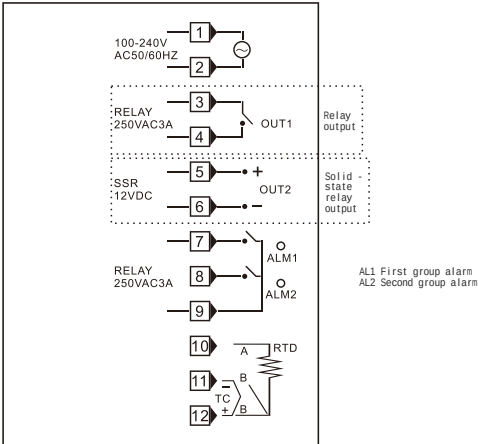
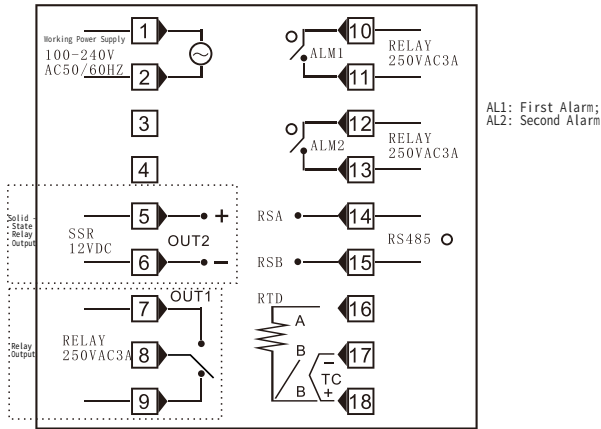


Terminal configuration of the HR401 series
(For actual wiring, please refer to the diagram attached to the instrument housing.)



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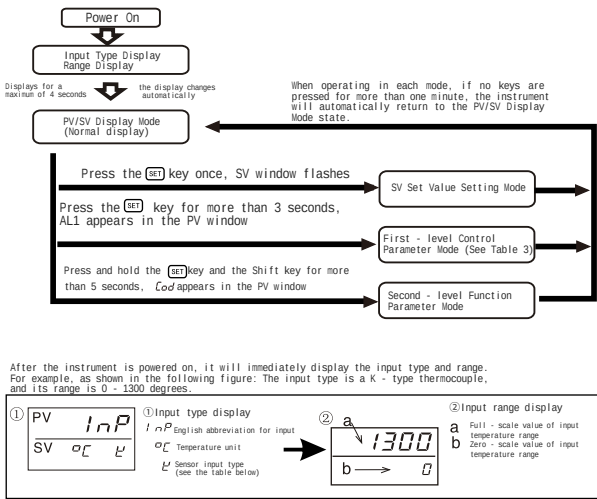
Terminal configuration for the HR701 series (For actual wiring, please refer to the diagram attached to the instrument housing.).



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VII. Instrument Operation Process

1.Call - out Sequence of Each Mode:



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Table 2: Input Sensor Types

Display Symbol	K	J	E	N	Pt
Input Type	Thermocouple (TC)				Resistance Temperature Detector (RTD)
	K	J	E	N	Pt100

Table 3: Description of Control Parameters in the First - Level Menu

Symbol	Name	Description	Setting Range	Default Value
RL1	First Alarm Setting	Set different alarm values based on the alarm mode.	Full scale	10
AL1	First Alarm Setting	Set different alarm values based on the alarm mode.	Full scale	20
RL2	Second Alarm Setting	Set different alarm values based on the alarm mode.	Full scale	20
ATU	Auto - Tuning	The instrument automatically calculates PID control parameters.	0000: Disable auto - tuning 0001: Enable auto - tuning	0000
P	Proportional Band	Set the proportional band for temperature control. If "P" is set to "0000", it switches to ON/OFF control (typically set to "0030").	0 ~ Full scale; ON/OFF control when set to 0000	30
I	Integral Time (S)	Integral time constant. Increase I if temperature fluctuates regularly; decrease I if temperature stabilizes slowly. Values between 60 ~ 240 seconds suit most systems.	0 ~ 3600 seconds	240
d	Derivative Time (S)	Derivative time constant. Increasing D reduces overshoot but weakens anti - interference. D is generally 1/4 of I.	0 ~ 3600 seconds	60
Ar	Integral Action Range	Limit the effective range of integral action.	Automatically set after auto - tuning	5
r	Cycle Time (S)	1. Relay output: T = 20 seconds. 2. External solid - state relay: T = 2 seconds; SCR output: T = 1 second.	0 ~ 100 seconds	20

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Symbol	Name	Description	Setting Range	Name
SC	Sensor Error Correction Value	Used to correct measurement errors caused by thermocouples and compensation wires	Full range	10
LCK	Data Lock	(1) When LCK=1000 , all data can be modified. (2) When LCK=0001 , except for "SV", "AL1", and "AL2", other parameters can be modified. (3) When LCK=0011 , except for "SV", other parameters can be modified. (4) When LCK=0111 , all data cannot be modified.	0000 ~ 1111	0000
oH	Auto - tuning	The instrument automatically calculates PID control parameters	0000: Turn off auto - tuning 0001: Turn on auto - tuning	0000

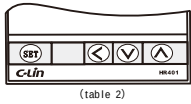
① After the instrument is powered on and displays normally, press and hold the "SET" key for 3 seconds to enter the first - level control parameter menu. (See Table 3)
② For the data lock (LCK) in the first - level menu, only when it is set to "1000" can you enter the second - level control parameter menu.

Table 4 Instrument Input Type Setting

Input Type	Power - on Symbol	SL1 Setting
K -50~1350 $^{\circ}\text{C}$	$^{\circ}\text{C}$ K	0 - K
J -50~1200 $^{\circ}\text{C}$	$^{\circ}\text{C}$ J	1 - J
E -50~850 $^{\circ}\text{C}$	$^{\circ}\text{C}$ E	2 - E
N -50~1300 $^{\circ}\text{C}$	$^{\circ}\text{C}$ N	3 - N
Pt100-200~650 $^{\circ}\text{C}$	$^{\circ}\text{C}$ Pt	4 - Pt

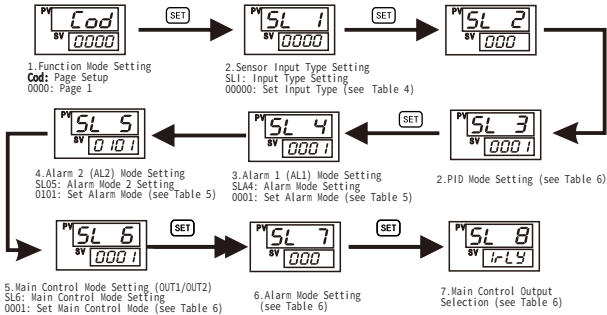
3.Second - level Function Parameter Menu: (Instrument data lock: LCK). It can only be accessed when set to "1000". For example: Sensor input type, main control output type (heating or cooling), alarm modes (6 types), temperature range, etc. In the normal PV/SV display mode, press and hold the "SET" key and the "<" key simultaneously (see Figure 2) to enter the function parameter setting mode. The PV window displays (corresponding content), and the SV window displays 0000. After entering this mode, each press of the "SET" key will cyclically display the following code symbols in sequence.

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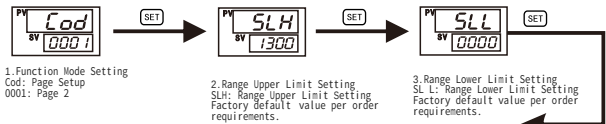


(table 2)

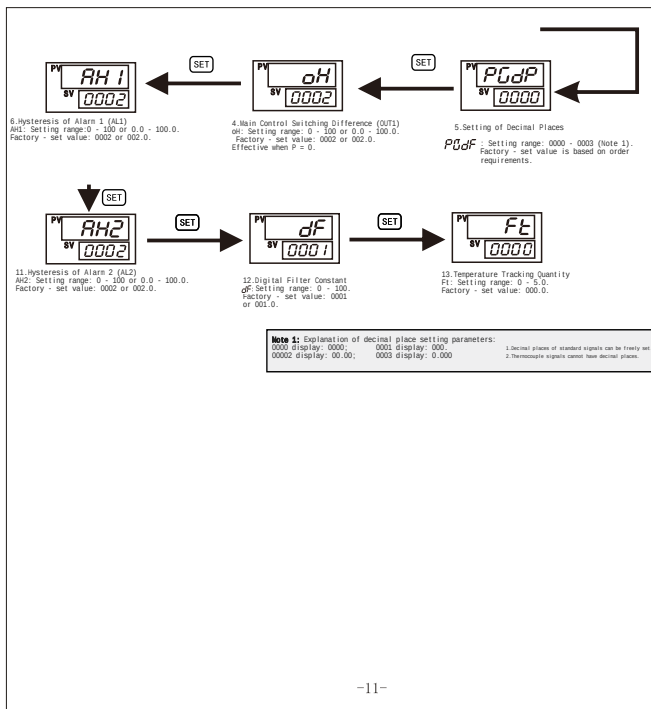
Flow 1:



Flow 2:



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Table 5: Alarm Modes (ALM1/ALM2) ▲ Set Value (SV) △ Alarm Point

Alarm Type (ALM1/ALM2)	S.14/S.15 Setting	Alarm Description (Taking AL1 as an Example; AL2 Follows the Same Logic)
No First/Second Channel AlarmFunction Set	0000	No AL1 alarm.
Upper Deviation Alarm	0001	LOW (Low Temperature) HIGH (High Temperature)
Lower Deviation Alarm	0101	LOW (Low Temperature) HIGH (High Temperature)
Out-of-Range Alarm	0010	LOW (Low Temperature) HIGH (High Temperature)
In-Range Alarm	0110	LOW (Low Temperature) HIGH (High Temperature)
Upper Absolute Value Alarm	0011	LOW (Low Temperature) HIGH (High Temperature)
Lower Absolute Value Alarm	0111	LOW (Low Temperature) HIGH (High Temperature)

Table 6: Process - Parameter Description

Display Symbol	Setting Value	Description	
SL 1	0 - K	K	0~1350℃
	1 - J	J	0~1200℃
	2 - E	E	0~850℃
	3 - N	N	0~1300℃
	4 - PT	PT100	-200~850℃

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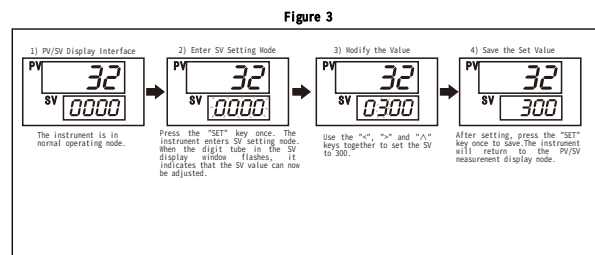
SL 2	1 - °C	Celsius	Temperature Unit Setting
	2 - °F	Fahrenheit	
SL 3	P Id F	Fast PID	PID Mode Setting
	P Id S	Slow PID	
SL 4		AL1 Alarm Mode Setting	See Table 5 for details
SL 5		AL2 Alarm Mode Setting	See Table 5 for details
SL 6	0 0 0 0	Positive Action Control (Cooling)	Main Control OUT1/OUT2 Positive/Reverse Action Selection
	0 0 0 1	Reverse Action Control (Heating)	
SL 7	0 0 0 0	Energized Alarm	Energized Alarm/Non - energized Alarm First Alarm Side (Fourth Digit Setting)
	0 0 0 1	Non - energized Alarm	
	0 0 0 0	Energized Alarm	Energized Alarm/Non - energized Alarm Second Alarm Side (Third Digit Setting)
	0 0 1 0	Non - energized Alarm	
SL 8	1 - L Y	Select OUT1 Relay Output	Main Control Output Selection
	2 - S S r	Select OUT2 SSR Output	

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4. Parameter Setting Operations

- After modifying a parameter value during operation, press the "SET" key once to save the changes.
- In the control parameter setting menu, press and hold the "SET" key for 3 seconds to return to the PV/SV display mode.
- In the function parameter setting menu, press and hold the "SET" key for 3 seconds to return to the PV/SV display mode.
- During operation, if no key is pressed for more than 30 seconds, the current mode will automatically return to the PV/SV display mode, and unsaved modified data will be discarded.

- Changing the Set Value (SV)
Example: Set the set value (SV) to 300.℃.



6. Changing Control Parameters

In the normal PV/SV display mode, press and hold the "SET" key for 3 seconds without releasing it to enter the control parameter setting mode. Its operation is similar to steps 2) and 3) in "Changing the Main Control Value (SV)" as illustrated in Figure 3. After finishing a setting, press the "SET" key once to save the change and proceed to the next parameter symbol. Once all parameter settings are completed, press and hold the "SET" key for 3 seconds without releasing it to return to the PV/SV display mode. (If no key operations are performed for more than 30 seconds, the instrument will automatically return to the PV/SV display mode.)

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7. Changing Function Parameters

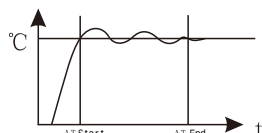
In the normal PV/SV display mode and when the data lock function LCK = 1000, press and hold the "SET" key and the "<<" key for 4 seconds without releasing to enter the function parameter setting mode. The operation is the same as steps "2) and 3)" in the "Change Main Control Value (SV)" procedure shown in Figure 3. After setting, press the "SET" key once to save the setting and enter the next parameter symbol. After all parameters are set, press and hold the "SET" key and the "<<" key for 4 seconds without releasing, and the instrument will return to the PV/SV display mode.

VIII.Explanation of Relevant Parameters and Functions

1. Auto - tuning Function (ATU)

The ATU function is used to automatically measure, calculate, and set the optimal PID constants. 1) Enabling the ATU auto - tuning function (auto - tuning): In the normal PV/SV display mode, press and hold the "SET" key for 3 seconds without releasing. The instrument will enter the first - level control parameter setting mode. Cycle through options using the "SET" key, find the function symbol "ATU", set its value to 0001, then press the "SET" key to confirm; the instrument will return to the PV/SV display mode, and the auto - tuning function will start. **You can also long - press the shift key in the measurement state to directly start auto - tuning, and the AT Indicator light on the instrument panel will turn on.**

2) Indication after starting the auto - tuning function: When the AT indicator light on the panel is on, the instrument will calculate the most suitable P, I, and D parameters based on the situation of the entire heating system. The time taken is related to the system working conditions, and the operator needs to wait patiently. After the instrument enters the auto - tuning working state, the output is controlled as on - off. The temperature value of the controlled object, after two oscillations, the (AT) light will turn off, and the instrument will calculate the ideal PID parameter values and save them automatically. The instrument will then start normal operation according to the auto - tuning results, and the auto - tuning setting parameter (ATU) will automatically return to "0000". If auto - tuning is needed next time, the "ATU" parameter value must be set to "0001" again to restart auto - tuning. During the whole process, if you need to exit auto - tuning midway, find "ATU" in the control mode, set its value back to "0000", press the "SET" key to confirm, the (AT) light will turn off, and auto - tuning will exit. After auto - tuning ends and the optimal PID parameters are set, even if the power is cut off, the set PID parameters will still be saved. Therefore, there is no need to perform auto - tuning again during subsequent operation.



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2.Changing the Input Type and Temperature Range of the Meter Sensor

When the input type is changed, the corresponding range of the meter also needs to be adjusted. Refer to the following example for specific steps.
Example: When modifying a Type K (0~400℃) meter to a Pt100 type (-50.0℃~400.0℃), follow these steps:

(1) Step 1: Modify the input type:

Enter the second - level function parameter setting mode. When CDD = 0000, select the first page and reset the SL1 value to "8 - Pt1". Press the "SET" key to confirm, and the input type will be changed to Pt100.

(2) Step 2: Modify the range:

Enter the second - level function parameter setting mode and select the second page. When COD = 0001, change the value of the decimal point setting "PGDP" to 0001 (one decimal place). Then, set the "SLH" value to "400.0" (upper range limit). Finally, change the "SLL" value to "-50.0" (lower range limit). Press the "SET" key to confirm the completion of the changes, and long - press the SET key to return to the normal display mode.

3.Setting the Differential Value for On - off Control (ON/OFF) Meters

In on - off control, an appropriate differential value must be set. If the differential value is too small, it will cause the AC contactor to operate frequently, reducing its service life. If the differential value is too large, the controlled value will fluctuate significantly. When the "P" value in the first - level control mode parameters is set to "0000", the symbol "OH" appearing in the menu represents the differential value. The magnitude of the differential value "OH" can be freely set according to user requirements. For example, if a user requires that the controlled object is energized to work when the temperature is below the lower limit (such as 80℃) and de - energized to stop working when the temperature is above the upper limit (such as 100℃), the main control relay contact (OUT1) of the on - off meter can be used to achieve this function. In this example, set SV to 100℃ and OV to 20℃ (100 - 80 = 20). Other different temperature requirements can also be calculated in the same way.

4. Correcting Errors Caused by Sensors

In practical applications, sensors may fail to be installed in the ideal measurement area due to various reasons, and the sensors themselves also have inherent errors. In such cases, the signal measured by the instrument cannot reflect the accurate temperature. This may lead to user misunderstandings in some situations and compromise the authenticity of measurements. Therefore, correcting the displayed value is sometimes necessary. Follow the instrument's setup procedure: In the first-level control mode parameters, when the "SC" character appears in the upper PV display window, modify the value in the lower SV display window. After finishing, press the "SET" key again to input the corrected value into the instrument. (Warning: The factory-set correction value is 00. Do not modify this value without standard testing.)

5. Data Lock Function

The data lock (LCK) function is designed to prevent misoperations on parameters that are not frequently adjusted. The instrument has 3 levels of lockout states. Parameters can be locked at each level; once locked, parameters cannot be set or changed but remain viewable.

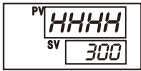
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6.Fault Diagnosis and Maintenance

(1) If you doubt the accuracy of the instrument, insert the sensor into a fully stirred ice - water mixture. The instrument should display around 0 °C. Insert the sensor into boiling water under standard atmospheric pressure; the instrument should display around 100 °C. If the error is large, it is generally caused by a mismatch between the sensor 's calibration number and the instrument.

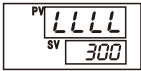
(2) If the displays of various functions on the instrument panel and the setting of parameters are normal, and the indicator lights act accordingly, but the instrument loses control, it is usually because the external load of the instrument is short - circuited, open - circuited, or miswired, causing damage to the internal components of the instrument. At this time, open the instrument. If it is contact output, check if the connection wires are charred. If it drives a silicon - controlled rectifier, check if the pulse transformer or photoelectric coupler has an open - circuit phenomenon. If there are the above situations, please send the instrument back to the manufacturer for repair.

(3) Display Fault 1:



If the measured value PV displays "HHHH" as shown in the above figure, it may be that the measured value (PV) exceeds the maximum measurement range of the instrument, or the thermocouple is broken, or there is an instrument fault.

(4) Display Fault 2:



If the measured value PV displays "LLLL" as shown in the above figure, it may be that the thermocouple signal wires are reversed, or the thermal resistor is short - circuited, or there is a fault in the temperature measurement probe, or there is an instrument fault.

IX.Ordering Information

It is necessary to specify the product model, working power supply, and order quantity.
For example: HR401 FK - V*AN, AC220V, 5 sets

Attachment:- 1 pair of mounting brackets,
1 copy of the instruction manual

Order Information and Matching Components

1) Order Information Includes:
Product name, model, and extended function type Rated working voltage: Default AC100 - 240V
Length of matching sensor connection line
Quantity, Delivery date, etc.
2) Components matched with the controller:
Controller mounting bracket
1 copy of the product instruction manual

产品合格证

符合标准: GB/T 13639

检 验 员: 检 01

出厂日期: 见产品或盒贴出厂编号

本产品经检验合格,准予出厂。

C-Lin

欣灵电气股份有限公司
XINLING ELECTRIC CO.,LTD