Remote Terminal Unit

PZ-J16

(16 relay outputs DO)

Version: 20100524

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1. General

The PZ-J16 Unit has 16 relay outputs which are either pulse output or the self-retain output. In the pulse type, the relay contact closes for seconds and then automatically releases. In the self-retain type, the relay output remains closed or open on a long-term basis. The unit is connected to the upper computer through an RS485 bus to perform its intended control functions.

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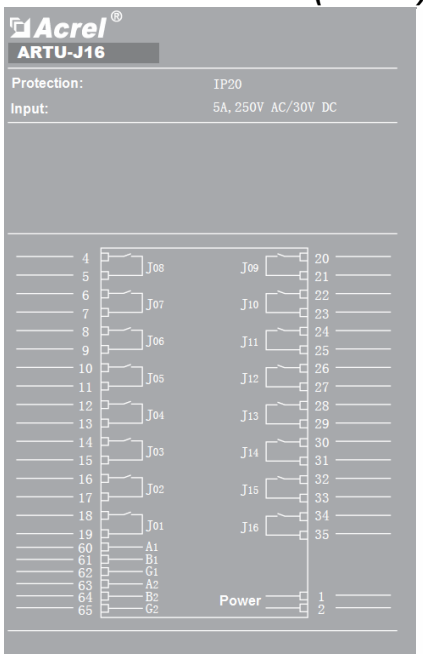
2. Norms

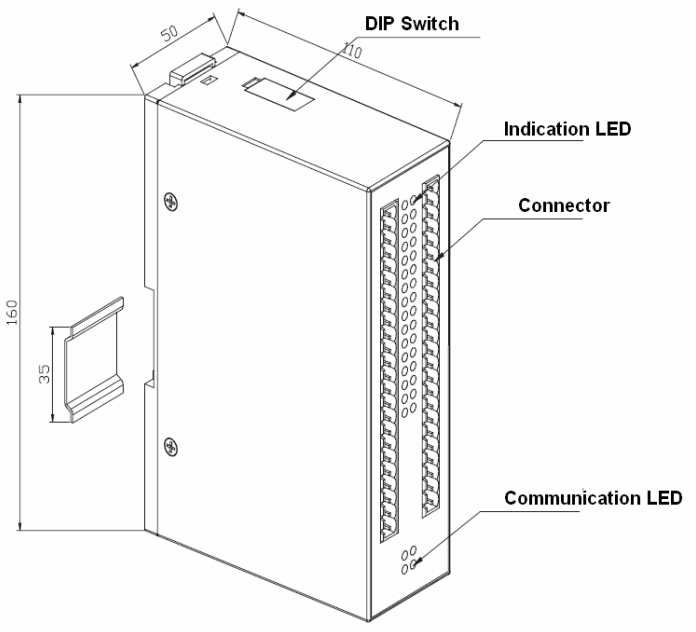
IEC61000-4-2	(EN61000-4-2)	Personnel Electrostatic Discharge Immunity
IEC61000-4-3	(EN61000-4-3)	Testing and measurement techniques - Radiated
IEC61000-4-4	(EN61000-4-4)	Electrical fast transient burst immunity test
IEC61000-4-5	(EN61000-4-5)	Combination wave and surge impulse test
IEC61000-4-6	(EN61000-4-6)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

3. Technical Feature

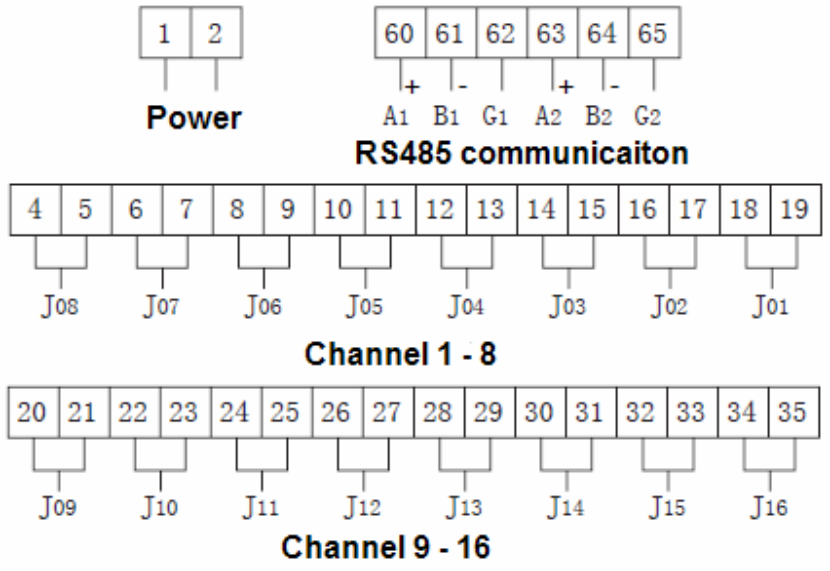
Feature		Value
Output	16 Signals	16 relay outputs
	Relay capacity	5A/250vAC or 5A/30vDC
	Mode	pulse or self-retain
Power Supply	Voltage range	24VDC (18~36VDC); AC/DC 80-270V (Order special)
	Consumption	≤ 5W
Communication	Bus Mode	2-wires half-duplex RS485/Modbus protocol
	Bus Capacity	≤ 32
	Response Time	20ms
	Baud rate	9600 / 4800 / 2400 / 1200 bps
Capacity of Sequence of Events (SOE)		≤1600
Others	Degree of Protection	IP40, Terminal IP20
	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

4.1 Size: 160 × 50 ×110mm (L*W*H)

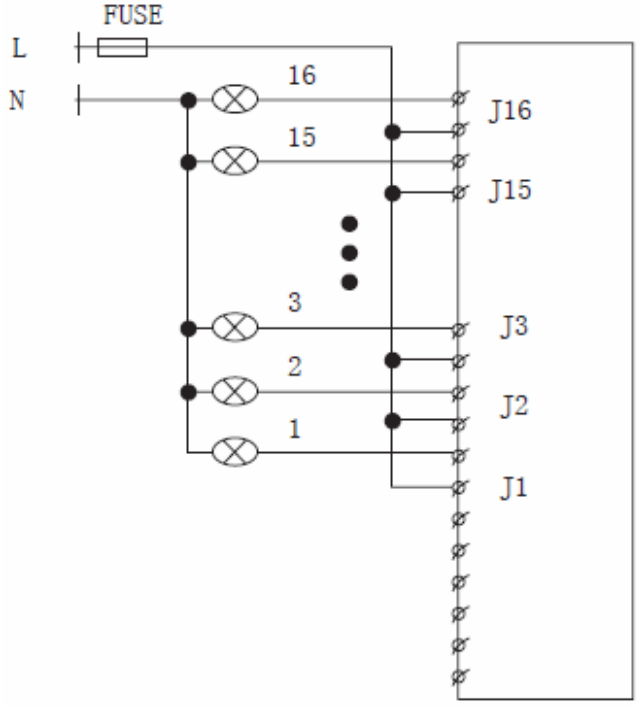




4.2 Fixing: standard DIN TS35



4.3 The application example:



PZ-J16 controls signal light

5. RS485 Communication

5.1 The list of registers

Register code	Items	R/W	Order	Byte	Port
00	Meter code	R	03 / 04	2	
01	Software version	R	03 / 04	2	
02	Slave device address	R/W	03 / 04 /16	2	COMM2
03	Baud rate	R/W	03 / 04 /16	2	COMM2
04	Parity mode (Note1)	R/W	03 / 04 /16	2	COMM2
05	Time: second, minute	R/W	03 / 04 /16	2	COMM2
06	Date: hour, Day	R/W	03 / 04 /16	2	COMM2
07	Date: Month, Year	R/W	03 / 04 /16	2	COMM2
08	Allow clock: (1: yes, 0: no)	R/W	03 / 04 /16	2	COMM2
09	Reserved				
10	Reserved				
11	SOE indexes (40-8035)	R	03 / 04	2	
12	Reserved				
13	Current time: second, minute	R	03 / 04	2	
14	Current date: hour, day	R	03 / 04	2	
15	Current date: month, year	R	03 / 04	2	
16	Reserved				
17	The states of 16 relays (Note2)	R/W	03 / 04 /16	2	COMM1
18	Reserved				
19	Reset of SOE (1-YES; 0-NO)	R/W	03 / 04 /16	2	COMM1
20	Duration of 1st relay (Note3)	R/W	03 / 04 /16	2	COMM1
21	Duration of 2nd relay	R/W	03 / 04 /16	2	COMM1
22	Duration of 3rd relay	R/W	03 / 04 /16	2	COMM1
23	Duration of 4th relay	R/W	03 / 04 /16	2	COMM1
24	Duration of 5th relay	R/W	03 / 04 /16	2	COMM1
25	Duration of 6th relay	R/W	03 / 04 /16	2	COMM1
26	Duration of 7th relay	R/W	03 / 04 /16	2	COMM1
27	Duration of 8th relay	R/W	03 / 04 /16	2	COMM1
28	Duration of 9th relay	R/W	03 / 04 /16	2	COMM1
29	Duration of 10th relay	R/W	03 / 04 /16	2	COMM1
30	Duration of 11th relay	R/W	03 / 04 /16	2	COMM1
31	Duration of 12th relay	R/W	03 / 04 /16	2	COMM1
32	Duration of 13th relay	R/W	03 / 04 /16	2	COMM1
33	Duration of 14th relay	R/W	03 / 04 /16	2	COMM1
34	Duration of 15th relay	R/W	03 / 04 /16	2	COMM1
35	Duration of 16th relay	R/W	03 / 04 /16	2	COMM1
36	Reserved				
37					
38					
39					
40	The changes of relays of 1st SOE (Note4)	R/W	03 / 04 /16	2	
41	The time of 1st SOE (ss:mm)	R/W	03 / 04 /16	2	
42	The time of 1st SOE (hh:dd)	R/W	03 / 04 /16	2	
43	The time of 1st SOE (mm:yy)	R/W	03 / 04 /16	2	
44	Duration of relay in 1st SOE (unit: ms)	R/W	03 / 04 /16	2	
45	The changes of relays of 2nd SOE (unit: ms)	R/W	03 / 04 /16	2	
46	The time of 2nd SOE (ss:mm)	R/W	03 / 04 /16	2	
47	The time of 2nd SOE (hh:dd)	R/W	03 / 04 /16	2	
48	The time of 2nd SOE (mm:yy)	R/W	03 / 04 /16	2	
49	Duration of relay in 2nd SOE (unit: ms)	R/W	03 / 04 /16	2	

	……..				
8035	The changes of relays of 1600th SOE (unit: ms)	R/W	03 / 04 /16	2	
8036	The time of 1600th SOE (ss:mm)	R/W	03 / 04 /16	2	
8037	The time of 1600th SOE (hh:dd)	R/W	03 / 04 /16	2	
8038	The time of 1600th SOE (mm:yy)	R/W	03 / 04 /16	2	
8039	Duration of relay in 1600th SOE (unit: ms)	R/W	03 / 04 /16	2	

Note1:

Parity mode:

01: 10 bits (1 start, 8 data, 1 stop)

02: Reserved

03: 11 bits (1 start, 8 data, even parity, 1 stop)

04: 11 bits (1 start, 8 data, odd parity stop)

Note2:

The states of 16 relays:

It is the current states of 16 relays

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
NC	NC	NC	NC	NC	NC	NC	NC	NC	NO	NO	NO	NO	NO	NO	NO

1 – NC (normal close)

0 – NO (normal open)

Note3:

Duration of relay:

Its range is 0-10000ms. (Default 0ms)

If it is 0ms, the relay is normal mode;

If it is >0ms, the relay is impulse output mode. The value is the width of impulse.

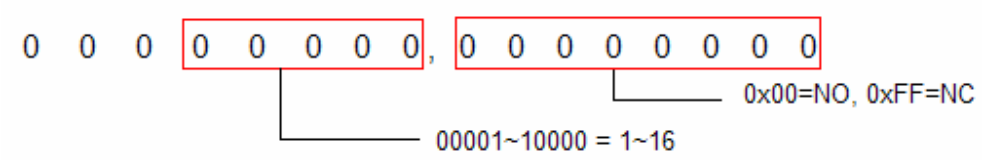
Note4:

There are 1600 SOE. Each SOE has 5 registers and 10 bytes. The first register is from register40.

For example:

40	The changes of relays of 1st SOE	
41	The time of 1st SOE (ss:mm)	23 45H
42	The time of 1st SOE (hh:dd)	12 30H
43	The time of 1st SOE (mm:yy)	07 07H
44	Duration of relay in 1st SOE (unit: ms)	03 45H

Register40:



00001010,11111111 means relay10 from NO to NC

Register41 / 42 / 43: the time of first SOE is 12:45:23, 30-07-2007

Register44: the first SOE was during Hex(345) 837ms

5.2 Read states of 16 relays. (read by order 01 and by COMM1)

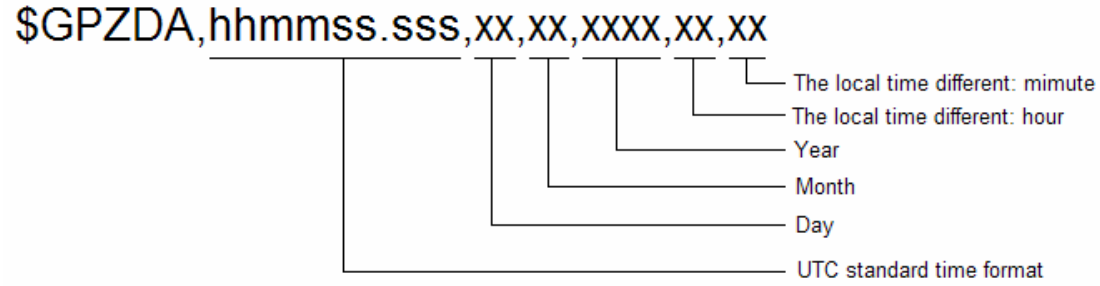
Register	Content	Format	R/W	Order	Value
0000	DO1	bit	R	01	1=NC 0=NO
0001	DO2	bit	R	01	1=NC 0=NO
0002	DO3	bit	R	01	1=NC 0=NO
0003	DO4	bit	R	01	1=NC 0=NO
0004	DO5	bit	R	01	1=NC 0=NO
0005	DO6	bit	R	01	1=NC 0=NO
0006	DO7	bit	R	01	1=NC 0=NO
0007	DO8	bit	R	01	1=NC 0=NO
0008	DO9	bit	R	01	1=NC 0=NO
0009	DO10	bit	R	01	1=NC 0=NO
0010	DO11	bit	R	01	1=NC 0=NO
0011	DO12	bit	R	01	1=NC 0=NO
0012	DO13	bit	R	01	1=NC 0=NO
0013	DO14	bit	R	01	1=NC 0=NO
0014	DO15	bit	R	01	1=NC 0=NO
0015	DO16	bit	R	01	1=NC 0=NO

5.3 Set states of 16 relays. (read by order 05 and by COMM1)

Register	Content	Format	R/W	Order	Value
0000	DO1	bit	W	05	0xFF00=NC 0x0000=NO
0001	DO2	bit	W	05	0xFF00=NC 0x0000=NO
0002	DO3	bit	W	05	0xFF00=NC 0x0000=NO
0003	DO4	bit	W	05	0xFF00=NC 0x0000=NO
0004	DO5	bit	W	05	0xFF00=NC 0x0000=NO
0005	DO6	bit	W	05	0xFF00=NC 0x0000=NO
0006	DO7	bit	W	05	0xFF00=NC 0x0000=NO
0007	DO8	bit	W	05	0xFF00=NC 0x0000=NO
0008	DO9	bit	W	05	0xFF00=NC 0x0000=NO
0009	DO10	bit	W	05	0xFF00=NC 0x0000=NO
0010	DO11	bit	W	05	0xFF00=NC 0x0000=NO
0011	DO12	bit	W	05	0xFF00=NC 0x0000=NO
0012	DO13	bit	W	05	0xFF00=NC 0x0000=NO
0013	DO14	bit	W	05	0xFF00=NC 0x0000=NO
0014	DO15	bit	W	05	0xFF00=NC 0x0000=NO
0015	DO16	bit	W	05	0xFF00=NC 0x0000=NO

5.4 GPS timing check

We can check the date and time of PZ-K32 by COMM2 in standard protocol NMEA and data format $GPZDA.



For example:

GPS sends: $GPZDA,020102.012,05,11,2007
(ASCII: 24 47 50 5A 44 41 2C 30 32 30 31 30 32 2E 30 31 32 2C 30 35 2C 31 31 2C 32 30 30 37 2C)
PZ-K32 is set as time (02:01:02) and date (November 5, 2007)

5.5 Examples

Examples1

Read the state from channel1 to channel5 on device01 (by order 01H)
Request: 0x01,0x01,0x00,0x00,0x00,0x05,0xFC,0x09
Reply: 0x01,0x01,0x01,0x0C,0x51,0x8D
Explanation: 0x0C to binary is 01100; the channel3 and channel4 are NC and others are NO.

Examples2

Read the state of all the relays on device01 (by order 01H)
Request: 0x01,0x01,0x00,0x00,0x00,0x10,0x3D,0xC6
Reply: 0x01,0x01,0x02,0x00,0x03,0xB9,0xFC
Explanation: 0x00,0x03 to binary is 0000,0000,0000,0011; the channel1 and channel2 are NC and others are NO.

Examples3

Read the state from channel5 to channel16 on device01 (by order 01H)
Request: 0x01,0x01,0x00,0x04,0x00,0x0C,0x7D,0xCE
Reply: 0x01,0x01,0x02,0x25,0x00,0xA3,0x6C
Explanation: 0x25,0x00 to binary is 0010,0101,0000,0000

0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0
12	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**16**	**15**	**14**	**13**

The reply state from 0x25 to 0x00, so the first bit of 0x25 is for channel5.
The channel5 ,7, 10 are NC and others are NO.

Examples4

Read the current time on device01 (by order 03H)
Request: 0x01,0x03,0x00,0x0D,0x00,0x03,0x94,0x08
Reply: 0x01,0x03,0x06,0x32,0x01,0x12,0x05,0x11,0x07,0xD1,0xCB
Explanation: read device01 time as 12:01:32 and November 5, 2007
Request: 0x01,0x04,0x00,0x0D,0x00,0x03,0x21,0xC8
Reply: 0x01,0x04,0x06,0x09,0x29,0x15,0x05,0x11,0x07,0x64,0x53
Explanation: read device01 time as 15:29:09 and November 5, 2007

Examples5

Set relay1 close on device01 (by order 05H)
Request: 0x01,0x05,0x00,0x00,0xFF,0x00,0x8C,0x3A
Reply: 0x01,0x05,0x00,0x00,0xFF,0x00,0x8C,0x3A

Examples6

Set relay1 open on device01 (by order 05H)
Request: 0x01,0x05,0x00,0x00,0x00,0x00,0xCD,0xCA
Reply: 0x01,0x05,0x00,0x00,0x00,0x00,0xCD,0Xca

Examples7

Set all relays close on device01 (by order 10H)
Request: 0x01,0x10,0x00,0x11, 0x00,0x01,0x02,0xFF,xFF,0x00,0XAF,0XA1
Reply: 0x01,0x10,0x00,0x11,0x00,0x01,0X51,0xCC

Examples8

Set the current time on device01 (by order 10H)
Request: 0x01,0x10,0x00,0x05,0x00,0x04,0x08,0x12,0x14,0x10,0x21,0x09,0x07,0x00,0x01,0xA3,0xA8
Reply: 0x01,0x10,0x00,0x05,0x00,0x04,0xD1,0xCB
Explanation: Set device01 time as 10:14:12 and September 21,2007

Examples9

Set relay1 as pulse output on device01, its pulse width is 5000ms (by order 10H)
Request: 0x01,0x10,0x00,0x14,0x00,0x01,0x02,0x13,0x88,0xA8,0x12
Reply: 0x01,0x10,0x00,0x14,0x00,0x01,0x41,0xCD
Explanation: Set device of delay of contact input as 4ms

Examples10

Reset SOE on device01 (by order 10H)
Request: 0x01,0x10,0x00,0x13,0x00,0x01,0x02,0x00,0x01,0x65,0x33
Reply: 0x01,0x10,0x00,0x13,0x00,0x01,0Xf0,0x0C

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)

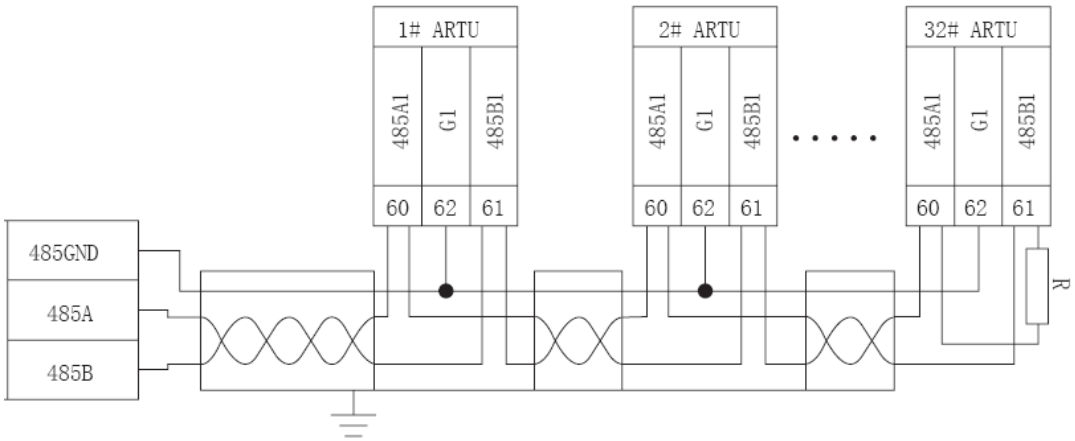
6.2.6 The 10H order code

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.