

XC series extension BD board

User manual

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Catalog

| 1. Configure method of BD board | 5 |
|-----------------------------------|----|
| 1. 1 BD configuration | 5 |
| 2. XC-2AD2PT(-H)-BD | 6 |
| 2.1 Characteristic | 6 |
| 2.2 General Specification | 6 |
| 2.3 Wiring | 7 |
| 2.4 Input address | 7 |
| 2.5 Working mode | |
| 2.6 Control specification | 9 |
| 2.7 Application of PID output | 10 |
| 2.8 Program | 10 |
| 3. XC-2AD2DA-BD | |
| 3.1 Characteristic | |
| 3.2 General Specification | |
| 3.3 Wiring | |
| 3.4 Input address | |
| 3.5 Working mode | |
| 3.6 AD transformation diagram | |
| 3.7 Example | |
| 4. XC-4AD(-H)-BD | 19 |
| 4.1 Characteristics | 19 |
| 4.2 General specifications | 19 |
| 4.3 Wiring | |
| 4.4 I/O address assignment | |
| 4.5 Working mode | |
| 4.6 The application of PID output | |
| 4.7 Programming | |
| 5. XC-COM(-H)-BD | |
| 5.1 Characteristic | |
| 5.2 Wiring | |
| 5.3 XC software setting | |
| 6. XC-SD-BD | |
| 6.1 Characteristic | |

| 6.2 Explanation | |
|--|----|
| 6.3 Operation for the SD | |
| 6.4 SD card state information ID1000 | |
| 6.5 The type definition in ".csv" file | |
| 6.6 Install and set the BD board | |
| 6.7 Format changing tool | |
| 6.8 Example | |
| 7. XC-TBOX-BD | |
| 7.1 Summarization | |
| 7.2 Characteristics | |
| 7.3 System construction | |
| 7.4 Suitable field | |
| 7.5 Interface for Ethernet | |
| 7.6 Configure the BD board | |
| 7.7 DIP switch | |
| 7.8 LED display | |
| 7.9 Using steps | |
| 7.10 Connect to SCADA | |
| 7.11 Application | |
| 8. XC-WT-BD | |
| 8.1 Summarization | |
| 8.2 Specifications | |
| 8.3 Terminals | |
| 8.4 Weighing system | |
| 8.5 BD Configuration | |
| 8.6 Pressure sensor | |
| 8.7 A/D transformation diagram | |
| 8.8 I/O address | |
| 8.9 Programming example | |
| 9. XC-OFC-BD | |
| 9.1 Summarization | |
| 9.2 Installation and wiring | 61 |
| 9.3 Configuration and settings | |
| 10. XC-PBOX-BD | |
| 10.1 Summarize | |
| 10.2 Terminal resistor | |
| 10.3 Installation and configuration | |

| 10.4 Wiring | |
|----------------------|--|
| 10.5 DIP switch | |
| 10.6 LED | |
| 10.7 Operation steps | |

1. Configure method of BD board

1.1 BD configuration

1. Install BD board correctly to the main unit;

Open the left cover, insert the BD into the pins and fix it with screw. Then close the cover.



2. Then, online with XCPpro software, click configure/BD setting... to open the BD set window.

3. Click "other BD" and choose the BD model and set the working mode. Then click ok and restart the PLC.

| PLC1 - BD Set | | | 23 |
|--|--|--|-----------|
| PLC Corfig PLC Serial Port PLC Serial Port PLC Serial Port PLC Serial Port CAN CAN Module T/0 I/O MA Module M Motion | BD Config(write to PLC when downloading) BD No Config BD Serial Port Other BD BD-2AD2PT-P BD-2AD2PT1DA-P BD-2AD2PT1DA-P BD-4AD-P-XC BD-4AD-P-XC BD-4AD-P-XP BD-2AD2DA-P BD-SD BD-WT XP-3AD3PT-P-BD2 | BD-2AD2PT-P Config AD Channel 1 Voltage: AD Channel 2 Voltage: AD Channel 1 Filter: AD Channel 2 Filter: PT Channel 1 Filter: PT Channel 2 Filter: | 0-10V |
| ۰ III + | | | |
| | Read From PLC | | OK Cancel |

4. For XC-COM-BD and XC-TBOX-BD, please choose "BD serial port".

2. XC-2AD2PT(-H)-BD

2.1 Characteristic



- 14 bits high precise analog input. 2 channels voltage 0~10V, 0~5V selective, 2 channels temperature analog input.
- Platinum temperature testing resistor (Pt100 two-line format), temperature sensor using analog input.
- XC-2AD2PT-H-BD and PLC are electrically isolated, • and the AD input port enhances the protection function.

| Item | Voltage input | Temperature input | | | | |
|----------------------------|--|--|--|--|--|--|
| Analog input signal | DC0~5V, 0~10V (Input resistor 13.3kΩ) | Platinum resistor Pt100 (2-line format) | | | | |
| Temperature testing bound | - | -100~350°C | | | | |
| Distinguish ratio | 0.15mV (10/16383) | 0.1°C | | | | |
| Digital output bound | 0~16383 | -1000~3500 | | | | |
| Colligate precision | ±1% of th | ne full-scale | | | | |
| Convert time | 15ms×4 channels | | | | | |
| PID output value | 0~k | 0~K4095 | | | | |
| No-load defaulted value | 0 | 3500 | | | | |
| Input characteristic | 16383 Digital output 0 Analog input 10V/5v | -100 -100 -1000 | | | | |
| Insulation | No insulation between each channel of PLC | | | | | |

2.2 General Specification

2.3 Wiring



2.4 Input address

This BD board doesn't occupy any I/O unit, the converted value will be sent to PLC register directly, the corresponding PLC registers address:

| | AD signal/ | PID | Set | | | | | | start/ |
|---------|-------------|--------|-----------|----------|----------|----------|----------|----------|--------|
| Channel | | output | data/temp | Кр | Ki | Kd | Diff | Death | |
| | temperature | value | -erature | | | | | | stop |
| 0CH | ID1000 | ID1004 | QD1000 | | | | | | Y1000 |
| | | | | OD1004 | OD1005 | OD1006 | OD1007 | OD1008 | |
| 1CH | ID1001 | ID1005 | QD1001 | L | C | C | L | C | Y1001 |
| 2CH | ID1002 | ID1006 | QD1002 | 0.0.1000 | 001010 | 001011 | 001010 | | Y1002 |
| 3CH | ID1003 | ID1007 | QD1003 | QD1009 | QD1010 | QDI011 | QD1012 | - | Y1003 |

Description:

- 1. 0CH, 1CH are AD input channels; 2CH, 3CH are Pt input channels.
- 2. Kp: proportion parameters; Ki: integral parameter; Kd: differential parameters; Diff: control range Control range Diff: in the assigned range, carry on PID control, beyond that range, don't carry on that control

Start signal (Y): if Y is 0, close PID control, if Y is 1, start PID control.

Death range (Death): it means the current PID control value compares with the preceding PID control value, if the difference between them is less than the set range of death, the module will abandon the current PID control value, send the preceding PID control value to the PLC main unit.

2.5 Working mode

There are two ways to set the working mode.

- 1. Set through the XCPpro software
- 2. Set through PLC register FD
- Set through XCPpro software

Open the XCPpro software, connect it with PLC and BD. Click configure/BD setting to open the BD set window.

Click "other BD" and choose the BD model and set the working mode. Then click ok and restart the PLC.



• Set through PLC register FD

The BD input/output have options of voltage 0~5V, 0~10V, current 0~20mA, 4~20mA modes and filter modes. Set via special FLASH data register FD. See the below graph:



Each channel's working mode is assigned by 4 bits in the FD register. Each bit's definition is shown below: Register FD8306:

| | C | Channel 1 | | Channel 0 | | | |
|---------|-----------|-----------|-----------------|----------------|----------------|---|-----------------|
| Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit3 Bit2 | | Bit0 |
| 00: 1/ | 2 filter | | 0:0~10V | 00: 1/ | 2 filter | | 0:0~10V |
| 01: n | ot filter | _ | 1 : 0~5V | 01: n | ot filter | _ | 1 : 0~5V |
| 10: 1/ | 3 filter | | _ | 10: 1/3 filter | | | _ |
| 11: 1/- | 4 filter | | - | 11: 1/4 filter | | | - |
| | Cha | annel 3 | | Channel 2 | | | |
| Bit15 | Bit14 | Bit13 | Bit12 | Bit11 | Bit11 Bit10 | | Bit8 |
| 00: 1/ | 2 filter | | | 00: 1/ | 00: 1/2 filter | | |
| 01: n | ot filter | | | 01: not filter | | | |
| 10: 1/ | 3 filter | - | - | 10: 1/3 filter | | - | _ |
| 11: 1/- | 4 filter | | | 11: 1/ | 4 filter | | |

2.6 Control specification

1. Functions of the four parameters: proportion parameter (Kp), integral parameter (Ki), differential parameter (Kd), control proportion band (Diff).

Parameter P is proportion parameter. It shows the difference of system. It can control the difference once it produced.

Parameter I is integral parameter. It can delete the offset and improve the accuracy.

Parameter D is differential parameter. It can control the changing trend of signal and decrease the system oscillation.

Temperature control range: do PID in the range.

2. Control specification

The PID control range is from QD-Diff to QD+Diff. When the temperature is less than QD-Diff, the controller heats up; when the temperature is higher than QD+Diff, the controller stops heating.

Temperature-control curve of PID:



3. Each parameter's reference value: Kp=20~100; Ki=5~20; Kd=200~800; DIFF=100~200

These values are for your reference. Please adjust them as the actual needs.

2.7 Application of PID output

The module output a PID value every 2s when it is doing PID temperature control. It can control the heating process in the following way. Suppose the PID output value is X ($0 \le X \le 4095$), the controller will heat in 2X/4095 seconds, the controller will not heat in (2-2X/4095) seconds.

2.8 Program

1. real-time read channel 0 AD value, set the channel 0 PID parameters, read the PID output.



2. PID temperature control



3. XC-2AD2DA-BD

3.1 Characteristic



- lacksquare
- •
- 14 bits high precise analog input. 10 bits high precise analog output 2 channels 0~10V, 0~5V voltage input •
- 2 channels 0~20mA, 4~20mA current output

3.2 General Specification

| Item | Voltage input | Current output | | | |
|-------------------------|---|--|--|--|--|
| Analog input range | DC0~5V, 0~10V (Input resistor 13.3kΩ) | _ | | | |
| Analog output range | - | DC0~20mA, 4 ~20mA (external load resistor less than 500 Ω) | | | |
| Resolution | 1/16383 (14 bits); the transformed data are stored in PLC in hex format (14 bits) | 1/1023 (10 bits); the transformed data are stored in PLC in hex format (12 bits) | | | |
| Digital output range | 14 bits binary (0~16383) | - | | | |
| Digital input range | - | 10 bits binary (0~1023) | | | |
| Colligate precision | ±1% of the | full-scale | | | |
| Convert time | 15ms×2 channels | 3ms/1 channel | | | |
| PID output value | 0~K1023 | - | | | |
| Insulation | No insulation between each channel of PLC | | | | |
| I/O engross | 0 I/O (Since it is operated via data register, so it is not limited by main PLC's standard max. control points) | | | | |

3.3 Wiring



XC-2AD2DA-BD needs 24V power supply for current output.



3.4 Input address

This BD board doesn't occupy any I/O unit, the converted value will be sent to PLC register directly, the corresponding PLC registers address:

| Channel | AD signal | PID output | PID start/stop bit | Set value | PID parameters: Kp, Ki, Kd, Diff, Death |
|---------|--------------|------------|--------------------|-----------|--|
| 0CH | ID1000 | ID1002 | Y1000 | QD1002 | KpQD1004; KiQD1005; |

| 1CH | ID1001 | ID1003 | Y1001 | QD1003 | KdQD1006; DiffQD1007; DeathQD1008 |
|---------|--------------|--------|-------|--------|--------------------------------------|
| Channel | DA signal | - | - | - | |
| 0CH | QD1000 | - | - | - | - |
| 1CH | QD1001 | - | - | - | |

Description:

- 1. 0CH, 1CH are AD input channels; 2CH, 3CH are DA output channels.
- 2. Kp: proportion parameters; Ki: integral parameter; Kd: differential parameters; Diff: control range Control range Diff: in the assigned bound, carry on PID control, beyond that range, don't carry on that control

Start signal (Y): if Y is 0, close PID control, if Y is 1, start PID control.

Death range (Death): it means the current PID control value compares with the preceding PID control value, if the difference between them is less than the set range of death, the module will abandon the current PID control value, send the preceding PID control value to the PLC main unit.

3.5 Working mode

There are two ways to set the working mode.

- 1. Set through the XCPpro software
- 2. Set through PLC register FD
- Set through XCPpro software

Open the XCPpro software, connect it with PLC and BD. Click configure/BD setting to open the BD set window.

Click "other BD" and choose the BD model and set the working mode. Then click ok and restart the PLC.

| | PLC1 - BE |) Set | × |
|---|---|--|---|
| PLC Config Password PLC Serial Port BD CAN CAN CAN CAN Module T/0 MA Module M Motion | BD Config(write to PLC when downloading) BD ○ No Config ○ BD Serial Port ○ Other BD □ BD-2AD2PT-P ○ BD-2AD2PT1DA-P □ BD-2AD2PT1DA-P □ BD-2AD2PT1DA-P □ BD-2AD2PT1DA-P □ BD-2AD2PT-P □ BD-2AD2PT-P □ BD-2AD2DA-P □ BD-SD □ BD-WT □ XP-3AD3PT-P-BD2 ∨ | BD-2AD2DA-P Config AD Channel 1 Voltage: AD Channel 2 Voltage: AD Channel 1 Filter: AD Channel 2 Filter: DA Channel 1 Current: DA Channel 2 Current: | 0-10V 0-10V 1/2Filter 1/2Filter 0-20mA 0-20mA ✓ |
| < > | | | |
| | Read From PLC | | OK Cancel |

• Set through PLC register FD

The expansion BD board has 0-5V, 0-10V voltage input and 0~20mA, 4~20mA current output. The working mode can be set through FD register. Please see the below picture.



One register has 16 bits, every 4 bits can decide one channel's working mode.

Register FD8306:

| Channel 1 | | | | C | hannel 0 | | |
|-----------|-------|------|----------|----------------|----------|------|----------|
| Bit7 | Bit6 | Bit5 | Bit4 | Bit3 Bit2 | | Bit1 | Bit0 |
| 00: 1/2 f | ilter | | 0: 0~10V | 00: 1/2 filter | | | 0: 0~10V |
| 01: no fi | lter | | 1: 0~5V | 01: no filter | | | 1: 0~5V |
| 10: 1/3 f | ilter | - | | 10: 1/3 filter | | - | |
| 11: 1/4 f | ilter | | - | 11: 1/4 filter | | | - |

| Channel 3 | | | | С | hannel 2 | | |
|-----------|-------|-------|-----------|-------|----------|------|-----------|
| Bit15 | Bit14 | Bit13 | Bit12 | Bit11 | Bit10 | Bit9 | Bit8 |
| | | | 0: 0~20mA | | | | 0: 0~20mA |
| - | | - | 1: 4~20mA | - | | - | 1: 4~20mA |

3.6 AD transformation diagram

The relationship between input analog and transformed digital data:



The relationship between input digital and transformed analog data:



Note: If the input data is more than K1023, D/A result will be 20mA.

3.7 Example

Read the real time data of 2 channels; write the data in 2 channels.



Explanation:

M8000 is always ON when PLC is running.

When PLC is running, it sends the channel 0 data of model 1 to register D0 of PLC.

It sends the channel1 data of model 1 to register D1 of PLC.

It sends the PLC D10 data to model 1 channel 0.

It sends the PLC D11 data to model 1 channel 1.

4. XC-4AD(-H)-BD

4.1 Characteristics



- 14 bits high precision analog input
- First 2 channels 0-10V, 0-5V voltage input choices
- Last 2 channels 0-20mA, 4-20mA current input
- XC-4AD-H-BD and PLC are electrically isolated, and the AD input port enhances the protection function.

| Item | Voltage input | Current input | | |
|--|---|---|--|--|
| Analog input range | DC0~5V, 0~10V (Input resistor 13.3kΩ) | 0~20mA, 4-20mA | | |
| Resolution | 1/16383 (14 bits); | | | |
| Digital output range | 14 bits binary (0~16383) | 14 bits binary (0~16383) | | |
| Colligate precision | ±1% of the fu | ll-scale | | |
| Convert time | 15ms×4 cha | nnels | | |
| PID output value | 0~K4095 | | | |
| Default value of free load | 0 | | | |
| Input features | 16383 Digital output 0 Analog input 10V/5v | 16383 Digital output 0/4 Analog input 20mA | | |
| Insulation | No insulation between each channel of PLC | | | |
| I/O engross 0 I/O (Since it is operated via data register, so it is not limited by standard max. control points) | | r, so it is not limited by main PLC's (trol points) | | |

4.2 General specifications

4.3 Wiring



Note: Above is the connection mode of two-wire active sensor. If it is three-wire passive sensor (24V, 0V, signal line), 24V is connected to 24V on the PLC, 0V is connected to 0V on the PLC, signal line is connected to VI + or AI +, and VI - or AI - is connected to 0V on the PLC.

4.4 I/O address assignment

The BD board will not occupy I/O space, the transformed data will be saved in PLC registers. The PLC registers are as the following:

| Channel | AD signal | PID output | PID control bit | Set value | PID parameters: Kp, Ki, Kd, Diff, Death |
|---------|-----------|------------|-----------------|-----------|--|
| 0CH | ID1000 | ID1004 | Y1000 | QD1000 | KpQD1004; KiQD1005; |
| 1CH | ID1001 | ID1005 | Y1001 | QD1001 | KdQD1006; DiffQD1007; |
| 2CH | ID1002 | ID1006 | Y1002 | QD1002 | DeathOD1008 |
| 3CH | ID1003 | ID1007 | Y1003 | QD1003 | |

Notes:

- (1) Kp: proportion, Ki: integral, Kd: differential, Diff: control range
- (2) Diff: to do PID control in appointed area.
- (3) PID control bit (Y): Y=0, PID control is unable; Y= 1, PID control is able.
- (4) Death: to compare the former and the current PID control value, if the difference is less than death area, the module will abandon the current PID control value and send the former value into the PLC.

4.5 Working mode

There are two method to set the working mode.

- Set through XCPpro software.
- Set through FD register.

(1) Set through XCPpro software

Open XCPpro software, click Configure/BD setting. Then choose "BD-4AD-P-XC" in the setting window. And set the working mode of each channel. Then click OK to confirm. Then restart the PLC and download the user program to make the setting valid.



(2) Set through FD register

The expansion BD board has 0-5V and 0-10V voltage input choices; 0-20mA, 4-20mA current input choices. They can be set by FLASH register in the PLC. As the right diagram showing, each register can decide the modes of 4 channels. Every 4 bits of the register can decide one channel's mode.

One register has 16 bits, every 4 bits can decide one channel's working mode.



Register FD8306:

| | Channel 1 | | | Channel 0 | | | |
|---|-----------|-----------|------------------------|--|-------------------------|------|------------------------|
| Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
| 00: 1/2 filter 01: no filter 10: 1/3 filter 11: 1/4 filter | | 0 | 0: 0~10V 1: 0~5V | 00: 1/2 fil 01: no filt 10: 1/3 fil 11: 1/4 fil | ter er ter ter | 0 | 0: 0~10V 1: 0~5V |
| | | Channel 3 | | Channel 2 | | | |
| Bit15 | Bit14 | Bit13 | Bit12 | Bit11 | Bit10 | Bit9 | Bit8 |
| 00: 1/2 filter 01: no filter 10: 1/3 filter 11: 1/4 filter | | 1 | 0: 0~20mA 1: 4~20mA | 00: 1/2 fil 01: no filt 10: 1/3 fil 11: 1/4 fil | ter ter ter | 1 | 0: 0~20mA 1: 4~20mA |

4.6 The application of PID output

When the module is doing temperature PID regulation, it will output a PID control value every 2 seconds. So, in the PLC program, we could make heating control through the duty ratio of PID output vale and K4095 in 2 seconds! Assume PID output value is X ($0 \le X \le 4095$). It carries on duty ratio control in the cycle of 2 seconds, heater output for 2X/4095 seconds, heater close output for (2-2X/4095) seconds.

4.7 Programming

Read the AD value of channel 0, set the PID parameters of channel 0, read the PID output value.



5. XC-COM(-H)-BD

5.1 Characteristic



- RS485 communication port
- RS232 communication port
- RS485 and RS232 cannot be used at the same time
- XC-COM-H-BD has isolation for RS485

5.2 Wiring



Notes:

- (1) TXD, RXD, GND are RS232 communication port.
- (2) A, B are RS485 communication port.
- (3) RS232 and RS485 cannot be used at the same time.

5.3 XC software setting

Open the XCPpro software, click configure/BD settings. Choose BD serial port in the BD set window and click ok. Then restart the PLC and download the program to make the setting valid.

| | PLC1 - BD Set | × |
|--|---|-----------|
| PLC Config Password PLC Serial Port BD PCN CAN Save Hold Memo DO Module T/0 I/O MA Module M Motion | BD Config (write to PLC when downloading) BD No Config BD Serial Port Other BD BD-2AD2PT-P BD-2AD2PT1DA-P BD-2AD2PT1DA-P BD-2AD2PT1DA-P BD-2AD2PT-P-XC BD-4AD-P-XC BD-4D-4D-4AD-P-XC BD-4D-4D-4D-4AD-4AD-4AD-4AD-4AD-4AD-4AD-4 | |
| | Read From PLC | OK Cancel |

6. XC-SD-BD

6.1 Characteristic



- To install SD card and expand the XC memory
- PLC can read and write the data of SD card
- Support 4 data formats (single word, double word, float, character)
- XC hardware version V3.2 and above is required

6.2 Explanation

(1) SD card

- XC-SD-BD has not been installed the SD card when out of factory, user needs to prepare MicroSD (TF card), the card memory should be not more than 2GB.
- Before install the SD card in the XC-SD-BD, please use card reader to format the SD to FAT16 in the PC.
- SD card supports hot plug, but please wait for at least 5 second after hot plug.

(2) The file standard in SD card

- SD card supports .csv file, these file should be saved in the root directory.
- All the .csv files must be named as dataxxx.csv, xxx is the file index number, the range is 001~999, when xxx is less than 100, add 0 from the left side. For example, if file index number is 1, the file name will be data001.csv.

(3) Data format and type in SD card

- SD card supports 4 kinds of data type: single word (W), double word (DW), float(Fm.n), character (Sx).
- The data range and space:

| Data type | W | DW | Fm.n(m<=15,n<=15) | Sx(x<=16) |
|--------------------|---------|--------------|------------------------|-----------|
| Data ranga | -32768~ | -2147483648~ | -18446742974197923840~ | N |
| Data Tange | 32767 | 2147483647 | 18446742974197923840 | / |
| Character occupied | | | | |
| in SD card | 6 | 11 | m+1+n | 2*x |
| WORD number | 1 | 2 | 2 | Х |

NOTE:

- (1) When the real data length is less than the character length in SD card, add space from the left side. For example, single word data 454, data type is W, character length is 6, so add 6-3 = 3 spaces. The real number is ∟ ∟ ⊥ 454. (∟ is space).
- (2) When Fm.n is negative number, the sign bit occupies one character. For example, F5.3, after writing the number -12345.123 in SD card, the lowest valid bit will be deleted; the number will become 12345.12.
- (3) The x of character Sx means word length, but not character length.

6.3 Operation for the SD

XC series PLC can connect SD card, write and read the data from the SD card.

(1) Read the SD card

After installing the SD card successfully, PLC can read the SD card data. Use FROM instruction to read the appointed data block in .csv file of SD card.



- Read the data from SD card to PLC, unit is word.
- S1: K7 means the object is XC-SD-BD.
- S2~S2+2: appoint .csv file index number, the column head address of data block, the row head address of data block. Operand is D.

In the example, D200 is the .csv file index number

D201 is the column head address of the data block

D202 is the row head address of the data block

- S3: the word numbers you want to read out. Operand is D.
- D1: save the data in PLC register. Operand is D.

In this example, if D200=2, D201=1, D202=3, D210=3. The instruction will do like this: read 3 numbers start from column 1, row 2 of the file "data002.csv" in SD card, and save it in D220 of PLC. If the data002.csv is shown as the following, then the numbers in the red color line will be read.

| w, dw, s8, f | 4.15, dw, w, dw | 1 | | | |
|--------------|-----------------|----------------|-------------|-------------------|---------|
| 2980, | 178605, | HFASDFNQWEJFN, | 769.467894, | -1321240, -330, | 780240 |
| 2471, | -191280, | JKSAHDKFHAKLS, | 830.26683, | -2515275, -23782, | -665320 |
| 9628, | 39984, | jakjfkdakl, | 387.56305, | 458388, -7728, | -884013 |
| 9045, | -251190, | testh, | 949.899791, | -417510, 39600, | 195264 |
| 1824, | 141351, | hellbaby, | 408.248854, | 2644828, -1836, | 558904 |
| 22300, | 70153, | testh, | 570.088499, | -583542, -6534, | 1095926 |
| -1742, | 271975, | HSDKLJDF, | 162.57849, | -1238233, -25761, | -125260 |
| 1636, | 207536, | JSKDJFDSALF, | 735.422261, | 293940, 2400, | 345495 |
| 9962, | 37107, | HDJNFCJDSNC, | 860.864485, | 538920, 24660, | 827472 |

Explanation:

(1) In the data002.csv file, the first line is data type definition; this line is included in the row address.

(2) The number "2471" is W type, "-191280" is DW type, so totally 3 words, the same as the read out word numbers.

(2) Write SD card

By TO instruction, PLC can write the data into appointed location in .csv file of SD card. Please note that user must build a .csv file in the SD card at first, and define the write in data type in the .csv file. If not, the ERROR LED of XC-SD-BD will be always ON.



- Write the appointed data block of PLC in the SD card .csv file. Unit is word.
- S1: K7 means the object is XC-SD-BD.
- S2~S2+2: appoint the .csv file index number, the column and row address of data block. Operand is D. In the instruction, D100 is the index number of the .csv file

D101 is the column address of the data block

D102 is the row address of the data block

• S3: the word numbers need to write in the SD card. Operand is D.

• S4: the PLC register head address need to write into the SD card. Operand is D. In the instruction, if D100=1, D101=1, D102=2, D110=5, D120=365, D121=10235465, D123=26456. So the data will be written in data001.csv is in the red color range:

| w, dw, dw, | f4.15, | | |
|------------|-----------|--------|-------------|
| 365, | 10235465, | 26456, | 769.467894, |
| 2471, | -191280, | 70153, | 830.26683, |

NOTE: the write in data type should be the same as the .csv file data type. If not, the ID1000 will be error.

(3) Notice

- Character type Sx
- A. Sx supports visible character such as letter, number, the same as ASCII code [32,126], but not support comma ",".
- B. Invisible character, Sx supports end character.
- Reading and writing word quantity limitation
- A. Limited by the RAM capacity of PLC, the reading and writing word quantity should be less than 50.
- B. Cannot read part of the data. For example, define the data type to be "W, DW, S8", if the reading word quantity is 10 and read from the first column W, the S8 will not be read completely, ID1000 will return error value. When the program found that the parameters were wrong, it will not read and write the SD card.
- C. When reading or writing data, if one row is over, it will jump to the first column of the next row.
- D. ".csv" file cannot have space between data. When writing data into SD card, the address must be continuous, if not the ID1000 will have error code 20.

- E. When reading the data, the address cannot over the last data address, if not the ID1000 will produce error code.
- Default operation file

To save the time, after installing the SD card, it will read the data001.csv file, if there is no this file in the SD card, ID1000 will return code 2. But this will not affect the following operation for data001.csv file.

6.4 SD card state information ID1000

The SD card state information will show in ID1000. Especially when SD card has error, it can check the error code in ID1000 to find the solution.

| ID1000 | Meaning | Reasons |
|--------|--|---|
| 0 | Successful | |
| 1 | Initialization failure | SD card is not installed well or is damaged |
| 2 | Reading or writing file does not exist | The operation file does not exist |
| 3 | Reserved | |
| 4 | Reserved | |
| 5 | Reserved | |
| 6 | Reserved | |
| 7 | Reserved | |
| 8 | Reading or writing error | Uninstall the SD card when reading or writing |
| 9 | Reserved | |
| 10 | Reserved | |
| 11 | FAT16 error | SD card has not been formatted to FAT16 |
| 12 | Reserved | |
| 13 | Reserved | |
| 14 | Reserved | |
| 15 | Reserved | |
| 16 | Reserved | |
| 17 | Reserved | |
| 18 | Reserved | |
| 19 | SD card is not inserted | SD card is not inserted |
| 20 | Reading or writing parameter error | Please check the file index number, column, row and word number |

| 21 | The reading or writing data are not fit for format definition | There are illegal characters when data type is character | |
|----|---|--|--|
| 22 | The file data type is wrong | There are data type definition exclusive of "w, dw, Sx, Fm.n" | |
| 23 | Data type is not matching when reading the file | There are illegal characters when data type is character | |
| 24 | Illegal file name | Index number >999 | |
| 25 | Illegal column index | Column index > file column numbers | |
| 26 | Illegal row index | Row index number is 0 or 1 | |
| 27 | Illegal reading and writing word numbers | Word numbers >50 | |

6.5 The type definition in ".csv" file

Before writing data into .csv file, you need to define the data type in the Excel table.

A. Build a new Excel file, define the data type in the first row.

| ĺ | A | В | C | D | E | |
|---|---|----|------|----|----|--|
| 1 | W | dw | f3.2 | s5 | dw | |
| 2 | | | | | | |
| 3 | | | | | | |

B. Save the file and named as dataxxx.csv. For example, data003.csv.

C. After saving the file, open it in txt file, you will see the following things: each data type is divided by "," automatically. In that way PLC can recognize it easily.



6.6 Install and set the BD board

(1) Install the BD board

Open the PLC cover on the right, insert the BD board with the pins then fix it with screw, then put the cover back.



There are three LED lights on the XC-SD-BD, they are Power, Run and Error.

Power: always ON after power on;

Run: blinking when PLC and BD communication is normal

Always ON when PLC and BD communication is abnormal

Error: Off when there is no error

Always ON when there is no SD card, SD card broken or SD card is not formatted.

Blinking when there are other errors.

(3) Configure the BD board

Open XCPpro software, click "configure/BD setting, then select other BD/BD SD, then click OK. Then restart the PLC and download program to make the setting valid.

| | PLC1 - BD Set | X |
|---|---|-----------|
| PLC Config Password PLC Serial Port BD CAN CAN CAN Module I/O DD MA Module M Motion | BD Config(write to PLC when downloading) BD No Config BD Serial Port Other BD BD-4AD-P-XP BD-2AD2DA-P BD-2AD2DA-P BD-WT XP-3AD3PT-P-BD2 XP-3AD2DA-P-BD2 XP-3PT-P-BD2 XP-3TC-P-BD2 XP-SD-BD2 | |
| < > | | |
| | Read From PLC | OK Cancel |

6.7 Format changing tool

When there are data in the Excel, please use format changing tool to transform the Excel format to .csv. The tool will be attached with this manual. Please see the operation steps:

(1) Open Excel, click Tool/Add-Ins/Browse..., then select the format changing tool, click ok.



| ld-Ins available: | |
|--|--------------|
| Analysis ToolPak Analysis ToolPak - VBA Conditional Sum Wizard Euro Currency Tools | OK Cancel |
| Format Changing Tool Internet Assistant VBA Lookup Wizard J Solver Add-in] 格式转换 | Browse |

(2) In the tool menu, there is a format changing tool item. That means the tool installation is finished. When finished the data inputting, click "format changing tool".

At last, save the file as .csv format.

| | A | В | C | D | E | F | G | Н |
|----|-------|-------|--------|-------|--------|--------|-------|-----|
| 1 | W | dw | s8 | f4.15 | dw | W | dw | |
| 2 | 2980 | 1786 | HFASDF | | -13212 | -330 | 7802 | 240 |
| 3 | 2471 | -1912 | JKSAHI | | -25152 | -23782 | -6653 | 320 |
| 4 | 9628 | 399 | jak | | 4583 | -7728 | -8840 | 013 |
| 5 | 9045 | -2511 | | | -4175 | 39600 | 1952 | 264 |
| 6 | 1824 | 1413 | ł | | 26448 | -1836 | 5589 | 904 |
| 7 | 22300 | 701 | | | -5835 | -6534 | 10959 | 926 |
| 8 | -1742 | 2719 | ŀ | | -12382 | -25761 | -1252 | 260 |
| 9 | 1636 | 2075 | JSKI | | 2939 | 2400 | 3454 | 95 |
| 10 | 9962 | 371 | HDJN | | 5389 | 24660 | 8274 | 72 |

6.8 Example

Write data in data001.csv in SD card, read data from data002.csv.

Process: format the SD card \rightarrow build a csv file \rightarrow make the program \rightarrow install SD card and BD board \rightarrow configure the BD board, download the program and the data \rightarrow debug the program, monitor the running result Step:

- 1. Transform the SD card format to FAT16 by card reader
- (1) Use card reader to connect SD card with PC. (SD card capacity should be less than 2GB).
- (2) Right click the SD card disk, choose format.
- (3) File system please select FAT.
- (4) Click start to format the SD card.

2. Build an empty file "data001.csv" and a file "data002.csv" with data in the root directory of SD card.(1) Open the SD card, build two new Excel files.

(2) Open one of the file, input the following data types:

| 1 | W | dw | f5.3 | s7 | W |
|---|---|----|------|----|---|
| 2 | | | | | |

(3) Save the file as 'data001.cs '. Then open it in txt, make sure it is correct.

| 立住(の) | 编程(17) | 松式の) | る子 春春(1/) | 駆曲の |
|------------|----------|----------|--------------|-----------|
| w, dw, f5. | 3, s7, w | 1824 (6) | | (13) (25) |

(4) Open another Excel file, input the data type in the first line, and input data in each row, the data in each row should be accord with the data type.

| | A | В | С | D |
|----|--------|----------|------------|-----------|
| 1 | w | s8 | dw | f6.2 |
| 2 | 245 | hfiw | 1234567890 | 543631.32 |
| 3 | 415 | sdlgjeoa | -534007321 | 464.1 |
| 4 | 14456 | 8gskhd | 77182 | 7654.65 |
| 5 | 26654 | nd903jlp | 8945 | 3563 |
| 6 | 12356 | 48dj1j=j | 9054873 | -13251.98 |
| 7 | 97 | ey67 | 326483894 | -645.8 |
| 8 | -27658 | e21 | 89490 | 15.54 |
| 9 | 4579 | k*nlw | 737328923 | 3165.3 |
| 10 | | | | |
| | | | | |

(5) Transform the data via format changing tool.

| | A | В | С | D |
|----|--------|----------|------------|-----------|
| 1 | W | s8 | dw | f6.2 |
| 2 | 245 | hfiw | 1234567890 | 543631.32 |
| 3 | 415 | sdlgjeoa | -534007321 | 464.1 |
| 4 | 14456 | 8gskhd | 77182 | 7654.65 |
| 5 | 26654 | nd903jlp | 8945 | 3563 |
| 6 | 12356 | 48djlj=j | 9054873 | -13251.98 |
| 7 | 97 | ey67 | 326483894 | -645.8 |
| 8 | -27658 | e21 | 89490 | 15.54 |
| 9 | 4579 | k*nlw | 737328923 | 3165.3 |
| 10 | | | | |

(6) Save as "data002.csv". Then open it in txt file:

| 🕽 data002.csv - 记事本 | | | | 📕 dat a | .002. cs | v - 记事 | 本 | |
|--|--|--|---|--|---|--|---|-------|
| 文件(E) 编辑(| (E) 格式(0) 者 | E看(V) 帮助(H |) | 文件(F) | 编辑(E) | 格式(0) | 查看(V) | 帮助(H) |
| W, s8, dw, f6.2 245, 415, 14456, 26654, 12356, 97, -27658, 4579, | hfiw, sdlgjeoa, 8gskhd, nd903jlp, 48djlj=j, ey67, e21, k*nlw, | 1234567890, 5 -534007321, 77182, 8945, 9054873,- 326483894, 89490, 737328923, | 543631.32 464.1 7654.65 3563 -13251.98 -645.8 15.54 3165.3 | w, s8, dw, 245, hfi 415, sdl 14456, 8 26654, n 12356, 4 97, ey67, -27658, 4579, k* | ,f6.2 w,123456 gjeoa,-5 gskhd,71 d903j1p, 8dj1j=j, ,3264838 e21,8949 n1w,7373 | 57890, 543 534007323 7182, 7654 8945, 356 9054873, 994, -645, 394, -645, 328923, 33 | 3631.32 1,464.1 4.65 53 -13251. 8 165.3 | 98 |

Before

After

Attention: after format changing, if the data length is not enough, it will add space from the left side of the numbers. Before format changing, the data are out of order.

- (7) File "data001" and "data002" setting are finished. Please delete the disk and pull out the SD card from the PC.
- 3. Make program in XCPpro software.

(1) Purpose:

A. write 16 words from D200 to row 1, line 2 of data001.csv.

B. read 25 words from row 2, line 3 of data002.csv to D400.

(2) Process:



4. Insert the SD card on the XC-SD-BD, install the BD on the PLC.

(1) Power on the PLC, check the LED situation. POWER LED is ON, communication LED is flickering, ERROR LED is OFF.

| (2) Connect the PLC with PC to configure the BD board | (2) | Conrect the | PLC with I | PC to configure | e the BD board |
|---|-----|-------------|------------|-----------------|----------------|
|---|-----|-------------|------------|-----------------|----------------|

| 🗏 🚰 PLC Config | BD Config | BD-2AD2PT-P Config | | |
|-----------------------|--|-----------------------|-----------|---|
| Password | 🔘 No Config | AD Channel 1 Voltage: | 0-10V | ~ |
| BD BD CAN CAN | O BD Serial Port | AD Channel 2 Voltage: | 0-10V | ~ |
| Save Hold Memo | BD-24D2PT-P | AD Channel 1 Filter: | 1/2Filter | ~ |
| 000 Module 1/0 I/0 | BD-2AD2PT1DA-P BD-2TC-P BD-4AD-P | AD Channel 2 Filter: | 1/2Filter | ~ |
| | BD-2AD2DA-P | PT Channel 1 Filter: | 1/2Filter | ~ |
| | | PT Channel 2 Filter: | 1/2Filter | ~ |

(3) Click"Online--- download program & data select"BD config" in the window:



(4) Click the BD details in the projectar; you can see the BD board information.

| PLC | Status |
|------------|-------------------|
| | CPU Detail |
| 980 | BD Details |
| | Expansion Details |
| - O | Scan Cycle |
| 🙆 | Clock Details |
| | Course Diskails |

5. Run the program to see the result.

A. Write data into data001.csv

Ė

a) The data in D200~D215 of PLC are shown as the following:
| onitor Add Edit | Del Upward Downward | | |
|-----------------|-----------------------|-------------|------------|
| Reg | Monitor value | Word length | Num Format |
| D200 | 12335 | Word | Dec |
| D201 | 555881125 | DWord | Dec |
| D203 | 78545.23 | Float | Dec |
| D205 | gh | Word | ASCII |
| D206 | 45 | Word | ASCII |
| D207 | 9j | Word | ASCII |
| D208 | 3# | Word | ASCII |
| D209 | +< | Word | ASCII |
| D210 | 5v | Word | ASCII |
| D211 | 78. | Word | ASCII |
| D212 | -6786 | Word | Dec |
| D213 | -23412 | Word | Dec |

b) When M1 is from OFF \rightarrow ON, write the data from D200~D215 to data001.csv.

The result of data001.csv is as the following:

```
w,dw,f5.3,s7,w
12335, 555881125,78545.227,gh459j3#+<5v?&,−6786
-23412, -474327809,
```

B. Read data002.csv

a) The data will be read in data002.csv:

| 245, | hfiw, | 1234567890, 5 | 43631.32 |
|--------|-----------|---------------|----------|
| 415. | sdlgjeoa. | -534007321. | 464.1 |
| 14456, | 8gskhd, | 77182, | 7654.65 |
| 26654, | nd903j1p, | 8945, | 3563 |
| 12356, | 48djlj=j, | 9054873,- | 13251.98 |
| 97, | ey67, | 326483894, | -645.8 |
| 27658, | e21, | 89490, | 15.54 |
| 4579, | k*nlw, | 737328923, | 3165.3 |

b) when M2 is from OFF \rightarrow ON, read the data from data002.csv to D400~D424 of PLC:

| D400 | | Word | ASCII |
|------|---------------------|-------|-------|
| D401 | | Word | ASCII |
| D402 | | Word | ASCII |
| D403 | | Word | ASCII |
| D404 | sd | Word | ASCII |
| D405 | lg | Word | ASCII |
| D406 | je | Word | ASCII |
| D407 | oa | Word | ASCII |
| D408 | -534007321 | DWord | Dec |
| D410 | 464.1 | Float | Dec |
| D412 | 1445 <mark>6</mark> | Word | Dec |
| D413 | | Word | ASCII |
| D414 | | Word | ASCII |
| D415 | | Word | ASCII |
| D416 | | Word | ASCII |
| D417 | | Word | ASCII |
| D418 | 8g | Word | ASCII |
| D419 | sk | Word | ASCII |
| D420 | hd | Word | ASCII |
| D421 | 77182 | DWord | Dec |
| D423 | 7654.65 | Float | Dec |

C. the process of reading the data from SD card to PLC registers:



7. XC-TBOX-BD

7.1 Summarization



- Ethernet BD board is used to access to Ethernet, special for XC series PLC
- Support Modbus-RTU protocol
- Applied to remote monitor, program upload/download/modification
- XCPpro software version requirements: XC-TBOX-BD hardware v2.10, XCPpro v3.3 XC-TBOX-BD hardware v2.0, XCPpro v3.0f

7.2 Characteristics

- Flexible distributed automation structure, simplify the system management
- Standard RJ45 interface, TCP/IP protocol
- To realize remote monitoring, checking and programming, save time and cost
- To store and deal with the data via Ethernet, simplify the data processing and filing
- Connect PLC with Ethernet to realize intercommunication with other devices
- High cost performance, easy to maintain, support simple user's friendly diagnose function

7.3 System construction

The industrial Ethernet system contains XC-TBOX-BD, PC, XC series PLC, XCPpro software, HMI, switch, twisted-pair cable, etc.

7.4 Suitable field

Industrial Ethernet is an electrical network which based on shielded coaxial cable, twisted-pair cable or optical fiber which based on optical network. It is accord with IEEE802.3 by using ISO and TCP/IP protocol. As the expansion of Modbus/RTU protocol, Modbus/TCP protocol defines the standard of TCP/IP network transmission and application. XC-TBOX-BD meets the requirements for industrial network automation control.

It provides complete solution and reliable control method.

The application based on XC-TBOX-BD:

- Remote monitor, maintain and debug the PLC program of the IP device
- Traditional Modbus communication is one-master-multi-slaver mode, the speed is very slow. By using XC-TBOX-BD, master station can communicate with other branch stations.

In the following picture, XC-TBOX-BD and TBOX support devices with Modbus/RTU interface connecting to Ethernet. It can realize multi-master-multi-slaver system; make the devices suitable for complicated system.



7.5 Interface for Ethernet

• Ethernet interface is RJ45



• The pin definition of RJ45:

| Pin | Wire color | Signal | Direction |
|------------|--------------|--------|-----------|
| S 1 | Orange white | TXD+ | Output |
| S2 | Orange | TXD- | Output |
| S 3 | Green white | RXD+ | Input |
| S 4 | Blue | - | - |
| S5 | Blue white - | | - |
| S 6 | Green | RXD- | Input |
| S 7 | Brown white | - | - |
| S 8 | Brown | - | - |

7.6 Configure the BD board

Install the BD board on the PLC

Connect PLC with PC, use XCPpro software to configure the BD board Select configure/BD setting, then click BD serial port:



7.7 DIP switch

XC-TBOX-BD has four DIP switches:



The function of DIP switch:

| Switch | Status | Function |
|-----------------------------------|--------|--|
| S 1 | ON | SLAVE mode |
| | OFF | MASTER mode |
| S2 | ON | Shut down the server log-on |
| | OFF | Turn on the server log-on |
| S3 ON Use user-defined IP address | | Use user-defined IP address |
| | OFF | Use default IP address (192.168.0.111) |
| S4 ON | | - |
| | OFF | - |

There are 2 modes to set the IP address: please select the mode via DIP switch

A. Use default IP address

B. Use user-defined IP address

The priority of the 3 modes are A>B.

A: use default IP address (S3 OFF)

When using the TBOX-BD at the first time, please use default IP address.

IP address: 192.168.0.111

Subnet mask: 255.255.255.0

Default gateway: 192.168.0.1

Preferred DNS: 192.168.0.1

B : use the address set by users (S3 ON)

IP address, subnet mask, default gateway, preferred DNS (the same as default gateway)

7.8 LED display



| LED | Name | Function | | |
|--------|----------------|---|--|--|
| REMOTE | Remote login | Always ON: log on the remote server | | |
| | | | | |
| СОМ | Serial port | Shining: connected | | |
| IP | IP address | Shining: IP address is conflicted | | |
| LINK | Ethernet link | Always ON: network connection is normal | | |
| ACT | Data receiving | Shining: receiving the data | | |

7.9 Using steps

If you want to connect the PLC in the Ethernet, you have to set the T-BOX-BD first. Please see the steps:

(1) Hardware connection and setting

- A Install the XC-TBOX-BD on the PLC.
- B Confirm the XCPpro version.
- C Set the DIP switch according to the requirements.
- D Make sure XC-TBOX-BD is connected with Ethernet. Electrify the PLC.

Note: when using XC-TBOX-BD at the first time, please set DIP switch S3 to OFF, make it as static IP (192.168.0.111), then connect with Ethernet to set parameters. The IP of PC must in the same gateway of the TBOX-BD which is 192.168.0.xxx. As XC-TBOX-BD has the same default IP when out of the factory, only one can be configured in the network at the same time.

| Initial configuration parameter list | | | | | |
|--------------------------------------|---------------|---------------|--|--|--|
| | TBOX | PC | | | |
| IP address | 192.168.0.111 | 192.168.0.*** | | | |
| Subnet mask | 255.255.255.0 | 255.255.255.0 | | | |
| Default gateway | 192.168.0.1 | 192.168.0.1 | | | |
| DNS server | 192.168.0.1 | 192.168.0.1 | | | |

E Make sure PC with XCPpro software are in the network.

(2) Set the parameters

- A. Open XCPpro software, click option/Ethernet module setting.
- B. Click "refresh list" to find the existed XC-TBOX-BD in the network.

| ۲ 🗄 | TCP_IP Device(Green:Device table,network exist,Red:Device table exist,network not exist,Blu – | | | | | | × | | |
|-----|---|----------------|---------------|---------------|-------------|-----|-----------------|--|--|
| Ad | Add TBOX Add GBOX Edit Delete Refresh List Import Export | | | | | | | | |
| | Name IP Mask DNS Port Comment | | | | | | | | |
| ١. | 1 | TBOX Defaulted | 192.168.0.100 | 255.255.255.0 | 192.168.0.1 | 502 | Defaulted TBOX, | | |

C. Double click the TBOX device, the "edit TBOX device" window will pop up.

| Edit TBOX Device | | | x |
|---|--|--|---|
| Communication Master/Client TBOX Comment | | | |
| Login in Name: 123 Device ID: 00-00-00-00-00-00 Remote Login in IP: 61 . 160 . 67 . 86 Port: 502 Server 2 Name: Thinget slave server Config Network | Serial Port Baudrate: Databits: Stopbits: Parity: Protocol: | 19200 BPS 8Bit 1Bit Even MODBUS Protocol | • |
| IP Address: 192.168.0.111 Port: 65535 Mask Code: 255.255.255.0 Gateway: 192.168.0.1 DNS: 192.168.0.1 Image: 100.0.1 | | | |
| Device Type:TBox_Slave | | | |
| Switch Read From Write To TBO | X | OK Cancel | |

Explanation for the parameters:

• Login in

Name: define by user

Device ID: set by factory, cannot change

• Remote login in

The aim of setting this part of parameters is to connect the XC-TBOX-BD and its device into the WAN, user can maintain the remote devices via the remote login in function.

IP, port, server 2 name: if using XINJE server, it no needs to change the parameter; if customer has server, please set the IP, port and server name.

• Config network

When the DIP switch S3 is OFF, user can set the IP address, mask code, gateway, DNS(same to the default gateway) as the actual requirements. Please turn ON S3 after setting.

• Serial port

Baud rate, data bits, stop bits, parity, protocol. These parameters should be the same to connected device.

| Edit TBOX Device | | | | | |
|------------------------------------|---------------|-------------------|--|--|--|
| Communication Master/Client TBOX (| Comment | | | | |
| Master Mode | | Client Mode | | | |
| Protocol: UDP 🗸 | | Send Delay(ms): 3 | | | |
| Station-IP Table | Shield Table | Station Table | | | |
| Station IP Num IP | Station | Station Num | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Switch Read | From Write To | TBOX OK Cancel | | | |

• Master mode and client mode

Under the "edit IP device" dialog box, it will show device type. When XC-TBOX-BD is master mode, it shows "device type: T-BOX_Master", the parameters setting of "Master" part is effective, "Slave" part is ineffective. When XC-TBOX-BD is slave mode, it shows "device type: T-BOX_Slave", the parameters setting of "Slave" part is effective and that of "Master" part is ineffective.

♦ Device type: XC-TBOX-BD Master

It includes two sections: protocol, station number- IP table.

> Protocol: UDP: more efficient and faster

TCP: better stability to send and receive data, but occupy more resources

Station number-IP table: station number: in Industrial Ethernet, the station number of Slave station IP address: slave station IP address

♦ Device type: XC-TBOX-BD Slave

It includes two sections: send delay (ms), static station number table.

- Send delay: as soon as XC-TBOX-BD receives the reply from Slave device, it will send next order at once. Adding delay time between reply and sending order to reduce the possibility of lose command packets of the slave device.
- Static station number table: the station number of Slave device in Industrial Ethernet, supporting direct access

| | | Edit | TBOX Device | | | × |
|-------------------|-------------|-----------------|----------------------|-----------------|--------|-----|
| Communication Mas | ster/Client | TBOX Comment | | | | |
| Comment | | | | | | |
| Device Name: | TBOX De | faulted | | | | |
| | Defaulted | TBOX,Need Edit, | Create Date of:6/3/2 | 2013 2:13:06 下午 | ~ · | |
| Comment: | | | | | | |
| | | | | | > | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| Swi | tch | Read From | Write To TBOX | 0 | K Cano | ;el |

• Comment

It contains device name and comment. User can modify them and click OK to confirm.

- D. Click "Write to T-BOX", the click "OK". The devices will be listed in the TCP-IP device window. Close this window.
- E. It shows "select communication mode" window. Please choose UDP for communication mode. The network type can be inner or outer network.

| Select Co | ommunication Mode |
|---|-------------------|
| UDP-inner network Communication Mode O Serial Port O UDP | + TBOX Defaulted |
| network type inner network outer network | |
| | OK Cancel |

G Click "OK" to finish the XC-TBOX-BD parameters setting.

7.10 Connect to SCADA

When use WAN, XC-TBOX-BD can connect with Touchwin SCADA (version 2.c.5 and higher).

The steps are as below:



(2) Select PC HMI software/Win800*600 or Win 1024*768 (according to your PC screen size).

| Panel | | | | × |
|-------|--------|---------------------|---|--------|
| | | Select Panel | ries Touch-Control Par D-L D-T (XMP-32) ries Touch Panel 5-MT/UT/ET 5-NT/MT/UT/ET 5-MT/UT/ET 2-MT/UT/ET 2-MT/UT/ET 5-MT/UT/ET ries Touch-Control Par 60ftware 0x600 | nel |
| | | , Attr: 240*128, | monochromatic | |
| | < Back | Next> | Finish | Cancel |

(3) Click "Next", then PLC port device select "Thinget XC series"

| Device | | | | | × |
|--------|--------|---|--|--------------|---|
| Device | | Please select po Thinget XC Seri Thinget FC Seri Mitsubishi FX S Mitsubishi Q Se Omron CPM/CO Omron CP/CJ/C Siemens S7-20 Siemens S7-30 AB Micrologix S Koyo S Series | ort PLC device: ies ies ies Inverter eries sries 2M Series 2S Series 0 Series 0 Series 0 Series 0 Series 0 Series (DF1 Full- | -duplex Prot | × |
| | | AB Micrologix,S Koyo S Series Schneider (Micr Matsushita (FPC Com Para: 19 Setting | SLC Series (DF1 Full ro/Neza/Twido) 0/FP1) 200, 8, Even, 1 | -duplex Prot | |
| | < Back | Next> | Finish | Cancel | |

(4) Download port device select "unused download port" then click "Next" Device

×

| | Please select po Unuse Downlac Thinget XC Seri Thinget FC Seri Mitsubishi FX So Mitsubishi Q Se Omron CPM/CO Omron CP/CJ/O Siemens S7-200 Siemens S7-300 AB Micrologix, S Koyo S Series Schneider (Micr | ort Download Device es es es Inverter eries M Series 20 Series 0 Series 0/400 SLC Series (DF1 Full ro/Neza/Twido) | e: -duplex Prot |
|--------|---|---|--------------------|
| < Back | Next> | Finish | Cancel |

- (5) The parameters in below window:
 - Name: TBOX log in name •
 - User ID: TBOX log in device ID. Please delete the "-" when input the ID. For example: ID 01-10-02-21-00-01-00-00 will be 0110012100010000. •
 - Device: select the device in the drop-down list, then click "Add". •
 - Server IP and port: XC-TBOX-BD remote log in IP and port. Click "Next" to finish the configuration.

| Net Device | | | | | | × |
|---------------|----------------|--------|-------|------|--------------|--------|
| | | | | | | |
| Name | thinget | | | | | |
| UserID | | | | 0110 | 012100010000 |] |
| Device | Thinget XC Se | ries | | | • | [|
| Add | | Modify | | | Delete | [|
| thingotThir | act XC Series | | | | | [|
| uninger i nir | iger AC Series | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| Server IP | 61 . 160 . | 67.86 | | Port | 502 | |
| | | | | | | |
| | | < Back | Next> | | Finish | Cancel |

(6) Make the project in below window:

| 👿 TouchWin for TH Edit To | ol - Project - Screen1 |
|---------------------------|---|
| File Edit View Part Tool | Window Help |
| 🗅 🚅 🔒 🐰 🛍 📾 🕫 🔗 🧣 | 2 A 🕰 🛣 🐨 🕸 🗰 🚥 💷 🖾 🛤 🗰 🕮 🖬 📾 📾 🖄 🖬 🖬 📾 📾 🖉 🖬 🖬 |
| | 🖼 🖌 🗣 陆 🗑 🔆 🔆 🛗 🖸 👅 📾 😰 🗳 🖳 🔍 🛤 🔤 🛤 🛲 🕊 😢 🖂 🗠 🗉 🖽 📰 🛤 |
| 歴 明 湖 辞 良 結 ⊝ 1 | |
| | |
| | |
| / KI 00 ~ . A 8 | |
| E A Project | |
| E Screen | |
| 1: Screen1 | |
| | |
| 60001: Password | |
| 60002: SetRTC | |
| 60003: Password | |
| 60004: XC Input | |
| 60005: XC Outpu | |
| 65532: PickSave | |
| 65533: Pfint | |
| Window | |
| 60001: Commu N | |
| 60003: password | |
| 60004: password | |
| 60005: password | 1 |
| 60006: KeyBoard | III |
| 60007: KeyBoard | 1 |
| 60010: KeyBoard | ∥., |
| 60009: password | |

Please note: for all the objects in the project, please change the "PLC port" to network device. For example: the lamp button, change "PLC port" to "thinget XC series".

| : | : | : | : | : | : | ÷ | : | ÷ | ÷ | 2 | |
|---|---|----|---|---|---|---|---|---|---|---|--|
| : | | ÷ | : | : | : | : | : | : | : | : | Lamp |
| : | • | | : | : | : | : | | : | : | : | Object Lamp Twinkle Color Position |
| : | • | : | : | : | : | : | : | : | : | : | Station |
| : | | ī, | X | 1 | Î | | | Ň | : | : | Device PLC Port |
| : | | i | | H | N | h | |) | : | : | VirStaNO PLC Port thinget:Thinget XC Series |
| ÷ | | 1 | J | - | Ţ | | G | Ę | : | ÷ | Object |
| : | | : | : | : | : | : | : | : | : | : | Object M 🔽 0 |
| : | | : | : | : | : | : | : | : | : | : | Indirect |
| • | • | • | • | • | • | • | • | • | • | • | |

(7) After finishing the editing of project, click online simulation button to monitor the remote device.

| | Q r | Touch | Win foi | r TH E | dit Too | l - Proje | ect - Sc | reen1 | | | | | |
|---|------------------------|-------------------|----------|------------|--------------|-----------------|----------|---------------|----------------------|-------------------------|--------------------|----------------------------|------------|
| | File | Edit | View | Part | Tool | Window | / Help | | | | | | |
| ĺ | D | 🖻 🖥 | X E | à 🖪 | ∽ ? | AÃ | . 👬 🧕 | 2 😪 🧿 | P1 I | 55 555 60 | 23 A | B 🗛 🔤 | 3 🛛 🖬 🇯 |
| | $\left \right\rangle$ | $\supset \square$ | OC | 06 | 2 🗖 🖥 | 1 🦻 🖗 | | 1 |) 🕝 🍕 |). K 🔆 🕅 | li 🔤 🖥 | ş 🔤 🛛 | r († 5 |
| ĺ | D + | ₩ 1 2 | 秤 [| 1 <u>1</u> | Θ 10 | 0% - | • 🕀 | :: 👆 | 0 | l∎ro l ∩a l line sim | اکہ طلا ulation | $\times \mid \mathfrak{M}$ | (1) |
| I | 唱 | 7F A | A 20 I | | 8 ° 8 | ?? \$7 | C N | ~~ [<u>\</u> | \geq $\frac{1}{2}$ | | D 🐝 . | 🐝 FW | |

7.11 Application

The following is an Ethernet consisted of three PLC and one HMI.



In this system, there are 3 XC-TBOX-BD and 1 T-BOX. T-BOX is master mode, others are slave mode. HMI is master device, PLC1, PLC2, PLC3 are slave devices.

This system's purpose is to control many slave devices by one master device. Make the industrial network being used widely.

The steps are as shown as below:

- (1) Confirm the station number of the 3 PLC via XCPpro software.
- (2) Connect TBOX1 and XC-TBOX-BD with related devices. If use TBOX1 and XC-TBOX-BD at the first time, set S3 switch to OFF (static IP address), connect the TBOX1 and XC-TBOX-BD with the Ethernet, configure them with XCPpro software. After finishing the setting for one TBOX, turn on S3 and continue setting next XC-TBOX-BD.

(3) Configure the XC-TBOX-BD. Select the BD serial port.

(4) Set the IP address:

T-BOX1: 192.168.0.1

XC-TBOX-BD2: 192.168.0.2

XC-TBOX-BD3: 192.168.0.3 XC-TBOX-BD4: 192.168.0.4

Please see the edit TBOX device window:

T-BOX1 parameters setting:

| Login in | Serial Port |
|---|--------------------------|
| Name: tbox2 | Baudrate: 19200 BPS 🗸 |
| Device ID: 00-00-00-00-00-00-00 | Databits: 8Bit v |
| | Stopbits: 1Bit v |
| Remote Login in | Parity: France A |
| IP: 61 . 160 . 67 . 86 Port: 502 | Faily. Even V |
| Server 2 Name: Thinget slave server | Protocol: MODBUS Protoco |
| Config Network | |
| IP Address: 192.168.0.10 Port: 65535 | |
| Mask Code: 255.255.255.0 | |
| Gateway: 192.168.0 1 | |
| DNS: 192.168.0.1 | |
| nmunication Master/Client TBOX Comment Master Mode | Citard Mada |
| | Client Mode |
| Protocol: UDP v | Send Delay(ms): 3 |
| Protocol: UDP V Station-IP Table Shield Table | Send Delay(ms): 3 |
| Protocol: UDP V Station-IP Table Shield Table Station IP IP | Send Delay(ms): 3 |
| Protocol: UDP V Station-IP Table Shield Table Station IP Num IP 1 192.168.0.20 | Send Delay(ms): 3 |
| Protocol: UDP V Station-IP Table Shield Table Station IP Num IP 1 192.168.0.20 2 192.168.0.30 | Send Delay(ms): 3 |
| Station-IP Table Shield Table Station IP 1 192.168.0.20 2 192.168.0.30 3 192.168.0.40 | Send Delay(ms): 3 |
| Protocol: UDP | Send Delay(ms): 3 |
| Protocol: UDP Station-IP Table Station IP 1 1 1 92.168.0.20 2 192.168.0.30 3 192.168.0.40 | Send Delay(ms): 3 |
| Protocol: UDP Station-IP Table Station IP 1 1 1 92.168.0.20 2 192.168.0.30 3 192.168.0.40 | Send Delay(ms): 3 |

XC-TBOX-BD 2 parameters setting:

| ommunication Master/Client TBOX Comment | | |
|--|-----------------|-------------------|
| Login in | Serial Port | |
| Name: tbox | Baudrate: | 19200 BPS 🗸 🗸 |
| Devices ID: 00-00-00-00-00-00-00 | Databits: | 8Bit 🗸 |
| | Stophite: | 1P# V |
| Remote Login in | Stopbits. | - |
| IP: 61 · 160 · 67 · 86 Port: 502 | Parity: | Even V |
| Server 2 Name: Thinget slave server | Protocol: | MODBUS Protocol V |
| Config Network | | |
| IP Address: 192 . 168 . 0 . 20 Port: 65535 | | |
| Mask Code: 255.255.0 | | |
| Gateway: 192.168.0.1 | | |
| DNS: 192.168.0.1 | | |
| | | |
| Device Type:TBox_Slave | | |
| mmunication Master/Client TBOX Comment | | |
| Master Mode | Client Mode | |
| Protocol: UDP V | Send Delay(ms): | 3 |
| Station-IP Table Shield Table | Station Table | |
| Station IP Station | Station Num | |
| | 1 | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

XC-TBOX-BD3 parameters setting:

| Login in | Serial Port | | |
|--|-----------------|-----------------|---|
| Name: tbox | Baudrate: | 19200 BPS | ¥ |
| 00-00-00-00-00-00 | Databite: | 0D# | |
| Device ID: | Databits. | d Bri | - |
| Remote Login in | Stopbits: | 1 Bit | × |
| IP: 61 . 160 . 67 . 86 Port: 502 | Parity: | Even | ۷ |
| Server 2 Name: Thinget slave server | Protocol: | MODBUS Protocol | ¥ |
| | | | |
| Config Network | | | |
| IP Address: 192 · 168 · 0 · 30 Port: 65535 | | | |
| Mask Code: 255.255.0 | | | |
| Gateway: 192.168.0.1 | | | |
| DNS: 192.168.0.1 | | | |
| | | | |
| nmunication Master/Client TBOX Comment Master Mode | Client Mode | | |
| Protocol: UDP V | Send Delay(ms): | 3 | - |
| Station-IP Table Shield Table | Station Table | | |
| Station IP Station | Station Num | | |
| 2 | 2 | _ | |
| | | - | |
| | | _ | |
| | | | |
| | | - | |
| | | - | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

XC-TBOX-BD4 parameters setting:

| Communication Master/Client TBOX Comment | | |
|---|---|---|
| Login in Name: tbox Device ID: 00-00-00-00-00-00 00-00-00-00 Remote Login in IP: 61 . 160 . 67 . 86 Port: 502 Server 2 Name: Thinget slave server Thinget slave server 100-00-00-00-00-00-00-00-00-00-00-00-00- | Serial Port Baudrate: 19 Databits: 8E Stopbits: 1E Parity: Ev Protocol: Mo | D200 BPS V Bit V Bit V Ven V ODBUS Protocol V |
| Config Network IP Address: 192 · 168 · 0 · 40 Port: 65535 Mask Code: 255 · 255 · 255 · 0 Gateway: 192 · 168 · 0 · 1 DNS: 192 · 168 · 0 · 1 Device Type:TBox_Slave | | |
| Communication Master/Client TBOX Comment | lient Mode | |
| Protocol: UDP Station-IP Table Station IP Num IP Station 3 | Send Delay(ms): 3 Station Table Station Num 3 | |

Then click write to TBOX. The following steps please refer to "Using step". Now the XC-TBOX-BD parameters setting are finished.

8. XC-WT-BD

8.1 Summarization

XC-WT-BD is the expansion BD board of XC series PLC. It can test the 0~39.0625mV voltage signal from pressure sensor, and transform the voltage to digital value.



- Collect one channel pressure sensor signal
- Test voltage range is 0~39.0625mV
- 16-bit A/D transformation

8.2 Specifications

| Analog input | DC 0~39.0625mV |
|----------------------|------------------|
| Digital output | 0~65535 |
| Resolution | 0.596uV |
| Transformation speed | 20ms/channel |
| Working ambient | No corrosive gas |
| Ambient temperature | 0°C~60°C |
| Storage temperature | -20~70°C |
| Ambient humidity | 5~95% |
| Storage humidity | 5~95% |

8.3 Terminals



| Terminal | Name | Meaning |
|----------|----------------------------|---|
| EXC+ | Weighing sensor power + | EXC+, EXC- connect to weighing sensor power |
| EXC- | Weighing sensor power - | terminal |
| SEN+ | External reference input + | |
| | | SEN+, SEN- connect to EXC+, EXC- |
| SEN- | External reference input - | |
| SIG+ | Weighing sensor signal + | SIG+, SIG- connect to sensor signal output |
| | | terminal |
| SIG- | Weighing sensor signal - | |

Note: for real application, EXC+ connects to SEN+ and sensor power + (DC5V), EXC- connects to SENand sensor power -. SIG+ connects to sensor output +, SIG- connects to sensor output -.

8.4 Weighing system

A typical weighing system:



The weighing system contains:

Loading bearing part: to support the load. Such as flat, hopper, container, air transport car... **Pressure sensor:** transform the weight to voltage signal.

Assembly part: make sure the pressure sensor can work correctly, assembly part and direct part can avoid overload. Overload will cause measurement error and sensor damage.

Connection box (JB): to collect several sensor signals.

XC-WT-BD: can be used as an electronic assessment device, it gets the pressure sensor signal and makes further assessment.

8.5 BD Configuration

Open the XCPpro software, connect PC with PLC and BD. Click configure/BD setting, open the BD set window.

| | PLC1 - BD Set | × |
|--|--|-----------|
| PLC Config PLC Serial Port PLC Serial Port PLC Serial Port PLC Serial Port CAN CAN Module T/0 I/O MA Module M Motion | BD Config(write to PLC when downloading) BD No Config BD Serial Port Other BD BD-2AD2PT-P BD-2AD2PT1DA-P BD-2AD2PT1DA-P BD-2AD2PT1DA-P BD-2AD2PT-P.XC BD-4AD-P.XC BD-4AD-P.XP BD-2AD2DA-P BD-2AD2DA-P BD-SD V BD-WT XP-3AD3PT-P-BD2 V | |
| | Read From PLC | OK Cancel |
| | | |

Click "other BD" and choose the BD-WT. Then click ok and restart the PLC.

8.6 Pressure sensor

The pressure sensor is based on resistance strain effect, see the following diagram:



R1 and R2 is strain resistor which make bridge circuit with R3 and R4. With the change of R1 and R2, the bridge circuit will lose the balance, unbalance voltage Uo will be produced as the output of sensor. U+ and U- are positive and negative point of the sensor power supply. Please select the 5V power of the module or from outside.

S+ and S- are positive and negative point of the sensor output. Connect the output to the module to test the weight.

8.7 A/D transformation diagram

The relationship between input voltage and converted digital value:



8.8 I/O address

XC-WT-BD will not occupy I/O address, the A/D transformed value will be stored in PLC register ID1000.

8.9 Programming example

Suppose the pressure sensor range is $0\sim100$ KG (the sensor output voltage range is $0\sim20.00$ mV). Display the weight (unit is kG) value in the HMI.

Program:



D4: real-time weight digital value (float number)

D10: the full-range analog value of XC-WT-BD (float number)

D14: (the full-range analog value of pressure sensor) ÷(the full-range analog value of XC-WT-BD)

D18: the digital value range of XC-WT-BD (float number)

D22: (digital value) ÷(weight) (float number) D24: the real weight, unit is kG (float number)

9. XC-OFC-BD

9.1 Summarization

XC-OFC-BD has high baud rate and fast communication speed. The signal is transferred through light wave. Light wave has strong noise immunity ability; the max transmission distance is 1KM. It is easy to build the network, the slave station can up to 254.



- TX: Fiber-optic communication send terminal
- RX: Fiber-optic communication receive terminal

9.2 Installation and wiring

(1) Installation

Open the left cover of PLC, install the BD board into the pins, fix it with the screws, and close the cover.



Please keep clean for the fiber optical terminal. Please put on the protection cover to prevent pollution.

(2) Wiring





Connect TX with RX as the above diagram, make all the PLC in a loop.

9.3 Configuration and settings

(1) BD board settings

Connect the PLC with XC-OFC-BD to the PC, open XCPpro software, choose BD serial port. Please restart the PLC after setting. Then download user program.

| | PLC1 - BD Set | × |
|---|--|-----------|
| PLC Config Password PLC Serial Port BD CAN Ave Hold Memo Too I/O MA Module M Motion M Motion | BD Config(write to PLC when downloading) BD No Config BD Serial Pot Other BD BD-2AD2PT-P BD-2AD2PT1DA-P BD-2AD2PT1DA-P BD-2AD2PT1DA-P BD-2AD2PT1DA-P BD-2AD2PT-P-XC BD-4AD-P-XC BD-4AD-P-XC BD-4AD-P-XP BD-2AD2DA-P BD-2D BD-2D BD-VT XP-3AD3PT-P-BD2 | |
| | Read From PLC | OK Cancel |

(2) Serial port settings

XC-OFC-BD will occupy serial port3 of PLC; it needs to set the port3 in XCPpro software:

- (A) The baud rate of all the port3 in the network must be the same.
- (B) The station number of all the port3 in the network should be different.
- (C) XC3/XC5 support the follow baud rates:

600Hz,1200Hz,2400Hz,4800Hz,9600Hz,19200Hz,38400Hz,57600Hz,115200Hz,192000Hz, 288000Hz, 384000Hz, 576000Hz

(D) XC2/XCM/XCC support the follow baud rates:

600Hz,1200Hz,2400Hz,4800Hz,9600Hz,19200Hz,38400Hz,192000Hz,256000Hz,384000Hz, 512000Hz, 768000Hz

Please see the settings in XCPpro software:

| Pl | .C1 - Serial Port Set | × |
|--|--|---|
| PLC Config Password PLC Serial Port BD CAN CAN Module IVO Module M Module | Serial Port 3 Communication Mode • Modbus Num 1 • User Protocol Overtime Set (ms) Char: 3 Reply: 300 Serial Port User Protocol Baudrate: 19200 BPS Databits: 8Bit Stopbits: 1Bit Parity: Even | |
| < > | Notice:configuration effective,reboot PLC | |
| Read From PLC W | rite To PLC OK Cancel | |

Please set the suitable parameters, click write to PLC, then download an empty program into the PLC. Finally, re-power on the PLC to make it effective. (make sure to choose serial port3 when setting)

Note: serial port 1 parameters cannot be changed, otherwise PLC cannot communicate with XCPpro software.

10. XC-PBOX-BD

10.1 Summarize

XC-PBOX-BD can be the slave station of Profibus DP. It realizes the interconnection between XC series PLC and Profibus DP system.



- The theoretical address range of Profibus: 0~127, 127 is broadcast address.
- Up to 32 master stations can be used. The station amounts can up to 127.
- The station No. of XC-PBOX-BD should be in the range of 1-255 and in accord with the slave station no.

of Profibus.

Profibus slave station



10.2 Terminal resistor

Both ends of the Profibus cable should connect terminal resistor. The terminal resistor can clear the signal reflection in the cable which is caused by resistor discontinuity and mismatching.

There are two reasons for the signal reflection: the resistance discontinuity and impedance mismatch. Resistance discontinuity: The signal suddenly encounter little or no (eg short circuit) or high resistance (example: open circuit) at the end of the transmission line, the signal will cause reflections in this place. The both ends of the cable must be connected with resistors whose impedance is same to the cable to make the resistance of the cable continuously.

Impedance mismatch: when the communication cable is in standby mode, the entire network data are orderless. The noise suppression or bias resistors can reduce the effect of reflection signal.

Thus, the terminal resistor is ON when it is connecting the last station. All the other terminal resistors are OFF.

10.3 Installation and configuration

(1) Open the cover on the left of the PLC, insert the BD into the pins, fix it with the screws and close the cover.



(2) Connect the PLC installed XC-PBOX-BD to the XCPpro software. In the XCPpro software, click "configure/BD settings":

| XC | PPro | | | | | | | | |
|-----------------|------|-------|--------|------|----------------------------------|-----------|------------|-------------|------|
| File | Edit | Sea | rch | View | Online | Configure | Option | Window | Help |
| | A | | ¥ | | P / | PLC Co | mm Port | Settings | |
| | | ana a | 00 | 니크 | | Securit | y Settings | | |
| ⊟ IF | | ¥H+ ⊦ | मिल्सि | -11- | <u>-∦</u> - <u>-</u> <u>1</u> }- | BD Set | tings | | |
| Ins | sins | Del : | sDel | 15 | F6 SF5 | CAN Se | ettings | | |
| Project | | | | | | Expans | ion Modu | le Settings | |
| Proj | ect | | | | | | 11 | | |

(3) Choose "BD serial port":

| PLC Config Password PLC Serial Port BD CM CAN Asve Hold Memory Module I/0 I/0 | BD Config(write to PLC when downloading) BD C No Config BD Serial Port C Other BD |
|---|--|
| M Motion | BD-2AD2PT-P BD-2AD2PT1DA-P |

(4) Click "PLC serial port", choose serial port 3. The modbus num should be the same to Profibus slave station no. click "write to PLC", then download program. Cut the PLC power and power on again, then run the PLC.

Note: the station no. of PLC serial port 3 must be equal to Profibus slave station no. (XC-PBOX-BD station no.) The PLC station no. range is from 1 to 255.

| PLC Config | Serial Port 3 |
|---|--|
| BD BD | Communication Mode ⓒ Modbus Num ⓑ = ○ User Protocol |
| - M CAN - M Save Hold Memory - 000 Module - 100 I/O - 000 MA Module - M Motion | Overtime Set (ms) Char : 3 Reply : 300 |
| | Serial Port User Protocol |
| | Baudrate: 19200 BPS |
| | Databits: 8Bit |
| | Stopbits: 1Bit |
| | Parity: Even |
| | |

10.4 Wiring

The DB9 port of XC-PBOX-BD is the standard Profibus terminal, please see the terminal definition:

| XC- | PBOX-BD | | Pro | ofibus DP device |
|-----|---------|----------|-----|------------------|
| Pin | Name | | Pin | Name |
| 1 | | | | |
| 2 | | | | |
| 3 | В | | | (RxD/TxD P) |
| 4 | | | | |
| 5 | D-GND | | | GND |
| 6 | VP(+) | | | VCC |
| 7 | | | | |
| 8 | А | <u> </u> | | (RxD/TxD N) |
| 9 | | | | |

XC-PBOX-BD Profibus DP device

5—GND and 6—VCC provide power for terminal resistor. If there is no terminal resistor, please do not connect them.

10.5 DIP switch

Please set the baud rate of communicating between XC-PBOX-BD and Xinje PLC via DIP switch.



| Baud rate (bps) | DIP1 | DIP2 | DIP3 | DIP4 |
|-----------------|------|------|------|------|
| 19200 | OFF | OFF | | |
| 9600 | OFF | ON | | |
| 38400 | ON | OFF | | |
| 115200 | ON | ON | | |

Note:

- 1. The default communication parameter is: 8 data bit, 1 stop bit, even parity.
- 2. Only DIP switch 1 and 2 are valid, 3 and 4 are invalid.

10.6 LED

There are four LED lights on the XC-PBOX-BD.

D4: the light flashes when reading the station No. of PLC serial port3, it always lights when got the station No.

D3: the state of Profibus.

D2: it lights when data is being sent.

D1: it lights when data is being received.



10.7 Operation steps

Please do the following operations if the master station of XC-PBOX-BD is Siemens Profibus-DP device.

- Copy XC-PBOX.GSD to the route of \...\Step7\S7data\gsd\
- Copy Xinje_B.bmp to the route of \...\Step7\S7data\nsbmp\

If the master station is not Siemens products, please copy XC-PBOX.gsd and Xinje_B.bmp to the folder of gsd and bmp.

Now we take Siemens S7-300 series PLC (315-2AH14-0AB0) as an example to explain the debug process. Suppose the S7-300 sets ON M0-M7 of Xinje PLC via XC-PBOX-BD. And set double word register (D0,D1) to 12345678, set (D3,D4) to 87654321. And read the value of M20-27 and (D100, D101)(D102, D103).

- (1) Open the Siemens simatic manager software, build a new project.
- (2) Name the project:

| Name | Storage path | |
|------------------------------------|------------------------|---------------------------------|
| | | |
| Add to |) current multiproject | |
| |) current multiproject | <u>Т</u> уре: |
| _ Add to Same: Kinje |) current multiproject | <u>Typ</u> e: Project |
| Add to Ame: Xinje Storage |) current multiproject | Iype: Project F E Librery |

(3) Insert new object/Simatic 300 station, name it as PBOXOPC:

| <u></u> | SIMATIC | C Manager - xin | je | |
|--------------|--------------------------|--|--------------------------------|---|
| Ei | ile <u>E</u> dit | Insert PLC View | <u>O</u> ptions <u>W</u> indow | Help |
| 1 | C) 🧀 🖁 | 1 🕷 X 🖻 🖻 | M 9 9 9 | n 📴 🔠 🔃 < No Fi |
| E | 🖗 xinje | C:\Program | Files\Siemens | \Step7\s7proj\xinje |
| | - - E) xi | | THE CTILLTIC DOD (| 1) 📲 MPI(1) |
| | | Lut | CtrltA | |
| | | Lopy | CUTITC | |
| | - | faste | UTLTY | |
| | | Delete | Del | |
| | | Insert New Object | • | SIMATIC 400 Station |
| | | PLC | • | SIMATIC 300 Station |
| | | Rename Object Properties | F2 . Alt+Return | SIMATIC H Station SIMATIC FC Station Other Station |
| (4) Click PI | BOXOPC | , it will show below | window | |
| | 🦪 SIBAT | IC Manager - xi | nje | |
| | <u>F</u> ile <u>E</u> di | t <u>I</u> nsert P <u>L</u> C <u>V</u> iew | Options Window | / <u>H</u> elp |
| | 0 🗳 | 27 🛲 X 🖻 🖻 | 1 | <u>□</u> |
| | 🛃 xinj | e C:\Program | Files\Siemer | ns\Step7\s7proj\xinj |
| | E D xi | nje PBOXOPC | 🔊 Hardware | |

(5) Double clickthe hardware, you will see below window:



(6) Click Insert/insert object, it will show below window:

| 🌺 HV Config - [PBOXOP | C (Configuration) — xinje | l | | | |
|--------------------------------|--|-------------|-----|---|--------------|
| DO Station Edit Insert PL | C <u>V</u> iew Options <u>M</u> indow <u>H</u> elp | | | | _ 6 × |
| | | | | | |
| W PROFIBUS DP | | | | | |
| W PROFINET IO | | <u>F</u> in | id: | | mt mi |
| SIMATIC 300 SIMATIC PC Base | | Pr | fil | Standard | |
| < IIII I> | | | | PROFIBUS DP PROFIBUS-PA PROFINET IO SIMATIC 300 SIMATIC 400 SIMATIC PC Based Con SIMATIC PC Station | trol 300/400 |

(7) Click "SIMATIC 300", then click "RACK-300", it will show below window:



(8) Click Rail, it will show below window:

| 🙀 HV Config - [PBOXOPC (Configuration) xinje] | | | |
|--|-----------------|--|--|
| 🕅 Station Edit Insert PLC View Options Mindow Melp | _ a × | | |
| D 😅 🔐 🖉 🐘 🎒 🖻 🖻 🏜 🏜 🚯 🗖 🔡 🕅 | | | |
| | | | |
| | Eind: Mt Mi | | |
| | Profil Standard | | |
| 4 | PROFIBUS DP | | |
| 5 | PROFINET IO | | |
| 7 | E SIMATIC 300 | | |
| | E SIMATIC 400 | | |
| | | | |

(9) Click Option/update catalog, then do the operations in below window:

| 🖳 HV Config - [P | BOXOPC (Configura | tion) xinje | e] | | | |
|--|----------------------------------|-------------------------------|----|--|----------|-------|
| D Station Edit Ins | ert <u>PLC V</u> iew Options | s <u>W</u> indow <u>H</u> elp | | | | - 8 × |
| | 5 fa fa á án | | | | | |
| → (0) 1/R | | | ^ | | | ㅋㅋㅋ |
| | 1 | 1000 000000 | | <u>F</u> ind: | | mt mi |
| 2 <u>Copy</u> 3 <u>P</u> aste | | Ctrl+C Ctrl+V | | Profil | Standard | |
| 4 <u>I</u> nser | Insert Object | | | BY PROFIBUS DP BOFTBUS-PA | | |
| B Add M | Add Master System | | | PROFINET IO | | |
| 7 Disco | Bisconnec <u>t</u> Master System | | | E SIMATIC 300 | | |
| Inser | Insert PROFINET IO System | | | E SIMATIC 400 | | |
| Disco | Disconnect PROFINET IO System | | | 🗄 🗄 🎆 SIMATIC PC Based Control 300/400 | | |

(10)Choose the matched power module for the PLC. Here we choose PS307 2A , CPU 315-2DP\6ES7 315-2AG10-0AB0\V2.6:



(11)Click v2.6, it will show below window, choose the master station (S7-300) No. of XC-PBOX-BD, here we choose 2. Then click "New..." button in the window:
| 🙀 HV Config - [PBOXOPC (Configuration) xinje] | |
|---|---|
| III Station Edit Insert EC Yiew Options Mindow Help □ ☞ 읍~ 및 및 를 ☜ ඬ ஹ ஹ [[[]] □ 號 № | |
| (0) UR Properties - PROFIBUS interface DP | (R0/S2.1) |
| I ISS General Parameters 3 | f a subnet is selected, he next_available address is |
| Subnet: | <u>N</u> ew P <u>roperties</u> De <u>l</u> ete |
| OK | Cancel Help , M7 |

(12)Click "Network setting", set the transmission rate to 12Mbps.

| <u>H</u> ighest PROFIBUS Address: | 126 👻 🗖 Change | Options |
|--------------------------------------|---|---------|
| <u>T</u> ransmission Rate: | 500 Kbps 1.5 Mbps 3 Mbps 6 Mbps 12 Mbps | |
| <u>P</u> rofile: | DF Standard Vser-Defined | |

(13) Click ________, then choose Profibus DP\ Additional Field Device's Gateway\ PBOX", double click PBOX, then set the slave station No. of PBOX to 5.

| 💐 HV Config - [PBOMOPC (Configuration) xinje] | |
|--|----------------------------|
| 📬 Station Edit Insert ELC View Options Window Help | _ 8 × |
| | |
| | |
| | Eind: mt mi |
| 1 1 15 301 2A 2 CPU 315-2 DP 72 1 0ρ | Profil Standard 💌 |
| 3 Description DEORIPHIC interface DEOR | PROFIBUS DP |
| 4 Fropercies - PROFIDOS Internace PDOX | - Additional Field Devices |
| 6 General Parameters | |
| Address: 5 | E Gateway |
| | AS-1 |
| Transmission rate: 12 Mbps | 🗈 📑 DP/RS232C Link |
| | |
| Subnet: | empty |
| PROFIBUS(1) 12 Mbps | read 8 bits(0xxxx) |
| Properties | read 16 bits (0xxxx) |

(14) As the chapter 1 said, we copy the file XC-PBOX.GSD to $\.\Step7\S7data\gsd$, and copy the file Xinje_B.bmp to $\.\Step7\S7data\nsbmp$, now we can see the Xinje station picture in the below window:

| HV Co Stati | onfig - [PBOXOPC (Configuration) - on <u>E</u> dit <u>I</u> nsert <u>P</u> LC <u>V</u> iew <u>O</u> ptions <u>W</u> indow | — xinje] Help |
|---|--|-----------------------------------|
| 2 | }~ 8 \$; \$ b 6 \$ \$ \$ \$ \$ \$ | ₩ |
| 3 (0) 1 2 <i>1</i> 2 3 4 5 6 7 | UR PS 307 2A CPU 315-2 DP DP DP | PROFIBUS(1): DP master system (1) |

(15) double click the Xinje station picture, it will show below window. Set the data update mode: At every MD end or At MD scan end.

| R HV Config - [PBOXOPC (Conf Station Edit Insert <u>PLC View</u> | iguration) xinje] Properties - DP slave | | |
|--|---|---|--|
| | General Parameter Assignment | | |
| 1 FS 307 2A 2 CPU 315-2 DP 22 DP 3 | Parameters Station parameters Device-specific parameters 国教派史新建式, DataUpdataMode 记述, Hex parameter assignment User_Prm_Data (0 to 3) | Value 在MD扫描结束后 At MD_scan End 03,00,00,00 | Standard FIBUS DP Additional Field Switching Dev: |
| <u>6</u> | | | Gateway Gateway Definition of the second s |

(16) Configure the read and write.

Read: read the value of Xinje PLC to Profibus.

Write: write the value of Profibus to Xinje PLC.

Force single bit and Set single word: write the value of Profibus to Xinje PLC.

| en in | Config - [PH | OXOPC (Con | figur | ation) | xinje] | |
|--|---|---|----------|-----------|---------------------------------------|-------------|
| 00 Sta | tion Edit Inse | art PLC View | Option | s Windo | w Help | |
| | | | AAAAAAAA | | | |
| | | | | | | |
| 200 1 2 3 4 5 6 7 |) UR PS 307 2A CPU 315-2 DP | 2 DP | | | PROFIBUS(1): DP master system (1) | |
| < | | | | | | |
| | una yese | | | | | |
| - | (5) PBOX | | | | | |
| 5 | | Order Numbe | r / Des | ignation | T add O address Comment | |
| 1 | 801 | status | 0 | I Enacion | I Add & Addless Comment | |
| 2 | 800 | control | | 0 | | |
| 3 | SDT | read 8 hits (0) | 1 | - | | |
| 4 | 211 | read 2 DWords | 256 2 | | | |
| - | 207 | mente 2 DWord | 2002 | 200 20 | | |
| 6 | 810 | mrite 2 biord | | 20020 | | |
| 7 | 000 | WIICE O DICS (| 0 | 20 | | |
| 8 | | e | | | | |
| (17) A below | fter making th v window: | e program, c | lick sa | ve and | compil, then click download to module | . Return to |
| • / DI | | se 200) | - | | | |
| File | <u>E</u> dit <u>I</u> nsert | PLC View O | ptions | Mindow | <u>H</u> elp | |
| | 2 H 🛲) | 6 8 8 8 | ân 9 | | D . Ko Filter > | |
| 🖹 xi | nje C:\l | Program Fi | iles\ | Siemen | s\Step7\s7proj\xinje | |
| | xinje PBOXOPC CPU 315 ST 57 57 5 ST 5 | 5-2 DP Program(4) Sources Blocks | DU Hard | lware | CPV 315-2 DP | |

(18) click "Blocks", it will show ¹⁰⁰¹, double click OB1, it will show below window, then click ok enter programming windowThen make the program in it.

| | | _ |
|--|--|---|
| SINATIC Nanager - xinje | | |
| <u>Eile Edit Insert PLC View Options</u> | lindow Help | |
| D 🗃 🚼 🛲 👗 🖻 🖻 🏙 오 | 🌯 🖭 🗄 💼 💽 Ko Filter > 🔄 🏹 🞇 🛞 🖷 🗖 🕅 😵 | |
| 🗃 xinje C:\Program Files\S | lemens\Step7\s7proj\xinje | |
| Syst | n data 🕞 OB1 | |
| 🖻 🚺 CPU 315-2 DP | Properties - Organization Block | |
| 57 Frogram (4) D Sources | General - Part 1 General - Part 2 Calls Attributes | |
| Blocks | Name: DB1 | |
| | Symbolic Name: | |
| | Symbol Comment: | |
| | | |
| | Created in Language. SIL | |
| | Project path: Storage location | |
| | of project: C:\Program Files\Siemens\Step7\s7proj\xinje | |
| | Code Interface | |
| | Uste created: U1/22/2011 10:34:08 AM I ==================================== | |
| | | |
| | "Main Program Sweep (LycLe)" | |
| | | |
| | | |
| | OK Cancel Help | |
| | | |

Programming window:

| 🔣 LAD/STL/FBD — [OB1 — 5 | xinje\PBOXOPC\CPU 315-2 DP] | |
|---|---|----------|
| File Edit Insert PLC Debug | View Options Mindow Help | _ = × |
| | Contents Of: 'Environment'Interface' | |
| Barbara Barbara | Interface Interface Imane Imanee Imanee Imanee Imanee Imanee Imanee | |
| SF Diocks SF Diocks Multiple instances Multiple instances | Network 1: Title: | <u> </u> |
| | | |
| Program | | > |

Program:



(19) After making the program, save and download to the module. Turn On the RUN switch of S7-300. The SF BF LED is OFF on the S7-300, it means the communication is successful. Then turn off the RUN switch. Now please open the XCPpro software, connect it to the Xine PLC with XC-PBOX-BD (please configure the

XC-PBOX-BD at first in the software). Click free monitor [1], add the data in the monitor list (see figA).

Then turn on RUN switch of S7-300, the monitor data is shown in figB. (M20-M27,D100 D102 are the data write from S7-300 to XC series PLC.

| MO | ON |
|------|----------|
| M1 | OFF |
| M2 | ON |
| МЗ | OFF |
| M4 | ON |
| M5 | OFF |
| M6 | ON |
| M7 | OFF |
| M20 | OFF |
| M21 | OFF |
| M22 | OFF |
| M23 | OFF |
| M24 | OFF |
| M25 | OFF |
| M26 | OFF |
| M27 | OFF |
| DO | 12345678 |
| D2 | 87654321 |
| D100 | 00000000 |
| D102 | 00000000 |

FigA

| MO | ON |
|------|----------|
| M1 | OFF |
| M2 | ON |
| МЗ | OFF |
| M4 | ON |
| M5 | OFF |
| M6 | ON |
| M7 | OFF |
| M20 | ON |
| M21 | ON |
| M22 | ON |
| M23 | ON |
| M24 | ON |
| M25 | ON |
| M26 | ON |
| M27 | ON |
| DO | 12345678 |
| D2 | 87654321 |
| D100 | 12345678 |
| D102 | 78654321 |
| | |

FigB

(20) Monitor the data of S7-300. Right click the data needs to monitor:

| ių II (| Config - [PBC | XOPC (Configurat | ion) xinje] | |
|----------------------------|--------------------------------|---|--|----------------------|
| D Stat | ion <u>E</u> dit <u>I</u> nser | t <u>PLC V</u> iew <u>O</u> ptions | <u>W</u> indow <u>H</u> elp | |
| 0 🖨 | : 2~ 6 6 1 5 | 🖻 🕄 🏜 🏜 | 🗈 🗖 🔡 K? | |
| 1 2 3 4 5 6 | UR PS 307 2A CPU 315-2 DP | DP | Copy Paste Replace Object Add Master System Disconnect Master System Insert PROFINET IO System Disconnect PROFINET IO System | Ctr] Ctr] |
| <u>L</u> | 1 | | PROFINET IO Domain Management. PROFINET IO Topology Isoc <u>h</u> rone Mode | 12 |
| | | | Delete | Del |
| | | | Go To Filter Assigned Modules | 100000 |
| | | | <u>M</u> onitor/Modify | |
| < | | | <u>E</u> dit Symbols Object Properties Open Object With | Alt Ctr] |
| S | (5) PBOX | Order Number / Desi status | P <u>r</u> oduct Support Information FAQs Find Manual | Ctr] Ctr] Ctr] |
| 2 | 800 | control | Start Device Tool | |
| 3 | 16DI | read 16 bits(Oxxxx) 🖡 | | |
| 4 | 8DI 16DI | read 8 bits(Oxxxx) read 16 bits(Oxxxx) | 3 45 | |

(21) Choose "monitor" to see the data. The data are the same to the setting data in XC series PLC.

| | 📥 Addr | ess | Symbol | Display | Status value |
|----------|--|---------|--------|---|----------------------------------|
| 1 | I | 1.0 | | BIN | 2#1 |
| 2 | I | 1.1 | | BIN | 2#0 |
| 3 | I | 1.2 | | BIN | 2#1 |
| 4 | I | 1.3 | | BIN | 2#0 |
| 5 | I | 1.4 | | BIN | 2#1 |
| 6 | I | 1.5 | | BIN | 2#0 |
| 7 | I | 1.6 | | BIN | 2#1 |
| 8 | I | 1.7 | | BIN | 2#0 |
| 9 | I | 2.0 | | BIN | 6774110-71-+11-+11-+11-+11-+11-+ |
| Rur V | R <u>o</u> w Not 1 condit Monitor Modi <u>f</u> y | Effecti | ve R | Update Force un immediately ₩∑tatus Value ₩Mod <u>i</u> fy Value | Symbol with I |

(22)Monitor theRead 2 Dwords with the same way

| Dnl | ine via | assigne | d CPU serv | ices | |
|-----|-----------|---------|-------------|----------|-----------------------------|
| at | :h: x: | inje\PB | OXOPC\CPU : | 315-2 DP | |
| | Address 🗧 | | Symbol | Display | Status value |
| 1 | PIW | 256 | ii. | HEX | ₩#16#1234 |
| 2 | PIW | 258 | | HEX | ₩ # 16 # 5678 |
| 3 | PI₩ | 260 | | HEX | W#16#8765 |
| 4 | PIW | 262 | | HEX | W#16#4321 |

Notes:

- 1. The Xinje PLC only can be slave station with XC-PBOX-BD. XC-PBOX-BD only can be used with Xinje PLC. Please choose the Xinje PLC which can expand BD module.
- 2. After configuration of the XC-PBOX-BD, please re-power on it.
- 3. The station No. in the PLC should be accord to the Profibus slave station No., especially for SCADA application.

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