S5-1 Communication Agreement

Communication manual

▣ Agreement Description

1. Overview

The device uses Modbus RTU RS485 Communication, read status function number 0x02, read function number 0x03, write function number 0x10. Using 16–bit CRC check, the device no return for check errors.

Data frame format:

Starting bits	Data bits	Stop bits	Check bits
1	8	1	CRC16

2. Communication exception handling

When an exception is answered, the highest position of the function number is 1. For example, if the host requests the function number 0x03, the slave returns the function number corresponding to 0x83.

Error type code:

0x01———Function wrong: The device not return.

0x02———Address wrong: The register address specified by the host is outside the allowed range of device parameter addresses.

0x03———Value wrong : The write data value sent by the host is outside the allowed range of the device.

3. Communication cycle

The Communication period refers to the time between the completion of the data request from the host and the completion of the data return from the slave. That is: Communication cycle = Request data transmission time + slave reply time + reply delay time + reply return time.

Take 9600 baud rate for example: single measurement data Communication period is not less than 250ms.

▣ Register Description

1. Read register

Example: Host reads integer SV (given value 200)

The address code of SV is 0x02 because SV is an integer (2 bytes) and occupies 1 data register. The memory code of decimal integer 200 is 0x00C8.

※Note : When reading data, you should first read the DP value or confirm the DP menu value to determine the decimal point position before reading the data. And convert the read data to get the actual value.

※Instead, the data to be written should be converted to the appropriate multiplier before being written to the device.

Host request (read multiple registers)							
1	2	3	4	5	6	7	8
Device Address	Function No.	Start Address High	Start Address Low	Data word length High	Data word length Low	CRC code Low	CRC code High
0x01	0x03	0x00	0x02	0x00	0x01	0x25	0xCA

Slave responds normally (reads multiple registers)						
1	2	3	4	5	6	7
Device Address	Function No.	Data bytes	Data High	Data Low	CRC code Low	CRC code High
0x01	0x03	0x02	0x00	0xC8	0xB9	0xD2

Function number exception response: (e.g. host request address is 0x2011)

Slave exception response (read multiple registers)				
1	2	3	4	5
Device Address	Function No.	Error Code	CRC code Low	CRC code High
0x01	0x83	0x02	0xC0	0xF1

2. Writing multiplex registers

Example: Host writes SV with 0x10 function (given value 150)

The address code of SV is 0x02, because SV is an integer (2 bytes) and occupies 1 data register.

The hexadecimal memory code for the decimal integer 150 is 0x0096.

Host request (write multiple registers)										
1	2	3	4	5	6	7	8	9	10	11
Device Address	Function No.	Start Address High	Start Address Low	Data word length High	Data word length Low	Data word length	Data High	Data Low	CRC code Low	CRC code High
0x01	0x10	0x00	0x02	0x00	0x01	0x02	0x00	0x96	0x27	0xDC

Continue to the above table

Slave responds normally (write multiple registers)							
1	2	3	4	5	6	7	8
Device Address	Function No.	Start Address High	Start Address Low	Data word length High	Data word length Low	CRC code Low	CRC code High
0x01	0x10	0x00	0x02	0x00	0x01	0xA0	0x09

▣ Parameter Address Map Table

No.	Address (Register No.) Decimal System	Variable Name	Register Number	Read/Write Allowed
1	1 (0)	Measurement status (※Note ①)	2	R
2	2 (1)	Present value PV	2	R
3	3 (2)	Set value SV	2	R / W
4	4 (3)	Alarm setting value 1【AL1】	2	R / W
5	5 (4)	Alarm setting value 2【AL2】	2	R / W
6	6 (5)	Proportional band 【 P 】	2	R / W
7	7 (6)	Integral time 【 I 】	2	R / W
8	8 (7)	Derivative time【 d 】	2	R / W
9	9 (8)	Control cycle【 t 】	2	R / W
10	10 (9)	Suppression of the overshoot【Ar】	2	R / W
11	11 (10)	Bit return control【oH】	2	R / W
12	12 (11)	Error correction【EC】	2	R / W
13	13 (12)	Input specification【inP】 (※ Note ②)	2	R / W
14	14 (13)	Decimal places【dP】	2	R
15	15 (14)	Temperature unit (℃ or °F)【Unt】	2	R / W
16	16 (15)	Analog input zero value【dLL】	2	R / W
17	17 (16)	Analog input full value【dLH】	2	R / W
18	18 (17)	Lower limit of SV【SLL】	2	R / W
19	19 (18)	Upper limit of SV【SLH】	2	R / W
20	20 (19)	Output mode (※ Note ③) (T、R、S、AN、PH、SCR)	2	R
21	21 (20)	Control method【Prd】	2	R / W
22	22 (21)	Alarm type 1【Ad1】	2	R / W
23	23 (22)	Alarm return difference 1【AH1】	2	R / W
24	24 (23)	Alarm type 2【 Ad2 】	2	R / W
25	25 (24)	Alarm return difference 2【 AH2 】	2	R / W
26	26 (25)	Heating / cooling selection【HC】	2	R / W
27	27 (26)	Digital filter【F.L】	2	R / W
28	28 (27)	Parameter group lock【LCK】	2	R / W
29	29 (28)	Communication address【Ad】	2	R / W
30	30 (29)	Baud rate【bPS】	2	R / W
31	31 (30)	Soft–start time【bUF】	2	R / W
32	32 (31)	Shortcut function【Udb】	2	R / W

R: Read–only R/W: Read–write

Note1: Measurement status indication —— a data bit of 1 indicates execution, a bit of 0 indicates no execution

(Option)

D15	D14	D13	D12	D11	D10	D9	D8
—	—	—	—	—	—	—	—

D7	D6	D5	D4	D3	D2	D1	D0
AT	℉	AL1	℃	—	AL2	OUT2	OUT1

Note 2: 0=K, 1=E, 2=J, 3=N, 4=T, 5=S, 6=R, 7=B, 8=Pt100, 9=Cu50, 10=4~20mA, 11=0~20mA, 12=1~5V, 13=0~5V

Note 3: 0=T (temperature variable output) , 1=R (relay output) , 2=S (solid state relay output) , 3=AN (analog output) , 4=PH (phase shift output) , 5=SCR (over–zero output)