4 Loop Multi-Function PID Temperature Controller
MA04D-652
User Manual

MA04D-652-E1

Please read this manual thoroughly and keep this manual in a place for further reference

Main Features

1. Standard DIN rail mount, plug-in terminals, easy to install, serial connection for different device.
2. Controller with dual LED display, various indicators, four setting buttons, the configuration can be carried out even without master device
3. Modbus RTU communication protocol, support 03H read, read multiple points, 06H write single point, 10H write multiple points, 03H read maximum 36 bytes one time, and 10H write 20 bytes one time
4. Thermocouple inputs, 0.3% accuracy
5. Output: Relay, SSR Drive, analog mA or Vdc. direct/reverse control configurable for each loop, PID or ON/OFF control, auto/manual control switchable, RUN/STOP function, independent auto-tuning for each loop, four different groups of PID for four loops, maximum and minimum output configurable
6. Each loop has the output omit function to protect executor such as AC contractor

Quick Start Guide

1. Refer to 5.2.2 under LCK-0202 for details on device address, baud rate, CRC checking method
2. Refer to 5.2.3 under LCK-0010 number 12 for details on RUN/STOP parameters
3. Refer to 5.2.3 under LCK-0010 number 11 for details on Auto-tuning function
4. Refer to 5.2.10 under LCK-0020 number 67 for details on Auto/manual control and M1,M2,M3,M4
5. Refer to 5.2.4 number 13~16 for details on how to set the SP1/SP2/SP3/SP4 which is the setting value of each loop. the factory default memory type is EEPROM, the data will resume if you have a power failure happens during the operation, but the EEPROM has a downside which is the limits on the rewrite 100,000 times, this memory type is not idea for application where they need to rewrite in a very high frequency, in this case, goes to the LCK-0101 and change the RAM to 1111, refer to number 66 under LCK-0101 for further explanation on RAM parameter
6. Output,the physical output type is fixed once you ordered with us, however, you can change the control mode based on your field application
   6.1) Refer to 5.2.9 LCK-0101 number 65 for parameter OUd. this is the parameter to configure the heating /cooling control mode
   oUd=xxx0, OP1 will be heating mode, oUd=xxx1, OP1 will be cooling mode
   oUd=xx0x, OP2 will be heating mode, oUd=xx1x, OP2 will be cooling mode
   oUd=x0xx, OP3 will be heating mode, oUd=x1xx, OP3 will be cooling mode
   oUd=0xxx, OP4 will be heating mode, oUd=1xxx, OP4 will be cooling mode
   6.2) How do you change the PID control mode
   Refer to 5.2.5 LCK-0011 for PID parameters on loop #1
   Refer to 5.2.6 LCK-0012 for PID parameters on loop #2
   Refer to 5.2.7 LCK-0013 for PID parameters on loop #3
   Refer to 5.2.8 LCK-0014 for PID parameters on loop #4

1. Ordering information

Please make sure that you know exactly what you are looking for before proceed

Model and function code

MA04D -652 - ☐ - ☐ - ☐

Main model / Software version / 1 / 2 / 3

1. Factory default input, refer to input table as below

Input Code	input type and range							
K	K	−30	to	1300	℃ /	−20	to	2372	℉
E	E	−30	to	600	℃ /	−20	to	1112	℉
J	J	−30	to	800	℃ /	−20	to	1472	℉
N	N	−30	to	1300	℃ /	−20	to	2372	℉
W	Wu3_Re25	600	to	2000	℃ /	1000	to	3632	℉
S	S	0	to	1600	℃ /	0	to	2912	℉
T	T	−30	to	400	℃ /	−20	to	752	℉
R	R	0	to	1700	℃ /	0	to	3092	℉
B	B	200	to	1800	℃ /	400	to	3272	℉

Remark: the accuracy for S and R is not accurate if the temperature lower than 200℃

2. Main output OP1/OP2/OP3/OP4
OP1 and OP2 output must be the same, OP3 and OP4 must be the same

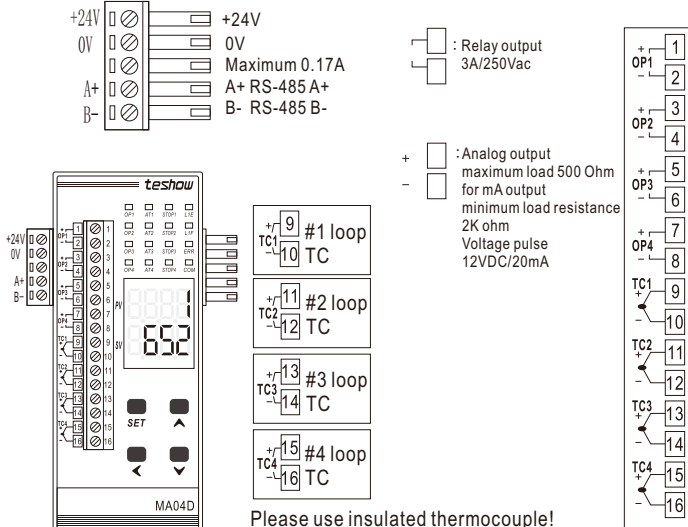| code	OP1/OP2	OP3/OP4
1	Relay 3A/250V	Relay 3A/250V
2	Voltage pulse 12VDC	Voltage pulse 12VDC
3	Voltage pulse 12VDC	Relay 3A/250V
4	Relay 3A/250V	Voltage pulse 12VDC
9	Analog output DA	Analog output DA

3. Main output OP1/OP2/OP3/OP4 are analog output

N: Not analog output
2: DC0~20mA
8: DC 4~20mA
5: DC 0~5V
6: DC 0~10V
7: DC 1~5V

MA04D-652-K-1-N
Remark: MA04, 4 loops controller, OP1 and OP2 relay output, OP3 and OP3 output

2. Wiring

Power source and communication

+24V +24V
0V 0V
Maximum 0.17A
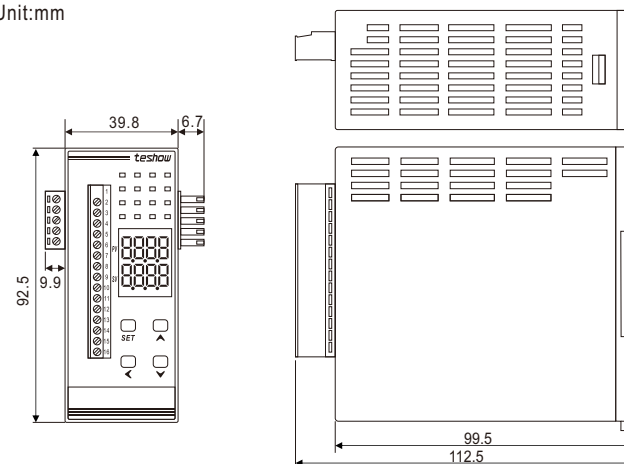A+ A+ RS-485 A+
B- B- RS-485 B-

: Relay output 3A/250Vac

: Analog output maximum load 500 Ohm for mA output minimum load resistance 2K ohm Voltage pulse 12VDC/20mA

OP1 1 / 2
OP2 3 / 4
OP3 5 / 6
OP4 7 / 8
TC1 9 / 10
TC2 11 / 12
TC3 13 / 14
TC4 15 / 16

TC1 +9 −10 TC #1 loop
TC2 +11 −12 TC #2 loop
TC3 +13 −14 TC #3 loop
TC4 +15 −16 TC #4 loop

PV 652 SV
SET ∧ ∨ ＜

MA04D

Please use insulated thermocouple!

You can choose either #1 connector or #2 based on your field application

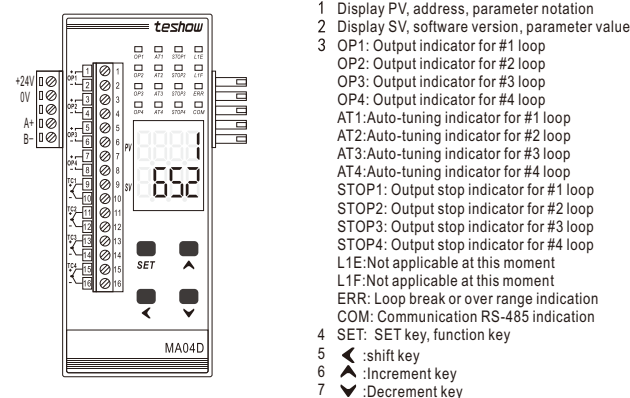Power&RS-485 connector #1   Power&RS-485 connector #2
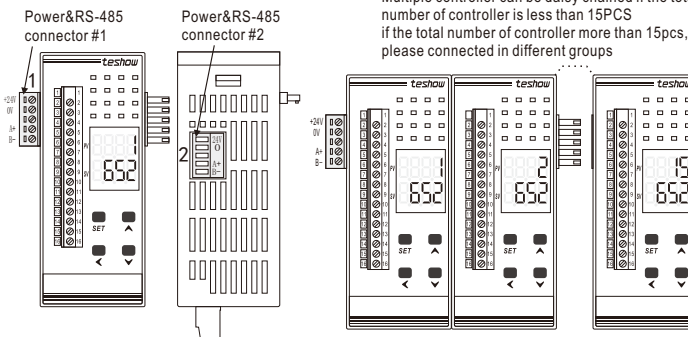
Multiple controller can be daisy chained if the total number of controller is less than 15PCS if the total number of controller more than 15pcs, please connected in different groups
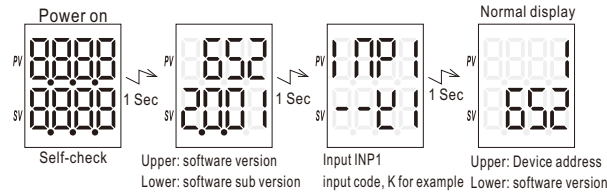
3. Dimensions

Unit:mm

39.8 6.7

92.5 9.9

99.5
112.5

4. Panel description

1 Display PV, address, parameter notation
2 Display SV, software version, parameter value
3 OP1: Output indicator for #1 loop
  OP2: Output indicator for #2 loop
  OP3: Output indicator for #3 loop
  OP4: Output indicator for #4 loop
  AT1: Auto-tuning indicator for #1 loop
  AT2: Auto-tuning indicator for #2 loop
  AT3: Auto-tuning indicator for #3 loop
  AT4: Auto-tuning indicator for #4 loop
  STOP1: Output stop indicator for #1 loop
  STOP2: Output stop indicator for #2 loop
  STOP3: Output stop indicator for #3 loop
  STOP4: Output stop indicator for #4 loop
  L1E: Not applicable at this moment
  L1F: Not applicable at this moment
  ERR: Loop break or over range indication
  COM: Communication RS-485 indication
4 SET: SET key, function key
5 ＜ :shift key
6 ∧ :Increment key
7 ∨ :Decrement key

5. Parameter setting and communication address registry

5.1 Power up self-check, input and software version display

Power on

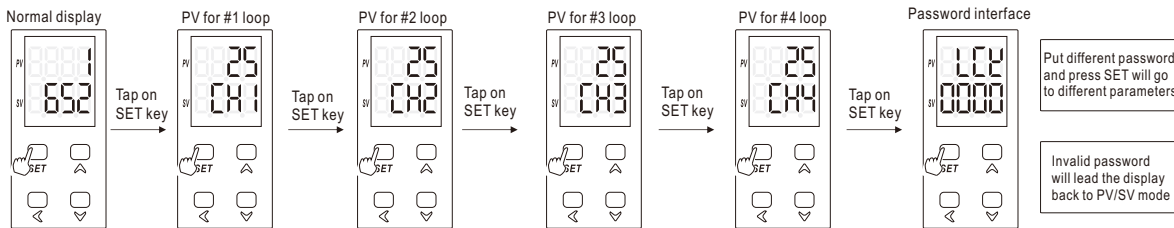Self-check → (1 Sec) Upper: software version / Lower: software sub version → (1 Sec) Input INP1 input code, K for example → (1 Sec) Normal display / Upper: Device address / Lower: software version

Symbol	Ʋ	J	t	S	r	E	b	П	ū
Input type	K	J	T	S	R	E	B	N	Wu3_Re25

5.1.1 Communication protocol

(1) Modbus-RTU protocol, support 03 read, 06&10 write command
(2) Communication format: half-duplex multi-drop connection RS-485
   Baud rate: 2400,4800,9600,19200(selectable)
   Data format: 1 start bit, 8 data bit, None parity bit, 1 stop bit
(3) Maximum one time allowable write 20 address, maximum one time allowable read 37 address
(4) DR04 factory default address is "1" , baud rate is 9600
(5) Please refer to manual for detailed information on the address

5.2 Parameter lists and communication address for each parameters(Hex or Decimalism)
5.2.1 PV display and access to password interface, AU1/AU2 function configuration

Normal display → Tap on SET key → PV for #1 loop → Tap on SET key → PV for #2 loop → Tap on SET key → PV for #3 loop → Tap on SET key → PV for #4 loop → Tap on SET key → Password interface

Put different password and press SET will go to different parameters

Invalid password will lead the display back to PV/SV mode

No	Parameter type	HEX	10 Hex	Data format	R/W	Remarks
1	PV1 for #1 loop	0000H	0	16 bit integer 10 hex	R	reading gain 0.1, read 1000 means 100.0 degree(display only shows integral number)
2	PV2 for #2 loop	0001H	1	16 bit integer 10 hex	R	reading gain 0.1, read 1000 means 100.0 degree(display only shows integral number)
3	PV3 for #3 loop	0002H	2	16 bit integer 10 hex	R	reading gain 0.1, read 1000 means 100.0 degree(display only shows integral number)
4	PV4 for #4 loop	0003H	3	16 bit integer 10 hex	R	reading gain 0.1, read 1000 means 100.0 degree(display only shows integral number)
5	Output % for #1 loop	0004H	4	16 bit integer 10 hex	R	reading gain 0.1,0-1000 means 0.0%-100.0%, indicates the output % of #1 loop
6	Output % for #2 loop	0005H	5	16 bit integer 10 hex	R	reading gain 0.1,0-1000 means 0.0%-100.0%, indicates the output % of #2 loop
7	Output % for #3 loop	0006H	6	16 bit integer 10 hex	R	reading gain 0.1,0-1000 means 0.0%-100.0%, indicates the output % of #3 loop
8	Output % for #4 loop	0007H	7	16 bit integer 10 hex	R	reading gain 0.1,0-1000 means 0.0%-100.0%, indicates the output % of #4 loop
9	Various indicator on the panel	0008H	8	16 bit integer binary	R	bit0:COM , bit1:ERR , bit2:reserved , bit3:reserved , bit4:OP4 , bit5:OP3 , bit6:OP2 , bit7:OP1 , bit8:STOP4 , bit9:STOP3 , bit10:STOP2 , bit11:STOP1 , bit12:AT4 , bit13:AT3 , bit14:AT2 , bit15:AT1 bitx=0 ON =1 OFF ERR indicator on if any of the loop had a loop break or over range。
10	Password	0009H	9	16 bit integer 10 hex	R/W (RAM)	LCK Password 0-9999

5.2.2 Communication related parameters "LCK-0202" menu

Password key-in → LCK 0202 Press SET → Device address → Press SET → bAUd (Baud rate =0: 2.4Kbps =1: 4.8Kbps =2: 9.6Kbps =3: 19.2Kbps) → Press SET → UCr (CRC check =0 no parity(N) =1 Odd parity(O) =2 Even parity(E)) → Press SET → PV/SV display mode
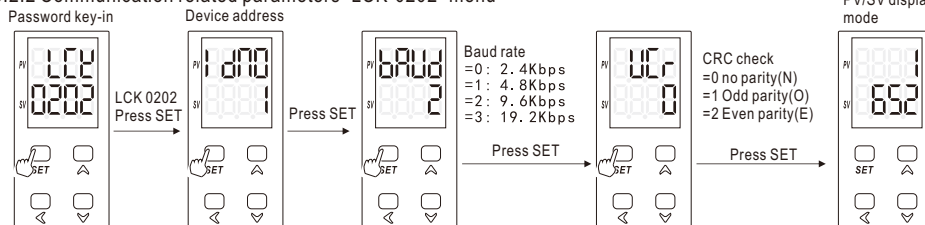
Parameter type		Hex	Hex 10	Data format	R/W
Device address	IDNO	0047H	71	16 bit positive integer 10 hex	R
Baud rate	BAUD	0048H	72	16 bit positive integer 10 hex	R
Error check Field	UCR	0049H	73	16 bit positive integer 10 hex	R

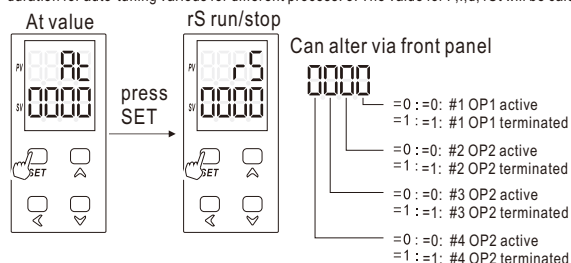## 5.2.3 Auto-tuning AT/ Run stop RS parameter "LCK-0010" parameter

Password key-in → LCK 0010 Press SET → At auto-tuning

Can set via front key
=0: #1 loop auto-tuning AT off
=1: #1 loop auto-tuning AT on
=0: #2 loop auto-tuning AT off
=1: #2 loop auto-tuning AT on
=0: #3 loop auto-tuning AT off
=1: #3 loop auto-tuning AT on
=0: #4 loop auto-tuning AT off
=1: #4 loop auto-tuning AT on

No	Parameter type	HEX	10 Hex	Data format	R/W	Remarks
11	Auto-tuning AT	000AH	10	16 bit positive integer Binary	R/W (RAM)	Bit0=0 Terminate the auto-tuning for #1 loop =1 Active the auto-tuning for #1 loop; Bit1=0 Terminate the auto-tuning for #1 loop =1 Active the auto-tuning for #1 loop; Bit2=0 Terminate the auto-tuning for #1 loop =1 Active the auto-tuning for #1 loop; Bit3=0 Terminate the auto-tuning for #1 loop =1 Active the auto-tuning for #1 loop

Address for AT1/AT2 indicator is 0008H, Bit15 for AT1 indicator, Bit14 for AT2 indicator Bit13 for AT3 indicator, Bit12 for AT4 indicator(bit=0 indicator on, bit=1, indicator off)
Remark: run/stop function will overwrite auto/manual and auto-tuning function, you can not initiated the auto-tuning and auto/manual under STOP status, auto-tuning can not be activated under manual control mode

Remark
1. AT1,AT2,AT3,AT4 indicator on after auto-tuning activated, indicator off when auto-tuning finished 2. The control mode will be ON/OFF mode, large temperature fluctuation is expected during the auto-tuning process, the time duration for auto-tuning various for different process. 3. The value for P,I,d, rSt will be calculated by the auto-tuning process, and controller goes back to PV/SV mode and continue to work with the updated P,I,d, rSt value
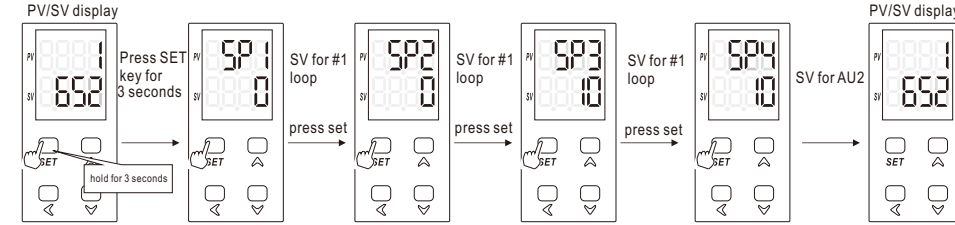

At value → press SET → rS run/stop

Can alter via front panel
=0: =0: #1 OP1 active
=1: =1: #1 OP1 terminated
=0: =0: #2 OP2 active
=1: =1: #2 OP2 terminated
=0: =0: #3 OP2 active
=1: =1: #3 OP2 terminated
=0: =0: #4 OP2 active
=1: =1: #4 OP2 terminated

No	Parameter type	HEX	10 Hex	Data format	R/W	Remarks
12	Run/Stop R/S	000BH	11	16 bit positive integer Binary	R/W Eeprom	Bit0=0 #1 loop output on =1 #1 loop output terminated; Bit1=0 #2 loop output on =1 #2 loop output terminated; Bit2=0 #3 loop output on =1 #3 loop output terminated; Bit3=0 #4 loop output on =1 #4 loop output terminated; if you write 10 hex value "0" to this address, all output will be activated; if you write 10 hex value "15" to this address, all output will be terminated

LED indicators on the panel: STOP1: OP1, STOP2: OP2, STOP3: OP3, STOP4: OP4, indicators on means "stop" correspondent address 0008H, bit8: STOP4 , bit9: STOP3, bit10: STOP2 , bit11: STOP1 bit=0 indicators on bit=1 indicators off
Remark: Can not initiate the auto/manual and auto-tuning features under "STOP" status

Remark: rS parameter is stored in EEPROM, the value will inherit during the power interruption, value will be the same after power resume

5.2.4 Setting value SP1/SP2/SP3/SP4 for #1,#2,#3,#4 loop

Important Notice

Factory default data storage method is EEPROM, the data stays at where the power was cutoff, the data will be the same after power on, the limitation of EEPROM is 100,000 times, so this mode is not suitable for application where data needs to be write and erased frequently. under this circumstance please go to LCK-0101 and change the RAM to RAM=1111,refer to LCK-0101 and NO.66 for explanation on the parameter "RAM"

PV/SV display — Press SET key for 3 seconds — hold for 3 seconds — SP1 0 SV for #1 loop — press set — SP2 0 SV for #1 loop — press set — SP3 10 SV for #1 loop — press set — SP4 10 SV for AU2 — PV/SV display

No	Parameter type	Hex	10 Hex	Data format	R/W	Remarks
13	#1 loop SP1	000CH	12	16 bit integer 10 hex	R/W(Ram/EEPROM)	reading gain 0.1, read 1000 means 100.0 degree, write 2000, means write 200.0 degree
14	#2 loop SP2	000DH	13	16 bit integer 10 hex	R/W(Ram/EEPROM)	reading gain 0.1, read 1000 means 100.0 degree, write 2000, means write 200.0 degree
15	#3 loop SP3	000EH	14	16 bit integer 10 hex	R/W(Ram/EEPROM)	reading gain 0.1, read 1000 means 100.0 degree, write 2000, means write 200.0 degree
16	#4 loop SP4	000FH	15	16 bit integer 10 hex	R/W(Ram/EEPROM)	reading gain 0.1, read 1000 means 100.0 degree, write 2000, means write 200.0 degree

5.2.5 #1 loop P.I.D parameters "LCK-0011" menu

Password key-in: LCY 0011 — LCK=0011 press SET once — Proportional band: P1 0200

The data storage method for below parameters are "EEPROM"

No	Notation	Parameter type	Hex	10 Hex	Data format	R/W	Remarks
17	P1	Proportional band for #1 channel	0010H	16	16 bit integer 10 hex	R/W	reading gain 0.1, unit is degree, read 200 for 20.0 degree, write 300 for 30.0 degree factory default 20.0, range 0.0 ~800.0, when P1=0, OP1 switch to ON/OFF control mode, HYS1 is hysteresis
18	i1	Integral for #1 channel	0011H	17	16 bit integer 10 hex	R/W	Unit "second", 0-3600 second, factory default=210
19	d1	Derivative for #1 channel	0012H	18	16 bit integer 10 hex	R/W	Unit "second", 0-200 second, factory default=30
20	CYt1	Cycle time for #1 channel	0013H	19	16 bit integer 10 hex	R/W	Unit "second", 1-200 second, factory default= 20 seconds for relay, 2 seconds for voltage pulse analog output is 1 seconds as factory default

No	Notation	Parameter type	Hex	10 Hex	Data format	R/W	Remarks
21	HYS1	#1 channel hysteresis HYS1	0014H	20	16 bit integer 10 hex	R/W	reading gain 0.1, unit" degree" reading 4=0.4, write 10=1.0 degree factory default: 0.4 degree, range 0.0-800.0, opposite hysteresis for direct control, forward hysteresis for reverse control
22	rSt1	#1 channel proportional reset rst1	0015H	21	16 bit integer 10 hex	R/W	reading gain 0.1, unit "degree", read -50=-5.0 degree, write -100=-10.0 degree, the display on the controller can not display decimal points, range:-199.0~199.0 degree, this parameter used to counter balance the overshoot during heating process, factory default is -5.0, recommended to obtain the value via auto-tuning process
23	OPL1	#1 channel output lower limit OPL1	0016H	22	16 bit integer 10 hex	R/W	Reading gain 0.1, unit is %, read 0=0.0%, write 200=20.0% factory=0.0, range 0.0-100.0%, this parameter used to define the lower limit output for the #1 channel
24	OPH1	#1 channel output higher limit OPH1	0017H	23	16 bit integer 10 hex	R/W	Reading gain 0.1, unit is %, read 0=0.0%, write 200=20.0% factory=0.0, range 0.0-100.0%, this parameter used to define the higher limit output for the #1 channel
25	bUF1	#1 channel output restriction for analog output only	0018H	24	16 bit integer 10 hex	R/W	Reading gain 0.1, unit %, read=0 means 0.0%, write=200 means 20.0% factory default is 100.0, range 0.0~100.0%, this parameters used to define the change rate of the output, for example, if you put bUF1=5.0 means the output for #1 channel change rate can't be larger than 5.0%/second, this is very useful for analog output in protection the heater from being damaged

5.2.6 #2 loop P.I.D parameters "LCK-0012" menu

Password key-in: LCY 0012 — LCK=0012 press SET once — Proportional band: P2 0200

The data storage method for below parameters are "EEPROM"

No	Notation	Parameter type	Hex	10 Hex	Data format	R/W	Remarks
26	P2	Proportional band for #2 channel	0019H	25	16 bit integer 10 hex	R/W	reading gain 0.1, unit is degree, read 200 for 20.0 degree, write 300 for 30.0 degree factory default 20.0, range 0.0 ~800.0, when P2=0, OP2 switch to ON/OFF control mode, HYS2 is hysteresis
27	i2	Integral for #2 channel	001AH	26	16 bit integer 10 hex	R/W	Unit "second", 0-3600 second, factory default=210
28	d2	Derivative for #2 channel	001BH	27	16 bit integer 10 hex	R/W	Unit "second", 0-200 second, factory default=30
29	CYt2	Cycle time for #2 channel	001CH	28	16 bit integer 10 hex	R/W	Unit "second", 1-200 second, factory default= 20 seconds for relay, 2 seconds for voltage pulse analog output is 1 seconds as factory default

No	Notation	Parameter type	Hex	10 Hex	Data format	R/W	Remarks
30	HYS2	#2 channel hysteresis HYS2	001DH	29	16 bit integer 10 hex	R/W	reading gain 0.1, unit" degree" reading 4=0.4, write 10=1.0 degree factory default: 0.4 degree, range 0.0-800.0, opposite hysteresis for direct control, forward hysteresis for reverse control
31	rSt2	#2 channel proportional reset rst2	001EH	30	16 bit integer 10 hex	R/W	reading gain 0.1, unit "degree", read -50=-5.0 degree, write -100=-10.0 degree, the display on the controller can not display decimal points, range:-199.0~199.0 degree, this parameter used to counter balance the overshoot during heating process, factory default is -5.0, recommended to obtain the value via auto-tuning process
32	OPL2	#2 channel output lower limit OPL2	001FH	31	16 bit integer 10 hex	R/W	Reading gain 0.1, unit is %, read 0=0.0%, write 200=20.0% factory=0.0, range 0.0-100.0%, this parameter used to define the lower limit output for the #2 channel
33	OPH2	#2 channel output higher limit OPH2	0020H	32	16 bit integer 10 hex	R/W	Reading gain 0.1, unit is %, read 0=0.0%, write 200=20.0% factory=0.0, range 0.0-100.0%, this parameter used to define the higher limit output for the #2 channel
34	bUF2	#2 channel output restriction for analog output only	0021H	33	16 bit integer 10 hex	R/W	Reading gain 0.1, unit %, read=0 means 0.0%, write=200 means 20.0% factory default is 100.0, range 0.0~100.0%, this parameters used to define the change rate of the output, for example, if you put bUF2=5.0 means the output change rate for #2 channel can't be larger than 5.0%/second, this is very useful for analog output in protection the heater from being damaged

5.2.7 #3 loop P.I.D parameters "LCK-0013" menu

Password key-in: LCY 0013 — LCK=0013 press SET once — Proportional band: P3 0200

The data storage method for below parameters are "EEPROM"

No	Notation	Parameter type	Hex	10 Hex	Data format	R/W	Remarks
35	P3	Proportional band for #3 loop	0022H	34	16 bit integer 10 hex	R/W	reading gain 0.1, unit is degree, read 200 for 20.0 degree, write 300 for 30.0 degree factory default 20.0, range 0.0 ~800.0, when P3=0, OP3 switch to ON/OFF control mode, HYS3 is hysteresis
36	i3	Integral for #3 loop	0023H	35	16 bit integer 10 hex	R/W	Unit "second", 0-3600 second, factory default=210
37	d3	Derivative for #3 loop	0024H	36	16 bit integer 10 hex	R/W	Unit "second", 0-200 second, factory default=30

No	Notation	Parameter type	Hex	10 Hex	Data format	R/W	Remarks
38	CYt3	Cycle time for #3 channel	0025H	37	16 bit integer 10 hex	R/W	Unit "second", 1-200 second, factory default= 20 seconds for relay, 2 seconds for voltage pulse analog output is 1 seconds as factory default
39	HYS3	#3 channel hysteresis HYS3	0026H	38	16 bit integer 10 hex	R/W	reading gain 0.1, unit" degree" reading 4=0.4, write 10=1.0 degree factory default: 0.4 degree, range 0.0-800.0, opposite hysteresis for direct control, forward hysteresis for reverse control
40	rSt3	#3 channel proportional reset rst3	0027H	39	16 bit integer 10 hex	R/W	reading gain 0.1, unit "degree", read -50=-5.0 degree, write -100=-10.0 degree, the display on the controller can not display decimal points, range:-199.0~199.0 degree, this parameter used to counter balance the overshoot during heating process, factory default is -5.0, recommended to obtain the value via auto-tuning process
41	OPL3	#3 channel output lower limit OPL3	0028H	40	16 bit integer 10 hex	R/W	Reading gain 0.1, unit is %, read 0=0.0%, write 200=20.0% factory=0.0, range 0.0-100.0%, this parameter used to define the lower limit output for the #3 channel
42	OPH3	#3 channel output higher limit OPH3	0029H	41	16 bit integer 10 hex	R/W	Reading gain 0.1, unit is %, read 0=0.0%, write 200=20.0% factory=0.0, range 0.0-100.0%, this parameter used to define the higher limit output for the #3 channel
43	bUF3	#3 channel output restriction for analog output only	002AH	42	16 bit integer 10 hex	R/W	Reading gain 0.1, unit %, read=0 means 0.0%, write=200 means 20.0% factory default is 100.0, range 0.0~100.0, this parameters used to define the change rate of the output, for example, if you put bUF3=5.0 means the output for #3 channel change rate can't be larger than 5.0%/second, this is very useful for analog output in protection the heater from being damaged

5.2.8 #4 loop P.I.D parameters "LCK-0014" menu

Password key-in

LCK
0014

LCK=0014
press SET
once

Proportional band

P4
0200

The data storage method for below parameters are "EEPROM"

No	Notation	Parameter type	Hex	10 Hex	Data format	R/W	Remarks
44	P4	Proportional band for #4 channel	002BH	43	16 bit integer 10 hex	R/W	reading gain 0.1, unit is degree, read 200 for 20.0 degree, write 300 for 30.0 degree factory default 20.0, range 0.0 ~800.0, when P4=0, OP4 switch to ON/OFF control mode, HYS4 is hysteresis
45	I4	Integral for #4 channel	002CH	44	16 bit integer 10 hex	R/W	Unit "second", 0-3600 second, factory default=210
46	d4	Derivative for #4 channel	002DH	45	16 bit integer 10 hex	R/W	Unit "second", 0-200 second, factory default=30

No	Notation	Parameter type	Hex	10 Hex	Data format	R/W	Remarks
47	CYt4	Cycle time for #4 channel	002EH	46	16 bit integer 10 hex	R/W	Unit "second", 1-200 second, factory default= 20 seconds for relay, 2 seconds for voltage pulse analog output is 1 seconds as factory default
48	HYS4	#4 channel hysteresis HYS4	002FH	47	16 bit integer 10 hex	R/W	reading gain 0.1, unit" degree" reading 4=0.4, write 10=1.0 degree factory default: 0.4 degree, range 0.0-800.0, opposite hysteresis for direct control, forward hysteresis for reverse control
49	rSt4	#4 channel proportional reset rst4	0030H	48	16 bit integer 10 hex	R/W	reading gain 0.1, unit "degree", read -50=-5.0 degree, write -100=-10.0 degree, the display on the controller can not display decimal points, range:-199.0~199.0 degree, this parameter used to counter balance the overshoot during heating process, factory default is -5.0, recommended to obtain the value via auto-tuning process
50	OPL4	#4 channel output lower limit OPL4	0031H	49	16 bit integer 10 hex	R/W	Reading gain 0.1, unit is %, read 0=0.0%, write 200=20.0% factory=0.0, range 0.0-100.0%, this parameter used to define the lower limit output for the #4 channel
51	OPH4	#4 channel output higher limit OPH4	0032H	50	16 bit integer 10 hex	R/W	Reading gain 0.1, unit is %, read 0=0.0%, write 200=20.0% factory=0.0, range 0.0-100.0%, this parameter used to define the higher limit output for the #4 channel
52	bUF4	#4 channel output restriction for analog output only	0033H	51	16 bit integer 10 hex	R/W	Reading gain 0.1, unit %, read=0 means 0.0%, write=200 means 20.0% factory default is 100.0, range 0.0~100.0, this parameters used to define the change rate of the output, for example, if you put bUF4=5.0 means the output for #4 channel change rate can't be larger than 5.0%/second, this is very useful for analog output in protection the heater from being damaged

5.2.9 Field parameters "LCK-0101" menu

Password key-in

LCK
0101

LCK=0101
Press SET

Input sensor selection

INP1
0000

The data storage method for below parameters are "EEPROM"

No	Notation	Parameter type	Hex	10 Hex	Data format	R/W	Remarks
53	INP1	Input type for both channels	0034H	52	16 bit integer 10 hex	R/W	see table below

INP=		Input type and range							
0 or 1	K type TC	−30	to	1300	℃	/ −20	to	2372	℉
2 or 3	E type TC	−30	to	600	℃	/ −20	to	1112	℉
4 or 5	J type TC	−30	to	800	℃	/ −20	to	1472	℉
6	N type TC	−30	to	1300	℃	/ −20	to	2372	℉
7	Wu3_Re25	600	to	2000	℃	/ 1000	to	3632	℉
8	S type TC	0	to	1600	℃	/ 0	to	2912	℉
9	T type TC	−30	to	400	℃	/ −20	to	752	℉
10	R type TC	0	to	1700	℃	/ 0	to	3092	℉
11	B type TC	200	to	1800	℃	/ 400	to	3272	℉

Write 0-17 to address 0034H or 52

No	Notation	Parameter type	Hex	10 Hex	Data format	R/W	Remarks
54	UNIt	Display unit	0035H	53	16 bit integer 10 hex	R/W	=0 celcius ℃ =1 Fahrenheit ℉ factory default=0
55	SC1	Sensor offset for #1 channel	0036H	54	16 bit integer 10 hex	R/W	Reading gain 0.1, unit "degree" read -50=-5.0 degree, write 20=2.0 degree (the LED only shows integer) factory default=0.0 Range:-199.9 to 999.9, the display of the PV for #1 channel= actual measuring value+SC1
56	SC2	Sensor offset for #2 channel	0037H	55	16 bit integer 10 hex	R/W	Reading gain 0.1, unit "degree" read -50=-5.0 degree, write 20=2.0 degree (the LED only shows integer) factory default=0.0 Range:-199.9 to 999.9, the display of the PV for #2 channel= actual measuring value+SC2
57	SC3	Sensor offset for #3 channel	0038H	56	16 bit integer 10 hex	R/W	Reading gain 0.1, unit "degree" read -50=-5.0 degree, write 20=2.0 degree (the LED only shows integer) factory default=0.0 Range:-199.9 to 999.9, the display of the PV for #3 channel= actual measuring value+SC3
58	SC4	Sensor offset for #4 channel	0039H	57	16 bit integer 10 hex	R/W	Reading gain 0.1, unit "degree" read -50=-5.0 degree, write 20=2.0 degree (the LED only shows integer) factory default=0.0 Range:-199.9 to 999.9, the display of the PV for #24channel= actual measuring value+SC4

No	Notation	Parameter type	Hex	10 Hex	Data format	R/W	Remarks
59	PVFt (PVFt)	PV input filter strength	003AH	58	16 bit integer 10 hex	R/W	Range 0-30, the filter strength gets stronger when value is larger, factory default=15
60	LdE (LdE)	SV deviation for temporarily extra output	003BH	59	16 bit integer 10 hex	R/W	Reading gain 0.1, read 50 means 5.0 degree, write 100 means 10.0 degree(LED display shows 0-200 means 0.0~20.0 degree),This function is used to counter balance the sudden heat loss after the SV is reached, sometimes the SV drops too fast and it takes too long for the temperature to go back to the setting value, this function will kick-in when this happens, an extra output will be generated from the controller to the system so that the PV will be dragged back to SV as quickly as possible, SV1 deviation value for this function is LdE, active points=SP1-LdE for #1 channel active points=SP2-LdE for #2 channel active points=SP3-LdE for #3 channel active points=SP4-LdE for #4 channel
61	SUP (SUP)	Temporarily extra output value	003CH	60	16 bit integer 10 hex	R/W	Reading gain 0.1, 0-1000 means 0.0-100.0% SUP=0, to turn off this function, if SUP=20, means the temporarily extra output is 20.0% Factory default=0.0(function off) please be care when using this function, large temperature fluctuation might happen if this function is not being executed correctly
62	OFF (OFF)	SV deviation for temporarily extra output decrease	003DH	61	16 bit integer 10 hex	R/W	Reading gain 0.1, read 50 means 5.0 degree, write 100 means 10.0 degree(LED display shows 0-200 means 0.0~20.0 degree),This function is used to counter balance the sudden heat increase after the SV is reached, sometimes the SV shoots up too much and it takes too long for the temperature to drop back to the setting value, this function will kick-in when this happens, an extra output decrease will be generated from the controller to the system so that the PV will be dragged back to SV as quickly as possible, OFF is the deviation value for this function to kick in, active points=SP1+PFF for #1 channel active points=SP2+PFF for #2 channel active points=SP3+PFF for #3 channel active points=SP4+PFF for #4 channel
63	LP (LP)	Temporarily extra output decrease value	003EH	62	16 bit integer 10 hex	R/W	Reading gain 0.1, 0-1000 means 0.0-100.0% LP=0, to turn off this function, if LP=20, means the temporarily extra output decrease is 20.0% Factory default=0.0(function off) please be care when using this function, large temperature fluctuation might happen if this function is not being executed correctly
64	Err (Err)	Over range response	003FH	63	16 bit integer 10 hex	R/W	=0, Output will be terminated if the PV cross the higher limit range or lower limit range =1, Output will work normally if the PV cross the higher limit range or lower limit range, the higher limit or lower limit range is the same as the range of the sensor ranged defined in this controller, for example, the lower limit range for thermocouple is -30.0 and -199.9 for PT100
65	OUd (OUd)	heating/cooling control configuration	0040H	64	16 bit integer Binary	R/W	Input respective bit value to configure bit0 =0 : OP1 output set as reverse control(heating) =1 : OP1 output set as direct control(cooling) bit1 =0 : OP2 output set as reverse control(heating) =1 : OP2 output set as direct control(cooling) bit2 =0 : OP3 output set as reverse control(heating) =1 : OP3 output set as direct control(cooling) bit3 =0 : OP4 output set as reverse control(heating) =1 : OP4 output set as direct control(cooling)
66	rAM (rAM)	SV store method configuration	0041H	65	16 bit integer Binary	R/W	Input respective bit value to configure bit0 =0:SP1 stored in EEPROM =1:SP1 stored in RAM, the value restored is the value registered in EEPROM before power cut bit1 =0:SP2 stored in EEPROM =1:SP2 stored in RAM, the value restored is the value registered in EEPROM before power cut, bit2 =0:AU1 stored in EEPROM =1:AU1 stored in RAM, the value restored is the value registered in EEPROM before power cut bit3 =0:AU2 stored in EEPROM =1:AU2 stored in RAM, the value restored is the value registered in EEPROM before power cut EEPROM: 100,000 times write and erase limits RAM: no limits on the write and erase

## 5.2.10 Auto/manual control MAN "LCK-0020"

Password key-in   Manual control setting

LCK 0020   0020 press SET   → MAN 0000

configurable via keys on panel

0000
=0 : OP1 output auto control
=1 : OP1 output manual control, output value M1
=0 : OP2 output auto control
=1 : OP2 output manual control, output value M2
=0 : OP3 output auto control
=1 : OP3 output manual control, output value M3
=0 : OP4 output auto control
=1 : OP4 output manual control, output value M4
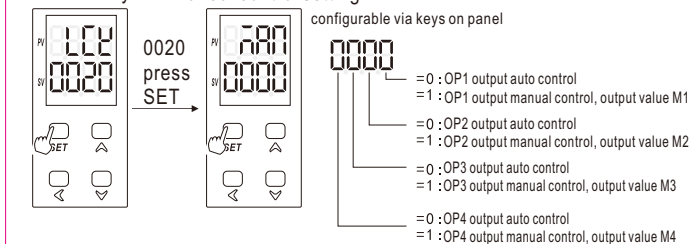
Below parameter stored as RAM mode, the controller will be at auto control mode after power resume if the controller was at manual control mode before power failure

No	Parameter type	HEX	Hex 10	Data format	R/W	Remarks
67	Auto/manaul control mode	0042H	66	16 bit integer 10 hex	R/W RAM	Bit0=0 OP1 output auto control =1 OP1 output manual control, output value M1 Bit1=0 OP2 output auto control =1 OP2 output manual control, output value M2 Bit2=0 OP3 output auto control =1 OP3 output manual control, output value M3 Bit3=0 OP4 output auto control =1 OP4 output manual control, output value M4

MAN control mode   #1 channel manual output%

MAN 0000   Press SET   → M1 0000
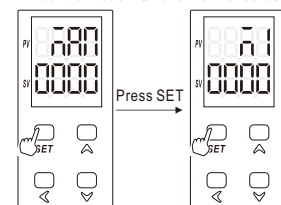
Below parameter stored on RAM mode

No	Notation	Parameter type	HEX	Hex 10	Data format	R/W	Remarks
68	M1	#1 channel manual output% M1	0043H	67	16 bit integer 10 hex	R/W RAM	Reading gain 0.1, unit is %, read 0 means 0.0%, write 200, means 20.0%
69	M2	#2 channel manual output% M2	0044H	68	16 bit integer 10 hex	R/W RAM	Reading gain 0.1, unit is %, read 0 means 0.0%, write 200, means 20.0%
70	MAU1	#3 channel manual output% M3	0045H	69	16 bit integer 10 hex	R/W RAM	Reading gain 0.1, unit is %, read 0 means 0.0%, write 200, means 20.0%
71	MAU2	#3 channel manual output% M4	0046H	70	16 bit integer 10 hex	R/W RAM	Reading gain 0.1, unit is %, read 0 means 0.0%, write 200, means 20.0%

Remark: you can't active the manual control mode if the controller are under stop mode
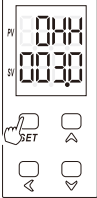
5.2.11 OLL/OHH output merge "LCK-0040"

Password key-in

PV `LCK`
SV `0040`

LCK set as 0040 then press set →

OLL output low limit merge

PV `OLL`
SV `0030`

按SET键一次 →

OHH output high limit merge

PV `OHH`
SV `0030`

→

Parameters stored in EEPROM

No	Notation	Parameter type	HEX	Hex 10	Data format	R/W	Remarks
76	OLL	output low limit merge	004BH	75	16 bit integer 10 hex	R/W	Reading gain 0.1, unit is %, factory default=3.0 read 0 means 0.0%, write 30 means 3.0% when the output is less than <oLL%, the output will be 0%
77	OHH	output high limit merge	004CH	76	16 bit integer 10 hex	R/W	Reading gain 0.1, unit is %, factory default=3.0 read 0 means 0.0%, write 30 means 3.0% when the output is larger than >(100%-oHH%) the output will be 100%

6. MA04D-652 quick start guide

6.1 Goes to LCK-0202 and refer to 5.2.2 on the manual for parameters affiliated with communication

6.2 Goes to LCK-0010 and refer to 5.2.3 on the manual for parameter R/S(No.12), RUN/STOP function

6.3 Goes to LCK-0010 and refer to 5.2.3 on the manual for parameter AT(No.11), Auto-Tuning function

6.4 Goes to LCK-0020 and refer to 5.2.10 on the manual for parameter MAN(No.67) and M1,M2,M3,M4 for auto/manual control function

6.5 Setting value for each loop,Refer to 5.2.4 on the manual on how to set SP1/SP2/SP3/SP4

6.6 Goes to LCK-0101 and refer to 5.2.9 on the manual on how to configure the output mode for OP1/OP2/OP3/OP4