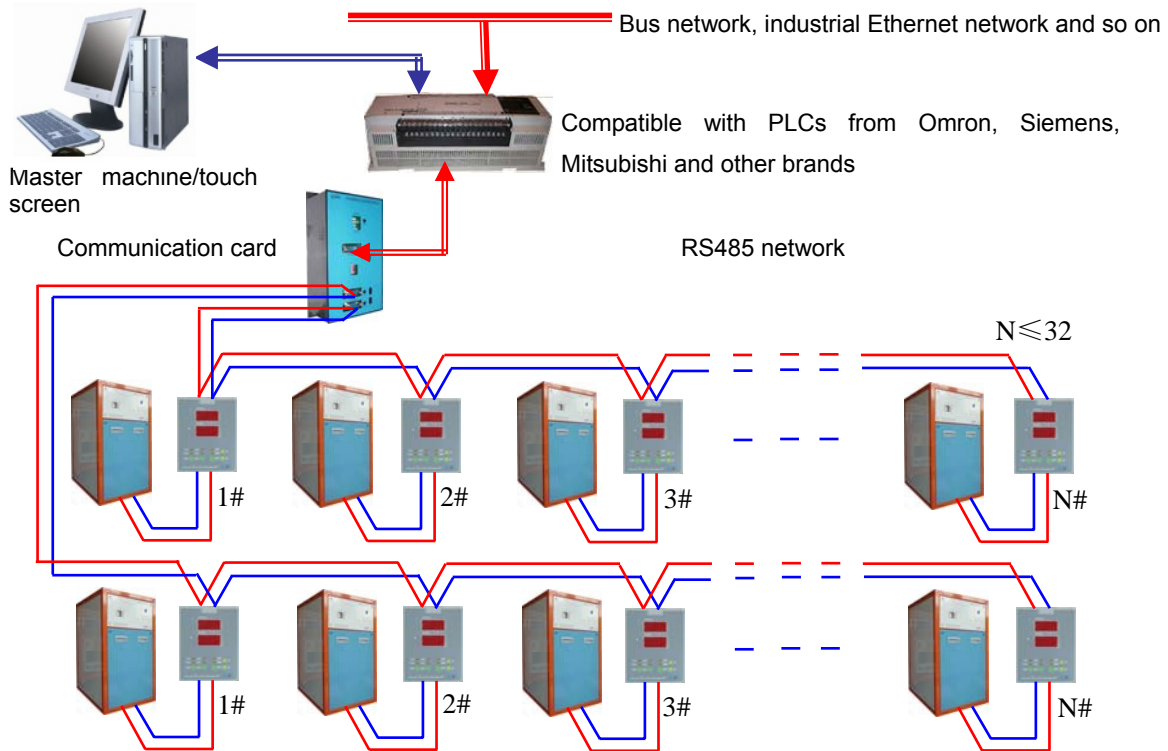Rectifier RS485 Network Control System

(Second Generation-1-SIEMENS)

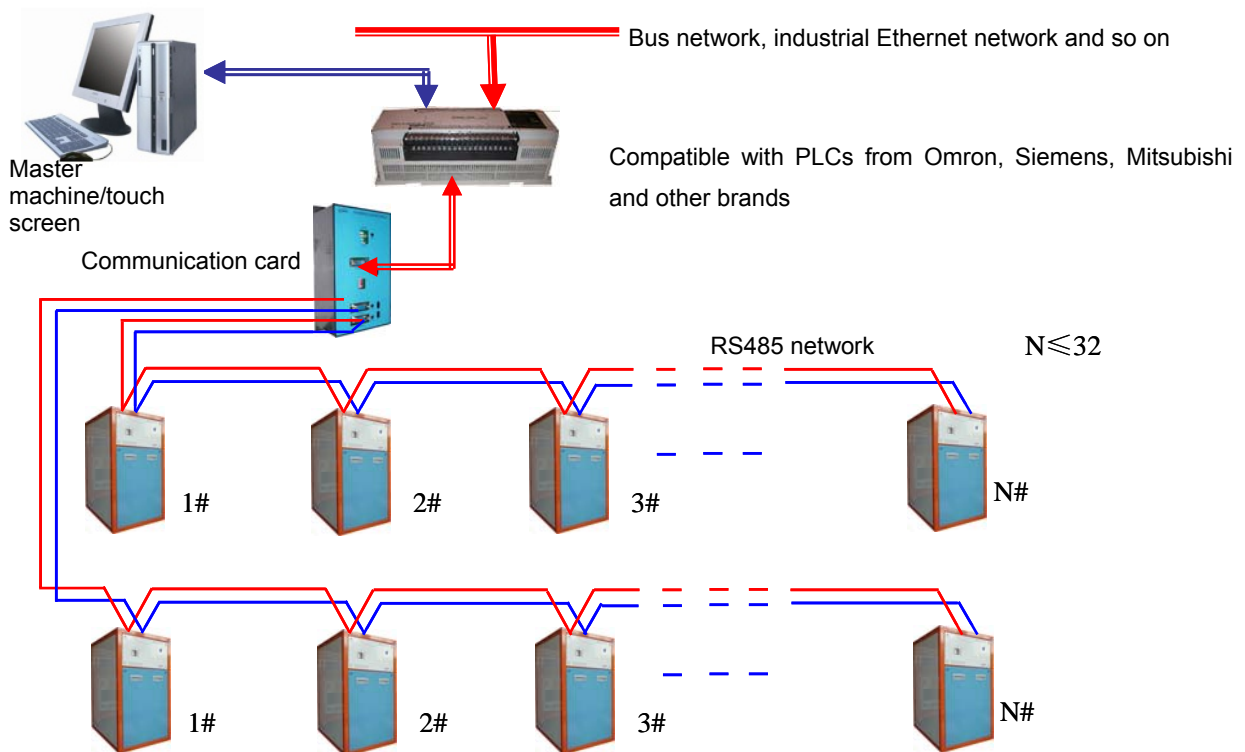# USERS' GUIDE

Rectifier (Huo niu) Network Control System (single card)

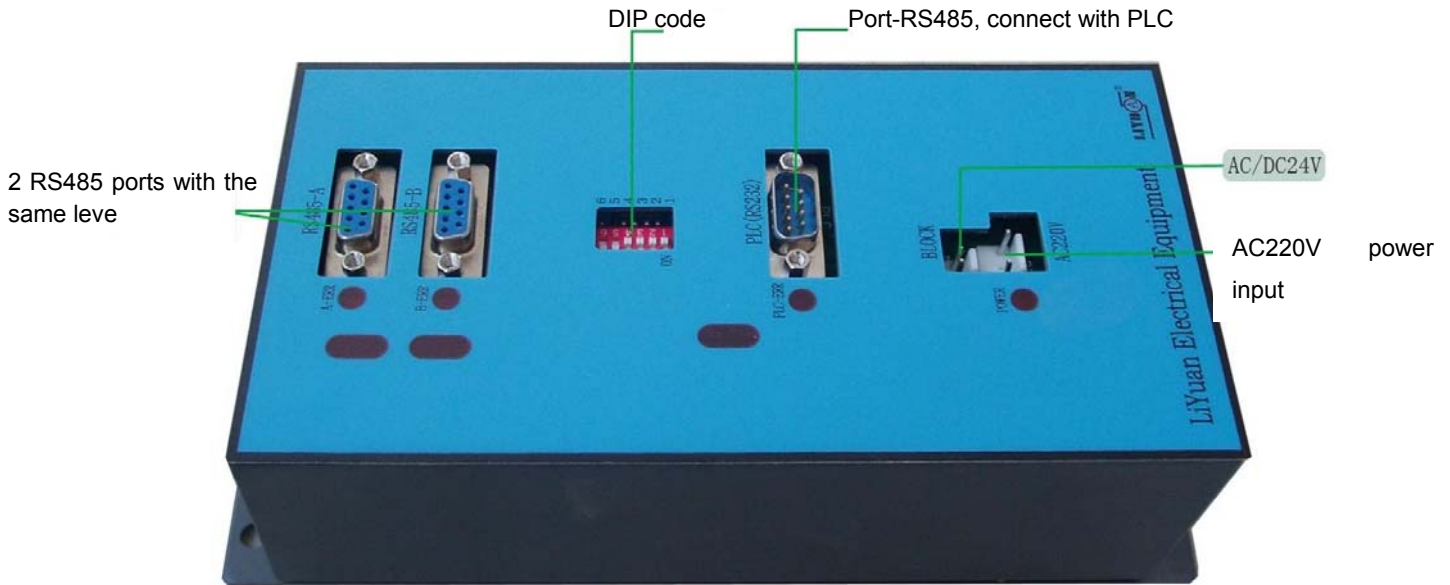## I、Net work control system with a digital meter

Bus network, industrial Ethernet network and so on

Compatible with PLCs from Omron, Siemens, Mitsubishi and other brands

Master machine/touch screen

Communication card

RS485 network

N≤32

1# 2# 3# N#

1# 2# 3# N#

II、Net work control system without a digital meter

Bus network, industrial Ethernet network and so on

Compatible with PLCs from Omron, Siemens, Mitsubishi and other brands

Master machine/touch screen

Communication card

RS485 network   N≤32

1# 2# 3# N#

1# 2# 3# N#

Operation instruction for Communication Card (conversion card)

I. Product Photo

DIP code

Port-RS485, connect with PLC

2 RS485 ports with the same leve

AC/DC24V

AC220V power input

II. External ports

Communication address: 00-1card 01-2card 10-3 card 11-4 card

PLC baud rate: 1 is 19200; 0 is 38400

B(PORT-RS485)

A(PORT-RS485)

B(PORT-RS485)

A(PORT-RS485)

Communication card

In the upper position, the code is 1; in the lower position, the

1(OFF)

0(ON)

Port-B communication error indicator

Port-B communication error indicator

PLC communication error indicator

BLOCK

AC 220 power input

Power indicato

AC/DC24V

Work normally when connecting with 24V power supply; when disconnected, all the power supplies will be closed forcibly (optional function).

PLC

Liyuan Rectifier RS 485 Network Control System is a digital, effective, rapid and stable communication system. It consists of a master machine, PLC, LY-RS232/RS485 and a slave machine (a rectifier equipped with a network control card RS485.

III. Main features

1. With digital data transfer, the correctness is ensured.
2. The status word and control word of the rectifier are read and written in relevant Area-VW of the PLC (Users can change it in PLC.)
3. A monitoring cycle for all 64 rectifiers with RS485 control card is about 4 seconds.
4. The rectifier can automatically integrate with the system, simplifying the control of rectifiers. It is possible to use ≥0.5 mm2 2-core STP or a special PROFIBUS cord to connect 32 rectifiers in a parallel manner.
5. In case the PLC is disconnected with the power supply, the rectifier will be turned off automatically.
6. In case the PLC fails to communicate with the rectifier, the rectifier will be turned off after 2 minutes.

IV. System components

1. Firstly, divide relevant Area-VW in the master machine PLC, this Area-VW includes: ①commands for the rectifier; set the current/voltage values; ② error codes, status parameters and actual current/voltage values of rectifiers. Each rectifier needs 6 Area-VW, namely, command used to turn on/off the rectifier and stabilize the voltage/current, set current/voltage value, communication error code, actual status word, actual current value and actual voltage value. After connecting the Communication Port- RS232 of the PLC with the human-machine interface of its master machine, the value in Area-VW can be displayed; it is also possible to use the human-machine interface of the master machine to input parameters into the Area-VW. Meanwhile, it is possible to connect the Port- RS 232 of the PLC with communication card LY-RS232/RS485PROTX. During the course of communication, the PLC is a receiver; the communication card reads data from or writes data into the PLC. Therefore, the PLC doesn't need any communication programs except setting the status and mode of its ports. Please refer to the instruction hereinafter.
2. The data of RS485 is converted by Communication card LY-RS232/RS485PROTX. The communication card automatically writes (WD) the status words and actual current/voltage of the rectifier into relevant Area-VW of PLC (according to previous setting which can be changed later) through Port-RS232 of the PLC; or the communication card automatically read (RD) the data in relevant Area-VW of the PLC and then transfers them to the rectifier. The card is equipped with 2 Port- RS485 of the same level. Each port can be connected with 32 rectifier equipped with LY-RS485 control card. There is also a RS232 card which can be directly connected with the Port-RS232 of PLC or a Port- RS232 converted from a programming port by an adapter.
3. The rectifiers equipped with control card are used as slave machines. They are completely in RS 485 communication mode. Each rectifier confirms its communication address by the DIP switch. They receive their own commands from the master machine and keep their own status readable by the master machine.

V. How to use

1. Rectifier with RS 485 control card: It is possible to use ≥0.5 mm2 2-core STP or a special

PROFIBUS cord to connect 32 rectifiers in a parallel manner. Install a 220 ohm terminal resistance in the last rectifier. Each rectifier uses a different address code. Connect with Prot-RS485A or Port-RS485B of communication card LY-RS232/RS485.

2. Connect Port-RS232 of communication card LY-RS232/RS485PROTX to Port-RS232C of the PLC or Port-RS232 converted from a programming port by an adapter.

3. Connect the power cord (supplied together with the device).

4. Use an output of the PLC as a normally-closed output and connect it with the operation terminal of communication card LY-RS485/RS232, controlling the operation of the whole system.

5. Connect with the power supply and the system will automatically communicate and transfer data. Different data areas of the PLC will control and display rectifiers with different address.

VI. **Work flow**

Any change of the DIP code and baud rate is available after the power supply is reconnected. During normal operation, do not change the DIP code, otherwise, after the power supply is disconnected and the device is restarted, the device will not work normally. At present, only the DIP code 4, 5 and 6 are available.

Users can change the "Connect to Monitoring Area VW" address. Different "Connect to Monitoring Area VW" has a different address. Please refer to the table below.

During normal operation, the communication card displays the status, error code and parameters of each rectifier.

Error codes of the devices:　　00----normal

01----over current

02----deviation

03----over heat

Communication codes:

00------ The initialization of the rectifier is normal; the communication is normal.

01------ The initialization of the rectifier is normal; the communication code from the rectifier is incorrect.

02------ The initialization of the rectifier is normal; the communication between communication card and rectifier failed.

03------ The initialization of the rectifier is abnormal; the communication is normal.

04----- The initialization of the rectifier is abnormal; the communication code from the rectifier is incorrect

05----- The initialization the communication is abnormal; the communication between communication

card and rectifier failed.

Commands and format of Area-VW; read by communication card from PLC (RD)

Area-VW	Master	Slave
First Area-VW Command	On 01 Off 00	Stable voltage 01 Stable current 00
Second Area-VW Set value	voltage （When the voltage is stable, the set value is the voltage value ） current （When the current is stable, the set value is the current value.）	

Format of status Area-VW; written by communication card into PLC (WD)

Area-VW	Master		Slave
First Area-VW	Communication code		Error code
Second Area-VW	Manual 1 Auto 0 （Note：optional, default is 0）	On 1 Off 0	stable voltage stable current
Third Area-VW	current value of the rectifier		
Fourth Area-VW	voltage of the rectifier		

VII. Communication format

PLC must in RUN status. The format of one frame ASCII code: 19200，E，7，2, namely,

       Baud rate:　19200 bps

    Sending a byte:　1 start bit

                 7 data bits (LSB sent first)

   1 parity bit (even Parity)

                 2 stop bit

VIII. Distribution of Area VW

Distribution of controller VW	Communication card（convert card）= PLC； Control card(computer board) = rectifier						
Convert card-1				Convert card-2			
VW	PORT-A	VW	PORT-B	VW	PORT-A	VW	PORT-B
1900	Number	1910	Number	1920	Number	1930	Number
1902	RD	1912	RD	1922	RD	1932	RD
Convert card-3				Convert card-4			
VW	PORT-A	VW	PORT-B	VW	PORT-A	VW	PORT-B
1940	Number (*1)	1950	Number (*1)	1960	Number (*1)	1970	台数(*1)
1942	RD(*2)	1952	RD(*2)	1962	RD(*2)	1972	RD(*2)
After the connection is normal, four "1" , namely, 1111, are regularly (each 2-3 seconds) written into the monitoring area.							
VW							
1980	Card1						
1982	Card2						
1984	Card3						
1986	Card4						

VW 区分配范例（PLC 连接转换卡-1 的 A 口 N 台）

area VW	numerical value	
VW1900（Number）	N（N<32）	**Parameter parts**
VW1902（Parameter first area）	100	
… … …		
VW100	00# RD-1	**Control parts**
VW102	00# RD-2	
VW104	01# RD-1	
VW106	01# RD-2	
… … …		
VWaaaa	0N# RD-1	
VWaaaa+2	0N# RD-2	
VWaaaa+4	00# WD-1	**Status parts**
VWaaaa+6	00# WD-2	
VWaaaa+8	00# WD-3	
VWaaaa+10	00# WD-4	
VWaaaa+12	01# WD-1	
VWaaaa+14	01# WD-2	
VWaaaa+16	01# WD-3	
VWaaaa+18	01# WD-4	
… … …		

SIEMENS S7- 200 PLC   COM port PORT0 setup：(19200, E, 8, 1)
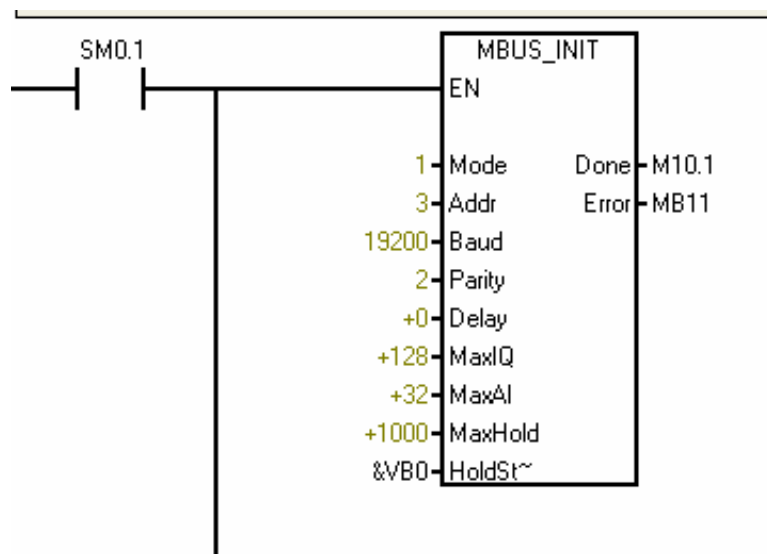
Operation instruction for control card（computer board）

I. Drawing for actual matter

Indication lamp ①

Transformer

Address code dialing switch

Specified calibration（no adjustment in general）

Control terminal

Indication lamp②
Indication lamp③
Indication lamp④

Control terminal

Current zeroing adjustment （no adjustment in general）

Voltage adjustment

Current calibration

Short connection while link with terminal resistor

Power supply terminal AC220V

Communication AB input terminal

II. Exterior wiring and description

Refer to following drawing; diagram has specified 16 serial numbers (i.e. (1), (2), (3)… (15), (16) and so forth), these 16 serial numbers have relevant descriptions as follows:

Transformer

Transformer

ON

1 2 3 4 5 6

(2) Code dialing switch

(4) Potentiometer

(5) Potentiometer

(6) Potentiometer

(16) Jumper   (15) Jumper

(3) Communication terminal

(8) Potentiometer

(7) Potentiometer

(1) AC220V

A B   A B

(9) ADJ   +
ADJN   -
(10) H1
H2   HEAT （Thermal relay）

(11) CC
AJ
CV
AK
(12) CT2   RUN2 （Always-open point）
V2
CT1   RUN1 （Always-close point）
V1

(13) AX   +
AXO
GNDA   Current divider   -
(14) GNDU   +
UX   -
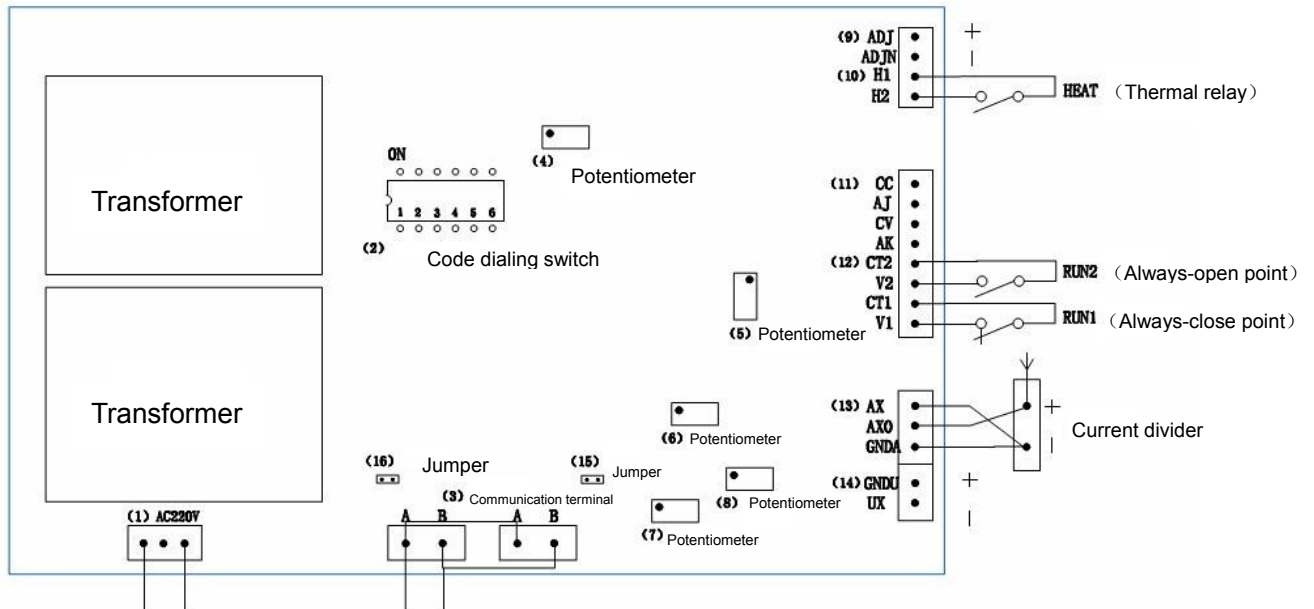
（1）AC220V power input terminal, all specified power are 15W, 50HZ（60HZ）, it is recommend to use not less than 0.5mm² power section area.

（2）Code dialing switch, 1, 2,……5 is used for dialing address code, as binary code, different bits has different addresses, 6 bits is used for voltage/current rise rate control, dial

ON is for fast rate, dial OFF is for slow one（fast rate or slow one depends upon requirement for user, however, they must be proposed before delivery）.

Contrast table (binary code) for dialing code address for RS485 network control card:

DIP（bit number）	SW1	SW2	SW3	SW4	SW5	Code of machine station
Status	ON	ON	ON	ON	ON	00
	OFF	ON	ON	ON	ON	01
	ON	OFF	ON	ON	ON	02
	OFF	OFF	ON	ON	ON	03
	ON	ON	OFF	ON	ON	04
	OFF	ON	OFF	ON	ON	05
	ON	OFF	OFF	ON	ON	06
	OFF	OFF	OFF	ON	ON	07
	ON	ON	ON	OFF	ON	08
	OFF	ON	ON	OFF	ON	09
	ON	OFF	ON	OFF	ON	10
	OFF	OFF	ON	OFF	ON	11
	ON	ON	OFF	OFF	ON	12
	OFF	ON	OFF	OFF	ON	13
	ON	OFF	OFF	OFF	ON	14
	OFF	OFF	OFF	OFF	ON	15
	ON	ON	ON	ON	OFF	16
	OFF	ON	ON	ON	OFF	17
	ON	OFF	ON	ON	OFF	18
	OFF	OFF	ON	ON	OFF	19
	ON	ON	OFF	ON	OFF	20
	OFF	ON	OFF	ON	OFF	21
	ON	OFF	OFF	ON	OFF	22
	OFF	OFF	OFF	ON	OFF	23
	ON	ON	ON	OFF	OFF	24
	OFF	ON	ON	OFF	OFF	25
	ON	OFF	ON	OFF	OFF	26
	OFF	OFF	ON	OFF	OFF	27
	ON	ON	OFF	OFF	OFF	28
	OFF	ON	OFF	OFF	OFF	29
	ON	OFF	OFF	OFF	OFF	30
	OFF	OFF	OFF	OFF	OFF	31

（3）Two RS485 communication ports with same class, two ports are parallel connection for user networking to easy control, including A, B identification acting as A, B line for RS485 communication line.

（4） Potentiometer, is used to calibrate output of specified voltage, must not be calibrated by non-professional operator.

（5）Potentiometer, is used for zero calibration for current indication, in general, such potentiometer must not at will be calibrated, except current indicates zero or when it has bad linearity; since it is hard to accurately calibrate potentiometer if done

independently, so this must match calibration with current potentiometer (6) to calibrate zero current indication and linearity.

（6）Potentiometer is used to calibrate current indication.

（7）Potentiometer is used to calibrate zero current indication so it is not able to be adjusted for.

（8）Potentiometer is used to calibrate voltage indication.

（9）Terminal for rectifier control, positive terminal is to output specified DA voltage (0~+10V) ADJ, or specify it while ordering if 0~+5V.

（10）Terminal for overheat rectifier, H1, H2 short circuit is normal, break circuit is for overheat (specify it if ordering, if short circuit is for overheat, break circuit is for normal). Network control card switches off output after overheat, along sending out 03 alarm code.

（11）Terminal for control stabilized voltage or stabilized current for rectifier, there are three types of wiring control, first as interior structure as follows:
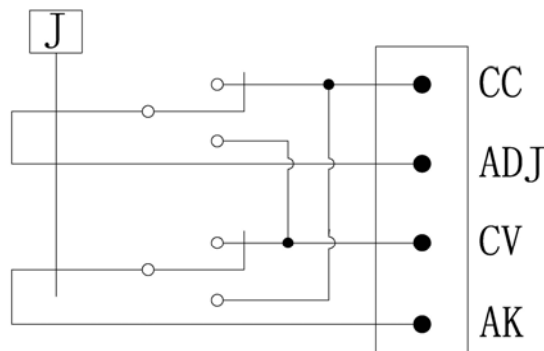
This has three types of control wiring:

A: ADJ at（9）terminal links with AJ at（11） terminal, ADJ at（9）terminal links with common terminal for rectifier control, AK at（11） terminal links with +10V（or +5V）standard power supply of rectifier, so "CC" is named as current control terminal, "CV" is named as voltage control terminal, some rectifiers are required to have such wiring.

B：Only extracting out AJ and CC, it is short circuit between AJ and CC while stable current; it is break circuit between AJ and CC while stable voltage; which is used as I/O point, so the rectifier needed for such control above should have such wiring.

C：Contrary to B, only AJ and CV also acts as I/O point in use. Two terminals are separate while stable current; two terminals are short circuit while stable voltage.

（12）Terminal used to control switch-on/off rectifier at (12) divides into two groups (CT1 and V1, or CT2 and V2), which are contrary to logic control. CT1 and V1 is always close while switch-off and separate while switch-on; CT2 and V2 is separate while switch-off and close-up while switch-on. Select for terminal upon different features of rectifier.

（13）Input terminal for current mv signal for actual rectifier divider is directly fed into three wires (same as wiring specified in drawing before), current divider is 60mv (also may be 75mv, 50mv or 7.5v sensor signal or other amplifier signal which should be specified while ordering)

（14）As for voltage signal feeding terminal for actual rectifier, UX is positive terminal which directly feeds into positive/negative polar of rectifier, input voltage should not be over 15V, or voltage should be reduced if over 15V.

（15），（16）stands for terminal resistor jumper lug, RS485 network communication wire is two-core twisted pair, one communication port at most links with 32 sets of rectifier. And add up terminal resistor into final remote network control card if it links with network line, this only needs to insert into these two jumper link lug. However, network control card in the middle of network line should switch off these two jumpers to isolate from final resistor.

Induction lamp description:

Indication lamp ① is power supply indication lamp, it is ON while power supply in ON.

Indication lamp ② is communication indication lamp, it flashes while communication lamp is normal
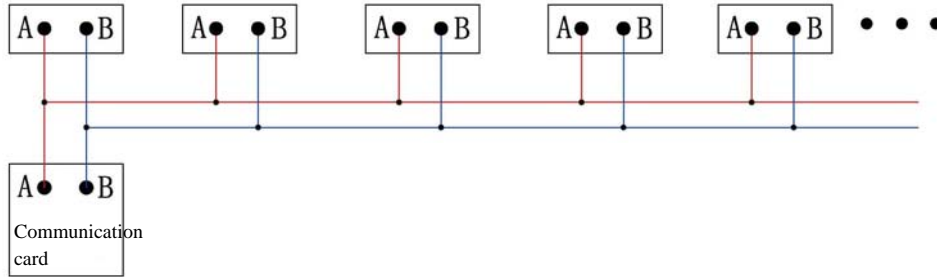
Indication lamp ③ is current indication lamp, it is ON while current is ON.

Indication lamp ④ is voltage indication lamp, it is ON while voltage is ON.
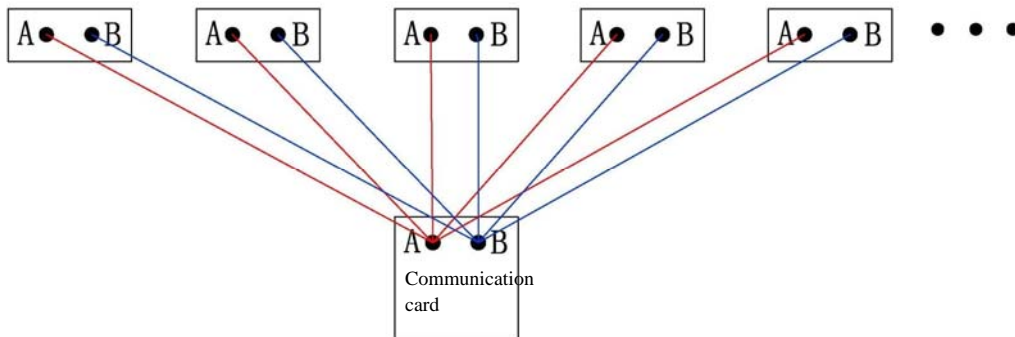
Communication wiring description
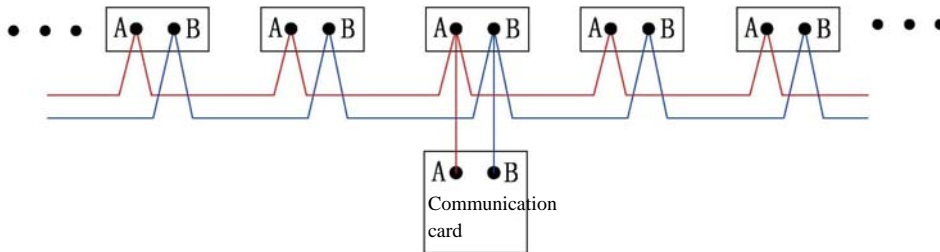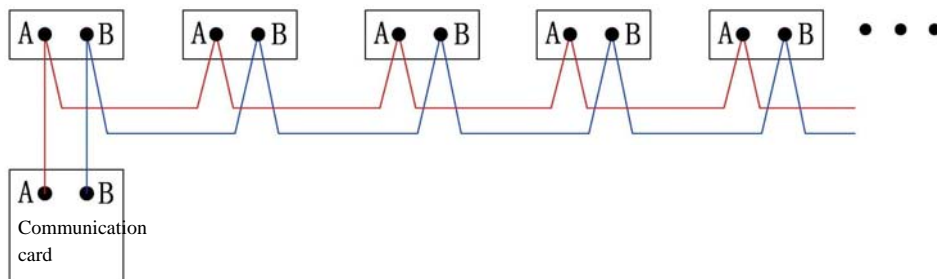
I、Regular error wiring
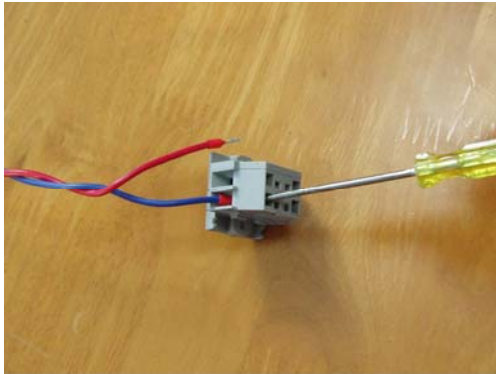
（1）

（2）

（3）

**Correct wiring is as follows; refer to Appendix 1 and Appendix 2.**

II、 Communication terminal wiring method

（1）Communication by or between rectifier and meter terminal

Communication terminal for rectifier, refer to diagram, first use little flat-head screwdriver to insert into small hole of terminal top, then make screwdriver to vertically force into such hole along terminal until side face of terminal has small hole to open enough to insert communication conduction wire (or that with insertion pin), at last pull it out by force till conduction wire fails to pull out; as for terminal for terminal, refer to (3), it only needs one group of wire.
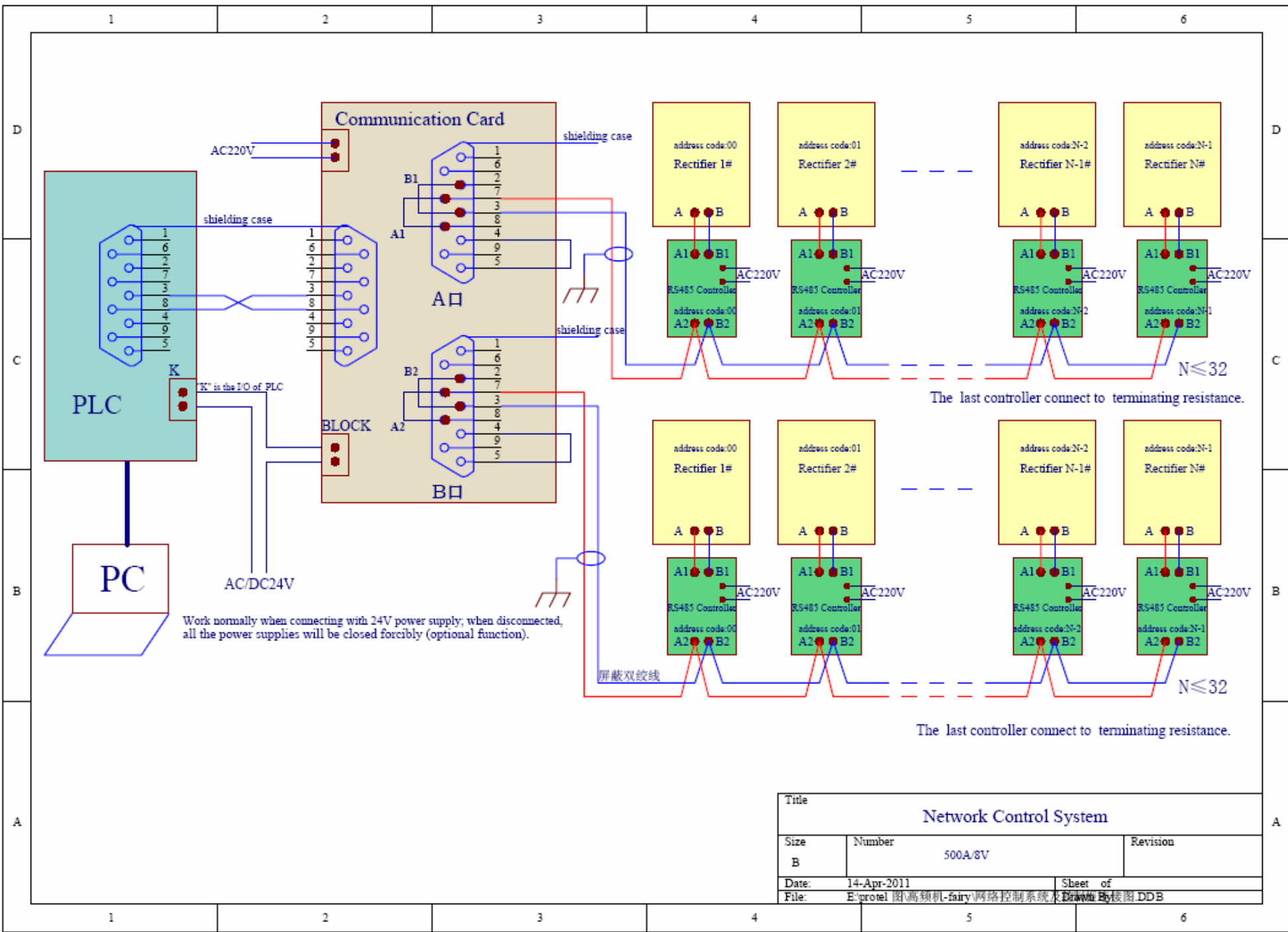
（2）Connection by or between two rectifiers.
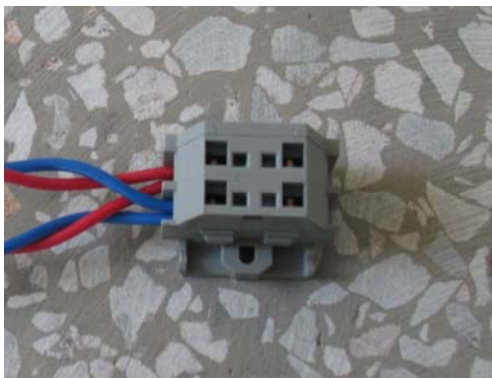
Communication terminal for rectifier, refer to drawing, first peel two sets of communication A wire for some distance, and then twist it together, and then use flat-head screwdriver to operate it under method specified above, and clip A line into it, connection with B line is same as that of A. After connection, operator must pull it out by force once, so as to that communication line is hard to be pulled out from terminal.

（3）Connection by or between two terminals

Communication terminal for control terminal, refer to drawing, first peel two sets of communication A wire for some distance, and then twist it together, and then use flat-head screwdriver to operate it under method specified above, and clip A line into it, connection with B line is same as that of A. After connection, operator must pull it out by force once, so as to that communication line is hard to be pulled out from terminal.

To prevent from magnetic-field interference and assure normal communication, communication line must have 0.5m㎡ twisted pair, operator must apply for shielded twisted pair, communication should not be too close to strong current conductive line.

Communication Card

AC220V

shielding case

B1
A1

A口

shielding case

B2
A2

B口

shielding case

PLC

K

"K" is the I/O of PLC

BLOCK

AC/DC24V

PC

Work normally when connecting with 24V power supply; when disconnected,
all the power supplies will be closed forcibly (optional function).

address code:00
Rectifier 1#
A   B
A1   B1
AC220V
RS485 Controller
address code:00
A2   B2

address code:01
Rectifier 2#
A   B
A1   B1
AC220V
RS485 Controller
address code:01
A2   B2

address code:N-2
Rectifier N-1#
A   B
A1   B1
AC220V
RS485 Controller
address code:N-2
A2   B2

address code:N-1
Rectifier N#
A   B
A1   B1
AC220V
RS485 Controller
address code:N-1
A2   B2

N≤32

The last controller connect to terminating resistance.

address code:00
Rectifier 1#
A   B
A1   B1
AC220V
RS485 Controller
address code:00
A2   B2

address code:01
Rectifier 2#
A   B
A1   B1
AC220V
RS485 Controller
address code:01
A2   B2

address code:N-2
Rectifier N-1#
A   B
A1   B1
AC220V
RS485 Controller
address code:N-2
A2   B2

address code:N-1
Rectifier N#
A   B
A1   B1
AC220V
RS485 Controller
address code:N-1
A2   B2

屏蔽双绞线

N≤32

The last controller connect to terminating resistance.

Title	Network Control System		
Size B	Number	500A/8V	Revision
Date:	14-Apr-2011	Sheet of	
File:	E:\protel 图\高频机-fairy\网络控制系统及接线图.DDB	Drawn By	