LX3V-2RS458-BD

Board (V3)

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1. Mounting instruction

Before the installation must be ensure that the PLC and BD associated equipment power off. Please install the BD module in the corresponding position of the PLC, and lock the four standard screws. If environmental dust is bigger, please cover BD right part by PLC's cover. Please do not power operation.

Caution

1) This BD module only support the following firmware versions or later. Users can check the PLC firmware version in D8001.
   - LX3V-A2: 25010;

   When mounting module to PLC, all the lights are blinking after power ON PLC please upgrade the firmware of PLC.
2) Please fixed BD module on the PLC, poor contact may lead to failure.
3) BD module and top cover of PLC's tightening torque is 0.3 ~ 0.6 N.m.

Warring

Make sure to power off the PLC before mounting or removing the BD module and put the cover in right place.

2. Features

LX3V-RS485-BD is used for communication via RS485, it can be installed on PLC, it has the following purposes.

1) Data transmission by no-protocol

Data transmit to designation register's address by RS instruction.

2) Data transmission by proprietary protocol

Data transmission is in based on 1: N via RS485.

3. Terminal

1) Only installed one BD board

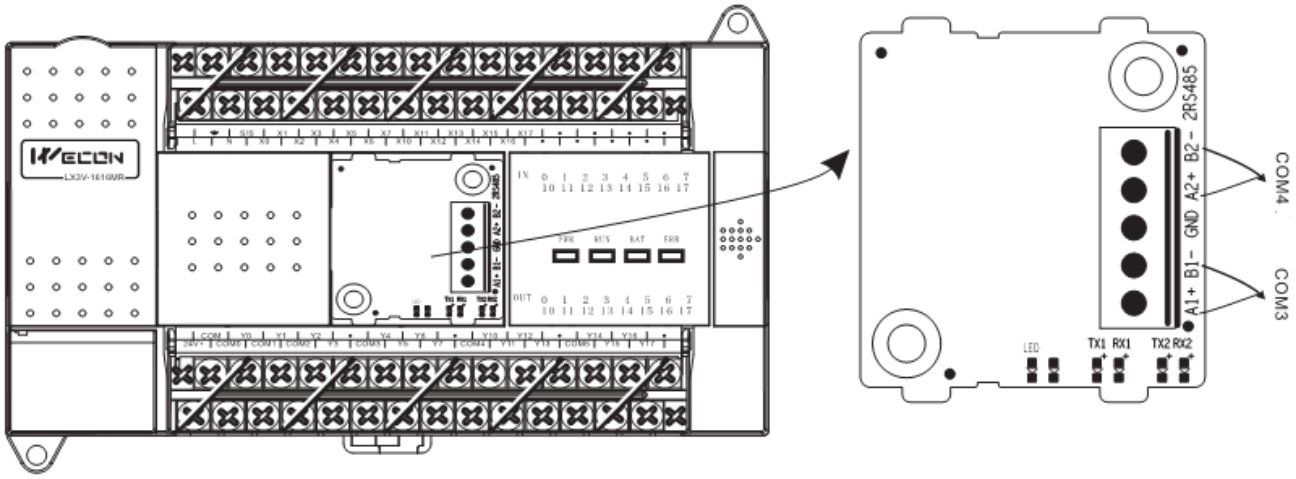


Figure 3-1

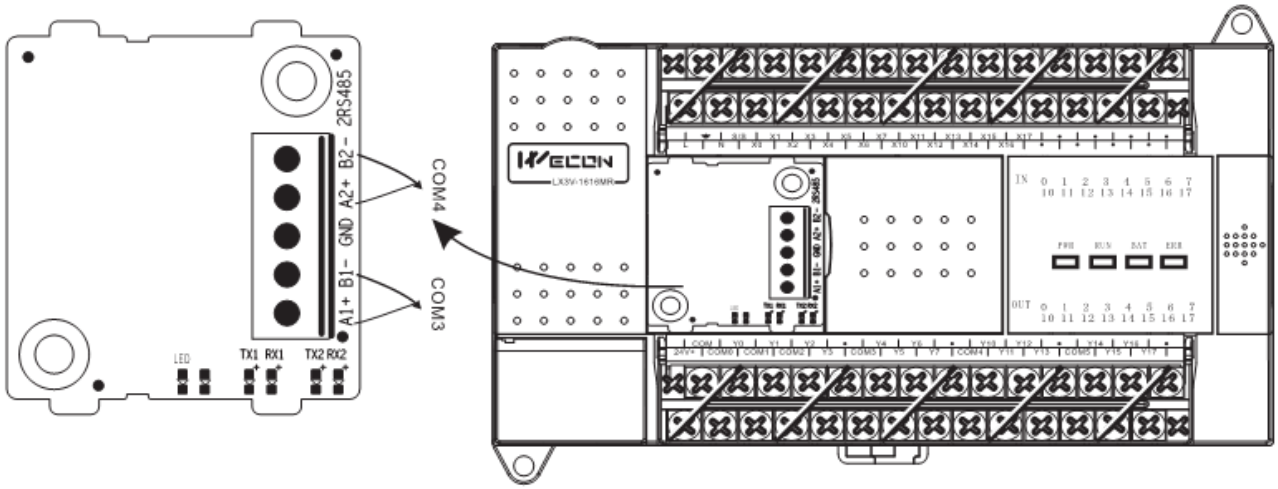


Figure 3-2

2) Installed two BD board

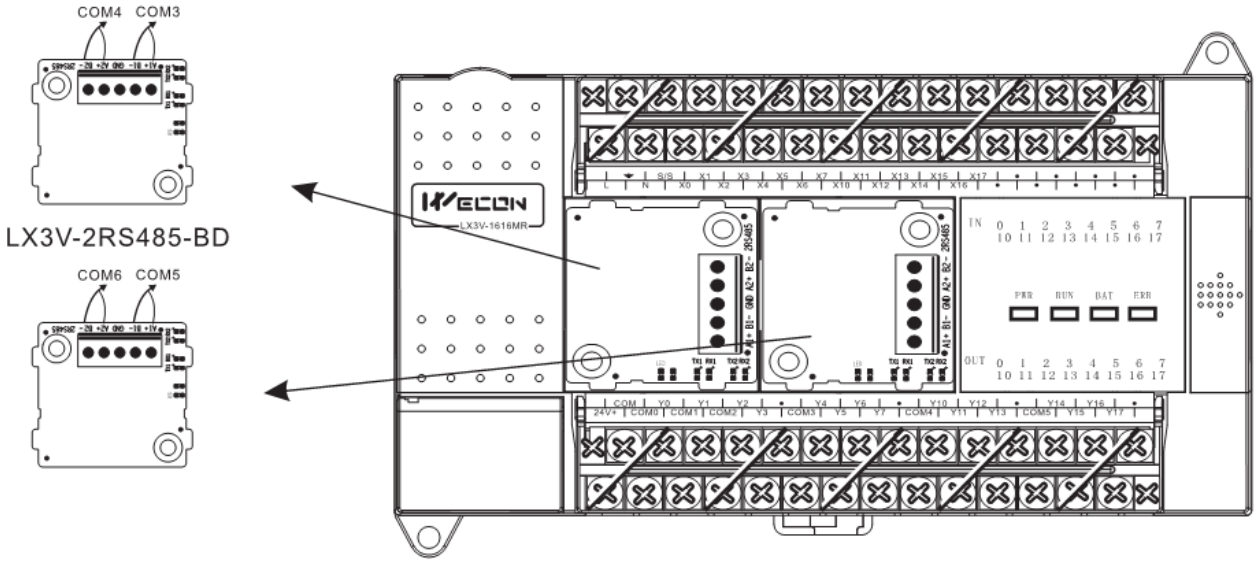


Figure 3-3

4. Function of serial communication

Table 4-1

Port No.	Protocol
COM 1	It supports download and HMI monitoring protocols, supports RS422 and RS485.
COM 2	It supports HMI monitoring protocol, MODBUS RTU protocol, RS instruction, only supports RS485.
COM 3	It supports MODBUS RTU protocol, RS instruction, N: N protocol only supports RS485.
COM 4	It supports MODBUS RTU protocol, RS instruction, N: N protocol only supports RS485.
COM 5	It supports MODBUS RTU protocol, RS instruction, N: N protocol only supports RS485.
COM 6	It supports MODBUS RTU protocol, RS instruction, N: N protocol only supports RS485.

5. New instructions

This BD board uses 2 new instructions.

5.1 RS instruction

Table 5-1

Name	Function	16 bit	Pulsed	Instruction format	Steps

RS2	Transfer serial data	√	No	RS2 (S) (m) (D) (n) (n1)	11

Table 5-2

Operand	Bit device						Word device							
	X	Y	M	S	K	H	KnY	KnM	KnS	T	C	D	V	Z
S												√		
m					√	√						√		
D												√		
n					√	√						√		
n1					√	√						√		

1) User-defined protocol

S: Starting address of transmitted data.

m: Length of transmitted data.

D: Starting address for storage data.

n: Length of received data.

n1: Serial port Number, 0 means using COM0, 1 means using COM1

2) Modbus protocol

S: Slave station address (high byte), communicational command (low byte, define by MODBUS protocol);

M: Register original address of call on slave station;

D: Data length will be read or write, units is word;

N: Memory units original address for read or write data, engross continuous address units, length decided by D;

n1: Serial port Number, 0 means using COM0, 1 means using COM1;

5.2 CPAVL instruction

Table 5-3

Name	Function	16 bit	Pulsed	Instruction format	Steps
CPAVL	Communication port parameters	√	No	CPAVL (S) (D) (M)	11

Table 5-4

Operand	Bit device						Word device							
	X	Y	M	S	K	H	KnY	KnM	KnS	T	C	D	V	Z
S												√		
D			√											
M					√	√								

1) S: The starting address of “D” device;
2) D: The starting address of “M” device;
3) M: Communication serial port parameters;

Setting the parameters of COM4 are in 20 consecutive addresses beginning of D0 and M0.

Table 5-5

Bit	Content	Word	Content
M0	Retention	D0	Communication format, defined is 0
M1	Sending(RS2)	D1	Station number, defined is 0
M2	Sending flag (RS2) Instruction state (MODBUS)	D2	Remaining amount of data transmission(RS2) Interval of sending(MODBUS)
M3	Receiving flag(RS2) Communication error flag (MODBUS)	D3	The number of receiving data (RS2)
M4	Receiving (RS2)	D4	Starting code STX(RS2)
M5	Retention	D5	Ending code ETX(RS2)
M6	Retention	D6	Communication protocol
M7	Retention	D7	Retention
M8	Retention	D8	Retention
M9	Timeout flag	D9	Timeout, defined is 10
M10-M19	Retention	D10-D19	Retention

Communication Serial Parameter Settings

Table 5-6

Item	Parameters	b15 (RS2)	b14-b8	b7	b6	b5	b4	b3	b2	b1	b0

Bit mode	8 bit	0	Retention	-	-	-	-	-	-	-	-
	16 bit	1		-	-	-	-	-	-	-	-
Baud rate (Bps)	115200	-		1	1	0	0	-	-	-	-
	57600	-		1	0	1	1	-	-	-	-
	38400	-		1	0	1	0	-	-	-	-
	19200	-		1	0	0	1	-	-	-	-
	9600	-		1	0	0	0	-	-	-	-
	4800	-		0	1	1	1	-	-	-	-
Stop bit	1 bit	-		-	-	-	-	0	-	-	-
	2 bit	-		-	-	-	-	1	-	-	-
Parity	None	-		-	-	-	-	-	0	0	-
	Odd	-		-	-	-	-	-	0	1	-
	Even	-		-	-	-	-	-	1	1	-
Data bit	7 bit	-		-	-	-	-	-	-	-	0
	8 bit	-		-	-	-	-	-	-	-	1

6. Communications protocol

6.1 Serial communication protocols

Table 6-1

Protocol	Value
Modbus RTU slave	02H
Modbus ASCII slave	03H
RS instruction	10H
Modbus RTU master	20H
Modbus ASCII master	30H

6.2 Communication Settings

6.2.1 Communication setting of MODBUS slave

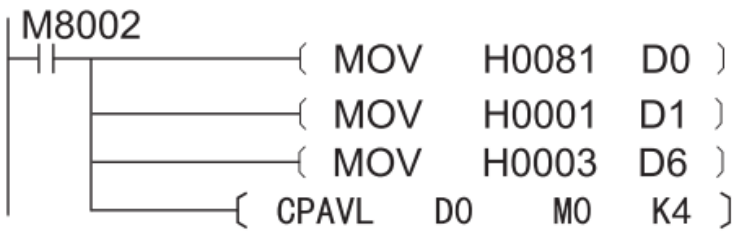
1) CPAVL is a instruction for communication; “S” means starting address of “D” registers, “D” means starting address of “M” registers.

Table 6-2

Bit	Content	Word	Content
D+0	Retention	S+0	Communication format, defined is 0
D+1	Sending(RS2)	S+1	Station number, defined is 0
D+2	Sending flag (RS2) Instruction state (MODBUS)	S+2	Remaining amount of data transmission(RS2) Interval of sending(MODBUS)
D+3	Receiving flag(RS2) Communication error flag (MODBUS)	S+3	The number of receiving data(RS2)
D+4	Receiving (RS2)	S+4	Starting code STX(RS2)
D+5	Retention	S+5	Ending code ETX(RS2)
D+6	Retention	S+6	Communication protocol
D+7	Retention	S+7	Retention
D+8	Retention	S+8	Retention
D+9	Timeout flag	S+9	Timeout, defined is 10
D+10-D+19	Retention	S+10-S+19	Retention

2) Setting serial communications parameters;
3) Setting the station number of MODBUS slave;
4) Setting Modbus protocol (H03 means Modbus ASCII slave, H02 means Modbus RTU slave);

Example



Set communication parameters: 9600, 1, 8, none;
Set station number: 1
Set protocol is MODBUS ASCII slave
Set D0&M0 as starting address for parameters;

6.2.2 Communication setting of MODBUS master

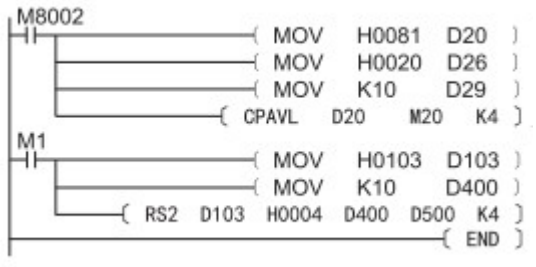
1) CPAVL is a instruction for communication; “S” means starting address of “D” registers, “D” means starting address of “M” registers;

Table 6-3

Bit	Content	Word	Content
D+0	Retention	S+0	Communication format, defined is 0
D+1	Sending(RS2)	S+1	Station number, defined is 0
D+2	Sending flag (RS2) Instruction state (MODBUS)	S+2	Remaining amount of data transmission(RS2) Interval of sending(MODBUS)
D+3	Receiving flag(RS2) Communication error flag(MODBUS)	S+3	The number of receiving data(RS2)
D+4	Receiving(RS2)	S+4	Starting code STX(RS2)
D+5	Retention	S+5	Ending code ETX(RS2)
D+6	Retention	S+6	Communication protocol
D+7	Retention	S+7	Retention
D+8	Retention	S+8	Retention
D+9	Timeout flag	S+9	Timeout, defined is 10
D+10-D+19	Retention	S+10-S+19	Retention

2) Setting serial communications parameters;
3) Setting the station number of MODBUS slave;
4) Setting Modbus protocol (H03 means Modbus ASCII slave, H02 means Modbus RTU slave);

Example



6.2.3 Communication setting of RS non-protocol

1) CPAVL is a instruction for communication; “S” means starting address of “D” registers, “D” means starting address of “M” registers;

Table 6-4

Bit	Content	Word	Content
D+0	Retention	S+0	Communication format, defined is 0
D+1	Sending(RS2)	S+1	Station number, defined is 0
D+2	Sending flag (RS2) Instruction state (MODBUS)	S+2	Remaining amount of data transmission(RS2) Interval of sending(MODBUS)
D+3	Receiving flag(RS2) Communication error flag(MODBUS)	S+3	The number of receiving data(RS2)
D+4	Receiving(RS2)	S+4	Starting code STX(RS2)
D+5	Retention	S+5	Ending code ETX(RS2)
D+6	Retention	S+6	Communication protocol
D+7	Retention	S+7	Retention
D+8	Retention	S+8	Retention
D+9	Timeout flag	S+9	Timeout, defined is 10
D+10-D+19	Retention	S+10-S+19	Retention

2) Setting serial communications parameters: bit mode

   Example:

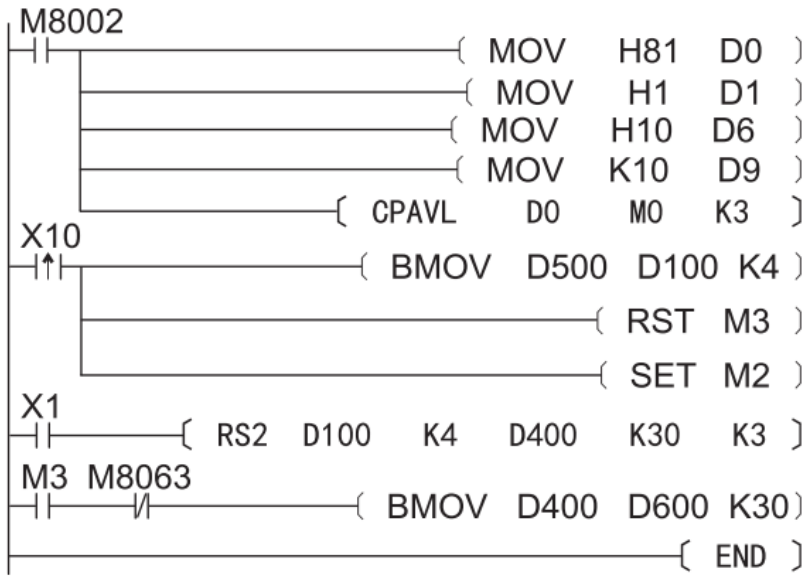
   H81 means 9600, 1, 8, none, 16 bit

   H8081 means 9600, 1, 8, none 8 bit

3) RS protocol setting (H20);
4) Timeout setting;
5) Start and end setting;
6) RS2 instruction

In the program, there is a need to set up the serial communications, such as setting data starting mode, baud rate, digits, and inspection, etc.

Example



Parameters: 9600, 1, 8, none;
Set mode: 16-bit mode
Protocol: RS non-protocol;
Timeout settings;
Set COM3, start with D0&M0;
Preparing sending data
Flag of reset
Reset sending request
Sending and receiving data
Dealing with receiving data

7. N: N network

7.1 Functional specifications

N: N network function, connecting 8 PLC by RS485 non-protocol, this protocol can be used in COM3, COM4, COM5, COM6, but it requires BD board.

1) There are 5 modes, according connect points;
2) It makes 8 PLC together;
3) Data transmission is shown in the following figure;

7.2 Connection pattern

Table 7-1

Station Number		Mode 0		Mode 1		Mode 2	
		Bit (M)	Word(D)	Bit (M)	Word(D)	Bit (M)	Word(D)
		0	4	32	4	64	8
Master	NO. 0	--	0-3	1000-1031	0-3	1000-1063	0-7
Slave	NO. 1	--	32-35	1064-1095	32-35	1064-1127	32-39

	NO. 2	--	64-67	1128-1159	64-67	1128-1191	64-71
	NO. 3	--	96-99	1192-1223	96-99	1192-1255	96-103
	NO. 4	--	128-131	1256-1287	128-131	1256-1319	128-135
	NO. 5	--	160-163	1320-1351	160-163	1320-1383	160-167
	NO. 6	--	192-195	1384-1415	192-195	1384-1447	192-199
	NO. 7	--	224-227	1448-1479	224-227	1448-1511	224-231
Station Number		**Mode 3**		**Mode 4**			
		Bit (M)	**Word(D)**	**Bit (M)**	**Word(D)**		
		64	**16**	**64**	**32**		
Master	NO. 0	1000-1063	0-15	1000-1063	0-31		
Slave	NO. 1	1064-1127	32-47	1064-1127	32-63		
	NO. 2	1128-1191	64-79	1128-1191	64-95		
	NO. 3	1192-1255	96-111	1192-1255	96-127		
	NO. 4	1256-1319	128-143	1256-1319	128-159		
	NO. 5	1320-1383	160-175	1320-1383	160-191		
	NO. 6	1384-1447	192-207	1384-1447	192-223		
	NO. 7	1448-1511	224-239	1448-1511	224-255		

7.3 N: N network communication parameters

Table 7-2

Items	**Numbers**	**Cable**	**Protocol**	**Methods**	**Baud rate**
Parameters	8 psc	RS485	N:N net	Half-duplex	38400
Items	**Format**	**Start**	**End**	**Sum check**	
Parameters	1,7,EVEN	Fixed	Fixed	Fixed	

7.4 The special devices in N: N network

Table 7-3

Device for N:N network communication			
Device	**Name**	**Content**	**Value**
M8179	Chanel	M8179=0, COM3 available M8179=1, COM4 available	0 or 1
D8176	Station No.	0 is for master, 1-7 for slave	0-7
D8177	Quantity of slaves	Set how many slave will be connected to master. (defined value is 7)	1-7

D8178	Refresh range	Select points mode	0-2
D8179	Retry	When communication is fail, try to connect.	0-10
D8180	Timeout	It used to judge the abnormal communication (50ms-2250ms), in 10 ms unit.	——
D8201	Current link scan time	Current value of network cycle time	——
D8202	Maximum link scan time	Maximum value of network cycle time	——
D8203	Error number of master	The number of master's sequence errors	——
D8204-D8210	Error number of slave	The number of each slaves' sequence errors.	——
D8211	Error code of master	It used to storage error code of master.	——
D8212-D8218	Error code of slaves	It used to storage error code of each slaves.	——
M8183	Flag of master error	M8183=1, when there is error in master transferring data	——
M8184-M8190	Flag of slave error	When slaves have error in transferring data, they will be on.	——
M8191	Sending	N:N network is working	——
D8063	Error code of communication	It used to save the error code of serial communication. Format: 7xyy, x-serial port No., yy-error code.	——
M8063	Flag of communication	M8063=1, when serial communication error.	——

7.5 Communication setting of N: N network

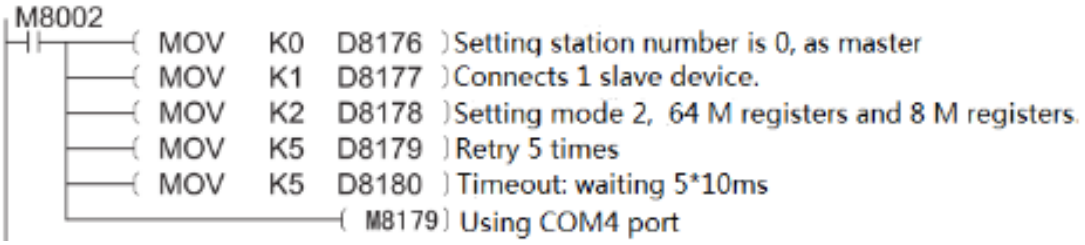
In N: N network protocol, the only one for the master, the other for the salve. Please view the following content for detailed information.

7.5.1 Master setting in N: N protocol

1) Station number (D8176): it must be 0, if it was 1 means slave.
2) Number of slave (D8177): setting range is 1-7.

3) Mode (D8178): setting range is 0-2.
4) The number of retry (D8179): setting range is 0-10, defined is 3.
5) Timeout (D8120): setting range is 0-255(unit: 10ms), defined is 10.
6) Serial port number (M8179): 0 means COM3, others mean COM4.

Example



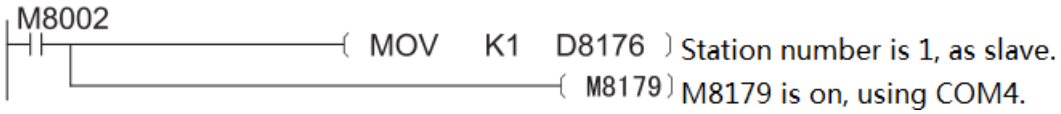
Note

1) Setting master in N: N protocol, the D8176 must be 0, otherwise communication will be fail, and M8063 turn on, D8063 shows 7348 or 7448.
2) If there was anything fault in parameters setting, M8063 turn on, D8063 shows 7348 or 7448.

7.5.2 Slave setting in N:N protocol

1) Station number (D8176): Set to non-zero, as slave.
2) Serial port number (M8179): 0 means COM3, others mean COM4.

Example

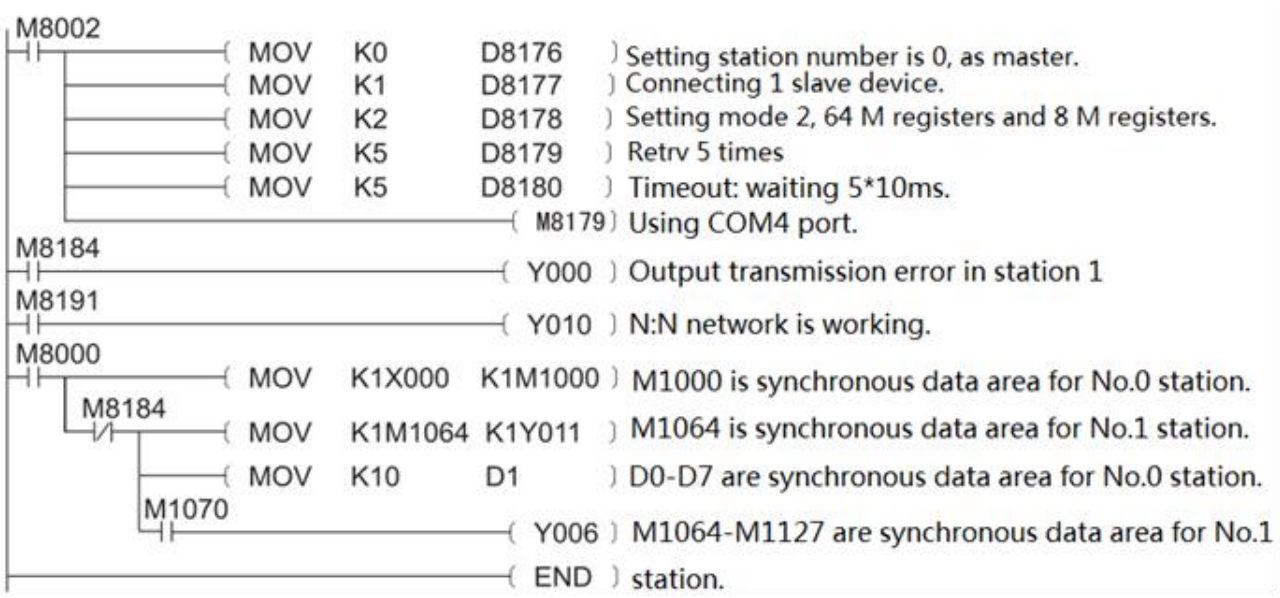


Note

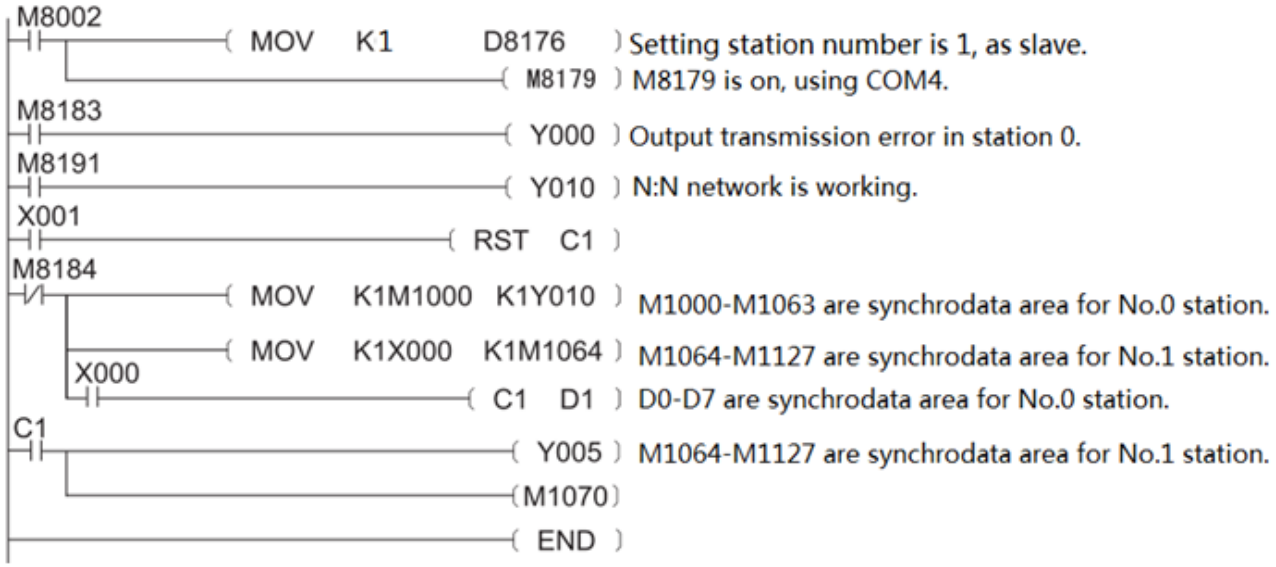
1) When setting slave in N: N protocol, D8176 must be non-zero. No other parameters.
2) If there was anything wrong in parameters, M8063 turn on, D8063 shows 7348 or 7448.

7.6 Example of N: N network

1) PLC as master



2) PLC as slave



8. Error codes

If there was anything wrong in communication, M8063 will turn on, and D8063 will display detailed information about error.

Table 8-1

Device address	Instructions of showed value	
D8063	COM3	73+Error Code

	COM4	73+Error Code
	COM5	73+Error Code
	COM6	73+Error Code

Table 8-2

	Value	Error information	Value	Explain	Value	Explain
ERROR CODE	0	Error in Modbus slave address.	10	Error in data transmission between PLC and BD board	40	Error in data transmission between PLC and BD board
	1	Error in length of the data frame.	11		41	
	2	Error in address	12		42	
	3	Error in CRC check.	13		43	
	4	Error in instruction code.	14		44	
	5	Error when receiving.	15		45	
	6	Error in data	16		46	
	7	Error in buffer overflow	17		47	
	8	Error in frame	18		48	Error in N:N network parameters
	9	Timeout	19		49	Error in N:N network parameters-BD board

Version: V3.0.1

Date: Dec 2019