

## 温控仪表系列

### 使用说明书

#### 注意

“注意安全”是为了安全正确地使用该产品，以防止危险事故的发生，请遵守以下内容。  
注意安全可分为“警告”与“注意”两个部分，其意思如下：  
**警告** 如违反此项，可能导致严重伤害或死亡。  
**注意** 如违反此项，可能导致轻度伤害或产品损坏。  
△ 表示在特殊情况下可能会发生意外或危险

#### 警告

- 用于对人身及财产有重大影响的机器（如：核能控制，医疗设备，船舶，车辆，铁道，航空，燃机设备，安全装置，防盗/防灾装置等）时，需要安装双重安全保护装置后使用。否则可能会引起火灾、人身伤亡或财产损失。
- 使用时必须安装面板。否则有触电的危险。
- 通电状态下请勿进行检修作业。否则有触电的危险。
- 接线时请先确认端子号再进行接线。否则可能引起火灾。
- 除本公司维修人员外不得改造本产品。否则可能发生触电或火灾。

#### 注意

- 请勿在室外使用该产品。否则会缩短该产品的使用寿命或发生触电事故。
- 电源输入端和继电器输出端接线时，请使用 AWG20(0.50mm<sup>2</sup>) 规格的导线，拧螺丝的扭矩保持在 0.74-0.90Nm。接触不良时可能引起火灾。
- 请在额定规格范围内使用该产品。否则会缩短该产品的寿命，有火灾隐患。
- 请使用小于继电器触点允许容量的负载。否则会造成绝缘不良，粗点粘黏，接触不良，继电器损坏，火灾等。
- 清洁时请勿用水或有机溶剂，应用干毛巾擦拭。否则会引起触电或火灾。
- 在易燃易爆，潮湿，太阳光直射，热辐射，振动等场所应避免使用该产品。否则会引起火灾或爆炸。
- 请勿使灰尘或线圈残渣进入产品内部。否则会引起火灾或产品的故障。
- 请确认端子的极性后，正确连接热电偶配线。否则会引起火灾或爆炸。
- 为了达到强化绝缘的目的，请使用能确保基础绝缘以上的电源装置。

#### 电气规格

额定电压	100-240V AC, 50HZ
电源功耗	≤ 5VA
工作环境	环境温度: 0°C - 50°C 相对湿度: 35% - 85% RH (无冷凝)
存储温度	-25°C - 65°C (避免结冰或结露)
分辨率	1°C, 0.1°C (可调)
接线方式	接线端子
测量精度	±0.5%FS
内存保护	非易失性内存
安装环境	安装种类 II, 污染等级 2
继电器输出	继电器接点 AC220V/DC30V, 3A
逻辑电平输出	ON 时: DC1.2V; OFF 时: DC0.5V 以下; 最大流: 30mA, 负载电阻 ≥ 1K

#### 产品选型

C TN 4 S 4 1 1

① 公司名称 C 昌得电气科技有限公司

② 系列 TN 标准型数码双显示 PID 温度控制器  
TZ 高精度数码双显示 PID 温度控制器

③ 显示位数 4 9999 (4 位)

④ 外形尺寸	S	4848
	V	4896
	H	9648
	M	7272
L	9696	

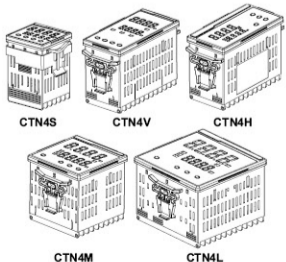
⑤ 电源电压 2 24VAC 50/60Hz, 24-48VDC  
4 开关电源 (85-265VAC 50/60Hz)

⑥ 控制输出	1	继电器	4	可控硅过零输出
	2	SSR 输出	5	可控硅自带 (5A)
	3	模拟量输出	6	SSR+继电器输出

⑦ 报警输出 1 1 路继电器 3 1 路 SSR  
2 2 路继电器 4 2 路 SSR

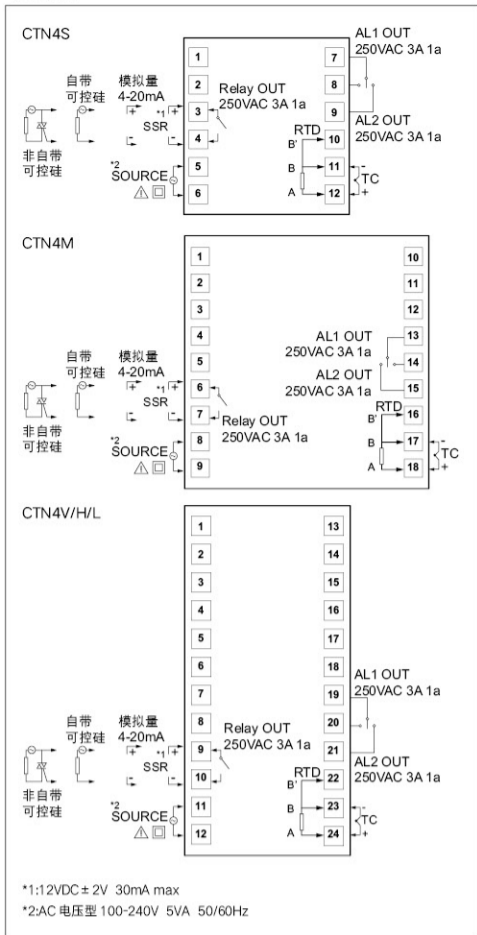
⑧ 分度号	无	热电偶多输入 (默认 K), E, J, N, W3-25, W5-26
	P	热电阻输入 PT100
	C	热电阻输入 Cu50

#### 外形与开孔尺寸表



型号	面板尺寸	壳体尺寸 (长 × 宽 × 高)	开孔尺寸
CTN4S	48 × 48	48 × 48 × 81	46 × 46
CTN4V	48 × 96	48 × 96 × 71	46 × 93
CTN4H	96 × 48	96 × 48 × 71	93 × 46
CTN4M	72 × 72	72 × 72 × 81	69 × 69
CTN4L	96 × 96	96 × 96 × 71	93 × 93

#### 端子接线



端子号	a	b	c
1~24	6~8	2.1 以下	4.2 以下

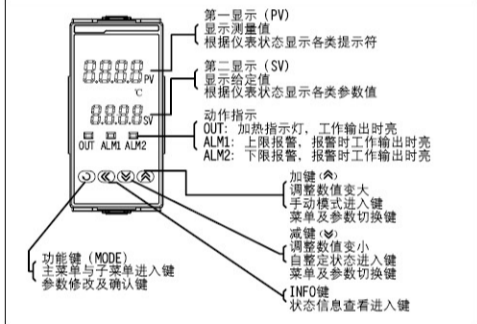
\* 请使用以下形状的端子和接线端子 单位 (mm)

端子号	a	b	c
1~24	6~8	2.1 以下	4.2 以下

接线端子 (圆型) (叉状)

端子号	a	b	c
a	3.0mm 以上	3.0mm 以上	
b	5.8mm 以下	5.8mm 以下	

#### 操作面板功能说明



特别提示:  
不同的加热装置需自整定一次，控制效果更佳。自整定方法，正常控温状态下测量值远低于目标值长按 (AT) 键 5 秒当 PV 测量温度值闪烁时代表进入自整定状态。取消自整定依然长按 (AT) 键 3 秒退出自整定状态。自整定过程为位式控制，依据不同的加热模型 (装置) 自整定的时间有所不同，温度可能有较大的波动。自整定完成后 PV 窗口的测量值停止闪烁，整定出来的值自动保存，仪表返回正常控温状态，以新的 P, I, D 值运算控温。  
注: 请参照仪表操作指导。

#### 菜单显示说明

代码	菜单功能	默认值	设定范围	权限	描述
P00	参数锁	0	0-900	0	0 为 0 级权限; 1 为 1 级权限; 18 为 2 级权限; 110 为恢复出厂值
P12	显示精度	0	0-1	1	P12=0 为无小数点 P12=1 为有小数点
P13	温度补偿	0	P32 值 -P33 值	1	当传感器位置问题或其他影响温度的因素产生时，用于温度修正
P16	输入分度号类型	有效类型	0-11	1	详情参见《输入分度号类型选择》
P17	报警 1 模式	1	0-24	1	第一路报警方式，设定详情参见《ALM 报警模式定义》
P18	报警 1 上限	10	P32 值 -P33 值	1	
P19	报警 1 下限	0	P32 值 -P33 值	0	
P20	报警 1 参数	0	0-7	1	
P22	报警 2 模式	0	0-24	2	第二路报警方式，设定方式同第一路，详情参见《ALM 报警模式定义》
P23	报警 2 上限	0	P32 值 -P33 值	2	
P24	报警 2 下限	0	P32 值 -P33 值	0	
P25	报警 2 参数	0	0-7	2	
P28	手动输出量	0	-100-100	0	手动输出量
P31	华氏度切换	0	0-1	2	P31=0 为摄氏度 P31=1 为华氏度
P32	设定温度上限	传感器通用温度范围	1	允许设定温度的最大值	
P33	设定温度下限	传感器通用温度范围	2	允许设定温度的最小值	
P46	SV 操作方式选择	0	0-1	2	详情参见《SV 操作方式选择》
P67	PID 控制模式	0	0-2	1	详情参见《PID 控制方式选择》
P70	加热回差	0.5	0-999.9	1	当 P67=2 位式控制时，修改加热回差值，为加热回差控制
P72	自整定 AT	0	0-2	0	用于使 PID 参数自动适应用户系统的自动演算功能
P73	超调抑制系数	3	0-20	1	超调抑制系数
P74	限制强度系数	1	0-3	2	限制强度系数
P76	加热参数 P	12	0.1-最大 (°C)	1	比例作用调节，P 值越大比例作用越小，系统增益越低

代码	名称	范围	单位	说明
P77	加热参数 I	135	1-最大 (s)	积分作用时间常数，I 值越大，积分作用越强，I=0 PD 控制
P78	加热参数 D	27	1-最大 (s)	微分作用时间常数，D 值越大，微分作用越强，D=0 PI 控制
P79	提前控制量	5.0	0.1-10.0	提前进入控制状态 单位: 度
P80	加热周期 HT	20	1-100	继电器: 20 逻辑电平: 3
P82	制冷周期 HT	20	1-100	继电器: 20 逻辑电平: 3
P83	制冷参数 P	10	0.1-最大 (°C)	比例作用调节，P 值越大比例作用越小，系统增益越低
P84	制冷参数 I	240	1-最大 (s)	积分作用时间常数，I 值越大，积分作用越强，I=0 PD 控制
P85	制冷参数 D	40	1-最大 (s)	微分作用时间常数，D 值越大，微分作用越强，D=0 PI 控制
P89	输出最大值限制	100	0-100	0 输出最大值限制
P90	输出最小值限制	-100	-100-0	2 输出最小值限制
P91	输出变化量限制	0	0-100	2 输出变化量限制

#### ALM 报警模式定义

P17/P22 代码	报警名称	说明
0	无报警	无报警输出
1	偏差上限	当 PV > SV+P18 时报警
2	偏差下限	当 PV < SV-P19 时报警
3	偏差上下限	当 PV > SV+P18 或 PV < SV-P19 时报警
4	偏差上下限范围 (保持)	当 PV < SV+P18 且 PV > SV-P19 时报警
5	偏差上限 (保持)	当 PV > SV+P18 时报警
6	偏差下限 (保持)	当 PV < SV-P19 时报警
7	偏差上下限 (保持)	当 PV > SV+P18 或 PV < SV-P19 时报警
8	偏差上下限范围 (保持)	当 PV < SV+P18 且 PV > SV-P19 时报警
9	绝对值上限	当 PV > P18 时报警
10	绝对值下限	当 PV < P19 时报警
11	绝对值上下限	当 PV > P18 或 PV < P19 时报警
12	绝对值上下限范围 (保持)	当 PV < P18 且 PV > P19 时报警
13	绝对值上限 (保持)	当 PV > P18 时报警
14	绝对值下限 (保持)	当 PV < P19 时报警
15	绝对值上下限 (保持)	当 PV > P18 或 PV < P19 时报警
16	绝对值上下限范围 (保持)	当 PV < P18 且 PV > P19 时报警
17	上限回差	出现 PV > SV+P18 后报警，直到 PV < SV-P19 后不报警
18	下限回差	出现 PV < SV-P19 后报警，直到 PV > SV+P18 后不报警
19	绝对值上限回差	出现 PV > P18 后报警，直到 PV < P19 后不报警
20	绝对值下限回差	出现 PV < P19 后报警，直到 PV > P18 后不报警
21	上限回差 (保持)	出现 PV > SV+P18 后报警，直到 PV > SV+P18 后不报警
22	下限回差 (保持)	出现 PV < SV-P19 后报警，直到 PV > SV+P18 后不报警
23	绝对值上限回差 (保持)	出现 PV > P18 后报警，直到 PV < P19 后不报警
24	绝对值下限回差 (保持)	出现 PV < P19 后报警，直到 PV > P18 后不报警

#### ALM 报警参数定义

P20/P25 代码	无	说明
0	报警输出 1	选择此代码，则对应报警点动作会等同于 ALM1 的动作
1	报警输出 2	选择此代码，则对应报警点动作会等同于 ALM2 的动作
2	加热输出	切换加热输出点，详情参见《仪表操作指导》
3	制冷输出	双向 PID 配置制冷输出点
4	手动标志	启用手动输出功能时对应动作标志位
5	信息标志	当 INFO 菜单: 代码 F.01 里的值不为 0 时可配置的动作输出点，详情参见《状态信息说明》
6	错误标志	当出现错误故障时可配置的动作输出点，详情参见《错误显示说明》
7	偏差上下限 (保持)	当 PV > SV+P18 或 PV < SV-P19 时报警

注: 当配置此参数时，相对应的 P17 或 P22 应配置为 0 才可进行报警

#### 输入分度号类型选择

输入信号	分度号	设定代码	设定范围
温度输入 (P16)	K	0	-200°C - 1200°C
	E	1	-200°C - 650°C
	J	2	-200°C - 850°C
	N	5	-200°C - 1300°C
	W3-25	10	0°C - 2300°C
	W5-26	11	0°C - 2300°C
P	PT100	8	-200°C - 850°C
C	Cu50	9	-50°C - 150°C

#### PID 控制方式选择

P67 设定值	0	1	2
模式	单向 PID	双向 PID	位式控制

#### 状态信息说明

INFO 状态信息表			
参数代码	代码意义	参数代码	代码意义
F.01	信息报警代码	F.91	生产时间: 月
F.10	控制输出量	F.92	生产时间: 日
F.11	冷端温度 (室温)	F.93	软件版本号
F.12	内部参数	F.94	PID 库版本号
F.90	生产时间: 年	F.95	用户版本号

#### 错误显示说明

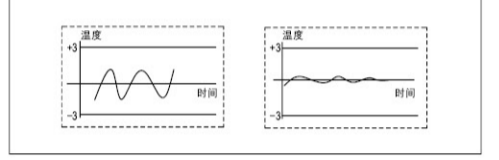
错误故障代码表			
错误显示	代码意义	排除故障	备注
Er0	无错误状态	无	
Er1	调试参数无效	仪表故障，请联系厂家	
Er2	热电偶断线	检查热电偶接线是否断开	上排数码管 (PV) 闪烁显示
Er3	冷端温度异常	仪表故障，请联系厂家	
Er4	超出量程上限	检查热电偶接线是否断开	
Er5	超出量程下限	检查热电偶接线是否断开	

#### SV 操作方式选择

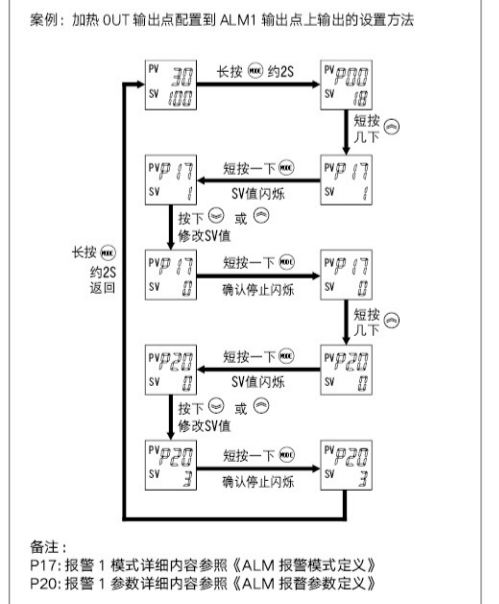
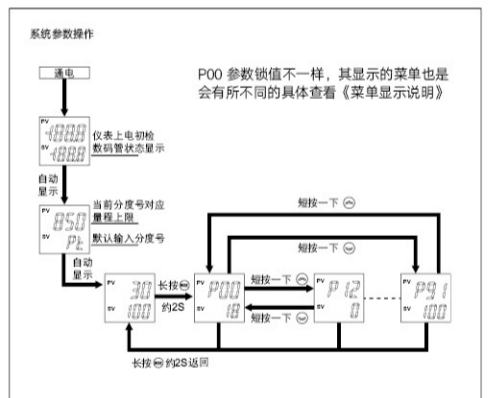
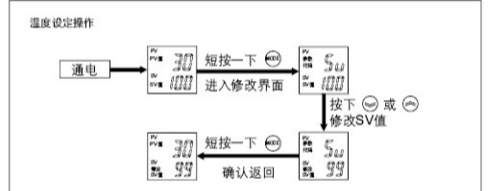
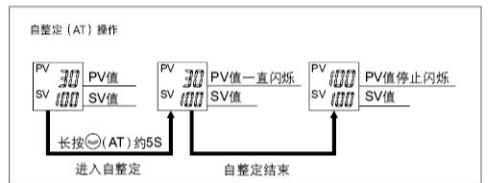
代码	参数值	说明	权限
P46	0	设定温度时，先单击 MODE 键，后按加/减键调节，再按 MODE 键确定	2 级
	1	设定温度时，直接按加/减键调节，停止调节后自动确认	

#### 其他信息

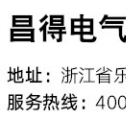
单相 PID 与双向 PID 区别:  
a. 减少能量损耗，实现精确控温  
b. 制冷加热同时实现 PID 智能控制  
c. 突破传统位式制冷导致温度大幅震荡的局限  
e. 制冷由原来的定点回差控制，改为 PID 智能控制，进步程度相当于原来的指针表升级为智能表



#### 仪表操作指导



备注:  
P17: 报警 1 模式详细内容参照《ALM 报警模式定义》  
P20: 报警 1 参数详细内容参照《ALM 报警参数定义》





## TEMPERATURE CONTROL METER SERIES

### INSTRUCTION MANUAL

#### Product safety Cautions

"Product safety Cautions" is for using the product safely and correctly. In case any dangerous accidents happen, please follow the following instructions.

"Product safety Cautions" can be divided into two parts, "warning" and "attention". They are explained as followed.

**For warning**, if you violate regarding instructions, it may cause severely injury or death.

**For attention**, if you violate regarding instructions, it may cause slightly injury or product damage.

⚠ It means under any exceptional circumstances, it may cause accidents or danger.

#### Warning

- When it is being used on machines that has significant impact on personal safety and their property (like Nuclear energy control, armamentarium, boats and ships, vehicles, railway, aviation, burning equipment, safety devices, anti-theft device, Disaster prevention device etc.), it needs to install double safety protection device. Otherwise, it may cause fire, personal injury or property loss.
- You must install panel before you use it, or you will get electric shock.
- Do not repair it if the power is on, or you will get electric shock.
- Please confirm the terminal number before wiring. Otherwise it may cause a fire.
- Do not reform the product other than maintenance staff in our company, or it may cause electric shock or fire.

#### Attention

- Do not use this product outside. Otherwise, it will reduce the useful lifespan or cause electric shock.
- When wiring the power input terminal and relay output terminal, please use cable of AWG20 (0.50mm<sup>2</sup>), with tightening torque of 0.74-0.90Nm for the screws. There is a risk of fire in case of poor contact.
- Please use the product within rated specifications. Otherwise, it will reduce the useful lifespan or cause fire.
- The load should be smaller than the allowable capacity of relay contacts. Otherwise it will result in poor insulation, contacts bonding, poor contact, relay damage, fire, etc.
- Do not use water or organic solvent to clean the product. Please use dry towel. Otherwise it may cause electric shock or fire.
- Avoid using this product in places that are explosive, damp, sunlight exposed, thermal-radiating, vibrational etc. Otherwise, it will cause fire or explosion.
- Make sure no dust or cable residue inside the product, or it will cause fire or product failure.
- Confirm polarity of terminals first, then correctly connect the wire of thermocouple. Otherwise, it will cause fire or explosion.
- In order to achieve the purpose of strengthening insulation, please use fundamental insulation or above power supply devices.

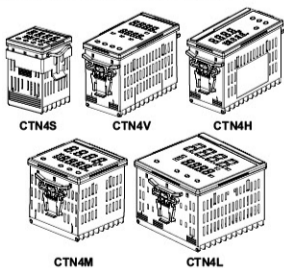
#### Electrical Specification

Rated voltage	100-240V AC, 50HZ
Power consumption	≤ 5VA
Operating ambient	Ambient temperature: 0°C ~ 50°C Relative humidity: 35%-85% RH (No-condensing)
Storage Temperature	-25°C ~ 65°C (Avoid freezing)
Resolution power	1°C, 0.1°C (Adjustable)
Wiring method	Connecting terminal
Measuring accuracy	± 0.5%FS
Memory Protection	Non-volatile memory
Installation conditions	Installation type II, Pollution degree 2
Relay output	Relay contact: AC220V/DC30V, 3A ON: DC12V; OFF: Below DC0.5V; Maximum Flow: 30mA, Oad resistance ≥ 1K
Logic level output	

#### Product Selection

C	TN	4	S	4	1	1
① Name of the company	C	CNTD				
② Series	TN	Standard digital dual display PID temperature controller				
	TZ	High precision digital dual display PID temperature controller				
③ Digit	4	9999 (4 digit)				
④ Dimensions	S	4848				
	V	4896				
	H	9648				
	M	7272				
⑤ Voltage supply	2	24VAC 50/60Hz, 24-48VDC				
	4	Switch power supply (85-265VAC 50/60Hz)				
⑥ Control output	1	Relay	4	SCR zero-crossing output		
	2	SSR output	5	SCR built-in (5A)		
	3	Analog output	6	SSR + relay output		
⑦ Alarm output	1	1-way relay	3	1-way SSR		
	2	2-way relay	4	2-way SSR		
⑧ Graduation	Non	Thermocouple multiple input (default setting K), E, J, N, W3-25, W5-26				
	P	Thermal resistance input PT100				
	C	Thermal resistance input Cu50				

#### Outline and hole dimension table

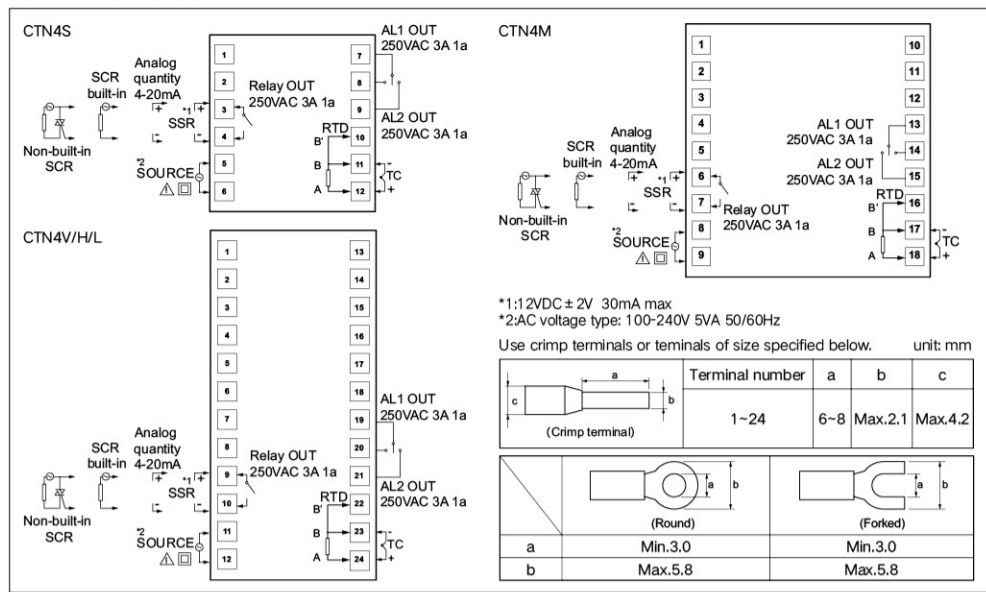


Type	Panel size	Shell Dimension (L x W x H)	Hole size
CTN4S	48 x 48	48 x 48 x 81	46 x 46
CTN4V	48 x 96	48 x 96 x 71	46 x 93
CTN4H	96 x 48	96 x 48 x 71	93 x 46
CTN4M	72 x 72	72 x 72 x 81	69 x 69
CTN4L	96 x 96	96 x 96 x 71	93 x 93

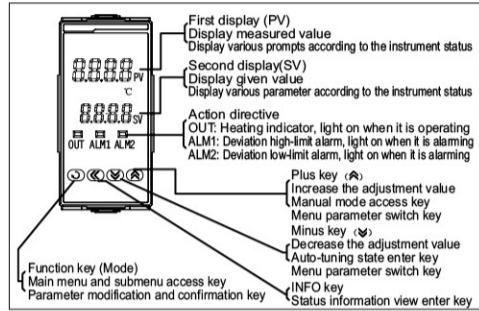
#### Enter Graduation type selection

Signal input	Graduation	Setup code	Setup range		
Temperature input (P16)	(Default) K	K	0	-200°C ~ -1200°C	
		E	1	-200°C ~ -650°C	
		J	2	-200°C ~ -850°C	
		N	5	-200°C ~ -1300°C	
		W3-25	10	0°C ~ -2300°C	
	P	W5-26	11	0°C ~ -2300°C	
		PT100	8	-200°C ~ -850°C	
		C	Cu50	9	-50°C ~ -150°C

#### Terminal connection



#### Operation panel function description



Extra tip: Different heating devices need auto-tuning once, and the control effect will be better. Auto-tuning method: When the measured value is far below the target value under normal temperature control, press and hold the (AT) key for 5 seconds until the PV measured temperature value flickers, it means entering the auto-tuning state. The auto-tuning state can be cancelled and exited by pressing and holding the (AT) key for 3 seconds. The self-tuning process is a stepping control. Different heating models (devices) have different self-tuning times, and the temperature may fluctuate greatly. The measured value in the PV window stops flickering when the auto-tuning is completed, the tuning value is automatically saved, and the meter returns to the normal temperature control state. The new P, I, D values are used to calculate the temperature control. Note: Please refer to the instrument operation guide.

#### Menu display description

Code	Menu function	Default	Setting range	Limits of authority	Description
P00	Parameter lock	0	0-900	0	0 is level 0 limits of authority; 1 is level 1 limits of authority; 18 is level 2 limits of authority; 110 is to reset to Factory Defaults;
P12	Display Accuracy	0	0-1	1	P12=0 means there is no decimal point; P12=1 means there is decimal point
P13	Temperature compensation	0	P32-P33 value	1	Used for temperature correction when sensor position problems or other factors affecting temperature occur
P16	put in index type	Valid type	0-11	1	For details, please see <Enter Index Type Selection>
P17	Alarm 1 Mode	1	0-24	1	First alarm mode, setting details please see <ALM Definition of Alarm parameter>
P18	Alarm 1 upper limit	10	P32-P33 value	1	
P19	Alarm 1 lower limit	0	P32-P33 value	0	
P20	Alarm 1 parameter	0	0-7	1	
P22	Alarm 2 Mode	0	0-24	2	Second alarm mode is as same as first alarm mode, setting details please see <ALM Definition of Alarm parameter>
P23	Alarm 2 upper limit	0	P32-P33 value	2	
P24	Alarm 2 lower limit	0	P32-P33 value	0	
P25	Alarm 2 parameter	0	0-7	2	
P28	Manual input	0	-100-100	0	Manual input
P31	Huacentigrade switching	0	0-1	2	P31=0 is centigrade P31=1 is Fahrenheit
P32	Set upper temperature limit	Applicable temperature range of sensor		1	Maximum allowable set for temperature
P33	Set lower temperature limit	Applicable temperature range of sensor		2	Minimum allowable set for temperature
P46	SV Operation mode selection	0	0-1	2	Details please see <SV Operation Mode Selection>
P67	PID control mode	0	0-2	1	Details please see <PID Control Mode Selection>
P70	Heating backlash	0.5	0-999.9	1	When P67 = 2-step control, modify the heating differential value for heating differential control
P72	Auto-tuning AT	0	0-2	0	Automatic calculation function for automatically adapting PID parameters to user system
P73	Overshoot suppression coefficient	3	0-20	1	Overshoot suppression coefficient
P74	Limiting strength coefficient	1	0-3	2	Limiting strength coefficient
P76	Heating parameter P	12	0.1-maximum (C)	1	Adjustment of proportional action, the larger the P value, the smaller the proportional action, and the lower the system gain
P77	Heating parameter I	135	1-maximum (s)	1	Integral-action time constant. The larger the I value, the weaker the integral action. I = 0 PD control
P78	Heating parameter D	27	1-maximum (s)	1	Derivate-action time constant. The larger the D value, the stronger the derivative action. D = 0 PI control
P79	Advance control quality	5.0	0.1-10.0	1	Enter control state in advance unit: degree
P80	Heating period H1	20	1-100	1	Relay20, logic level:3
P82	Refrigeration period HT	20	1-100	1	Relay20, logic level:3
P83	Refrigeration parameter P	10	0.1-maximum (C)	1	Adjustment of proportional action, the larger the P value, the smaller the proportional action, and the lower the system gain
P84	Refrigeration parameter I	240	1-maximum (s)	1	Integral-action time constant. The larger the I value, the weaker the integral action. I = 0 PD control
P85	Refrigeration parameter D	40	1-maximum (s)	1	Derivate-action time constant. The larger the D value, the stronger the derivative action. D = 0 PI control
P89	Output maximum limit	100	0-100	0	Output maximum limit
P90	Output minimum limit	-100	-100-0	2	Output minimum limit
P91	Limit Output variation	0	0-100	2	Limit Output variation

#### ALM Definition of alarm mode

P17/P22 Code	Name of Alarm	illustration
0	No alarm	No alarm output
1	Upper limit of deviation	When PV > SV+P18, alarm
2	Lower limit of deviation	When PV < SV-P19, alarm
3	Upper and lower limit of deviation	When PV > SV+P18 or PV < SV-P19, alarm
4	Scope of upper and lower limit of deviation	When PV < SV+P18 and PV > SV-P19, alarm
5	upper limit of deviation (hold)	When PV>SV+P18, alarm
6	Lower limit of deviation (hold)	When PV<SV-P19, alarm
7	Upper and lower limit of deviation (hold)	When PV>SV+P18 or PV<SV-P19, alarm
8	scope of upper and lower limit of deviation (hold)	When PV<SV+P18 and PV > SV-P19, alarm
9	Upper limit of absolute value	When PV>P18, alarm
10	Lower limit of absolute value	When PV<P19, alarm
11	Upper and lower limit of absolute value	When PV>P18 or PV<P19, alarm
12	Scope of upper and lower limit of absolute value	When PV<P18 and PV>P19, alarm
13	Upper limit of absolute value (hold)	When PV > P18, alarm
14	lower limit of absolute value (hold)	When PV<P19, alarm
15	Upper and lower limit of absolute value (hold)	When PV>P18 or PV<P19, alarm
16	Scope of upper and lower limit of absolute value (hold)	When PV<P18 and PV>P19, alarm
17	Upper limit of backlash	When PV > SV+P18, alarm. No alarm until PV<SV-P19
18	Lower limit of backlash	When PV < SV-P19, alarm. No alarm until PV>SV+P18
19	Backlash of upper limit of absolute value	When PV > P18, alarm. No alarm until PV<P19
20	Backlash of lower limit of absolute value	When PV<P19, alarm. No alarm until PV>P18
21	Upper limit of backlash (hold)	When PV > SV+P18, alarm. No alarm until PV<SV-P19
22	Lower limit of backlash (hold)	When PV < SV-P19, alarm. No alarm until PV>SV+P18
23	Backlash of upper limit of absolute value (hold)	When PV > P18, alarm. No alarm until PV<P19
24	Backlash of lower limit of absolute value (hold)	When PV<P19, alarm. No alarm until PV>P18

Note: "Hold" means the alarm will be removed when turning on the power; if the temperature control meter is in alarm state when starting up, it will not give an alarm. The temperature control meter should be in normal state first, and the alarm will not be issued until the alarm condition is reached again.

#### ALM Definition of alarm parameter

P20/P25 Code	no	Description
0	Alarm output 1 (ALM1)	If this code is selected, the corresponding alarm point action will be equivalent to ALM1 action
1	Alarm output 2 (ALM2)	If this code is selected, the corresponding alarm point action will be equivalent to ALM2 action
2	Heating output	Switch heating output point, details see <Guidence of Instrument Operation>
3	Refrigeration output	Two way PID configuration refrigeration output point
4	Manual sign	Corresponding action flag when manual output function is enabled
5	Information sign	When INFO menu: Configurable action output point when the value in code f.01 is not 0, details see Description of Status Information
6	Error sign	Configurable action output point when error failure occurs, details see <Description of Error Display>
7	Upper and lower limit of deviation (hold)	When PV>SV+P18 or PV<SV-P19, alarm

Attention: When this parameter is configured, the corresponding P17 or P22 should be configured as 0 before operation

#### SV Operation mode selection

Code	Parameter	Description	Limits of authority
P46	0	When setting the temperature, click MODE key first, then press plus / minus key to adjust, and then press MODE key to confirm	2 level
	1	When setting the temperature, directly press the plus/minus keys to adjust, and automatically confirm after stopping the adjustment	

#### PID Control Mode Selection

P67 Set value	0	1	2
Mode	Unidirectional PID	Bidirectional PID	ON/OFF

#### Description of status information

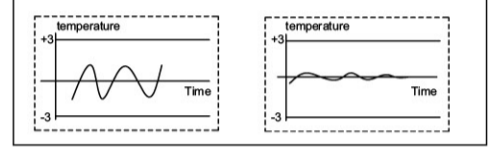
INFO Description of status information			
Parameter Code	Code meaning	Parameter Code	Code meaning
F.01	Code of message alarm	F.91	Production time: month
F.10	Control output	F.92	Production time: day
F.11	Cold end temperature (room temperature)	F.93	Software version number
F.12	Internal parameters	F.94	PID library version number
F.90	Production time: Year	F.95	User version number

#### Description of error display

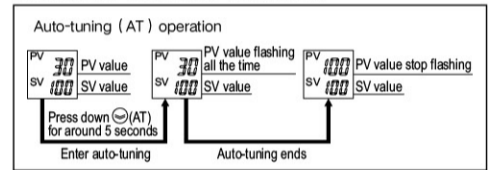
Description of error display			
Error display	Code meaning	Debug	Remarks
Er0	No error status	No	
Er1	Invalid debug parameter	Instrument failure, please contact the manufacturer	
Er2	Thermal resistance disconnection	Check whether the thermal resistance connecting wire is disconnected	Upper row of digital tube (PV) flashing display
Er3	Temperature of cold end is abnormal	Instrument failure, please contact the manufacturer	
Er4	Over upper limit range	Check whether the thermocouple connecting wire is disconnected	
Er5	Out of lower limit range	Check whether the thermocouple connecting wire is disconnected	

#### Other information

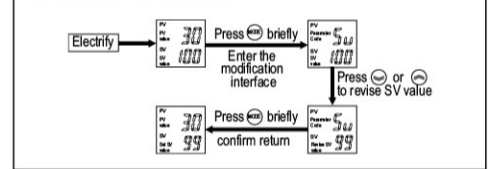
Difference between Unidirectional PID and Bidirectional PID:  
a. Reduce energy consumption and achieve accurate temperature control.  
b. Cooling and heating with intelligent PID control.  
c. Break through the limitation of temperature fluctuation caused by traditional step refrigeration.  
e. Refrigeration is changed from fixed-point differential control to intelligent PID control, and the degree of progress is equivalent to the upgrade of pointer gauge to intelligent meter.



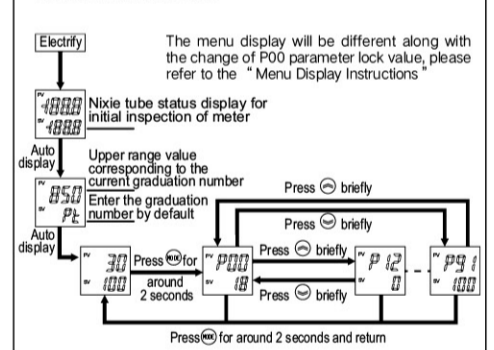
#### Instrument operation indication



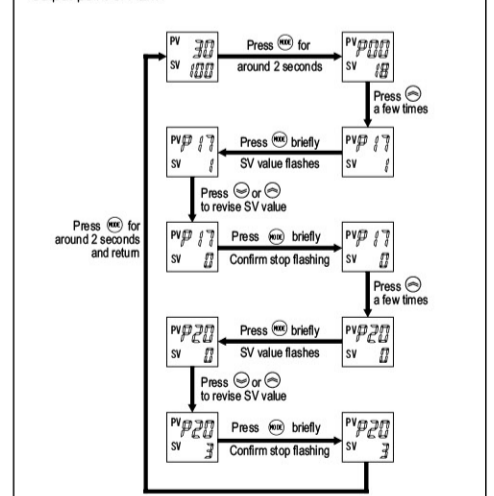
#### Temperature setting operation



#### System parameter operation



#### Example of case: How to set the output point of heating OUT to the output point of ALM1



Remarks:  
P17: Alarm mode 1 please refer to ALM Definition of Alarm Mode  
P20: Alarm parameter 1 please refer to ALM Definition of Alarm parameter



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