T622A Multi Loops Temperature Controller User Manual

(8 Loops)

Applicable for T622A-A version

Features

⊙Optional input signal types，DC300V withstand voltage between signal input channels can be used for grounded probes

⊙With measurement display, control output,TCP,RS485 communication functions and etc.

⊙Multi PID control algorithms for option, and with auto-tune function.

⊙With even power distribution function for multi-channel control load.

⊙This product is used in industrial machinery, machine tools, general measuring instruments and equipment.

National High-tech Enterprise/ National Standard Drafting Unit

Hotline: 400-0760-168 Version code: KKT622A-A01E-A/9-20250617

The instruction explain instrument settings, connections,name and etc, please read carefully before you use the temperature controller. Please keep it properly for necessary reference.

I. Safe Caution

⚠ Warning

1) When the failure or abnormal of products lead to a system of major accidents, please set the proper protection circuit in the external.
2) Please don`t plug in before completing all the wire.Otherwise it may lead to electric shock, fire, and fault.
3) Not allow to use outside the scope of product specification,otherwise it may lead to fire,fault.
4) Not allow to use in the place where is inflammable and explosive gas.
5) Do not touch power terminal and other high voltage part when the power on, otherwise you may get an electric-shock.
6) Do not remove,repair and modify this product,otherwise it may lead to electric shock, fire, fault.

⚠ Caution

1) The product should not be used in a nuclear facility and human life associated medical equipment.
2) The product may occur radio interference when it used at home.You should take adequate countermeasures.
3) The product get an electric shock protection through reinforced Insulation. When the product is embedded in the devices and wiring,please subject to the specification of embedded devices.
4) In order to prevent surge occurs,when using this product in the place of over 30m indoor wiring and wiring in outdoor, you need to set the proper surge suppression circuitry.
5) The product is produced based on mounting on the disk.In order to avoid to touch the wire connectors,please take the necessary measures on the product.
6) Be sure to observe the precautions in this manual, otherwise there is a risk of a major injury or accident.
7) When wiring, please observe the local regulation.
8) To prevent to damage the machine and prevent to machine failure, the product is connected with power lines or large capacity input and output lines and other methods please install proper capacity fuse or other methods of protection circuit.
9) Please don't put metal and wire clastic mixed with this product,otherwise it may lead to electric shock, fire, fault.
10) Please tighten screw torque according to the rules.If not,it may lead to electric shock and fire.
11) In order not to interfere with this products to dissipate heat, please don't plug casing around the cooling vent hole and equipment.
12) Please don' t connect any unused terminal.
13) Please do the cleaning after power off, and use the dry cleaning cloth to wipe away the dirt. Please don' t use desiccant, otherwise, it may casue the deformation or discoloration of the product.
14) Please don`t knock or rub the panel with rigid thing.
15) The readers of this manual should have basic knowledge of electrical,control, computer and communications.
16) The illustration, example of data and screen in this manual is convenient to understand,instead of guaranteeing the result of the operation.
17) In order to use this product with safety for long-term,regular maintenance is necessary. The life of some parts of the equipments are by some restrictions, but the performance of some will change for using many years.
18) Without prior notice, the contents of this manual will be change. We hope these is no any loopholes, if you have questions or objections, please contact us.

Caution of Install & Connection

1. Installation
1) This product is used in the following environmental standards. (IEC61010-1) [Overvoltage categoryⅡ、class of pollution 2]
2)This product is used in the following scope:environment, temperature, humidity and environmental conditions.Temperature:0~50℃;humidity: 45~85%RH; Environment condition:Indoor warranty.The altitude is less than 2000m.

3) Please avoid using in the following places：
The place will be dew for changing temperature;with corrosive gases and flammable gas;with vibration and impact;with water, oil, chemicals, smoke and steam facilities with Dust, salt, metal powder;and with clutter interference, static electric and magnetic fields, noise;where has air conditioning or heating of air blowing directly to the site; where will be illuminated directly by sunlight; where accumulation of heat will happen caused by radiation.
4) On the occasion of the installation, please consider the following before installation.
In order to protect heat saturated, please ensure adequate ventilation space.
Please consider connections and environment,and ensure that the products below for more than 50mm space. Please avoid to installed over the machine of the calorific value (Such as heaters, transformer, semiconductor operations, the bulk resistance). When the surrounding is more than 50 , please using the force fan or cooling fans.But don't let cold air blowing directly to the product. In order to improve the anti - interference performance and security, please try to stay away from high pressure machines, power machines to install.
Don`t install on the same plate with high pressure machine and the product.
The distance should be more than 200mm between the product and power line.
2. Cable caution：
1) Please use specified compensation wire in the place of TC input; Please use insulated TC if the measured device is heated metal.
2) Please use the cable of lesser resistance in the place of RTD input,and the cable(3 wire) must be no resistance difference,but the total length is within 5m.
3) In order to avoid the effect of noise,please put the input dignal away from meter cable,power cable,load cable to wiring.
4) In order to reduce the power cables and the load power cables on the effect of this product,please use noise filter in the place where easy to effect.
You must install it on the grounding of the disk if you use the noise filter,and make the wiring to be shortest between noise filter output side and power connectors. Don`t install fuse and switch on the wiring of noice filter output side,otherwise it will reduce the effect of noise filter.
5) It takes 5s from input power to output.If there is a place with interlocking actions circuit signal,please use timer relay.
6) Please use twisted pair with a shield for analog output line, can also connect the common-mode coil to the front-end of the signal receiving device to suppress line interference if necessary, to ensure the reliabilty of signal.
7)Please use twisted pair with a shield for remote RS485 communication cable, and deal with the shield on the host side earth, to ensure the reliabilty of signal.
8) This product don' t have the fuse; please set according to rated voltage 250V,rated current 1A if you need; fuse type:relay fuse.
9) Please use suitable slotted screwdriver and wire.
Terminal screw cap size: φ 3mm ,distance 3.81mm
Recommended tightening torque: 0.2N.m.
Proper cables: 0.5 ～ 1.5mm² single cable/multiple core cable
10) Please don`t put the Crimp terminal or bare wire part contact with adjacent connector.
3. Usage regulations for temperature measuring components with built-in retractable cold end compensation:
1) When the thermocouple wire (thermocouple specific compensation wire) is directly connected to the module terminal, shorten the compensation wire to be close to the wiring terminal and increase the accuracy error by 1 ℃ in basic accuracy.
2) When using ordinary wires to transfer thermocouple signals from the wiring block to the module terminals; Ensure and extend the cold end compensation element (up to 4cm in length) and the wiring harness in the same temperature environment.

II. Ordering information

T622A - D F - 8 T 8 Q 8 Q 6 —

1. 8: with RS485 Communication 6:with RS485 & TCP Communication
2. Q：Transistor alarm
3. 8：Alarm quantity
4. Q：transistor D：4～20mA V: 0～10V(to be ordered)
5. 8：8 control output
6. T：TC input R：RTD input X：mA/V linear signal input
7. 8：8 input channel
8. F：DC 24V power supply
9. D：Double splicing DIN rail installation
10. T622A series multi-loops temperature controller

Note: mA/V output up to 8 channels at most;
Transistor output can be selected from 8 channels, 10 channels, or 16 channels.

III. Models

Model	Input	Control Output	Alarm or cooling output	Auxiliary output	RS485 communication	TCP communication
T622A-DF-8T8Q8Q6	8*TC	8*Q	8*Q	No	Yes	Yes
T622A-DF-8T8Q2Q6	8*TC	8*Q	No	2*Q	Yes	Yes
T622A-DF-8T8Q8Q8	8*TC	8*Q	8*Q	No	Yes	No
T622A-DF-8T8Q2Q8	8*TC	8*Q	No	2*Q	Yes	No
T622A-DF-8T2Q6	8*TC	No	No	2*Q	Yes	Yes
T622A-DF-8T2Q8	8*TC	No	No	2*Q	Yes	No
T622A-DF-8T8D6	8*TC	8* 4 ～ 20mA	No	No	Yes	Yes
T622A-DF-8T8D8	8*TC	8* 4 ～ 20mA	No	No	Yes	No
T622A-DF-8R8Q8Q6	8*RTD	8*Q	8*Q	No	Yes	Yes
T622A-DF-8R8Q2Q6	8*RTD	8*Q	No	2*Q	Yes	Yes
T622A-DF-8R8Q8Q8	8*RTD	8*Q	8*Q	No	Yes	No
T622A-DF-8R8Q2Q8	8*RTD	8*Q	No	2*Q	Yes	No
T622A-DF-8R2Q6	8*RTD	No	No	2*Q	Yes	Yes
T622A-DF-8R2Q8	8*RTD	No	No	2*Q	Yes	No
T622A-DF-8R8D6	8*RTD	8* 4 ～ 20mA	No	No	Yes	Yes
T622A-DF-8R8D8	8*RTD	8* 4 ～ 20mA	No	No	Yes	No

IV. Specifications

1. Electrical parameters:

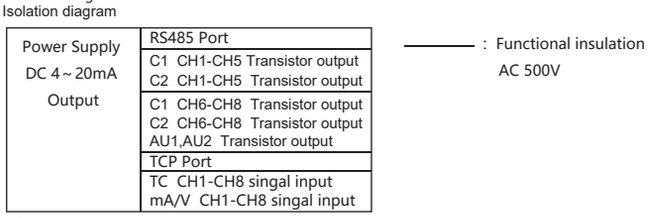
Main Control Output Type	Transistor output, 4～20mA , 0～10V, 1～10V for selection
Output Capacity	@25℃ DC 24V Max 100mA The current is reduced by 8mA for every 10 ℃ increase in ambient temperature Withstand voltage：100V
Display Update	2 times/sec per channel(Sampling speed larger than 80 times per second)
Power supply	DC 24V
Power consumption	2W without output; 24V transistor output maximum 40W; 4-20mA output maximum 6W
Environment	Indoor use only, temperature: 0~50℃ no condensation,humidity＜85%RH, altitude<2000m
Storage environment	-10～60℃, no condensation
Communication port	RS485 port Modbus-RTU protocol
Insulation impedance	Input, output, power to the housing ＞20MΩ
ESD	IEC/EN61000-4-2 Contact ±4KV /Air ±8KV perf.Criteria B
Pulse traip anti-interference	IEC/EN61000-4-4 ±2KV perf.Criteria B
Surge immunity	IEC/EN61000-4-5 ±0.5KV perf.Criteria B
Voltage drop & short interruption immunity	IEC/EN61000-4-29 0%～70% perf.Criteria B
Isolation voltage	Signal input and power: 500V AC, 1min
Total weight	About 400g
Shell material	The shell and panel frame PC/ABS (Flame Class UL94V-0)
Panel Material	PC film and PEM silicone keys
Power Failure Memory	10 years, EEPROM write more than 10 billion times

2. Input parameters

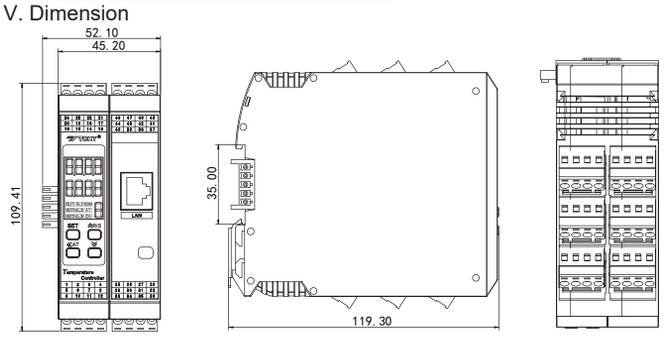
Input type		Symbol	Measure range	Resolution	Accuracy	Temperature drift	Input impedance /auxiliary current	Com. parm. code
TC	K1		-50～1200	1℃	0.2%F.S±3digits	0.005%F.S/℃	>1MΩ	0
	K2		-50.0～999.9	0.1℃	0.2%F.S±1℃	0.005%F.S/℃	>1MΩ	16
	J1		0～1200	1℃	0.2%F.S±3digits	0.005%F.S/℃	>1MΩ	1
	J2		0.0～999.9	0.1℃	0.2%F.S±1℃	0.005%F.S/℃	>1MΩ	17
	E1		0～850	1℃	0.2%F.S±3digits	0.005%F.S/℃	>1MΩ	2
	E2		0.0～850.0	0.1℃	0.2%F.S±1℃	0.005%F.S/℃	>1MΩ	18
	T1		-50～400	1℃	0.5%F.S±3℃	0.01%F.S/℃	>1MΩ	3
	T2		-50.0～400.0	0.1℃	0.5%F.S±3℃	0.01%F.S/℃	>1MΩ	19
	B		250～1800	1℃	0.5%F.S±2℃	0.01%F.S/℃	>1MΩ	4
	R		-17～1700	1℃	0.5%F.S±2℃	0.01%F.S/℃	>1MΩ	5
	S		-10～1600	1℃	0.5%F.S±2℃	0.01%F.S/℃	>1MΩ	6
	N1		-50～1200	1℃	0.2%F.S±1℃	0.005%F.S/℃	>1MΩ	7
	N2		-50.0～999.9	0.1℃	0.2%F.S±1℃	0.005%F.S/℃	>1MΩ	20
	0～50mV		-1999～9999	16bit	0.2%F.S±3digits	0.005%F.S/℃	>1MΩ	12
RTD	PT1		-200.0～600.0	0.1℃	0.2%F.S±2digits	0.005%F.S/℃	0.25mA	8
	PT2		-200～600	1℃	0.2%F.S±2digits	0.005%F.S/℃	0.25mA	21
	JPT1		-200.0～500.0	0.1℃	0.2%F.S±2digits	0.005%F.S/℃	0.25mA	9
	JPT2		-200～500	1℃	0.2%F.S±2digits	0.005%F.S/℃	0.25mA	22
	CU50-1		-50.0～150.0	0.1℃	0.3%F.S±2digits	0.015%F.S/℃	0.25mA	10
	CU50-2		-50～150	1℃	0.3%F.S±2digits	0.015%F.S/℃	0.25mA	23
	CU100-1		-50.0～150.0	0.1℃	0.3%F.S±2digits	0.01%F.S/℃	0.25mA	11
	CU100-2		-50～150	1℃	0.3%F.S±2digits	0.01%F.S/℃	0.25mA	24
	0～400Ω		-1999～9999	16bit	0.2%F.S±3digits	0.005%F.S/℃	0.25mA	13
mA /V	*4～20mA		-1999～9999	16bit	0.2%F.S±3digits	0.005%F.S/℃	<50Ω	14
	*0～10V		-1999～9999	16bit	0.2%F.S±3digits	0.005%F.S/℃	>1MΩ	15

*: Please specify the signal input requirements before order.
Note 1: When the thermocouple input uses internal cold end compensation, an additional 2°C cold end compensation allowable error should be added
Note 2: When the B-grade thermocouple is measured in the range of 250~600°C, the accuracy cannot reach the calibration accuracy. When in the range of 600~1800°C, the measurement accuracy can be guaranteed.

3. Isolation diagram



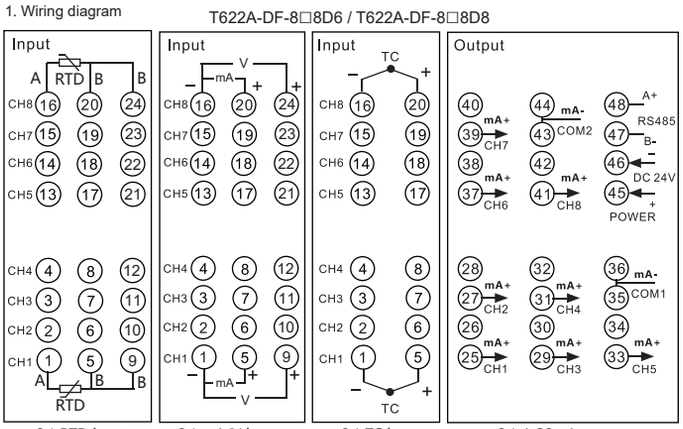
V. Dimension



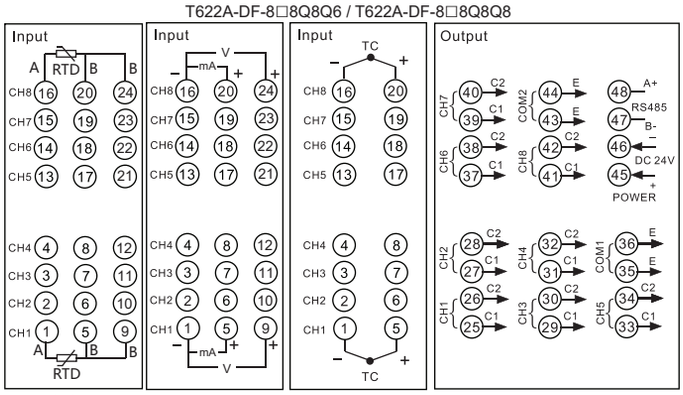
VI. Connections

1. Wiring diagram

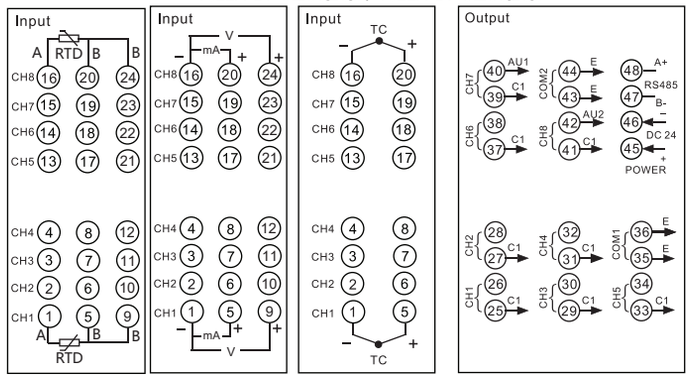
T622A-DF-8□8D6 / T622A-DF-8□8D8



T622A-DF-8□8Q8Q6 / T622A-DF-8□8Q8Q8

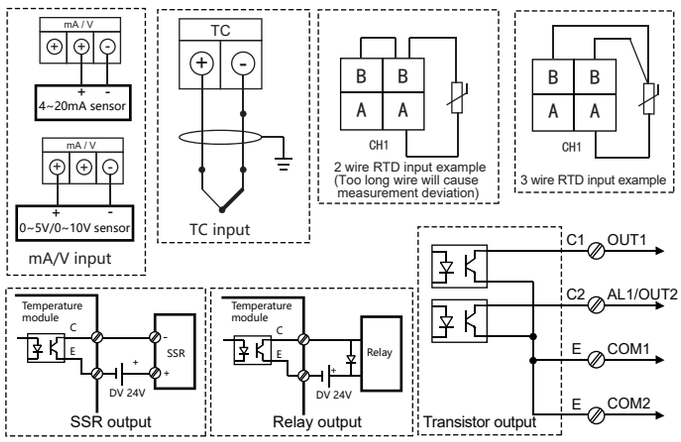


T622A-DF-8□8Q2Q6 / T622A-DF-8□8Q2Q8

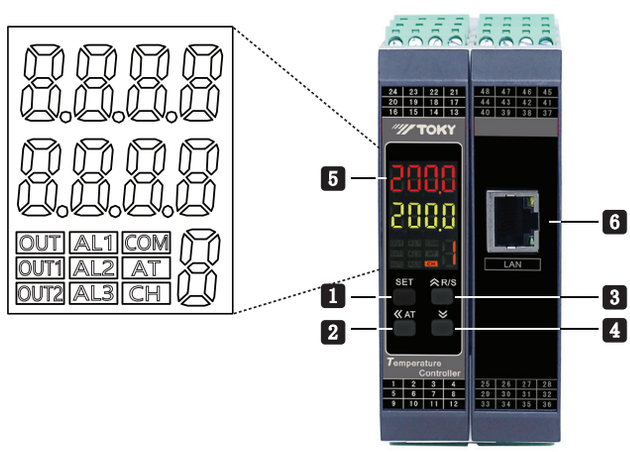


If there are any changes in the wiring, please subject to the actual wiring diagarm on equipment

2. Wiring example diagram



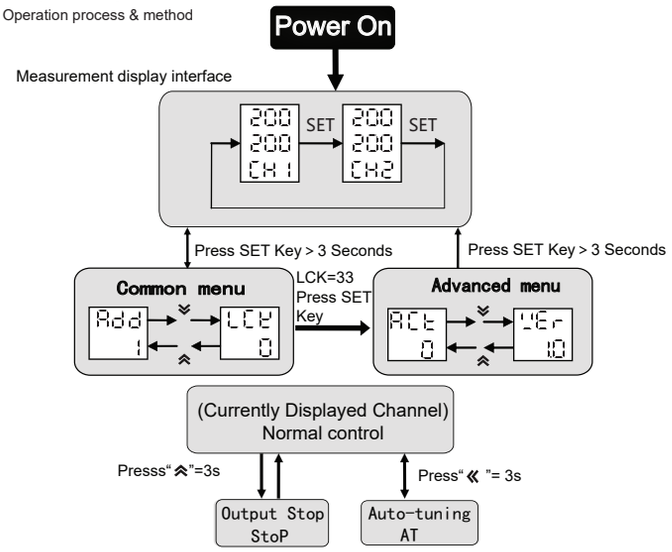
VII.Panel Name



No.	Symbol	Name	Function Description
1	SET	SET key	Menu key / Confirm key for entering or exiting parameter modification mode or confirming saving and modifying parameters.
2	«	Shift/AT Key	Activation key / Shift key / AT auto-tuning key, long press in measurement control mode to enter or exit auto-turning mode
3	»	Add key/R/S	Add key / menu up key, in measurement control mode, long press can realize RUN /STOP Mode switch
4	ˇ	Decrease	Decrease key / Menu down key
5	OUT1	OUT1	Main control output indication, output is ON when there is display, output is OFF when there is no display
	OUT2	OUT2	Cooling output indicator, output is ON when there is display, output is OFF when there is no display
	AL1	AL1	Alarm output indication, output is ON when display, output is OFF when no display
	AL2	AL2	Alarm output indication, output is ON when display, output is OFF when no display
	COM	COM	Communication indicator, flash once means a communication has been completed.
	AT	AT	AT instruction. When there is a display, it indicates that the current channel is performing auto-turning.When there is no display, it indicates that there is no auto-tuning or auto-tuning is complete.
	CH	CH	Channel indication window
6	LAN	LAN port	TCP communucation port

XIII. Operation process and menu illustration

1. Operation process & method



a. In normal measurement control mode after power on, press and hold the "SET" key for more than 3 seconds to enter the menu parameter viewing mode, short press "SET" key to switch the display channel, the channel number is displayed in the CH indication window,and the panel display correspond to the channel number;

b. In the menu view mode,short press "≪" or "≫" key check the common menu parameters circularly.

c.In the menu view mode, short press the "≪" key to flash the viewed menu parameter value to enter the parameter modification mode, and each short press can move position to the left in cycle. In this mode, long press the "≪" key more than 3 seconds can set all channel parameters to be the same as the current value.

d. In the parameter modification mode, press the "≪" or "≫" key once to increase or decrease the flashing data bit by one.

e. In the parameter modification mode, shortly press the "SET" key after the parameter is modified to save the modified parameter and long press "SET" exit to the menu view mode.

f. In normal measurement control mode, press and hold the "≪" key for more than 3 seconds to enter the PID auto-tuning state corresponding to the channel.

h. In the normal measurement control mode, press and hold the "≪" key for more than 3 seconds to enter or exit the running or stop mode corresponding to the channel; the stop mode SV window displays "STOP"

IX. Menu Illustration

□: No mater what model, what control mode it is, it will always display these parameters.

▭: According to different model, control mode, these parameters will be hidden.

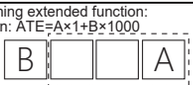
1. Regular Menu

No.	Symbol	Name	Illustration	Setting range	Factory setting
1		PV	Measuring display value,it will flash or display LLLL/HHHH when the value overflow measure range. Unit: ℃ / ℉ or no unit	Refer to measured signal table	NO
2		SV	Control item setting value,Unit: ℃ / ℉ or no unit	SLL~SLH	200
3		CH	Channel number display window	1~8	
4	LCK	LCK	Lock function; 0001: SV value can not be changed; 0010: menu setting value can be read only; 0033: advanced menu can be accessed; 0123: menu restore factory setting 1111: Clearing OTC cumulative value	0~9999	0
5	Add	ADD	Communication Address	1~247	1
6	bAd	BAD	RS485 communication baud rate 0: 1200; 1: 2400 2: 4800; 3: 9600; 4: 19200; 5: 38400; 6: 57600; 7: 115200;	0~7	9.6(3)
7	PrtY	PRTY	Communication parity check setting, NO(0): No parity check, ODD(1): Odd parity check, EVEN(2): Even parity check	0~2	NO(0)
8	dAtC	DATC	The communication signal data transmission sequence and response delay are set to 0000; the 2nd and 4th bits are reserved, the 3rd bit is byte order exchange, and the 1st bit is used for reset function in TCP communication interface, and other interfaces are invalid.	Refer to COM protocol	0
9	AL1	AL1	The 1st alarm value, when set as a negative number as the alarm deviation, it will be treated as an absolute value	FL ~ FH	10
10	HY1	HY1	1st alarm hystersis	0 ~ 1000	1
11	Ad1	AD1 (1)	The 1st alarm mode, note: when AD1=0, the alarm function is turned off; when 6<AD1<13, the 2nd alarm function is invalid	0 ~ 14	3
12	AL2	AL2	The 2nd alarm value, when set as a negative number as the alarm deviation, it will be treated as an absolute value	FL ~ FH	5
13	HY2	HY2	2nd alarm hystersis	0 ~ 1000	1
14	Ad2	AD2 (1)	2nd alarm mode	0 ~ 14	4
15	ot	OT	Control Mode, 0: ON/OFF Heating control; 1: PID heating; 2: ON/OFF Cooling control; 3: 3: PID heating and cooling (no such function for model T622A-D□-8□8D□); 4: Over temperature cooling output; 5: PID Cooling	0~5	1
16	P	P	Proportional band, the smaller the setting value, the faster the system heats up, and vice versa. Increasing the proportional band can reduce oscillation, but will increase control deviation. Reducing the proportional band can reduce control deviation, but will cause oscillation. Unit: Corresponding measured value.	0~9999	30
17	I	I	Integral time, the smaller the value is, the stronger the integral action is, otherwise, it is weeker. When I=0, no integral action, unit: s.	0~9999	120
18	d	D	Differential time, the greater the value is, the stronger the differential actiontion is, otherwise, it is weeker. When D=0, no differential action. Set D=0 when controlling fast systems, e.g., pressure, speed; unit: s	0~9999	30
19	P1	P1	OT=3, PID parameters of cooling OUT2, same as above	0~9999	30
20	I1	I1		0~9999	120
21	d1	D1		0~9999	30
22	oVS	OVS	Overshoot limit, during PID control process, when PV (measured value) > SV(set value) + OVS(overshoot limit), force to close output. The smaller this value is, the smaller the PID adjustment range is, the worse the control stability is. Please set the appropriate value according to the actual situation.When set OVS=0, no this function	0~9999	0
23	A-M	A-M	Auto-manual control switch, AUTO(0): auto control only; MAN(1): manual control only;	AUTO~AM	AUTO
24	CP	CP	OUT1 Control cycle; reduce it appropriately to improve control performance, but when using relay control, increase it appropriately to increase the service life of the relay; SSR control is recommended to be set to 1, 4~20mA control is recommended to be set to 1, and relay control output is recommended to be set to 4~200, unit: second	1 ~ 200	1

Continued

No.	Symbol	Name	Illustration	Setting range	Factory setting
25	CP1	CP1	OUT2 cooling control cycle; same as above, need to configure appropriate value according to the control actuator, unit: second	1 ~ 200	20
26	db	DB	Position control hysteresis (negative hysteresis position control) or cooling control and compressor refrigeration control dead zone. Please change the value according to the decimal point position when changing the INP type.	-1000~1000	5
27	inP	INP	Input signal selection. Note: After modification, other related parameters must be modified.	refer to input signal para-meters table (page 2)	K1
28	PS	PS	Amend value, display value= actual measured value + amend value	-1000~1000	0
29	otC	OTC	Control output time accumulation: Unit: seconds When LCK=1111, it can be cleared to 0 or communication input 0.	0 ~ 65535	-

2. Advanced menu illustration

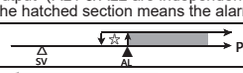
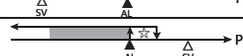
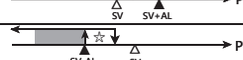
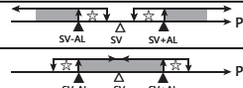
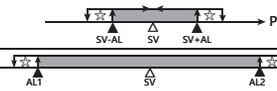
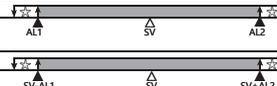
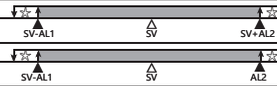
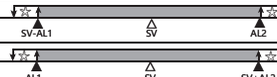
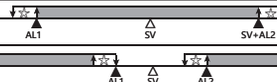
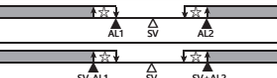
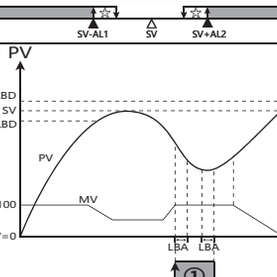
No.	Symbol	Name	Illustration	Setting range	Factory setting
30	ACt	ACT	Control execution mode, 0: SSR drive output or transistor output (determined by the model master control output type); 1: Reserved, same as ACT=0; 2: Current or voltage regulation output; 3: Analog transmission output	0~3	0/2
31	AE1	AE1 (2)	1st alarm extensions function,refer to alarm extension function table	0~5	0
32	AE2	AE2 (2)	2nd alarm extensions function,refer to alarm extension function table	0~5	0
33	LbA	LBA	Controller disconnection alarm time, unit: second	0 ~ 9999	10
34	Lbd	LBD	Controller disconnection alarm insensitive temperature range, unit: ℃ or ℉	0 ~ 9999	10
35	LbF	LBF	Controller disconnection alarm judgment range, unit: ℃	0 ~ 9999	2
36	dP	DP	Decimal point setting is effective under the linear signal input	0~3	1
37	dtr	DTR	PV fuzzy tracking value,properly set this value on some occasions, it can get a more stable control display value,this value is unrelated with actual measured value. Note:after setting this value,when alarm setting value is equal to SV setting value, alarm output operation is subject to actual measured value. Set as 0 to close this function.The temperature input unit: Fahrenheit or Celsius.The linear signal input unit: Engineering Digits	0.0 ~ 2.0 (0~20)	1.0
38	SSA	SSM	Press the key on the panel to switch the RUN/STOP operation switch, 0: prohibited, 1: OPEN	0 ~ 1	0
39	SLL	SLL	Low limit of target setting value range	FL ~ FH	FL
40	SLH	SLH	High limit of target setting value range	FL ~ FH	FH
41	FL	FL	Measure range low limit,the setting value must be less than measure range high limit	Refer to input signal table	
42	FH	FH	Measure range high limit,the setting value must be more than measure range low limit.	Refer to input signal table	
43	brA	BRM	Transmission mode, 0: PV transmission output 1: SV transmission output	0 ~ 1	0
44	brL	BRL	Lower limit of transmission range, note: When this value is larger than the high limit of transmission range, it is considered as reverse transmission output	FL ~ FH	FL
45	brH	BRH	High limit of transmission range, note: When this value is lower than the low limit of transmission range, it is considered as reverse transmission output	FL ~ FH	FH
46	oLL	OLL	Output low limit, limit the output low limit current amplitude Setting value must be less than high limit setting	-5.0 ~ 100.0	0.0
47	oLH	OLH	Output high limit,limit the output high limit current amplitude. Setting value must be greater than low limit setting	0.0 ~ 105.0	100.0
48	oLL1	OLL1	OUT2 cooling output limit lower limit, limit the output lower limit current amplitude, the set value must be less than the upper limit setting	0.0 ~ 100.0	0.0
49	oLH1	OLH1	OUT2 cooling output limit upper limit, limit the output upper current amplitude, the setting value must be greater than the lower limit setting	0.0 ~ 100.0	100.0
50	oLHE	OLHE	Output limit upper limit effective range, Under reverse action (heating) control, when PV<OLHE, OLH takes effect Under direct action (cooling) control, when PV>OLHE, OLH takes effect	FL ~ FH	FH
51	SFSt	SFST	Soft start time, the time required for the output to reach the maximum power, unit: seconds	0 ~ 9999	0
52	Ft	FT	PV digital filter coefficient. The larger the value, the stronger the filtering effect.	0 ~ 255	10
53	Pt	PT	Compressor start delay time, unit: s	0 ~ 9999	0
54	PdC	PDC	PID algorithm option:0(FUZ): Advanced fuzzy PID arithmetic; 1(STD): normal PID arithmetic	FUZ/STD	FUZ
55	AtE	ATE	PID self-tuning extended function: Menu option: ATE=A×1+B×1000  1. A: Self-tuning timeout (unit: minutes) After the self-tuning exceeds the set time, the self-tuning will be exited and the PID parameters before tuning will be retained. The setting range is A∈[0,999]. This function is not enabled when A=0; 2. B: Self-tuning algorithm selection (effective when PDC selects FUZ) B=0, 90% tuning algorithm; B=1, 50% tuning algorithm	0 ~ 1999	1180
56	SPC	SPC	Industry PID parameter call	NULL/PID0 ~ PID9	NULL
57	SPrt	SPRT	Heating slope setting value, 0 means no function, unit: ℃/minute. When SPRT setting is valid, when PID is running, if the measured value is lower than the given value, the temperature will be raised to the given value at the heating speed limit value defined by SPRT. Unit: per minute. If SPRT=5, the temperature will be raised to the given value at 5℃ per minute.	0~9999	0
58	Unit	UNIT	Temperature unit setting C: Celsius F: Fahrenheit, note: this unit setting is only for temperature measurement signals, "_" no unit display	(25)℃ (26)℉	(25)℃
59	PrS	PRS	Setting parameter reserve position: 0 (EEP):EEPROM with power failure protection; 1(RAM): RAM without power failure protection. Description of setting parameter storage location: EEP and RAM. EEP means that the setting parameters are written into EEPROM and can be permanently saved after power failure.It is generally used for factory setting parameters of equipment. Because EEPROM has the limit of writing times, too many and too frequently writes will be damaged;RAM: it means that the parameters are stored in RAM without writing limit and will not be damaged due to frequently writing. The parameters set after the equipment is powered off will not be saved. After power on, they will be restored to the parameters saved in EEPROM by the equipment manufacturer. Using method : set it to EEP first. After debugs the equipment settings, the parameters are saved in EEPROM. Then change PRS to RAM, delivered the equipment to the user, to prevent accidental modification or long-term communication data writing from damaging the EEPROM.	EEP/RAM	EEP

Continued

No.	Symbol	Name	Illustration	Setting range	Factory setting
60	rSS	RSS	RUN/STOP reserve position: 0 (EEP):EEPROM with power failure protection;1(RAM): RAM without power failure protection. Using method: if the instrument is required to be in stop mode every time when powered on, first set RSS to EEP,then set "start stop operation" = STOP. This setting parameter will be saved for a long time; Then set RSS to RAM. When using,the upper computer starts/stops the instrument, which is stored in RAM. After power on again, the instrument will still enter STOP mode.	EEP/RAM	EEP
61	St	ST	Power-on operation mode; 0: After power-on, execute RUN control operation state; 1: After power-on, automatically enter PID parameter self-tuning state; long press AT key to exit self-tuning; 2: After power-on, execute STOP to stop operation state; 3: After power-on, keep RUN/STOP operation state before power-off; Menu options 0, 1, 2 are bound to "RSS" menu option "RAM", and option 3 is bound to "EEP".	0~3	3
62	LPH	LPH	The actual load power of each channel, used for total power limit; unit: kW. When set to 0, this channel does not participate in power limit.	0.0～999.9	0.0
63	SLPL	SLPL	Total power limit, limits the power distribution of each participating channel when the channel output controls the total power and exceeds the total power limit value; Unit: kW; Set to 0, no power limit function	0.0～999.9	0.0
64	AL1P	AL1P	AL1 alarm output terminal configuration, used to program the mapping relationship between AL1 and C2 output terminals	0～8	
65	AL2P	AL2P	AL2 alarm output terminal configuration, used to program the mapping relationship between AL2 and C2 output terminals	0～8	
66	dn	DN	Display the number of channels, indicating the number of measurement channels actually used by the instrument	1～8	8
67	dnS	DNS	Display the starting channel number, which is used to indicate number of channel 1 in multi-machine application. For example: when DNS=3, CH3～CH10 represent 1～8 channels respectively	1～8	1
68	dnt	DNT	Channel cycle display time, 0 means cancel automatic cycle display	0～99	4
69	VEr	VER	Software version.	——	——

(1) Alarm parameters and output logic diagram:

Symbol description: "☆" means HY, "▲" means alarm value, "△" means SV value

Alarm code	Alarm mode	Alarm output (AL1 & AL2 are independent from each) Image:the hatched section means the alarm action
1	High limit absolute value alarm	
2	Low limit absolute value alarm	
3	※High limit deviation value alarm	
4	※Low limit deviation value alarm	
5	※High/low limit deviation value alarm	
6	※High/low limit interval value alarm	
7	High and low limit absolute value interval alarm	
8	※High and low limit deviation value interval alarm	
9	※High limit absolute value and low limit deviation value interval alarm	
10	※High limit deviation value and low limit absolute value interval alarm	
11	High/low limit absolute value alarm	
12	High/low limit deviation value alarm	
14	Controller line break alarm (LBA)	 When the PV value is not within the range of [SV-LBD, SV+LBD]; When MV=100 and PV rise ＜ LBF within the LBA time, alarm ① When MV=0 and PV drop ＜ LBF within the LBA time, alarm ②

(2) Alarm extension function table

AE1/AE2 value	Display over-limit alarm processing method	Power on, alarm inhibition or not
0	Alarm status remains the same	Power on, no alarm inhibition (As long as the alarm condition is met, alarm output immediately.)
1	Forced alarm output	
2	Forced alarm close	
3	Alarm status remains the same	Power on, alarm inhibition (After power on and before the PV value reaches the SV for the first time, the alarm will not output. After that alarm work normally)
4	Forced alarm output	
5	Forced alarm close	

X. Key function operation

1. Monitoring mode operation(RUN/STOP)
   1) SSM is set in open operation; Otherwise, the settings only be modified during communication.
   2) Under the measure mode, long press "㊈" key to enter the STOP mode, SV window will display "STOP", main control output will stop or keep the minimum output.
   3) Under STOP mode, long press "㊈" key to exit STOP mode, press "《" key to modify SV value.
   4) Under STOP mode, alarm output and transimition output work normally.

2. PID auto-tune operation:
   1) Before auto-tune procedure, please switch off the control output load power, or set the meter as STOP mode.
   2) Before auto-tune procedure, PV value should meet below condition: PV must be much smaller than SV during PID heating control; PV must be much larger than SV during PID cooling control.
   3) Before auto-tune procedure, please set a proper alarm value or eliminate the alarm influence, in order to prevent the auto-tune procedure from being affected by alarm output.
   4) Set PID type and SV value; the factory default setting is fuzzy PID.
   5) Set as PID control, if there is OLL & OLH output limit, please set the output to a proper range; factory default setting is OLL=0%, OLH=100%.
   6) Exit STOP mode, or switch on the load Power, immediately long press "《" key to enter auto-tune mode, then the AT indicator light is on.
   7) The auto-tune procedure will take some time, in order not to affect auto-tune result,please don`t modify the parameters or power-off.
   8) When AT light goes out, it automatically exits auto-tune mode, PID parameters will be updated automatically, and then the meter will control automatically and exactly.
   9) During the auto-tune procedure, below actions will cause the termination of the precess, long press "《" key, measure beyond the scope, abnormal display, switch to STOP mode, power-off, etc.
   10) Note: In the occasions with output limiting operation, sometimes, even if the auto-tune is carried out, the best PID parameters still cannot be obtained.
   11) Experienced users can set a proper PID parameter according to their experience.
3. Single channel power limit:
   1) OLL and OLH are used to limit the minimum to maximum range of single channel output control quantity, which is 0 ~ 100% by default.
   2) The OLL setting value must be smaller than the OLH setting value.
   3) Too small OLH setting will affect the control efficiency and speed, and may cause the failure of reach the target value.
   4) Single channel power limit can't realize the total power limit function.
4. Total power limit function:
   1) When each channel's actual power LPH setting value is larger than 0, then this channel participates in the total power limit SLPL and power well-distribution function.
   2) If the total power limit setting value SLPL is too small, it will affect each limited channel's control response speed,and even fail to reach the target value. Therefore, it should be set appropriately according to the actual situation.
   3) After setting the LPH and SLPL values, the controller will automatically stagger and evenly distribute the load power to avoid the power grid impact from each channel full power output at the same time.
   4) The auto-tuning channel will temporarily exit the total power limit and automatically recover after the auto-tuning is completed.
5. Soft start function operation
   1) Set the menu OLHE, in PID heating mode, soft start takes effect when PV<OLHE; in PID cooling mode, soft start takes effect when PV>OLHE.
   2) Set the soft start time SFST. When the soft start is turned on, the output will increase to the maximum power after SFST.
6. PID heating and cooling operation
   1) Set the control mode OT to 3.
   2) PID heating control acts on C1, and PID cooling control acts on C2.
   3) Change the cooling control cycle CP1 to an appropriate value, and configure appropriate P1, I1, D1 parameters
7. Alarm output channel configuration
   1) Each channel AL1 alarm output terminal can be programmed through the AL1P menu, and AL2 through the AL2P menu.
   2) AL1P/AL2P options 1~8 correspond to the wiring diagram terminals C2 CH1~CH8 in turn.
   3) When multiple alarms use the same C2 terminal, any alarm is triggered, then the corresponding terminal output.

XI.Checking methods of simple fault

Display	Checking methods
LLLL/HHHH	Checks whether the input disconnection and whether normal of FH/ FL value, working environment temperature and whether input signal is selected correctly.
No display when power on	Check whether the voltage is normal; Check whether the contact is bad; internal protection for excessive harmonics in the power grid;
No Output	Check whether the wiring connection is normal; Check whether the contact is bad; ACT/OT menu setting wrong;
No Communication	Check hardware connection, instrument settings and software reading settings; hexadecimal conversion error; Address error; data error

XII. Communication procotol

Meter adopts RS485 Modbus RTU communication protocol, Read function code 0x03 of the holding register in zone 04, write function code 0x10/0x06. Adopt 16 digit CRC check, the meter does not return for error check. The data type is a 16 bit signed or unsigned integer.

Data frame format:

Start bit	Data bit	Stop bit	Check bit
1	8	1	None/odd parity/even parity

1. Read register

For example:Host reads integer PV1(set value 200)

The address code of PV1 is 0x2000 ("0x" represents for hexadecimal), because SV data type is a 16-bit integer (2 bytes),seizes 1 data register. The memory code of decimal integer 200 convert to hexadecimal code is 0x00C8.Note:when reading data, should confirm DP menu value first to ensure the decimal point postion, after that transform the read data to get the actual value.

Read multi-register	Meter ADD	Function code	Start ADD High bit	Start ADD Low bit	Data byte Length high bit	Data byte Length low bit	CRC Code	CRC Code
Host request	0x01	0x03	0x20	0x00	0x00	0x01	0x8F	0xCA
Slave normal answer	0x01	0x03	0x02 bits		0x00	0xC8	0xB9	0xD2
Slave abnormal answer	0x01	0x83	0x02 error code For example:Host request address is 0x2011				0xC0	0xF1

2. Write multi-register

For example:Host use 0x10 function code write SV1 value (SV=150)

ADD code of SV1 is 0x2110,because SV1 data type is a 16-bit integer (2 bytes),seizes 1 data register. The decimal integer 150 convert to hexadecimal code is 0x0096. Before writing the data, you should convert the data to the corresponding magnification and then writing the data into the instrument.

Host request (write multi-register)										
Meter ADD	Function code	Start ADD High bit	Start ADD Low bit	Data byte Length high bit	Data byte Length low bit	Data byte Length	Data high bit	Data low bit	CRC code	CRC code
0x01	0x10	0x21	0x10	0x00	0x01	0x02	0x00	0x96	0x15	0xAC

Slave normal answer (write multi-register)							
Meter ADD	Function code	Start ADD High bit	Start ADD Low bit	Data byte length high bit	Data byte length low bit	※CRC code low bit	※CRC code high bit
0x01	0x10	0x21	0x10	0x00	0x01	0x0A	0x30

Host write SV with 0x06 function (set value 150)

Read single register	Meter ADD	Function code	Start ADD High bit	Start ADD Low bit	Data byte Length high bit	Data byte Length low bit	CRC Code	CRC Code
Host request	0x01	0x06	0x21	0x10	0x00	0x96	0x02	0x5d
Slave normal answer	0x01	0x06	0x21	0x10	0x00	0x96	0x02	0x5d
Slave abnormal answer	0x01	0x86 Function code		0x02 Error Code			0xC3	0xA1

Handling of abnormal communication:
When abnormal response，put 1 on the highest bit of function code. For example: Host request function code 0x03,and slave response function code should be 0x83.
Error code:
0x01---Illegal function: the function code sent from host is not supported by meter.
0x02---Illegal address:the register address designated by host beyond the address range of meter.
0x03---Illegal data: Date value sent from host exceeds the corresponding data range of meter.

Meter parameters address table

No.	Add(Register No①)	Parameter name	Parameter Decription	Register	R/W	Remark
1	0x2000~0x2007(48193~48200)	PV1~PV8	Measure value	1	R	
2	0x2010~0x2017(48209~48216)	STA1~STA8	Status value	1	R	②
3	0x2020~0x2027(48225~48232)	SR-M1~SR-M8	Slope display value	1	R	
Reserve						
4	0x2100~0x2107(48449~48456)	MV1~MV8	PID Output value	1	R/W	
5	0x2110~0x2117(48465~48472)	SV1~SV8	Setting Value	1	R/W	
6	0x2120~0x2127(48481~48488)	RSA1~RSA8	Power switch	1	R/W	⑤0:RUN 1:STOP 2:ATON 3:ATSTOP
7	0x2130~0x2137(48497~48504)	SSM1~SSM8	Panel R/S switch	1	R/W	
8	0x2140~0x2147(48513~48520)	SLL1~SLL16	Set value low limit	1	R/W	
9	0x2150~0x2157(48529~48536)	SLH1~SLH8	Set value high limit	1	R/W	
10	0x2160~0x2167(48545~48552)	H_MV1~H_MV8	Heating control output	1	R	
11	0x2170~0x2177(48561~48568)	C_MV1~C_MV8	Cooling control output	1	R	
12	0x2180~0x2187(48577~48584)	RS1~RS8	Run switch	1	R/W	⑤ 0:OFF 1:ON
13	0x2190~0x2197(48593~48600)	AT1~AT8	Auto-ture switch	1	R/W	
Reserve						
14	0x2200~0x2207(48705~48712)	INP1~INP8	Input Type	1	R/W	
15	0x2210~0x2217(48721~48728)	FL1~FL8	Display High limit	1	R/W	
16	0x2220~0x2227(48737~48744)	FH1~FH8	Display low limit	1	R/W	
17	0x2230~0x2237(48753~48760)	DP1~DP8	Decimal point	1	R/W	
18	0x2240~0x2247(48769~48776)	OTC1~OTC8	Accumulated output time	1	R	
Reserve						
19	0x2300~0x2307(48961~48968)	PS1~PS8	Display correct value	1	R/W	
20	0x2310~0x2317(48977~48984)	FT1~FT8	Filter constants	1	R/W	
21	0x2320~0x2327(48993~49000)	DTR1~DTR8	Dispaly tracking value	1	R/W	
22	0x2330~0x2337(49009~49016)	BRL1~BRL8	Analog output low limit	1	R/W	
23	0x2340~0x2347(49025~49032)	BRH1~BRH8	Analog output high limit	1	R/W	
24	0x2350~0x2357(49041~49048)	BRM1~BRM8	Transmission mode	1	R/W	
Reserve						
25	0x2400~0x2407(49217~49224)	OLL1~OLL8	Output low limit	1	R/W	
26	0x2410~0x2417(49233~49240)	OLH1~OLH8	Output high limit	1	R/W	
27	0x2420~0x2427(49249~49256)	UNIT1~UNIT8	Unit display	1	R/W	
28	0x2430~0x2437(49265~49272)	PRS1~PRS8	Setting parameter reserve position	1	R/W	
29	0x2440~0x2447(49281~49288)	RSS1~RSS8	RUN/STOP Reserve Position	1	R/W	
30	0x2450~0x2457(49297~49304)	OLL11~OLL18	OUT2 cooling output lower limit	1	R/W	
31	0x2460~0x2467(49313~49320)	OLH11~OLH18	OUT2 cooling Output lower limit	1	R/W	
32	0x2470~0x2477(49329~49336)	OLHE1~OLHE8	OLH effective range	1	R/W	
33	0x2480~0x2487(49345~49352)	SFST1~SFST8	Soft start time	1	R/W	
34	0x2490~0x2497(49361~49368)	ST1~ST8	Power-on operation mode	1	R/W	
Reserve						
35	0x2500(49473)	DN	Display the number of channels	1	R/W	
36	0x2501(49474)	DNS	Display the starting channel number	1	R/W	
37	0x2502(49475)	DNT	Channel cycle display time	1	R/W	
Reserve						
38	0x2600~0x2607(49729~49736)	AL11~AL18	Alarm value	1	R/W	
39	0x2610~0x2617(49745~49752)	AD11~AD18	Alarm type	1	R/W	
40	0x2620~0x2627(49761~49768)	HY11~HY18	Alarm hysteresis	1	R/W	
41	0x2630～0x2637(49777～49784)	AE11~AE18	Alarm extended mode	1	R/W	
42	0x2640～0x2647(49793～49800)	AL1P1~AL1P8	AL1 output terminal configuration	1	R/W	
Reserve						
43	0x2700~0x2707(49985~49992)	AL21 ~ AL28	Alarm value	1	R/W	
44	0x2710~0x2717(410001~410008)	AD21 ~ AD28	Alarm type	1	R/W	
45	0x2720~0x2727(410017~410024)	HY21 ~ HY28	Alarm hysteresis	1	R/W	
46	0x2730~0x2737(410033~410040)	AE21 ~ AE28	Alarm extended mode	1	R/W	
47	0x2740~0x2747(410049~410056)	AL2P1~AL2P8	AL2 output terminal configuration	1	R/W	
48	0x2750~0x2757(410065~410072)	LBA1~LBA8	Disconnection alarm time	1	R/W	
49	0x2760~0x2767(410081~410088)	LBD1~LBD8	Disconnection alarm non-sensitive temperature zone	1	R/W	
50	0x2770~0x2777(410097~410104)	LBF1~LBF8	Disconnection alarm judgment range	1	R/W	
Reserve						
51	0x2800~0x2807(410241~410248)	OT1~OT8	Control type	1	R/W	
52	0x2810~0x2817(410257~410264)	P1~P8	Proportional coefficient	1	R/W	
53	0x2820~0x2827(410273~410280)	I1~I8	Integral time	1	R/W	
54	0x2830~0x2837(410289~410296)	D1~D8	Differential time	1	R/W	
55	0x2840~0x2847(410305~410312)	OVS1~OVS8	Overshoot limit	1	R/W	
56	0x2850~0x2857(410321~410328)	P11~P18	OUT2 cooling proportional band	1	R/W	

Continued

No.	Add(Register No①)	Parameter name	Parameter Decription	Register	R/W	Remark
57	0x2860~0x2867(410337~410344)	I11~I18	OUT2 cooling integral time	1	R/W	
58	0x2870~0x2877(410353~410360)	D11~D18	OUT2 cooling differential time	1	R/W	
59	0x2880~0x2887(410369~410376)	SPC1~SPC8	Industry PID call	1	R/W	
Reserve						
60	0x2900~0x2907(410497~410504)	CP1~CP8	Control cycle	1	R/W	
61	0x2910~0x2917(410513~410520)	DB1~DB8	Heat & Cool control dead zone	1	R/W	
62	0x2920~0x2927(410529~410536)	AM1~AM8	Auto-Manual switch	1	R/W	
63	0x2930~0x2937(410545~410552)	CP11~CP18	Cooling control cycle	1	R/W	
64	0x2940~0x2947(410561~410568)	PC1~PC8	Cooling Proportional coefficient	1	R/W	
65	0x2950~0x2957(410577~410584)	ATE1~ATE8	Auto-ture extended function	1	R/W	
66	0x2960~0x2967(410593~410600)	SPRT1~SPRT8	Slope control setpoint	1	R/W	
Reserve						
67	0x2A00~0x2A07(410753~410760)	ACT1~ACT8	Output type	1	R/W	
68	0x2A10~0x2A17(410769~410776)	PT1~PT8	Cooling relay time	1	R/W	
69	0x2A20~0x2A27(410785~410792)	PDC1~PDC8	PID Type	1	R/W	
70	0x2A30~0x2A37(410801~410808)	LPH1~LPH8	Actual load power(KW)	1	R/W	
71	0x2A40(410817)	SLPL	Total load power limit(KW)	1	R/W	
Reserve						
72	0x2F00~0x2F02(412033~412035)	ADD1~ADD3	Communication address	1	R/W	③
73	0x2F03~0x2F05(412036~412038)	BAD1~BAD3	Communication baud rate	1	R	
74	0x2F06~0x2F08(412039~412041)	PRTY1~PRTY3	Parity Check	1	R	
75	0x2F09~0x2F0B(412042~412044)	DATC1~DATC3	Data transmission sequence	1	R	④
76	0x2F0C(412045)	LCK	Lock key	1	R	
77	0x2F0D(412046)	NAME	Meter name	1	R	

R：Read only；R/W：Read & write

Note①: The register number is the address converted to decimal plus 1 and then the register identification code 4 is added in front; for example: the register number of the data address 0x2000 is 8192 + 1 = 8193 and then 4 is added in front, that is, the register number 48193; Related applications can be seen, such as Siemens S7-200 PLC.
Note ②: Measurement status indication. When the data bit is 1, it means execution, and when it is 0, it means no execution.

D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
—	AT	HHHH	LLLL	℃	F	AL2	AL1	OUT2	OUT1

Note ③: This product can set three communication addresses at most, and achieve three communication functions.
The first ADD is used to set the external RS485 communication interface address.
The standard RS485 communication interface is valid.
The second ADD is used to set the device address for applying MODBUS-RTU communication mode in TCP communication. Effective if equipped.
The third ADD is used to set the extended RS485 communication interface address.
This function is mainly used for products with extended output modules, which are usually used for inter module communication. Effective if equipped.

Note④: DTC communication data transmission sequence description

DTC: □ □ □ □ —
- Reserve
- Byte transfer order: when it is 0, 1, 2, and when it is 1, 2, 1
- Reserve
- The second communication is valid, all others are reserved, default: 0, 1: Reset TCP communication interface

Note ⑤: Precautions for working switch RSA, running switch RS, and auto-tuning switch AT
1) "Working switch RSA" cannot be repeatedly written with "AT(2)", and "Auto-tuning switch “AT" cannot be repeatedly written with "ON(1)", otherwise it will cause auto-tuning to be started again after auto-tuning is completed;
2) In the auto-tuning state, the "working switch RSA" is continuously "AT(2)", and automatically jumps to "RUN(0)" after the auto-tuning is completed. If "RUN(0)" or "STOP(1)" is written during the auto-tuning process, the auto-tuning will be stopped.
However, writing "ON(1)" to the "running switch RS" will not affect the execution of the auto-tuning.
3) Conventional usage is as follows:
① Working switch RSA: only write once when the state needs to be switched, and read the register for verification after writing;
② Running switch RS + self-tuning switch AT: continuously write the state in "Running switch RS"; when self-tuning needs to be turned on, "Running switch RS" needs to be in the "On (1)" state, write "On (1)" once in "Self-tuning switch AT", and the register can be read for verification.

※16-bit CRC check code to get C program

```
unsigned int Get_CRC(uchar *pBuf, uchar num)
{
    unsigned i,j;
        unsigned int wCrc = 0xFFFF;
        for(i=0; i<num; i++)
        {
                wCrc ^= (unsigned int)(pBuf[i]);
                for(j=0; j<8; j++)
                {
                        if(wCrc & 1){wCrc >>= 1; wCrc ^= 0xA001; }
                        else
                                wCrc >>= 1;
                }
        }
    return wCrc;
}
```

XIII. TCP Communication Instruction

Please contact our company to obtain the configuration tool VirCom6.29_ne for communication interface configuration. This product uses TCP interface for communication in Modbus RTU mode.

XIV.Version and Revision History

Date	Version	Revision content
2025.01.16	A/0 Version	1st save

If used in a way not specified in this manual, the protective function may be damaged.
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