

RSI32 RCM32 RCU16

Technical Instruction

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RSI32



Fig.1 Appearance of RSI32

1 Overview

The RSI32 unit serves the function of collecting switch signals and converting them to digital signals for data exchange with MODBUS communication interface. It is used as the hardware unit of Remote Status Indication of ESD2000 Substation Supervisory & Control System. It is also applicable for other intelligent systems in which Remote Status Indication is required.



2 Features

The RSI32 unit allows the simultaneous collection of 32 passive switch signals. The unit is connected to upper computer with an RS485 interface and utilizes Polling for data exchange to reflect the switch status on a real-time basis. This unit can store the sequence of 32 events (SOE information), and therefore can accurately indicate the time of the switch status changes.

2.1 Photoelectric Isolating Input

The input takes place through photoelectric isolation, which guards the internal circuit against damage caused by possible external high voltage.

2.2 Switching Status Resolution

The Switching Status Resolution represents the ability of

the RSI32 to differentiate the successive dislocations of multiple contacts. The module is capable of differentiating the dislocation of any two contacts occurring less than 2ms apart, and indicating it in the SOE information.

2.3 Communication

The bus is in the two-wire half-duplex RS485 mode, capable of supporting up to 32 RSI32 units. The Shielded Twisted Pair (STP) is used for connection between units.

The communication interface is based on high-reliability lightning-proof port chips, which are capable of suppressing the transient overvoltage on the circuit resulting from lightning and other causes, thereby preventing damage to the interface and improving communication reliability.

The data transmission is based on the CRC circulating redundancy calibration which greatly improves the data reliability and enhances its anti-interference capability.

3 Technical Data

Input:	32 Passive Dry Contact			
Operational Supply:	24 VDC \pm 10%, Ripple Coefficient < 5%			
Power Consumption:	\leq 2.5W			
Bus Mode:	RS485			
Bus Capacity:	Up to 32 RSI32 Units			
Resolution of switch status:	< 2ms			
Teleindication Scanning Rate:	1ms			
Communication Response Time:	20ms			
Capacity of Sequence of Events (SOE):	32			
Communication Rate:	Selectable Rate 9600/4800/1200/600bit/s			
Module Address:	The range from 1 to 32; broadcast address - 0x00(0)			
Degree of Protection:	IP40, Terminal IP20			
Operational Temperature:	-5°C - 55°C			
Storage Temperature:	-25°C - 85°C			
Standards:	IEC61000-4-2:	1995	Electrostatic discharge immunity test	Level 3
	IEC61000-4-3:	1995	Radiated, radio-frequency, electromagnetic field immunity	Level 3
	IEC61000-4-4:	1995	Electrical fast transient pulse immunity test	Level 3
	IEC61000-4-5:	1995	Surge immunity test	Level 3
	EN55022:	1998	Information technology equipment(ITE)	Level B

4 Installation & Wiring

4.1 Dimension & Installation

Unit Dimension (L × W × H):

145 × 40 × 135mm

Installation: Standard Clip Track TS35 × 7.5

4.2 Unit Wiring

The terminal is indicated in Fig.2:

Terminal 37 is the common point of input connection. Terminal 38 is the protection earth point. Terminals 1-16 and 21-36 are the input terminals of the teleindication switch signals. All inputs of the switch signals must be passive dry contacts.

Terminals 19 and 20 are for RS485 connection. Terminals 17 and 18 are for shield of communication wire.

Terminals 39 and 40 are operational power supply terminals. Operational supply is 24VDC.

The four indicators are defined as follows:

TX: Communication Transmission Indicator. When the unit transmits data to the connected computer, this light blinks.

RX: Communication Reception Indicator. When the unit receives commands from the connected computer, this light blinks.

RUN: Running Indicator. When the unit is running normally, this light blinks per a second.

POWER: Power Indicator. When the power supply is normal, this light remains on.

4.3 Address, Communication mode and Communication Rate

The diagram Fig.3 shows the definition of the 10-digit dial-up of the RSI32 Unit.

The first five digits are the address bits of the address dial-up switches. The “6” and “7” digits are the setting bits for the communication mode. The last two digits “9” and “10” are the setting bits for the communication rate. “0” is for OFF and “1” is for ON.

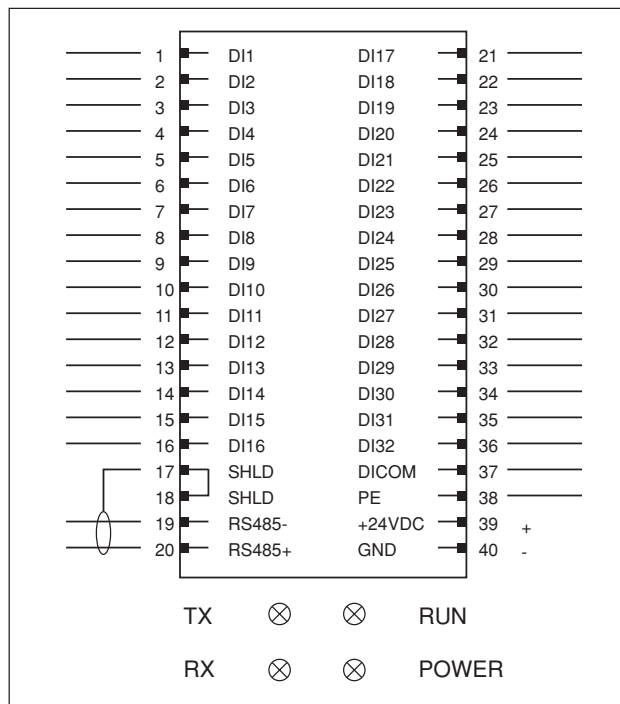


Fig.2 The Definition of RSI32 Terminals

Switches									
1	2	3	4	5	6	7	8	9	10
Address Setting					Com. Data Format Setting			Baud Rate Setting	
Address Setting									
1	2	3	4	5	Address	Remark			
1	0	0	0	0	1	OFF: 0 ON: 1			
0	1	0	0	0	2				
-	-	-	-	-	-				
1	1	1	1	1	31				
0	0	0	0	0	32				

Fig.3 The Definition of 10-digit Dial-up of The RSI32 Unit



No.s 1-5 of dial-up (SW) is for setting station numbers.

SW1	SW2	SW3	SW4	SW5	Address
1	0	0	0	0	1
0	1	0	0	0	2
-	-	-	-	-	-
0	1	1	1	1	30
1	1	1	1	1	31
0	0	0	0	0	32

Table: 4-1

No.s 6 and 7 of dial-up (SW) are for setting communication mode.

SW6	SW7	Communication Mode
0	0	10 bits: 1 start bit, 8 data bits, 1 stop bit
1	0	11 bits: 1 start bit, 8 data bits, even, 1 stop bit
0	1	11 bits: 1 start bit, 8 data bits, odd, 1 stop bit
1	1	11 bits: 1 start bit, 8 data bits, 2 stop bits

Table: 4-2

The last two digits “9” and “10” are the setting bits for the communication rate.

SW9	SW10	Baud Rate (bit/s)
0	0	9600
1	0	4800
0	1	1200
1	1	600

Table: 4-3

The status of dial-up (SW) is shown in Fig.4. If the ID address is 1, communication mode is 10 bits: 1 start bit, 8 data bits, 1 stop bit and the baud rate is 9600bps.

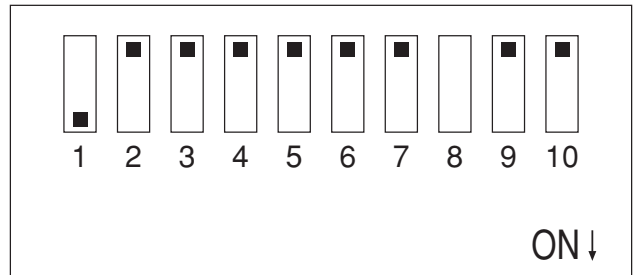


Fig.4 The Status of Dial-up (SW)

The status of dial-up (SW) is shown in Fig.5. If the ID address is 31, communication mode is 11bits: 1 start bit, 8 data bits, odd, 1 stop bit and the baud rate is 600bps.

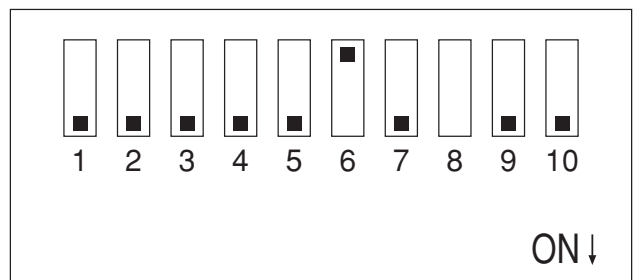


Fig.5 The Status of Dial-up (SW)

5 Testing & Maintenance

5.1 Usage

- 1) Make sure the power cable is properly connected before turning on the power.
- 2) When the power is turned on, the power indicator will illuminate and the running indicator will blink every second.
- 3) Setting Communication
 - a) Tie in the RS485 bus correctly and connect it to the upper computer.
 - b) The upper computer issues commands in the prescribed format according to the station number of the module and the Baud rate. The reception indicator (RX) should be blinking at this point.
 - c) When the transmission indicator (TX) of the module is blinking, it means that the module has responded to the command issued by the upper computer, and that communication has been established.
- 4) A terminal resistance should be connected with RS485+ and RS485- of the last RSI32 when more than one RSI32 units are used on a bus in order to assure communicational matching.

The resistance is about 120 Ω (RJ-1/8-120I).

5.2 Testing

- 1) Before turning on the power, make sure the power connection is correct.
- 2) After turning on the power, check the power indicator. If it does not illuminate, the power connection is faulty.
- 3) Check the running indicator. If it does not blink, the unit is not running correctly.
- 4) Prior to the connection to the upper computer, the TX and RX indicators are both off. When communication with the upper computer is underway, check the TX and RX indicators. The red indicates that the downward transmission of data is underway, and the green shows that the upward transmission of data is underway. Only after the communication has been properly established will the green indicator blink.
- 5) To test teleindication, connect the common terminals in the proper sequence to the input terminals; thereafter, check if the open and close statuses reflect their respective real status.
- 6) Setting the rogatory interval of the upper computer. Due to the half-duplex mode of the bus, the time must be appropriate to avoid failure of communication. The minimum interval is 60ms and the commendatory value is 100ms.

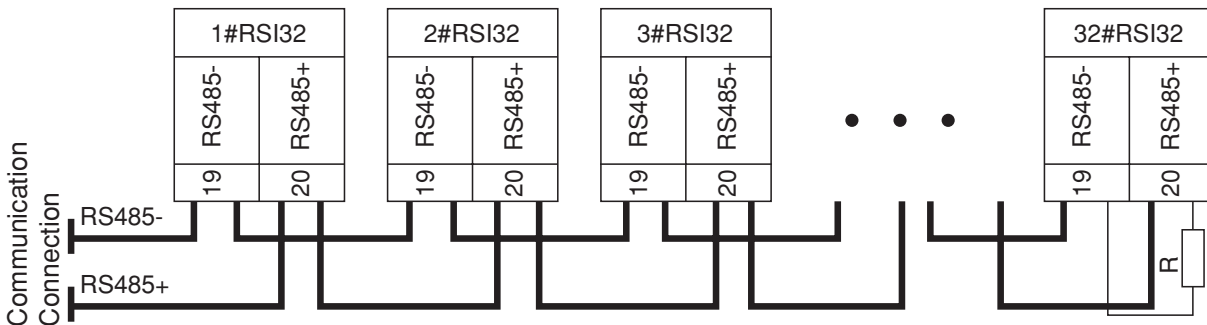


Fig.6 The Communication Connection of RSI32

RCM32



Fig.1 Appearance of RCM32

1 Overview

The RCM32 unit serves the function of metering analog signals and converting them to digital signals for data exchange with MODBUS communication interface. It is used as the hardware unit of remote metering of ESD2000 Substation Supervisory & Control System. It is also applicable for other intelligent system in which the remote metering of analog signals, like current, voltage, power, temperature, pressure and humidity etc, is required.

2 Features and Technical Data

The RCM32 unit allows the simultaneous collection of 32 0–20mA AC/DC or 0–2.5V DC analog signals. The unit is connected to the upper computer with an RS485 bus, and utilizes Polling for data exchange to reflect the value of the metered object on a real-time basis.

2.1 Technical Data

Input:	32 analog signals			
Input Mode:	0-20mA /AC, 4-20mA/DC, 0-2.5V(DC)			
Operational Power Supply:	24 VDC \pm 10%, Ripple Coefficient < 5%			
Power Consumption:	\leq 2.5W			
Bus Mode:	RS485			
Bus Capacity:	\leq 32			
Refreshing Rate:	< 1s			
Accuracy:	0.5%			
Communication Response Time:	20ms			
Communication Rate:	selectable rate 9600/4800/1200/600 bit/s			
Address:	The range from 1 to 32; broadcast address - 0x00			
Degree of Protection:	IP40, Terminal IP20			
Operational Temperature:	-5°C - 55°C			
Storage Temperature:	-25°C - 85°C			
Standards:	IEC61000-4-2:	1995	Electrostatic discharge immunity test	Level 3
	IEC61000-4-3:	1995	Radiated, radio-frequency, electromagnetic field immunity test	Level 3
	IEC61000-4-4:	1995	Electrical fast transient pulse immunity test	Level 3
	IEC61000-4-5:	1995	Surge immunity test	Level 3
	EN55022:	1998	Information technology equipment (ITE)	Level B

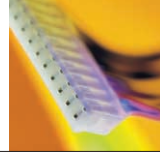
2.2 Communication

The bus is in the two-wire half-duplex RS485 mode, capable of supporting up to 32 RCM32 units. The Shielded Twisted Pair (STP) is used for connection between units.

The communication interface is based on high-reliability lightning-proof port chips, which are capable of suppressing the transient overvoltage

on the circuit resulting from lightning and other causes, thereby preventing damage to the interface and improving communication reliability.

The data transmission is based on the CRC circulating redundancy calibration which greatly improves the data reliability and enhances its anti-interference capability.



3 Installation & Wiring

3.1 Dimension & Installation

Unit Dimension: (L × W × H) :145 × 40 × 135mm
 Installation: Standard Clip Track TS35 × 7.5

3.2 Unit Wiring

The terminal is indicated in Fig.2:
 Terminal 37 is the common point of the analog signal connection. Terminal 38 is for protection earthing. Terminals 1–16 and 21–36 are the input terminals of the analog signals; all analog signals must be input in a manner consistent with applicable requirements.
 Terminals 19 and 20 are for RS485 connection. Terminals 17 and 18 are the ones for shield of communication wire.
 Terminals 39 and 40 are for power supply connection. The voltage of the power supply is 24V DC.

The four indicators are defined as follows:

- TX:** Communication Transmission Indicator. When the unit transmits data to the connected computer, this light blinks.
- RX:** Communication Reception Indicator. When the unit receives commands from the connected computer, this light blinks.
- RUN:** Running Indicator. When the unit is running normally, this light blinks per a second.
- POWER:** Power Indicator. When the power supply is normal, this light remains on.

The terminal connection is shown in Fig.3.

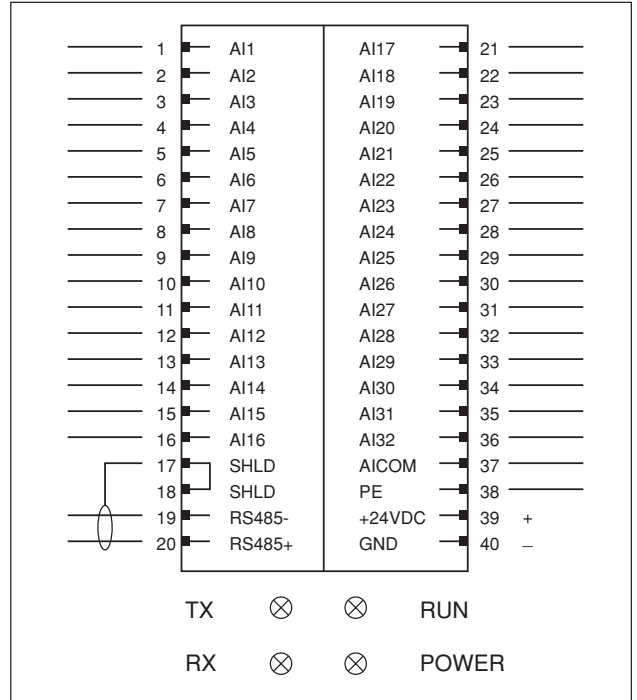


Fig.2 The Definition of RCM32 Terminals

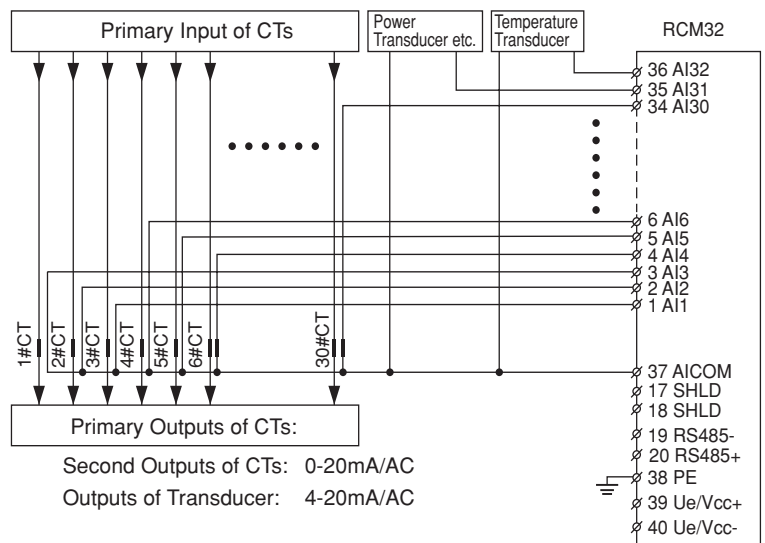


Fig.3 The Terminals Connection

3.3 Communication Connection

The communication connection of RCM32 is shown in Fig.4.

A terminal resistance should be connected to the RS485+ and RS485- communication parts of the last RCM32 Module of the communication loop in order to assure communicational matching. The resistance is about 120 Ω(RJ-1/8-120I).

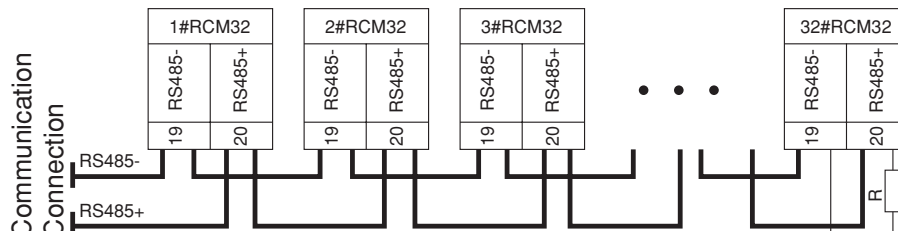


Fig.4 The Communication Connection of RCM32

3.4 Address, Communication mode and Communication Rate

The diagram Fig.5 shows the definition of the 10-digit dial-up of the RCM32 Unit.

The first five digits are the address bits of the address dial-up switches. The “6” and “7” digits are the setting bits for the communication mode. The last two digits “9” and “10” are the setting bits for the communication rate. “0” is for OFF and “1” is for ON.

Switches									
1	2	3	4	5	6	7	8	9	10
Address Setting					Com. Data Format Setting			Baud Rate Setting	
Address Setting									
1	2	3	4	5	Address		Remark		
1	0	0	0	0	1		OFF: 0 ON: 1		
0	1	0	0	0	2				
-	-	-	-	-	-				
1	1	1	1	1	31				
0	0	0	0	0	32				

Fig.5 The Definition of 10-digit Dial-up of The RCM32 Unit

No.s 1-5 of dial-up (SW) is for setting station numbers (1-32).

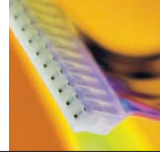
SW1	SW2	SW3	SW4	SW5	Address
1	0	0	0	0	1
0	1	0	0	0	2
-	-	-	-	-	-
0	1	1	1	1	30
1	1	1	1	1	31
0	0	0	0	0	32

No.s 6 and 7 of dial-up (SW) are for setting communication mode.

SW6	SW7	Communication Mode
0	0	10 bits: 1 start bit, 8 data bits, 1 stop bit
1	0	11 bits: 1 start bit, 8 data bits, even, 1 stop bit
0	1	11 bits: 1 start bit, 8 data bits, odd, 1 stop bit
1	1	11 bits: 1 start bit, 8 data bits, 2 stop bits

The last two digits “9” and “10” are the setting bits for the communication rate.

SW9	SW10	Baud Rate(bit/s)
0	0	9600
1	0	4800
0	1	1200
1	1	600



The status of dial-up (SW) is shown in Fig.6. If the ID address is 1, communication mode is 10 bits: 1 start bit, 8 data bits, 1 stop bit and the baud rate is 9600bps.

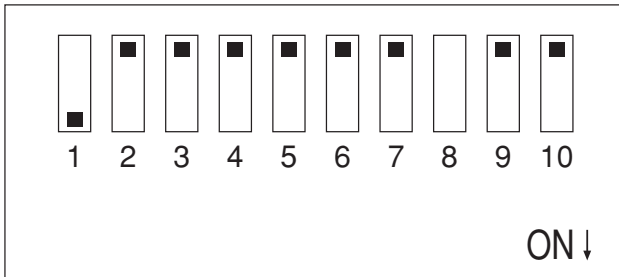


Fig.6 The Status of Dial-up (SW)

The status of dial-up (SW) is shown in Fig.7. If the ID address is 31, communication mode is 11 bits: 1 start bit, 8 data bits, odd, 1 stop bit and the baud rate is 600bps.

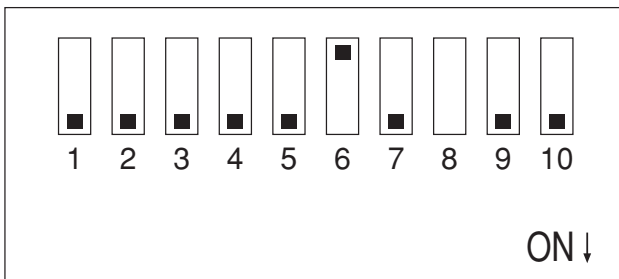


Fig.7 The Status of Dial-up (SW)

- c) When the transmission light (TX) of the unit is blinking, it means that the unit has responded to the command issued by the upper computer, and that communication has been established.

4.2 Testing

- 1) Before turning on the power, make sure the power connection is correct.
- 2) After turning on the power, check the power indicator. If it does not illuminate, the power connection is faulty.
- 3) Check the running light. If it does not blink, the module is not running correctly.
- 4) Prior to the connection to the upper computer, the transmission and reception indicators are both off. When communication with the upper computer is underway, check the transmission and reception indicators; the red indicates that the downward transmission of data is underway, and the green shows that the upward transmission of data is underway. Only after communication has been properly established will the green light blink.
- 5) Setting the rogatory interval of the upper computer. Due to the half-duplex mode of the bus, the time must be appropriate to avoid failure of communication. The minimum interval is 60ms and the commendatory value is 100ms.

4 Testing & Maintenance

4.1 Usage

- 1) Make sure the power cable is properly connected before turning on the power.
- 2) When the power is turned on, the power indicator will illuminate and the running indicator will blink every second.
- 3) Setting Communication
 - a) Tie in the RS485 bus correctly and connect it to the upper computer.
 - b) The upper computer issues commands in the prescribed format according to the unit address and the Baud rate. The reception indicator (RX) should be blinking.

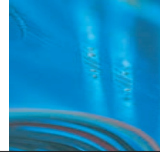
RCU16



Fig.1 Appearance of RCU16

1 Overview

The RCU16 unit serves the function of relay output with MODBUS communication interface. It is used as the hardware unit of remote control of the ESD2000 Substation Supervisory & Control System. It is also applicable for other intelligent systems in which remote control is required.



2 Features and Technical Data

The RCU16 Unit has 16 relay outputs which are either impulse output or the self-retain output. In the impulse 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.

2.1 Technical Data

Output :	16 relay outputs			
Contact Capacity:	5A/250V (AC) or 5A/30V(DC)			
Operational Supply:	24 VDC \pm 10%, Ripple Coefficient < 5%			
Power Consumption:	\leq 2.5W			
Bus Mode:	Two-wire half-duplex RS485 mode			
Bus Capacity:	\leq 32			
Communication Response Time:	20ms			
Communication Rate:	Selectable Rate 9600/4800/1200/600 bit/s			
Address:	The range from 1 to 32; broadcast address - 0x00			
Degree of Protection:	IP40, Terminal Portion IP20			
Operational Temperature:	-5°C - 55°C			
Storage Temperature:	-25°C - 85°C			
Standards:	IEC61000-4-2:	1995	Electrostatic discharge immunity test	Level 3
	IEC61000-4-3:	1995	Radiated, radio-frequency, electromagnetic field immunity test	Level 3
	IEC61000-4-4:	1995	Electrical fast transient pulse immunity test	Level 3
	IEC61000-4-5:	1995	Surge immunity test	Level 3
	EN55022:	1998	Information technology equipment(ITE)	Level B

2.2 Communication

The bus is in the two-wire half-duplex RS485 mode, capable of supporting up to 32 RCU16 units. The Shielded Twisted Pair (STP) is used for connection between units.

The communication interface is based on high-reliability lightning-proof port chips, which are capable of suppressing the transient overvoltage on the circuit resulting from

lightning and other causes, thereby preventing damage to the interface and improving communication reliability.

The data transmission is based on the CRC circulating redundancy calibration, which greatly improves the data reliability and enhances its anti-interference capability.

3 Installation & Wiring

3.1 Dimension & Installation

Unit Dimension: (L × W × H) 145 × 40 × 135mm

Installation: Standard Clip Track TS35 × 7.5

3.2 Unit Wiring

The terminal is indicated in Fig.2:

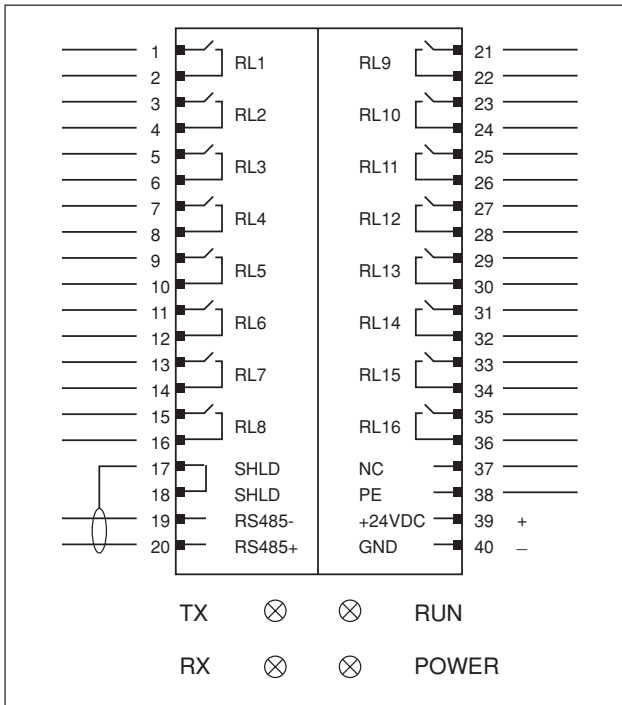


Fig.2 The Definition of RCU16 Terminals

Terminal 37 is a blank terminal. Terminal 38 is the protection earthing. Terminals 1-16 and 21-36 are used for the outputs of 16 relays. Terminals 19 and 20 are for RS485 connection. Terminals 17 and 18 are for shield of communication wire. Wiring must be done in a manner consistent with the requirements of the wiring of a communication cable. Terminals 39 and 40 are for power supply connection. The power supply is 24V DC.

The four indicator lights are defined as follows:

- TX:** Communication Transmission Indicator. When the unit transmits data to the connected computer, this light blinks.
- RX:** Communication Reception Indicator. When the unit receives the commands from the connected computer, this light blinks.
- RUN:** Running Indicator. When the module is running normally, this light blinks per a second.
- POWER:** Power Indicator Light. When the power supply is normal, this light remains on.

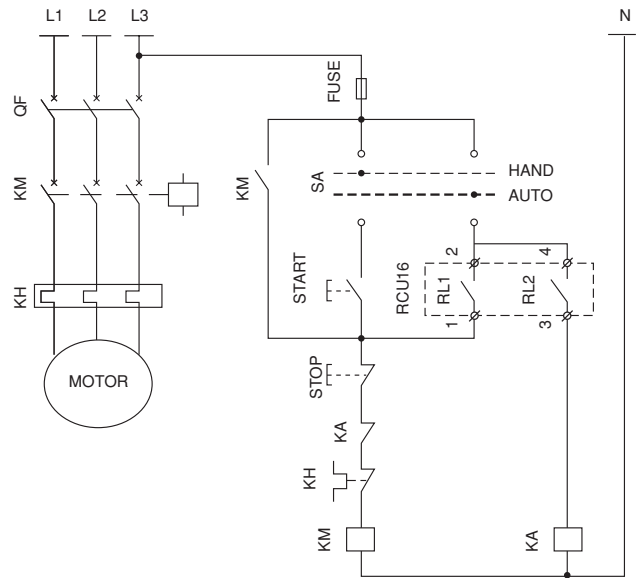


Fig.3 The Example for The Application of RCU16

The example for the application of RCU16 is shown in Fig.3. It shows the connection of remote control for non-reversing direct on-line of motor. In this case, the RCU can be set to impulse output mode.

3.3 Communication Connection

The communication connection of RCU16 is shown in Fig.4.

A terminal resistance should be connected with RS485+ and RS485- of the last RCU16 when more than one RCU16 unit is used on a bus in order to assure communicational matching. The resistance is about 120 Ω (RJ-1/8-120I).

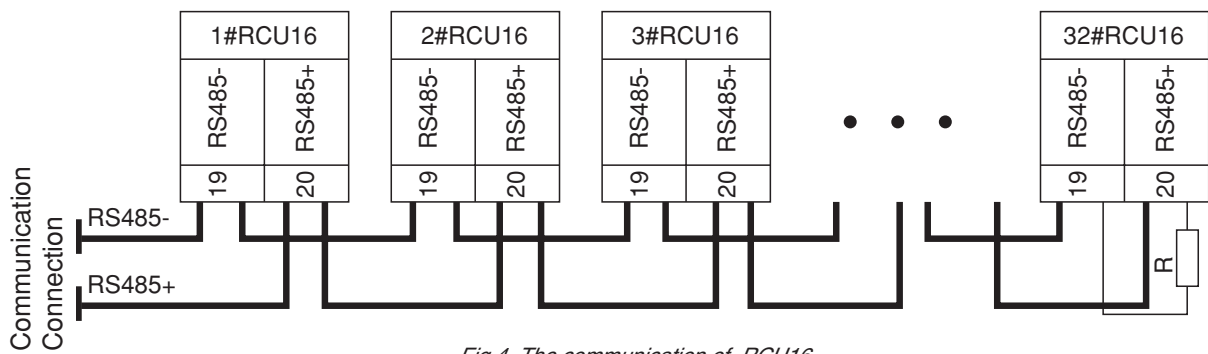


Fig.4 The communication of RCU16

3.4 Address, Communication mode and Communication Rate

The diagram Fig.5 shows the definition of the 10-digit dial-up of the RCU16 Unit.

The first five digits are the address bits of the address dial-up switches. The “6” and “7” digits are the setting bits for the communication mode. The “8” digit is the setting bit for the relay output type. The last two digits “9” and “10” are the setting bits for the communication rate. “0” is for OFF and “1” is for ON.

Switches										
1	2	3	4	5	6	7	8	9	10	
Address Setting					Com. Data Format Setting	Relay Type	Baud Rate Setting			
Address Setting					Address	Remark				
1	0	0	0	0	1	OFF: 0 ON: 1				
0	1	0	0	0	2					
-	-	-	-	-	-					
1	1	1	1	1	31					
0	0	0	0	0	32					

Fig.5 The Definition of 10-digit Dial-up of The RCU16 Unit

Address Setting: 1-5 of dial-up (SW) is for setting station numbers (1-32)

SW1	SW2	SW3	SW4	SW5	Address
1	0	0	0	0	1
0	1	0	0	0	2
-	-	-	-	-	-
0	1	1	1	1	30
1	1	1	1	1	31
0	0	0	0	0	32

Communication mode setting: 6 and 7 of dial-up (SW) are for setting communication mode.

SW6	SW7	Communication Mode
0	0	10 bits: 1 start bit, 8 data bits, 1 stop bit
1	0	11 bits: 1 start bit, 8 data bits, even, 1 stop bit
0	1	11 bits: 1 start bit, 8 data bits, odd, 1 stop bit
1	1	11 bits: 1 start bit, 8 data bits, 2 stop bits

Output Setting: The eighth digit is the setting code of the output mode.

1: Self-retain output.

0: Impulse output.

Communication Setting: The last two digits “9” and “10” are the setting bits for the communication rate.

SW9	SW10	Baud Rate(bit/s)
0	0	9600
1	0	4800
0	1	1200
1	1	600

The example for the status of dial-up (SW) is shown in Fig.6. If ID address is 1, the output mode is impulse, communication mode is 10 bits: 1 start bit, 8 data bits, 1 stop bit and baud rate is 9600bps.

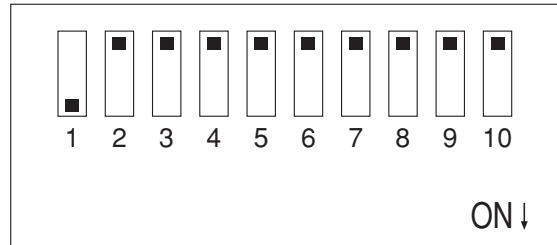


Fig.6 The Status of Dial-up (SW)

Another example is shown in Fig.7. If ID address is 31, the output mode is impulse, communication mode is 11 bits: 1 start bit, 8 data bits, 1 stop bit and baud rate is 9600bps.

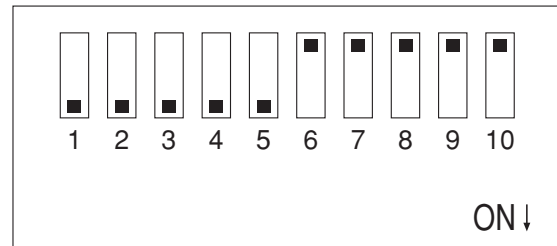


Fig.7 The Status of Dial-up (SW)



4 Testing & Maintenance

4.1 Usage

- 1) Make sure the power cable is properly connected before turning on the power.
- 2) When the power is turned on, the power indicator will illuminate and the running indicator will blink every second.
- 3) Setting Communication
 - a) Tie in the RS485 bus correctly and connect it to the upper computer.
 - b) The upper computer issues commands in the prescribed format according to the address of the unit and the Baud rate. The reception indicator (RX) should be blinking.
 - c) When the transmission light (TX) of the unit is blinking, it means that the module has responded to the command issued by the upper computer, and that communication has been established.

4.2 Testing

- 1) Before turning on the power, make sure the power connection is correct.
- 2) After turning on the power, check the power indicator. If it does not illuminate, the power connection is faulty.
- 3) Check the running indicator. If it does not blink, the module is not running correctly.
- 4) Prior to the connection to the upper computer, the transmission and reception indicators are both off. When communication with the upper computer is underway, check the transmission and reception indicators; the red indicates that the downward transmission of data is underway, and the green shows that the upward transmission of data is underway. Only after communication has been properly established will the green light blink.
- 5) Setting the rogatory interval of the master computer. Due to the half-duplex mode of the bus, the time must be appropriate to avoid failure of communication. The interval is 60-150ms.



We reserve the right to make changes in the course of technical development.

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