visit 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, therefore, the contents of this manual is subject to change without prior notice.

Communication Protocol

TM Series is accepted to Modbus RTU Protocol.

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

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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 Side)

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 Side)

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 output status(ON: 1, OFF: 0) of 10EA within coil 000001(0000 H)~000010(0009 H) on Slave side(Address 17) from Master side.

▪ Query (Master Side)

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)~000001(0000 H) on the slave side 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 Side)

Slave Address	Function	Byte Count	Data (000008~000001)	Data (000010~000009)	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 Side)

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 Side)

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 input status(ON: 1, OFF: 0) of 10EA range 100001(0000 H)~ 100010(0009 H) in the Slave side from the Master side.

- Query (Master Side)

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)~100001(0000 H) on slave side 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 Side)

Slave Address	Function	Byte Count	Data (100008~100001)	Data (100010~100009)	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 Side)

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 Side)

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 values of 2EA, from Holding Register 40001(0000 H) to 40002(0001 H), in Slave(Address 17) from the Master.

- Query (Master Side)

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 40001(0000 H) on Slave side is “555(22B H)” and the value of 40002(0001 H) is “100(64 H)”.

- Response (Slave Side)

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 Side)

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 Side)

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 values of 2EA range from Input Register 300001(0000 H) ~ 300002(0001 H) on Slave side(Address 17) from Master side.

- Query (Master Side)

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 side are respectively “10(A H)” and “20(14 H)”.

- Response (Slave Side)

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 Preset Single Registers(Func 06–06H)

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

(1) Query (Master Side)

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 Side)

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 side(Address 17) from Master side.

- Query (Master Side)

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 Side)

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

1.6 Preset Multiple Registers(Func 16-10H)

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

(1) Query (Master Side)

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

(2) Response (Slave Side)

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

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

- Query (Master Side)

Slave Address	Function	Starting Address		No. of Register		Byte Count	Data		Data		Error Check (CRC16)	
		High	Low	High	Low		High	Low	High	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 Side)

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

1.7 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 side(Address 17) from Master side.

- Query (Master Side)

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 Side)

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	-	RUN
000002(0001)	000002(0001)	CH1 Auto-Tuning Execute	CH1 Auto-Tuning Execute/Stop	0: OFF 1: ON	-	OFF
000003(0002)	000003(0002)	CH2 RUN/STOP	CH2 Control Output Run/Stop	0: RUN 1: STOP	-	RUN
000004(0003)	000004(0003)	CH2 Auto-Tuning Execute	CH2 Auto-Tuning Execute/Stop	0: OFF 1: ON	-	OFF
-	000005(0004)	CH3 RUN/STOP	CH3 Control Output Run/Stop	0: RUN 1: STOP	-	RUN
-	000006(0005)	CH3 Auto-Tuning Execute	CH3 Auto-Tuning Execute/Stop	0: OFF 1: ON	-	OFF
-	000007(0006)	CH4 RUN/STOP	CH4 Control Output Run/Stop	0: RUN 1: STOP	-	RUN
-	000008(0007)	CH4 Auto-Tuning Execute	CH4 Auto-Tuning Execute/Stop	0: OFF 1: ON	-	OFF
000009(0008)	000009(0008)	Reserved				
~	~					
000050(0031)	000050(0031)					

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) ~100050(0031)	100011(000A) ~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) ~300100(0063)	300001(0000) ~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) ~300200(00C7)	300127(007E) ~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's Decimal Point	0: 0 1: 0.0	-	0
301003(03EA)	301003(03EA)	CH1 Unit	Sensor's Temperature Unit	0: °C 1: °F	-	0
301004(03EB)	301004(03EB)	CH1 Set Value	Temperature Setting Value controlled currently	SV Low Limit~SV High Limit	°C/°F	0
301005(03EC)	301005(03EC)	CH1 Heating_MV	Heating MV	0.0~100.0	%	-
301006(03ED)	301006(03ED)	CH1 Cooling_MV	Cooling MV	0.0~100.0	%	-
301007(03EE) ~301012(03F3)	301007(03EE) ~301012(03F3)	CH2 Parameter - the same as above CH1				
-	301013(03F4) ~301018(03F9)	CH3 Parameter - - the same as above CH1				
-	301019(03FA) ~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	-	-
	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	-	-
301026(0401)	301026(0401)	Unit Address	Unit Address	01~31	-	01

No(Address)		Parameter	Description	Setting Range	Unit	Factory Default
TM2	TM4					
301027(0402)	-	CT1_Heater Current	CT1 Heater Current Value Monitoring	0.0~50.0	A	-
301028(0403)	-	CT2_Heater Current	CT2 Heater Current Value Monitoring	0.0~50.0	A	-

- Consists of the 31025(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~SV High Limit	°C/°F	0
400002(0001)	400002(0001)	CH1 Heating_MV	Heating MV	0.0~100.0	%	-
400003(0002)	400003(0002)	CH1 Cooling_MV	Cooling MV	0.0~100.0	%	-
400004(0003)	400004(0003)	CH1 Auto-Manual Control	Auto/Manual Control	0: AUTO 1: MANUAL	-	AUTO
400005(0004) ~400050(0031)	400005(0004) ~400050(0031)	CH1 Reserved				
401001(03E8) ~401050(0419)	401001(03E8) ~401050(0419)	CH2 Parameter – the same as above CH1				
-	402001(07D0) ~402050(0801)	CH3 Parameter - the same as above CH1				
-	403001(0BB8) ~403050(0BE9)	CH4 Parameter - the same as above CH1				

2.5.2 Operating(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	-	RUN
400102(0065)	400052(0033)	CH1 Multi SV No	Multi SV No. Option	0: SV-0 1: SV-1 2: SV-2 3: SV-3	-	SV-0
400103(0066)	400053(0034)	CH1 SV-0 Setting Value	SV-0 Setting Value	SV Low Limit~SV High Limit	°C/°F	0
400104(0067)	400054(0035)	CH1 SV-1 Setting Value	SV-1 Setting Value	SV Low Limit~SV High Limit	°C/°F	0
400105(0068)	400055(0036)	CH1 SV-2 Setting Value	SV-2 Setting Value	SV Low Limit~SV High Limit	°C/°F	0
400106(0069)	400056(0037)	CH1 SV-3 Setting Value	SV-3 Setting Value	SV Low Limit~SV High Limit	°C/°F	0
400107(006A) ~400200(00C7)	400057(0038) ~400100(0063)	CH1 Reserved				
401101(044C) ~401200(04AF)	401051(041A) ~401100(044B)	CH2 Parameter – the same as above CH1				
-	402051(0802) ~402100(0833)	CH3 Parameter - the same as above CH1				
-	403051(0BEA) ~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	-	OFF
400202(00C9)	400102(0065)	CH1 Heating_Proportional Band	Heating Proportional Band	0.1~999.9	°C	10
400203(00CA)	400103(0066)	CH1 Cooling_Proportional Band	Cooling Proportional Band			
400204(00CB)	400104(0067)	CH1 Heating_Integral Time	Heating Integral Time	0~9999	초	0
400205(00CC)	400105(0068)	CH1 Cooling_Integral Time	Cooling Integral Time			
400206(00CD)	400106(0069)	CH1 Heating_Derivation Time	Heating Derivation Time	0~9999	초	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, Dysfunction Band	-P BAND~+P BAND -999.9~0~999.9	Digit	0.0 0
400209(00D0)	400109(006C)	CH1 Manual Reset	In Proportional Control Mode, Manual Reset	0.0~100.0	%	50.0
400210(00D1)	400110(006D)	CH1 Heating_ON Hysteresis	Heating Hysteresis	1~100(H) 0.1~100.0(L)	Digit	2
400211(00D2)	400111(006E)	CH1 Heating_OFF Offset	Heating OFF offset	0~100(H) 0.0~100.0(L)	Digit	0
400212(00D3)	400112(006F)	CH1 Cooling_ON Hysteresis	Cooling Hysteresis	1~100(H) 0.1~100.0(L)	Digit	2
400213(00D4)	400113(0070)	CH1 Cooling_OFF Offset	Cooling OFF Hysteresis	0~100(H) 0.0~100.0(L)	Digit	0
400214(00D5)	400114(0071)	CH1 MV Low Limit	MV Low-limit Setting Value	0.0~ MV High Limit -0.1 (Normal Control) -100.0~ 0 (heating & cooling control)	%	0.0 -100
400215(00D6)	400115(0072)	CH1 MV High Limit	MV High-limit Setting Value	MV Low Limit + 0.1~100.0 0~100	%	100.0
400216(00D7)	400116(0073)	CH1 Ramp_Up Rate	Ramp Up Change Rate	0~9999	-	0
400217(00D8)	400117(0074)	CH1 Ramp_Down Rate	Ramp Down Change Rate	0~9999	-	0
400218(00D9)	400118(0075)	CH1 Ramp Time Unit	Ramp Time Unit	0: SEC 1: MIN 2: HOUR	-	MIN
400219(00DA) ~400300(012B)	400119(0076) ~400150(0095)	CH1 Reserved				
401201(04B0) ~401300(0513)	401101(044C) ~401150(047D)	CH2 Parameter - the same as above CH1.				

No(Address)		Parameter	Description	Setting Range	Unit	Factory Default
TM2	TM4					
-	402101(0834) ~ 402150(0865)	CH3 Parameter - the same as above CH1.				
-	403101(0C 1C) ~ 403150(0C4D)	CH4 Parameter - the same as above CH1.				

2.5.4 Initial Setting 그룹(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~22: DPt100.L	-	K(CA).H
400302(012D)	400152(0097)	CH1 Unit	Sensor's Temperature Unit	0: °C 1: °F	-	°C
400303(012E)	400153(0098)	CH1 Input Bias	Input Bias	-999~999	Digit	0
400304(012F)	400154(0099)	CH1 Input Digital Filter	Input Digital Filter	0.1~120.0	Sec.	0.1
400305(0130)	400155(009A)	CH1 SV Low Limit	SV Low-limit Setting Value	Input Low-limit Range~SV High Limit - 1Digit	°C/°F	-200
400306(0131)	400156(009B)	CH1 SV High Limit	SV High-limit Setting Value	SV Low Limit +1Digit~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
400308(0133)	400158(009D)	CH1 Control Method	Temperature Control Type	Standard Control Mode	0: PID 1: ONOFF	0
				Heating & Cooling Control Mode	0: PID-PID 1: PID-ONOFF 2: ONOFF-PID 3: ONOFF-ONOFF	0
400309(00134)	400159(009E)	CH1 Auto-Tuning Type	Auto-Tuning Mode	0: TUN1 1: TUN2	-	TUN1
400310(0135)	400160(009F)	CH1 Heating_Control Time	Heating Control Time	0.1~120.0	Sec.	20.0(RY) 2.0(SSR)
400311(0136)	400161(00A0)	CH1 Cooling_Control Time	Cooling Control Time	0.1~120.0	Sec.	20.0(RY) 2.0(SSR)
400312(0137)	-	CH1 Output(SSR_Curr) Type	Control Output Type	0: SSR 1: CURRENT	-	SSR
400313(0138)	-	CH1 Current Output Range	Current Output Range	0: 4-20 1: 0-20	mA	4-20-
400314(0139) ~400400(0189))	40162(00A1) ~400200(00C7)	CH1 Reserved				
401301(00514) ~401400(0577))	401151(047E) ~ 401200(04AF)	CH2 Parameter - the same as above CH1.				
-	402151(0866) ~ 402200(0897)	CH3 Parameter - the same as above CH1.				
-	403151(0C4E) ~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: 1EA 1: 2EA 2: 4 EA	EA	0
400402(0191)	400202(00C9)	CH1 Initial Manual MV	MV in Manual Control Mode	0: AUTO-MV 1: PRESET-MV	-	AUTO-MV
400403(0192)	400203(00CA)	CH1 Preset MV	Initial MV in Manual Control Mode	0.0~100.0 (Standard Control Mode) -100.0~100.0 (Heating & Cooling Control)	%	0.0
400404(0193)	400204(00CB)	CH1 Sensor Error MV	MV in case of occurs an error in sensors	1. In Standard Control 1) PID control: 0.0 ~ 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. In Heating & Cooling Control 1) PID control: -100.0(Cooling)~100.0(Heating) 2)ON/OFF control: -100.0(Cooling ON)/0.0(OFF)/100.0(Heating ON)	%	0.0
400406(0195)	400206(00CD)	-	-	-	-	-
400407(0196) ~400500(01F3)	400207(00CE) ~400250(00F9)	CH1 Reserved				
401401(0578) ~401500(05DB))	401201(04B0) ~401250(04E1)	CH2 Parameter - the same as above CH1.				
-	402201(0898) ~402250(08C9)	CH3 Parameter - the same as above CH1.				
-	403201(0C80) ~403250(0CB1))	CH4 Parameter - the same as above CH1.				

2.5.6 Option Setting(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)	Bit Per Second	Communication Speed	0: 2400 1: 4800 2: 9600 3: 19200 4: 38400	-	9600
400602(0259)	400302(012D)	Parity Bit	Communication Parity Bit	0: NONE 1: EVEN 2: ODD	-	NONE
400603(025A)	400303(012E)	Stop Bit	Communication Stop Bit	0: 1 1: 2	-	2
400604(025B)	400304(012F)	Response Waiting Time	Response Waiting Time	5~99	ms	20
400605(025C)	400305(0130)	Communication Write	Communication Write	0: ENABLE 1: DISABLE	-	ENABLE
400606(025D)	400306(0131)	Parameter Initialization	Parameter Initialization	0: NO 1: YES	-	NO
400607(025E) ~400700(02BB)	400307(0132) ~400350(015D)	Reserved				

2.5.7 Alarm Setting Group(1) (Func: 03/06/16, RW: R/W)

No(Address)		Parameter	Description	Setting Range	Unit	Factory Default
TM2	TM4					
400501(01F4)		Alarm1 Target CH	Alarm Output1 Target Channel	0: CH1 1: CH2 2: CH1 or CH2 3: CH1 and CH2		CH1
400502(01F5)		Alarm1 Mode	Alarm Output 1 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	°C/°F	AL-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		AL-A
400504(01F7)		Alarm1 Low_Ch1	Alarm Output 1 Ch1 Low-limit Setting Value	Deviation Alarm: -F.S ~ F.S Absolute Value Alarm: within the Sensor Input Range	°C/°F/A	1550
400505(01F8)		Alarm1 High_Ch1	Alarm Output 1 Ch1 High-limit Setting Value	Deviation Alarm: -F.S ~ F.S Absolute Value Alarm: within the Sensor Input Range	°C/°F	1550
400506(01F9)		Alarm1 Low_Ch2	Alarm Output 1 Ch2 Low-limit Setting Value	Deviation Alarm: -F.S ~ F.S Absolute Value Alarm: within the Sensor Input Range	°C/°F/A	1550
400507(01FA)		Alarm1 High_Ch2	Alarm Output 1 Ch2 High-limit Setting Value	Deviation Alarm : -F.S ~ F.S Absolute Value Alarm: within the Sensor Input Range	°C/°F	1550
400508(01FB)		Alarm1 Hysteresis_Ch1	Alarm Output 1 Ch1 Hysteresis	1~100(Sensor. H) 0.1~100.0(Sensor. L)	Digit	1
400509(01FC)		Alarm1 Hysteresis_Ch2	Alarm Output 1 Ch2 Hysteresis	1~100(Sensor. H) 0.1~100.0(Sensor. L)	Digit	1
400510(01FD)		Alarm1 NO/NC	Alarm Output 1 Contact Type	0: NO 1: NC		NO
400511(01FE)		Alarm1 ON Delay Time	Alarm Output 1 ON Delay Time	0~3600	초	0
400512(01FF)		Alarm1 OFF Delay Time	Alarm Output 1 OFF Delay Time	0~3600	초	0
400513(0200)		LBA1 Time_Ch1	LBA1 Ch1 Detecting Time	0~9999	초	0
400514(0201)		LBA1 Level_Ch1	LBA1 Ch1 Detecting Value	1~999(Sensor. H) 0.1~999.9(Sensor. L)	°C/°F	8
400515(0202)		LBA1 Band_Ch1	LBA1 Ch1 Detecting Band	1~999(Sensor. H) 0.1~999.9(Sensor. L)	°C/°F	3
400516(0203)		LBA1 Time_Ch2	LBA1 Ch2 Detecting Time	0~9999	초	0
400517(0204)		LBA1 Level_Ch2	LBA1 Ch2 Detecting Value	1~999(Sensor. H) 0.1~999.9(Sensor. L)	°C/°F	8
400518(0205)		LBA1 Band_Ch2	LBA1 Ch2 Detecting Band	1~999(Sensor. H) 0.1~999.9(Sensor. L)	°C/°F	3
400519(0206)		Alarm2 Target CH	Alarm Output 2 Target Channel	0: CH1 1: CH2 2: CH1 or CH2 4 : CH1 and CH2		CH2

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	°C/°F	AL-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		AL-A
400522(0209)		Alarm2 Low_Ch1	Alarm Output 2 Ch1 Low-limit Setting Value	Deviation Alarm: -F.S ~ F.S Absolute Value Alarm: within the Sensor Input Range	°C/°F/A	1550
400523(020A)		Alarm2 High_Ch1	Alarm Output 2 Ch1 High-limit Setting Value	Deviation Alarm: -F.S ~ F.S Absolute Value Alarm: within the Sensor Input Range	°C/°F	1550
400524(020B)		Alarm2 Low_Ch2	Alarm Output 2 Ch2 Low-limit Setting Value	Deviation Alarm: -F.S ~ F.S Absolute Value Alarm: within the Sensor Input Range	°C/°F/A	1550
400525(020C)		Alarm2 High_Ch2	Alarm Output 2 Ch2 High-limit Setting Value	Deviation Alarm: -F.S ~ F.S Absolute Value Alarm: within the Sensor Input Range	°C/°F	1550

2.5.8 Alarm Setting Group(2) (Func: 03/06/16, RW: R/W)

No(Address)		Parameter	Description	Setting Range	Unit	Factory Default
TM2	TM4					
400526(020D)	-	Alarm2 Hysteresis_Ch1	Alarm Output 2 Ch1 Hysteresis	1~100 (Sensor. H) 0.1~100.0 (Sensor. L)	Digit	1
400527(020E)	-	Alarm2 Hysteresis_Ch2	Alarm Output 2 Ch2 Hysteresis	1~100 (Sensor. H) 0.1~100.0 (Sensor. L)	Digit	1
400528(020F)	-	Alarm2 NO/NC	Alarm Output 2 Contact Type	0: NO 1: NC	-	NO
400529(0210)	-	Alarm2 ON Delay Time	Alarm Output 2 ON Delay Time	0~3600	Sec.	0
400530(0211)	-	Alarm2 OFF Delay Time	Alarm Output 2 OFF Delay Time	0~3600	Sec.	0
400531(0212)	-	LBA2 Time_Ch1	LBA2 Ch1Detecting Time	0~9999	Sec.	0
400532(0213)	-	LBA2 Level_Ch1	LBA2 Ch1Detecting Value	1~999(Sensor. H) 0.1~999.9(Sensor. L)	°C/°F	8
400533(0214)	-	LBA2 Band_Ch1	LBA2 Ch1Detecting Band	1~999(Sensor. H) 0.1~999.9(Sensor. L)	°C/°F	3
400534(0215)	-	LBA2 Time_Ch2	LBA2 Ch2Detecting Time	0~9999	Sec.	0
400535(0216)	-	LBA2 Level_Ch2	LBA2 Ch2Detecting Value	1~999(Sensor. H) 0.1~999.9(Sensor. L)	°C/°F	8
400536(0217)	-	LBA2 Band_Ch2	LBA2 Ch2Detecting Band	1~999(Sensor. H) 0.1~999.9(Sensor. L)	°C/°F	3
400537(0218)	-	Alarm3 Target CH	Alarm Output 3 Target Channel	0: CH1 1: CH2 2: CH1 or CH2 4: CH1 and CH2	-	CH1
400538(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	°C/°F	AL-1
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	-	AL-A
400540(021B)	-	Alarm3 Low_Ch1	Alarm Output 3 Ch1Low- limit Setting Value	Deviation Alarm : -F.S ~ F.S Absolute Value Alarm: within the Sensor Input Range	°C/°F /A	1550
400541(021C)	-	Alarm3 High_Ch1	Alarm Output 3 Ch1High- limit Setting Value	Deviation Alarm : -F.S ~ F.S Absolute Value Alarm: within the Sensor Input Range	°C/°F	1550
400542(021D)	-	Alarm3 Low_Ch2	Alarm Output 3 Ch2 Low- limit Setting Value	Deviation Alarm: -F.S ~ F.S Absolute Value Alarm: within the Sensor Input Range	°C/°F /A	1550
400543(021E)	-	Alarm3 High_Ch2	Alarm Output 3 Ch2 High- limit Setting Value	Deviation Alarm: -F.S ~ F.S Absolute Value Alarm: within the Sensor Input Range	°C/°F	1550
400544(021F)	-	Alarm3 Hysteresis_Ch1	Alarm Output 3 Ch1 Hysteresis	1~100 (Sensor. H) 0.1~100.0 (Sensor. L)	Digit	1
400545(0220)	-	Alarm3 Hysteresis_Ch2	Alarm Output 3 Ch2 Hysteresis	1~100 (Sensor. H) 0.1~100.0 (Sensor. L)	Digit	1

No(Address)		Parameter	Description	Setting Range	Unit	Factory Default
TM2	TM4					
400546(0221)	-	Alarm3 NO/NC	Alarm Output 3 Contact Type	0: NO 1: NC	-	NO
400547(0222)	-	Alarm3 ON Delay Time	Alarm Output 3 ON Delay Time	0~3600	Sec.	0
400548(0223)	-	Alarm3 OFF Delay Time	Alarm Output 3 OFF Delay Time	0~3600	Sec.	0
400549(0224)	-	LBA3 Time_Ch1	LBA3 Ch1 Detecting Time	0~9999	Sec.	0
400550(0225)	-	LBA3 Level_Ch1	LBA3 Ch1 Detecting Value	1~999(Sensor. H) 0.1~999.9(Sensor. L)	°C/°F	8
400551(0226)	-	LBA3 Band_Ch1	LBA3 Ch1 Detecting Band	1~999(Sensor. H) 0.1~999.9(Sensor. L)	°C/°F	3
400552(0227)	-	LBA3 Time_Ch2	LBA3 Ch2 Detecting Time	0~9999	초	0
400553(0228)	-	LBA3 Level_Ch2	LBA3 Ch2 Detecting Value	1~999(Sensor. H) 0.1~999.9(Sensor. L)	°C/°F	8
400554(0229)	-	LBA3 Band_Ch2	LBA3 Ch2 Detecting Band	1~999(Sensor. H) 0.1~999.9(Sensor. L)	°C/°F	3

2.5.9 Alarm Setting Group(3) (Func: 03/06/16, RW: R/W)

No(Address)		Parameter	Description	Setting Range	Unit	Factory Default
TM2	TM4					
400555(022A)	-	Alarm4 Target CH	Alarm Output4 Target Channel	0: CH1 1: CH2 2: CH1 or CH2 4: CH1 and CH2	-	CH2
400556(022B)	-	Alarm4 Mode	Alarm Output4 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	°C/°F	AL-2
400557(022C)	-	Alarm4 Type	Alarm Output4 Option	0: AL-A 1: AL-B 2: AL-C 3: AL-D 4: AL-E 5: AL-F	-	AL-A
400558(022D)	-	Alarm4 Low_Ch1	Alarm Output4 Ch1 Low-limit Setting Value	Deviation Alarm: -F.S ~ F.S Absolute Value Alarm: within the Sensor Input Range	°C/°F /A	1550
400559(022E)	-	Alarm4 High_Ch1	Alarm Output4 Ch1 High-limit Setting Value	Deviation Alarm: -F.S ~ F.S Absolute Value Alarm: within the Sensor Input Range	°C/°F	1550
400560(022F)	-	Alarm4 Low_Ch2	Alarm Output4 Ch2 Low-limit Setting Value	Deviation Alarm: -F.S ~ F.S Absolute Value Alarm: within the Sensor Input Range	°C/°F /A	1550
400561(0230)	-	Alarm4 High_Ch2	Alarm Output4 Ch2 High-limit Setting Value	Deviation Alarm: -F.S ~ F.S Absolute Value Alarm: within the Sensor Input Range	°C/°F	1550
400562(0231)	-	Alarm4 Hysteresis_Ch1	Alarm Output4 Ch1 Hysteresis	1~100 (Sensor.H) 0.1~100.0 (Sensor.L)	Digit	1
400563(0232)	-	Alarm4 Hysteresis_Ch2	Alarm Output4 Ch2 Hysteresis	1~100 (Sensor.H) 0.1~100.0 (Sensor.L)	Digit	1
400564(0233)	-	Alarm4 NO/NC	Alarm Output4 Contact Type	0: NO 1: NC	-	NO
400565(0234)	-	Alarm4 ON Delay Time	Alarm Output4 ON Delay Time	0~3600: 0 ~ 3600	초	0
400566(0235)	-	Alarm4 OFF Delay Time	Alarm Output4 OFF Delay Time	0~3600: 0 ~ 3600	초	0
400567(0236)	-	LBA4 Time_Ch1	LBA4 Ch1 Detecting Time	0~9999	초	0
400568(0237)	-	LBA4 Level_Ch1	LBA4 Ch1 Detecting Value	1 ~ 999(Sensor.H) 0.1 ~ 999.9(Sensor.L)	°C/°F	8
400569(0238)	-	LBA4 Band_Ch1	LBA4 Ch1 Detecting Band	1 ~ 999(Sensor.H) 0.1 ~ 999.9(Sensor.L)	°C/°F	3
400570(0239)	-	LBA4 Time_Ch2	LBA4 Ch2 Detecting Time	0~9999	초	0
400571(023A)	-	LBA4 Level_Ch2	LBA4 Ch2 Detecting Value	1 ~ 999(Sensor.H) 0.1 ~ 999.9(Sensor.L)	°C/°F	8
400572(023B)	-	LBA4 Band_Ch2	LBA4 Ch2 Detecting Band	1 ~ 999(Sensor.H) 0.1 ~ 999.9(Sensor.L)	°C/°F	3
400573(023C)	-	Digital Input 1 Func	Digital Input Terminal 1 Function	0: OFF 1: STOP 2: AL-RESET 3: MANUAL 4: MULTI-SV	-	8
400574(023D)	-	Digital Input 2 Func	Digital Input Terminal 2 Function	0: OFF 1: STOP 2: AL-RESET 3: MANUAL 4: MULTI-SV	-	3

No(Address)		Parameter	Description	Setting Range	Unit	Factory Default
TM2	TM4					
400575(023E)	-	Digital Input 1_Ch	Digital Input Terminal 1 Target Channel	0: CH1 1: CH2	-	STOP
400576(023F)	-	Digital Input 2_Ch	Digital Input Terminal 2 Target Channel	0: CH1 1: CH2	-	AL-RESET
400577(0240) ~400600(0257)	-	Reserved				

2.5.10 Option(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	-	8
400574(024D)	-	Digital Input 2 Func	Digital Input Terminal 2 Function	0: OFF 1: STOP 2: AL-RESET 3: MANUAL 4: MULTI-SV	-	3
400575(024E)	-	Digital Input 1_Ch	Digital Input Terminal 1 Target Channel	0: CH1 1: CH2	-	STOP
400576(024F)	-	Digital Input 2_Ch	Digital Input Terminal 2 Target Channel	0: CH1 1: CH2	-	AL-RESET
400577(0250) ~400600(0257)	-	Reserved				