

# 7

## Communication Function

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This chapter mainly includes: basic concept of communication, Modbus communication, free communication and CAN-bus communication;

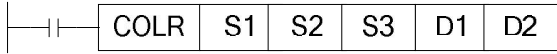
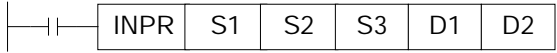
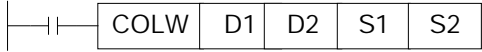
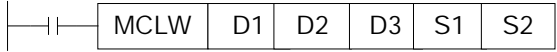
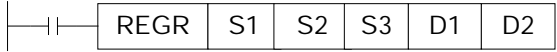
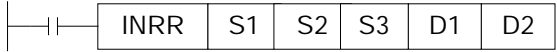
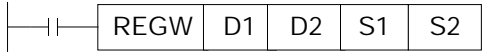
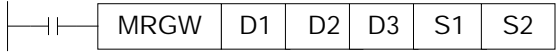
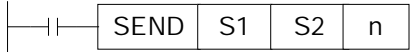
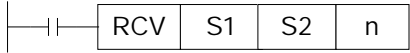
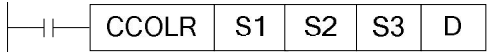

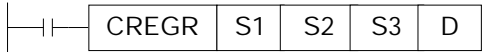
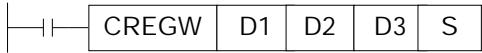
7-1 . Summary

7-2 . Modbus Communication

7-3 . Free Communication

7-4 . CAN Communication

Relative Instructions:

Mnemonic	Function	Circuit and Soft Components	Chapter
<b>MODBUS Communication</b>			
COLR	Coil Read	 COLR S1 S2 S3 D1 D2	7-2-3
INPR	Input coil read	 INPR S1 S2 S3 D1 D2	7-2-3
COLW	Single coil write	 COLW D1 D2 S1 S2	7-2-3
MCLW	Multi-coil write	 MCLW D1 D2 D3 S1 S2	7-2-3
REGR	Register read	 REGR S1 S2 S3 D1 D2	7-2-3
INRR	Input register read	 INRR S1 S2 S3 D1 D2	7-2-3
REGW	Single register write	 REGW D1 D2 S1 S2	7-2-3
MREGW	Multi-register write	 MREGW D1 D2 D3 S1 S2	7-2-3
<b>Free Communication</b>			
SEND	Send data	 SEND S1 S2 n	7-3-2
RCV	Receive data	 RCV S1 S2 n	7-3-2
<b>CAN-bus Communication</b>			
CCOLR	Read coil	 CCOLR S1 S2 S3 D	7-4-4
CCOLW	Write coil	 CCOLW D1 D2 D3 S	7-4-4
CREGR	Read register	 CREGR S1 S2 S3 D	7-4-4
CREGW	Write register	 CREGW D1 D2 D3 S	7-4-4

## 7-1 . Summary

XC2-PLC, XC3-PLC, XC5-PLC main units can fulfill your requirement on communication and network. They not only support simple network (Modbus protocol, free communication protocol), but also support those complicate network. XC2-PLC, XC3-PLC, XC5-PLC offer communication access, with which you can communicate with the devices (such as printer, instruments etc.) that have their own communication protocol.

XC2-PLC, XC3-PLC, XC5-PLC all support Modbus protocol、free protocol these communication function, XC5-PLC also have CANbus function.

### 7-1-1 . COM port

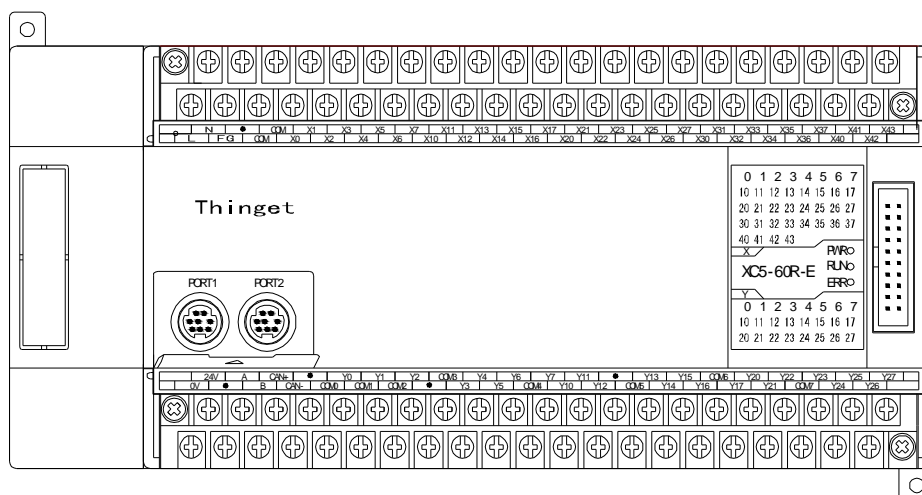
#### COM Port

There are 2 COM ports (Port1、 Port2) on XC3 series PLC basic units, while there are 3 COM ports on XC5 series PLC main units. Besides the same COM ports (COM1、 COM2), they have also CAN COM port.

COM 1 (Port1) is the program port, it can be used to download the program and connect with the other devices. The parameters (baud rate, data bit etc.) of this COM port are fixed, can't be re-set.

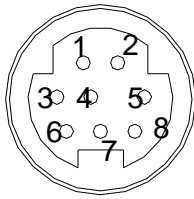
COM 2 (Port2) is communication port, it can be used to download program and connect with the other devices. The parameters (baud rate, data bit etc.) of this COM port can be re-set via software.

Via BD cards, XC series PLC can expend other COM ports. These COM ports can be RS232 and RS485.



## 1、 RS232 COM Port

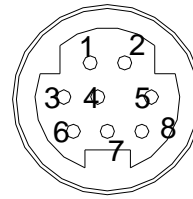
### | COM1 Pin Definition:



2 : PRG  
4 : RxD  
5 : TxD  
6 : VCC  
8 : GND

Mini Din 8 pin female

### COM2 Pin Definition:



4 : RxD  
5 : TxD  
8 : GND

Mini Din 8 pin female

## 2、RS485 COM port:

About RS485 COM port, A is “+” signal、 B is “-“ signal.

The A, B terminals (RS485) on XC series PLC comes from COM2, so, you can't only use two at the same time.

## 3、 CAN COM port:

CAN port can be used to realize CANbus communication. The pin terminals are “CAN+”, “CAN-“

For the detailed CAN communication functions, please refer to “6-8 . CAN bus function (XC5 series)”

### 7-1-2 . Communication Parameters

#### Communication Parameters

Station	Modbus Station number: 1~254、 255 (FF) is free format communication
Baud Rate	300bps~115.2Kbps
Data Bit	8 bits data、 7 bits data
Stop Bit	2 stop bits、 1 stop bit
Parity	Even、 Odd、 No check

The default parameters of COM 1:

Station number is 1、 baud rate is 19200bps、 8 data bit、 1 stop bit、 Even

#### Parameters Setting

Set the parameters with the COM ports on XC series PLC;

	Number	Function	Description
COM 1	FD8210	Communication mode	255 is free format , <b>1~254 bit is Modbus station number</b>
	FD8211	Communication format	Baud rate, data bit, stop bit, parity
	FD8212	ASC timeout judgment time	Unit: ms , if set to be 0, it means no timeout waiting
	FD8213	Reply timeout judgment time	Unit: ms , if set to be 0, it means no timeout waiting
	FD8214	Start symbol	High 8 bits invalid
	FD8215	End symbol	High 8 bits invalid
	FD8216	Free format setting	8/16 bits cushion, with/without start bit, with/without stop bit

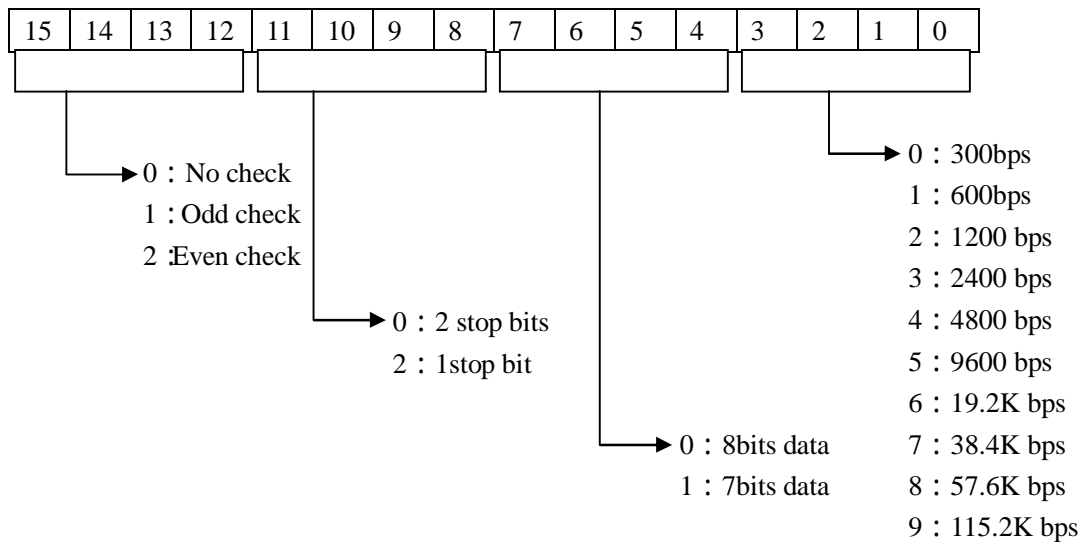
COM 2	FD8220	Communication mode	255 is free format , <b>1~254 bit is Modbus station number</b>
	FD8221	Communication format	Baud rate, data bit, stop bit, parity
	FD8222	ASC timeout judgment time	Unit: ms , if set to be 0, it means no timeout waiting
	FD8223	Reply timeout judgment time	Unit: ms , if set to be 0, it means no timeout waiting
	FD8224	Start symbol	High 8 bits invalid
	FD8225	End symbol	High 8 bits invalid
	FD8226	Free format setting	8/16 bits cushion, with/without start bit, with/without stop bit
COM 3	FD8230	Communication mode	255 is free format , <b>1~254 bit is Modbus station number</b>
	FD8231	Communication format	Baud rate, data bit, stop bit, parity
	FD8232	ASC timeout judgment time	Unit: ms , if set to be 0, it means no timeout waiting
	FD8233	Reply timeout judgment time	Unit: ms , if set to be 0, it means no timeout waiting
	FD8234	Start symbol	High 8 bits invalid
	FD8235	End symbol	High 8 bits invalid
	FD8236	Free format setting	8/16 bits cushion, with/without start bit, with/without stop bit

1: The PLC will be Off line after changing the communication parameters, use “stop when reboot” function to keep PLC online;

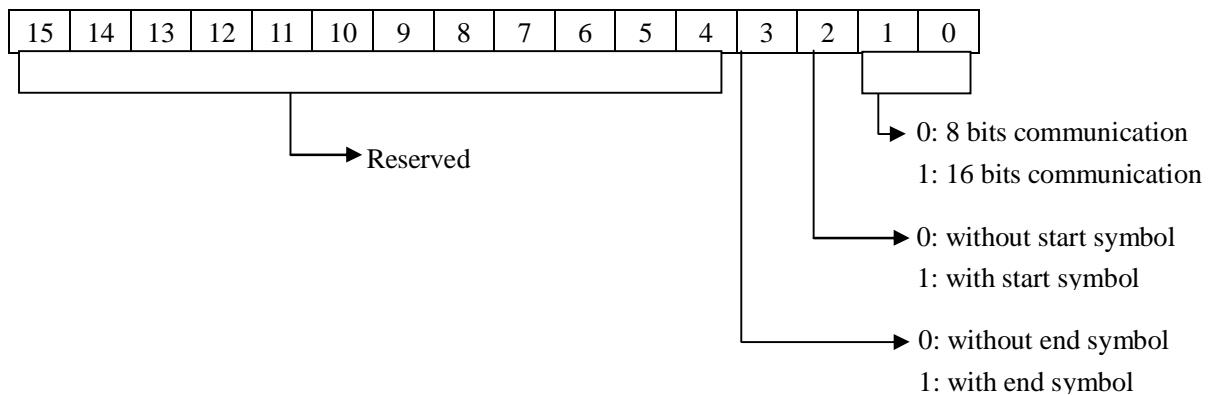
2: After modifying the data with special FLASH data registers, the new data will get into effect after reboot;

	Set the communication parameters:
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### FD8211 (COM1)/FD8221 (COM2)/FD8231 (COM3)



### FD8216 (COM1)/FD8226 (COM2)/FD8236 (COM3)



## 7-2 . MODBUS Communication

### 7-2-1 . Function

XC series PLC support both Modbus master and Modbus slave

Master format: When PLC is set to be master, PLC sends request to other slave devices via Modbus instructions, other devices response the master.

Slave format: when PLC is set to be slave, it can only response with other master devices.

The default status of XC-PLC is Modbus slave.

### 7-2-2 . Address

For the soft component's number in PLC which corresponds with Modbus address number, please see the following table:

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**Coil Space: (Modbus ID prefix is “0x” )**

Bit ID	ModbusID ( decimal K)	Modbus ID (Hex. H)
M0~M7999	0~7999	0~1F3F
X0~X1037	16384~16927	4000~421F
Y0~Y1037	18432~18975	4800~4A1F
S0~S1023	20480~21503	5000~53FF
M8000~M8511	24576~25087	6000~61FF
T0~T618	25600~26218	6400~666A
C0~C634	27648~28282	6C00~6E7A

**Register Space: (Modbus ID prefix is “4x” )**

Word ID	ModbusID ( decimal K)	Modbus ID (Hex. H)
D0~D7999	0~7999	0~1F3F
TD0~TD618	12288~12906	3000~326A
CD0~CD634	14336~14970	3800~3A7A
D8000~D8511	16384~16895	4000~41FF
FD0~FD5000	18432~23432	4800~5B88
FD8000~FD8511	26624~27135	6800~69FF

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1: Bit soft components X、 Y are in Octal form, the left are in decimal form;

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### 7-2-3 . Communication Instructions

Modbus instructions include coil read/write, register read/write; below, we describe these instructions in details:

#### Ø Coil Read [COLR]

##### 1、 Instruction Summary

Read the specified station's specified coil status to the local PLC;

Coil read [COLR]			
16 bits instruction	COLR	32 bits instruction	-
Execution Condition	Normally ON/OFF coil	Suitable Models	XC2、 XC3、 XC5、 XCM
Hardware Requirement	-	Software Requirement	-



## 2、Operands

Operands	Function	Type
S1	Specify the remote communication station or soft component's ID	16bits, BIN
S2	Specify the remote coil's start ID or soft component's ID	16bits, BIN
S3	Specify the coil number or soft component's ID	16bits, BIN
D1	Specify the start ID of the local receive coils	bit
D2	Specify the serial port's number	16bits, BIN

## 3、suitable soft components

Word	Operands	System									constant	module	
		D	FD	ED	TD	CD	DX	DY	DM	DS	K/H	ID	QD
	S1												
	S2												
	S3												
	D2										K		

Bit	Operands	Operands						
		X	Y	M	S	T	C	Dnm
	D1							



- Read coil instruction, Modbus code is 01H.
- Serial Port: K1~K3

## Ø Input Coil Read [INPR]

### 1、Instruction

Read the specified station's specified input coils into local coils:

Input coil read [INPR]			
16 bits instruction	INPR	32 bits instruction	-
Execution Condition	Normally ON/OFF、 rising edge	Suitable Models	XC2、 XC3、 XC5、 XCM

Hardware Requirement	-	Software Requirement	-
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## 2、Operands

Operands	Function	Type
S1	Specify the remote communication station or soft component's ID	16bits, BIN
S2	Specify the remote coil's start ID or soft component's ID	16bits, BIN
S3	Specify the coil number or soft component's ID	16bits, BIN
D1	Specify the start ID of the local receive coils	bit
D2	Specify the serial port's number	16bits, BIN

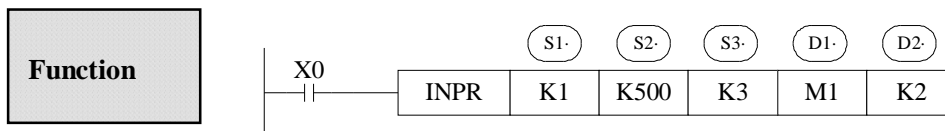
## 3、Suitable Soft Components

Word

Operands	System									constant	module	
	D	FD	ED	TD	CD	DX	DY	DM	DS	K/H	ID	QD
S1												
S2												
S3												
D2										K		

Bit

Operands	System						
	X	Y	M	S	T	C	Dnm
D1							



- | Instruction to read the input coil, Modbus code is 02H
- | Serial port: K1~K3
- | When X0 is ON, execute COLR or INPR instruction, set communication flag after execution the instruction; when X0 is OFF, no operation. If error happens during communication, resend automatically. If the errors reach 3 times, set the communication error flag. The user can check the relative registers to judge the error;

## Ø single coil write [COLW]

### 1、 summary

Write the local coil status to the specified station's specified coil;



16 bits instruction	MCLW	32 bits instruction	-
Execution Condition	Normally ON/OFF、 rising edge	Suitable Models	XC2、 XC3、 XC5、 XCM
Hardware Requirement	-	Software Requirement	-

## 2、 Operands

Operands	Function	Type
D1	Specify the remote communication station or soft component's ID	16bits, BIN
D2	Specify the remote coil's start ID or soft component's ID	16bits, BIN
D3	Specify the coil number or soft component's ID	16bits, BIN
S1	Specify the start ID of the local receive coils	bit
S2	Specify the serial port's number	16bits, BIN

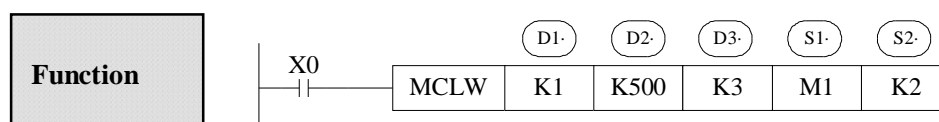
## 3、 Suitable soft components

Word

Operands	System									constant	module	
	D	FD	ED	TD	CD	DX	DY	DM	DS	K/H	ID	QD
D1												
D2												
D3												
S2										K		

Bit

Operands	System						
	X	Y	M	S	T	C	Dnm
S1							



- Instruction to write the multiply coils, Modbus code is 0FH
- Serial port: K1~K3
- When X0 is ON, execute COLW or MCLW instruction, set communication flag after execution the instruction; when X0 is OFF, no operation. If error happens during communication, resend automatically. If the errors reach 4 times, set the communication error flag. The user can check the relative registers to judge the error;

Ø **Register Read [REGR]**

### 1、Summary

Read the specified station's specified register to the local register;

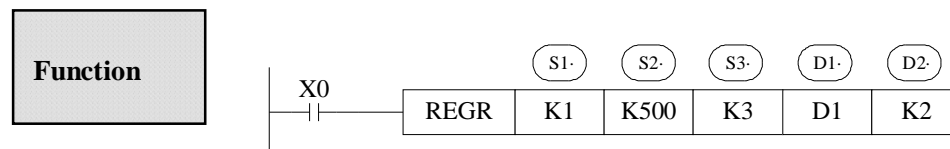
Register read [REGR]			
16 bits instruction	REGR	32 bits instruction	-
Execution Condition	Normally ON/OFF、 rising edge	Suitable Models	XC2、 XC3、 XC5、 XCM
Hardware Requirement	-	Software Requirement	-

### 2、Operands

Operands	Function	Type
S1	Specify the remote communication station or soft component's ID	16bits, BIN
S2	Specify the remote coil's start ID or soft component's ID	16bits, BIN
S3	Specify the coil number or soft component's ID	16bits, BIN
D1	Specify the start ID of the local receive coils	bit
D2	Specify the serial port's number	16bits, BIN

### 3、Suitable soft components

Word	Operands	System								constant	module	
		D	FD	ED	TD	CD	DX	DY	DM	DS	K/H	ID
	S1											
	S2											
	S3											
	D1											
	D2									K		



┆ Instruction to read the REGISTERS, Modbus code is 03H

┆ Serial port: K1~K3

### Ø Read Input Register [INRR]

### 1、Summary

Read the specified station's specified input register to the local register

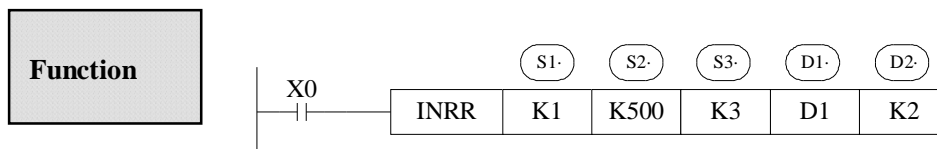
Read Input Register [INRR]			
16 bits instruction	INRR	32 bits instruction	-
Execution Condition	Normally ON/OFF、 rising edge	Suitable Models	XC2、 XC3、 XC5、 XCM
Hardware Requirement	-	Software Requirement	-

## 2、 Operands

Operands	Function	Type
S1	Specify the remote communication station or soft component's ID	16bits, BIN
S2	Specify the remote coil's start ID or soft component's ID	16bits, BIN
S3	Specify the coil number or soft component's ID	16bits, BIN
D1	Specify the start ID of the local receive coils	bit
D2	Specify the serial port's number	16bits, BIN

## 3、 Suitable soft components

Word	Operands	System								constant	module	
		D	FD	ED	TD	CD	DX	DY	DM	DS	K/H	ID
	S1											
S2												
S3												
D1												
D2										K		



- | Instruction to read the input registers, Modbus code is 04H
- | Serial port: K1~K3
- | When X0 is ON, execute REGR or INRR instruction, set communication flag after execution the instruction; when X0 is OFF, no operation. If error happens during communication, resend automatically. If the errors reach 4 times, set the communication error flag. The user can check the relative registers to judge the error;

Ø Single register write [REGW]

### 1、summary

Instruction to write the local specified register into the specified station's specified register;

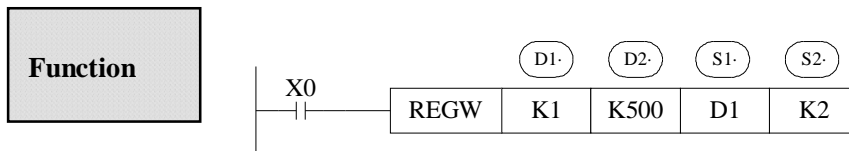
Single register write [REGW]			
16 bits instruction	REGW	32 bits instruction	-
Execution Condition	Normally ON/OFF、 rising edge	Suitable Models	XC2、 XC3、 XC5、 XCM
Hardware Requirement	-	Software Requirement	-

### 2、 Operands

Operands	Function	Type
D1	Specify the remote communication station or soft component's ID	16bits, BIN
D2	Specify the remote coil's start ID or soft component's ID	16bits, BIN
S1	Specify the start ID of the local receive coils	16bits, BIN
S2	Specify the serial port's number	16bits, BIN

### 3、 Suitable soft components

Word	Operands	System								constant	module		
		D	FD	ED	TD	CD	DX	DY	DM	DS	K/H	ID	QD
	D1												
	D2												
	S1												
	S2										K		



l Write the single register, Modbus code is 06H

l Serial port: K1~K3

## Ø Multi-register write [MRGW]

### 1、 Summary

Instruction to write the local specified register to the specified station's specified register;

Multi-register write [MRGW]			
16 bits instruction	MRGW	32 bits instruction	-
Execution Condition	Normally ON/OFF 、 rising edge	Suitable Models	XC2、 XC3、 XC5、 XCM
Hardware Requirement	-	Software Requirement	-

## 2、 Operands

Operands	Function	Type
D1	Specify the remote communication station or soft component's ID	16bits, BIN
D2	Specify the remote coil's start ID or soft component's ID	16bits, BIN
D3	Specify the coil number or soft component's ID	16bits, BIN
S1	Specify the start ID of the local receive coils	bit
S2	Specify the serial port's number	16bits, BIN

## 3、 Suitable soft components

Word	Operands	System								constant	module		
		D	FD	ED	TD	CD	DX	DY	DM	DS	K/H	ID	QD
	D1												
	D2												
	S1												
	S2									K			



- | Instruction to write the multiply registers, Modbus code is 10H
- | Serial port: K1~K3
- | When X0 is ON, execute REGW or MRGW instruction, set communication flag after execution the instruction; when X0 is OFF, no operation. If error happens during communication, resend automatically. If the errors reach 4 times, set the communication error flag. The user can check the relative registers to judge the error;



## 7-3 . FREE FORMAT COMMUNICATION

### 7-3-1 . Communication mode

Free format communication transfer data in the form of data block, each block can transfer 128 bytes at most. Meanwhile each block can set a start symbol and stop symbol, or not set.

#### Communication Mode:

Start Symbol (1 byte)	Data Block (max. 128 bytes)	End Symbol (1 byte)
-----------------------	-----------------------------	---------------------

- | Port1、 Port2 or Port3 can realize free format communication
- | Under free format form, FD8220 or FD8230 should set to be 255 (FF)
- | Baud Rate: 300bps~115.2Kbps
- | Data Format
  - Data Bit: 7bits、 8bits
  - Parity: Odd、 Even、 No Check
  - Stop bit: 1 bit、 2 bits
- | Start Symbol: 1 bit
  - Stop Symbol: 1 bit
  - User can set a start/stop symbol, after set the start/stop symbol, PLC will automatically add this start/stop symbol when sending data; remove this start/stop symbol when receiving data.
- | Communication Format: 8 bits、 16 bits
  - If choose 8 bits buffer format to communicate, in the communication process, the high bytes are invalid, PLC only use the low bytes to send and receive data.
  - If choose 16 bits buffer format to communicate, when PLC is sending data, PLC will send low bytes before sending higher bytes

### 7-3-2 . Instruction form

#### Ø Send data [SEND]

#### 1、 Summary

Write the local specified data to the specified station's specified ID;

Send data [SEND]			
16 bits instruction	SEND	32 bits instruction	-
Execution Condition	Normally ON/OFF 、 rising edge	Suitable Models	XC2、 XC3、 XC5、 XCM
Hardware Requirement	-	Software Requirement	-

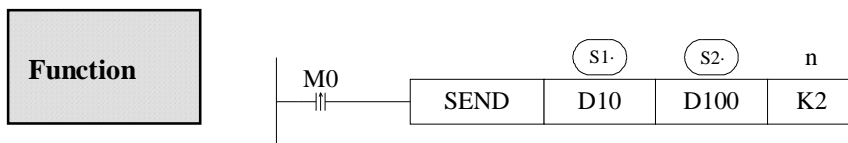
#### 2、 Operands

Operands	Function	Type
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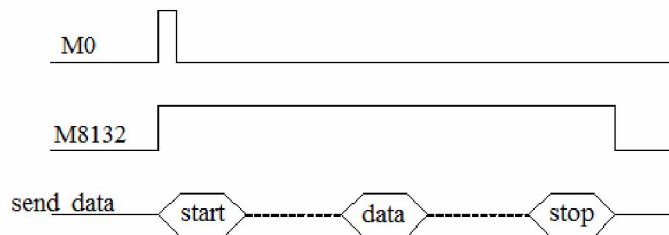
S1	Specify the start ID of local PLC	16bits, BIN
S2	Specify the ASC number to send or soft component's ID	16bits, BIN
n	Specify the COM port Nr.	16bits, BIN

### 3、Suitable soft components

Word	Operands	System								constant	module		
		D	FD	ED	TD	CD	DX	DY	DM	DS	K/H	ID	QD
	S1												
	S2												
	n										K		



- | Data send instruction, send data on the rising edge of M0;
- | Serial port: K2~K3
- | When sending data, set “sending” flag M8132 (COM2) ON



### Ø Receive Date [RCV]

#### 1、Summary

Write the specified station's data to the local specified ID;

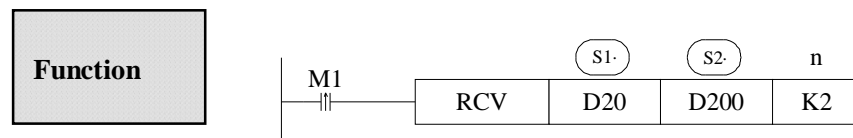
Receive data [RCV]			
16 bits instruction	RCV	32 bits instruction	-
Execution Condition	Normally ON/OFF 、 rising edge	Suitable Models	XC2、 XC3、 XC5、 XCM
Hardware Requirement	-	Software Requirement	-

## 2、 Operands

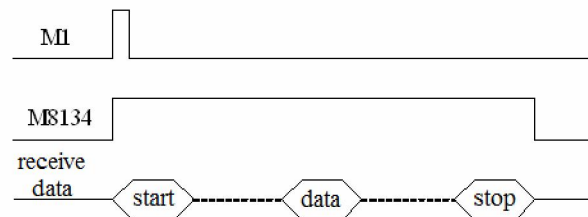
Operands	Function	Type
S1	Specify the start ID of local PLC	16bits, BIN
S2	Specify the ASC number to receive or soft component's ID	16bits, BIN
n	Specify the COM port Nr.	16bits, BIN

## 3、 Suitable soft components

Word	Operands	System								constant	module		
		D	FD	ED	TD	CD	DX	DY	DM	DS	K/H	ID	QD
	S1												
	S2												
	n												



- | Data receive instruction, receive data on the rising edge of M0;
- | Serial port: K2~K3
- | When receiving data, set “receiving” flag M8134(COM2) ON

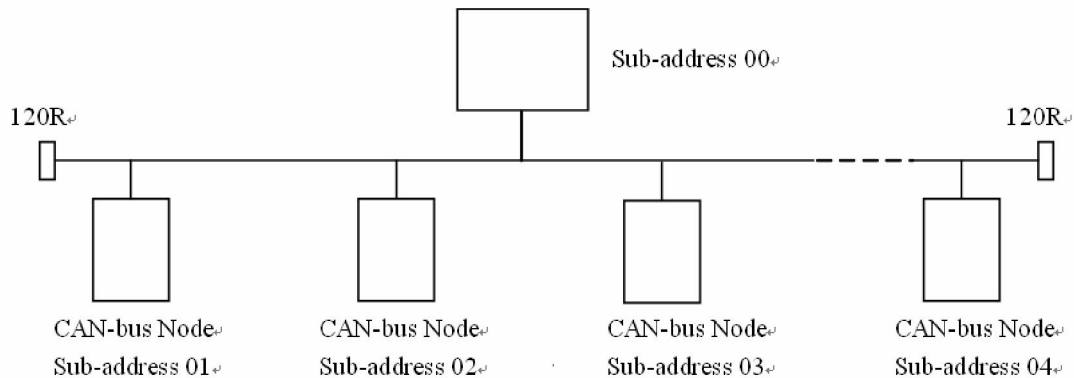


- 
- 1: If you require PLC to receive but not send, or receive before send, you need to set the communication timeout as 0ms
-

## 7-4 . CAN Bus Functions

### 7-4-1 . Brief Introduction of CAN-bus

XC5 series PLC support CANbus bus function. Below we will give some basic concept on CANbus;



**CAN** (Controller Area Network) belongs to industrial area bus category. Compared with common communication bus, CAN bus data communication has performance of outstanding dependability, real time ability and flexibility.

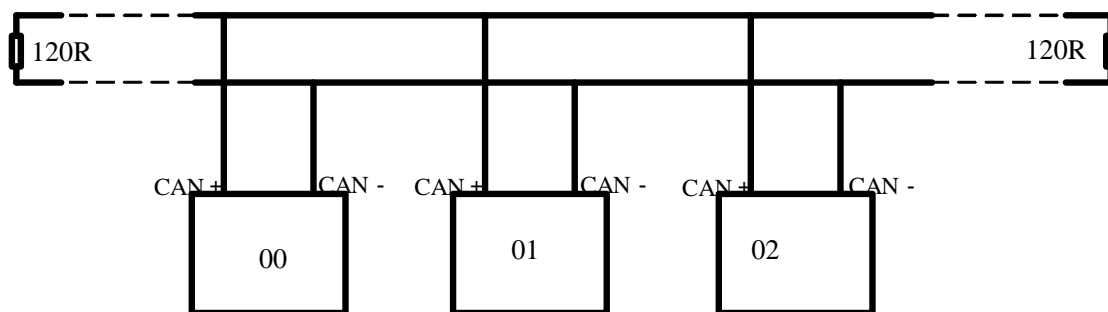
**CAN** controller works under multi-master format. In the network, each node can send data to bus according to the bus visit priority. These characters enable each node in CAN bus network to have stronger data communication real time performance, and easy to construct redundant structure, improve the system's dependability and flexibility.

In CANBUS network, any node can initiatively send message at any time to any other node, no master and no slave. Flexibility communication, it's easy to compose multi-device backup system, distributing format monitor, control system. To fulfill different real time requirement, the nodes can be divided to be different priority level. With non-destroy bus arbitrament technology, when two nodes send message to the network at the same time, the low level priority node initiatively stop data sending, while high level priority node can continue transferring data without any influence. So there is function of node to node, node to multi-node, bureau broadcasting sending/receiving data. Each frame's valid byte number is 8, so the transfer time is short, the probability ratio is low.

### 7-4-2 . External Wiring

CAN-Bus Communication Port: CAN + 、 CAN -

The wiring among each node of CAN bus is shown in the following graph; at the two ends, add 120 ohm middle-terminal resistors.



### 7-4-3 . CAN Bus Network Form

There are two forms of CAN bus network: one is instructions communication format; the other is internal protocol communication format. These two forms can work at the same time

Ø Instructions communication format

This format means, in the local PLC program, via CAN-bus instructions, execute bit or word reading/writing with the specified remote PLC.

Ø Internal protocol communication format

This format means, via setting of special register, via configure table format, realize allude with each other among PLC's certain soft component's space. In this way, realize PLC source sharing in CAN-bus network.

### 7-4-4 . CAN-bus Instructions

#### Ø Read Coil [CCOLR]

#### 1、Instruction Description

Function : Read the specified station's specified coil status into the local specified coil.

Read Coil [CCOLR]			
16 bits instruction	CCOLR	32 bits instruction	-
Execution Condition	Normally ON/OFF, rising edge activates	Suitable Models	XC5
Hardware Requirement	-	Software Requirement	-

#### 2、Operands

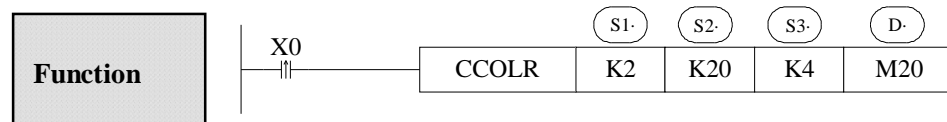
Operands	Function	Type
S1	Specify remote communication station ID or soft component's number;	16bits, BIN
S2	Specify the remote coil's start ID or soft component's number;	16bits, BIN
S3	Specify the coil number or soft component's number;	16bits, BIN
D	Specify the local receive coil's start ID	bit

### 3、Suitable Soft Components

Word	Operands	System								Constant	Module		
		D	FD	ED	TD	CD	DX	DY	DM	DS	K/H	ID	QD
	S1												
	S2												
	S3												

Bit	Operands	System						
		X	Y	M	S	T	C	Dnm
	D							



- I Execute CCOLR instruction when X0 changes from OFF to ON; read the four coils data of remote station 2th, coil's start ID K20 to local M20 ~ M23.

### Ø Write the Coil [CCOLW]

#### 1、Summary

Write the local specified multi-coils status into the specified station's specified coils;

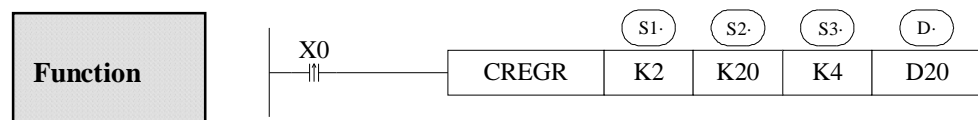
Write the coil [CCOLW]			
16 bits instruction	CCOLW	32 bits instruction	-
Execution Condition	Normally ON/OFF 、 rising edge	Suitable Models	XC5
Hardware Requirement	-	Software Requirement	-

#### 2、Operands

Operands	Function	Type
D1	Specify remote communication station ID or soft component's number;	16 bit, BIN
D2	Specify the remote coil's start ID or soft component's number;	16 bit, BIN
D3	Specify the coil number or soft component's number;	16 bit, BIN
S	Specify the local receive coil's start ID	bit

#### 3、Suitable soft components





- Execute CREGR instruction when X0 changes from OFF to ON; read the remote station 2th, coil's start ID K20 to the local D20 ~ D23

## Write the Register [CREGW]

### 1、Summary

Write the specified local input register to the specified station's specified register;

Write the register [CREGW]			
16 bits instruction	CREGW	32 bits instruction	-
Execution Condition	Normally ON/OFF、 rising edge	Suitable Models	XC5
Hardware Requirement	-	Software Requirement	-

### 2、Operands

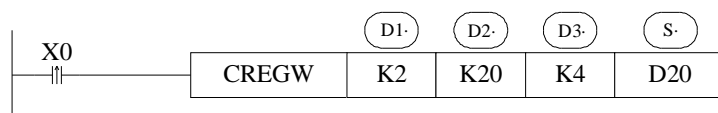
Operands	Function	Type
D1	Specify remote communication station ID or soft component's number;	16bits, BIN
D2	Specify the remote register's start ID or soft component's number;	16bits, BIN
D3	Specify the register number or soft component's number;	16bits, BIN
S	Specify the local receive coil's start ID	16bits, BIN

### 3、Suitable soft components

Word	Operands	System								constant	module	
		D	FD	ED	TD	CD	DX	DY	DM	DS	K/H	ID
	S1											
S2												
S3												
D												

## Function





- I Execute CREGW instruction when X0 changes from OFF to ON; write the local D20 ~ D23 to the remote station 2th, coil's start ID K20.

#### 7-4-5 . Communication Form of Internal Protocol

##### Function

- I Open/close the internal protocol communication function

Set the value in register FD8350:

0: do not use CAN internal protocol communication;

1: use CAN internal protocol communication

CAN internal protocol communication is default to be closed;

- I Set the communication parameters

See the setting methods with baud rate, station number, sending frequency etc. in the below table:

Define the configure items:

Internal protocol communication is to communicate via setting the configure items;

The configure items include: read the bit, read the word, write the bit, write the word;

The configure form:

Step 1、 add the four configure items number separately: FD8360—read the bit items、  
FD8361—read the word items、 FD8362—write the bit items、 FD8363—write the  
word items

Step 2、 set each configure item's communication object, each item includes four parameter:  
remote node's station, remote node's object ID、 local object's ID、 number; the  
correspond register ID is: FD8370~FD8373 represents Nr.1 item、  
FD8374~FD8377 represents Nr.2 item、 .....FD9390~FD9393 represents  
Nr.256 item ; totally we can set 256 items; see table below:

##### Communication Setting

Nr.	Function	Description
FD8350	CAN communication mode	0 represents <b>not use</b> ; 1 represents internal protocol
FD8351	CAN baud rate	See CAN baud rate setting table
FD8352	Self CAN station	For CAN protocol use (the default value is 1)
FD8354	Configured sending frequency	The set value's unit is <b>ms</b> , represents "send every <b>ms</b> " if set to be 0, it means send every cycle, the default value is 5ms

FD8360	Read bit number	
FD8361	Read word number	
FD8362	write bit number	
FD8363	write word number	
FD8370	Remote node's ID	The Nr.1 item's configuration
FD8371	Remote node's object ID	
FD8372	Local object's ID	
FD8373	Number	
.....	.....	.....
FD9390	Remote node's ID	The Nr.256 item's configuration
FD9391	Remote node's object ID	
FD9392	Local object's ID	
FD9393	Number	

### Status Flag

M8240	CAN self check error flag	Set 1 if error; set 0 if correct
M8241	Error flag of CAN configure	Set 1 if error; set 0 if correct
M8242	Automatically recover the control after CAN bus error	If set to be 1, then recover after error happens; If set to be 1, then CAN stops working after error happens; The default value is 1, this flag is not power-off retentive

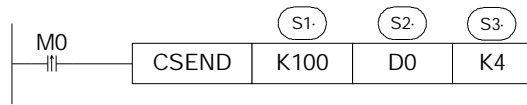
### Baud Rate Setting

FD8351 value	Baud Rate (BPS)
0	1K
1	2K
2	5K
3	10K
4	20K
5	40K
6	50K
7	80K
8	100K
9	150K
10	200K
11	250K
12	300K
13	400K
14	500K
15	600K
16	800K
17	1000K

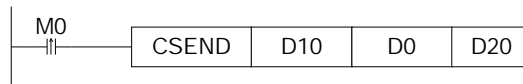
### Register Status



## Functions and Actions



- | Instruction to enable data sending, send data at every rising edge of M0
- | ID number of sending data package is 100, 4 bytes data, the first ID is in D0
- | 8 bits data transfer: the transferred data is: D0L、 D1L、 D2L、 D3L (D0L means the low byte of D0)
- | 16 bits data transfer: the transferred data is: D0L、 D0H、 D1L、 D1H (D0H means the high byte of D0)



- | The ID of sending data package is specified by D10, the data number is specified by D20, the first ID is in D0;
- | 8 bits data transfer: the transferred data is: D0L、 D1L、 D2L、 D3L(D0L means the low byte of D0)
- | 16 bits data transfer: the transferred data is: D0L、 D0H、 D1L、 D1H (D0H means the high byte of D0)
- | Standard Frame: the valid bits of the data package ID number that is specified by D10 is the low 11 bits, the left bits are invalid;
- | The expansion frame: the valid bits of the data package ID number that is specified by D10 is the low 29 bits, the left bits are invalid;
- | The maximum data bits specified by D20 is 8, if exceeds 8, the instruction will send only 8 bits;

## Ø CAN Receive [CRECV]

### 1、Instructions Summary

Write the specified data in one unit to a specified address in another unit (data transfers between different units)

CAN Receive [CRECV]			
16 bits instruction	CRECV	32 bits instruction	-
Executing Condition	Normally ON/OFF、 Rising edge	Suitable Models	XC5
Hardware Requirement	-	Software Requirement	-

### 2、Operands

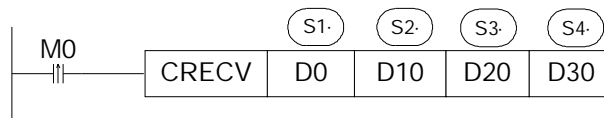
Operands	Function	Type
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S1	specify the ID number to receive the data package	16bits, BIN
S2	specify the first ID number of received soft component locally	16bits, BIN
S3	specify the byte number of received data	16bits, BIN
S4	specify the soft component's start ID number of ID filter code	16bits, BIN

### 3、Suitable soft components

Word Type	Operands	System								Constant	Module		
		D	FD	ED	TD	CD	DX	DY	DM	DS	K/H	ID	QD
	S1												
	S2												
	S3												
	S4												

#### Functions and Actions



- The 32 bits memory combined by [D1, D0] (D0 is low byte, D1 is high byte) is used to stock ID number of the received data package. The received data length is stored in D20. The data content is stored in registers start from D10. D30 specifies the received ID filter code; if the received data doesn't fit the filter codes, then it will keep the RECV status;
- ID filter code: D30 specifies the start address of ID filter codes; the instruction specifies two groups of filter codes, occupy D30~D37 zone;

Filter Code	Memory	Description	Example
The first group	D31, D30	D30 low bytes, D31 high bytes, they compose a 32 bits mask code	D30=0xFFFF, D31=0x0000, then the mask code is 0x0000FFFF D30=0x1234, D31=0x0000, then filter value is 0x00001234 If ID and 0x0000FFFF equals 0x00001234, the pass the first group of filter. If the ID pass any of two groups, the allow the reception
	D33, D32	D32 low bytes, D33 high bytes, they compose a 32 bits filter value	
The first group	D35, D34	D34 low bytes, D35 high bytes, they compose a 32 bits mask code	
	D37, D36	D36 low bytes, D37 high bytes, they compose a 32 bits filter	

		value	
--	--	-------	--

- l Standard/ expansion frame: the setting of FD8358 has no effect to reception. If the data frame fulfills ID mask codes, the standard frame and the expansion frames can be all received. When receive the standard frame, the ID bits is 11, but will still occupy the 32 bits memory combined by [D1,D0]
- l 8 bits data transfer: the transfer data is: D0L、 D1L、 D2L、 D3L.....(D0L means the low byte of D0)
- l 16 bits data transfer: the transfer data is: D0L、 D0H、 D1L、 D1H.....(D0H means the high byte of D0)

#### Ø Relate Special Soft Components List

##### 1、 System FD8000 Setting

ID	Function	Description
FD8350	CAN Mode	0: not usable 1: XC-CAN network 2: Free format <b>FREE</b>
FD8351	CAN baud rate	0, 1KBPS initial value, actual is 5KBPS. 1, 2KBPS initial value, actual is 5KBPS. 2, 5KBPS initial value 3, 10KBPS initial value 4, 20KBPS initial value 5, 40KBPS initial value 6, 50KBPS initial value 7, 80KBPS initial value 8, 100KBPS initial value 9, 150KBPS initial value 10, 200KBPS initial value 11, 250KBPS initial value 12, 300KBPS initial value 13, 400KBPS initial value 14, 500KBPS initial value 15, 600KBPS initial value 16, 800KBPS initial value 17, 1000KBPS initial value
FD8358	CAN free format mode	low 8 bits: 0-standard frame . low 8 bits: 1-expansion frame high 8 bits: 0-8 bits data store high 8 bits: 1-16 bits data store
FD8359	CAN accept timeout time	for free format using, unit: ms
	CAN send timeout time	fixed to be 5ms

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## 2、System M8000 flag

ID	Function	Description
M8240	CAN error flag	ON: error happens OFF: normal if set M8242 as ON, and manually set M8240 as ON, this will enable CAN reset
M8241	CAN node dropped off flag	XC-CAN mode valid ON: certain node/nodes are dropped off OFF: Normal
M8242	do reset or not if CAN error happens	ON: CAN reset automatically when error happens OFF: take no operation when error happens
M8243	CAN send/accept finished flag	FREE mode valid ON: receive/accept finish reset ON automatically when starting to send/accept
M8244	CAN send/accept timeout flag	FREE mode valid ON: send/accept timeout Set OFF automatically when starting to send/accept

## 3、System D8000

ID	Function	Description
D8240	CAN error information	0: no error 2: initializing error 30: CAN bus error 31: error alarm 32: data overflow
D8241	configure item number when error happens	XC-CAN valid
D8242	data package number sent every second	both XC-CAN and FREE modes are valid
D8243	data package number accepted every second	both XC-CAN and FREE modes are valid
D8244	CAN communication error counter	correspond with M8240 at every CAN error, M8240 will be set ON one time, D8244 increase 1

