LX5V-2ADI-BD BD Module Manual

1 Installation

- Before installation, it must be ensured that the PLC host and the related device of the BD module terminal wiring are powered off reliably. The shell is inserted into the BD module slot of PLC host, and then locked with two standard screws for fixation.
- Two standard terminal heads are equipped with this BD module. After connecting the wiring, insert them into its terminal. After confirming that the host, BD module, wiring, etc. are installed correctly, it can be powered on for use.
- ✎**Note:**
  - The ADV input cannot exceed the absolute maximum (-15V/+15V), otherwise the BD module will be damaged.
  - Please install the BD module firmly and fix it on PLC. Poor contact may lead to failure.
  - Tightening torque for fixing BD module or PLC top cover is 0.3N.m to0.6N.m. Please tighten it firmly to avoid malfunction.
- **Warning: Cut off the power before installing, removing or wiring the BD module to avoid electric shock or product damage.**

2 Appearance and terminal

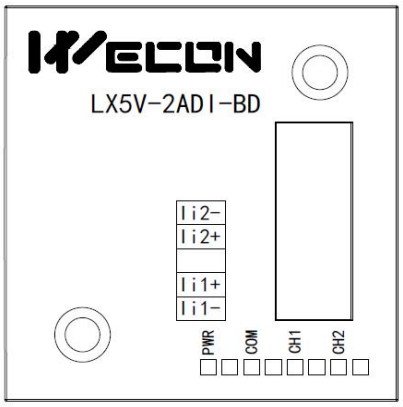


Table1 Terminal distribution

Input current range: 4mA to 20mA	
Ii2-	Channel 2 current input negative
II2 +	Channel 2 current input positive
	NC
Ii1+	Channel 1 current input positive
Ii2-	Channel 1 current input negative

Table2 LED lamp function description

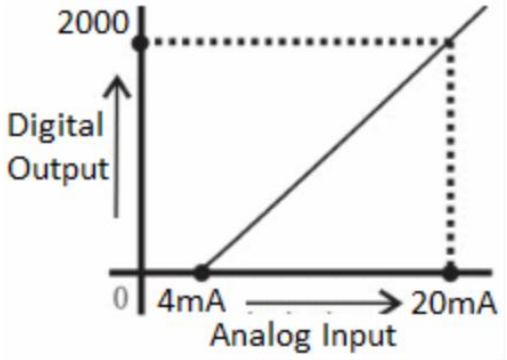
Indicator lamp	Description
PWR	ON when power-on (when the program is running, it will be ON).
COM	It flashes when communicating with PLC normally, and it is OFF when timeout.
CH1	Channel 1 lamp: Always on in range; Flashing outside the range of (4mA to 20mA); Off when the channel is closed.
CH2	Channel 2 lamp: Always on in range; Flashing outside the range of (4mA to 20mA); Off when the channel is closed.

3 Specification

(1) General specification: Same as PLC main unit. (Please refer to the accompanying manual of the PLC main unit.)

(2) Power supply specification: The power supply is provided internally by PLC.

(3) Performance specifications:

Project	Specification
	Current input
Analog input range	DC 4mA to 20mA (input resistor 250Ω) , absolute maximum input: -2mA, +60mA
Digital output	12-bit binary
Resolution	8uA (4mA to 20mA/2000)
Comprehensive precision	±0.5% of full scale (4mA to 20mA: ±0.16 mA)
A/D conversion time	One scan cycle (A/D conversion after ladder diagram END instruction is executed, and BD channel map value is updated)
Input features	
Insulation	There is no insulation between the channels of the module
Points occupied	0 point (2ADI is not affected by the standard maximum control points of the main PLC because it is operated through the data register)

4 Wiring

Warning
Cut off the power before installing, removing or wiring the BD module to avoid electric shock or product damage.

✎Note:

- Do not place signal cables near high voltage power cables or in the same trunk line. Otherwise, it may be disturbed or surged. Keep a safe distance between signal cable and power cable, at least 100mm.
- Ground the shielding of shielded wire or shielded cable. But the ground point and high voltage line cannot be the same.
- Do not connect cables of impermissible size to avoid poor contact or product damage.
- Fix the cable so that no force directly acts on the terminal line or cable connection area.
- The tightening torque of terminal is 0.5Nm to 0.6N.m. Please tighten it to prevent malfunction.
- Do not use empty terminals.

4.1 Applicable cables

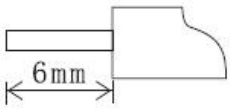
(1) AWG25-16 is used for connection with output device.

(2) Maximum terminal tightening torque is 0.5N.m to 0.6N.m.

(3) Using different types of cables may cause poor contact with terminals. Please use pressfit terminals for good contact.

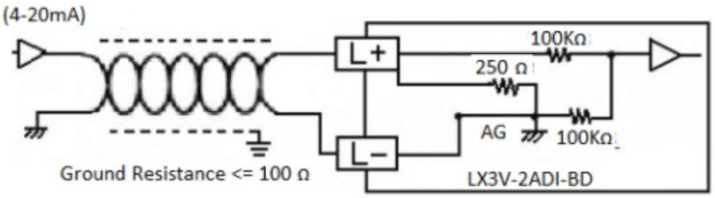
Line number and cross-sectional area

Line number	Cross-sectional area (mm^2)	End processing
AWG26	0.1288	Stranded cable: Strip off the sheath, rub the core wire, and then connect the cable. Single-core cable: Strip off the sheath and connect the cable.
...	...	
AWG16	1.309	



4.2 Input mode

Current input mode



5 Description of PLC device

(1) When connected to LX3 series PLC, please refer to LX3 series BD module manual.

(2) When connected to LX5 series PLC, if the firmware version of PLC is lower than 2.051 (excluding 2.051), or BD module is not configured by host computer, it can be controlled by the following system devices:

Table3Device allocation

PLC model	BD model	Device	Expansion port 1 description	Device	Expansion port 2 description
LX5V	2ADI	SM2010	CH1 current input channel open flag OFF: Open ON: Close	SM2030	CH1 current input channel open flag OFF: Open ON: Close
		SM2011	CH2 current input channel open flag OFF: Open ON: Close	SM2031	CH2 current input channel open flag OFF: Open ON: Close
		SD2010	CH1 digital value (4mA to 20mA: 0 to 2000)	SD2030	CH1 digital value (4mA to 20mA: 0 to 2000)
		SD2011	CH2 digital value (4mA to 20mA: 0 to 2000)	SD2031	CH2 digital value (4mA to 20mA: 0 to 2000)

(3) You can select device through I/O mapping to use the configuration function of new BD module. For details, please refer to "6.1 Parameter configuration".

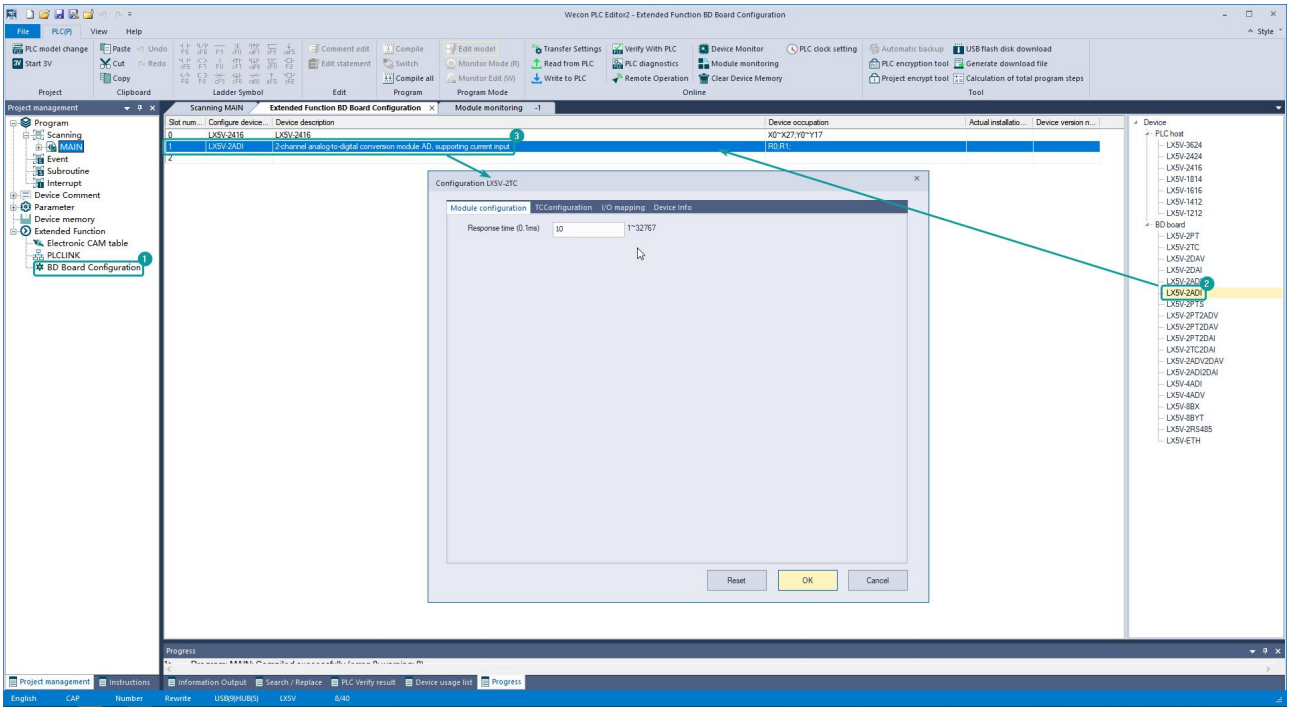
6 Instructions

6.1 Parameter configuration

① Open the host computer software and create a new project, double-click “Project Manager” → “Extended Function” → "BD module Configuration" Noteto enter “BD settings” interface;

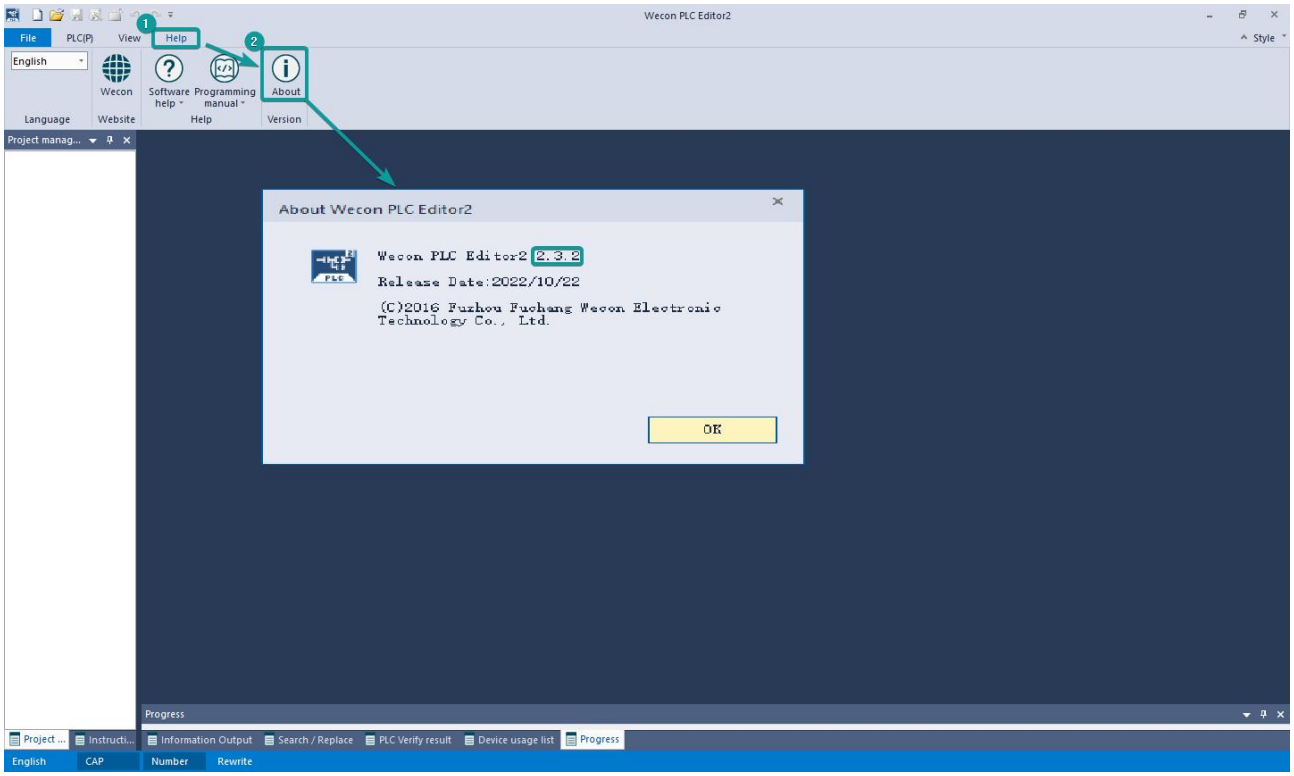
② Configure the currently connected PLC (take the LX5V-2416 model as an example) and BD module model on the BD module configuration interface: Select “LX5V-2ADI" in the device bar on the right side of the BD module configuration interface and double-click to add it to the corresponding slot position of PLC (slot number 1 or 2, the software will select slot 1 by default, and right-click to move down to slot 2);

③ After adding the BD module to the slot, double-click or right-click to select configuration parameters to enter LX5V-2ADI-BD configuration parameters interface, as shown in the following figure. Configure related parameters on this interface.

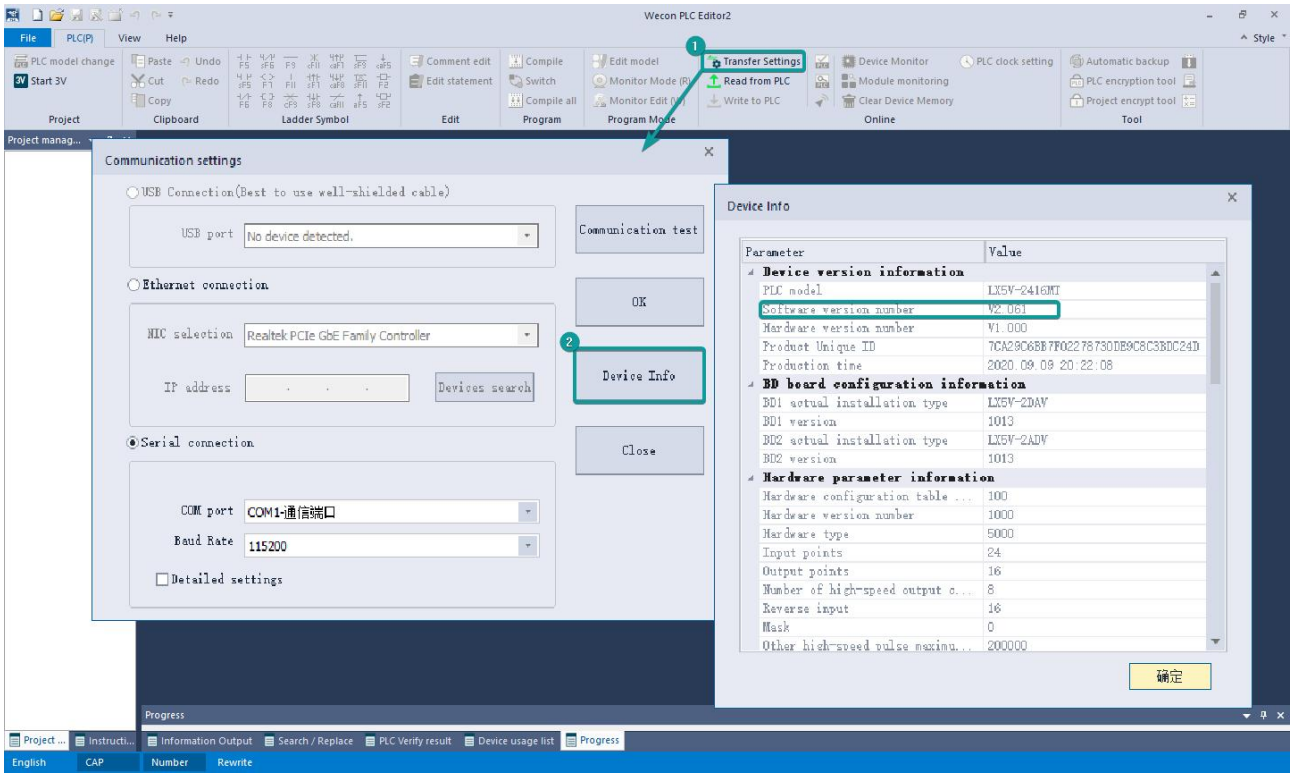


Note: This function is only supported in the following versions of host computer, slave computer and BD module:

(1) Supported host computer versions: Wecon PLC Editor2 2.1.204 and above, as shown in the following figure:



(2) Supported slave computer versions: 2.051 and above, as shown in the following figure:



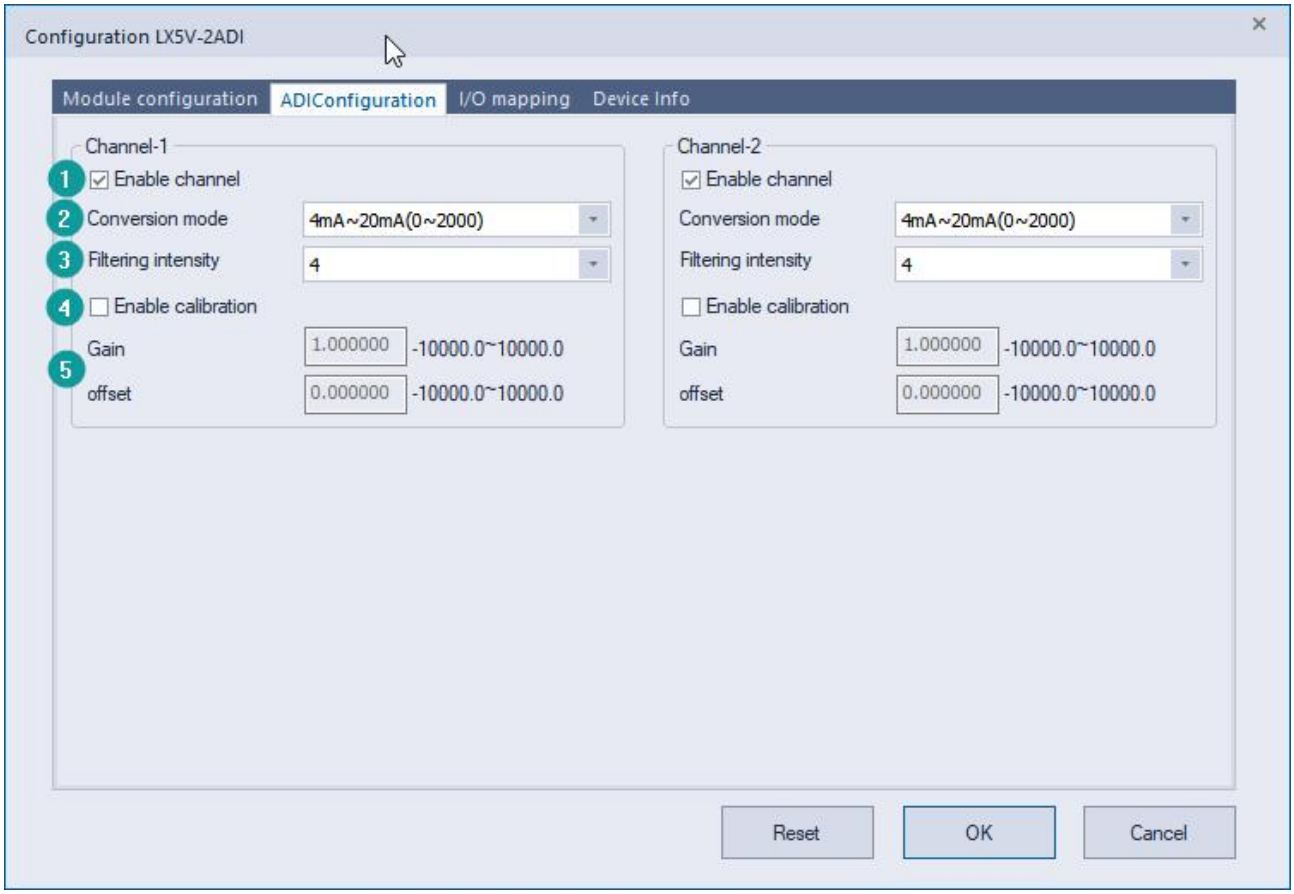
(3) Supported BD module version number: 1013 and above, as shown in the following figure:

Slot num...	Configure device...	Device description	Device occupation	Actual installatio...	Device version n...
0	LX5V-2416	LX5V-2416	X0~X27;Y0~Y17	LX5V-2416MT	V2.061
1	LX5V-2ADI	2-channel analog-to-digital conversion module AD, supporting current input	R0;R1;	LX5V-2ADI	1013
2					

The parameter configuration interface is as follows:

1、Module setting: Set response time (The response time is the interval time between PLC acquisition of BD module data. Range: 0.1ms to 3276.7ms).

2、ADI configuration:



① Check enable channel to set whether to enable the current BD module channel.

② The conversion mode is set to ADI conversion mode by default, and the measurement range is 4mA~20mA (0~2000).

③ Setting the filtering intensity can reduce the jitter of BD channel value. The default configuration of filter intensity is 4. Level 0 is the lowest and level 9 is the highest. The filter intensity can be adjusted according to actual use.

④ Check enable calibration, you could calculate the gain offset according to the following formula to convert the corresponding channel value:

Channel value = digital value × gain value + offset value

⑤ When the channel value deviates, you could also set the gain offset to calibrate the channel. For example:

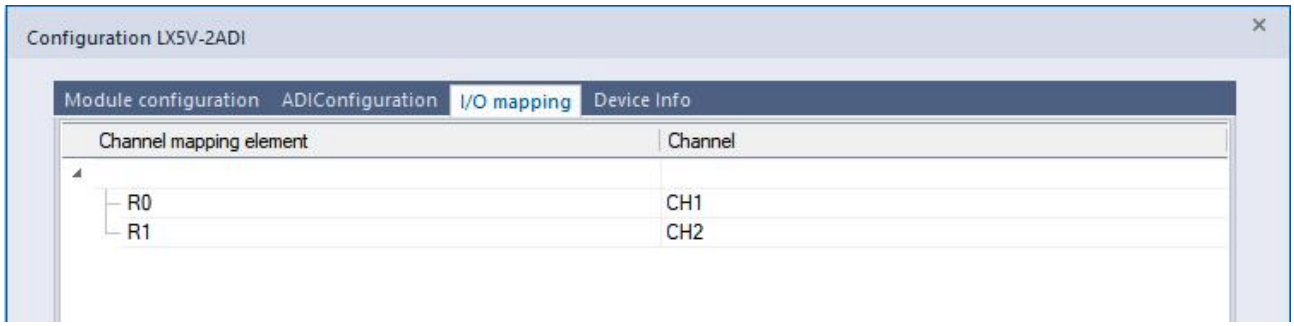
- When the channel input analog is 20mA, the digital quantity of BD module acquisition channel value is 1970, and the actual digital value should be 2000.
- When the channel input analog is 4mA, the digital quantity of BD module acquisition channel value is

30, and the actual digital value should be 0.

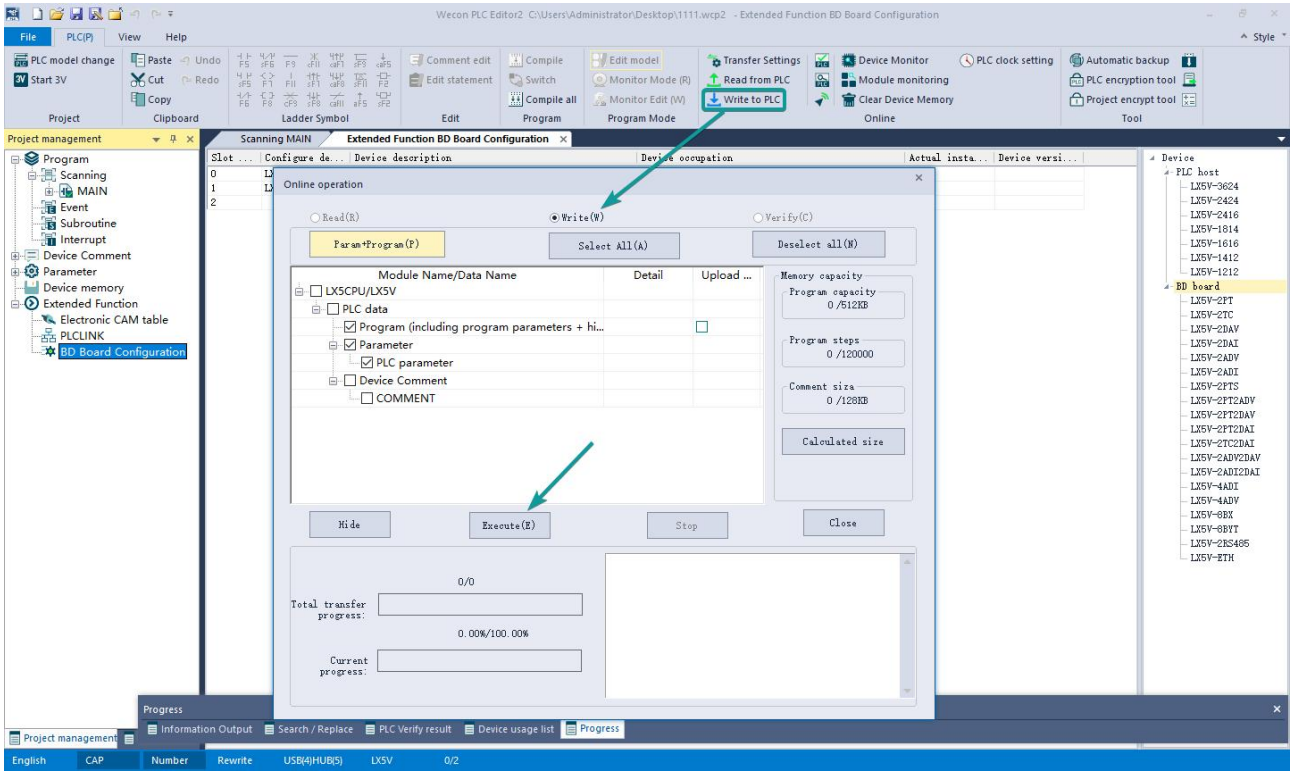
Suppose the gain is a, and the offset is b, then $\begin{cases} 2000 = 1970 * a + b \\ 0 = 30 * a + b \end{cases}$,

Solve and get $\begin{cases} a = 1.030928 \\ b = -30.92784 \end{cases}$ The calibration can be completed by setting the corresponding gain offset to the current channel.

3、Set I/O mapping. The channels are mapped to R device according to the current number of BD module channels by default. As shown in the following figure, BD module CH1 to CH2 is mapped to device R0 to R1.

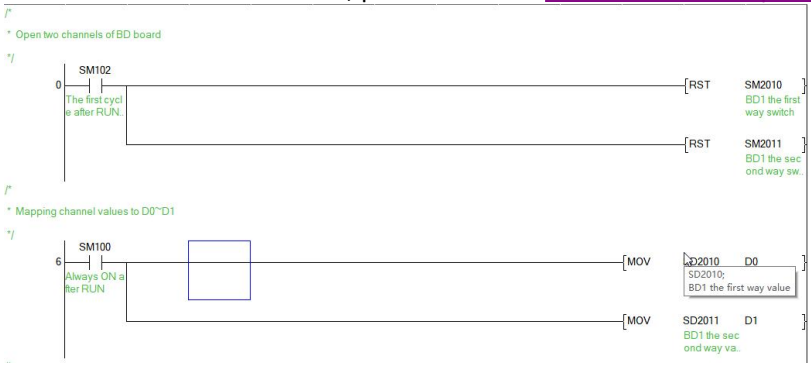


4、After the above configuration is completed, check the program, download the configuration to PLC, and STOP→RUN configuration takes effect.



6.2 Ladder Diagram

1、Programming example that does not use the host computer software "BD module configuration" function. For device allocation, please refer to "5 PLC device description".



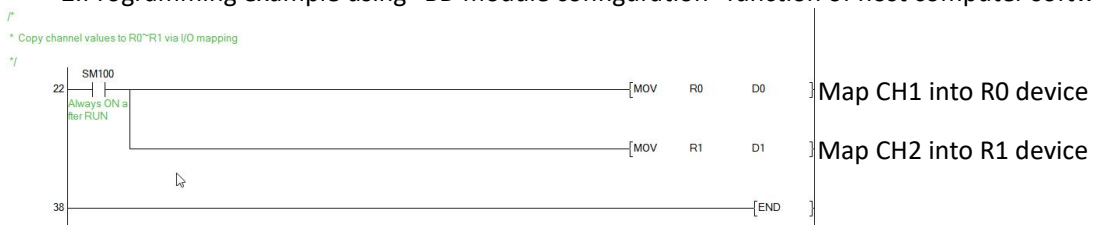
Turn on the CH1 current input channel

Turn on the CH2 current input channel

Write the digital value of CH1 to register

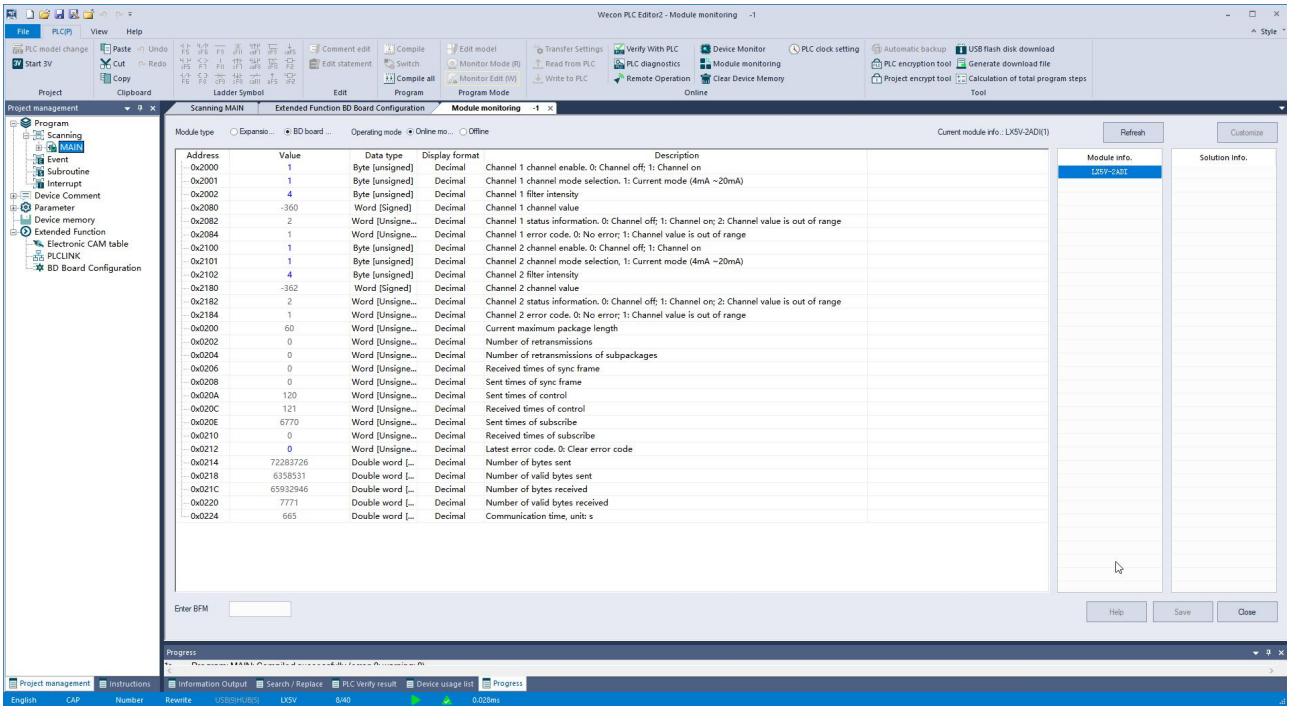
Write the digital value of CH2 to register

2.Programming example using "BD module configuration" function of host computer software:



6.3 BD monitoring interface and buffer memory

Open the module monitoring interface, select BD module, select LX5V-2ADI from the list of BD modules on the right to monitor it online, and check the current BD module communication status and error information in time.



① 2ADI buffer memory (BFM): Used for 2ADI-BD module status monitoring.

BFM address	Power off hold	Read-write Function	Memory name	Default	Range	Description
0x2000	×	R/W	Channel 1 channel enable	1	0 to 1	0: Channel closed; 1: Channel open
0x2001	×	R/W	Channel 1 channel mode selection	1	1	1: Current mode (4mA to 20mA)
0x2002	×	R/W	Channel 1 filter intensity	4	0 to 9	0: Minimum filter strength; 9: Maximum filter strength
0x2080	×	R	Channel 1 channel value	0	0 to 2000	
0x2082	×	R	Channel 1 status information	0	0 to 2	0: Channel closed; 1: Channel opened 2: Channel value exceeds the range
0x2084	×	R	Channel 1 error code	0	0 to 1	0: No error; 1: Channel value exceeds the range
0x2100	×	R/W	Channel 2 channel enable	1	0 to 1	0: Channel closed; 1: Channel open
0x2101	×	R/W	Channel 2 channel mode selection	1	1	1: Current mode (4mA to 20mA)
0x2102	×	R/W	Channel 2 filter intensity	4	0 to 9	0: Minimum filter strength; 9: Maximum filter strength

BFM address	Power off hold	Read-write Function	Memory name	Default	Range	Description
0x2180	×	R	Channel 2 channel value	0	0 to 2000	
0x2182	×	R	Channel 2 status information	0	0 to 2	0: Channel closed; 1: Channel opened 2: Channel value exceeds the range
0x2184	×	R	Channel 2 error code	0	0 to 1	0: No error; 1: Channel value exceeds the range

② Universal buffer memory (BFM): used to diagnose the communication status of the currently connected BD module.

BFM address	Power-off hold	Read-write Function	Memory name	Default	Range	Description
0x200	×	R	Current maximum package length	0	0 to 0xFFFF	The maximum length of the currently sent package
0x202	×	R	Number of retransmissions	0	0 to 0xFFFF	Number of retransmissions
0x204	×	R	Number of retransmissions of subpackages	0	0 to 0xFFFF	Number of retransmissions of subpackages
0x206	×	R	Received times of sync frames	0	0 to 0xFFFF	Received times of sync frames
0x208	×	R	Sent times of sync frames	0	0 to 0xFFFF	Sent times of sync frames
0x20A	×	R	Control the number of transmissions	0	0 to 0xFFFF	Control the number of transmissions
0x20C	×	R	Control the number of receptions	0	0 to 0xFFFF	Control the number of receptions
0x20E	×	R	Number of subscriptions sent	0	0 to 0xFFFF	Number of subscriptions sent
0x210	×	R	Number of subscriptions received	0	0 to 0xFFFF	Number of subscriptions received
0x212	√	R/W	Latest error code	0	Only 0 can be written.	Protocol internal error code, write 0 to clear
0x214	×	R	Number of bytes sent	0	0 to 0xFFFFFFFF	Number of bytes sent
0x218	×	R	Number of valid bytes sent	0	0 to 0xFFFFFFFF	Number of valid bytes sent
0x21C	×	R	Number of bytes received	0	0 to 0xFFFFFFFF	Number of bytes received
0x220	×	R	Number of valid bytes received	0	0 to 0xFFFFFFFF	Number of valid bytes received
0x224	×	R	Communication time (unit s)	0	0 to 0xFFFFFFFF	Normal communication time since the BD module is powered on