



Dk5041 Universal Input Data Acquisition Module



Independent four-way data acquisition, transmission, 4AD, 1DA

Use instructions book

Catalog

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1. Module introduction

1.1 Functions and Characteristics

- 1.1.1 DK5041 remote data acquisition module is an intelligent module which integrates signal acquisition, transmission and DA output. It can measure four common industrial standard signals and adopt the international standard two-wire ModBus RTU communication mode. This module is widely used in various industrial measurement and control systems.
- 1.1.2 Digital intelligent data acquisition and transmission module with high-speed signal processor and microprocessor as the core adopts the latest international electronic technology.
- 1.1.3 can measure four channels of 24 common industrial standard signals, that is, one of them can be transmitted and output to the remote by four choices and one of them can be selected for the remote given DA by parameter setting.
- 1.1.4 is equipped with RS-485 communication interface with photoelectric isolation and adopts ModBus RTU communication protocol. The circuit design adopts three-terminal isolation of input, power supply and output.

1.2 Technical Indicators

1.2.1 Main Technical Indicators

Number of input channels: Independent 4 routes, different input types

Input signal range: 24 common industrial standard signals

A/D conversion resolution: 18BIT

A/D conversion time: 13 SPS

D/A conversion resolution: 16BIT

D/A conversion time: 10M SPS

Communication mode: RS485 interface, two-wire system

Drive distance: 1200 meters

Communication rate: 4800, 9600, 19200

Communication data format: one bit starting bit, eight bits of data bit, one stop bit

Communication Protocol: MODBUS RTU

Supply voltage: DC24V $\pm$ 10 %

Isolation voltage: 2000 V AC

1.2.2. Communication: ModBus RTU protocol, RS485 interface; Address: 1-255,

baud rate: 4800, 9600, 19200 bps, baud rate and address can be set by software or by keys.

1.2.3. Working Conditions: Temperature: -20 C~ +60 C, Humidity: 10%~90% RH

1.2.4. Storage conditions: temperature: - 40 ~80 C, humidity: 10%~90% RH

1.2.5. Shape size: 88mm * 72mm * 59mm

1.2.6 Installation with standard 35mm Guide

1.3 Type Selection Description

DK5041-IN1:X(Y-Y)-IN2:X(Y-Y)-IN3:X(Y-Y)-IN4:X(Y-Y)-OUT:X(Y-Y)-DA:X

Dk 5041: Product model.

IN1: X(Y-Y): IN1 represents the first input, X is the input signal type, and Y-Y in parentheses is the input signal range.

IN2: X(Y-Y): IN2 represents the second input, X is the input signal type, and Y-Y in parentheses is the input signal range.

IN3: X(Y-Y): IN3 represents the third input, X is the input signal type, and Y-Y in parentheses is the input signal range.

IN4: X(Y-Y): IN4 represents the fourth input, X is the input signal type, and Y-Y in parentheses is the input signal range.

OUT: X(Y-Y): X(1-5 selection, 1-4 for the variable channel value, 5 for the communication DA), (Y-Y) for the corresponding transmission range. When given for remote communication, the given 16-bit value(0-65535) for the default communication.

DA: X: DA represents DA variant output, X corresponding output signal type, such as: 4-20MA written 4 MA20,

For example: The customer needs to measure 1 K-type thermocouple, 1 20-MV pressure sensor signal 0-2000 Pa, 1 4-20MA signal 0-5000, 1 0-5V signal 0-8000, DA for communication given control 4-20MA.

The selection code is:

DK5041-IN1:K-IN2:0MV20(0-2000)-IN3:4MA20(0-5000)-IN4:0V5(0-8000)-OUT:5-DA:4MA20

1.4 Transmit Output Type Description

Selection code	type	Selection code	type
0V5	0-5V	0MA20	0-20mA
1V5	1-5V	4MA20	4-20mA
0V10	0-10V	0MA10	0-10mA

1.5 Input Signal Type Code Description

Serial number	Signal type	measuring range
0	K	-200~1370°C
1	S	0~1760°C
2	R	0~1760°C
3	T	-270~400°C
4	E	-270~1000°C
5	J	-200~1200°C
6	B	400~1820°C
7	N	-200~1300°C
8	WRe3-WRe25	0~2310°C
9	WRe5-WRe26	0~2310°C
10	4~20mA	4~20mA
11	0~20mA	0~20mA
12	Cu50	-50~150°C
13	PT100	-200~850°C
14	0~80Ω	0~80Ω
15	0~400Ω	0~400Ω
16	0~20mV	0~20mV
17	0~100mV	0~100mV
18	0~1V	0~1V
19	1~5V	1~5V
20	0~5V	0~5V
21	-20~+20mV	-20~+20mV
22	-100~+100mV	-100~+100mV
23	-5V~+5V	-5V~+5V

Note 1:4-20MA and 0-20MA input, need to be B, C end and connected with a 2.49 ohm resistance, when ordering instructions, shipped as an attachment.

Note 2:0-10MA is connected with a 500-ohm resistance at the input end. The input type can be selected as 0-5 volts. It can be shipped as an attachment when ordering.

1.6 Shape structure

3-D View of 4-way Transmitter Profile

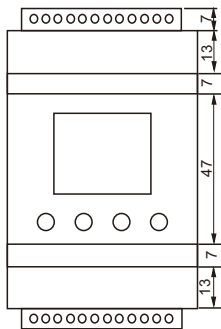


Figure 1-1 Module Pin Top View

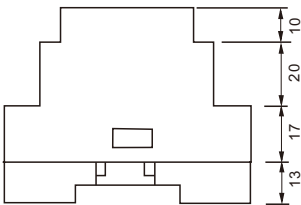


Figure 1-2 Module Side View

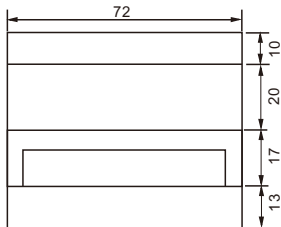
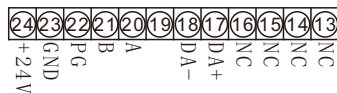


Figure 1-3 Module Main View

1.7 Wiring diagram

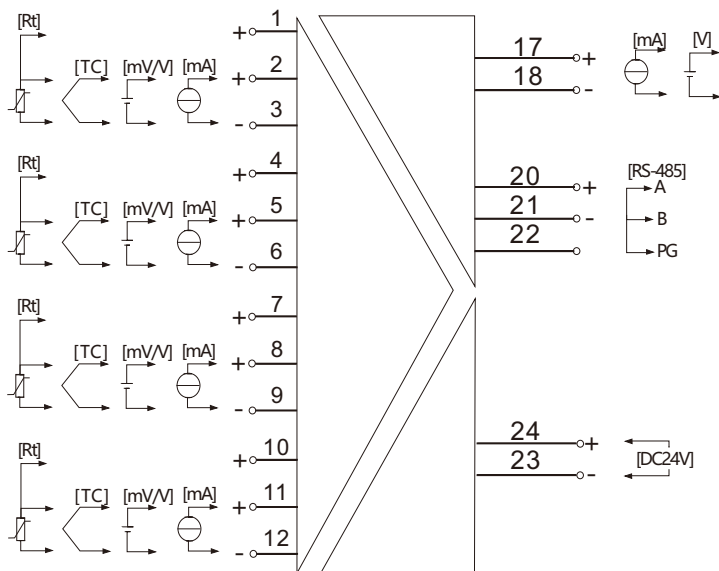
A. Four-way universal input terminal wiring diagram of remote MODBUS RTU data acquisition module



MODBUS RTU 4-way acquisition-variable module terminal wiring diagram



B. Connection schematic diagram of four-way universal input remote MODBUS RTU data acquisition module



1.8 pin definition

Terminal serial number	Terminal name	function
1	1A	Power supply terminal of first resistance signal
2	1B	First signal input positive pole
3	1C	First signal input negative pole
4	2A	The power supply terminal of the second resistance signal
5	2B	Second signal input positive pole
6	2C	Second signal input negative pole
7	3A	Power supply terminal of third resistance signal
8	3B	The third signal input positive pole
9	3C	Third way signal input negative pole
10	4A	Fourth Circuit Resistance Signal Power Supply Terminal
11	4B	Fourth signal input positive pole
12	4C	Fourth signal input negative pole
13	NC	Suspension pin
14	NC	Suspension pin
15	NC	Suspension pin
16	NC	Suspension pin
17	DA+	DA Signal Output Rectification
18	DA-	DA signal output negative
19	NC	Suspension pin
20	RXD	RS-485 interface signal positive pole, A
21	TXD	RS-485 interface signal negative pole, B
22	PG	RS-485 Interface Signal Protection Area
23	GND	Grounding end of input power supply
24	+24V	Input 24V power supply

2. Module Application Guide

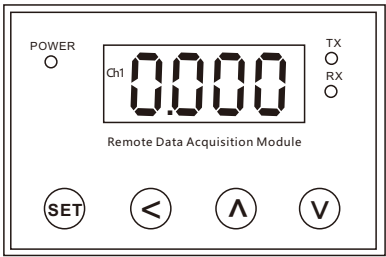
2.1 Panel introduction

- 2.1.1 Parameter Display Window: Display process measurements and functional parameters of 4 input channels.
- 2.1.2 Operating indicator: The system is powered on, the power indicator flashes 3 times, and then it is always on. When the module communicates, TXD flickers when sending data and RXD flickers when receiving data.
- 2.1.3  key: Press 3S to enter the adjustment parameter mode in normal operation, save the set parameters when setting parameters, press 5S to return to normal operation mode after setting parameters.
- 2.1.4  key: When the cycle moves left and setting parameters, it is used when switching from POXX parameter mode to parameter modification mode.
- 2.1.5  key: Modify parameter and add key.
- 2.1.6  key: Modify parameter reduction key.

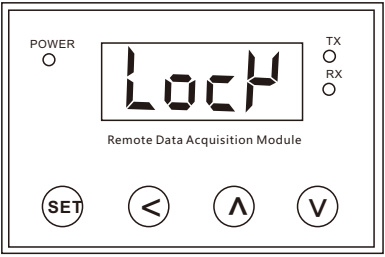
2.2 Description of Operation Status

- 2.2.1 By default, the process measurements of four channels are displayed alternately when the system is powered on, and the channel measurements are switched on every second.
- 2.2.2 After holding down  key for 3 seconds, the system automatically switches to the LOCK interface of the system parameter modification menu.
- 2.2.3 The display interface corresponding to each state of the module.

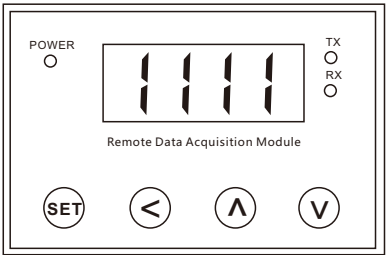
(Figure 2-1 shows the first channel)



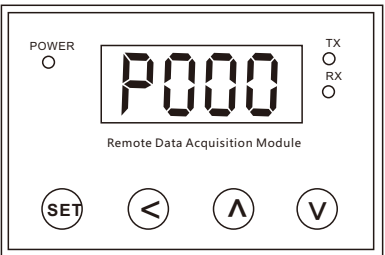
(Figure 2-2 shows the lock interface after pressing  keys for 3s)



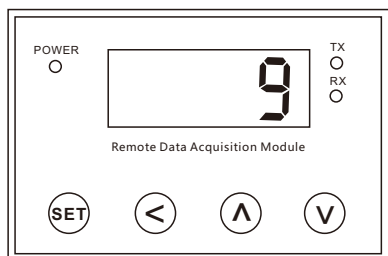
(Figure 2-3 Input Password Interface)



(Figure 2-4 Setting Parameter Selection Interface)



(Fig. 2-5 Modifying the parameter value interface)



2.2.4 Modular parameters are configured by keystrokes for detailed operational steps.

a. In normal display mode, hold down the **SET** key 3s and enter the "LOCK" interface.

b. LOCK interface, press the **<** key to enter the password interface,

LOCK interface, press **SET** 5S to enter normal display mode.

c. Enter password interface, press **<** key, **^** key, **v** key enter password. Password unchanged initial value is "1111"; Press the **SET** key, enter the parameter selection interface if the password is correct, "If the code is wrong, return" LOCK "Interface.

d. Parameter selection interface, P0XX will be displayed.

1. Press **^** or **v** key "P0XX" to increase or decrease 1.

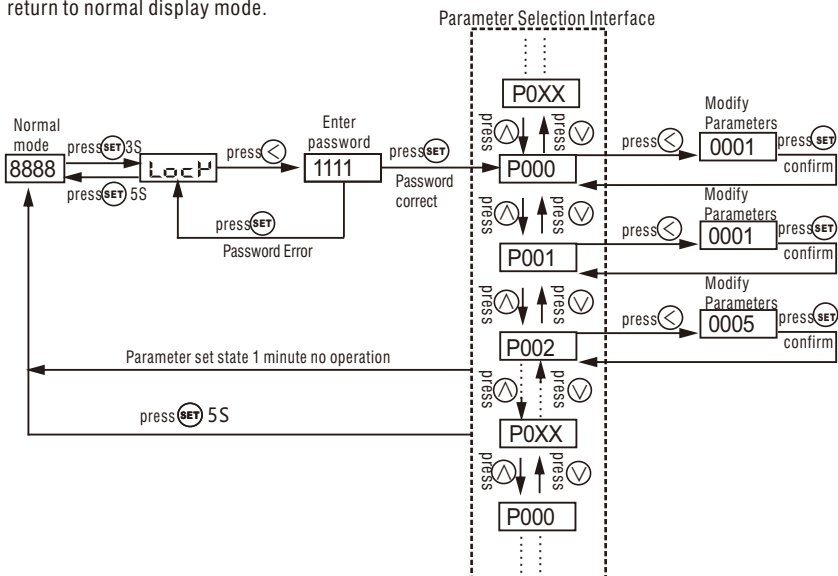
2. Press **<** to enter the modified parameter interface.

3. Press **SET** key 5S to return normal display mode.

e. Parameter modification interface, press **<** key, **^** key, **v** key to modify parameters.

Press the **SET** key to save and return to the parameter selection interface.

Press any key LED backlight will be bright, 1 minute no operation backlight extinguished, automatically return to normal display mode.



2.3 System parameter code table

Code	parameter	function	Numerical range	Default value
1	P000	Fixing and Wheel Display Switching	0-1, 0-round display, 1-fixed display	0
2	P001	Fixed Display Channel Value	1~4	1
3	P002	Wheel display channel time	1 ~ 60S	1
4	P003	Spare		0
5	P004	Password modification	0000~9999	1111
6	P005	Spare		0
7	P006	Input Digital Filtering	0~10	0
8	P007	1-way input translation correction	-500 ~ +500	0
9	P008	2-way input translation correction	-500 ~ +500	0
10	P009	3-way input translation correction	-500 ~ +500	0
11	P010	4-way input translation correction	-500 ~ +500	0
12	P011	Postaladdress	1 ~ 255	1
13	P012	Baudrate	0 ~ 2: 0-4800, 1-9600, 2-19200 bps	1
14	P013	Verificationmode	0-2:0-no check, 1-odd check, 2-even check	0
15	P014	Communicationdelaytime	0~60MS	0
16	P015	TransmitterChannelSelection	1-5: 1-4-measured value transmission, 5-communication given value	1
17	P016	TransmitOutputRangeSelection	0~1: 0<0-5V/0-20mA/0-10mA>, 1<1-5V/4-20mA>	0
18	P017	Transmitcapsetting	-9999 ~ 9999	5000
19	P018	TransmitLowerLimitSetting	-9999 ~ 9999	0
20	P019	Spare		0
21	P020	TypeSettingof1-wayInputSignal	0~23	20
22	P021	1-wayscaledecimalpointposition	0 ~ 3: 0<0000>, 1<000.0>, 2<00.00>, 3<0.000>	3

Code	parameter	function	Numerical range	Default value
23	P022	1-way input scale upper limit	-9999 ~ 9999	5000
24	P023	1-way input scale lower limit	-9999 ~ 9999	0
25	P024	Setting Upper Limit of 1-way Alarm	-9999 ~ 9999	9999
26	P025	Setting the Lower Limit of 1-way Alarm	-9999 ~ 9999	-9999
27	P026	Type Setting of 2-way Input Signal	0 ~ 23	20
28	P027	2-way scale decimal point position	0 ~ 3: 0<0000>, 1<000.0>, 2<00.00>, 3<0.000>	3
29	P028	2-way input scale upper limit	-9999 ~ 9999	5000
30	P029	2-way input scale lower limit	-9999 ~ 9999	0
31	P030	Setting Upper Limit of 2-way Alarm	-9999 ~ 9999	9999
32	P031	Setting the Lower Limit of 2-way Alarm	-9999 ~ 9999	-9999
33	P032	Type Setting of 3-way Input Signal	0 ~ 23	20
34	P033	3-way scale decimal point position	0 ~ 3: 0<0000>, 1<000.0>, 2<00.00>, 3<0.000>	3
35	P034	3-way input scale upper limit	-9999 ~ 9999	5000
36	P035	3-way input scale lower limit	-9999 ~ 9999	0
37	P036	Setting Upper Limit of 3-way Alarm	-9999 ~ 9999	9999
38	P037	Setting the Lower Limit of 3-way Alarm	-9999 ~ 9999	-9999
39	P038	Type Setting of 4-way Input Signal	0 ~ 23	20
40	P039	4-way scale decimal point position	0 ~ 3: 0<0000>, 1<000.0>, 2<00.00>, 3<0.000>	3
41	P040	4-way input scale upper limit	-9999 ~ 9999	5000
42	P041	4-way input scale lower limit	-9999 ~ 9999	0
43	P042	Setting Upper Limit of 4-way Alarm	-9999 ~ 9999	9999
44	P043	Setting the Lower Limit of 4-way Alarm	-9999 ~ 9999	-9999

3. Communication section

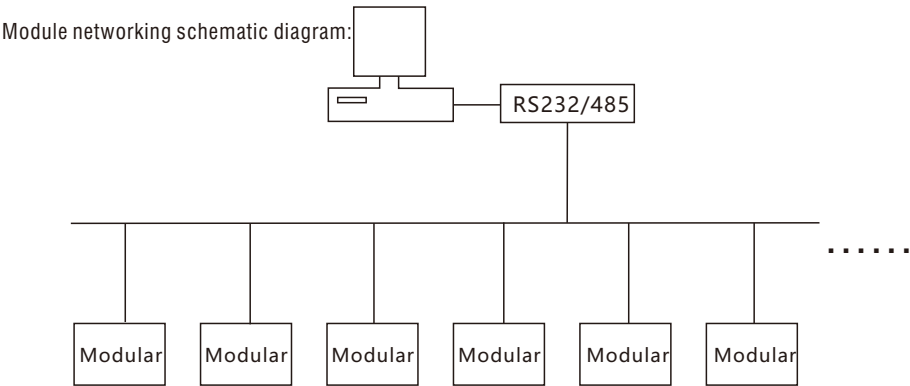
3.1 Communication connection

The module RS485 communication port is connected by shielded twisted pair. When networking, 32 modules can be hung on the same RS485 network, such as the length of communication cable, direction, location of the main station, matching resistance at the end of the network, communication adapter, network scalability, network coverage, electromagnetic interference of the environment and other factors should be considered comprehensively.

Generally, the single computer communication in the laboratory is relatively simple, because the distance is relatively close and the electromagnetic environment is good, so there is no need to consider too many factors, and even in the absence of twisted pairs, it is possible to find two suitable length conductors to temporarily replace. But in engineering, we should strictly follow the requirements of construction, so as not to cause trouble in the future. Communication master station can be computer (PC), PLC, data collector, RTU, etc. This chapter takes PC as an example, and other analogies.

PC does not have RS485 interface, but all have RS232 serial interface, so to connect with the module, we need a conversion device. Here we recommend the use of multi-serial card. RS232 serial interface can be directly converted into RS485 interface and connected with the module. In order to effectively ground one end of the cable shield layer connected with the upper computer (protective ground: earth, cabinet, chassis, etc.), two or more points of grounding should be avoided. The module does not protect the grounding end, and the shell is plastic, so it does not need to be grounded. But if there are metal cabinets and boxes, they should be installed inside as far as possible, and the effect will be better.

When connecting RS485 cable, try to use double-color twisted pair, all '+' ends are connected with the same color, and '-' ends are connected with another color.



3.2 Parameter setting

The default address of the module is 01, and the baud rate is 9600 bps. Address, baud rate can be set by button, or by communication protocol. When multiple modules are applied, the address can not be repeated and the baud rate should be consistent.

3.3 Communication protocol

This instrument adopts ModBus RTU communication protocol
(ModBus is the registered trademark of Modicon Company)
Specifically as follows;

Data frame format:

A starting bit
8 data bits, the smallest valid bits are sent first
Non-parity calibration
1 stop bit

3.4 Introduction of Function Code

Code	Meaning	operation
02	Bit register	Read the current register bit variable value
03	Batch reading data	Read single or multiple consecutive binary values within the current register range
04	Batch reading data	Read single or multiple consecutive binary values within the current register range
06	Write a single register	Write the set binary value to a single register
16	Batch write multiple registers	Write the set binary values to multiple continuous registers

number	Read-Only Register--0x02		
	MODBUS register address	content	Description - Bit Variable, 1 -- Alarm, 0 -- No Alarm
1	0001H	1 way upper limit alarm	The measured value is greater than the upper limit setting value.
2	0002H	1 way lower limit alarm	The measured value is less than the set value of the lower limit.
3	0003H	1 way open circuit alarm	Open Circuit Detection of Thermocouple, Thermal Resistance and Type III Instrument Signal
4	0004H	1 way short circuit alarm	Thermal Resistance Short Circuit Detection
5	0005H	2 way upper limit alarm	The measured value is greater than the upper limit setting value.
6	0006H	2 way lower limit alarm	The measured value is less than the set value of the lower limit.
7	0007H	2 way open circuit alarm	Open Circuit Detection of Thermocouple, Thermal Resistance and Type III Instrument Signal
8	0008H	2 way short circuit alarm	Thermal Resistance Short Circuit Detection
9	0009H	3 way upper limit alarm	The measured value is greater than the upper limit setting value.
10	000AH	3 way lower limit alarm	The measured value is less than the set value of the lower limit.
11	000BH	3 way open circuit alarm	Open Circuit Detection of Thermocouple, Thermal Resistance and Type III Instrument Signal
12	000CH	3 way short circuit alarm	Thermal Resistance Short Circuit Detection
13	000DH	4 way upper limit alarm	The measured value is greater than the upper limit setting value.
14	000EH	4 way lower limit alarm	The measured value is less than the set value of the lower limit.
15	000FH	4 way open circuit alarm	Open Circuit Detection of Thermocouple, Thermal Resistance and Type III Instrument Signal
16	0010H	4 way short circuit alarm	Thermal Resistance Short Circuit Detection

number	Read-write register-0x03、0x06、0x10			
	MODBUS register address	content	Description	Default value
1	0001H	Communication Write Transmit Value	0000H~FFFFH	0
2	0002H	empty		0
3	0003H	empty		0
4	0004H	empty		0
5	0005H	empty		0
6	0006H	empty		0
7	0007H	empty		0
8	0008H	empty		0
9	0009H	address	1-255: Modular Communication Address	1
10	000AH	baud rate	0~2 : 0: 4800bps,1: 9600bps,2:19200bps	1
11	000BH	Verification mode	0-2:0: no check, 1:odd check, 2:even check	0
12	000CH	Communication delay time	0~60MS	0
13	000DH	Transmitter Channel Selection	1-5, 1-4-measured value transmitter, 5-communication given value	1
14	000EH	Transmit Output Range Selection	0~1 : 0 (0-5V/0-20mA/0-10mA), 1 (1-5V/4-20mA)	0
15	000FH	Transmit Upper Limit Setting	-9999 ~ 9999	5000
16	0010H	Transmit Lower Limit Setting	-9999 ~ 9999	0
17	0011H	Input Digital Filtering	0 ~ 10	0
18	0012H	1-way input translation correction	-500 ~ +500 LSB	0
19	0013H	2-way input translation correction	-500 ~ +500 LSB	0

number	Read-write register-0x03、0x06、0x10			
	MODBUS register address	content	Description	Default value
20	0014H	3-way input translation correction	-500 ~ +500 LSB	0
21	0015H	4-way input translation correction	-500 ~ +500 LSB	0
22	0016H	empty		0
23	0017H	empty		0
24	0018H	empty		0
25	0019H	Type Setting of 1-way Input Signal	0 ~ 23	20
26	001AH	1-way scale decimal point position	0 ~ 3: 0<0000>, 1<000.0>, 2<00.00>, 3<0.000>	3
27	001BH	1-way input scale upper limit	-9999 ~ 9999	5000
28	001CH	1-way input scale lower limit	-9999 ~ 9999	0
29	001DH	Setting Upper Limit of 1-way Alarm	-9999 ~ 9999	9999
30	001EH	Setting the Lower Limit of 1-way Alarm	-9999 ~ 9999	-9999
31	001FH	Type Setting of 2-way Input Signal	0 ~ 23	20
32	0020H	2-way scale decimal point position	0 ~ 3: 0<0000>, 1<000.0>, 2<00.00>, 3<0.000>	3
33	0021H	2-way input scale upper limit	-9999 ~ 9999	5000
34	0022H	2-way input scale lower limit	-9999 ~ 9999	0
35	0023H	Setting Upper Limit of 2-way Alarm	-9999 ~ 9999	9999
36	0024H	Setting the Lower Limit of 2-way Alarm	-9999 ~ 9999	-9999
37	0025H	Type Setting of 3-way Input Signal	0 ~ 23	20
38	0026H	3-way scale decimal point position	0 ~ 3: 0<0000>, 1<000.0>, 2<00.00>, 3<0.000>	3

number	Read-write register-0x03、0x06、0x10			
	MODBUS register address	content	Description	Default value
39	0027H	3-way input scale upper limit	-9999 ~ 9999	5000
40	0028H	3-way input scale lower limit	-9999 ~ 9999	0
41	0029H	Setting Upper Limit of 3-way Alarm	-9999 ~ 9999	9999
42	002AH	Setting the Lower Limit of 3-way Alarm	-9999 ~ 9999	-9999
43	002BH	Type Setting of 4-way Input Signal	0 ~ 23	20
44	002CH	4-way scale decimal point position	0 ~ 3: 0<0000>, 1<000.0>, 2<00.00>, 3<0.000>	3
45	002DH	4-way input scale upper limit	-9999 ~ 9999	5000
46	002EH	4-way input scale lower limit	-9999 ~ 9999	0
47	002FH	Setting Upper Limit of 4-way Alarm	-9999 ~ 9999	9999
48	0030H	Setting the Lower Limit of 4-way Alarm	-9999 ~ 9999	-9999

number	Read-Only Register--0x04		
	MODBUS register address	content	Description
1	0001H	1-way input measurements value	Input Scale Upper Limit ~ Input Scale Lower Limit
2	0002H	2-way input measurements value	Input Scale Upper Limit ~ Input Scale Lower Limit
3	0003H	3-way input measurements value	Input Scale Upper Limit ~ Input Scale Lower Limit
4	0004H	4-way input measurements value	Input Scale Upper Limit ~ Input Scale Lower Limit
5	0005H	Transmit Output Value	Setting Range--16-digit Quantity
6	0006H	empty	
7	0007H	empty	
8	0008H	empty	

* Special reminder*:

1. A single read-write command supports up to 16 registers.
2. When users need to write DA output value through communication, it is better to use 06H command to write a single register 0000H. If 10H batch command is used, it is suggested that the batch register should not exceed two registers'length. If the length is longer than two repeated batches, EEPROM will be permanently damaged.

4. Technical support

4.1 Description of parameter modification status

Password modification: If the system password has been modified and forgotten, on the LOCK page, press "  " and "  " to force the recovery of factory password 1111, and exit to the normal display mode.

Warning:

The modification of parameter modification status may cause unnecessary faults and losses. Non-engineering technicians should not alter system parameters without authorization. For unnecessary losses caused by modification of parameters beyond the order specifications, the company does not assume any responsibilities and obligations. If customers need to modify parameters by themselves, please call for consultation. Our company will provide you with technical guidance.

The product is repaired free of charge for one year (except for man-made damage), and maintained for life.

