Combo Temperature controller+SCR
KDF100-662
User manual

KDF100-662-C1

Please read this manual carefully before operation and keep it for further reference

Main Feature

1.KDF100 is an all-in-one temperature controller+SCR unit with heatsink, it's really a ready to use solution for resistive loads, plug in terminals are used for connections, very easy when it comes down to installation
RS-485 and power source using the same terminals.
2.Built-in display and setting buttons available, the configuration can be carried out even without master device
3.Unit can be used as a regular PID controller or just a regular SCR
4.Output 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,1-5Vdc this is a true universal input controllers, accuracy is 0.2%F.S
6.SCR output rated at 380V/220Vac(maximum 440Vac), single phase
AL1 relay output, deviation alarm, absolute value alarm, 12 different alarms modes
AL2 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 heat might 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 SCR so 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 the samecabinet
5.The cabinet with SCR in it must be less than 550C, a cooling fans must be included if the temperature higher 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.Ordering Information

Please generate the ordering code based on your requirements

Model

KDF100-662- □ – □ – □ – □

① ② ③ ④

1. Main function

PID: This device used as a PID+SCR unit
SCR: This device used as SCR unit only

2.Input

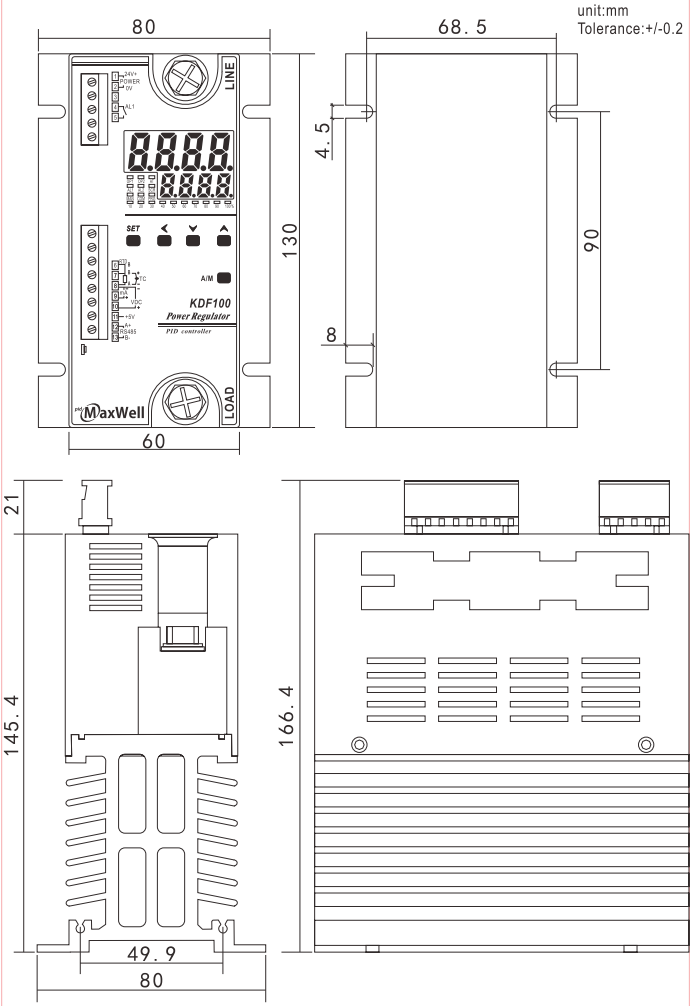
Input code	Input type and range									
K	K type thermocouple	−30	to	1300	℃	/	−20	to	2360	℉
E	E type thermocouple	−30	to	600	℃	/	−20	to	1100	℉
J	J type thermocouple	−30	to	800	℃	/	−20	to	1460	℉
N	N type thermocouple	−30	to	1300	℃	/	−20	to	2360	℉
W	Wu3_Re25 thermocouple	600	to	2000	℃	/	1000	to	3632	℉
S	S type thermocouple	0	to	1600	℃	/	0	to	2900	℉
T	T type thermocouple	−30	to	400	℃	/	−20	to	740	℉
R	R type thermocouple	0	to	1700	℃	/	0	to	3080	℉
B	B type thermocouple	200	to	1800	℃	/	400	to	3260	℉
D	Pt100	−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(Actual load should be no more than 80% of ratings)
48A: resistive load 48A(200~440Vac)
60A: resistive load 60A(200~440Vac)
80A: resistive load 80A(200~440Vac)
4. Cooling fans
N: Without fans
F: With fans(24VDC/150mA)

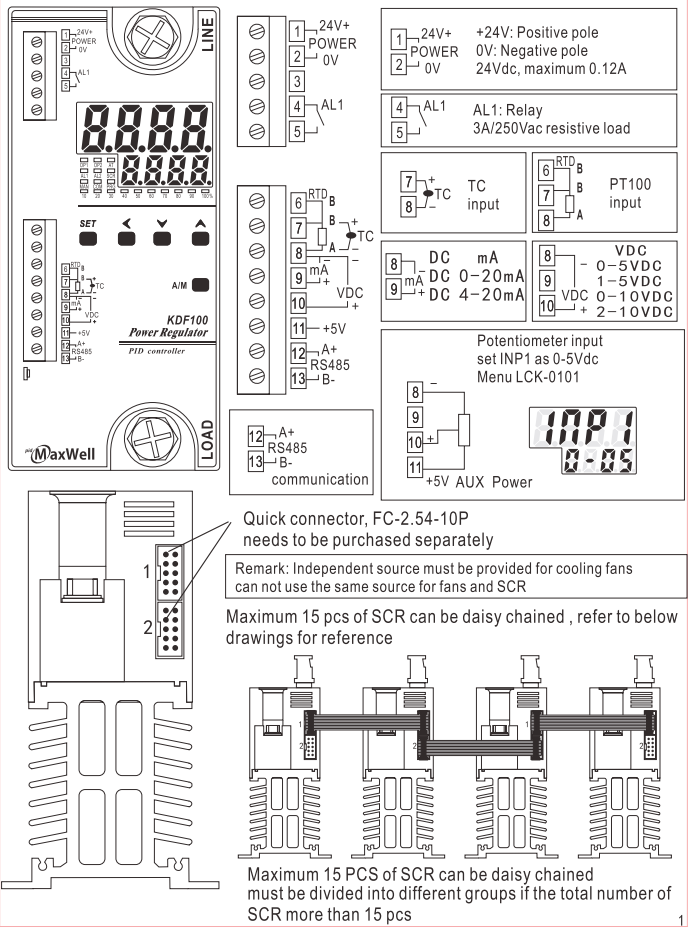
KDF100-662-PID-A03-80A-F
1:PID mode
2:4-20mA input
3:80A load
4:with cooling fans

2.Size and dimension

unit:mm
Tolerance:+/-0.2



3.Wiring

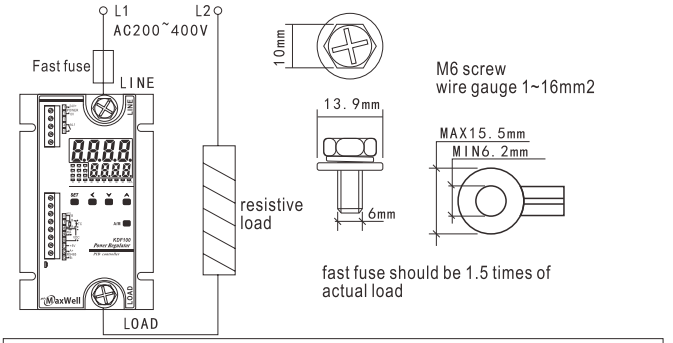


Quick connector, FC-2.54-10P
needs to be purchased separately

Remark: Independent source must be provided for cooling fans can not use the same source for fans and SCR

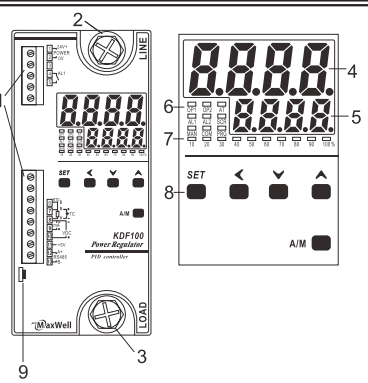
Maximum 15 pcs of SCR can be daisy chained , refer to below drawings for reference

Maximum 15 PCS of SCR can be daisy chained must be divided into different groups if the total number of SCR more than 15 pcs



- 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

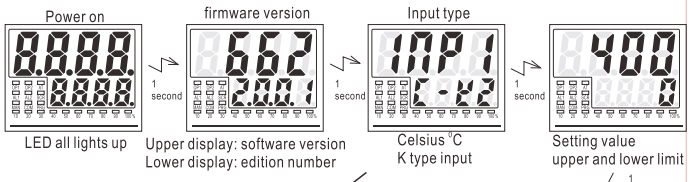


Compensation sensor
please be sure not to damage it

1: Source and input terminals
2: LINE for load
3: LOAD line for resistive load
4: PV or 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

5.Parameter setting and RS-485 address map

5.1 Power on self-checking and communication



Notation	K	E	J	N	Wu3_Re25	S	T	R	B	Pt100
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/O/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): Parameter list and respective address map for RS-485

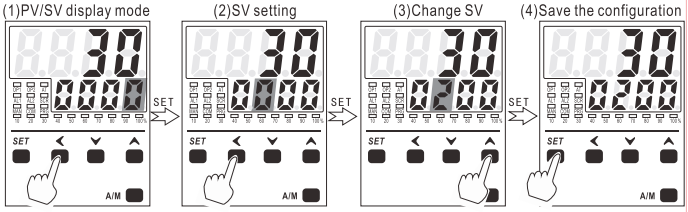
5.2 Parameter list and respective address (HEX and 10Hex format)

5.2.1 Process value, output value and various indicator

No	Notation	HEX	10HEX	Data format	R/W	Remark
1	Process Value PV	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 AL2 is 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



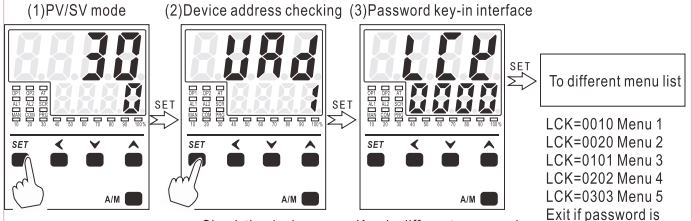
Tap on "◀"key once and the last digits flashing
Press "◀"key and shift the flashing digits to hundred's place
Press "▲"key and set the SV as 200
Press SET to confirm the setting and display go back to PV/SV

Remark
*Press up or down key once, the numbers will increase or decrease by 1 each time, if you 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	Remark
6	Setting value for controller data storage type 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

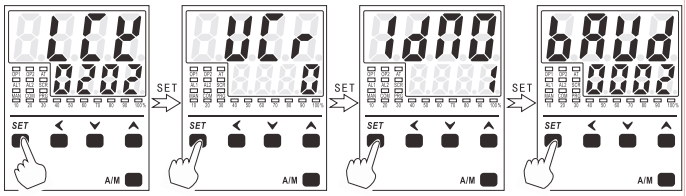
5.2.3 Password Key-in section LCK



Tap on "SET" once to the setting value
Check the device address
Key-in different password to different parameter menu

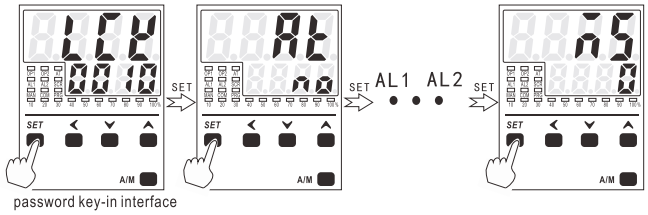
LCK=0010 Menu 1
LCK=0020 Menu 2
LCK=0101 Menu 3
LCK=0202 Menu 4
LCK=0303 Menu 5
Exit if password is incorrect

5.2.4 Parameter related to communication "LCK-0202" menu



password key-in interface
Verification method
=0 without verification
=1 odd verification
=2 Even verification
Device address configuration from 1~255
Baud rate
=0 2.4Kbps
=1 4.8Kbps
=2 9.6Kbps
=3 19.2Kpbs

5.2.5 Auto-tuning, alarm and Run/Stop, manual control parameter parameter "LCK-0010"

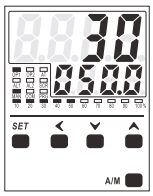


password key-in interface

Data storage type EEPROM

No	Notation	HEX	10HEX	Data format	R/W	Remark
8	At Auto-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 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 menu LCK-0101, ALd1=0 or 10, AL1 will be dismissed, AH1 is alarm hysteresis
10	AL2 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 menu LCK-0101, ALd2=0 or 10, AL2 will be dismissed, AH2 is alarm hysteresis
11	Run/Stop, manual control	000AH	10	Hex 10Hex	R/W	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"

Manual control mode

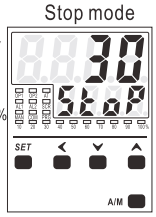


1.Man indicator light on if device enter into manual control mode,Lower display shows the output %

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

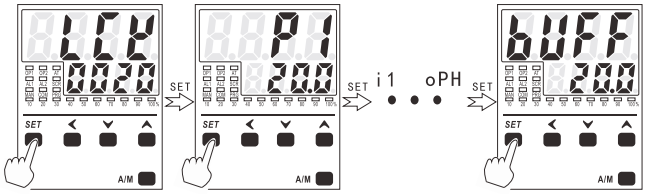
3.Or you can set the output% via the master device like HMI refer to LCK-0020, NO 32 address001F

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

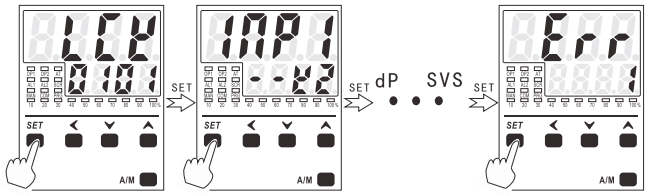


Password key-in interface

Data storage type, EEPROM

NO	Notation	HEX	10 HEX	Data format	R/W	Remark
12	reserved	000BH	11			
13	P1 P1 Proportional band	000CH	12	HEX 10 Hex	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 i1 integral time	000DH	13	HEX 10 Hex	R/W	Unit "Second" 0-3600 seconds, factory default=210
15	d1 d1 derivative	000EH	14	HEX 10 Hex	R/W	Unit "Second" 0-200 seconds, factory default=30
16	reserved	000FH	15			
17	AtVL AtVL Auto-tunig SV shift value	0010H	16	HEX 10 Hex	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 Cyt1 Control cycle time	0011H	17	HEX 10 Hex	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 HYS1 Hysteresis for ON/OFF control	0012H	18	HEX 10 Hex	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	reserved	0016H	22			
24	reserved	0017H	23			
25	reserved	0018H	24			
26	reserved	0019H	25			
27	reserved	001AH	26			
28	rSt1 Proportional reset This	001BH	27	HEX 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
29	reserved	001CH	28			
30	OPL OPL minimum output %	001DH	29	HEX 10 Hex	R/W	Reading gain 0.1 read 0-1000 means 0.0%-100.0% output lower limit factory default=0.0
31	OPH OPH maximum output%	001EH	30	HEX 10 Hex	R/W	Reading gain 0.1 read 0-1000 means 0.0%-100.0% output higher limit factory default=100.0
32	output % under manual control mode	001FH	31	HEX 10 Hex	R/W	Reading gain 0.1 0-1000 means 0.0%-100.0% under manual control output mode set the manual output % via master device
33	reserved	0020H	32			
34	reserved	0021H	33			
35	bUFF Buff soft-start	0022H	34	HEX 10 Hex	R/W	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
36	LCK address Password interface	0023H	35	HEX 10 Hex	R/W	Range 0-9999

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



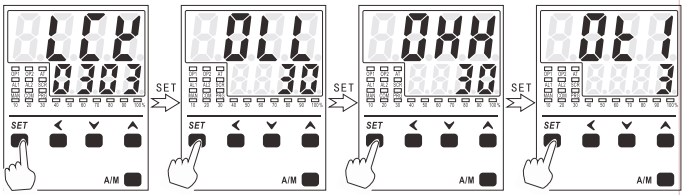
Password key-in interface

Data storage type, EEPROM

NO	Notation	HEX	10 HEX	Data format	R/W	Remark
37	INP1 INP1 input type selection	0024H	36	HEX 10HEX	R/W	Data range:0-15 write or read: 0 1 2 3 4 notation: K E J 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
38	dP Decimal point dP	0025H	37	HEX 10HEX	R/W	Range: 0-3 TC/RTD input, 0-1 Analog input 0-3
39	LSPL Setting value lower limit	0026H	38	HEX 10HEX	R/W	SV lower limit only works when you configure it via front panel
40	USPL Setting value higher limit	0027H	39	HEX 10HEX	R/W	SV upper limit only works when you configure it via front panel
41	UNIt Display unit	0028H	40	HEX 10HEX	R/W	range 0-2 =0 Celsius =1 Fahrenheit
42	PVOS 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	PVFt Filter strength	002AH	42	HEX 10HEX	R/W	Input filter strength: 1-30 normal filter strength,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	Range 0-1 =0 Device will be used as PID controller =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=0.0, ANH1=100.0 4. Set Con=1
47	reserved	002EH	46			
48	ALd1 alarm mode for alarm 1	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 alarm 1	0030H	48	HEX 10HEX	R/W	Alarm 1 hysteresis, factory default=0.4
50	ALd2 alarm mode for alarm 2	0031H	49	HEX 10HEX	R/W	Range 0-16, Configure the alarm mode for alarm two refer to 5.2.9 for details
51	AH2 alarm hysteresis for alarm 2	0032H	50	HEX 10HEX	R/W	Alarm 2 hysteresis, factory default=0.4

NO	Notation	HEX	10 HEX	Data format	R/W	Remark
52	Reserved	0033H	51			
53	Reserved	0034H	52			
54	0Ud 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	CRC 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 over range happens, output terminated manual mode still working =1,when over range happens, output still working
61	Device address	003CH	60		R	Refer to LCK-0202 for details
62	Communication speed	003DH	61		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



Password key-in interface

Data storage type EEPROM

NO	Notation	HEX	10 HEX	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 output is 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 output is larger than >(100%-oHH%) the output will be 100%
68	Ot1 output mode	0043H	67	HEX 10HEX	R/W	Range 0-3 =0 or 1 or 2 random, zero-crossing, PWM output =3 phase angle fired output

5.2.9 Alarm mode details

ALd□	Alarm mode
10 or 00	Without alarm
11	AL1 ⩾ 0: Deviation high alarm; AH1; Alarm on; LOW; SV; SV+AL1; HIGH
	AL1 < 0: AH1; Alarm on; Deviation high alarm; LOW; SV+AL1; SV; HIGH
12	AL1 ⩾ 0: AL1 deviation low alarm; alarm on; Alarm on; AH1; LOW; SV; SV+AL1; HIGH
	AL1 < 0: alarm on; AH1; AL1 deviation low alarm; LOW; SV+AL1; SV; HIGH
13	Deviation band alarm; Alarm on; AH1; AH1; Alarm on; LOW; SV−AL1; SV; SV+AL1; HIGH
14	Deviation band alarm; Alarm on; LOW; SV−AL1; SV; SV+AL1; HIGH
15	AH1; Alarm on; Absolute value high alarm; LOW; AL1Value; HIGH

ALd□	Alarm mode
16	Alarm on; AH1; Absolute value low alarm; LOW; AL1Value; HIGH
01	AL1 ⩾ 0: Deviation high alarm with standby function; AH1; Alarm on; LOW; SV; SV+AL1; HIGH
	AL1 < 0: AH1; Alarm on; Deviation high alarm with standby function; LOW; SV+AL1; SV; HIGH
02	AL1 ⩾ 0: Deviation low alarm with standby function; Alarm on; AH1; LOW; SV; SV+AL1; HIGH
	AL1 < 0: Alarm on; AH1; Deviation low alarm with standby function; LOW; SV+AL1; SV; HIGH
03	Deviation band alarm with standby function; Alarm on; AH1; AH1; Alarm on; LOW; SV−AL1; SV; SV+AL1; HIGH
04	Deviation band reverse alarm with standby function; Alarm on; LOW; SV−AL1; SV; SV+AL1; HIGH
05	AH1; Alarm on; Absolute value high alarm with standby function; LOW; AL1; HIGH
06	Alarm on; AH1; Absolute value high alarm with standby function; LOW; AL1; HIGH

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

ALd1 or ALd2=

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

6. KDF100-662 quick start guide

1. Device address, baud rate, CRC checking method
   refer to 5.2.4 LCK-0202 on parameters UCR/IDNO/BAUD
2. Function configuration, PID control mode, or SCR mode
3. Input selection, refer to 5.2.7 LCK-0101, INP1 for input 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 for Run/Stop, Manual/Auto control function
7. Refer to 5.2.7 LCK-0101 for parameters ALd1/AH1/ALd2/AH2