PID temperature controller+SCR

TDF100-662
Manual

TDF100-662-C4

Pls read this manual carfully before iperation and keep it for furgher reference

FEATURE

1. TDF100 is an all-in-one temperature controller+SCR unit with heatsink, it's really a ready to use solutionfor resistive loads, plug in terminals are used for connections, very easy when it comes down to installationRS-485 and power source using the same terminals.
2. Built-in display and setting buttons available, the configuration can be carried out even without masterdevice
3. Unit can be used as a regular PID controller or just a reqular SCR
4. 0utput high/low limits configuration, soft-start function analog output
5. Works with all kinds of input, TC/RTD and analog signal covers 0-20mA,4-20mA,0-10Vdc, 0-5Vdc,1-5Vdcthis is a true universal input controllers, accuracy is 0.2%F.S
6. SCR output rated at 380V/220Vac(maximum 440Vac),single phaseAL1 relay output, deviation alarm, absolute value alarm, 12 different alarms modesAL2 digits output, deviation alarm, absolute value alarm, 12 different alarms modes

Safety Cautions

1. SCR is not going to work if there is no load or the load current less than 0.5A
2. Large amps are expected on the SCR, terminals needs to be fastened securely, otherwise excessive heamight be accumulated on the terminals result in a damage on the SCR
3. SCR must be installed vertically on a strong surface, can not placed anything above or beneath the SCRso the air can flow freely.
4. Must make sure the air flow is sufficient enough in the cabinet if you have multiple SCR installed in thesamecabinet
5. The cabinet with SCR in it must be less than 550C, a cooling fans must be included if the temperaturehigher than 550C
6. The distance between two SCR must be minimum 5CM.
7. Please make sure all the configuration and wiring done properly before power on
8. A circuit breaker must be installed in the system to protect the SCR unit
9. Do not touch the terminals at anytime whatsoever even power was cut off
10. Do not attempt to change the fans while the power is still feeding to the SCR
11. Please supply the voltage to the SCR within it's ratings
12. Please make sure the polarity is correct when input is feed to the SCR

1. MODEL NO& CODE NO

Pls confirm the code no based on your requirement

Model TDF100-662- □ – □ – □ – □
                    ①   ②   ③   ④

①Main function：

PID：This device used as a PID+SCR unit

SCR：This device used as SCR unit only

②Input：

Input code	Input type and range							
K	K type TC	−30	to	1300	℃	/ −20	to	2360	℉
E	E type TC	−30	to	600	℃	/ −20	to	1100	℉
J	J type TC	−30	to	800	℃	/ −20	to	1460	℉
N	N type TC	−30	to	1300	℃	/ −20	to	2360	℉
W	Wu3_Re25	600	to	2000	℃	/ 1000	to	3276	℉
S	S type TC	0	to	1600	℃	/ 0	to	2900	℉
T	T type TC	−30	to	400	℃	/ −20	to	740	℉
R	R type TC	0	to	1700	℃	/ 0	to	3080	℉
B	B type TC	200	to	1800	℃	/ 400	to	3260	℉
D	Pt100 RTD	−199	to	800	℃	/ −199	to	1400	℉
V03	0−5VDC	−1999	to	9999				
V04	0−10DC	−1999	to	9999				
V08	1−5VDC	−1999	to	9999				
V09	2−10VDC	−1999	to	9999				
A02	0−20mA	−1999	to	9999				
A03	4−20mA	−1999	to	9999				

③. Current ratings（★Actural load should be no more than 80% of ratings）

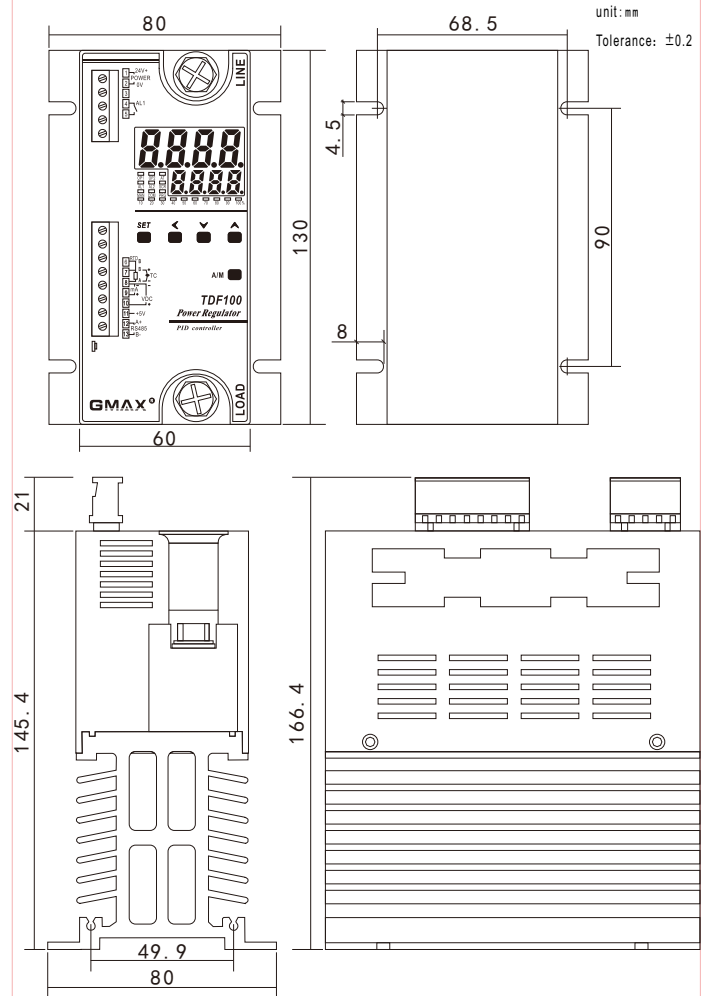48A: resistive load 48A(200~440VAC)

60A: resistive load60A(200~440VAC)
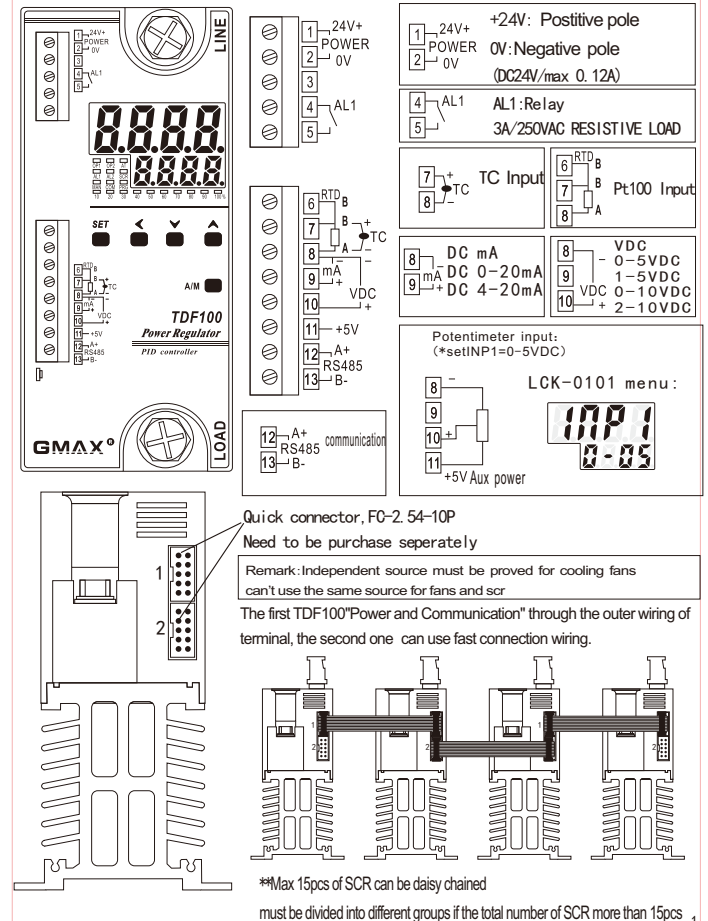
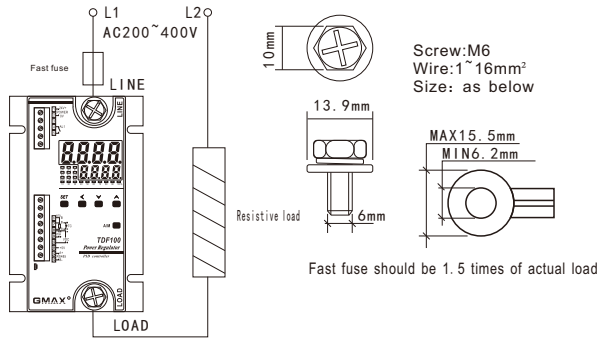80A: resistive load80A(200~440VAC)

④ Cooling fans

N：NO fans

F：With fans（24VDC/150mA）

2. SIZE AND DIMENSION

unit：mm
Tolerance：±0.2

3. WIRING

+24V: Postitive pole
0V: Negative pole
(DC24V/max 0.12A)

AL1:Relay
3A/250VAC RESISTIVE LOAD

TC Input

Pt100 Input

DC mA
DC 0-20mA
DC 4-20mA

VDC
0−5VDC
1−5VDC
0−10VDC
2−10VDC

Potentimeter input:
(*setINP1=0-5VDC)

LCK-0101 menu:

INP1
0-05

+5V Aux power

Quick connector, FC−2.54−10P
Need to be purchase seperately

Remark:Independent source must be proved for cooling fans can't use the same source for fans and scr

The first TDF100"Power and Communication" through the outer wiring of terminal, the second one can use fast connection wiring.

**Max 15pcs of SCR can be daisy chained
must be divided into different groups if the total number of SCR more than 15pcs
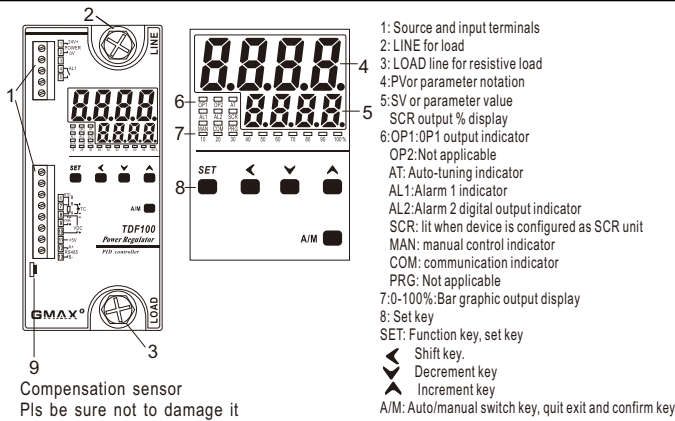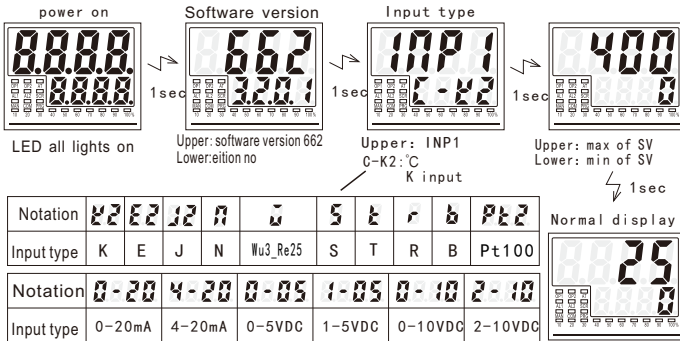
High frequency device should be placed far away from this device
Please make sure that there is no unattached metal parts left in the cabinet
Please make sure input is correctly wired to the SCR otherwise the units might be damaged

4. PANEL DESCRIPTION

1: Source and input terminals
2: LINE for load
3: LOAD line for resistive load
4: PVor parameter notation
5: SV or parameter value
   SCR output % display
6: OP1:OP1 output indicator
   OP2:Not applicable
   AT: Auto-tuning indicator
   AL1:Alarm 1 indicator
   AL2:Alarm 2 digital output indicator
   SCR: lit when device is configured as SCR unit
   MAN: manual control indicator
   COM: communication indicator
   PRG: Not applicable
7:0-100%:Bar graphic output display
8: Set key
SET: Function key, set key
◄   Shift key.
∨   Decrement key
∧   Increment key
A/M: Auto/manual switch key, quit exit and confirm key

Compensation sensor
Pls be sure not to damage it

5. Parameters setting and RS-485 address

5.1 Power on display and communication

power on — LED all lights on
Software version — Upper: software version 662 / Lower:eition no
Input type — Upper: INP1 / C-K2: ℃ K input
Upper: max of SV / Lower: min of SV
Normal display

Notation	K2	E2	J2	N	Ṽ	S	t	r	b	Pt2
Input type	K	E	J	N	Wu3_Re25	S	T	R	B	Pt100

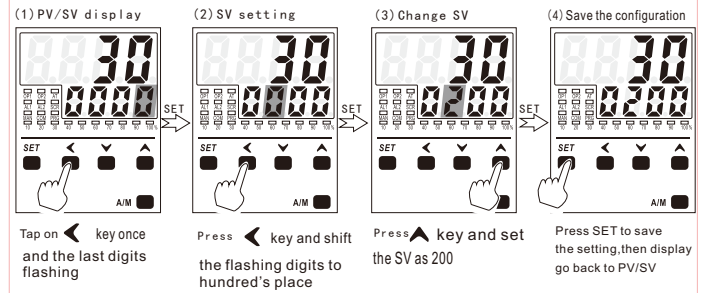| Notation	0-20	4-20	0-05	1-05	0-10	2-10
Input type	0-20mA	4-20mA	0-5VDC	1-5VDC	0-10VDC	2-10VDC

5.1.1 Communication protocol
(1):Modbus-RTU protocol,support 03H read, 06H&10H read command
(2):Single drop RS-485 multi-drop communication baud rate:2400,4800,9600,19200 selectable
(3): data format: 1 start bit+8 data bit(N/0/E)CRC checking+1 stop bit
(4):Write maximum 20 data and read maximum 37 data
(5): Factory default address is 1, baud rate is 9600, without CRC checking
(6):Parameterlist and respective address map for RS-485

5.2 Parameter list and respective address
(HEX and 10Hex format)

No	Notation	HEX	10 HEX	Data format	R/W	Remark
1	Process ValuePV	0000H	0	Hex 10Hex	R	TC/RTD input, reading gain 0.1 read 2000 means 200.0 no reading gain when input is analog
2	PID output%	0001H	1	Hex 10Hex	R	reading gain 0.1 0-1000 means 0. 0%-100. 0%,
3	Various indicator on the panel	0002H	2	Hex Binary	R	bit0:COM , bit1:MAN , bit2:SCR bit3:AL2 , bit4:AL1 , bit5:AT bit6:OP2 , bit7:OP1 bitx=0 light on , =1 light off AI2 can be used as digital output
4	Reserved	0003H	3			
5	Reserved	0004H	4			

5.2.2 Setting value for PiD control mode
Change the SV from the front plate, for example, change the SV from 0 to 200'C

(1) PV/SV display — Tap on ◄ key once and the last digits flashing
(2) SV setting — Press ◄ key and shift the flashing digits to hundred's place
(3) Change SV — Press ∧ key and set the SV as 200
(4) Save the configuration — Press SET to save the setting,then display go back to PV/SV

Remark
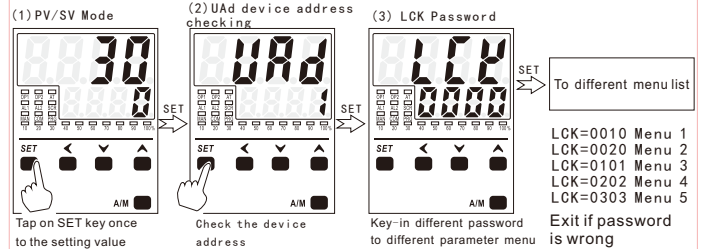*Press up or down key once, the numbers will increase or decrease by 1 each time, Ifyou keep pressing up or down key, the numbers will go up or down continuously.
*Press A/M key will save the configuration

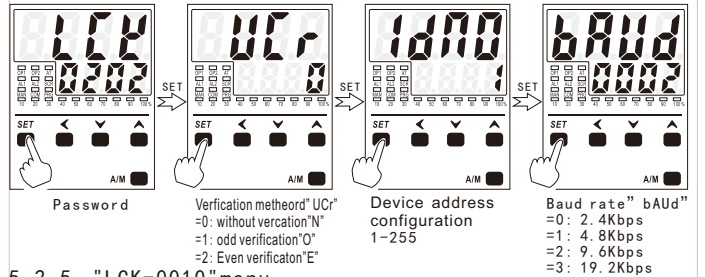| NO	Notation	HEX	10HEX	Data format	R/W	Remard
6	Setting value forcontrollerdata storage RAM or EEPROM	0005H	5	HEX 10HEX	R/W	TC/RTD input, reading gain 0.1 read 2000 means 200.0 write 1500 means 150.0 no reading gain for analog input
7	Reserved	0006H	6			

Remark The data storage type is EEPROM, which means the data will inherit after power resume, but there is a limitation on the EEPROM mode, this mode is not appropriate if you need to write different data frequently, if you need to write frequently, please goes to LCK-0101, and change SVS to 0, which is RAM mode. refer to 5.2.7 LCK-0101 number 59 for details
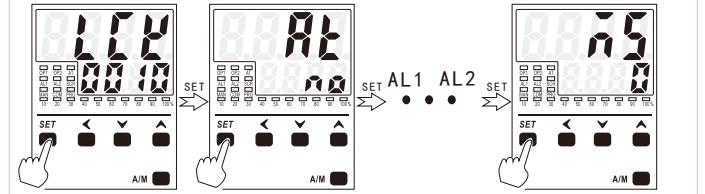
5.2.3 Password key- LCK

(1)PV/SV Mode — Tap on SET key once to the setting value
(2)UAd device address checking — Check the device address
(3) LCK Password — Key-in different password to different parameter menu

To different menu list

LCK=0010 Menu 1
LCK=0020 Menu 2
LCK=0101 Menu 3
LCK=0202 Menu 4
LCK=0303 Menu 5

Exit if password is wrong

5.2.4 ★Parameter related to comunication "LCK-0202" menu

Password

Verfication metheord" UCr"
=0: without vercation"N"
=1: odd verification"O"
=2: Even verificaton"E"

Device address configuration 1-255

Baud rate" bAUd"
=0: 2. 4Kbps
=1: 4. 8Kbps
=2: 9. 6Kbps
=3: 19. 2Kbps

5.2.5 "LCK-0010" menu
Auto-tuning" AT", Alarm "AL1/AL2", Auto/manual/stop "MS" parameters

Password
Data storage type EEPROM

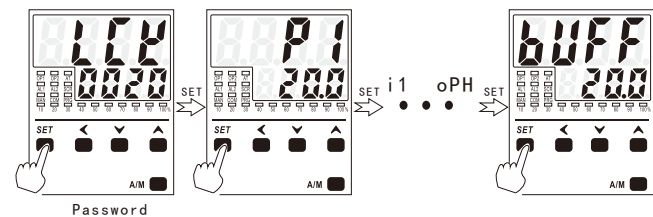| No	Notation	HEX	10HEX	Data format	R/W	Remark
8	AtAuto-Tuning	0007H	7	Hex 10Hex	R/W	Read/write=0: Auto-tuning off Read/write=1:Active auto-tuning Set via front key=No, auto-tuning off Set via front key=Yes, Active auto-tuning
9	AL1 1 alarm relay output	0008H	8	Hex 10Hex	R/W	TC/RTD input, reading gain 0.1 read 2000 means 200.0 no reading gain when input is analog menuLCK-0101,ALd1=0 or 10,AL1 will be dismissed, AH1 is alarm hysteresis
10	AI2 alarm, digit output	0009H	9	Hex 10Hex	R/W	TC/RTD input, reading gain 0.1 read 2000 means 200.0 no reading gain when input is analog menuLCK-0101,ALd2=0 or10,AL2 will be dismissed,AH2 is alarm hysteresis
11	MS RUN/STOP manual control	000AH	10	Hex 10Hex	R/W	Remark:RSR parameters in LCK-0050 menu RSR = 0: MS parameter is kept when power off. RSR = 1: MS = 2 after the power is restarted Only for 662-3.2.01 software version	Read/write set=0: auto control Read/write set=1:manual control refer to LCK-0202 for manual output% setting No.32,address 001F Read/write set=2, goes to"Stop" Lower display shows"STOP* StoP

2

TDF100-662-C4

Manual control mode

1. Man indicator light on if device enter into manual control mode, Lower display shows the output %

2. Use the shift key, increment decrement key to set the output%

3. Or you can set the output% via the master device like Hm refer to LCK-0020, NO 32 address001F

Stop mode

1. Lower display shows Stop when device enter into stop mode
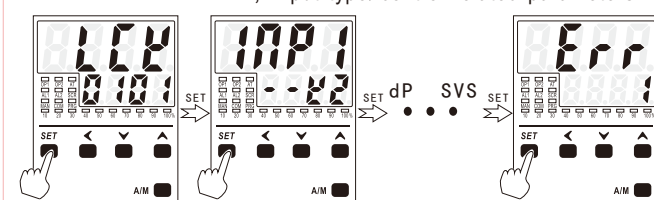2. output goes to 0.0% in stop mode
3. Stop mode does not cut off AL1

5.2.6 "LCK-0020", PID related parameters

Password

Data storge type, EEPROM

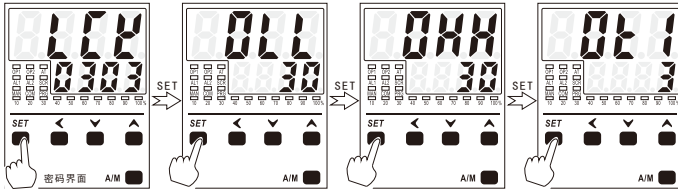| NO	Notation	HEX	10HEX	Data format	R/W	Remark
12	reserved	000BH	11			
13	P1 Proportional band	000CH	12	HEX 10HEX	R/W	proportional band,range 0.0~400.0 unit is degree ON/OFF mode when P1=0 HYS1 is hysteresis , refer to No.18 on the manuaL
14	i1 integral time	000DH	13	HEX 10HEX	R/W	Unit"Second"0-3600 seconds, factory default=210
15	d1 derivative	000EH	14	HEX 10HEX	R/W	Unit"Second"0-200 seconds, factory default=30
16	reserved	000FH	15			
17	AtVL Auto-tuning SV shift value	0010H	16	HEX 10HEX	R/W	Shift the setting value lower for the auto-tuning process to protect the system as the auto-tuning is an ON/OFF process by doing this will protect the system from being damaged, factory default=0.0
18	Cyt1 Control cycle	0011H	17	HEX 10HEX	R/W	Unit"second",0-100 second, factory default=0 only applicable when LCK-0303, Ot1=0/1/2 PWM output=0, special output: 5HZ PWM output when ot1=3, phase angled output, CYt1 not working,refer to 5.2.8 LCK-0303 for details
19	HYS1 Hysteresis for ON/OFF control	0012H	18	HEX 10HEX	R/W	When P1=0.0,OP1 switch to ON/OFF controL mode HYS1 is hysteresis, PV>SV,OP1 terminated PV<SV-HYS1,OP1 output 100%
20	reserved	0013H	19			
21	reserved	0014H	20			
22	reserved	0015H	21			
23	rSr	0016H	22	16-bit integer	R/W	details in menu:5.2.9 LCK-0050
24	WAIT	0017H	23	16-bit integer	R/W	reading gain 0.1, range: 0.0-100.0degree
25	SEP	0018H	24	16-bit integer	R/W	reading gain0.1, range: 0.0-999.8degree
26	RP	0019H	25	16-bit integer	R/W	reading gain0.1, range: 0.0-999.8degree
27	reserved	001AH	26			
28	rSt1 Proportional reset	001BH	27	16-bit integer 10HEX	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
29	Ar Integral ration	001CH	28	16-bit integer 10HEX	R/W	Reading0-1000 represents 0.0-100.0 times Setting range 0.0-100.0 represents 0.0-100.0 times Used for special occasions to disclose large -to -large magnification control.Ar less than 1.0 is controlled by 1.0 times, and the factory = 0.0
30	OPL OPLmin output%	001DH	29	16-bit integer 10HEX	R/W	Reading gain 0.1 read 0-1000 means 0.0%-100.0% output lower limit factory default=0.0
31	OPH OPH max output%	001EH	30	16-bit integer 10HEX	R/W	Reading gain 0.1 read 0-1000 means 0.0%-100.0% output lower limit factory default=100.0
32	output% under manual control mode	001FH	31	16-bit integer 10HEX	R/W	Reading gain 0.1 0-1000 means0.0%-100.0% under manual control output mode set the manual output % via master device
33	reserved	0020H	32			
34	reserved	0021H	33			
35	BUFF soft-start	0022H	34	16-bit integer 10HEX	R/W	This parameters used to define the change rate of the output, for example, ifyou 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
36	LCK password address	0023H	35	16-bit integer 10HEX	R/W	Range 0-9999

5.2.7 "LCK-0101" menu , Input type/control related parameters

Password

Data storage type, EEPROM

NO	Notation	HEX	10HEX	Data format	R/W	Remark
37	INP1 Input type selection	0024H	36	HEX 10HEX	R/W	Data range: 0-15

write or read	0	1	2	3	4
notation	K2	E2	J2	n	u
Input type	K	E	J	N	Wu3_Re25

write or read	5	6	7	8	9
notation	S	t	r	b	Pt2
input type	S	T	R	B	Pt100

write or read	10	11	12
notation	0-20	4-20	0-05
input type	0-20mA	4-20mA	0-5VDC

write or read	13	14	15
notation	1-05	0-10	2-10
input type	1-5VDC	0-10VDC	2-10VDC

NO	Notation	HEX	10HEX	Data format	R/W	Remark
38	dP Decimal point dP	0025H	37	HEX 10HEX	R/W	Range: 0-3 TC/RDT INPUT, 0-1 Analog input, 0-3
39	LSPL Setting value lower limit	0026H	38	HEX 10HEX	R/W	TC/RTD input,reading gain 0.1 reading 100 means10.0 degree (analog input,no gain) SV lower limit only works when you configure it via front panel
40	USPL Setting value higher limit	0027H	39	HEX 10HEX	R/W	TC/RTD input,reading gain 0.1 reading 1000 means10.0 degree (analog input,no gain) SV upper limit only works when you configure it via front panel
41	UNIt Display unit	0028H	40	HEX 10HEX	R/W	Range0-2 =0 ℃ =1 Fahrenheit =2 nothing
42	PIOS Input offset	0029H	41	HEX 10HEX	R/W	Input offset, in some of applications where there is a certain error occurred this value can be used to offset the error factory default=0
43	PIFt Filter strength	002AH	42	HEX 10HEX	R/W	Range:0-60 , factory value=10 Input filter strength: 1-30 normal filters trength,31-60 enhanced filter strength
44	ANL1 lower limit display for analog input	002BH	43	HEX 10HEX	R/W	Range:-1999~9999 Display when input is lower limit analog signal
45	ANH1 higher limit display for analog input	002CH	44	HEX 10HEX	R/W	Range:-1999~9999 Display when input is higher limit analog signal
46	Con Function configuration	002DH	45	HEX 10HEX	R/W	Range0-1 =0: Device will be used as PID control =1: Device will be used as SCR unit only (SCR indicator light on when this mode selected) 1、Set INP1 as 4-20mA 2、set dP=1 3、set ANL1及ANH1 如: ANL1=0.0 , ANH1=100.0 means value=0.0-100.0了 (alsl can set 4.00-20.00mA) 4、set Con=1
47	Reserved	002EH	46			
48	ALd1 Alarm mode for alarm1	002FH	47	HEX 10HEX	R/W	Range 0-16, Configure the alarm mode for alarm one refer to 5.2.9 for details
49	AH1 Alarm hysteresis for alarm1	0030H	48	HEX 10HEX	R/W	Alarm1 hysteresis,factory default=0.4
50	ALd2 alarm mode for alarm2	0031H	49	HEX 10HEX	R/W	Range0-16. configure the alarm mode fro alarm 1 refer to 5.2.9 for details
51	AH2 alarm hysteresis for alarm2	0032H	50	HEX 10HEX	R/W	Alarm 2 hysteresis ,factory default=0.4

NO	Notation	HEX	10HEX	Data format	R/W	Remark
52	Reserved	0033H	51			
53	Reserved	0034H	52			
54	OUd control mode heating or cooling	0035H	53	HEX 10HEX	R/W	Range: 0-1 =0: reverse action (heating) =1: direct action (cooling)
55	Reserved	0036H	54			
56	Reserved	0037H	55			
57	Reserved	0038H	56			
58	Communication check	0039H	57	HEX 10HEX	R	communication data refer to LCK-0202, do not write any data
59	SuS SV storage type	003AH	58	HEX 10HEX	R/W	=0:stored as RAM =1:stored as EEPROM
60	Err over range action	003BH	59	HEX 10HEX	R/W	=0,when overrange happens, output terminated manual mode still working =1,when overrange happens, output still working
61	Device address	003CH	60	HEX 10HEX	R	Refer to LCK-0202 for details
62	Baud rate	003DH	61	HEX 10HEX	R	Refer to LCK-0202 for details
63	Reserved	003EH	62			
64	Reserved	003FH	63			
65	Reserved	0040H	64			

5.2.8 "LCK-0303" engineer parameter list

Data storage type EEPROM

NO	Notation	HEX	10HEX	Data format	R/W	Remark
66	OLL output low limit merge	0041H	65	HEX 10HEX	R/W	Reading gain 0.1, unit is %, factory default=3.0 read 0 means 0.0%,write 30 means 3.0% when the outputis less than <oLL%, the output will be 0%
67	OHH output high limit merge	0042H	66	HEX 10HEX	R/W	Reading gain 0.1, unit is %, factory default=3.0 read 0 means 0.0%, write 30 means 3.0% when the outputis larger than >(100%-0HH%) the output will be 100%
68	Oti Output mode	0043H	67	HEX 10HEX	R/W	Range: 0-3 =0 or1or2 random,zero-crossing,PWM output =3 phase angle fired output

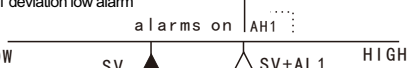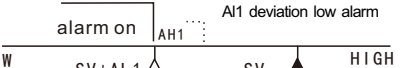## 5.2.9 "LCK-0050" menu, engineer parameter list
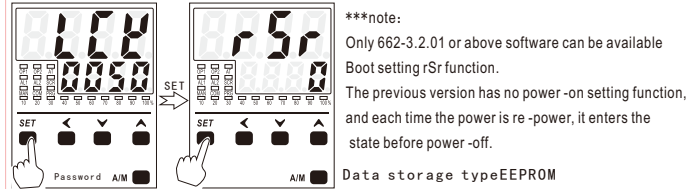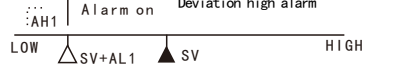
***note:
Only 662-3.2.01 or above software can be available
Boot setting rSr function.
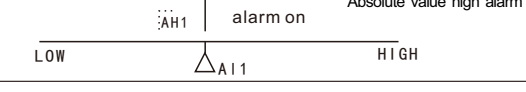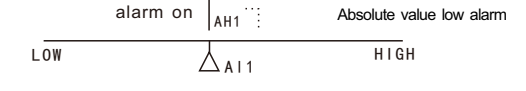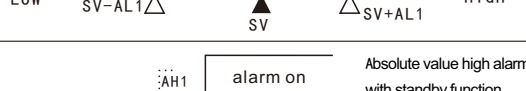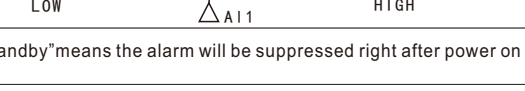The previous version has no power-on setting function, and each time the power is re-power, it enters the state before power-off.
Data storage typeEEPROM
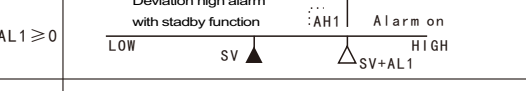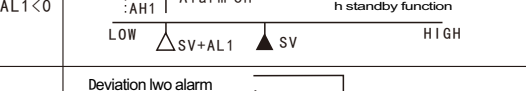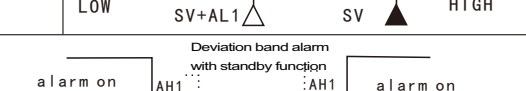
NO	Notation	HEX	10HEX	Data format	R/W	Remark
23	rSr Boot setting	0016H	22	HEX 10HEX	R/W	rSr = 0: When the power is restarted, the module enters the state before power off. rSr = 1: When the power is restarted, the module enters the stop state. For example, it is automatically run before power off. After the restart, the module still enters the state of stopping and needs to be restarted to run.Control LCK-0010 menu MS parameter combined with use

5.2.10 Alarm mode details

ALd□	Alarm mode		
10 or00	NO alarm		
11	AL1≥0	Deviation high alarm	
11	AL1<0	Deviation high alarm	
12	AL1≥0	Al1 deviation low alarm	
12	AL1<0	Al1 deviation low alarm	

ALd□	Alarm mode	
13	Deviation band alarm	
14	Deviation band alarm	
15	Absolute value high alarm	
16	Absolute value low alarm	
01	AL1≥0	Deviation high alarm with stadby function
01	AL1<0	Deviation high alarm with standby function
02	AL1≥0	Deviation lwo alarm with standby function
02	AL1<0	Deviation low alarm with standby function
03	Deviation band alarm with standby function	
04	Deviation band reverse alarm with standby function	
05	Absolute value high alarm with standby function	
06	Absolute value high alarm with standby function	

Remark:"alarm standby"means the alarm will be suppressed right after power on

ALd1 orALd2=
00: Without alarm function
01:Deviation high alarm with standby function
02: Deviation low alarm with standby function
03: Deviation band alarm with standby function
04: Deviation band reverse alarm with standby function
05:Absolute value high alarm with standby function
06:Absolute value low alarm with standby function
10:Without alarm function
11:Deviation high alarm
12:Deviation low alarm
13:Deviation band alarm
14:Deviation band reverse alarm
15:Absolute value high alarm
16:Absolute value low alarm

6. TDF100-662 quick start guide

1. Device address, baud rate, CRC checking method
   refer to 5.2.4 LCK-0202 on parameters UCR/DNO/BAUD

2. Function configuration, PID control mode, or SCR mode

3. Input selection, refer to 5.2.7 LCK-0101,INP1 forinput configuration

4. Refer to 5.2.2 for SV setting

5. Refer to 5.2.5 LCK-0010 for auto-tuning parameters

6. Refer to 5.2.5 forRun/Stop, Manual/Auto control function

7. Refer to 5.2.7 LCK-0101 for parameters ALd1/AH1/ALd2/AH2