LX3V-ETH-BD

User manual

Website: http://www.we-con.com.cn/en
Technical Support: support@we-con.com.cn
Skype: fcwkkj
Phone: 86-591-87868869
QQ: 1043098682
Technical forum: http://wecon.freeforums.net/

1. Installation instructions

Before the installation make sure that the PLC host and the equipment connected to BD module have been powered off. Please install the BD module in the corresponding position of the PLC, and lock the four standard screws. In case of the dust interference, please cover BD right part by PLC's cover.

Caution:

1) Install the board firmly on the PLC. Poor contact may cause malfunction.
2) The suggested tightening torque is 0.3-0.6 N.m.

Warning:

1) Disconnect the power supply before installing/removing the board and wiring in case of electric shock or product damage.
2) The After completing the installation and wiring, do not replace the PLC top cover before turning on the power.

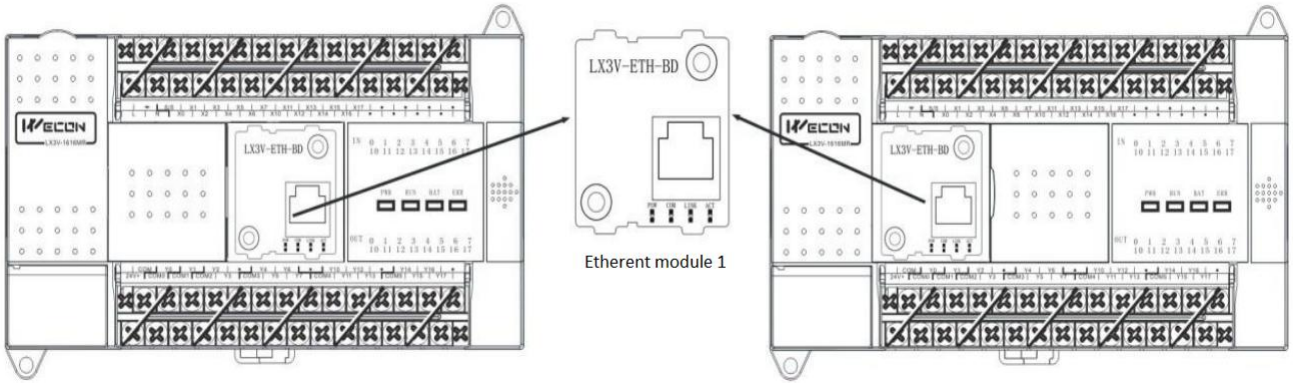
2. Features of LX3V-ETH-BD

1) It could use LX3V-ETH-BD to add Ethernet communication ports. It is internally installed in the top of PLC, thus it is not necessary to change the PLC's installation area;
2) Maximum number of connections 8, regardless of master and slave;
3) The current protocol only supports: MODBUS-TCP;

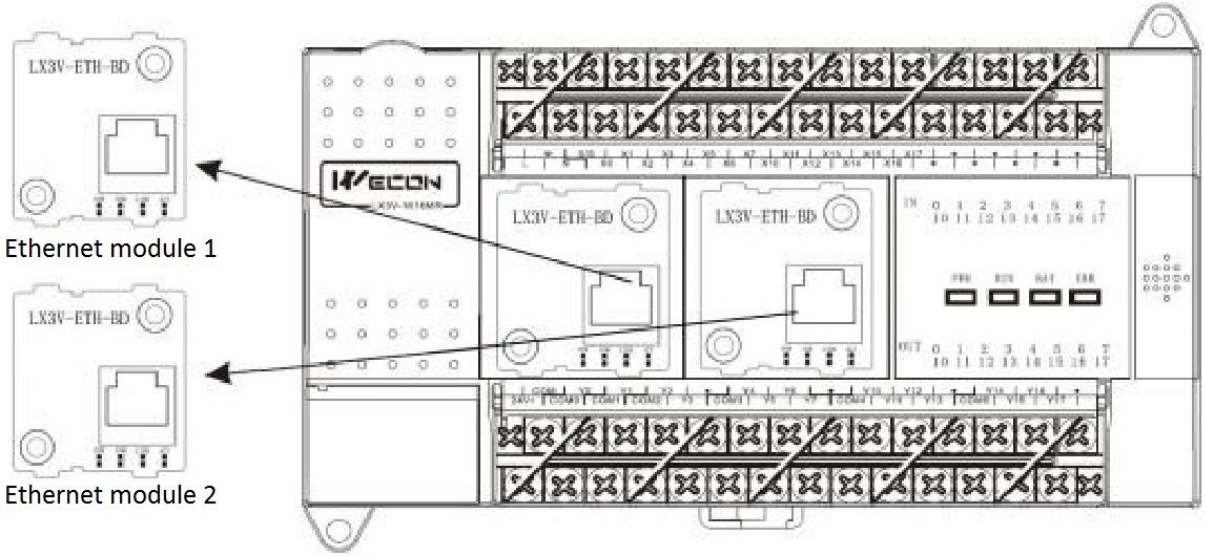
3. The shape and terminal description

1) The case of one BD module

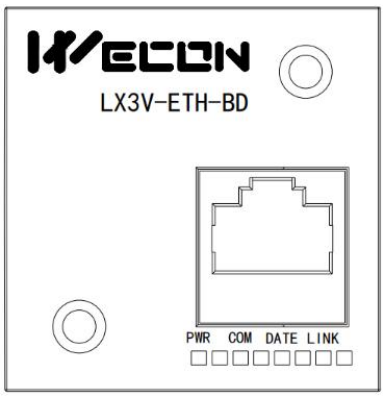
The LAN port type is RJ45



2) The case of two BD module



3) Light



PWR: power light, normal state is always bright when connected

COM: the flicker frequency corresponds to communication with plc

DATA: data light blinks if the communication with network is normal

LINK: when connect to the network then the light is lit, if the connect is abnormal, there will be exterminated or chaotic situation

Caution:

When the power light and the com light blink simultaneously (1 Hz) that means the PLC does not support Ethernet BD.

4. The use of instructions

4.1 RS2 instruction

Table 4- 1

Name	Function	16 bit	Pulsed	Instruction format	Steps
RS2	Transfer serial data	√	No	RS2 **S m D n n1**	11

Table 4- 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					√	√						√		

Description

1) **S** is the address of slave (high byte) and communication command (low byte, defined by MODBUS protocol);
2) **m** is the starting address number of the slave;
3) **D** is the length of the data (read or write), the unit is word. (The specific setting is shown in the following table 4-3)

Table 4- 3

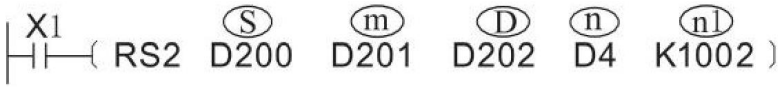
Function code	Length	Length (HEX)
Write coils	1968	0x7B0
Read coils	200	0x7D0
Write registers	123	0x7B
Read registers	123	0x7D

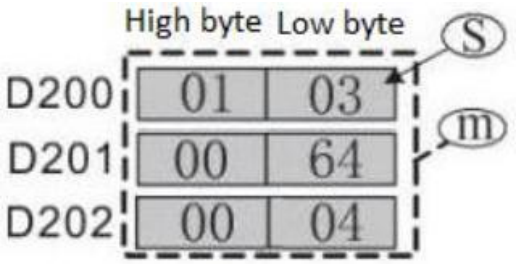
4) **n** is the starting address of the storage unit for reading or writing data, occupying the subsequent address unit, and the length is determined by the “D”
5) **n1** is the connection number corresponding to the Ethernet port connection number (specific settings is shown as the following table 4-4)

Table 4- 4

Ethernet module 1		Connection number	Ethernet module 2		Connection number
RS2 instruction	Connection 1	1000	RS2 instruction	Connection 1	1100
	Connection 2	1001		Connection 2	1101
	Connection 3	1002		Connection 3	1102
	Connection 4	1003		Connection 4	1103
	Connection 5	1004		Connection 5	1104
	Connection 6	1005		Connection 6	1105
	Connection 7	1006		Connection 7	1106
	Connection 8	1007		Connection 8	1107

If n1 is set as K1002, then RS2 is configured for Ethernet module 1, connection 3. When X1 is ON, the data is shown as below.





The sending data: 00 03 00 00 00 06 01 03 00 64 00 04
Description: Read the data of the slave ranges from 100 to 103, and transfer the data to D202, D203, D204, D205.

Instruction format:

00 03(numbers of transmission), means has sent 3 times;

00 00(the length); 00 06(the length of Modbus instruction, like 01 03 00 64 00 04; 01 03(station number and function code); 00 64(starting address 0; 00 04(the length of address).

4.2 CPAVL instruction

Table 4- 5

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

Table 4- 6

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

S												√		
D			√											
M					√	√								

1) **S** is the starting address of the D device parameter table ranges from D0 to D7999. (try to store in the latched area in case of data loss)
2) **D** is the starting address of the M device parameter table ranges from M0 to M3071. ((try to store in the latched area in case of data loss)
3) **M** is the connection number, set the number according to the Ethernet port. (See the table below for specific settings)

Table 4- 7

Connection number description		
CPAVL instruction	**Port**	**Connection number**
	Ethernet module 1	1000
	Ethernet module 2	1100

Note:

Only need one CPAVL instruction to configure multiple connections. The RS2 instruction needs to be used for the corresponding connection.

5. Ethernet parameter settings

The parameters of LX3V-ETH-BD module are configured by the CPAVL instruction. The specific address of the D device and M device in the CPAVL instruction is shown in the following table.

5.1 D Device

Word address	D device	Description	Others	Read or writ
S+0	Version number		Parameters for BD module	R
S+1	IP for BD module	IP Section 1		R/W
S+2		IP Section 2		R/W
S+3		IP Section 3		R/W
S+4		IP Section 4		R/W
S+5	Port	Default value is K502		R/W
S+6	Gateway	Gateway section 1		R/W

S+7		Gateway section 2		R/W
S+8		Gateway section 3		R/W
S+9		Gateway section 4		R/W
S+10	Subnet mark	Subnet mask section 1		R/W
S+11		Subnet mask section 2		R/W
S+12		Subnet mask section 3		R/W
S+13		Subnet mask section 4		R/W
S+14	MAC	MAC section 1		R
S+15		MAC section 2		R
S+16		MAC section 3		R
S+17		MAC section 4		R
S+18		MAC section 5		R
S+19		MAC section 6		R
S+20	Reserved			R/W
S+21	Reserved			R/W
S+22	Number of connections (max 8)			R/W
S+23	Protocol	Communication protocol	Parameters for connection 1	R/W
S+24	Salve IP	IP section 1		R/W
S+25		IP section 2		R/W
S+26		IP section 3		R/W
S+27		IP section 4		R/W
S+28	Port	Default is K502		R/W
S+29	Reserved			R/W
S+30	Command send interval	Default is 0.1 ms		R/W
S+31	Reserved			R/W
S+32	Reserved			R/W
S+33	Reserved			R/W
S+34	Timeout			R/W
S+35	Protocol	Communication protocol	Parameters for connection 2	R/W
S+36	Slave IP	IP section 1		R/W
S+37		IP section 2		R/W
S+38		IP section 3		R/W
S+39		IP section 4		R/W
S+40	Port	Default is K502		R/W

S+41	Reserved			R/W
S+42	Command send interval			R/W
S+43	Reserved			R/W
S+44	Reserved			R/W
S+45	Reserved			R/W
S+46	Timeout			R/W
S+47	…	…		R/W

1) Setting example of IP, Gateway and subnet mask

For example the IP address is 192.168.1.35, set as follows:

Table 5- 1

Word address		Decimal	Hexadecimal
1	The IP address of BD module	192	C0
2		168	A8
3		1	01
4		35	23

MAC display description: 192.168.1.35 51-5b-a8-59-55-68 dynamic

Device	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
D314	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0051
D315	1	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	005B
D316	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	00A8
D317	1	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0059
D318	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0055
D319	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0068

Figure 5- 1

2) Number of connections

- The maximum number of connections is 8;
- The setting of connection number: The number of settings should be the same as the number of connections;
- If the connection number is exceeded, user will get error code in D8067 (means the value is exceeded);

3) Protocol setting

- When LX3V-ETH-BD serves as a slave, user could switch the master equipment.
- The specific situation is: when the Ethernet BD serves as a slave, and reach the number of connection, one of the master equipment is disconnected, user could connect another master

device.

Table 5- 2

Protocol	Value
MODBUS-TCP Slaves	0x02
MODBUS-TCP Master	0x20

Note:

No need to configure IP address when LX3V-ETH-BD serves as a slave.

5.2 M Device

Table 5- 3

Bit address	Description	
D+0	Reserved	Connection 1 configuration
D+1	Instruction execution	
D+2	Instruction execution state	
D+3	Communication error flag	
D+4	Reserved	
D+5	Reserved	
D+6	Reserved	
D+7	Reserved	
D+8	Reserved	
D+9	Timeout flag	
D+10	Reserved	Connection 2 configuration
D+11	Instruction execution state	
D+12	Communication error flag	
D+13	Communication error flag	
D+14	Reserved	
D+15	Reserved	
D+16	Reserved	
D+17	Reserved	
D+18	Reserved	
D+19	Timeout flag	
D+20	…	…

5.3 Special device

When BD module is properly installed and there is no problem with BD module, user could check the model of BD module in D8170 and D8171.

Table 5- 4

Special device	Description
D8170	Model of expansion module 1
D8171	Model of expansion module 2

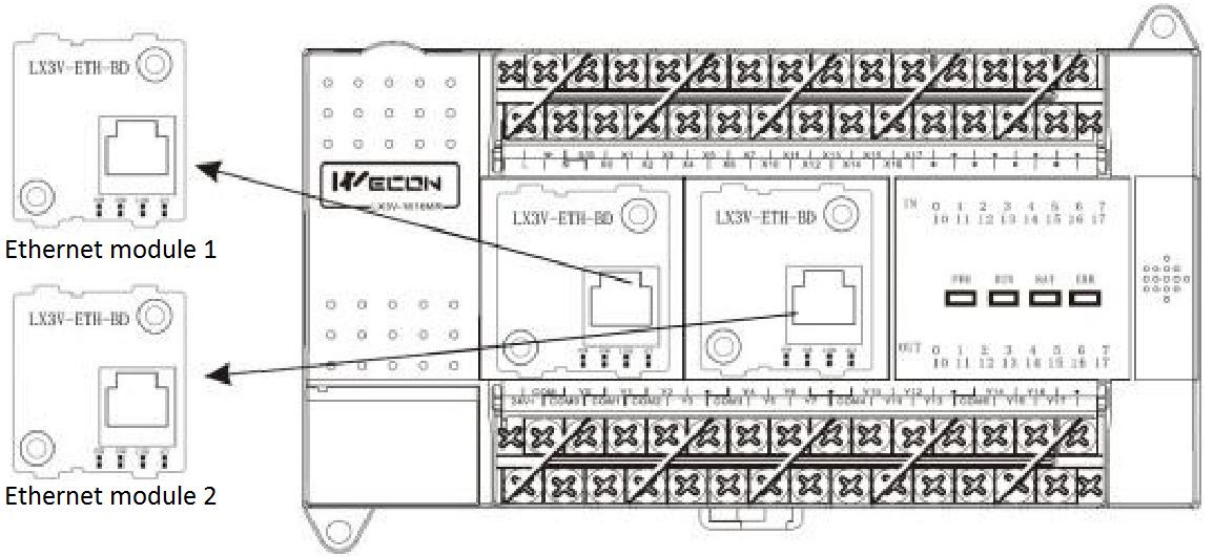


Figure 5- 2

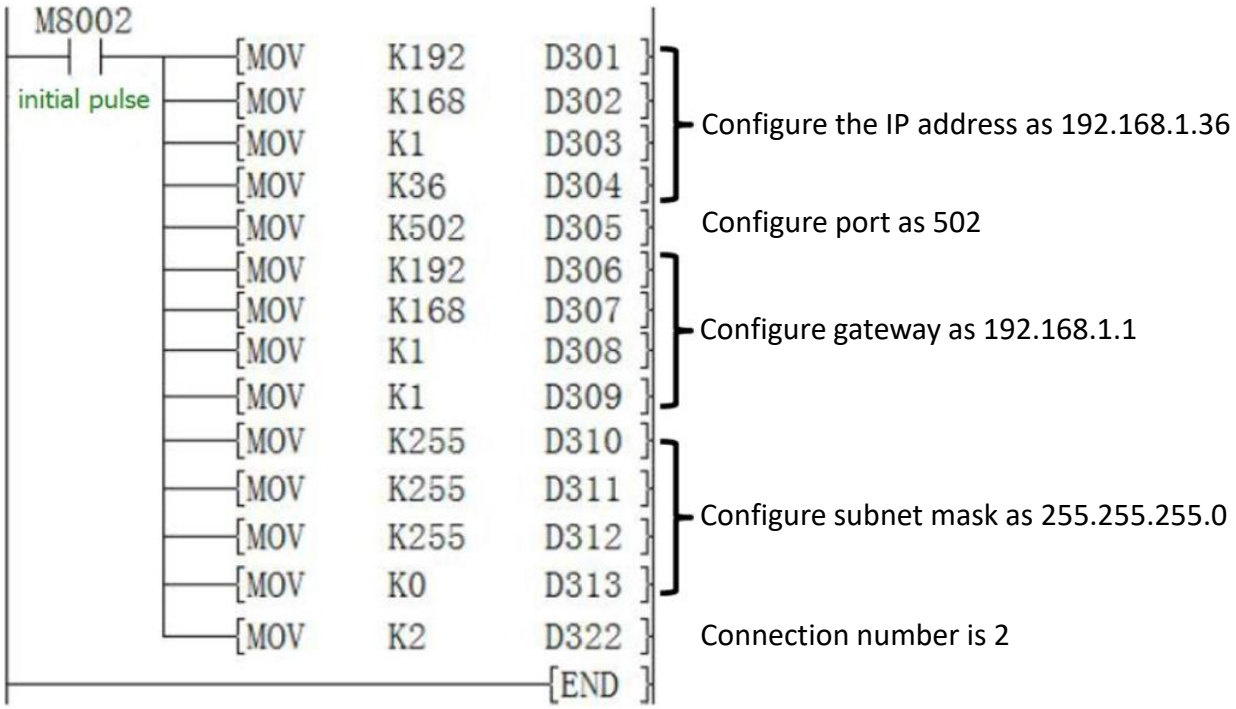
Note:

The special device could display all BD modules' model. As the picture shown above, the Ethernet BD model is HFF20（K -224）according to the position.

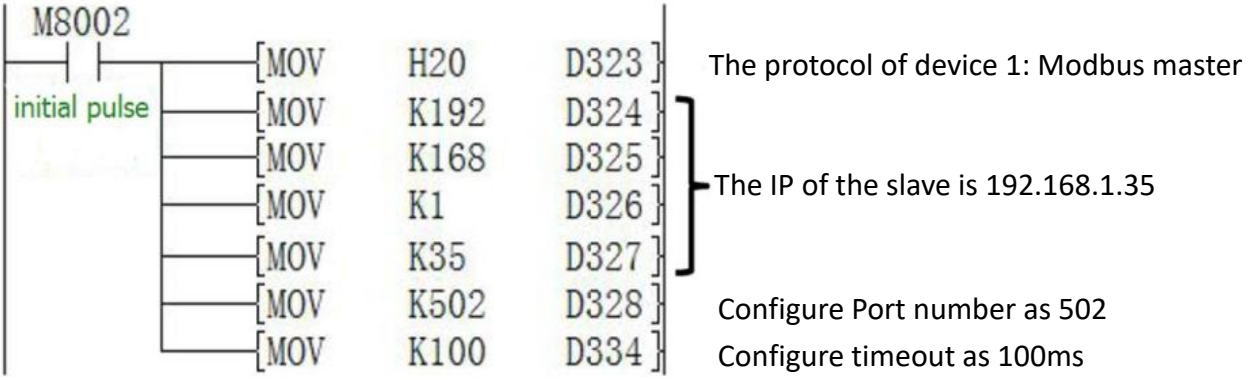
6. Examples

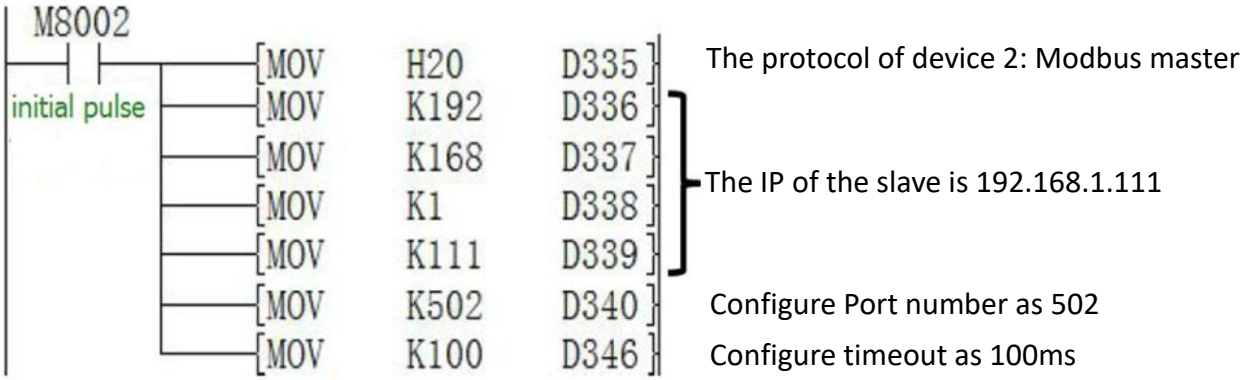
6.1 MODBUS master

1) Ethernet communication setting

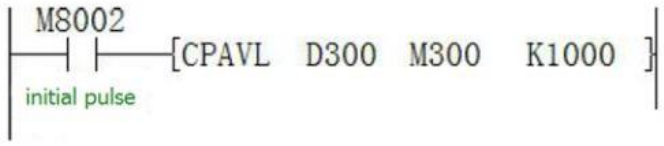


2) The communication setting of two devices connected with the LX3V-ETH-BD





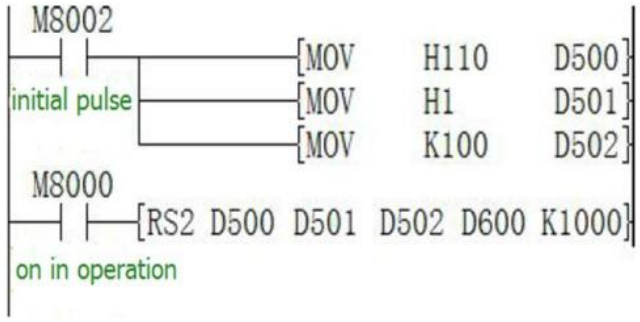
3) Parameter setting for LX3V-ETH-BD



Use the Ethernet port 1, and the parameter table start from D300 and M300

4) Send and receive data to two connected devices

- Device 1



Station number 01, function code 10(write word)
The start address for writing is 1
The length of address is 1

Write the data of D600 to address 1 in device 1 that is connected with Ethernet port 1

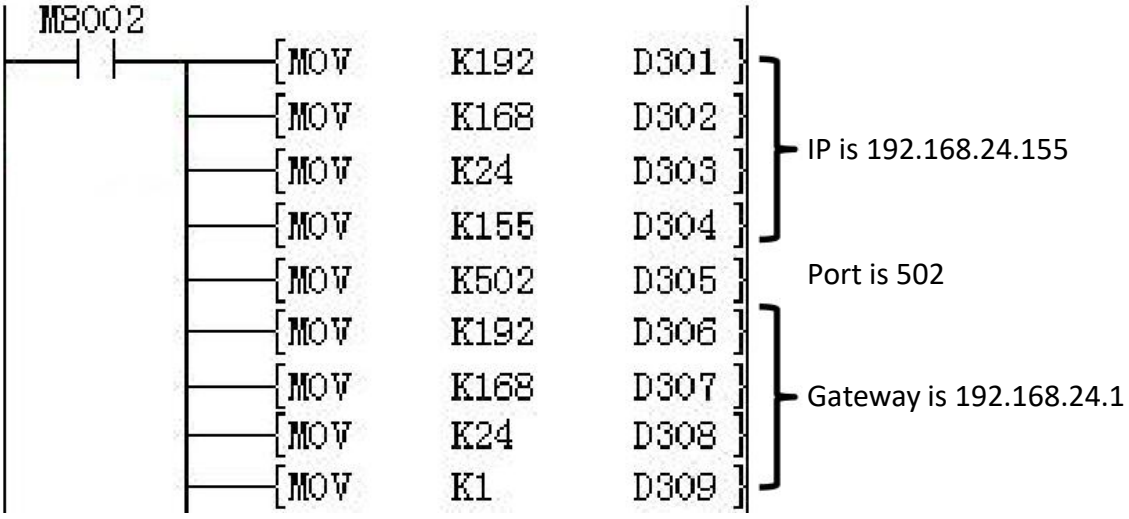
- Device 2

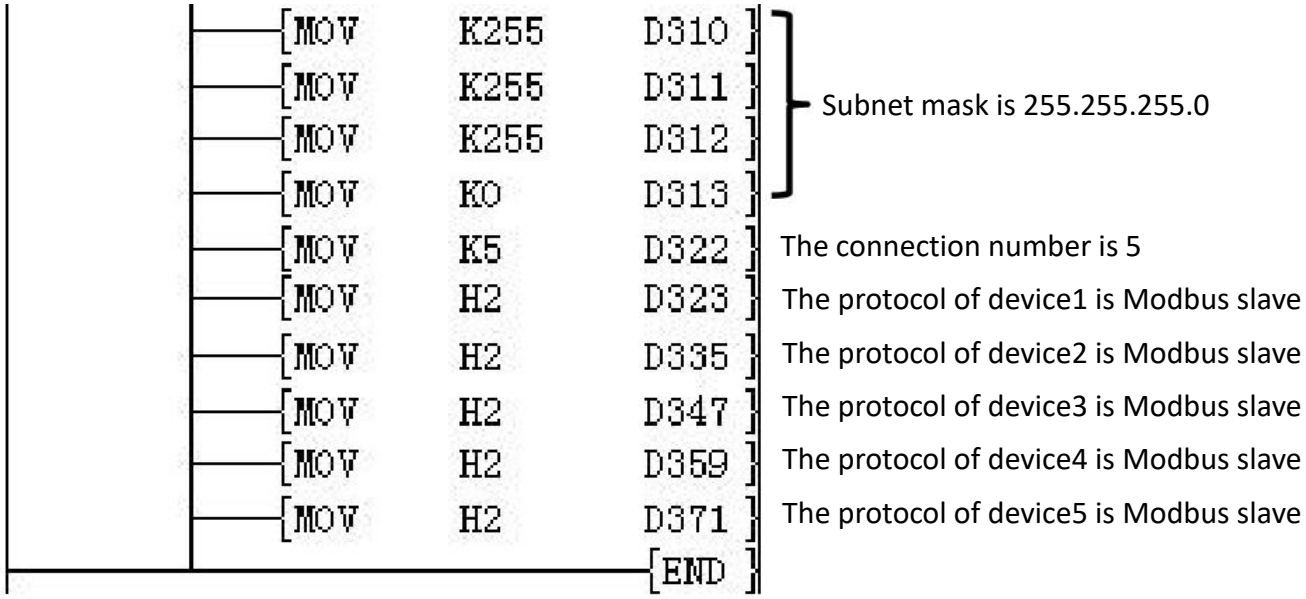
Station number 01, function code 0F(write word)
The start address for writing is 2
The length of address is 10

Write 10 data starting from D800 to the 10 address starting from address 2 in device 2 that is connected with Ethernet port 1

6.2 MODBUS Slave

1) The communication setting of LX3V-ETH-BD:





2) The parameters setting of LX3V-ETH-BD:

6.3 Note

The ladder for parameter settings (CPAVL instruction) must be after of communication settings. If the sequence is wrong, the Ethernet parameters cannot be written into the module, which will result in the failure of normal communication.

7. Error Code Description

If an error occurs in the module communication, the special address M8063 is set to 1, and the special address D8063 will display the error code.

Table 7- 1

Value	Description
0	MODBUS Slave address is set incorrectly
1	Data frame length is incorrect

2	Wrong address
3	CRC Verification error (No CRC check)
4	Command code is not supported
5	Receive timeout
6	Data error
7	Buffer overflow
8	Frame error
9	Send timeout
10-19	Interaction error between PLC and BD module
20	Ethernet disconnected
21	LAN cable disconnected (yellow LED and green LED off at the same time)
22	Ethernet connection failed
23	Ethernet connection timeout
40~46	Interaction error between PLC and BD module

Error code display description

Address	Display value description	
D8063	Expansion port 1 Conn 1	10000+ error code
	Expansion port 1 Conn 2	10100+ error code
	Expansion port 1 Conn 3	10200+ error code
	Expansion port 1 Conn 4	10300+ error code
	Expansion port 1 Conn 5	10400+ error code
	Expansion port 1 Conn 6	10500+ error code
	Expansion port 1 Conn 7	10600+ error code
	Expansion port 1 Conn 8	10700+ error code
	Expansion port 2 Conn 1	20000+ error code
	Expansion port 2 Conn 2	20100+ error code
	Expansion port 2 Conn 3	20200+ error code
	Expansion port 2 Conn 4	20300+ error code
	Expansion port 2 Conn 5	20400+ error code
	Expansion port 2 Conn 6	20500+ error code
	Expansion port 2 Conn 7	20600+ error code
	Expansion port 2 Conn 8	20700+ error code

Example: D8063 display 10121(means Ethernet is disconnected in Expansion port 1 connection 2

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