LX5V-ETH-BD Module Manual

V1.0

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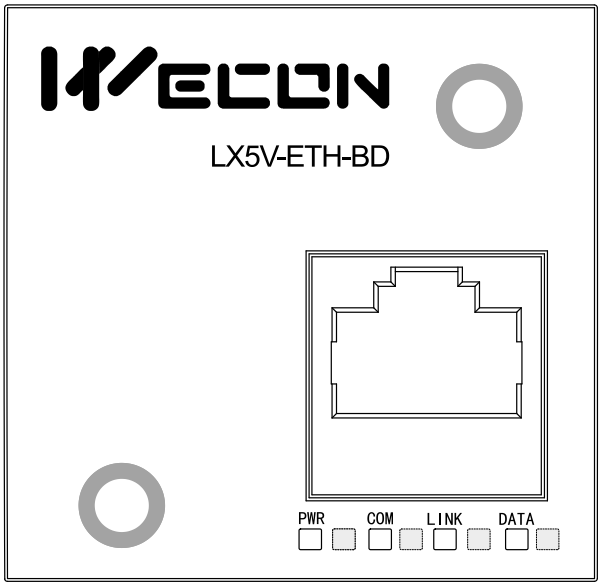
1 Features

- LX5V-ETH-BD is an Ethernet module installed on the top of PLC.
- Only Modbus TCP protocol is supported currently.
- One LX5V-ETH-BD module supports up to 8 devices (regardless of master and slave).

✎ **Note:** This manual is only applicable to the use of LX5V-ETH-BD with 5V series PLC. For specific instructions on the use of LX5V-ETH-BD with 3V series PLC, please refer to LX3VP-ETH-BD Module Manual.

2 Appearance and indicator light



Indicator light	Color	Description
PWR	White	Power light: It is always ON when the power supply connection is normal.
COM	White	The communication light between BD module and PLC. How fast it flashes is determined by the number of PLC communication. After Plugging in the network cable, configuring Ethernet parameters by the host computer software, and downloading, the communication light flashes.
DATA	Yellow	Network access light. It is ON when accessing the network. If the contact is not good, the indicator light is OFF or flashing (the same as the lights of general network cards).
LINK	Green	Network communication Light. It flashes when network communication is normal (the same as the light of general network card).

3 Parameter configuration

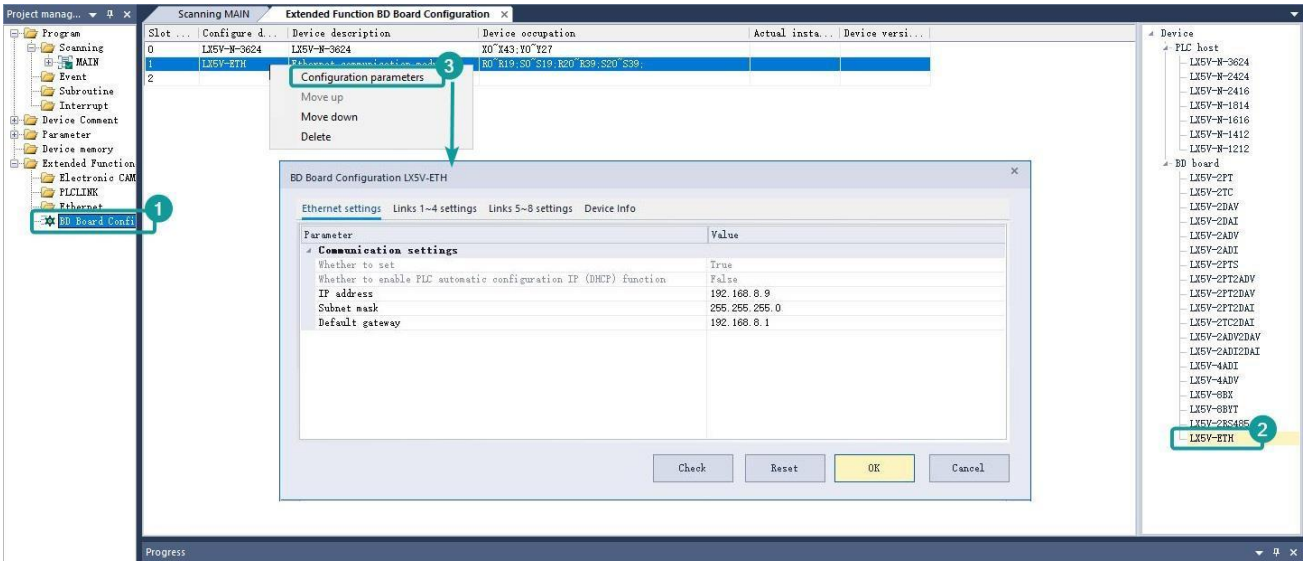
The Ethernet parameters of LX5V-ETH-BD are configured by the host computer, dividing into basic parameter configuration and link parameter configuration.

3.1 Basic parameter configuration

① Open the host computer and create a new project,double-click "BD Module Configuration" in “Project Manager” → “Extended Function”[Note] to enter “BD Settings” Interface;

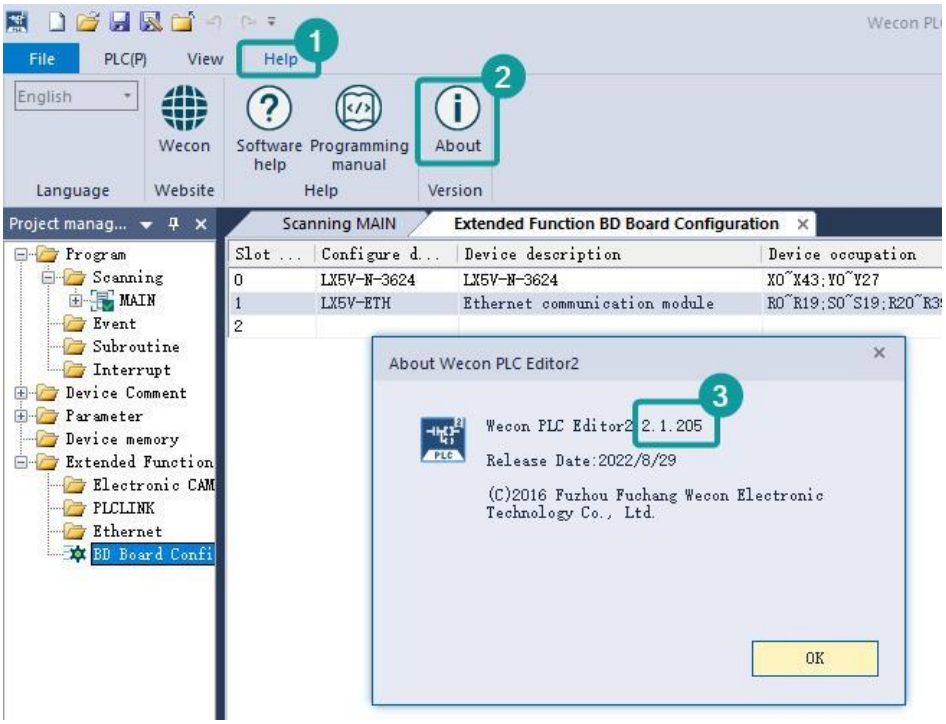
② Select "LX5V-ETH" in the device bar on the right side of the BD module configuration interface and double-click to add it to the corresponding slot position of PLC (slot 1 or 2, the software will select slot 1 by default. You could right-click it to move to slot 2);

③ After adding BD module to the slot, double-click or right-click to select configuration parameters to enter the LX5V-ETH-BD configuration parameters interface, as shown in the following figure. IP address, subnet mask, and default gateway of LX5V-ETH-BD could be configured in this interface. Currently, only static IP could be configured.

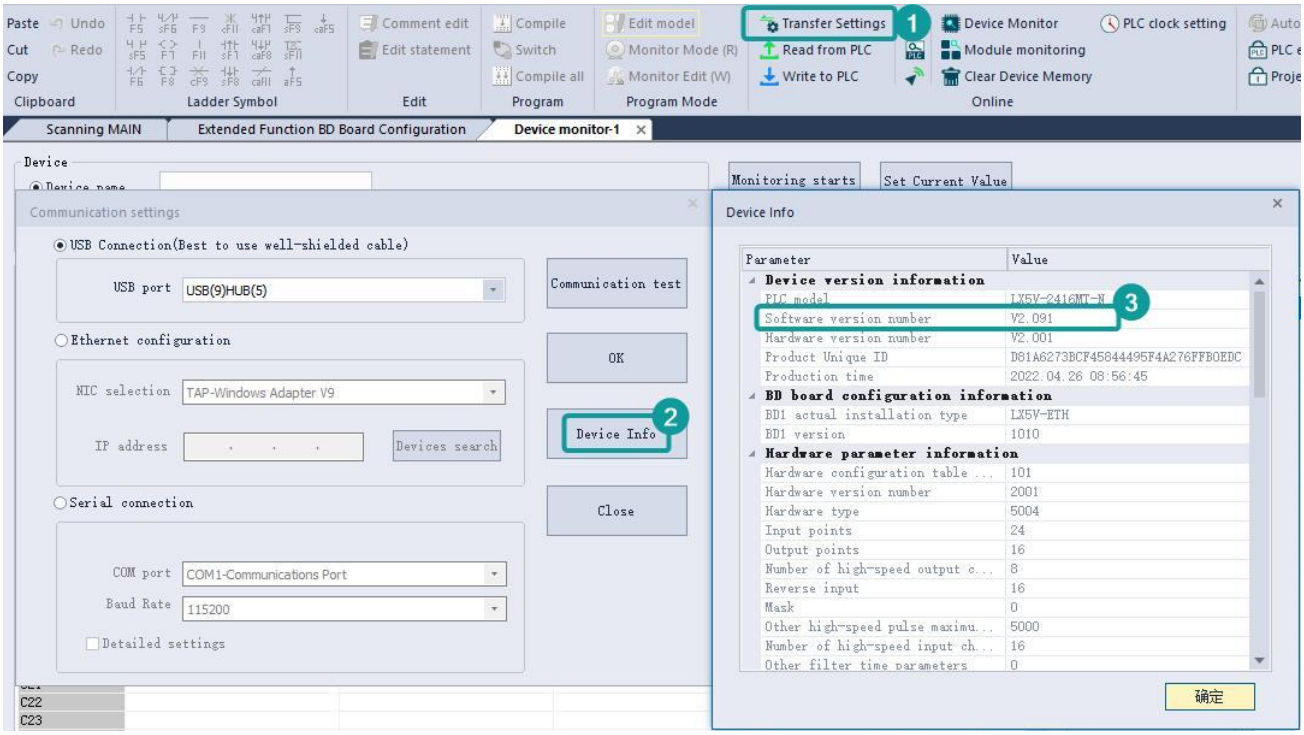


✎**Note:** This function is only supported by the following host computer and slave computer versions:

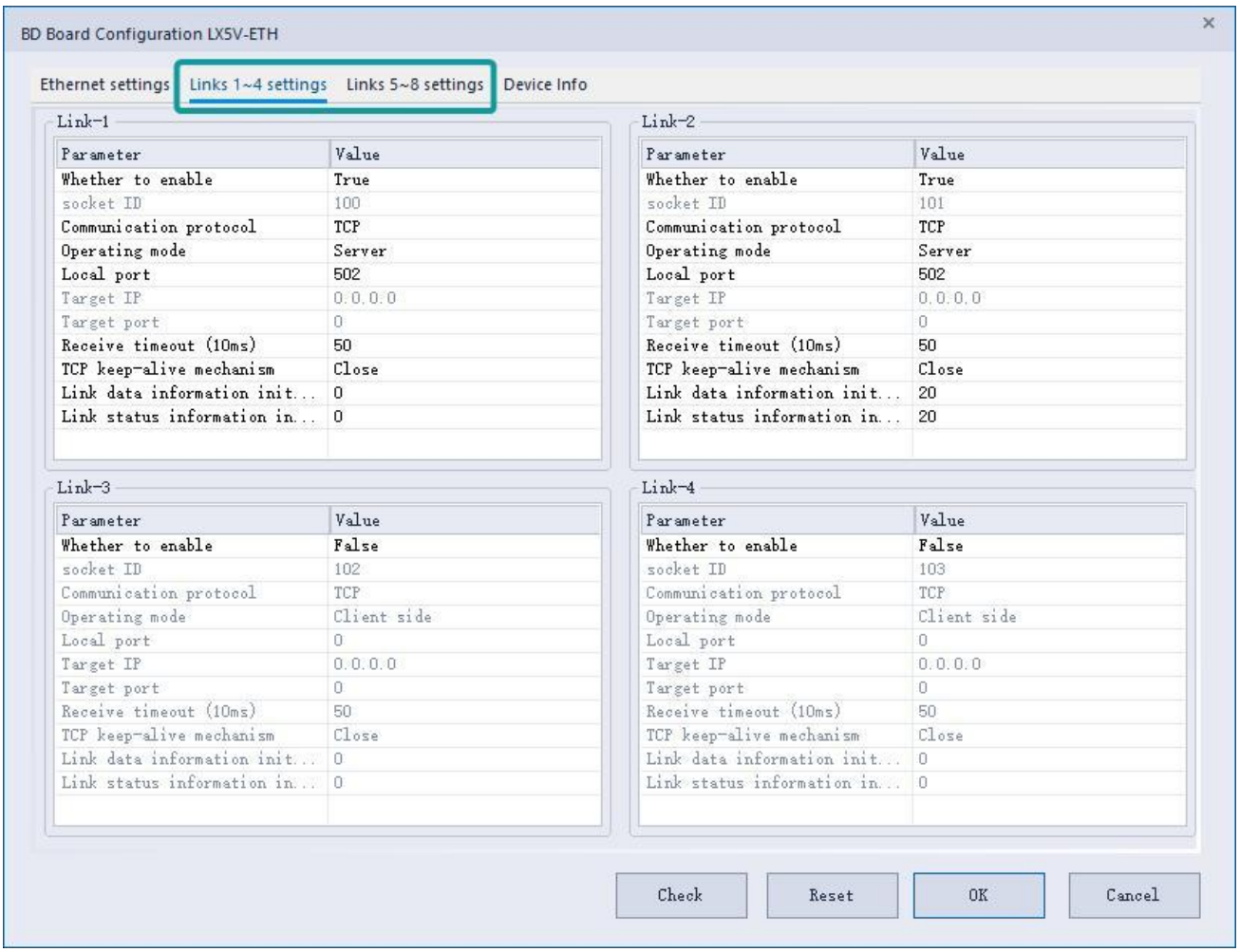
① Supported host computer versions: Wecon PLC Editor 2 2.1.204 and above, shown as below.



② Supported slave computer versions: 2.061 and above, shown as below.



3.2 Link configuration



✎**Note:** One LX5V-ETH-BD supports up to 8 Ethernet links, each of which can be individually configured to enable.

Description of each configuration item for each link:

① **Whether to enable:** Indicates whether the configuration is valid. When it is False, the configured socket ID cannot be used.

② **Socket ID:** This field is assigned by the host computer and cannot be modified.

③ **Communication protocol:** Currently only the Modbus TCP protocol is supported.

④ **Operating mode:** Client and server can be selected.

⑤ **Local port:**

- When the client is selected as the operating mode, the local port cannot be configured and is assigned by the BD module. The assigned port number range is 4096to32767.
- When the server is selected as the operating mode, the local port is fixed as 502, and only Modbus TCP protocol is supported.

⑥ **Destination IP:** It is valid when the client is selected as the operating mode, indicating that the client needs to connect to the server address.

⑦ **Destination port:** It is valid when the client is selected as the operating mode, indicating that the client needs to connect to the server port.

⑧ **Receive timeout:** It is valid when the client is selected as the operating mode, indicating the maximum waiting time from the instruction sent to the response. When the receive timeout is exceeded, but the response has not yet returned, the receive timeout error will be reported.

⑨ **TCP keep-alive:** It is valid for both client and server. After enable, it will monitor whether the link has data interaction. If the link does not send or receive data for more than 50 seconds, it means that the other party of the connection may fail, and the link is closed immediately to recycle the link resources.

⑩ **Link data information initial device (R) and link status information initial device (S):** It is valid when the server is selected as the operating mode. During the initialization process of the ladder diagram, using these devices, the SOCOPEN/create socket link operation is automatically performed, and you do not need to perform the SOCOPEN operation in the ladder diagram.

4 Instructions used

4.1 SOCOPEN/Create socket link

Create a socket link specified by (S), update the data information of the socket link to (D1), and update the status information to (D2).

-[SOCOPEN (S) (D1) (D2)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S)	Socket ID	-	Signed BIN16 bits	ANY16
(D1)	The data information initial device that stores socket links.	-	Signed BIN16 bits	ANY_ELEMENTARY
(D2)	The status information initial device that	-	Bit	ANY_BOOL

	stores socket links.			

✎**Note:** The socket ID is configured by Ethernet host computer, and cannot be selected at will.

Device used

Instruction	Parameter	Devices																						Offset modification	Pulse extension
		X	Y	M	S	SM	T (bit)	C (bit)	LC (bit)	HSC (bit)	D.b	KnX	KnY	KnM	KnS	T	C	D	R	SD	LC	HSC	K	H	E	[D]	XXP
SOCOPEN	Parameter 1																						●	●			
	Parameter 2															●	●	●	●	●							
	Parameter 3		●	●	●	●					●																

Function

Create a link to the socket specified in (S) and display the link information in (D1) and (D2).

When the instruction is turned on, the device specified in (D1) and (D2) will be used in other Ethernet instructions using the same socket ID (e.g. SOCCLOSE, SOCMTCP).

The information specified by (D1) is as follows. (A total of 14 word devices are occupied):

Devices	Function
(D1)	Local port number
(D1+1)	The 1st segment of destination IP
(D1+2)	The 2nd segment of destination IP
(D1+3)	The 3rd segment of destination IP
(D1+4)	The 4th segment of destination IP
(D1+5)	The 5th segment of destination IP
(D1+6)	Receive timeout (10ms)
(D1+7)	Reserved
(D1+8)	Current link error code
(D1+9)	Communication error count high word
(D1+10)	Communication error count low word
(D1+11)	Reserved
(D1+12)	Reserved
(D1+13)	Reserved

Parameter description:

① Local port number:

- Establish a TCP client, and PLC automatically assigns the local communication port. The range is 4096to32767. The port number will be automatically increased by 1 each time it is turned ON.
- Establish a TCP server specified by the Ethernet socket configuration of the host computer.

② Destination IP:

- Establish a TCP client, and the destination address is specified by the Ethernet socket configuration of the host computer.
- Establish a TCP server and display the IP of the remote connection after the remote client

connection is successful.

③ Destination port number:

- Establish a TCP client, and the destination port number is specified by the Ethernet socket configuration of the host computer.
- Establish a TCP server and display the port number of the remote connection after the remote client connection is successful.

④ Receive timeout (10ms): Specified by Ethernet socket configuration of host computer.

⑤ Current link error code: Displays the current error information. For specific errors, please refer to the Ethernet error list.

⑥ Number of communication errors: the total number of communication errors after successful connection (double words).

The information specified by (D2) is as follows. (A total of 14 bit devices are occupied):

Devices	ON status	OFF status
(D2)	Connecting	Connection not enabled
(D2+1)	Connection complete	Connecting or not connected
(D2+2)	Reserved	Reserved
(D2+3)	Reserved	Reserved
(D2+4)	Reserved	Reserved
(D2+5)	Reserved	Reserved
(D2+6)	Connection closed	Instruction not started or closed completed
(D2+7)	Connection close complete	Instruction not started or closing
(D2+8)	Communication completion (for SOCMTCP instruction)	In communication
(D2+9)	Connection error	No connection error
(D1+10)	Reserved	Reserved
(D1+11)	Reserved	Reserved
(D1+12)	Reserved	Reserved
(D1+13)	Reserved	Reserved

Error code

Error code	Content
4085H	The devices specified in the application instructions (D1) and (D2) exceed the range of the corresponding device.
5080H	The Ethernet socket has been linked and cannot be opened repeatedly.
5083H	Failed to create TCP server.
5084H	Failed to create link
5086H	The socket ID used by the Ethernet instruction is not configured or enabled by the host computer.

4.2 SOCMTCP/Ethernet Modbus TCP Communication

Ethernet Modbus TCP client communication instruction.

-[SOCMTCP (S1) (S2) (S3) (S4) (S5)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S1)	Socket ID	-	Signed BIN16 bits	ANY16
(S2)	The high byte is the station number and the low byte is the function code	-	Signed BIN16 bits	ANY_ELEMENTARY
(S3)	Modbus address that requires communication	0 to 65535	Unsigned BIN16 bits	ANY16
(S4)	Send or receive length	-	Signed BIN16 bits	ANY16
(S5)	Send or receive initiation device	-	Signed BIN16 bits	ANY_ELEMENTARY

✎**Note**: The socket ID is configured by Ethernet host computer, and cannot be selected at will.

Device used

Instruction	Parameter	Devices																								Offset modification	Pulse extension
		X	Y	M	S	SM	T (bit)	C (bit)	LC (bit)	HSC (bit)	D.b	KnX	KnY	KnM	KnS	T	C	D	R	SD	LC	HSC	K	H	E	[D]	XXP
SOCMTCP	Parameter 1																						●	●			
	Parameter 2															●	●	●	●	●			●	●			
	Parameter 3															●	●	●	●	●			●	●			
	Parameter 4															●	●	●	●	●			●	●			
	Parameter 5															●	●	●	●	●							

Function

(S1): Specify the socket ID of the link, and other parameters are compatible with the RS instruction Modbus master protocol.

(S2): The high byte is the station number. For Modbus TCP, the station number can be set at will.

(S2): The lower byte is the station number. Please refer to the Modbus function code section of RS instruction.

(S3): Modbus communication address, the address of the Modbus TCP server to be read or written.

It must be used with the SOCOPEN instruction, and data can only be sent after a complete link is established.

This instruction can only be used when a TCP client socket link is established.

Communication completion information and the number of received and sent can be viewed in the device specified by SOCOPEN instruction.

Error code

Error code	Content
5081H	The Ethernet socket is not open and cannot be operated.
5086H	The socket ID (S1) used by the Ethernet instruction is not configured on the host computer or is not enabled after configuration.

4.3 SOCCLOSE/Close socket link

Close the socket link specified by (S).

-[SOCCLOSE (S)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S)	socket ID	-	Signed BIN16 bits	ANY16

✎**Note:** The socket ID is configured by Ethernet host computer, and cannot be selected at will.

Device used

Instruction	Parameter	Devices																							Offset modification	Pulse extension
		X	Y	M	S	SM	T(bit)	C(bit)	LC (bit)	HSC (bit)	D.b	KnX	KnY	KnM	KnS	T	C	D	R	SD	LC	HSC	K	H	E	[D]	XXP
SOCCLOSE	Parameter 1																						●	●			

Function

Close the socket link specified in (S).

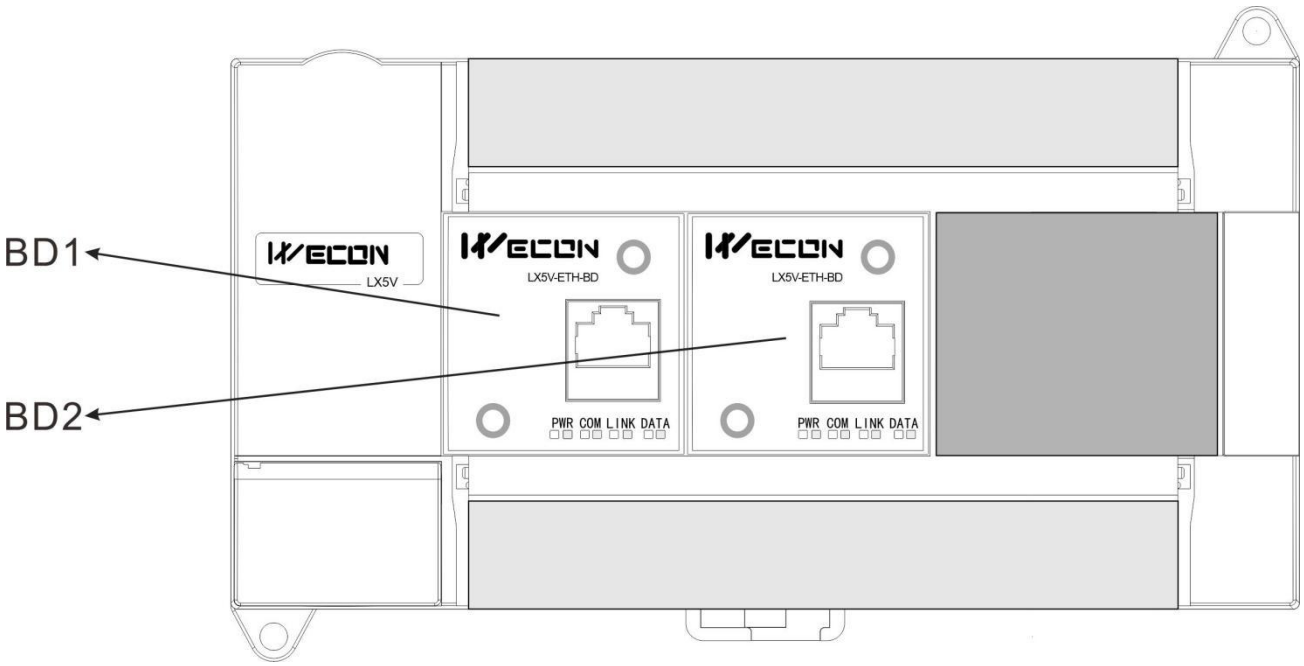
When the TCP server is shut down, it will send a reset request to the remote client. At this time, in the bit device specified by SOCOPEN, the status of connection closing will be set. Only when the state of connection closing is set can the socket be truly released and the next link be opened.

If the socket specified by (S) is not connected to the remote party, it cannot be closed, and the instruction reports an error.

Error code

Error code	Content
5081H	The Ethernet socket is not open and cannot be operated.
5086H	The socket ID used by the Ethernet instruction is not configured or enabled by the host computer.

5 Description of PLC special devices



BD1:

SD label	Content
SD2000	Display 0x1020 after Ethernet BD is recognized after power-on.
SD2001	Display Ethernet BD version after Ethernet BD is recognized after power-on.
SD 2005	BD1 error communication port.
SD2006	BD1 communication timeout (1ms).
SD2009	Ethernet BD1 keep-alive time settings.

BD2:

SD label	Content
SD2020	Display 0x1020 after Ethernet BD is recognized after power-on.
SD2021	Display Ethernet BD version after Ethernet BD is recognized after power-on.
SD2025	BD2 error communication port.
SD2026	BD2 communication timeout (1ms).
SD2029	Ethernet BD2 keep-alive time settings.

6 Address mapping

When the BD module configures the Modbus TCP slave protocol, the address mapping relationship accessed by the master station is as follows:

Word address				
Address type	Occupation	Address range	Decimal address	Total reserved address size
T0 to T511	512 WORD	0x0000 to 0x01ff	0	1536

C0 to C255	256 WORD	0x0600 to 0x06ff	1536	1024
LC0 to LC255	512 WORD	0x0A000 to 0x0BFF	2560	1024
HSC0 to HSC15	128 word	0x0E00 to 0x0E1F	3584	512
D0 to D7999	8000 WORD	0x1000 to 0x2F3F	4096	16384
SD0 to SD4095	4096 WORD	0x5000 to 0x5FFF	20480	12288
R0 to R30000	30000 WORD	0x8000 to 0xF52F	32768	30000

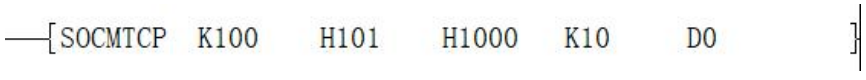
Bit address				
Address type	**Occupation**	**Address range**	**Decimal address**	**Total reserved address size**
T0 to T511	512 bits	0x0000 to 0x01ff	0	1536
C0 to C255	256 bits	0x0600 to 0x06ff	1536	1024
LC0 to LC255	256 bits	0x0A00 to 0x0AFF	2560	1024
HSC0 to HSC15	64 bits	0x0E00 to 0x0E0F	3584	512
M0 to M8000	8192 bits	0x1000 to 0x2F3F	4096	16384
SM0 to SM4095	4096 bits	0x5000 to 0x5FFF	20480	12288
Reserved		0x8000 to 0xBFFF		16383
S0 to S4095	4096 bits	0xC000 to 0xCFFF	49152	8192
X0 to X1023	1024 bits	0xE000 to 0xE3FF	57344	4096
Y0 to Y1023	1024 bits	0xF000 to 0xF3FF	61440	4096

When using the Modbus TCP master station to access the slave station, the SOCMTCP instruction specifies the following address:

Example 1: Read 10 registers starting from slave station (station NO.1) D0 and store them in 10 devices starting from local D0:

The function code of this instruction is 3, which indicates reading register, and the address H1000 in it is the starting address of "D0 to D7999" by inquiring the "word address table", which corresponds to the address of D0.

Example 2: Read 10 bit devices starting from slave station (station NO.1) M0 and store them in local D0 device (because D0 can store the value of 16 bit devices, zero padding will be performed):

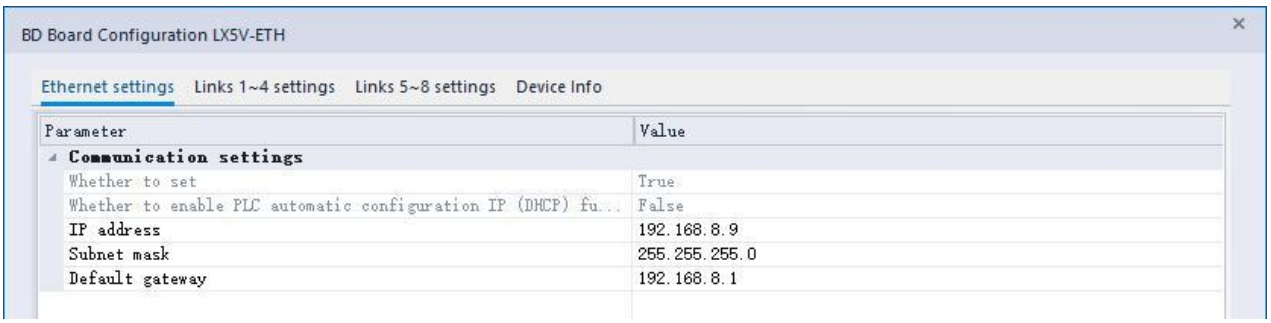


The function code of the instruction is 1, which indicates read coil, and the address H1000 in it is the starting address of “M0 to M8000" by inquiring the "bit address table", which corresponds to the address of M0. If slave stations M0 and M1 are 1, and the rest are 0, the value in D0 is H0300 (not H0003).

7 Examples

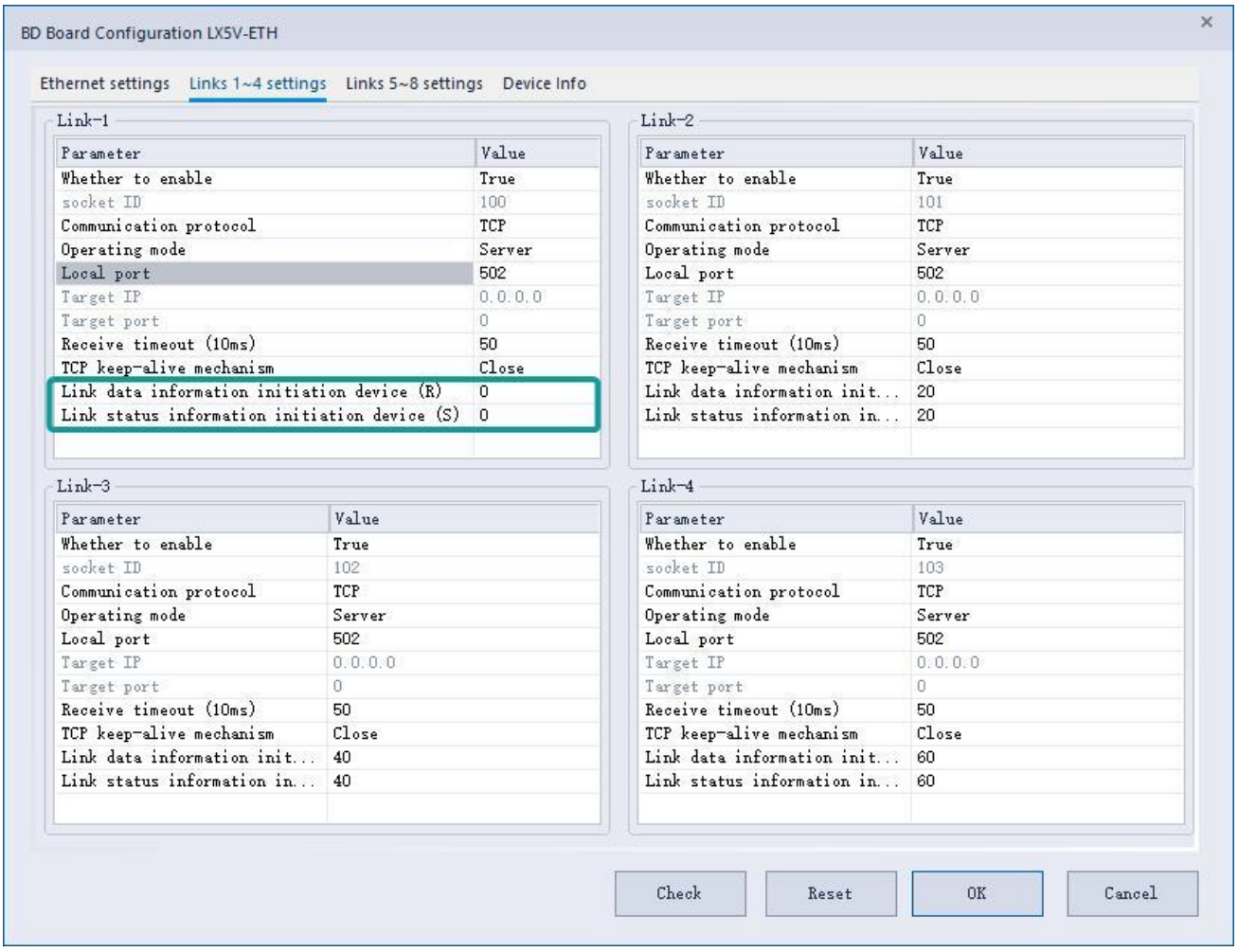
Example 1

Configure 8 Modbus TCP slave protocols. The basic parameters are configured as follows:



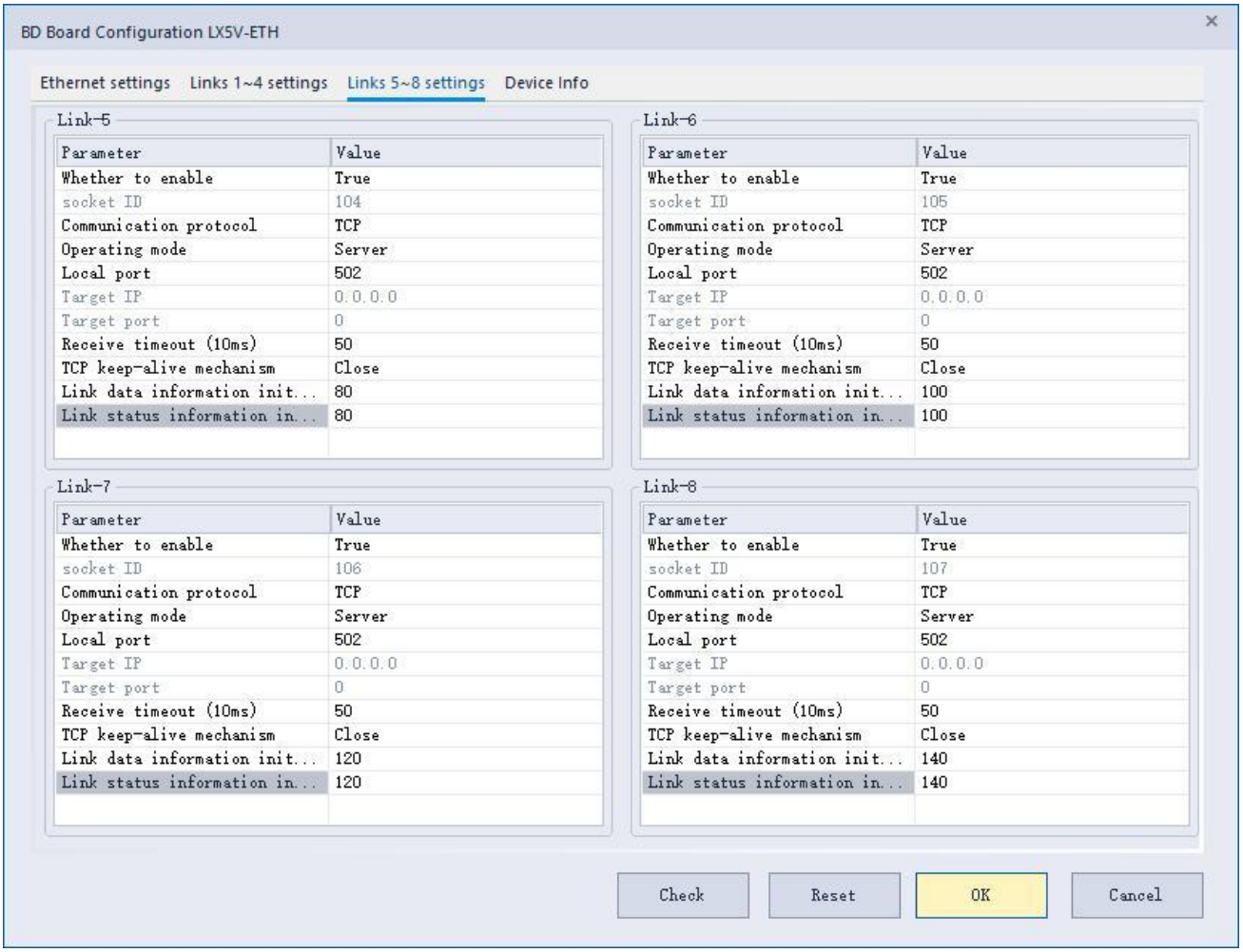
✎**Note:** The IP address should be configured in the same network segment as the IP address of the master station. For example, if the IP address of the master station is 192.168.8.8 and the subnet mask is 255.255.255.0, the IP address of the BD module should be configured as 192.168.8.xx (the value of xx is 1to255. Do not duplicate other IP addresses on the same network segment).

The parameters of link 1 to 4 are configured as follows:



✎**Note**: The server needs to configure "link data information initial device" and "link status information initial device", and the settings of each link should not overlap.

The parameters of link 5 to 8 are configured as follows:

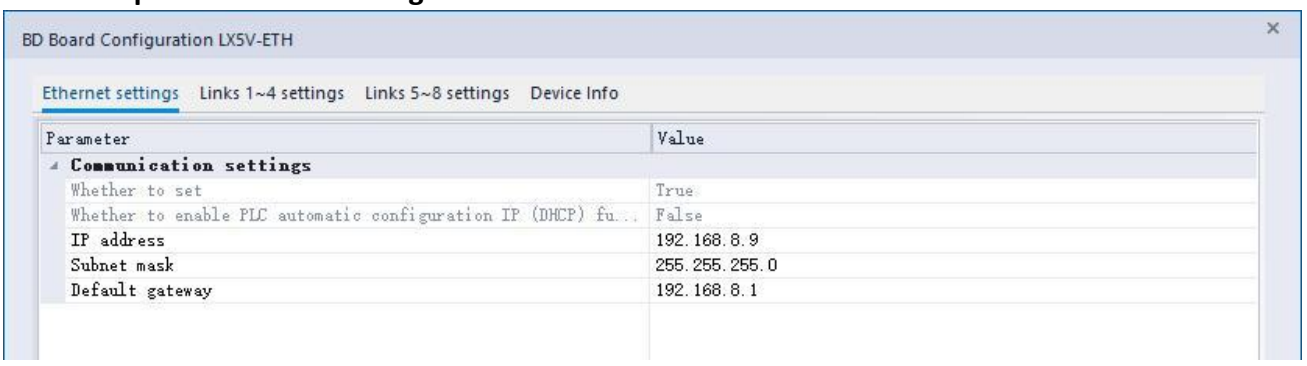


After the configuration is completed, there is no need to configure ladder diagram, and it will take effect after downloading programs and parameters.

Example 2

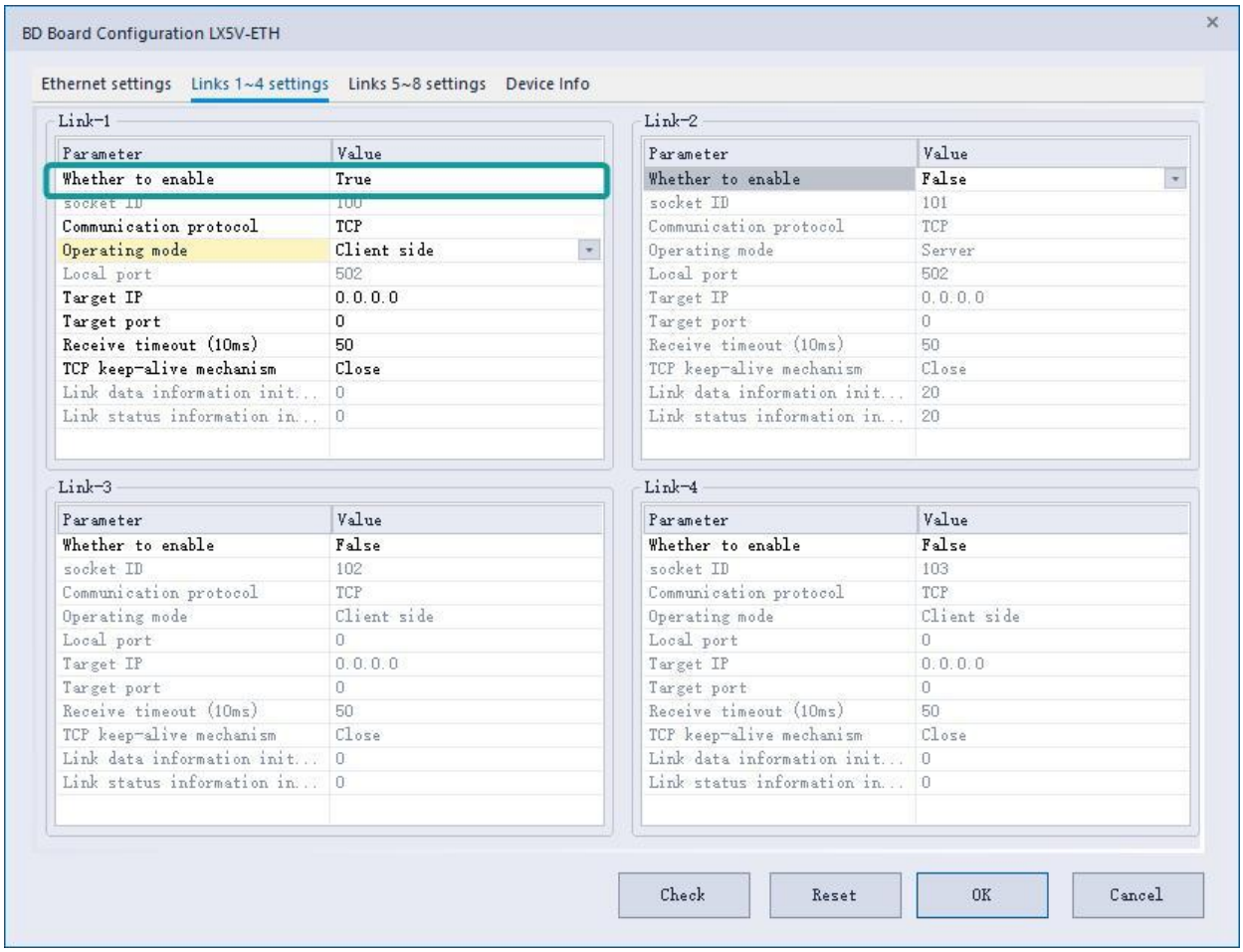
Configure a Modbus TCP master protocol to read 125 word devices from the address 0 of slave. Whether the communication is correct is judged by comparing whether the first word device is 100, and count the success and failure.

The basic parameters are configured as follows:

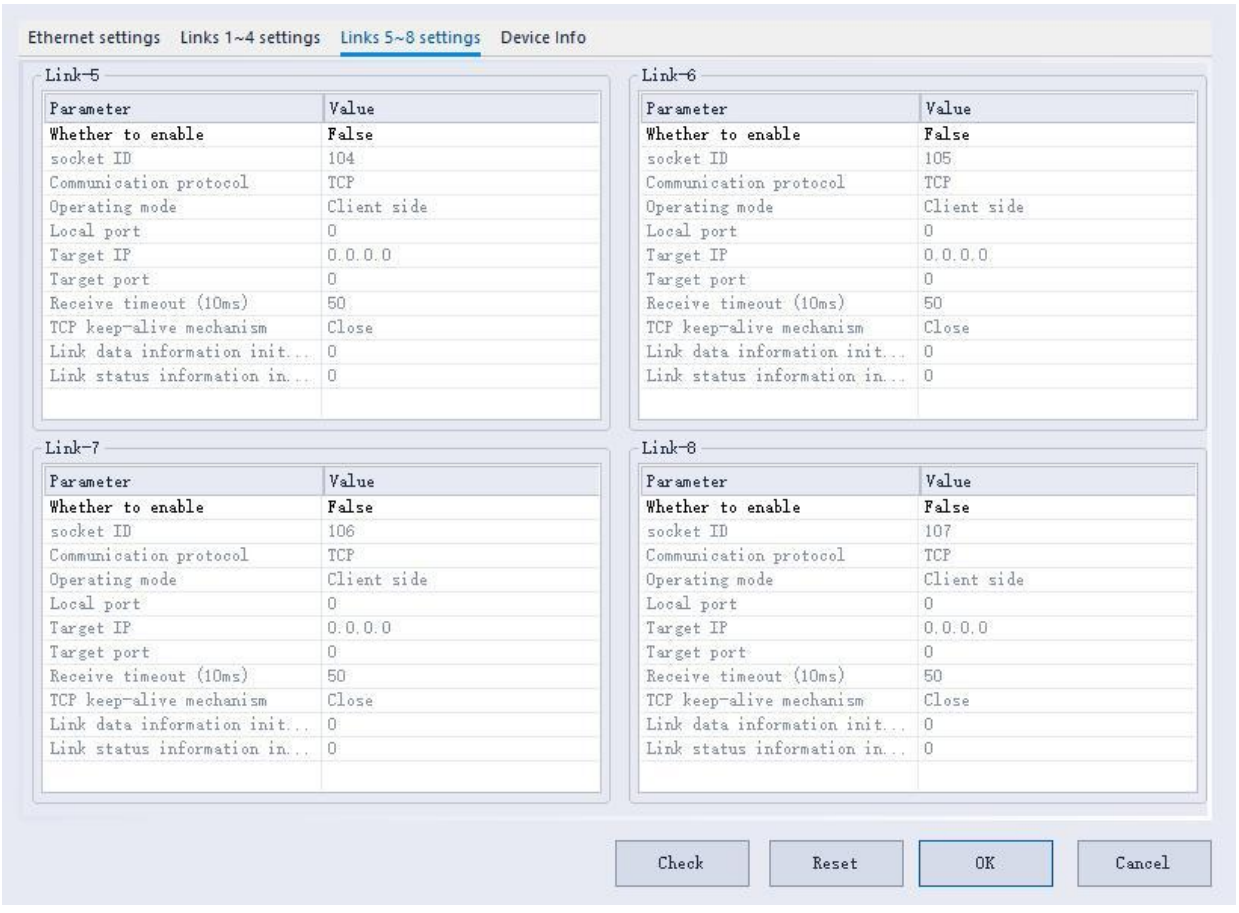


The parameters of link 1 to 4 are configured as follows:

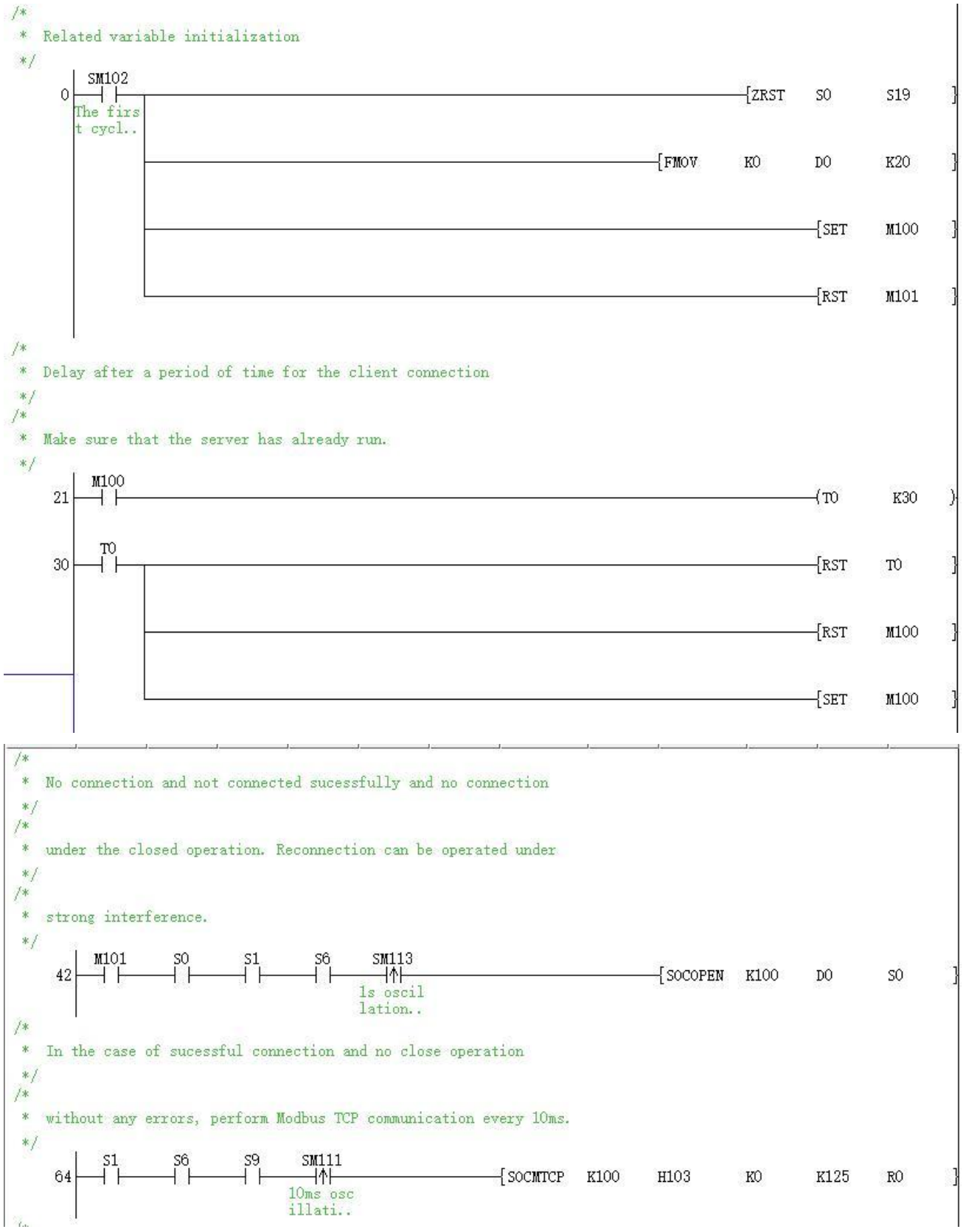
Because only one client is configured, none of the links except the first one are enabled.

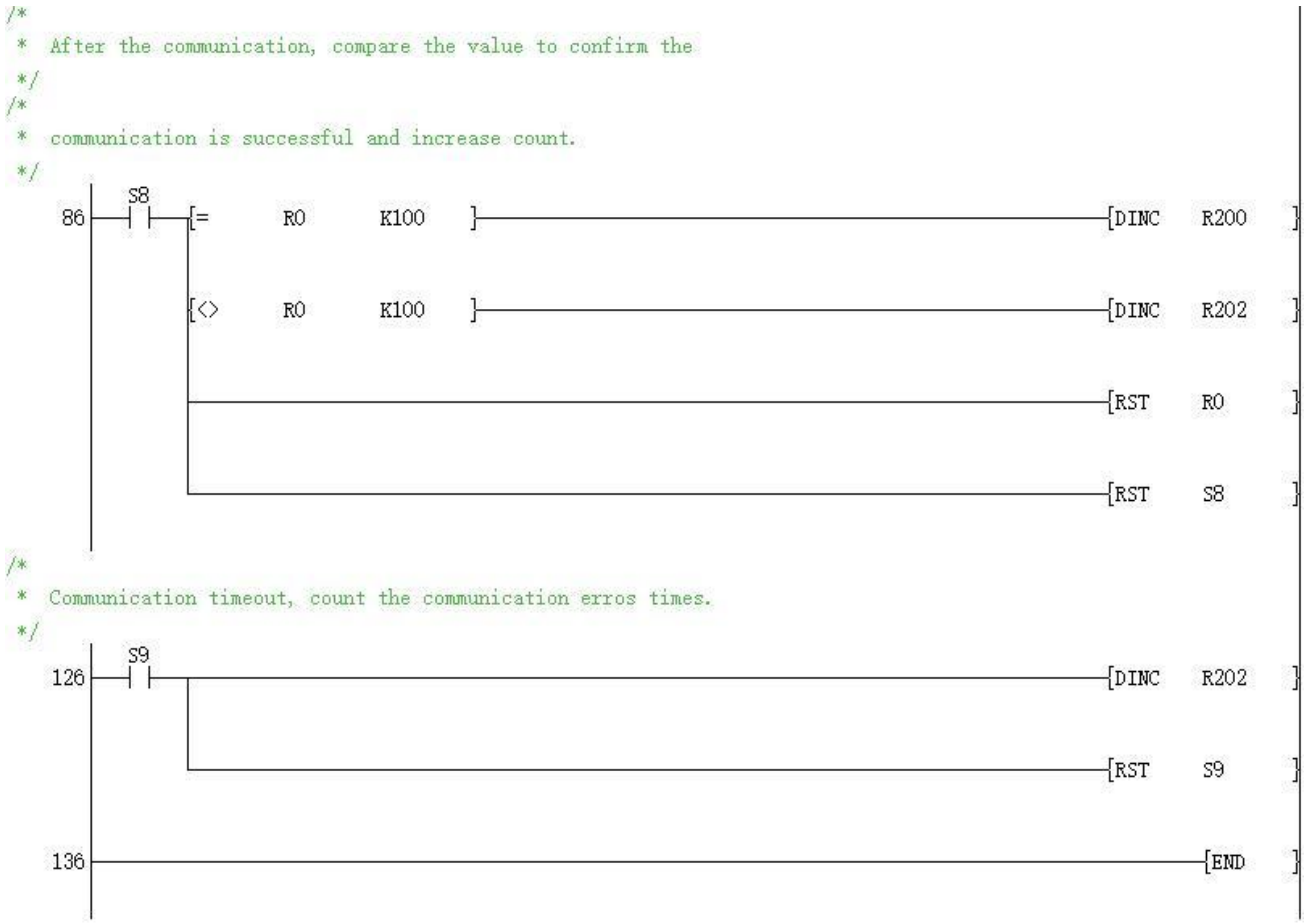


The parameters of link 5 to 8 are configured as follows:



The configuration ladder diagram is as follows:




/*
* After the communication, compare the value to confirm the
*/
/*
* communication is successful and increase count.
*/
S8
86
[= R0 K100]
[DINC R200]
[<> R0 K100]
[DINC R202]
[RST R0]
[RST S8]
/*
* Communication timeout, count the communication erros times.
*/
S9
126
[DINC R202]
[RST S9]
136
[END]