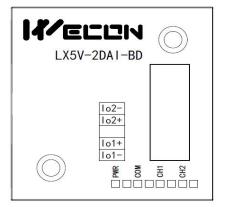


# LX5V-2DAI-BD BD Module Manual

## **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 module 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:
  - When DAI current is output, ensure that the external load resistance is less than 500Ω. If the external load resistance is greater than 500Ω, the output current will be lower than normal value.
  - 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



 Current output range: 4mA to 20mA

 lo2 Channel 2 sensor signal output negative

 lo2+
 Channel 2 sensor signal output positive

 lo1+
 Channel 1 current output positive

 lo1 Channel 1 current output negative

Table1Terminal distribution

#### Table2 LED lamp function description

Indicator lamp	Description
PWR	ON when power-on (when the program is running, it will be ON).
СОМ	It flashes when communicating with PLC normally, and it is OFF when timeout.
CH1	Channel 1 lamp: Set the digital value Oto 2000 (4mA) to 20mA) to be always on; Flashes outside the digital value 0 to2000 (4mA to 20mA). When the channel is open, the light is on, and the current is output; When the channel is closed, the light is off, and the current is not output (approaching 0).
CH2	Channel 2 lamp: Set the digital value 0to 2000 (4mA) to 20mA) to be always on; Flashes outside the digital value 0 to2000 (4mA to 20mA). When the channel is open, the light is on, and the current is output; When the channel is closed, the light is off, and the current is not output (approaching 0).



## **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
Project	Current output
Analog output range	DC 4mA to 20mA (external load resistance $\leq$ 500 $\Omega$ )
Digital output	12-bit binary
Resolution	8uA (4mA to 20mA/2000)
Comprehensive precision	±1% of full scale (4mA to 20mA: ±0.16 mA)
D/A conversion time	One scan cycle (D/A conversion after ladder diagram END instruction is executed, and BD channel output value is updated)
Output features	External load is 250Ω. 0 to 2000 was converted to 4mA to 20mA Analog output 4mA 0 Digital input
Insulation	There is no insulation between the channels of the module
Points occupied	0 point (2DA is not affected by the standard maximum control points of the main PLC because it is operated through the data register)



## 4 Wiring



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

#### Note:

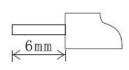
- Do not place signal cables near high voltage power cables or in the same trunk line. Otherwise, it may be disturbed or surged. Keep a safe distance between signal cable and power cable, at least 100mm.
- Ground the shielding of shielded wire or shielded cable. But the ground point and high voltage 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.

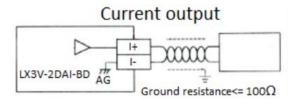
#### Line number and cross-sectional area

Line number	Cross-sectional area (mm²)	End processing
AWG26	0.1288	Stranded cable: Strip off the sheath, rub the core wire,
		and then connect the cable.
AWG16	1.309	Single-core cable: Strip off the sheath and connect the cable.



## 4.2 I/O Mode

Current output 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

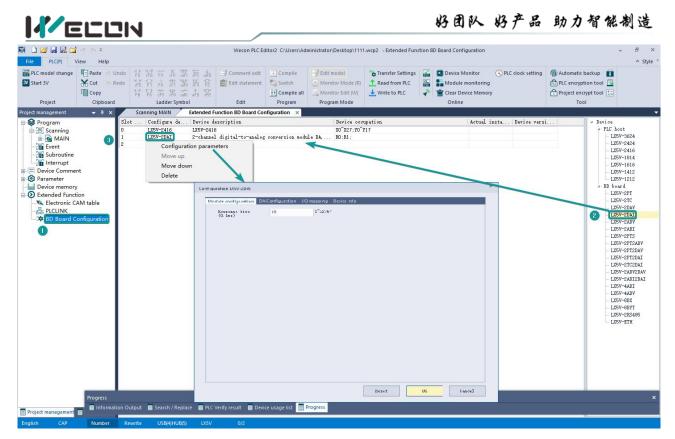
PLC model	BD Model	Devices	Expansion port 1 description	Devices	Expansion port 2 description
		SM2010	CH1 current output channel open flag OFF: Open ON: Close	SM2030	CH1 current output channel open flag OFF: Open ON: Close
LX5V	2DAI	SM2011	CH3 current output channel open flag OFF: Open ON: Close	SM2031	CH3 current output channel open flag OFF: Open ON: Close
	SD2010		CH1 digital value (0 to 2000: 4mA to 20mA)	SD2030	CH1 digital value (0 to 2000: 4mA to 20mA)
		SD 2011	CH2 digital value (0 to 2000: 4mA to 20mA)	SD2031	CH2 digital value (0 to 2000: 4mA to 20mA)

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

## 6 Instructions

## 6.1 Parameter configuration

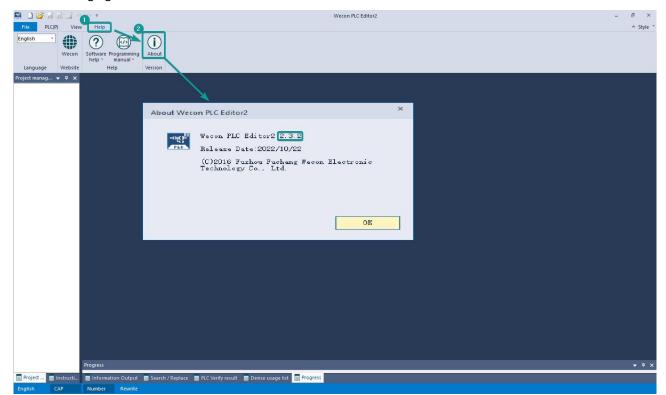
- Open the host computer software and create a new project, in "Project Manager" → "Extended Function", double-click "BD Module Configuration" Note to enter "BD settings" interface;
- (2) Configure the currently connected PLC (take the LX5V-2416 model as an example) and BD module model on the BD module configuration interface: Select "LX5V-2DAI" 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-2DAI-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 software versions: Wecon PLC Editor2 2.1.204 and above, as shown in the following figure:



(2) Supported PLC firmware: 2.051 and above, as shown in the following figure:

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File PLC(P) V	View Help				0					≜ Style *	
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Project	Clipboard	Ladder Symbol	Edit	Program	Program Mode		Online		Tool		
Project manag Co	mmunication setting	IS				×					
	OUSB Connection	(Best to use well-shielded	l cable)							×	
						Device Info					
	USB port	No device detected.		•	Communication test	-				_	
					4	Paramete		Value			
	OEthernet conne	ation			(i)		e version infor			<u> </u>	
	O'Ethernet ovide	otion			OK	PLC n		LX5V-2416M			
							are version number	V2.061			
	NIC selection	Realtek PCIe GbE Family Cont	roller	- 0			are version number		02278730DE9C8C3BDC24D		
							ot Unique ID stion time	2020.09.09			
			Device Info				20122108				
	IP address Devices sea		Devices sea	rch			BD board configuration information     BD1 actual installation type     LX5V-2DAV				
							ersion	1013			
	( Serial connect				P 6		ersion ctual installation				
	<ul> <li>Serial connect</li> </ul>	1 on.			Close		ersion	1013			
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						Rever	se input	16			
						Mask		0			
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(3) Supported BD module version number: 1013 and above, as shown in the following figure:

Slot	Configure de	Device description	Device occupation	Actual insta	Device versi
0	LX5V-2416	LX5V-2416	X0~X27; Y0~Y17	LX5V-2416MT	V2.061
1	LX5V-2DAI	2-channel digital-to-analog conversion module DA	R0; R1;	LX5V-2DAI	1013
2					



## The parameter configuration interface is as below:

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).

lodule configuration	DAIConfiguration	I/O mapping Device	nfo		

#### 2、 DAI configuration:

Channel-1	16	Channel-2					
🗹 Enable channel		🗹 Enable channel					
Conversion mode	4mA~20mA(0~2000) -	Conversion mode	4mA~20mA(0~2000) *				
Output status aft	er stopping	Output status after stopping					
○Reserved ○Default value		○Reserved ○Default value					
🗌 Enable calibrati	ion	Enable calibration	n				
Gain	1.000000 -10000.0~10000.0	Gain	1.000000 -10000.0~10000.0				
offset	0,000000 -10000.0~10000.0	offset	0.000000 -10000.0~10000.0				

- ① Check enable channel to set whether to enable the current BD module channel.
- (2) The conversion mode is set to DAI conversion mode by default, and the measurement range is 4mA~20mA (0~2000).
- ③ Output state after stop: When PLC stops, the output state of BD module channel mainly includes the following three types:

Output clear: When PLC stops, the output current of BD module channel is 4mA

Output hold: When PLC stops, the channel output of the BD module maintains the digital current value set by the corresponding channel in the current I/O mapping device.

Output preset value: When PLC stops, BD module channel outputs preset digital value or preset analog quantity corresponding to the current value.



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

Channel input digital value = actual output current corresponds to 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 digital value is 0, the multimeter measures the output current of BD module channel to be 5mA (corresponding digital value is 125).
  - When the channel input digital value is 2000, the multimeter measures the output current of BD module channel to be 5mA (corresponding digital value is 1875).

$$0 = 125 * a + b$$
  
2000 - 1875 \*  $a + b$ 

Suppose the gain is a, and the offset is b, then  $\lfloor 2000 = 1875 * a + b \rfloor$ ,

$$\begin{cases} a = 1.142857 \\ 1.142.057 \end{cases}$$

Solve and get  $\lfloor b = -142.857$  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.

Module configuration DAIConfiguration I/O mapp	Device Info	
Channel mapping element	Channel	
4		
— RO	CH1	
— R1	CH2	

4. After the above configuration is completed, check the program, download the configuration to PLC, and STOP $\rightarrow$ RUN configuration takes effect.

📓 🗅 💕 🖬 🔍 🖆	<i>⊨</i> ) (> ∓			Wecon PLC Ed	litor2 C:\Users\Admir	nistrator\Desktop\11	11.wcp2 - Exte	nded Function B	D Board Configuration			- 8 ×
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## 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 "<u>5 PLC device description</u>".

/* Open bd board 2 channels */ 0 SMIQ2 The firs t cycl.		—{RST	SM2010 BD1 the f	Turn on the CH1 current output channel
		{RST	SM2011 BD1 the s econd w.	Turn on the CH2 current output channel
/* * Channel values are mapped to D0°D1				
*/ 6 SM100 8 Always 0 N afte.	-{Moa	SD2010 BD1 the irst wa.		Write the value in D0 to CH1
	{moa	SD2011 BD1 the econd w.		Write the value in D1 to CH2
2、 Programming example using "BD module co	onfigu	ration	" funct	ion of host computer software:
* BD board channel values are mapped to R0 R1 via I/O				

* BD board channel values are mapped to $\rm RO\tilde{R}l$ via I/O				
*/ 22	{mov	DO	RO } The first channel	Set the digital value in D0 to CH1 mapping
	{moa	D1	R1 } The secon d channel	Set the digital value in D1 to CH2 mapping

## 6.3 BD monitoring interface and buffer memory

Open the module monitoring interface, select BD module module, select LX5V-2DAI 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.

Start 3V	Cut (* Redo	H H C> I H dFS F1 FII d		Comment edit	Compile Switch	() Mo	model nitor Mode (R) nitor Edit (W)	Transfer Setting		Device Monitor Module monitoring Clear Device Memor		PLC encryp		
Project	Clipboard	Ladder	r Symbol	Edit	Program	Prog	ram Mode			Online		To	ol	
t management	🔹 🕂 🗙 🥖	Scanning MAIN	Module mor	nitoring -6 ×								<u> </u>		
Program E Scanning	м	odule type 🔿 E	xpans 🖲 BD bo	oa Operating mode	g 💿 Onli	ne OOff	line	(	Surrent m	odule info.: LX5V-2D	AI (1)	Refresh		Custoni
Event		Address	Value	Data		splay format				escription	^ Modul	e info.	Solut	tion Info.
Subroutine		0x2000	1	Byte [un:		Decimal		annel enable. 0: C			LX5V-	2DAI		
Interrupt		0x2001	1	Byte [un:		Decimal				urrent output Mode (				
Device Commen	it 👘	0x2003	0	Byte [un:		Decimal				Output cleared; 1: Out	tp			
Parameter		0x2004	0	Word [S	igned]	Decimal	Channel 1 ou	tputs preset value	. Range	[-32768, 32767]				
Device memory		0x2080	32767	Word [S	signed]	Decimal	Channel 1 Ch	annel Value. Rang	e [0, 200	0], only support the s	e			
Extended Function		0x2082	2	Word [U	nsigne	Decimal	Channel 1 sta	tus information. 0	: Channe	l off; 1: Channel on; 2	:1			
Electronic CA	M table	0x2084	1	Word [U	nsigne	Decimal	Channel 1 er	or code. 0: No er	ror; 1: Th	e set channel value is	5 (			
BD Board Co	C	0x2100	1	Byte [uns	signed]	Decimal	Channel 2 ch	annel enable. 0: C	nannel of	f; 1: Channel on				
- A BD Board Co	onfiguration	0x2101	1	Byte [un:	signed]	Decimal	Channel 2 Ch	annel Mode Selec	tion, 1: C	urrent Output Mode	(4			
		0x2103	0	Byte [un:	signed]	Decimal	Output statu	after channel 2 s	tops. 0: 0	Output cleared; 1: Out	tp			
		0x2104	0	Word [S	igned]	Decimal	Channel 2 ou	tputs preset value	Range	[-32768, 32767]				
		0x2180	32767	Word [S	igned]	Decimal	Channel 2 Ch	annel value. Rang	e [0, 200	], only support the s	et			
		0x2182	2	Word [U	nsigne	Decimal	Channel 2 sta	tus information. 0	: Channe	l off; 1: Channel on; 2	:1			
		0x2184	1	Word [U	nsigne	Decimal	Channel 2 er	or code. 0: No er	ror; 1: Th	e set channel value is	5 (			
		0x0200	59	Word [U	nsigne	Decimal	Current maxi	num package len	gth					
		0x0202	0	Word [U	nsigne	Decimal	Number of r	transmissions	-					
		0x0204	0	Word [U	and the second second second	Decimal	Number of r	transmissions of	subpack	ages				
		0x0206	0	Word [U		Decimal		es of sync frame						
		0x0208	0	Word [U	nsiane	Decimal	Sent times of	sync frame						
		0x020A	1434	Word [U		Decimal	Sent times o							
		0x020C	1435	Word [U		Decimal	Received tim							
		0x020E	0	Word [U		Decimal	Sent times o	subscribe						
		0x0210	59028	Word [U		Decimal		es of subscribe						
		0x0212	0	Word [U		Decimal		ode. 0: Clear erro	r code					
		0x0214	57545294	Double v	and a state of the	Decimal	Number of b							
		0x0218	48459	Double v		Decimal		lid bytes sent						
		4									¥			
		•												
	E	nter BFM										felp	Save	Close

(1) DAI buffer memory (BFM): used for BD module status monitoring.

BFM Power Addres -off Read/ s hold write Memory name	Default Range	Description
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			Channel 1 channel			
0x2000	×	R/W	enable	1	0 to 1	0: Channel closed; 1: Channel open
0x2001	×	R/W	Channel 1 channel mode selection	1	1	1: Current output mode (4mA to 20mA)
0x2003	×	R/W	Output status after channel 1 stops	0	0 to 2	0: Output cleared; 1: Output held 2: Output preset value
0x2004	×	R/W	Channel 1 output preset value	0	-32768 to 32767	
0x2080	×	R	Channel 1 channel value	0	0 to 2000	Only supported in channel mapping device setting
0x2082	×	R	Channel 1 status information	1	0 to 2	<ul><li>0: Channel closed; 1: Channel</li><li>opened</li><li>2: Channel value exceeds the range</li></ul>
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 output mode (4mA to 20mA)
0x2103	×	R/W	Output status after channel 2 stops	0	0 to 2	0: Output cleared; 1: Output held 2: Output preset value
0x2104	×	R/W	Channel 2 output preset value	0	-32768 to 32767	
0x2180	×	R	Channel 2 channel value	0	0 to 2000	Only supported in channel mapping device setting
0x2182	×	R	Channel 2 status information	1	0 to 2	<ul><li>0: Channel closed; 1: Channel</li><li>opened</li><li>2: Channel value exceeds the range</li></ul>
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 Functi on	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 frame	0	0 to 0xFFFF	Received times of sync frame
0x208	×	R	Sent times of sync frame	0	0 to 0xFFFF	Sent times of sync frame
0x20A	×	R	R Control the number of transmissions		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	v	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	0	0 to 0xFFFFFFFF	Number of valid bytes received

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			received			
0x224	×	R	Communication time (unit s)	0	0 to 0xFFFFFFFF	Normal communication time since the BD module is powered on