Communication protocol description

（MODBUS-RTU-V2.2）

一、 MODBUS communication

Network intelligent panel can read and modify internal registers through 485 communication to achieve remote monitoring and output control. Communication protocol adopts standard MODBUS RTU communication protocol. Serial port settings: baud rate "9600", check bit "none", data bit "8" and stop bit "1".

Two instructions are separated by 50ms.

1.1 communication format

Communication number	Command code	data address	Communication data	CRC check
1Byte	1Byte	2Byte	nByte	2Byte

1.2 communication number

1−-255 switch factory default address: 0x02; 0XFF is the broadcast address.

No data is returned from the slave in broadcast mode.

1. 3 command code

Command code	Operation content
03H	Read the specified address data
06H	Setting address data
10H	Setting multiple address data
83H	Error return of reading instruction
86H	Error in setting the address.
90H	Error in setting multiple addresses.

Error code

Error code	meaning	explain
01H	Check error	
02H	operation mistake	
03H	Read only register	
04H	Register does not exist.	
05H	Invalid operation for.	
06H	The register is write protected.	

1.4 CRC16-1 check algorithm

At the beginning of CRC, all 16 bits of the register are set to "1", and then two adjacent 8-bit bytes of data are put into the current register. Only the 8-bit data of each character is used to generate CRC, and the start bit, stop bit and parity bit are not added

to CRC. During CRC generation, every 8-bit data is XOR-operated with the value in the register, and the result is shifted one bit to the right (in the direction of LSB), and the MSB is filled with "0" to detect the LSB. If the LSB is "1", it will be XOR-operated with the preset fixed value, and if the LSB is "0", it will not be XOR-operated. Repeat the above process until it is shifted 8 times. After the 8th shift, the next 8-bit data is XOR with the current value of this register. After all information processing, the final value in the register is CRC value.

The process of generating CRC:

1. set the 16-bit CRC register to FFFFH.

2. The first 8-bit data is XOR with the lower 8 bits of CRC register, and the result is put into CRC register.

3. The CRC register is shifted one bit to the right, the MSB is filled with zero, and the LSB is checked.

4. (If LSB is 0): Repeat 3, and then move one bit to the right. (if LSB is 1):CRC register is XOR with 0xA00l.

5. Repeat 3 and 4 until 8 shifts are completed, and the processing of 8-bit bytes is completed.

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

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

8. When the CRC value is put into the information, the lower 8 bits come first and the upper 8 bits come last.

1.4 communication example (switch communication example, the following communication data are hexadecimal)

(1) read a single address data, for example, the upper computer sends the following command:

Communication number	Command code	data address	Communication data	CRC check
02	03	10 0B	00 01	F1 3B

Example: 02 03 10 0B 00 01 F1 3B

Command explanation: Read key values.

If the first key is pressed, the returned data is.

Communication number	Command code	Data length	Communication data	CRC check
02	03	00 02	07 01	27 C9

(2) Send data to light the status light of the first button:

Communication number	Command code	data address	Communication data	CRC check
02	06	10 08	01 01	CC AB

Explanation: turn on the first key status light and backlight.

The lower computer returns the following data to prove that the modification is successful.

Communication number	Command code	data address	Communication data	CRC check
02	06	10 08	01 01	CC AB

III. Register address mapping table of intelligent switch panel

(The register is double-byte data, 0x1000～0x1FFF, with the highest bit in front).

Read-write integrated instruction 07

	Panel address	Command code	function code	Relay value	Indicator value	CRC check
Upper computer sending	02	07	00-04	relay	Indicator light	91 23
Panel reply	02	07	Key state	Relay status	Indicator status	check code

Note: See register 100B for key values, register 1009 for relay values and register 1008 for indicator values.

① The function code of 00 00 means that you don't need to reply, just write the relay and indicator register, that is, only update the status of the panel relay and indicator; [Write only]; (write only, no data returned)

② The function code of 00 01 indicates that data needs to be replied, and the data of relay-indicator light-key register value should be answered.

Do not update the status of panel relays and indicator lights, and fill in the values of relays and indicator lights at will; [Read-only] (Read the panel keys and the status of indicator lights)

③ The function code of 00 02 means that the response is made only when the key changes, and the status of the panel relay and indicator light is updated, and the value data of relay-indicator light-key register is returned; [After successful writing, return the value of successful modification]

④ The function code of 00 03 means that the key changes before the reply, and the relay-indicator light-key register value data is returned; [read only]

(The key state and indicator light state are returned only when the key is pressed)

⑤ The function code of 00 04 indicates that data needs to be replied, the status of panel relay and indicator light is updated, and the value data of relay-indicator light-key register is replied; [After successful writing, return the value of successful modification]

⑥ When the address 0XFF is broadcast instruction, operate all panels, reply with key action (function code is 02 or 03), and do not reply without key action;

Communication number of intelligent switch panel: 1-255, factory default address: 0x02; 0XFF is the broadcast address.

Register address (hexadecimal)	Register description
1000 (read and write)	[Note: This register is used for system configuration, and the factory default value is 02. If you don't need to modify it, you can ignore it] 1. Panel address register, the default register data is 0x02； ; Example of instruction: 2 06 10 00 00 01 4cf9 is set to address 01. 06 10 00 00 01 59 14 is set to address 1 (broadcast mode is valid for all panels) 2、Complete the change to send the save instruction: FF 06 10 0F 00 FE 29 57 Address change under 485 connecting multiple panels is supported. Operation

<table>
<tr><td></td><td>method: Press and hold the first button for 15S for a long time, and the white status light flashes. Send the data at the beginning of FE to change the address (for example, the panel that changes address 5 sends FE06 10 00 05 59 06). After the panel change is successful, the white status light stops flashing.</td></tr>
<tr><td>1001 (read and write)</td><td>According to the customer's proposal, the big keys of V8-Z6 panel are separated into two small keys.
<table>
<tr><th>B6~B15</th><th>B5</th><th>B4</th><th>B3</th><th>B2</th><th>B1</th><th>B0</th></tr>
<tr><td>reserve</td><td>The third group of keys is high.</td><td>The third group of keys is low.</td><td>The second group of keys is high.</td><td>The second group of keys is low.</td><td>The first group of keys is high.</td><td>The first set of keys is low.</td></tr>
</table>
Configuration key: the high bit is 0 and the low bit is 1.
Configure two small keys: the high bit is 1 and the low bit is 1.
To configure a junior development send: 02 06 10 01 00 15 1D 36
To configure a six-button sending: 02 06 10 01 00 3F 9C E9
Save instruction takes effect: 02 06 21 99 10 01 9F EA</td></tr>
<tr><td>1002 (read and write)</td><td>According to the customer's proposal, the V8-Z6 panel large aperture indicator lights are separated into the left and right sides.
<table>
<tr><th>B6~B15</th><th>B5</th><th>B4</th><th>B3</th><th>B2</th><th>B1</th><th>B0</th></tr>
<tr><td>The reserved bit is 0</td><td>The third group of aperture high position</td><td>The third group aperture is low.</td><td>The second group of aperture high position</td><td>Second group aperture low position</td><td>The first group of aperture high position</td><td>The first set of aperture is low.</td></tr>
</table>
Large aperture configuration: the high position is 0 and the low position is 1.
Two small apertures are configured: the high position is 1 and the low position is 1.
To configure a junior development send: 02 06 10 02 00 15 ED 36
To configure a six and a half aperture transmission: 02 06 10 02 00 3F 6C E9
Save instruction takes effect: 02 06 21 99 10 02 DF EB</td></tr>
<tr><td>1003 (read and write)</td><td>1、Send an instruction to change the corresponding protocol data:
Polling protocol: FF 06 10 03 00 00 68 D4
Smart Home Edition: FF 06 10 03 00 01 A9 14
Gateway protocol: FF 06 10 03 00 22 E8 CD
Strong Gateway Protocol: FF 06 10 03 00 23 29 0D
Smart Home Lite Press Send to Release Send: FF 06 10 03 00 21 A8 CC
2. After the change, send the effective command of FF 06 21 99 10 03 0B C6 instruction.
[Note: This register is used for system configuration. If it doesn't need to be modified, users can ignore it]</td></tr>
<tr><td>1007</td><td>001 turn on the radar, 00 00 turn off the radar.</td></tr>
<tr><td>1008 (read and write)</td><td>Display control of indicator lights D1 ~ D16
<table>
<tr><th>B15-B9</th><th>B8</th><th>B7</th><th>B6</th><th>B5</th><th>B4</th><th>B3</th><th>B2</th><th>B1</th><th>B0</th></tr>
<tr><td>--</td><td>Backlight LED</td><td>--</td><td>--</td><td>6 key LED</td><td>5 key led</td><td>4 key LED</td><td>3 key led</td><td>2 key led</td><td>1 key led</td></tr>
</table>
When a bit is 1, the corresponding key LED is lit, and when a bit is 0, the LED goes out.
Example of instruction:</td></tr>
</table>

2 06 10 08 01 01 CCAB key 1 LED is on and its back is on (other key LEDs are off)
02 06 10 08 01 00 CC AB back is bright, and all key LEDs are off.
2 06 10 08 00 000cfb All key LEDs are off (including backlight)

1009 (read and write, ignore the weak current panel)

relay control

B15-B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
--	--	--	--	--	--	4 relay	3 relay	2 relay	1 relay

When a bit is 1, the corresponding relay is closed, and when a bit is 0, the relay is open.

Example of instruction:

Open the first relay: 02 06 10 09 00 01 9C FB
Open the second relay: 02 06 10 09 00 02 DC FA
Open the first and second relays: 02 06 10 09 00 03 1D 3A
Turn off all relays: 02 06 10 09 00 00 5D3

100B (read only)

Key value register

Bit 0 ~ bit 5 correspond to key 1 to key 6, respectively. Bit8～Bit15 are absolute key values.

B15-B8	B7-B6	B5	B4	B3	B2	B1	B0
Absolute key value	--	=0 key 6 pops up, =1 Press key 6.	=0 key 5 pops up, =1 Press key 5.	=0 key 4 pops up, =1 Press key 4.	=0 key 3 pops up, =1 Press key 3.	=0 key 2 pops up, =1 Press key 2.	=0 key 1 pops up, =1 Press key 1.

Absolute key value = (panel address-1) * 6+key number
(Key number: Key 1 is numbered 1, key 2 is numbered 2 ... and so on.)

Example of instruction:

Read the key value, key 1 is pressed, and the panel address is 02.

Upper computer sending: 0203100B 001F13B
Panel back: 02 03 00 02 07 01 27 C9 (key value is 7)

Old version: no key value.

B15-B8	B7-B6	B5	B4	B3	B2	B1	B0
--	--	=0 key 6 pops up, =1 Press key 6.	=0 key 5 pops up, =1 Press key 5.	=0 key 4 pops up, =1 Press key 4.	=0 key 3 pops up, =1 Press key 3.	=0 key 2 pops up, =1 Press key 2.	=0 key 1 pops up, =1 Press key 1.

You can use FD data to start querying the panel. The panel will not reply to the data without pressing a key, but only the panel with pressing a key will reply to the data. For example, the instruction is FD 03 10 0B 00 01 E5 34.

100F (write only)

[Note: This register is used for system configuration. If the user does not modify the system configuration (such as modifying the panel address), it will be ignored]

Save control register:

Writing 00FE panel to this register will save the configuration, and every time

<table>
<tr><td></td><td>the system configuration is modified (such as modifying the panel address), a save instruction will be sent, and the panel will save the settings.
Example of instruction:
02 06 10 0F 00 FE 3C BA</td></tr>
<tr><td>310 ~ 131f (read only)</td><td>Key K1 ~ K16 status bits (0: off, 1: on, 2: long press the flag)
Example of instruction:
The upper computer sends the reading instruction: 02 03 13 10 00 01 81 78 Read button 1 status.
1 Press the key to pop up the panel, and it will return to: 02 03 13 10 00 00 40 B8.
1 Press the key to return to the panel: 02 03 13 10 00 01 81 78.
1 Press the panel for a long time to return: 02 03 13 10 00 02 C1 79.</td></tr>
<tr><td>1045 (read and write)</td><td>[Note: This register is used for system configuration. If it doesn't need to be modified, users can ignore it]
Modify the baud rate register, the factory default baud rate is 9600, and the register value is 0X48 (baud rate 4800) or 0X96 (baud rate 9600) or 0XC0 (baud rate 19200).
To send the save instruction: FF 06 21 99 10 45 8A 34</td></tr>
<tr><td>1046 (read and write)</td><td>[Note: This register is used for system configuration. If it doesn't need to be modified, users can ignore it]

Panel data reply interval register, set the sending data or query the panel reply time, the default value is 15ms, and the setting range is 20~200ms (save instruction is required).
For example, to modify the data reply after 200ms: FF 06 10 46 00 C8 78 97, send the save instruction to take effect: FF 06 21 99 10 46 CA 35.</td></tr>
<tr><td>10D0 (read and write)</td><td>Panel single-byte and double-byte configuration (factory default is double-byte panel)
Change double-byte data: 02 06 10 D0 00 00 8C C0
Change single byte data: 02 06 10 D0 00 01 4D 00
The change of sending instruction takes effect: 02 06 21 99 10 D0 5F B6</td></tr>
<tr><td>10D2 (read and write)</td><td>Increase the status of indicator light: the high byte of key register indicates the status of indicator light; For this configuration option, the factory defaults to the absolute value of keys, and the status of indicator lights after configuration.
<table>
<tr><th>B15-B9</th><th>B8</th><th>B7</th><th>B6</th><th>B5</th><th>B4</th><th>B3</th><th>B2</th><th>B1</th><th>B0</th></tr>
<tr><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td><td>1 key register high byte indicator status</td><td>--</td></tr>
</table>
The high byte of the configuration key register indicates the indicator light status data instruction: 02 06 10 D2 00 02 AC C1
The high byte of the configuration key register indicates the absolute key value data instruction: 02 06 10 D2 00 00 2D 00
Save instruction takes effect: 02 06 21 99 10 D2 DE 77</td></tr>
</table>

1 99 (write only)	Configuration register save instruction When modifying the corresponding register data, it should be written into the configuration register to save, and the modified information will take effect; 06 21 99 * * * check code (* * * indicates the modified register)

IV. Address Mapping Table of Power Access Register of High Frequency Card (The register is double-byte data, 0x0200～0x02FF, with the highest bit in front).

The number of the high-frequency card-inserting and power-taking communicator is 1-255, and the factory default address is 0x01; 0X00 is the broadcast address.

Register address (hexadecimal)	Register description	Allow reading and writing
0201	Device status register, =0000 without card, =0001 with card inserted Example of instruction: The upper computer sends and reads instructions: 01 03 02 01 00 01 D4 72. If there is no card, return: 01 03 00 02 00 00 E4 0A If there is a card, it will be returned: 01 03 00 02 00 01 25 CA	read only
0202	Card type 1-255, 0 is no card. 00= leaving status, 01= general control card, 02= building number card, 03= floor card, 04= cleaning card, 05= engineering card, 06= guest card, 07= privilege card. Example of instruction: The upper computer sends and reads instructions: 01 03 02 02 00 01 24 72 If there is no card, return: 01 03 00 02 00 00 E4 0A The total control card returns: 01 03 00 02 00 01 25 CA. The guest will return: 01 03 00 02 00 06 64 08.	read only

Figure 1: Definition of U-shaped aperture panel keys and indicator light aperture numbers

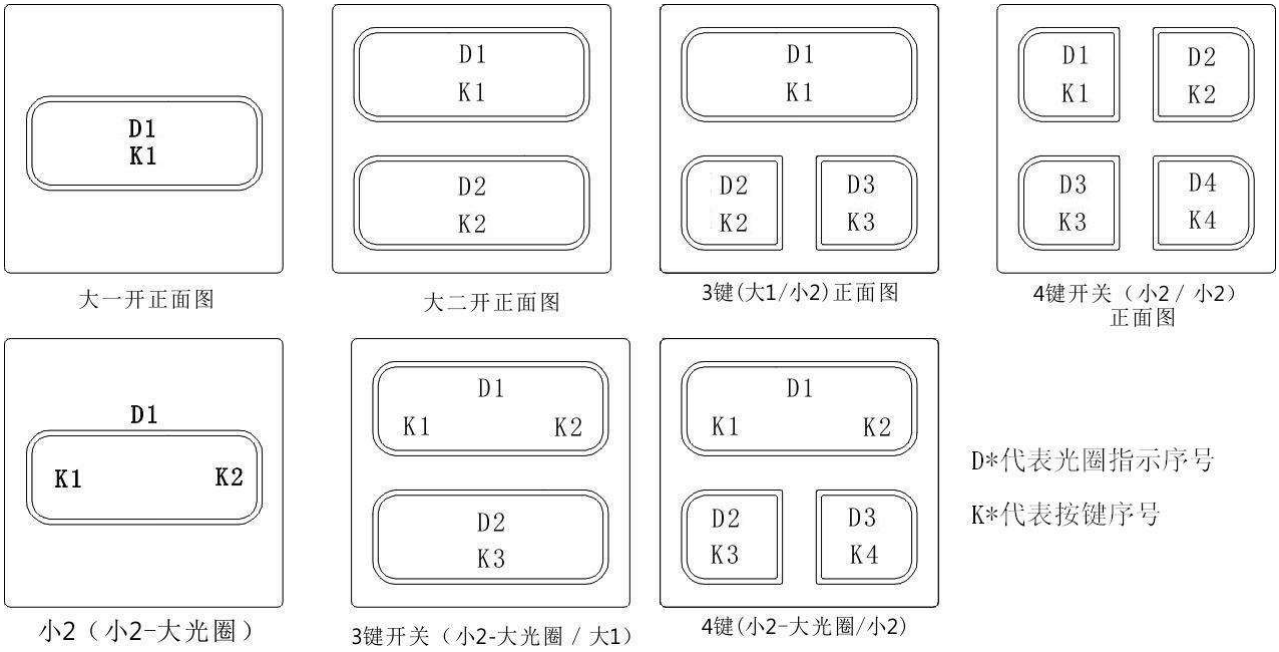
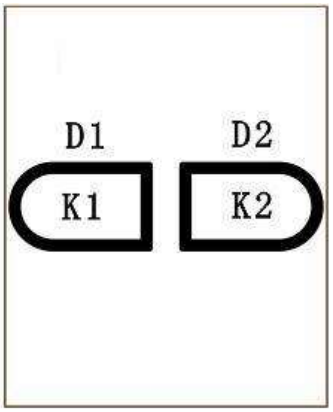
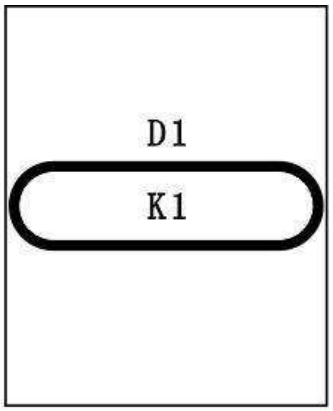


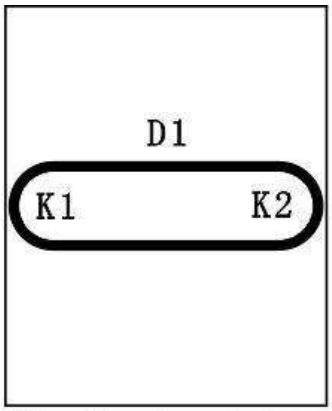
Figure 2: Definition of aperture numbers of keys and indicator lights of oval and square aperture panels: V8-Z,Z1,Z6



2键开关（小2）

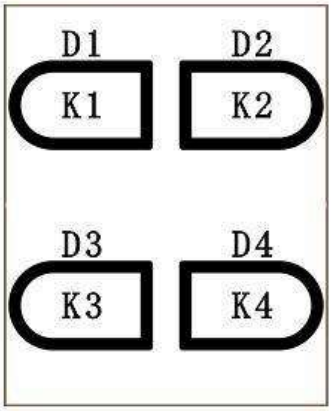


大一开

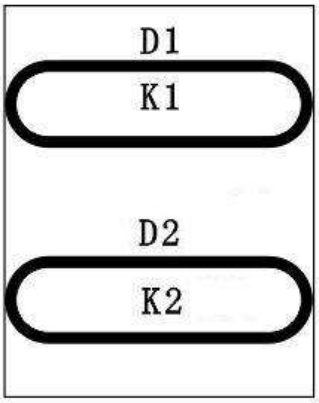


2键开关（小2-大光圈）

K3

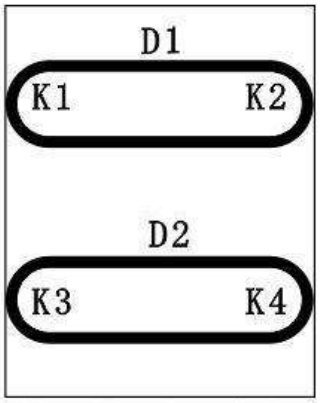


4键开关（小2 / 小2）



大二开

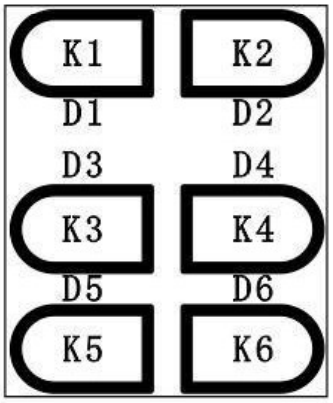
D2



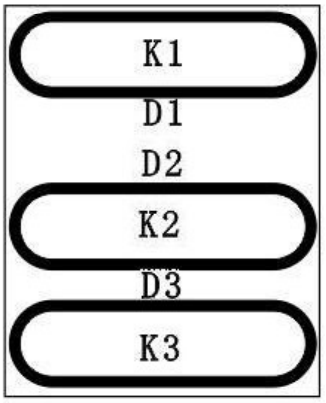
4键开关（小2-大光圈 / 小2-大光圈）

D*代表光圈指示序号

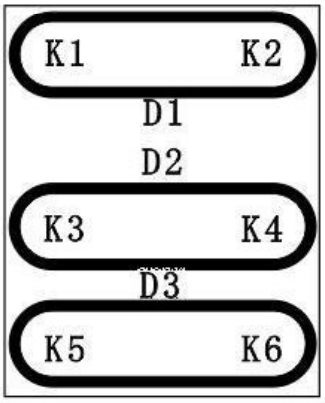
K*代表按键序号



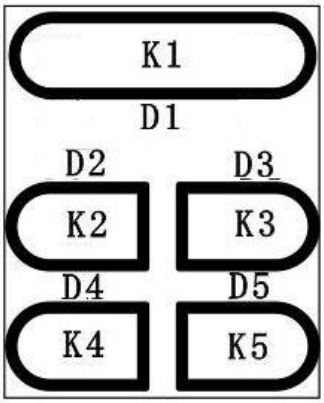
6键开关（小2 / 小2 / 小2）



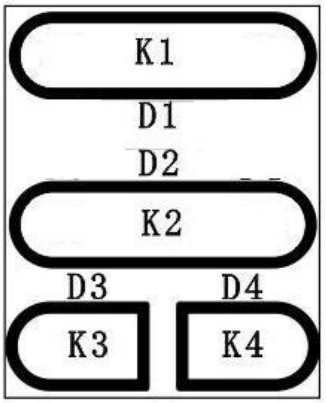
大三开



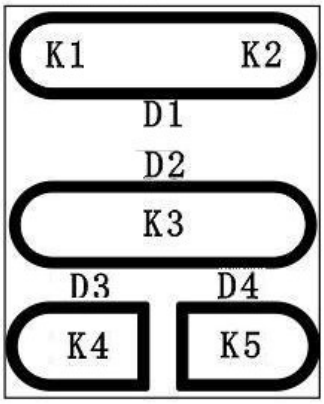
六键开关（小2-大光圈 / 小2-大光圈 / 小2-大光圈）



5键开关（大1 / 小2 / 小2）



4键（大1/大1/小2）



5键（小2-大光圈/大1/小2）