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使用说明书
Products Instructions

TDK0302

Intelligent Temperature and Humidity Controller

Thank you very much for choosing Xinling brand instruments. Please read the user manual before using the product.

09A002Q1

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I. Overview

The TDK0302 intelligent temperature and humidity controller enables real-time measurement of ambient temperature and humidity. It integrates multiple functions into one, making it suitable for use in various scenarios.

It adopts high-performance, high-precision, long-life, and highly reliable analog temperature and humidity sensors with a wide measurement range, allowing stable and reliable long-term operation in various environments. The sensor transmits temperature and humidity signals via 4 wires.

The controller can independently output temperature and humidity switch signals, and perform forward and reverse temperature and humidity regulation in four modes, offering flexible and free configuration.

An RS485 communication module (complying with the standard MODBUS protocol) can be added; alternatively, two analog transmission modules can be added for long-distance transmission of temperature and humidity signals.

II. General Technical Specifications

Operating Power Supply	AC100~240V
Product Power Consumption	≤2W
Resolution	0.1
Set Temperature	-19.9~99.9℃
Set Humidity	0~99.9%
Basic Error	Temperature (≤±0.5%FS), Humidity (≤±4.5%FS)
Display Device	LED (0.39 inches)
Control Output	AC220V 3A (resistive load)
Communication Interface	RS485 MODBUS-RTU communication protocol
Transmission Output	Two-channel transmission output for temperature and humidity
Operating Environment	0℃~50℃, 45~85%RH

III. Model Naming Rules

Product Model	Code		Description
T□K-0302	—□	—□	
TDK	External Dimensions: 72*72		
Sensor Type	TDK0302 Sensor (-19.9~59.9℃) TDK0302 Custom High-Temperature Sensor (-19.9~99.9℃)		
Temperature & Humidity Output	220V 3A Passive Contact Output (Note 1#)		
Communication Function	No	No communication function	
	C4	RS485 communication	
Analog Output (Note 2#)		B	Temperature analog output
			Humidity analog output

Notes:
1#: All instrument relays are equipped with normally open and normally closed contacts.
2#: The instrument is only provided with three current signal outputs (0～10mA, 0～20mA, 4～20mA) ex-factory. You can either customize it from the manufacturer or connect a 250-ohm resistor in parallel to obtain 0-5V or 1-5V.

IV. External and Installation Dimension Diagram

Installation Process

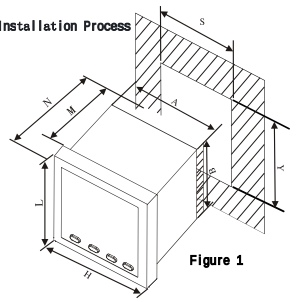


Figure 1

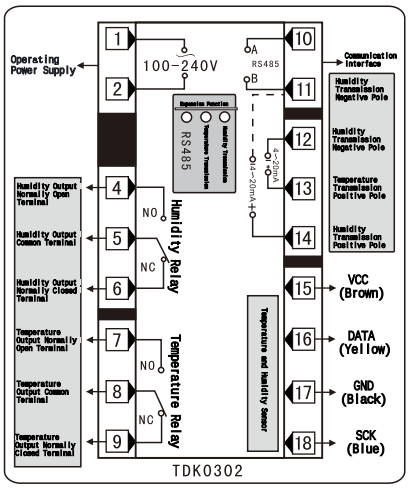
Installation Process

- Drill a rectangular hole on the panel according to the panel opening dimensions, which is used to install the instrument.
- When installing multiple instruments: the distance between two adjacent holes (left-right) should be more than 25mm; the distance between two adjacent holes (top-bottom) should be more than 30mm.
- Place the instrument into the opening on the panel.
- Insert the mounting bracket into the mounting slot of the instrument.
- Push the mounting bracket tightly to fasten the instrument firmly to the panel, then tighten the screws with a screwdriver — be sure not to over-tighten them.

Mounting Dimensions: A×B
Opening Dimensions: S×Y
Panel Dimensions: L×H (Unit: mm)

External Dimensions (L×H) Unit (mm)	Panel Mounting Fit Dimensions (A×B) Unit (mm)	Opening Dimensions (S×Y) Unit (mm)	Total Length (N) (mm)	Depth (M) (mm)
TDK(72×72)	67.5×67.5	68×68	78	71

Typical Terminal Block Function Configuration Description

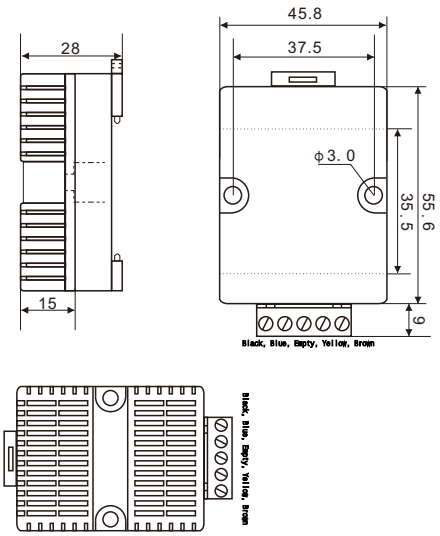


Wiring Terminal Function Configuration Instructions

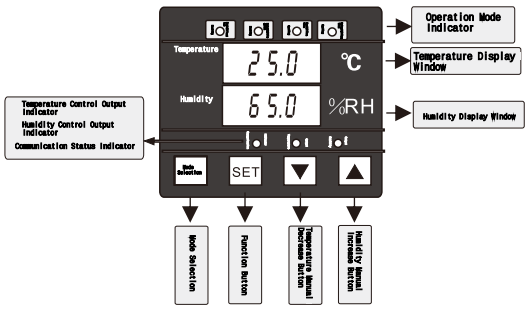
Function		Terminal Number	Description
Operating Power Supply		1, 2	AC 100～240V
Humidity Output		4, 5, 6	5 is the common terminal of the humidity relay output; 4 is the humidity normally open terminal; 6 is the humidity normally closed terminal
Temperature Output		7, 8, 9	8 is the common terminal of the temperature relay output; 7 is the temperature normally open terminal; 9 is the temperature normally closed terminal
Communication Interface		10, 11	10 is RSA; 11 is RSB
Temperature Transmission		12, 13	12 is Temperature Negative; 13 is Temperature Positive
Humidity Transmission		11, 14	11 is Humidity Negative; 14 is Humidity Positive
Temperature & Humidity Sensor	Brown	15	VCC Positive Power Supply
	Yellow	16	Humidity Signal Input
	Black	17	GND Negative Power Supply
	Blue	18	Temperature Signal Input

* Other external dimensions have the same terminal function markings, but the terminal numbers may vary.

Sensor Outline Diagram



V.Front Panel Structure Diagram



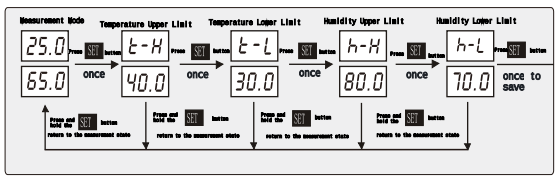
Button Name	Function Description
Mode Selection	After pressing 4 times continuously to unlock, each subsequent press switches the meter's operating mode among Heating & Humidification, Heating & Dehumidification, Cooling & Humidification, and Cooling & Dehumidification. Meanwhile, the corresponding mode indicator light will turn on.
SET	Press once to enter the first-layer control parameter menu, and set the four parameters (upper limit and lower limit) related to temperature and humidity control in sequence; Press and hold for more than 3 seconds to prompt for password input. Enter the correct password with the increase and decrease buttons to access the function parameter menu.
▼	In parameter modification mode: Decrease the digit; press and hold to decrease continuously. In measurement mode: Serve as the manual output switch for temperature.
▲	In parameter modification mode: Increase the digit; press and hold to increase continuously. In measurement mode: Serve as the manual output switch for humidity.

Menu Code Description

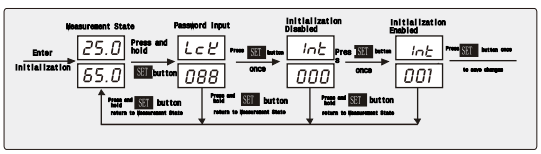
	Parameter Code	Parameter Meaning	Factory Setting
Control Parameters	t-H	Temperature Upper Limit Setting Value	40.0
	t-L	Temperature Lower Limit Setting Value	30.0
	h-H	Humidity Upper Limit Setting Value	80.0
	h-L	Humidity Lower Limit Setting Value	70.0
Function Parameters	oby	Transmission Type	002
	tbL	Temperature Transmission Lower End	00.0
	tbH	Temperature Transmission Upper End	99.9
	hbL	Humidity Transmission Lower End	00.0
	hbH	Humidity Transmission Upper End	99.9
	tSc	Temperature Correction Value	00. 0
	hSc	Humidity Correction Value	00. 0
	Add	Communication Address	001
	bAd	Communication Baud Rate	002
	Int	Initialization	000
	con	Check Bit	000

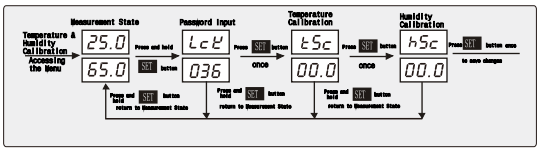
Menu Code Call Sequence

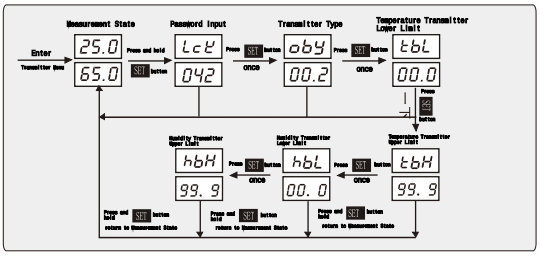
1. In the meter measurement mode, press the SET button to enter the control parameter setting mode. Adjust the control parameter values using the ▼ ▲ buttons.

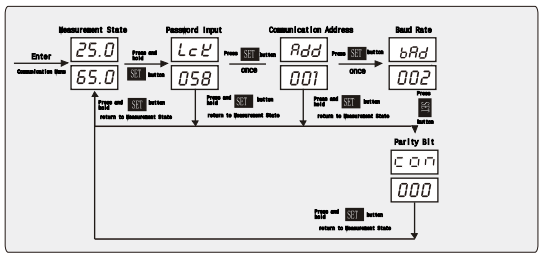


2. When the meter is in the measurement state, press and hold the SET button for more than 3 seconds to enter the function mode menu



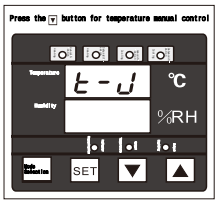






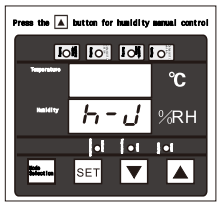
3. When the meter is in the Measurement State, press the ▼ ▲ buttons to perform manual temperature and humidity control

The temperature manual control interface is shown in the figure below:

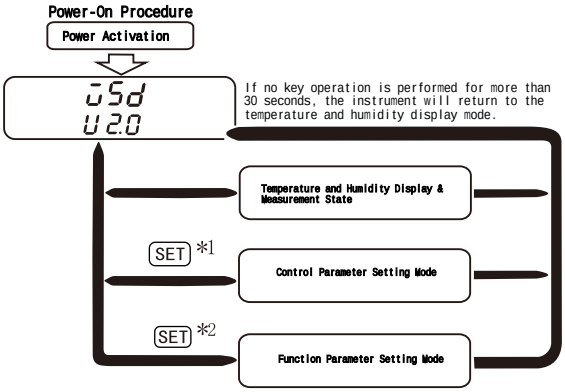


The humidity manual control interface is shown in the figure below

▲



VI.Instrument Operation Instructions



*1 Press the SET key once

*2 Press and hold the SET key for more than 3 seconds

After the instrument power is activated, it automatically enters the measurement state

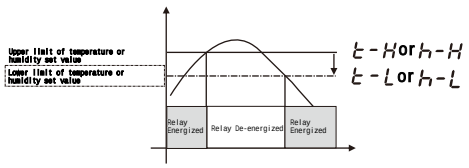
When the temperature output light is illuminated, it indicates that the normally open contact of the temperature control relay is closed. When the humidity output light is illuminated, it indicates that the normally open contact of the humidity control relay is closed.
When the communication light flashes, it indicates data transmission.

Function Parameter Modification Notes

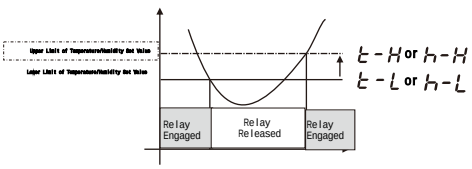
1.When correcting temperature and humidity measurement values, ahigh-grade temperature and humidity instrument must be used as the reference standard; otherwise, the measurement accuracy of the meter will be affected.

2.Since temperature and humidity are interrelated physical quantities, they are not controlled independently in any system. It is crucial for the user to understand the role of the temperature/humidity control targets in the entire system and determine the meter's working mode.

The figure below illustrates the relay output status under different modes:



Heating and Humidification Mode Output Schematic Diagram



Output Schematic of Cooling & Dehumidification Mode

Note: When setting the upper and lower limits of temperature and humidity, there is no need to distinguish between the values of and — the system will automatically recognize the higher value as the upper limit and the lower value as the lower limit.

3 Communication Baud Rate (bAd) Setting
- 0 indicates 2400
- 1 indicates 4800
- 2 indicates 9600

4 Transmitter Type (oby) Setting
- 0 indicates 0~10mA
- 1 indicates 0~20mA
- 2 indicates 4~20mA

5 Parity Bit (com) Setting
- 0 indicates No Parity
- 1 indicates Odd Parity
- 2 indicates Even Parity

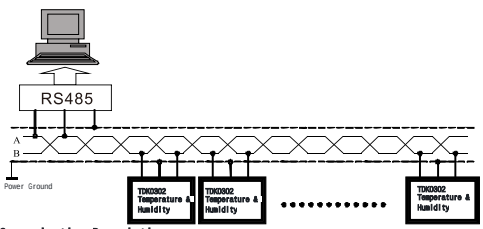
VII.Digital Communication

1 Overview

The TDK0302 temperature and humidity controller provides a serial asynchronous half-duplex RS485 communication interface. The device adopts the Modbus-RTU communication protocol, and all data information can be transmitted over the communication line. Up to 32 temperature and humidity instruments can be connected in parallel on a single line, with each instrument distinguished by a unique configurable address.

2 Requirements

2.1 Cable: Use a shielded twisted-pair cable with a characteristic impedance of 120±20% Ω and a cross-sectional area of 0.5 mm2 as the bus.
(Note: This impedance value does not specifically refer to the pure resistance of the line, but the line impedance at a specific frequency. Typically, the RS485 communication frequency ranges from 1.2K to several hundred K.)
2.2 Wiring Rules: The RS485 bus must use a daisy-chain (T-type) topology instead of a star topology. The length of the lead wire from the bus to each node should be as short as possible. (As shown in the figure below)
2.3 Impedance Matching: Another key consideration when building an RS485 network is the termination load resistor. Termination matching is generally achieved using termination resistors: RS-485 should have a 220-125Ω termination resistor connected at both the start and end of the bus cable.2.4 Anti-Interference: RS232/485 converters or hubs should preferably use products with lightning strike or surge protection devices, and their installation location should be as far away from strong interference sources as possible.



3 Communication Description

Communication Format: 1 start bit + 8 data bits + 1 stop bit (no parity bit)
Data Frame Structure: i.e., message format

Address Code	Function Code	Data Code	Check Code
1 byte	1 byte	N bytes	2 bytes

Address Code: Located at the start of the frame, it consists of 1 byte (8-bit binary code), with a decimal range of 0-255. In practice, only the range 1-247 is used, and the remaining values are reserved.
Function Code: Instructs the addressed terminal to execute a specific function.

Code	Meaning	Action
0x03	Read Data Register	
0x10	Write Data Register	Write binary values into the relevant registers

Data Code: Contains the data required for the terminal to perform a specific function, or the data collected by the terminal when responding to a query. The content of this data may include actual data, reference addresses, or set values. Data codes are transmitted and received based on words (2-byte units).
Check Code: Occupies 2 bytes and contains a 16-bit binary value. The check code is calculated by the transmitting device, then appended to the data frame. When receiving data, the receiving device recalculates a new check code and compares it with the received one — if the two values do not match, an error has occurred.
Process of generating CRC:

1.Set the 16-bit CRC register to 0xFFFF.

2.Perform an XOR operation between the first 8-bit data and the lower 8 bits of the CRC register, then store the result in the CRC register.

3.Shift the CRC register right by 1 bit, fill the highest bit with 0, shift out the lowest bit and check its value.

4.(If the lowest bit is 0): Repeat step 3 to shift right by 1 bit again. (If the lowest bit is 1): Perform an XOR operation between the CRC register and 0xA001.

5.Repeat steps 3 and 4 until 8 shifts are completed, finishing the processing of the 8-bit byte.

6.Repeat steps 2 to 5 to process the next 8-bit data, until all bytes are handled.

7.The final value of the CRC register is the CRC value.

8.When inserting the CRC value into the message, the upper 8 bits and lower 8 bits should be placed separately.

4 Communication Message Example:

4.1 Read Data (Function Code 0x03)

This function allows the user or terminal device to access recorded data. There is no limit to the number of data points the host requests to collect at one time, but it cannot exceed the defined address range. (See the Address Information Table in the appendix)
The following example reads 6 words (12 bytes) of data from the slave device with terminal address 1 (0x01).

Query Data Frame (Upper Computer)

Address	Command	Starting Register Address (High Byte)	Starting Register Address (Low Byte)	Number of Registers (High Byte)	Number of Registers (Low Byte)	CRC16 (Low Byte)	CRC16 (High Byte)
01H	03H	00H	01H	00H	03H	54H	0BH

Response Data Frame (Slave Device)

Address	Command	Data Length	Data 1-6	CRC16 (Low Byte)	CRC16 (High Byte)
01H	03H	06H	01H 90H 01H 2CH 03H 20H	21H	A4H

4.2 Write Data (Function Code 0x10)

This function allows the user to modify the contents of multiple registers.
It should be emphasized that the data to be written are modifiable parameters and cannot exceed the defined address range.(See the Address Information Table)It should be emphasized that the data to be written are modifiable parameters and cannot exceed the defined address range.(See the Address Information Table)

The following example writes a temperature set value of 50.0 to the terminal device (address 01H) at the target register address 01H.
Query Data Frame (Upper Computer)

Address	Command	Starting Register Address (High Byte)	Starting Register Address (Low Byte)	Number of Registers (High Byte)	Number of Registers (Low Byte)	Number of Bytes	Data to Write	CRC16 (Low Byte)	CRC16 (High Byte)
01H	10H	00H	01H	00H	01H	02H	01H F4H	A7H	96H

Response Data Frame (Slave Device), indicating that the data has been successfully written.

Address	Command	Starting Register Address (High Byte)	Starting Register Address (Low Byte)	Number of Registers (High Byte)	Number of Registers (Low Byte)	CRC16 (Low Byte)	CRC16 (High Byte)
01H	10H	00H	01H	00H	01H	50H	A9H

Communication Address Information Table

Address	Item	Description	Value Range	Unit	Read/Write	Factory Setting
Basic Setting Information						
01H	T-H	Temperature Upper Limit	-19.9～99.9	℃	Read/Write	40.0 Note1
02H	T-L	Temperature Lower Limit	-19.9～99.9	℃	Read/Write	30.0 Note1
03H	h-H	Humidity Upper Limit	0～99.9	%RH	Read/Write	80.0 Note1
04H	h-L	Humidity Lower Limit	0～99.9	%RH	Read/Write	70.0 Note1
05H	con	Parity Bit	0～2		Read	0 Note6
06H	TSc	Temperature Correction	-19.9～99.9	℃	Read/Write	00.0 Note1
07H	hSc	Humidity Correction	0～99.9	%RH	Read/Write	00.0 Note1
08H	ADD	Communication Address	1～247		Read/Write	1
09H	BAD	Communication Baud Rate	0～2		Read/Write	2 Note2

Communication Address Information Table

Address	Item	Description	Value Range	Unit	Read/Write	Factory Setting
Basic Setting Information						
0AH	OBY	Transmitter Type	0～2	mA	Read/Write	2 Note3
0BH	TBL	Temperature Transmitter Lower Limit	-9.9～99.9	℃	Read/Write	40.0 Note1
0CH	TBH	Humidity Transmitter Upper Limit	-9.9～99.9	℃	Read/Write	30.0 Note1
0DH	hBL	Temperature Transmitter Lower Limit	0～99.9	%RH	Read/Write	80.0 Note1
0EH	hBH	Humidity Transmitter Upper Limit	0～99.9	%RH	Read/Write	70.0 Note1
0FH		Temperature Measurement Value		℃	Read	Note4
010H		Humidity Measurement Value		%RH	Read	Note4

Note 1: Displayed number = data * 0.1
Note 2: Communication baud rate: 0 indicates 2400, 1 indicates 4800, 2 indicates 9600
Note 3: Transmitter type: 0 indicates 0~10mA, 1 indicates 0~20mA, 2 indicates 4~20mA
Note 4: Measurement data = data * 0.1
Note 6: Parity check: 0 indicates no parity, 1 indicates odd parity, 2 indicates even parity

VIII. Common Issue Analysis

1.Meter Not Powering On
Ensure that a suitable auxiliary power supply has been connected to the auxiliary power terminal of the meter. Auxiliary power supply voltage beyond the specified range may damage the meter, and the damage cannot be repaired.
You can use a multimeter to measure the voltage on the auxiliary power connector. If the power supply voltage is normal but the meter has no display, try powering it off and then on again. If the meter still fails to display normally, please contact our company's technical service department.

2.No Display or Inaccurate Display on the Meter
Check whether there is voltage or current across the terminal block, and whether the four-color wires of the temperature and humidity sensor are securely connected (ensure there is no color-matching error for the four wires).
If there is a large estimated error between the displayed value and the actual value, this step requires an experienced electrician to test the electrical performance of the sensor with a multimeter. If the external circuit is fully functional, please contact our company's technical service department.

3 Communication Issues
First, ensure that the communication settings of the meter (such as communication address and baud rate) are consistent with those of the upper computer.
If multiple meters on-site have no data return during communication, check whether the on-site communication bus connection is accurate and reliable, and whether the RS485 converter is functioning normally. If only a single or a few meters have abnormal communication, also check the corresponding communication lines. You can test by modifying the addresses of the abnormal and normal slave devices to rule out or confirm issues with the upper computer software; alternatively, test by swapping the installation positions of the abnormal and normal meters to rule out or confirm meter faults. Second, strictly follow the data storage format and address specified in this manual for communication.
Additionally, note that when the meter communicates with other products simultaneously, minimize the number of parallel-connected products to prevent crosstalk between products caused by differences in driving capability or communication format.

IX Environmental Protection and Other Legal Regulations

To protect the environment, when this product or its components are scrapped, please dispose of them properly as industrial waste; or hand them over to a recycling station for classified disassembly, recycling, and reuse in accordance with relevant national regulations.

Ordering Instructions and Accessory Components
1)Ordering Information Includes:
Product name, model, and extended function type
Rated operating voltage (default: AC100-240V)
Length of the matching sensor connecting wire
Quantity, delivery date, etc.
2)Accessories for the Temperature and Humidity Controller:
Temperature and humidity sensor (1 set; high-temperature sensors with a temperature measurement range of -19.9~99.9°C need to be customized)
Controller mounting bracket (1 piece)
Product manual (1 copy)
Matching wires for customized sensors
3)Peripheral Accessories for Use:
Heater (model: HHJRD2-2; power: 150W; rated voltage: AC220V)

产品合格证

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