Remote Terminal Unit

PZ-M32

(32 analog inputs)

Version: 20100524

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1. General

The PZ-M32 is applicable in intelligent systems remotely measuring analog signals, like current, voltage, power, temperature, pressure and humidity etc.. The PZ-M32 unit allows the simultaneous collection of 32 ways AC/DC 0-20mA or 0-5V AC/DC analog signals. The unit is connected to the upper computer by RS485 communication, and utilizes Polling for data exchange to reflect the value of the metered object on a real-time basis.

2. Norms

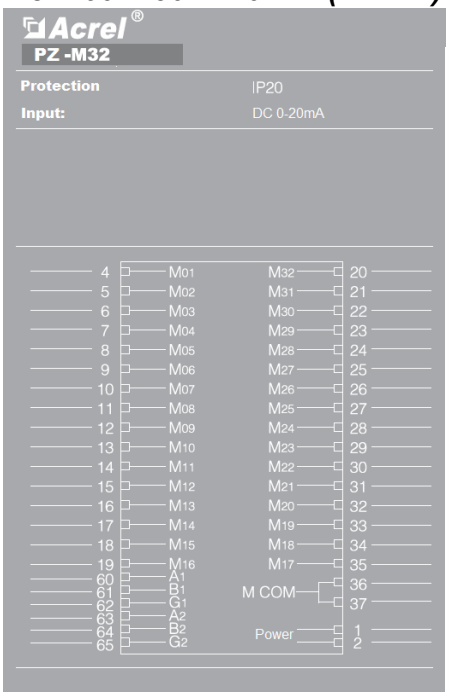
IEC61000-4-2	(EN61000-4-2)	Personnel Electrostatic Discharge Immunity
IEC61000-4-3	(EN61000-4-3)	Testing and measurement techniques - Radiated
IEC61000-4-4	(EN61000-4-4)	Electrical fast transient burst immunity test
IEC61000-4-5	(EN61000-4-5)	Combination wave and surge impulse test
IEC61000-4-6	(EN61000-4-6)	Measurement Uncertainty In Immunity Test
EN55011		Measuring radiated emissions

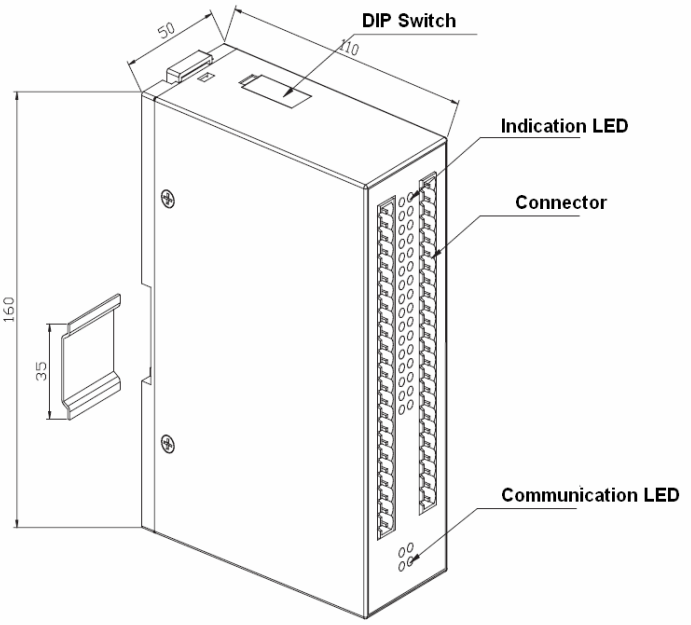
3. Technical Feature

Feature		Value
Input	32 Signals	AC/DC 0-20mA or 0-5V AC/DC analog signals
	Response time	< 2ms
	Scanning time	1ms
Power Supply	Voltage range	24 VDC(18-36VDC) or AC/DC 80-270V
	Consumption	≤ 5W
Communication	Bus Mode	2-wires half-duplex RS485/Modbus protocol
	Bus Capacity	≤ 32
	Response Time	20ms
	Baud rate	9600 / 4800 / 2400 / 1200 bps
Others	Degree of Protection	IP40, Terminal IP20
	Accuracy	0.5%
	Isolation	2Kv/1min,50Hz (inputs, output and supplier)
	Work Temperature	-5℃ - 55℃
	Storage Temperature	-25℃ - 85℃
	Mounting	TS35 Standard DIN rail
	Dimension	160 × 50 ×110mm

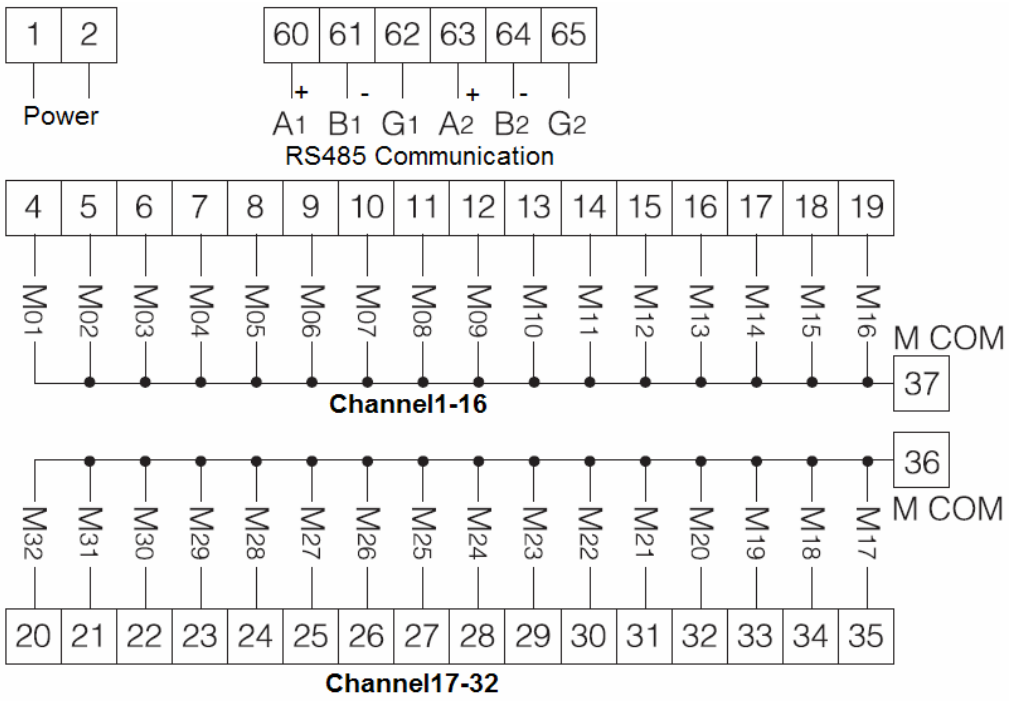
4. Fix and wire

*4.1 Size: 160 × 50 ×110mm (L*W*H)*

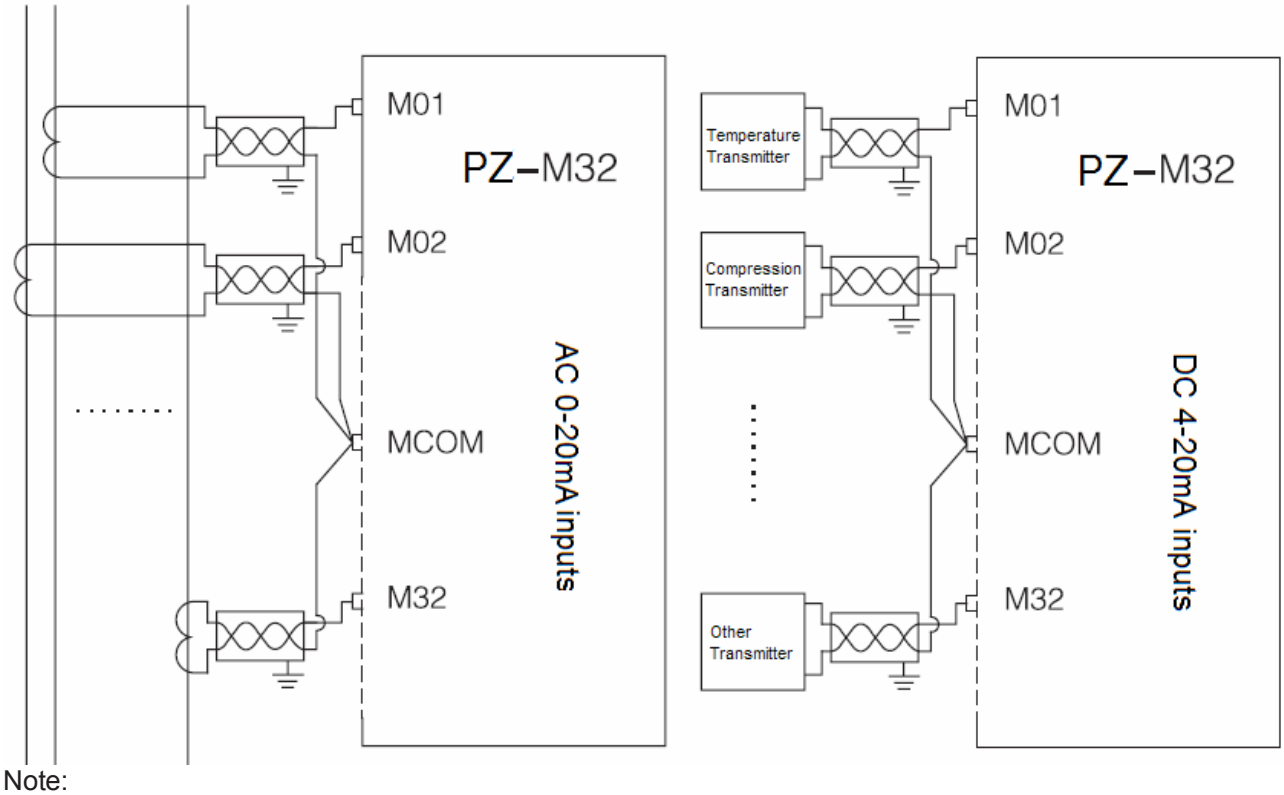




4.2 Fixing: standard DIN TS35



4.3 The application example:



Note:

1. To avoid the error from the resistance of input wire, the negative poles of 1-16 analog inputs connect MCOM point 37; and the negative poles of 17-32 analog inputs connect MCOM point 36.
2. We propose that the wire is STP and its shielding layer should be connect to earth.

4.4 The description of LED for analog input alarm

PZ-M32 can indicate the states of all the analog inputs. By 2 Rs485 communications, we can set maximal and minimal values alarms as well as the delay of alarms. It has 32 LED with 3 colors to match each analog input.

Description LED:

OFF: no input

Green: work well, the analog input value is between maximal and minimal alarms.

Red: on the state of maximal value.

Orange: on the state of minimal value.

5. RS485 Communication

5.1 The list of registers

Register Code	Items	R/W	Remark	Format
00	Meter code	R	203 (PZ-M32)	Unsigned int
01	Software version	R		Unsigned int
02	Slave device address	R/W	1-247	Unsigned int
03	Baud rate	R/W	1200,2400,4800,9600,19200, 38400	Unsigned int
04	Parity mode (Note1)	R/W	DIP switch 0,1,2,3	Unsigned int
05	Reserved			
06	The state of alarm of 16^{th} – 1^{st} way	R	Bit15=16^{th}; bit0= 1^{st} (1=on, 0=off)	Unsigned int
07	The state of alarm of 32^{nd} – 17^{th} way	R	Bit15=32^{nd}; bit0= 17^{th} (1=on, 0=off)	Unsigned int
08	The state of 8^{th} – 1^{st} way	R	Register08: bit1, bit0 for 1^{st} way Bit3, bit4 for 2^{nd} way Bit5, bit6 for 3^{rd} way Bit7, bit8 for 4^{th} way …… 1,1= no signal 0,1= alarm of maximal value 1,0= good work without alarm 0,0= alarm of minimal value	Unsigned int
09	The state of 16^{th} – 9^{th} way	R		Unsigned int
10	The state of 24^{th} – 17^{th} way	R		Unsigned int
11	The state of 32^{nd} – 25^{th} way	R		Unsigned int
12	Reserved			
13	Input value of 1^{st} way	R	Their value (-32768~32767). It is the value of current or voltage. If the input is 0-20mA, the read value is 20000, it signs 20.000mA. If the input is 0-5V, the read value is 5000, it signs 5.000V	int
14	Input value of 2^{nd} way	R		int
15	Input value of 3^{rd} way	R		Int
16	Input value of 4^{th} way	R		Int
17	Input value of 5^{th} way	R		int
18	Input value of 6^{th} way	R		int
19	Input value of 7^{th} way	R		int
20	Input value of 8^{th} way	R		Int
21	Input value of 9^{th} way	R		Int
22	Input value of 10^{th} way	R		int
23	Input value of 11^{th} way	R		int
24	Input value of 12^{th} way	R		int
25	Input value of 13^{th} way	R		Int
26	Input value of 14^{th} way	R		Int
27	Input value of 15^{th} way	R		int
28	Input value of 16^{th} way	R		int
29	Input value of 17^{th} way	R		int
30	Input value of 18^{th} way	R		Int
31	Input value of 19^{th} way	R		Int
32	Input value of 20^{th} way	R		int

33	Input value of 21st way	R		int
34	Input value of 22nd way	R		int
35	Input value of 23rd way	R		Int
36	Input value of 24th way	R		Int
37	Input value of 25th way	R		int
38	Input value of 26th way	R		int
39	Input value of 27th way	R		int
40	Input value of 28th way	R		Int
41	Input value of 29th way	R		Int
42	Input value of 30th way	R		int
43	Input value of 31st way	R		int
44	Input value of 32nd way	R		int
45	Maximal value of alarm of 1st way	R/W		Int
46	Maximal value of alarm of 2nd way	R/W		Int
47	Maximal value of alarm of 3rd way	R/W		int
48	Maximal value of alarm of 4th way	R/W		int
49	Maximal value of alarm of 5th way	R/W		int
50	Maximal value of alarm of 6th way	R/W		Int
51	Maximal value of alarm of 7th way	R/W		Int
52	Maximal value of alarm of 8th way	R/W		int
53	Maximal value of alarm of 9th way	R/W		int
54	Maximal value of alarm of 10th way	R/W		int
55	Maximal value of alarm of 11th way	R/W		Int
56	Maximal value of alarm of 12th way	R/W		Int
57	Maximal value of alarm of 13th way	R/W	Their value (-32768~32767). When the input value passes this value and the time passes the delay of alarm, the alarm LED will turn on. If you needn't the alarm on this channel, please its set value is 32767.	int
58	Maximal value of alarm of 14th way	R/W		int
59	Maximal value of alarm of 15th way	R/W		int
60	Maximal value of alarm of 16th way	R/W		Int
61	Maximal value of alarm of 17th way	R/W		Int
62	Maximal value of alarm of 18th way	R/W		int
63	Maximal value of alarm of 19th way	R/W		int
64	Maximal value of alarm of 20th way	R/W		int
65	Maximal value of alarm of 21st way	R/W		Int
66	Maximal value of alarm of 22nd way	R/W		Int
67	Maximal value of alarm of 23rd way	R/W		int
68	Maximal value of alarm of 24th way	R/W		int
69	Maximal value of alarm of 25th way	R/W		int
70	Maximal value of alarm of 26th way	R/W		Int
71	Maximal value of alarm of 27th way	R/W		Int
72	Maximal value of alarm of 28th way	R/W		int
73	Maximal value of alarm of 29th way	R/W		int
74	Maximal value of alarm of 30th way	R/W		int
75	Maximal value of alarm of 31st way	R/W		Int
76	Maximal value of alarm of 32nd way	R/W		Int
77	Minimal value of alarm of 1st way	R/W	Their value (-32768~32767). When the input value lowers this value and the time passes the delay of alarm, the alarm LED will turn on. If you needn't the alarm on this channel, please its set value is -32767.	int
78	Minimal value of alarm of 2nd way	R/W		int
79	Minimal value of alarm of 3rd way	R/W		int
80	Minimal value of alarm of 4th way	R/W		Int
81	Minimal value of alarm of 5th way	R/W		Int
82	Minimal value of alarm of 6th way	R/W		int
83	Minimal value of alarm of 7th way	R/W		int
84	Minimal value of alarm of 8th way	R/W		int
85	Minimal value of alarm of 9th way	R/W		Int
86	Minimal value of alarm of 10th way	R/W		Int

87	Minimal value of alarm of 11th way	R/W		int
88	Minimal value of alarm of 12th way	R/W		int
89	Minimal value of alarm of 13th way	R/W		int
90	Minimal value of alarm of 14th way	R/W		Int
91	Minimal value of alarm of 15th way	R/W		Int
92	Minimal value of alarm of 16th way	R/W		int
93	Minimal value of alarm of 17th way	R/W		int
94	Minimal value of alarm of 18th way	R/W		int
95	Minimal value of alarm of 19th way	R/W		Int
96	Minimal value of alarm of 20th way	R/W		Int
97	Minimal value of alarm of 21st way	R/W		int
98	Minimal value of alarm of 22nd way	R/W		int
99	Minimal value of alarm of 23rd way	R/W		int
100	Minimal value of alarm of 24th way	R/W		Int
101	Minimal value of alarm of 25th way	R/W		Int
102	Minimal value of alarm of 26th way	R/W		int
103	Minimal value of alarm of 27th way	R/W		int
104	Minimal value of alarm of 28th way	R/W		int
105	Minimal value of alarm of 29th way	R/W		Int
106	Minimal value of alarm of 30th way	R/W		Int
107	Minimal value of alarm of 31st way	R/W		int
108	Minimal value of alarm of 32nd way	R/W		int
109	Delay of alarm of 1st way	R/W	Between 0-65535 seconds	Unsigned int
110	Delay of alarm of 2nd way	R/W		Unsigned int
111	Delay of alarm of 3rd way	R/W		Unsigned int
112	Delay of alarm of 4th way	R/W		Unsigned int
113	Delay of alarm of 5th way	R/W		Unsigned int
114	Delay of alarm of 6th way	R/W		Unsigned int
115	Delay of alarm of 7th way	R/W		Unsigned int
116	Delay of alarm of 8th way	R/W		Unsigned int
117	Delay of alarm of 9th way	R/W		Unsigned int
118	Delay of alarm of 10th way	R/W		Unsigned int
119	Delay of alarm of 11th way	R/W		Unsigned int
120	Delay of alarm of 12th way	R/W		Unsigned int
121	Delay of alarm of 13th way	R/W		Unsigned int
122	Delay of alarm of 14th way	R/W		Unsigned int
123	Delay of alarm of 15th way	R/W		Unsigned int
124	Delay of alarm of 16th way	R/W		Unsigned int
125	Delay of alarm of 17th way	R/W		Unsigned int
126	Delay of alarm of 18th way	R/W		Unsigned int
127	Delay of alarm of 19th way	R/W		Unsigned int
128	Delay of alarm of 20th way	R/W		Unsigned int
129	Delay of alarm of 21st way	R/W		Unsigned int
130	Delay of alarm of 22nd way	R/W		Unsigned int
131	Delay of alarm of 23rd way	R/W		Unsigned int
132	Delay of alarm of 24th way	R/W		Unsigned int
133	Delay of alarm of 25th way	R/W		Unsigned int
134	Delay of alarm of 26th way	R/W		Unsigned int
135	Delay of alarm of 27th way	R/W		Unsigned int
136	Delay of alarm of 28th way	R/W		Unsigned int
137	Delay of alarm of 29th way	R/W		Unsigned int
138	Delay of alarm of 30th way	R/W		Unsigned int
139	Delay of alarm of 31st way	R/W		Unsigned int
140	Delay of alarm of 32nd way	R/W		Unsigned int

Note:
1. Read register: by order 03/04
2. Write each register: by order 06
3. Write multi registers by order 16 (10H)
4. Read and write operation can be done by COMM1 and COMM2.

5.2 Read 32 states of alarm. (read by order 01 or order 02 and by COMM1)

Register	Content	Format	R/W	Order	Value
0000	Alarm1	bit	R	01/02	1=ON 0=OFF
0001	Alarm2	bit	R	01/02	1=ON 0=OFF
0002	Alarm3	bit	R	01/02	1=ON 0=OFF
0003	Alarm4	bit	R	01/02	1=ON 0=OFF
0004	Alarm5	bit	R	01/02	1=ON 0=OFF
0005	Alarm6	bit	R	01/02	1=ON 0=OFF
0006	Alarm7	bit	R	01/02	1=ON 0=OFF
0007	Alarm8	bit	R	01/02	1=ON 0=OFF
0008	Alarm9	bit	R	01/02	1=ON 0=OFF
0009	Alarm10	bit	R	01/02	1=ON 0=OFF
0010	Alarm11	bit	R	01/02	1=ON 0=OFF
0011	Alarm12	bit	R	01/02	1=ON 0=OFF
0012	Alarm13	bit	R	01/02	1=ON 0=OFF
0013	Alarm14	bit	R	01/02	1=ON 0=OFF
0014	Alarm15	bit	R	01/02	1=ON 0=OFF
0015	Alarm16	bit	R	01/02	1=ON 0=OFF
0016	Alarm17	bit	R	01/02	1=ON 0=OFF
0017	Alarm18	bit	R	01/02	1=ON 0=OFF
0018	Alarm19	bit	R	01/02	1=ON 0=OFF
0019	Alarm20	bit	R	01/02	1=ON 0=OFF
0020	Alarm21	bit	R	01/02	1=ON 0=OFF
0021	Alarm22	bit	R	01/02	1=ON 0=OFF
0022	Alarm23	bit	R	01/02	1=ON 0=OFF
0023	Alarm24	bit	R	01/02	1=ON 0=OFF
0024	Alarm25	bit	R	01/02	1=ON 0=OFF
0025	Alarm26	bit	R	01/02	1=ON 0=OFF
0026	Alarm27	bit	R	01/02	1=ON 0=OFF
0027	Alarm28	bit	R	01/02	1=ON 0=OFF
0028	Alarm29	bit	R	01/02	1=ON 0=OFF
0029	Alarm30	bit	R	01/02	1=ON 0=OFF
0030	Alarm31	bit	R	01/02	1=ON 0=OFF
0031	Alarm32	bit	R	01/02	1=ON 0=OFF

Note:
1=ON (With alarm); 0=OFF (Without alarm)

5.3 Imperative alarm

Register	Content	Format	R/W	Order	Value
0000	Alarm1	bit	W	05	0xff00=ON 0x0000=OFF
0001	Alarm2	bit	W	05	0xff00=ON 0x0000=OFF
0002	Alarm3	bit	W	05	0xff00=ON 0x0000=OFF
0003	Alarm4	bit	W	05	0xff00=ON 0x0000=OFF
0004	Alarm5	bit	W	05	0xff00=ON 0x0000=OFF
0005	Alarm6	bit	W	05	0xff00=ON 0x0000=OFF
0006	Alarm7	bit	W	05	0xff00=ON 0x0000=OFF
0007	Alarm8	bit	W	05	0xff00=ON 0x0000=OFF
0008	Alarm9	bit	W	05	0xff00=ON 0x0000=OFF
0009	Alarm10	bit	W	05	0xff00=ON 0x0000=OFF
0010	Alarm11	bit	W	05	0xff00=ON 0x0000=OFF
0011	Alarm12	bit	W	05	0xff00=ON 0x0000=OFF
0012	Alarm13	bit	W	05	0xff00=ON 0x0000=OFF
0013	Alarm14	bit	W	05	0xff00=ON 0x0000=OFF
0014	Alarm15	bit	W	05	0xff00=ON 0x0000=OFF
0015	Alarm16	bit	W	05	0xff00=ON 0x0000=OFF
0016	Alarm17	bit	W	05	0xff00=ON 0x0000=OFF
0017	Alarm18	bit	W	05	0xff00=ON 0x0000=OFF
0018	Alarm19	bit	W	05	0xff00=ON 0x0000=OFF
0019	Alarm20	bit	W	05	0xff00=ON 0x0000=OFF
0020	Alarm21	bit	W	05	0xff00=ON 0x0000=OFF
0021	Alarm22	bit	W	05	0xff00=ON 0x0000=OFF
0022	Alarm23	bit	W	05	0xff00=ON 0x0000=OFF
0023	Alarm24	bit	W	05	0xff00=ON 0x0000=OFF
0024	Alarm25	bit	W	05	0xff00=ON 0x0000=OFF
0025	Alarm26	bit	W	05	0xff00=ON 0x0000=OFF
0026	Alarm27	bit	W	05	0xff00=ON 0x0000=OFF
0027	Alarm28	bit	W	05	0xff00=ON 0x0000=OFF
0028	Alarm29	bit	W	05	0xff00=ON 0x0000=OFF
0029	Alarm30	bit	W	05	0xff00=ON 0x0000=OFF
0030	Alarm31	bit	W	05	0xff00=ON 0x0000=OFF
0031	Alarm32	bit	W	05	0xff00=ON 0x0000=OFF

5.4 Examples

Examples1

Read 1st channel analog value on device02 (by order 03H)
Request: 0x02,0x03,0x00,0x0D,0x00,0x01,0x15,0Xc9
Reply: 0x02,0x03,0x02,0x13,0x00,0Xb5,0x74
Explanation: On device02, its 1st analog input value is 4.864.

Examples2

Set the maximal value of 1st alarm on device01 (by order 06H)
Request: 0x01,0x06,0x00,0x2D,0x3E,0x80,0x09,0xC9
Reply: 0x01,0x06,0x00,0x2D,0x3E,0x80,0x09,0xC9
Explanation: set the maximal value of 1st alarm as 16.000

Examples3

Read the states from 1st channel to 5th channel on device01 (by order 02H)
Request: 0x01,0x02,0x00,0x00,0x00,0x05,0xFC,0x09
Reply: 0x01,0x02,0x01,0x0C,0x51,0x8D
Explanation: 0C to binary is 01100. That's to say that there are 2 alarms, channel 3rd, 4th. Others work normally.

6. Others

6.1 DIP Switch setting

6.1.1 DIP definition

1	2	3	4	5	6	7	8	9	10
Address setting					Baud rate setting		Mode setting	communication	
1	0	0	0	0	0	0	0	0	0

6.2.1 Address setting

DIP1	DIP2	DIP3	DIP4	DIP5	Address
1	0	0	0	0	1
0	1	0	0	0	2
31					
1	1	1	1	1	31
0	0	0	0	0	32

6.1.3 Baud rate setting

Baud rate	DIP6	DIP7
9600 bps	0	0
4800 bps	1	0
2400 bps	0	1
1200 bps	1	1

6.1.4 Mode setting

	DIP8	Note: when reset DIP8, have to reset address and baud rate, then the PZ-K32 can work under new mode.
Setting address and baud rate locally	0	
Setting address and baud rate by PC	1	

6.1.5 Data format setting

Format	DIP9	DIP10
10 bits: 1 start, 8 data, 1 stop	0	0
11bits: 1 start, 8 data, 2 stop	1	0
11bits: 1 start, 8 data, even parity, 1 stop	0	1
11bits: 1 start, 8 data, odd parity, 1 stop	1	1

Note: the explanation of DIP: 1(off), 0(on)

6.2 Function data

6.2.1 The reply format when receiving error order

PC read (MODBUS 01H/02H)			
Address	Error function	Error data	CRC
Byte	Byte	Byte	Word
XX	XX(Demand code + 08H)	01H, 02H, 03H, 04H	XXXX (CRC value)

Definition of error code
01 error function code
02 error position of data
03 error value
04 the rupture of slave

6.2.2 The 01H/02H order code

PC master request (MODBUS 01H/02H)				
Code	Function	Address	Data	CRC
Byte	Byte	Word	Word	Word
XX	XX(01H/02H)	XXXX	XXXX	XXXX (CRC value)

Slave reply (MODBUS 01H/02H)				
Code	Function	Data length	Data	CRC
Byte	Byte	Byte	N Byte	Word
XX	XX(01H/02H)	XX	XXXX….	XXXX (CRC value)

Error slave reply (MODBUS 81H/82H)			
Code	Error function	Error Data	CRC
Byte	Byte	Byte	Word
XX	XX(81H/82H)	XX(02H error address, 03H error data)	XXXX (CRC value)

6.2.3 The 03H/04H order code

PC master request (MODBUS 03H/04H)				
Code	Function	Start address	Data	CRC
Byte	Byte	Word	Word	Word
XX	XX(03H/04H)	XXXX	XXXX (N)	XXXX (CRC value)

Slave reply (MODBUS 03H/04H)				
Code	Function	Data length	Data	CRC
Byte	Byte	Byte	2*N Byte	Word
XX	XX(03H/04H)	XX (2*N)	XXXX….	XXXX (CRC value)

Error slave reply (MODBUS 83H/84H)			
Code	Error function	Error Data	CRC
Byte	Byte	Byte	Word
XX	XX(83H/84H)	XX(02H error address, 03H error data)	XXXX (CRC value)

6.2.4 The 05H order code

PC master request (MODBUS 05H)				
Code	Function	Address	Data	CRC
Byte	Byte	Word	Word	Word
XX	XX(05H)	XXXX	OFF00H or 000H	XXXX (CRC value)

Slave reply (MODBUS 05H)				
Code	Function	Data length	Data	CRC
Byte	Byte	Byte	2*N Byte	Word
XX	XX(05H)	XX (as PC read)	XXXX(as PC read)	XXXX (CRC value)

Error slave reply (MODBUS 85H)			
Code	Error function	Error Data	CRC
Byte	Byte	Byte	Word
XX	XX(85H)	XX(02H error address, 03H error data)	XXXX (CRC value)

6.2.5 The 06H order code

PC write one data (MODBUS 06H)				
Code	Function	Start Address	Data	CRC
Byte	Byte	Word	Word	Word
XX	XX(06H)	XXXX	XXXX	XXXX (CRC value)
Error Slave reply (MODBUS 06H)				
Code	Function	Start Address	Data	CRC
Byte	Byte	Word	Word	Word
XX	XX(06H)	XXXX	XXXX	XXXX (CRC value)

Error slave reply (MODBUS 86H)			
Code	Error function	Error Data	CRC
Byte	Byte	Byte	Word
XX	XX(86H)	XX(02H error address, 03H error data, 04H no wrote)	XXXX (CRC value)

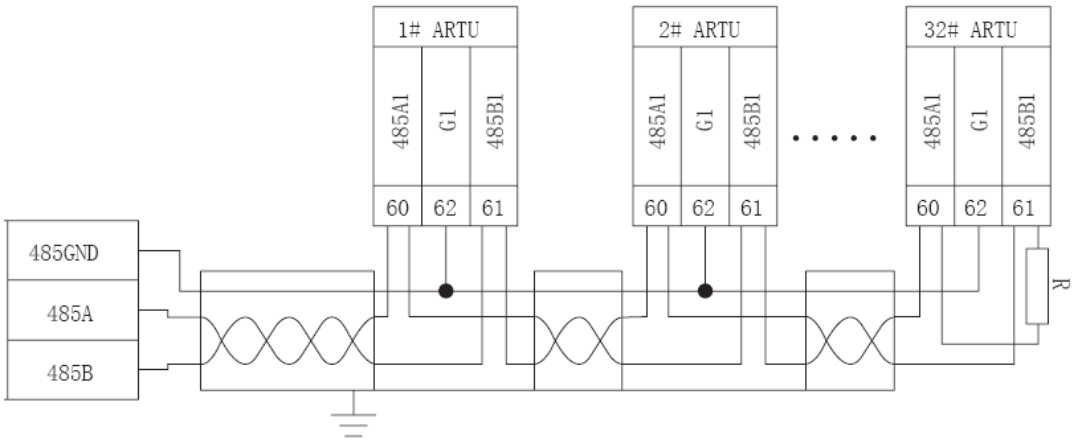
6.2.6 The 10H order code

PC write multi data (MODBUS 16(10H))						
Code	Function	Start Address	Data number	Data length	Data	CRC
Byte	Byte	Word	Word	Byte	2*N bytes	Word
XX	XX(06H)	XXXX	XXXX(n)	XX (2*N)	XXXX	XXXX (CRC value)

Slave reply (MODBUS 16(10H))				
Code	Function	Start Address	Data number	CRC
Byte	Byte	Word	Word	Word
XX	XX(10H)	XXXX	XXXX	XXXX (CRC value)

Error slave reply (MODBUS 90H)			
Code	Error function	Error Data	CRC
Byte	Byte	Byte	Word
XX	XX(90H)	XX(02H error address, 03H error data, 04H no wrote)	XXXX (CRC value)

6.3 Connection mode:



Note: When in a network, there are several PZ-K32, the connectors A and B of last PZ-K32 have to parallel one terminal R (120ohm~10kohm) to assure suitable communication resistance. According to the wiring, the terminal R is different.
In the schema above, use 3 cores cable, Shield connects GND; the connect G1 of each equipment parallel.

6.4 Adjustment and maintenance

6.4.1 Adjustment

Check whether the wiring is OK;
After powered, the power LED is ON, the running LED is glittering, and the interval is 1s.
Setting communication
Wire RS485 cable and to PC
After PC read the slave according to its address and baud rate, the communication LED glitters. The communication has realized.

6.4.1 Maintenance

Check power cable
Check the power LED on
Check the running LED on. If off, the unit doesn't work
Check the communication LED on.
Set the PC read interval. Because the bus is half-duplex, the PC should be set the suitable read interval, which is defined by the length of demand / answer order and baud rate. If the interval is not good, the communication maybe is not realized.