

LCD display advanced digital temperature controller

User Manual

FT20X-800-C1

Please read this manual carefully and keep this manual for further reference

Features

- LCD three color VA display, bar graphic, output percentage MV1/MV2 or feedback MVFB display
- 0.2% measuring accuracy, maximum resolution 0.1 for TC and RTD input
- Output: relay, SSR drive, analog, triac, re-transmission
- Alarm: AL1/AL2 relay output, excitation, non-excitation, delay output, alarm lock function
Alarm mode: PV, deviation, absolute, band, alarm standby, PV deviation alarm ramp start-up alarm, ramp end alarm, Loop break alarm, heater break alarm
- Control mode: PID with auto-tuning, on/off, heating or cooling, heating+cooling, 3 wires proportional valve control, valve control with feedback signal, output restrain
- Program version: PID mode, ramp up mode, temp constant mode, soft-start
- Add-on feature: auto/manual control, run/stop function, even SV input
- Special features: all parameters distributed in three levels, parameters can be manually designate to different level
- Communication: RS-485, modbus-RTU, pattern 8-(N,O,E)-(1,2)
- Ambient temp 0-50°C, humidity 0-80%RH

1: Model number and ordering information

Please check this ordering information and specify the code when order with us

Model	FT200 (48mm*48mm)
Item number(Panel size: width x height)	FT204 (48mm*96mm) Vertical
	FT205 (96mm*48mm) Horizontal
	FT207 (72mm*72mm)
	FT209 (96mm*96mm)

1:Controller type

U	Standard PID type
T	Temperature constant mode(with timer)
R	Ramp and soak mode(with timer)
X	Motor valve direct/reverse control version(two relays)

2:OUTPUT 1

R	Relay output
V	SSR Drive/Voltage pulse output
D	4-20mA output
E	0-10Vdc
F	0-20mA
5	0-5Vdc
7	1-5Vdc
T	Triac single phase zero-crossing trigger
A	Relay output, for motor valve direct act control

3:OUTPUT 2(output 2 is only available for heating+cooling controller)

N	No output2 (For single output controller, choose code N)
R	Relay output
V	SSR Drive/Voltage pulse output
D	4-20mA output
E	0-10Vdc
F	0-20mA
5	0-5Vdc
7	1-5Vdc
T	Triac single phase zero-crossing trigger
A	Relay output, for motor valve reverse act control

4:Number of Alarms

1	1 alarm
2	2 alarms
3	3 alarms

5:Power Source

96	85~265Vac 50/60HZ
24	24Vac/24Vdc

6:PV/SV re-transmission

N	No re-transmission function
A	4-20mA re-transmission via OP2
B	0-20mA re-transmission via OP2
E	0-10Vdc re-transmission via OP2
F	4-20mA re-transmission via AU3
G	0-20mA re-transmission via AU3
K	0-10Vdc re-transmission via AU3

7:RS-485 Communication

N	No communication feature
K	RS-485 modbus RTU communication

8:AUX power source

N	No aux power	B	24Vdc grounded	D	12Vdc grounded
A	24Vdc isolated	C	12Vdc isolated		

9:Position feedback(analog feedback input from INP2)

N	No position feedback	A	4-20mA	B	0-20mA
C	0-5Vdc/potentiometer	D	1-5Vdc	E	0-10Vdc

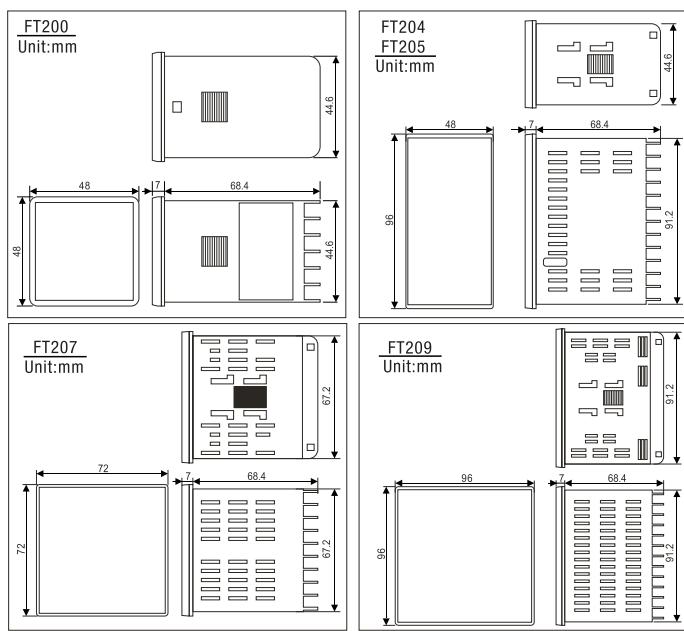
10:Remote SV setting

N	No remote SV feature	A	4-20mA via INP2	B	0-20mA via INP2
C	0-5Vdc via INP2	D	1-5Vdc via INP2	E	0-10Vdc via INP2
F	4-20mA via INP3	G	0-20mA via INP3	H	0-5Vdc via INP2
J	1-5Vdc via INP3	K	0-10Vdc via INP3	W	D1/D2 terminals event input

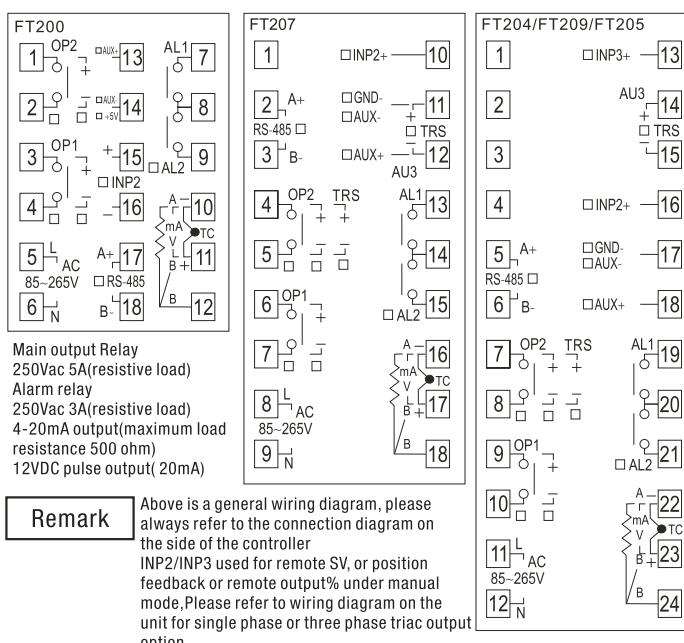
11:Manual output% remote setting

N	No remote SV feature	A	4-20mA via INP2	B	0-20mA via INP2
C	0-5Vdc via INP2	E	0-10Vdc via INP2	F	4-20mA via INP3
G	0-20mA via INP3	H	0-5Vdc via INP3	K	0-10Vdc via INP3

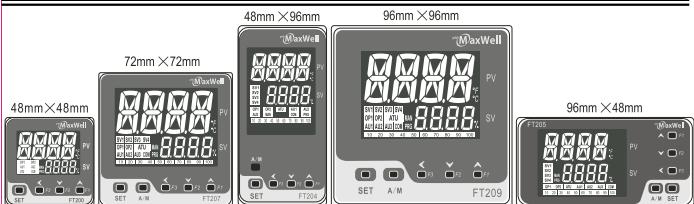
2. Size and mounting



3. Wiring diagram



4. Panel description



PV window: display PV and parameter notation
SV window: display SV and parameter value
Bar graphic: indicate output%, feedback value or re-transmission value

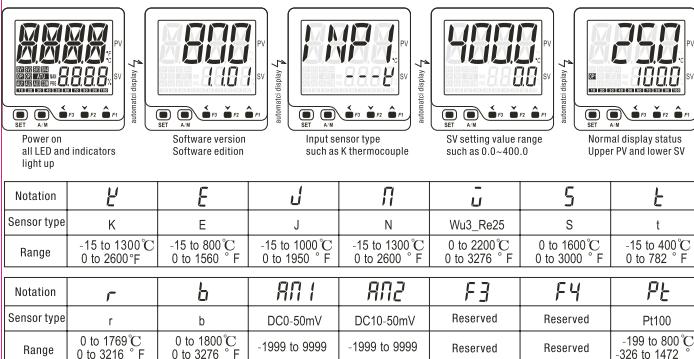
OP1: Indicate OP1 status
OP2: Indicate OP2 status
ATU: Indicate auto-tuning status
AU1: AL1 alarm status
AU2: AL2 alarm status
AU3: Reserved light
MAN: Manual control/soft-start indication
COM: Communication indication
PRG: Temp constant mode indication
Ramp and soak indication

SET: Main function key
A/M: Auto/manual switch key and enter key
◀ : Shift key/F3 function key, such as ATU fast initiated or go back to previous parameter
▼ : Numeric decrease/F2 function key
▲ : Numeric increase/F1 function key, Run/Stop)
SV1: Event input SV1 indication
SV2: Event input SV2 indication
SV3: Event input SV3 indication
SV4: Event input SV4 indication
SV1 and SV2 light together indicate remote-SV

5. Setting and programming

5.1 Power on initialization

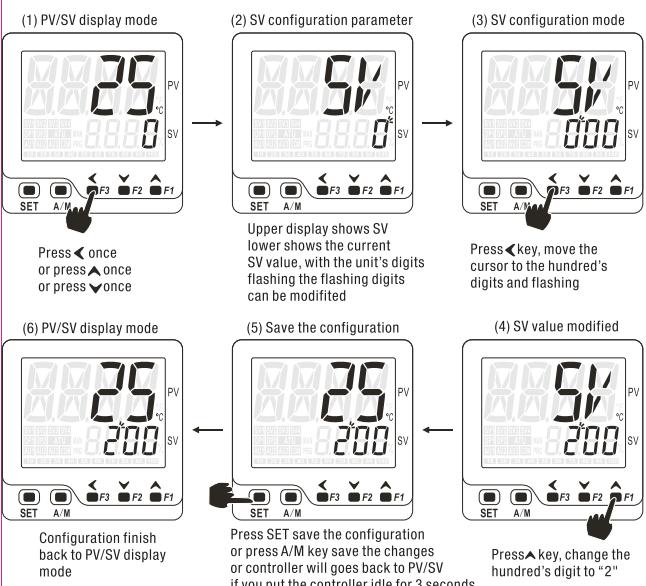
Power on stage shows the software version and edition, input type and setting value range



5.1.1 SV configuration and parameter configuration

5.2.1 How to change the SV setting value, use the short cut key.

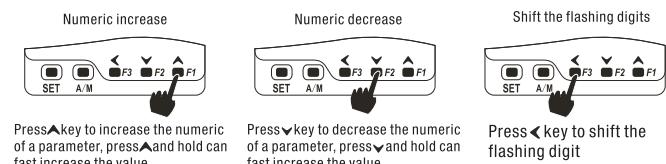
For example: change the SV from 0 to 200°C



Remark 1: SV setting parameter can be assigned to different parameter menus, refer to S.F00 parameter for details

Remark 2: SV remote setting details, refer to "10. SV remote setting for more information"

5.2.2 How to configure all configurable parameters



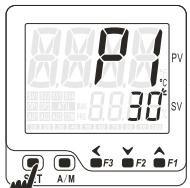
Press ▲ key to increase the numeric of a parameter, press ▲ and hold can fast increase the value

Press ▾ key to decrease the numeric of a parameter, press ▾ and hold can fast increase the value

Press ▲ key to shift the flashing digit

5.2.3 Shift between parameters and go back to previous parameter

(1) P1 parameter interface



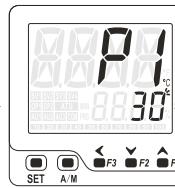
Press SET key once at any parameter to go to next parameter

(2) i1 parameter interface



Press F3 key and hold to go back to previous parameter

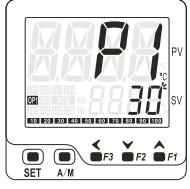
(3) P1 parameter interface



Go back to previous parameter in this case, P1 to i1 and back to P1

5.2.4 Save configuration and go back to normal PV/SV display mode

(1) P1 parameter interface

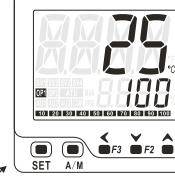


Three approaches

1. Press SET for 3 seconds

2. Press A/M key once

3. Press SET and F3 together for once

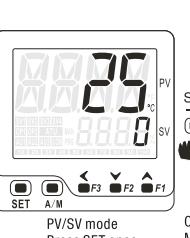


Save and exit to PV/SV display mode

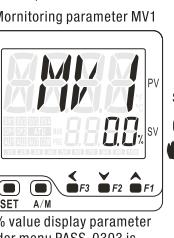
6. Parameter menu

6.1 Factory default parameter menu

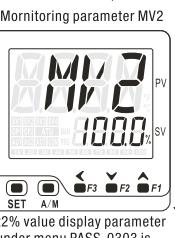
6.1.1 Quick start menu level 1(Press SET once to enter this menu)



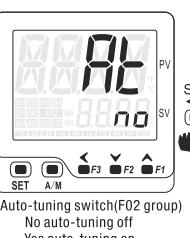
PV/SV mode
Press SET once



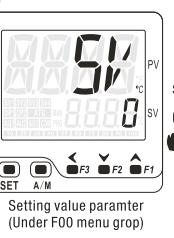
Monitoring parameter MV1
Output1 value display parameter MON1 under menu PASS-0303 is used for defining the status of MV1, whether present this or hide this



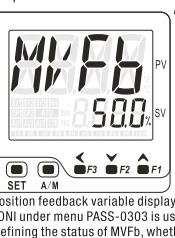
Monitoring parameter MV2
Output2 value display parameter MON2 under menu PASS-0303 is used for defining the status of MV2, whether present this or hide this



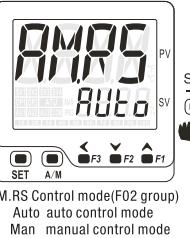
Auto-tuning switch(F02 group)
No auto-tuning off Yes auto-tuning on



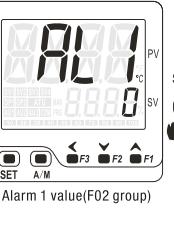
Setting value parameter (Under F00 menu grop)
Position feedback variable display MON1 under menu PASS-0303 is used for defining the status of MVfb, whether present this or hide this



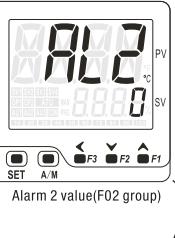
Position feedback variable display MON2 under menu PASS-0303 is used for defining the status of MVfb, whether present this or hide this



AM.RS Control mode(F02 group)
Auto auto control mode
Man manual control mode
Stop stop mode



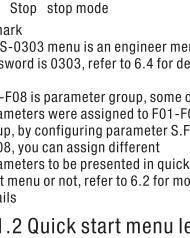
Alarm 1 value(F02 group)



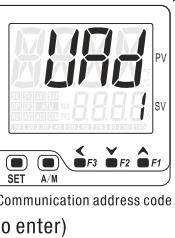
Alarm 2 value(F02 group)

Remark
PASS-0303 menu is an engineer menu password is 0303, refer to 6.4 for details

F01-F08 is parameter group, some of parameters were assigned to F01-F08 group, by configuring parameter S.F01-S.F08, you can assign different parameters to be presented in quick start menu or not, refer to 6.2 for more details

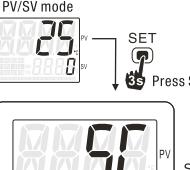


PV/SV display mode
Press SET for 3 seconds



Communication address code

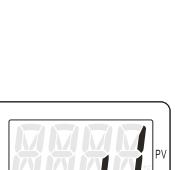
6.1.2 Quick start menu level 2(Press SET for 3 seconds to enter)



PV/SV mode



i1:Proportional band of output1 (F04 group)
P1: Integral time of output1 (F04 group)



FT20X-800-C1

6.2 Basic functional parameter menu(F menu)

PV/SV display mode → **d1**: Derivative time of output1 (F04 group) → **RSVL**: Auto-tuning offset (F04 group) → **CYT1**: Control cycle time of output1 (F04 group) → **OPL1**: Minimum output of output1 (F04 group) → **RSL1**: P1 reset wind-up (F04 group) → **HYS1**: Hysteresis for output1 (F04 group) → **OPH1**: Maximum output of output1 (F04 group) → **buf1**: Soft-start value for output1 (F04 group) → **Pk01**: Initial output value under power-on manual control mode (F04 group) → **P2**: Cooling output proportional band (F04 group) → **GAP2**: Cooling side SV off-set (F04 group) → **oLAP**: dual output heating and cooling overlap area (F04 group) → **d2**: Cooling output derivative time (F04 group) → **CYT2**: Cooling output control cycle time (F04 group) → **OPL2**: Output 2 minimum output (F04 group) → **RSL2**: Output 2 PID reset wind-up (F04 group) → **HYS2**: Output 2 ON/OFF control hysteresis (F04 group) → **OPH2**: Output 2 maximum output (F04 group) → **LCK**: Parameter access protection quick start menu level 3 password (F08 group).

Remark: All the parameters are distributed under ground F01, F02, F03, F04, F05, F06, F07, F08 some goes to group F01 and others goes to F02 etc. S.F01-S.F08 parameter is used to define whether present or hide specific parameters under different menu group

6.1.2 Quick start menu level 3(custom menu,access with password)

This is a customized menu, you can put those frequently used parameters which likely being incorrectly manipulated under this menu, password is required if you want to access to this menu this will prevent unauthorized access and configuration

Lck: password to access menu level 3 Customized parameters, there is no parameters under this menu as factory default

Lck: quick start menu(F08) S.F08 parameter defines the presence of this menu when Lck=0808, press SET key

Remark: F01-F06, parameters were distributed to these groups S.F01-S.F06 used to define the presence of these parameter groups refer to "6.2 basic functional menu(F menu)" for more details

6.2 Basic functional parameter menu(F menu)

PV/SV display mode → **25** → **PASS**: Password interface → **F00** menu interface

Press SET and F3 key once, goes to Set PASS=0033 enter into F menu Set PASS=0033 enter into F menu F00 menu, press F1 or F2 key to shift between F00-F08

F00 menu group

Notation	Name	Description	Default
SV1	setting value	Setting value Range defined by(LSPL to USPL)	0
SF00	define the status of F00 group parameters	0: Do not present F00 under quick start menu 1: Present F00 at quick start menu level 1 2: Present F00 at quick start menu level 2 3: Present F00 at quick start menu level 3	0

F01 menu group, for controller with event SV setting features only

Notation	Name	Description	Default
SV1	Event input SV1	SV setting configured by external D1/D2 terminals SV1 D1: open D2:open, SV=SV1	1
SV2	Event input SV2	SV setting configured by external D1/D2 terminals SV2 D1: open D2:close, SV=SV2	2
SV3	Event input SV3	SV setting configured by external D1/D2 terminals SV3 D1: close D2:open, SV=SV3	3
SV4	Event input SV4	SV setting configured by external D1/D2 terminals SV4 D1: close D2:close, SV=SV4	4
SF01	define the status of F01 group parameters	0: Do not present in quick start menu 1: Present F00 at quick start menu level 1 2: Present F00 at quick start menu level 2 3: Present F00 at quick start menu level 3	0

F02 menu group

Notation	Name	Description	Default
AT	Auto-tuning	No.: Auto-tuning off Yes: Auto-tuning on	no
AMRS	AM.RS	Operating mode Auto.: auto control mode MAN:manual control mode Stop: stop mode	Auto
AL1	AL1	Alarm value for alarm 1, range -1999~9999	10
AL2	AL2	Alarm value for alarm 2, range -1999~9999	10
UD	UD	Define device address in RS-485 system	1
SF02	define the status of F02 group parameters	0: Do not present in quick start menu 1: Present F00 at quick start menu level 1 2: Present F00 at quick start menu level 2 3: Present F00 at quick start menu level 3	1

F03 menu group, some of parameters under F03 might not be displayed due to different controller version

Notation	Name	Description	Default
RRAMP	Ramp	Ramp rate under ramp up heating mode Unit is °C/minute	1
t1	t1 timer range	t1 is a time duration for temperature constant mode or ramp up mode minutes or seconds, t1=0, temperature constant mode disabled parameter t1UN under PASS-0303 define the t1 unit	0
SF03	define the status of F03 group parameters	0: Do not present in quick start menu 1: Present F00 at quick start menu level 1 2: Present F00 at quick start menu level 2 3: Present F00 at quick start menu level 3	0

F04 menu group

Notation	Name	Description	Default
SC	Input offset	Input offset, to compensate the error caused by sensor Range, for temp: -199~199, for analog, -1999 to 1999	0
P1	P1	Proportional band of output1, range 0~800 output 1 switch to ON/OFF control when P1=0, Hysteresis is HYS1	20
i1	integral time	Integral time of output1, range 0~3600 seconds when i1=0, integral off	210
d1	Derivative time	Derivative time of output1, range 0~3600 seconds when d1=0, derivative off	30
REVL	Auto-tuning	Shift the SV value lower to prevent large overshoot during auto-tuning process range -199~199	0
CYT1	Cycle time for output1	cycle time for output1, CYT1=20 seconds for relay CYT1=2 seconds, CYT1 not applicable for analog output	20
HYS1	Hysteresis for output1	When P1=0, ON/OFF control, HYS1 0.1~900 Heating: OP1 stop PV>SV OP1 active when PV<SV-HYS1 Cooling: OP1 active when PV>SV+HYS1 OP1 stop PV<SV	0
RSE1	Time proportional reset	When i1=d1=0, pure proportional control, RSE1 is reset value Heating, out 1%=(SV+rst1-PV)/P1*100% Cooling, out 1%=(PV-SV-rst1)/P1*100% this used to suppress overshoot at start-up for PID control Heating, suppress more when rse1 gets smaller Cooling, suppress more when rse1 gets bigger range: -199~199	0
OP1	minimum output for out1	Minimum output value 0.0 to 100.0%	0.0
OPH1	maximum output for out1	Maximum output value 0.0 to 100.0%	100.0
buf1	Output 1 restrain	Output restrain for analog output, output restriction, only applicable for analog output controller for example, if buf1=5%, means the output changing ratio will be less than 5% per second	100.0
Pk01	Initial output %	Define the output ratio when temperature configured as manual output after power on	100.0
OLAP	heating/cooling overlap	Heating/cooling control overlap, range 0~100, overlap area is (SV-OLAP)~(SV+OLAP)	2

To the next page

F03

From the previous page

Notation	Name	Description	Default
GAP2	Cooling control SV offset	Define the cooling control SV value cooling controlt SV=SV+GAP2, Range: 0~200 For example, SV=100, GAP2=10 Then cool side SV=100+10	0
P2	P2 for cooling control	Proportional band for output 2, unit is degree range 0~800, P2=0 for ON/OFF control mode	20
i2	Integral time i2 for output 2	Integral time for output 2 range 0~3600 seconds i2=0 integral action off	210
d2	Derivative time d2 for output 2	Derivative time for output 2 range 0~3600 seconds d2=0 derivative action off	30
CY2	Control period for output 2	Control period for output 2, 2 seconds for relay output, 2 seconds for SSR drive output	20
HYS2	Hysteresis for output 2	When P2=0, on/off control for out2.HYS2, range 0.1~900, OP2 active when PV>SV+GAP2+HYS2 OP2 stop when PV<SV+GAP2	0
RSE2	time proportional reset, rSt2	When i2=0, d2=0, proportional control out2 %=(PV-SV-GAP2-rSt2)/P2*100% suppress the overshoot after power on range: -199~199	0
oPL2	Minimum output for out 2	Minimum output for output 2 range 0.0~100%	0.0
oPH2	Maximum output for out 2	Maximum output for output 2 range 0.0~100%	100.0
SF04	Define status of F04 group parameters	0: Absent 1:Present in quick start menu 1 2:Present in quick start menu 2 3:Present in quick start menu 3	2

Depends on the specific functions
some of parameter may or may not be available

Notation	Name	Description	Default	Remark
INP1 Input sensor code selection INP1				
Symbol	U	E	J	N
input	K	E	J	N
range	-15 to 1300°C 0 to 2600°F	-15 to 800°C 0 to 1560°F	-15 to 1000°C 0 to 1950°F	-15 to 1300°C 0 to 2600°F
Symbol	b	RA1	RA2	F3
input	r	b	DC0-50mV	DC10-50mV
range	0 to 1769°C 0 to 3212°F	0 to 1800°C 0 to 3276°F	-1999 to 9999	-1999 to 9999
Symbol	dP	Decimal point dP	0,1,2,3	0
UNI	E	Display unit UNI	°C, °F, no	°C Celsius °F:Fahrenheit No:No unit
LSPL	SV lower limit LSPL	Temp: -199~3276 Analog: -1999~9999	0	SV lower limit Remote-SV lower limit input display value
USPL	SV higher limit USPL	Temp: -199~3276 Analog: -1999~9999	400	SV higher limit Remote-SV higher limit input display value
PVOS	input offset PVOS	Temp: -199~199 Analog: -1999~9999	0	To compensate the input error caused by the sensor
PVFE	Input filter strength PVFE	0 to 60	5	1-30 normal input filter strength 31-60 enhanced input filter strength
ANL1	lower limit display for analog input	-1999~9999	0	Display for analog input at its lower limit value "ANL1"
ANH1	higher limit display for analog input	-1999~9999	2000	Display for analog input as its higher limit value "ANH1"
ERSL	Transmission output lower limit tRSL	-1999~9999	0	Display for re-transmission at its lower limit value
ERSH	Transmission output upper limit tRSH	-1999~9999	400	Display for re-transmission at its higher limit value
ALD1	Alarm mode for alarm 1	00 to 16	11	To configure the alarm mode of alarm 1
AH1	Alarm hysteresis for alarm 1	0 to 9999	0	Hysteresis value for alarm 1
ALT1	Alarm 1 delay time	0 to 9999 seconds	0	Alarm delay time for alarm 1 only applicable for ALD1=01~06 and 11~16, Alarm 1 will be triggered after delay time ALT1
ALD2	Alarm mode for alarm 2	00 to 16	10	To configure the alarm mode of alarm 2
AH2	Alarm hysteresis for alarm 2	0 to 9999	0	Hysteresis value for alarm 2
ALT2	Alarm 2 delay time	0 to 9999 seconds	0	Alarm delay time for alarm 2 only applicable for ALD2=01~06 and 11~16, Alarm 2 will be triggered after delay time ALT2
OUD1	OP1 output mode	0 or 1	0	0: reverse control(heating) 1:direct control(cooling)
BER1	OP1 analog output restriction	0,1,2	0	0: output restriction off 1: output restriction on 2: output restriction on when output increase, restriction off when output decrease
FLCY	motor valve travel time	0-200 秒	60	This parameter assign the travel time for the motor valve means the time for the valve from full open to full close this is only application for motor valve without position feedback
SSRM	Triac triggering mode	Stnd CYCL PHAS	PHAS	Stnd: SSR Drive output, zero-crossing trigger CYCL: Random trigger PHAS: Phase angled trigger
PMd	Program execution mode	0,1,2	0	Only applicable for temp constant and ramp and soak mode 0: Standard mode 1: temp constant mode 2: ramp and soak mode
TSP	TSP	0 to 9999	1	This parameter defines the temperature when the timer kicks in Temperature(TSP) for timer kicks in= SV-ISP when PV>SV-ISP, and stay for 5 seconds then timer kicks in
PEND	PEND	0, 1	1	=0, PID control off when timer finish =1, PID control goes on when timer finish power interruption or press F1 for 3 seconds will re-start
IDNO	IDNO	0-255	1	Device address configuration
baUD	baUD	2.4 4.8 9.6 19.2	9.6	2.4 Baud rate 2400 bps 4.8 Baud rate 4800 bps 9.6 Baud rate 9600 bps 19.2 Baud rate 19200 bps
UCR	UCR	N,O,E	N	N: 8 data bit, + No parity+1 stop bit(8N1) O: 8 data bit, + odd parity+1 stop bit(8O1) E: 8 data bit, + Even parity+1 stop bit(8E1)

Alarm mode(ALD1=00~16)

10: No alarm	00: No alarm	09: LBA alarm
11: Deviation high alarm	01: Deviation high alarm with standby function	19: HBA heater short circuit alarm
12: Deviation low alarm	02: Deviation low alarm with standby function	17: Timer kick-in alarm
13: Deviation high/low alarm	03: Deviation high/low alarm with standby function	18: Timer finish alarm
14: Deviation band alarm	04: Deviation band alarm with standby function	21: Setting value high alarm
15: Process high alarm	05: Process high alarm with standby function	22: Setting value low alarm
16: Process low alarm	06: Process low alarm with standby function	23: Process value limit value

6.2.1 Alarm mode details

Code	ALD	Specification(Example for alarm 1)
N	10 or 00	No alarm
A	11	Deviation high alarm
		AL1>0 LOW SV ▲△ SV+AL1 HIGH
B	12	Deviation high alarm
		AL1<0 LOW △ SV+AL1 ▲ SV HIGH
C	13	Deviation low alarm
		AL1>0 LOW SV ▲△ SV+AL1 HIGH
	12	Deviation low alarm
		AL1<0 LOW △ SV+AL1 ▲ SV HIGH
	13	Deviation high/low alarm
		AL1>0 LOW SV-AL1 ▲△ SV ▲△ SV+AL1 HIGH

F03

From the previous page

Notation	Name	Description	Default
GAP2	Cooling control SV offset	Define the cooling control SV value cooling controlt SV=SV+GAP2, Range: 0~200 For example, SV=100, GAP2=10 Then cool side SV=100+10	0
P2	P2 for cooling control	Proportional band for output 2, unit is degree range 0~800, P2=0 for ON/OFF control mode	20
i2	Integral time i2 for output 2	Integral time for output 2 range 0~3600 seconds i2=0 integral action off	210
d2	Derivative time d2 for output 2	Derivative time for output 2 range 0~3600 seconds d2=0 derivative action off	30
CY2	Control period for output 2	Control period for output 2, 2 seconds for relay output, 2 seconds for SSR drive output	20
HYS2	Hysteresis for output 2	When P2=0, on/off control for out2.HYS2, range 0.1~900, OP2 active when PV>SV+GAP2+HYS2 OP2 stop when PV<SV+GAP2	0
RSE2	time proportional reset, rSt2	When i2=0, d2=0, proportional control out2 %=(PV-SV-GAP2-rSt2)/P2*100% suppress the overshoot after power on range: -199~199	0
oPL2	Minimum output for out 2	Minimum output for output 2 range 0.0~100%	0.0
oPH2	Maximum output for out 2	Maximum output for output 2 range 0.0~100%	100.0
SF04	Define status of F04 group parameters	0: Absent 1:Present in quick start menu 1 2:Present in quick start menu 2 3:Present in quick start menu 3	2

Depends on the specific functions
some of parameter may or may not be available

Notation	Name	Description	Default
SFSV	Soft-start SV	SFSV range: -199~3275 SIME range: 0~100 minutes Sout range: 0.0~100.0%	0
SEME	Soft-start period	1. Power on, heating control, if PV< SFSV, soft start active 2. Power on, cooling control, if PV>SFSV, soft start active 3. MAN indicator flashes, out% = "Sout" value	0
Sou%	Soft-start out%	4. PID heating, when PV>SFSV or SIME time reached, soft-start off 5. PID cooling, when PV<SFSV or SIME time reached, soft-start off 6. MAN indicators off when soft-start terminated 7. SIME=0, soft-start function disabled	0.0
SF05	Define status of F05 group parameters	0: Absent 1:Present in quick start menu 1 2:Present in quick start menu 2 3:Present in quick start menu 3	0

F06 group parameters for controller with soft-start function only

Notation	Name	Description	Default
LbAt	LBA check time	Under heating mode(100% output), if the temperature did not increase LbAb within LbAt period, LBA will be triggered	80
LbAb	LBA temperature differential	Under cooling mode(100% output), if the temperature did not drop LbAb within LbAt period, LBA will be triggered	2
HLAL	Heater short circuit time	Under heating mode, if temperature increase HbAb within HLAL period at output 0% HBA goes off	180
HbAb	Temperature differential	Under cooling mode, if temperature drops HbAb within HbAb period at output 0% HBA goes off	10
SF06	Define status of F06 group parameters	0: Absent 1:Present in quick start menu 1 2:Present in quick start menu 2 3:Present in quick start menu 3	0

F07 group parameters

Notation	Name	Description	Default
ILR	ALM1 interlock	if alarm 1 interlocked, ILR=1 put 1LR=0 can disengage the interlock	0
2LR	ALM2 interlock	If alarm 2 interlocked, 2LR=2 put 2LR=0 can disengage the interlock	0
SF07	Define status of F07 group parameters	0: no shortcut for interlock disengage 1: shortcut for interlock disengage available Press F1 and F2 at the same to quick access to 1LR and 2LR	0

F08 group parameters

Notation	Name	Description	Default
LCK	Access protection and password for quick start menu 3	=0/1: all parameters can be modified =2: F05, F06 parameters locked =3: F04, F05, F06 parameters locked =4: F02, F03, F04, F05, F06 parameters locked =5: F01, F02, F03, F04, F05, F06 parameters locked =6: F00, F01, F02, F03, F04, F05, F06 parameters locked =8: 0808: Press SET to quick start menu 3	0
SF08	Define status of F08 group parameters	0: Absent 1:Present in quick start menu 1 2:Present in quick start menu 2 3:Present in quick start menu 3	2

Three approaches to exist and save the configuration under F menu

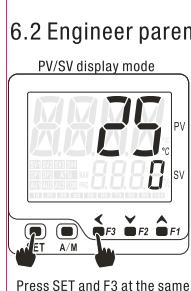
1: Press SET key for 3 seconds



2: Quick press A/M key once



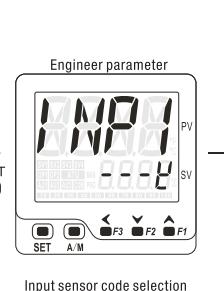
3:Press SET and F3 at the same time



Press SET and F3 at the same time enter into PASS interface

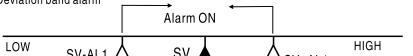
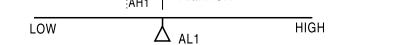
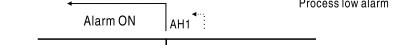
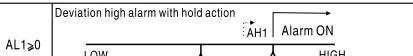
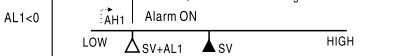
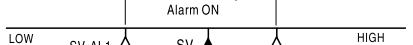
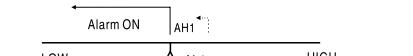
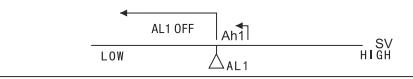
SET PASS=0101

Press SET to F menu



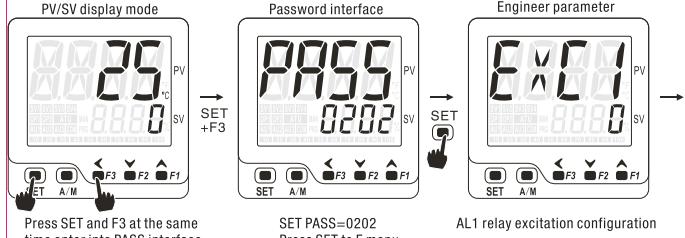
Input sensor code selection



D	14	Deviation band alarm 
H	15	Process high alarm 
J	16	Process low alarm 
E	01	AL1>0 Deviation high alarm with hold action 
		AL1<0 Deviation high alarm with hold action 
F	02	AL1>0 Deviation low alarm with hold action 
		AL1<0 Deviation low alarm with hold action 
G	03	Deviation high/low alarm with hold action 
M	04	Deviation band alarm with hold action 
K	05	Process high alarm with hold action 
L	06	Process low alarm with hold action 
V	21	SV high alarm When SV>AL1, AL1 on, When SV<AL1-AH1, AL1 off 
W	22	SV low alarm When SV<AL1, AL1 on, When SV>AL1+AH1, AL1 off 
P	23	Process value limit alarm
R	09	LBA loop break alarm
Q	19	Heater short circuit alarm
3	17	timer kick-in alarm
4	18	timer finish alarm

Note: The alarm action will be suppressed right after power on even the condition is satisfied, and the alarm standby on works 1 time right after power on, the alarm will go off if the condition satisfied again after suppression at the first time

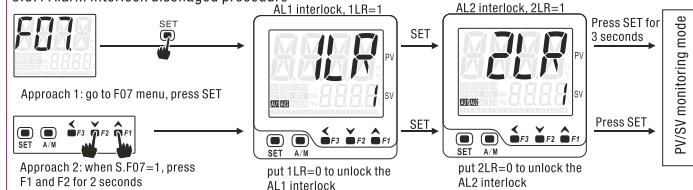
6.3 Engineer parameter (PASS-0202 menu)



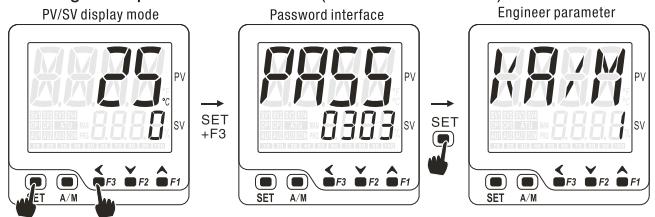
Engineer parameters menu "0202"(PASS-0202)

Notation	Name	Range	Default	Remark
E _{AL1}	AL1 relay excitation	0,1	0	0: AL1 relay pull-in when alarm 1 triggered 1: AL1 relay release when alarm 1 triggered
A _{AL1}	AL1 interlock	0,1	0	0: AL1 output standard mode 1: AL1 output interlock mode
E _{AL2}	AL2 relay excitation	0,1	0	0: AL2 relay pull-in when alarm 2 triggered 1: AL2 relay release when alarm 2 triggered
A _{AL2}	AL2 interlock	0,1	0	0: AL2 output standard mode 1: AL2 output interlock mode

6.3.1 Alarm interlock disengaged procedure



6.4 Engineer parameter menu 3 (PASS-0303 menu)



Press SET and F3 at the same time enter into PASS interface

SET PASS=0303
Press SET to F menu

Auto/manual control configuration

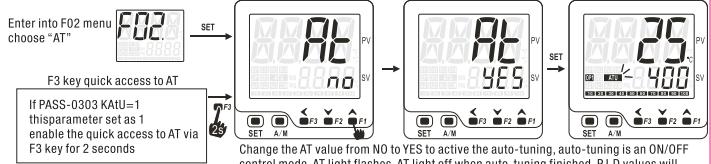
Depends on the specific functions some of parameter may or may not be available

Notation	Name	Range	Factory default	Remark
K _{A/M}	Auto/manual control switch configuration	0,1	1	0: A/M key disabled 1: A/M Key enable (press A/M key 3 seconds to switch)
K _{R/S}	Run/Stop function configuration	0,1	0	0: Disable RUN function active by F1 key Disable STOP function active by F2 key 1: Enable RUN function active by F1 key Enable STOP function active by F2 key
K _{ATU}	Auto-tuning short cut key	0,1	0	0: Disable auto-tuning active by F3 key 1: Enable auto-tuning active by F3 key
P _{MON}	Power on control mode	0,1,2,3	0	0: Auto control mode after power on 1: Stop mode after power on 2: Manual control mode after power on initial output value defined by PK01 parameter 3: Controller continue the status from where it left off
S _{FSE}	soft-start function configuration	0,1	0	0: Disable soft-start function 1: Enable soft-start function
R _{RS}	Re-transmission configuration	0,1	0	0: PV re-transmission 1: SV re-transmission
P _{FBK}	Position feedback configuration	0,1	0	0: Position feedback disabled 1: Position feedback enable for close loop control
R _{SV}	Remote SV	0,1	0	0: Remote SV off 1: Remote SV on (panel SV setting off) 2: Remote SV on (panel SV setting on)
M _{MON1}	Quick start menu 1 configuration	0,1,2,3	1	0: MV1,MV2,MVFb absent in quick menu 1 1: MV1,MV2, present in quick menu 1, MVFb absent 2: MVFb present in quick menu 1, MV1,MV2 absent 3: MV1,MV2,MVFb present in quick menu 1
B _{GRM}	Bar graphic display configuration	0,1,2,3	0	0: Bargraphic for OP1 % 1: Bargraphic for OP2 % 2: Bargraphic for TRS % 3: Bargraphic for MVFb %
E _{TUN}	Timer unit	0,1	0	0: Timer unit "second" 1: Timer unit "minute"
R _{EMS}	manual output % remote setting	0,1	0	0: Manual output % set via key pad 1: Manual output % set via remote signal

Three approaches to exist and save the configuration under F menu

1: Press SET key for 3 seconds 2: Quick press A/M key once 3: Press SET and F3 at the same time

7. Auto-Tuning



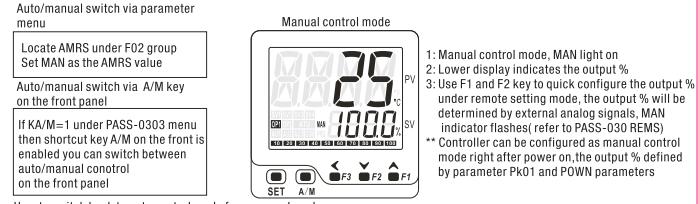
Change the AT value from NO to YES to active the auto-tuning, auto-tuning is an ON/OFF control mode, at light flashes, at light off when auto-tuning finished, P.I.D values will be calculated automatically.

Configure the ATVL parameter under F04 menu, the SV can be shifted down to prevent large overshoot during the auto-tuning Auto-tuning will be terminated if you enter into manual mode or STOP mode or encounter a power interruption

Under remote SV pattern, the SV will be locked if auto-tuning activated, the auto-tuning SV will be the SV when it was locked, recommend to switch to panel SV setting mode before auto-tuning

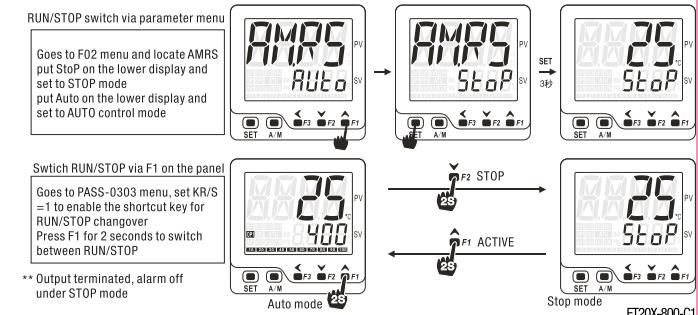
*Please start the auto-tuning at the ambient temp to get best auto-tuning result

8. Auto manual control switch



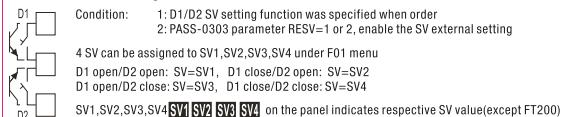
How to switch back to auto control mode from manual mode
1: Goes to F02 menu and locate AMRS, change the value from MAN to Auto, exit and save
2: Press A/M key for 2 seconds to auto control mode

9. RUN/STOP function



10. SV Panel setting and remote setting

10.1 Remote setting SV, use D1/D2 terminals at the back to set the SV

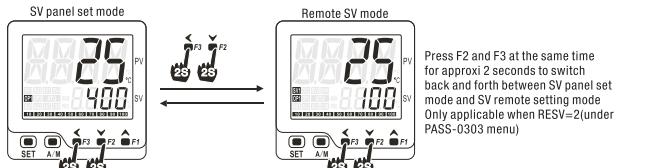


10.2 Remote setting SV via external analog signal input from INP2 or INP3

INP2+ or INP3+ condition: 1: remote SV via analog signal from INP2 or INP3 was specified when order
2: parameter RESV=1 or 2 (under menu PASS-0303), enable remote SV function
PASS-0101 menu, LSPL corresponding to the lower limit SV when analog signal at lower limit
USPL corresponding to the higher limit SV when analog signal at higher limit
SV1 and SV2 indicator SV1 SV2 light up at the same time indicate the SV is
being configured via external analog signal(except FT200)

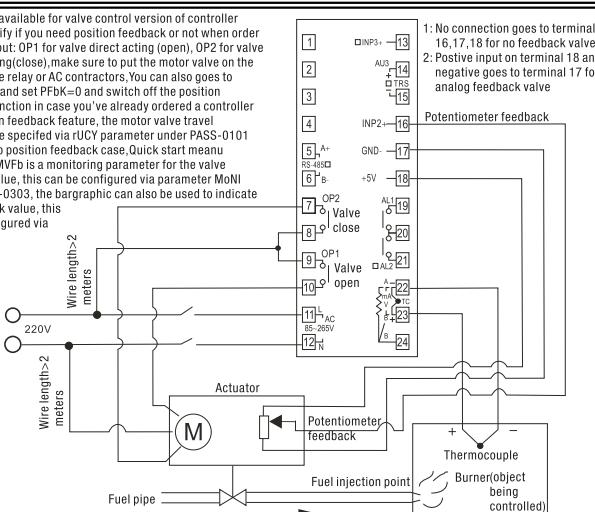
10.3 Switch between SV remote setting and SV panel setting

Goes to PASS-0303 and set RESV=2, quick switch between remote SV setting and panel SV setting enabled, enter into remote SV mode after power on



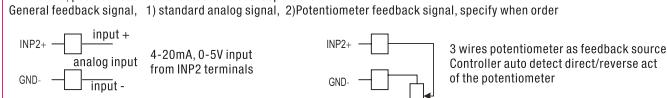
11. Three wires motor valve control

This is only available for valve control version of controller please specify if you need position feedback or not when order with us, output: OP1 for valve direct acting (open), OP2 for valve reverse acting(close), make sure to put the motor valve on the intermediate relay or AC contractors. You can also goes to PASS-0303 and set PFbk=1 and switch off the position feedback function in case you've already ordered a controller with position feedback feature, the motor valve travel time must be specified via IUCY parameter under PASS-0101 menu in a no position feedback case, Quick start mean parameter MVfb is a monitoring parameter for the valve feedback value, this can be configured via parameter MoNI under PASS-0303, the bargraphic can also be used to indicate the feedback value, this can be configured via BEAM under PASS-0303

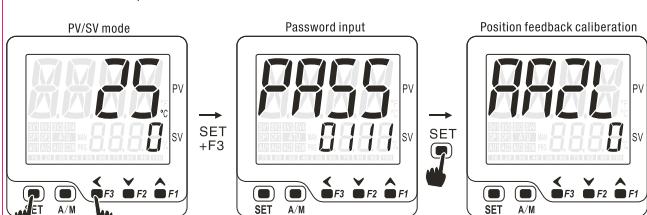


12. Position feedback calibration and operation

Condition
1: Position analog feedback via terminal INP2 ordered (only applicable for 3 wires motor valve or analog output controller)
2: PFbk=1, position feedback enabled for close loop control
General feedback signal, 1) standard analog signal, 2) Potentiometer feedback signal, specify when order



Auto calibration on the position feedback



PV/SV mode, press SET and F3 at the same time PASS pop-up

Position feedback "0" point calibration

Upper shows AA2L, OP1 light on, OP2 relay pull-in, motor reverse act, lower display changes along with the motor reverse act, display switch to one at right after some while, "0" point calibration finished

2. Analog output controller, upper shows AA2L, OP1 output at 0%

value, lower display changes along with the feedback signal, display switch to the right after some while, "0" calibration while, process finished

finished

1. 3 wires motor valve auto calibration

Upper shows AA2L, OP1 light on, OP2 relay pull-in, motor reverse act, lower display changes along with the motor reverse act, display switch to one at right after some while, "0" point calibration finished

2. Analog output controller, upper shows AA2L, OP1 output at 0%

value, lower display changes along with the feedback signal, display switch to the right after some while, "0" calibration while, process finished

finished

1. Upper shows AA2H, OP1 light on on OP1 relay pull-in, valve direct act lower display changes along with the direct act, display switch to the right one after some while, calibration finished

2. for analog output, upper shows AA2H, OP1 output 100%, lower display changes along with the valve feedback signal, display changes to the right after some while, "0" calibration while, process finished

finished

Calibration finish, goes back to PV/SV mode, these process always carried out automatically, user shall only observe the lower display changes, MVfb can be used to monitor the feedback value, MoNI under PASS-0303 used to define the status of the bargraphic display

13. Temp constant mode and ramp/soak mode

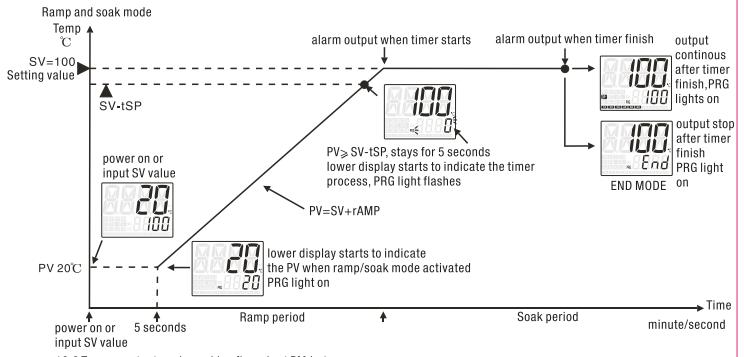
This is only applicable for programmable version of controller. specify when order

13.1 Parameters that involved

F03 group of parameters	Parameters under PASS-0101
RAMP Ramp and soak mode, Ramp is the temperature increase rate degree per minute, degree/minut	0: standard type 1: temp constant mode 2: ramp and soak mode
ETP Timer configuration T1=0 means timer off	Assign the temperature where timer kick-in constant temp/ramp and soak start temp-SV-tSP when PV>SV-tSP and stays for 5 seconds, program activated
ELIN Parameter "Unit" under PASS-0303	Define the control status after timer finished =0, PID stop working after timer finished =1, PID continue the output after timer finished power interruption or press F1 for 2 seconds can re-start the program

13.2 Ramp and soak mode detailed working flow chart PMd=2

1. program execute: power-on, lower display shows SV, this will delay 5 seconds before the program starts, PRG lights on during the ramp and soak process, lower display starts to indicate the PV value, PV increase gradually based on the preset ramp up rate towards to SV value
2. Timer kick-in: When PV>SV-tSP for at 1 seconds, timer kick-in, lower display shows the timer, PRG flashes, timer range is t1 value, timer starts alarm and timer finish alarm can be configured, refer to PASS-0101 ALd1 and ALd2
3. Timer finish: when timer finish, PRG light on, based on PEND parameter under PASS-0101, output can be configured as continue working or stop, when alarm mode=18, alarm will be triggered after timer finish
4. program terminated: if PEND=0 configured, program ends after timer finish, lower display shows "End" main output off, press F1 for 2 seconds can enter into STOP mode or active the program again



13.3 Temp constant mode working flow chart PMd=1

1. Program activate: lower shows SV, and heatup towards SV immediately
2. Timer kick-in: when PV>SV-tSP, stays for 5 seconds, timer activated, lower display shows timing process, PRG flashes, timer range is t1 value, an alarm can go off when timers starts by configuring the ALd1 or ALd2=17 under PASS-0101
3. Timer finish: when timer finish, PRG light on, based on PEND parameter under PASS-0101, output can be configured as continue working or stop, when alarm mode=18, alarm will be triggered after timer finish
4. program terminated: if PEND=0 configured, program ends after timer finish, lower display shows "End" main output off, press F1 for 2 seconds can enter into STOP mode or active the program again

14. RS-485 communication brief

- (1) Communication based on modbus RTU, support 03 read command, 06 and 10 write command
- (2) Communication format, 2 wires system, half-duplex, single drop connection
- (3) Communication speed: 2400, 4800, 9600, 19200 baud rate, data format, 1 start bit+ 8 data bit+parity(N.o.e)+1/2 stop bit
- (4) Support maximum 36 wire command and 37 read command
- (5) Detailed setting goes to PASS-0101 and locate parameter ldn0, bAUd, UCR parameters
- (6) Refer to "COM-800-C1" for detailed communication protocol information

15. Input sensors and range

Input type	Code	Input type	Code
K	0.0 to 200.0 °C K D2	0.0 to 100.0 °C D D1	
	0.0 to 400.0 °C K D4	0.0 to 200.0 °C D D2	
	0 to 400 °C K A4	-50.0 to 200.0 °C D G2	
	0 to 600 °C K A6	-100.0 to +200.0 °C D F2	
	0 to 1300 °C K B3	-199.9 to +200.0 °C D F3	
E	0.0 to 200.0 °C E D2	0 to 100 °C D A1	
	0.0 to 300.0 °C E D3	0 to 400 °C D A2	
	0 to 200 °C E A2	0 to 800 °C D A8	
	0 to 400 °C E A4	-100 to 200 °C D C2	
	0.0 to 300.0 °C E A8	-200 to 400 °C D C4	
J	0.0 to 400.0 °C J D4	-200 to 600 °C D C6	
	0 to 300 °C J A3	-200 to 800 °C D C8	
	0 to 400 °C J A4	AN1 0 to 50mV V 02	
	0 to 1000 °C J A0	AN2 10 to 50mV -1999 to 9999 V 10	
T	0 to 300 °C T D4	AN3 0 to 5VDC -199.9 to 999.9 V 03	
	0 to 400 °C T A4	AN3 0 to 10VDC V 04	
S **	0 to 1600 °C S B6	AN4 1 to 5VDC V 08	
R	0 to 1769 °C R B8	AN4 2 to 10VDC V 09	
B	200 to 1800 °C B B8	AN4 4 to 20mA A 03	
N	0 to 1300 °C N B3	AN3 0 to 20mA A 02	
	Wu3_Re25 600 to 2200 °C W B0	AN3 0 to 10mA A 01	

The accuracy is not guaranteed for type S thermocouple in the range of 0-100

Remark 1: user can switch input between thermocouple and RTDs via software

Remark 2: analog input except 0-50mA, 10-50mV needs to be specified when order