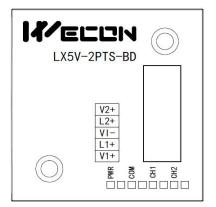


# LX5V-2PTS-BD BD Module Manual

### **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:
  - 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



2-wire/3-wire PT100 thermal resistance					
V2+	Channel 2 sensor signal input V positive				
L2+	Channel 2 sensor signal input L positive				
VI-	Sensor common pole				
L1+	Channel 1 sensor signal input L positive				
V1+	Channel 1 sensor signal input V positive				

Table1 Terminal distribution

#### Table2 LED lamp function description

Indicator Iamp	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: Always on in range; Flashing outside the range of -190 $^\circ\!C$ to600 $^\circ\!C$ ; Off when the channel is closed.
CH2	Channel 2 lamp: Always on in range; Flashing outside the range of -190 $^\circ\!C$ to600 $^\circ\!C$ ; Off when the channel is closed.

Note: The recommended range is -190  $^{\circ}$ C to 600  $^{\circ}$ C), and the maximum display range is -200  $^{\circ}$ C to 610  $^{\circ}$ C.



# **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	Description					
Power supply	24VDC±10%, 50mA; 5VDC±10%, 70mA (The power supply is provided internally by host)					
Analog input signal	Platinum thermal resistance PT100 sensor (100 $\Omega$ ), 3-wire 2-channel (CH1, CH2)					
Sensor current	1mA					
Compensation range	-190 °C to 600 °C (recommended range) Over range display: 32767					
Digital output	-2000to6100 (unit 0.1 $^\circ C$ )—"maximum display ran	nge"				
Measurement accuracy	16-bit conversion 15 data bits +1 sign bit					
Measurement accuracy	0.05℃					
Total accuracy	Full range ±0.5% (compensation range)					
Conversion speed	2 channels 50ms					
Conversion features	+6000 190 °C -1900 → T	Digital output +600°C remperature input				



#### 4 Wiring

#### Wiring instructions:

- (1) 2-wire PT100: When using channel 1, V1+ and L1+ are shorted with wires, and the two leads of the sensor are connected to L1+ and VI- respectively. Similarly, when using channel 2, V2+ and L2+ are shorted with wires, and the two leads of the sensor are connected to L2+ and VI- respectively.
- (2) 3-wire PT100: When using channel 1, two leads of the same color are connected to L1+ and V1+ respectively, and the other lead of different color is connected to VI-. Channel 2 is connected in the same way.

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.
- Never weld any cable ends. Ensure that the number of connecting cables does not exceed the designed number of units.
- Do not connect cables whose dimensions are not allowed to avoid poor contact or damage to products.
- 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

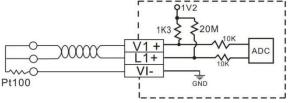
- (1) AWG25-16 is used for connection with output device.
- (2) Maximum terminal tightening torque is 0.5N.m to 0.6N.m.
- (3) Using different types of cables may cause poor contact with terminals. Please use pressfit terminals for good contact.

#### 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,	61
		and then connect the cable.	K
AWG16	1.309	Single-core cable: Strip off the sheath and connect the cable.	

#### 4.2 I/O Mode

Thermal resistance PT100 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	Devices	Expansion port 1 description	Devices	Expansion port 2 description
		SM2010	CH1 thermal resistance input channel open flag OFF: Open ON: Close	SM2030	CH1 thermal resistance input channel open flag OFF: Open ON: Close
LX5V	2PTS	SM2011	CH2 thermal resistance input channel open flag OFF: Open ON: Close	SM2031	CH2 thermal resistance input channel open flag OFF: Open ON: Close
		SD2010	CH1 temperature at 0.1 $^\circ\!C$ unit (-190 $^\circ\!C$ to 600 $^\circ\!C$ : -1900to6000)	SD2030	The temperature of CH1 at 0.1°C (-190°C to 600°C: -1900to6000)
		SD2011	The temperature of CH2 at 0.1°C (-190°C to 600°C: -1900to6000)	SD2031	The temperature of CH2 at 0.1℃ (-190℃ to 600℃: -1900to6000)

(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 for use

#### 6.1 Parameter configuration

- (1) Open the host computer software and create a new project, double-click "Project Manager"  $\rightarrow$  "Extended Function"  $\rightarrow$  "BD Module Configuration" <sup>Note</sup>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-2PTS" 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-2PTS-BD configuration parameters interface, as shown in the following figure. Configure related parameters on this interface.

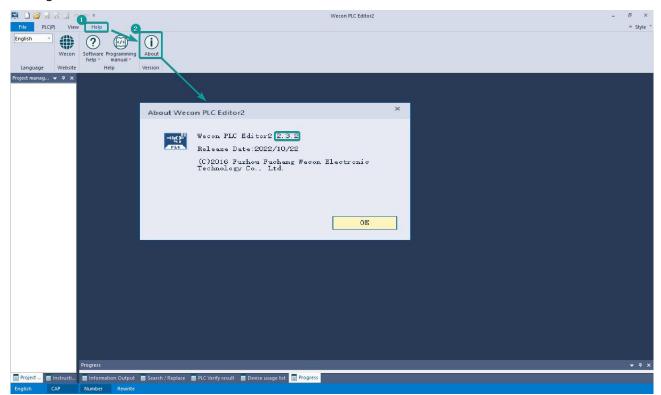


PLC(P) View						Wecon PLC	Editor2 - Extended Funct	on BD Board Configuration	n			
model change	Paste - Undo Cut (~ Redo Copy Clipboard	HF 合計数器 合計数数数 Ladder Symbol	i afs afe ol Edit	Switch	Edit model Monitor Mode (R) Sa Monitor Edit (W) Program Mode	↑ Read from PLC ↓ Write to PLC		Device Monitor Module monitoring		Automatic backup II USB fissh disk download PLC encryption tool II Generate download file Project encrypt tool II Cakulation of total program steps Tool		~
anagement	• * ×		Extended Function BD Board	Configuration ×	Module monitoring	-1						
rogram Scanning		Slot num Configure devico LX5V-2416	e Device description 35V-2416						ice occupation X27:Y0~Y17	Actual installatio Device version	n	
MAIN		LX5V-2416	2-channel temperature module					BOR			- LX5V-3624	
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Subroutine				Move up							- LX5V-2416 - LX5V-1814	
Interrupt				Move do	wn	Configuration	0 1 1 51/ 2015			×	- LX5V-1616	
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											- LX5V-2TC2DAI	
											- LX5V-2ADV2DA	
									Da		<ul> <li>LX5V-2ADI2DAI</li> <li>LX5V-4ADI</li> </ul>	
									P0.		- LX5V-4ADV	
											- LX5V-8BX	
											- LX5V-8BYT - LX5V-2RS485	
											LX5V-2HS485	
											- conem	
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	1	Program: MAIN: 0 Success: 1; Fai	Compiled successfully (error.	0; warning: 0)	-							
	* *	ouccess. I: Fai	IUID. U									
	Instructions		Search / Replace 🛛 PLC Verif									-

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: 2.061 and above, as shown in the following figure:

中operation     計算業業業論論:     通Compile all     Monitor Edit Life     Write to PLC     管 Clear Device Memory     Project encrypt tool Edit       Project     Clipboard     Ladder Symbol     Edit     Program     Program     Online     Tool	🛤 🗋 🗃 🗟 🖆	-1 (> <del>+</del>				Wecon PLC E	ditor2				- 8	×
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		The second s										

(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-2PTS	2-channel temperature module	R0;R1;	LX5V-2PTS	1013
1					



#### 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).

guration LX5V-2PTS		
lodule configuration PT	SConfiguration I/O mapping Device Info	
Response time (0.1ms)	10 1~32767	

#### 2、 PTS configuration:

	TSConfiguration I/O m	napping Device	e Info		
Channel-1			Channel-2		
Enable channel			Enable channel		
Sensor type	PT100		Sensor type	PT100	٣
Filtering intensity	4	*	Filtering intensity	4	*
Enable overrun detec	tion		Enable overrun detect	tion	
Upper temperature limit	6100 -2000~61	00	Upper temperature limit	6100	-2000~6100
(0.1°C) Lower temperature limit	-2000 -2000~61	00	(0.1°C) Lower temperature limit	-2000	-2000~6100
(0 1℃) Enable temperature ca	alibration		(0 1°C) Enable temperature ca	alibration	
Temperature gain	1.000000 -10000.07	~10000.0	Temperature gain	1.000000	-10000.0~10000.0
Temperature offset	0.000000 -10000.01	10000.0	Temperature offset	0.000000	-10000.0~10000.0
			2		

- ① Check enable channel to set whether to enable the current BD module channel.
- ② Sensor type: PT100 by default.
- 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 overrun detection to judge that when the upper and lower limits of temperature exceed the current setting temperature, the host computer will prompt an error.
- (5) Check enable calibration, you could calculate the gain offset according to the following formula to convert the corresponding channel value:



Channel value = actual temperature value × gain value + offset value

When the channel value deviates from the actual temperature value, the channel can be calibrated by setting the gain offset, for example:

- The input temperature of control channel is 0°C, the value of acquisition channel is 30 (unit: 0.1°C), and the actual channel value should be 0 (unit: 0.1°C).
- The input temperature of control channel is 500°C, the value of acquisition channel is 5200 (unit: 0.1°C), and the actual channel value should be 5000 (unit: 0.1°C).

$$(0 = 30*a + b)$$

Suppose the gain is a, and the offset is b, then  $\int 5000 = 5200^* a + b$ .

$$\int a = 0.967118$$

Solve and get  $\lfloor b = -29.0135$  The calibration can be completed by setting the corresponding gain

offset to the current channel.

Note: Using gain and offset calibration can only reduce the linear error. Since the PT100 resistance and temperature curve are nonlinear, there is still a certain error in partial temperature after the calibration is successful.



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 PTSConfiguration	I/O mapping Device Info	
Channel mapping element	Channel	
4		
- R0	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.

🛒 🗋 🚰 🛃 🖾 🖆 🔿 🗠 =	Wecon PLC Ed	itor2 C:\Users\Administrator\Desktop\1	111.wcp2 - Exten	ded Function BD Board Configuration		_ 8 ×
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	たいは、 新聞では Edit statement 日本は、 語合い Edit statement	Compile Edit model Switch Compile all	677 m	m PLC 🔐 👫 Module monitoring	1	∰ Automatic backup III
Project Clipboard	Ladder Symbol Edit	Program Program Mode		Online		Tool
	ing MAIN Extended Function BD Board Con			New Jose		-
Program     Slat     C     C     Program     Sundig     MAIN     Event     Subroutine     minterrupt     Device Comment     Device memory     Detended Function     Extended Function     Seteronic CAM table     Program     Device memory     Detended Function     Seteronic Configuration	Online operation	Write(W)     Select All(A)  me     Detail  m parameters + hi  pute(E)     S	Lop	Varify(C) Jeselect all(N) Mmory capacity Program stops 0 /120000 Coment siza 0 /12035 Calculated size Close	nsta	- FLC hast - FLC hast - FLC hast - LES9284 - LES9284 - LES9184 - LES1814 - LES1814 - LES1814 - LES1814 - LES1814 - LES1814 - LES2112 - BD basd - LES2114 - LES212 - LES2
Progress	5					×
Project management	🛿 Search / Replace 🛛 PLC Verify result 📄 Devic	e usage list Progress				
English CAP Number Rewrite	USB(4)HUB(5) LX5V 0/2					

#### 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".[Write] 0123456789101112

/*					
* Open two o	channels of BD board				
*/	SM102 The first cycl o other RUN.		[RST	SM2010 BD1 the first way switch	Open CH1 thermal resistance input
			-{RST	SM2011 BD1 the sec ond way sw.	Open CH2 thermal resistance input
/*				ond way sw	
* Mapping c	hannel values to D0°D1				
*/	SM100 	-[MOV	SD2010 BD1 the first way value	D0	Write the digital value of CH1 to register
		-[MOV	SD2011 BD1 the sec ond way va.		Write the digital value of CH2 to register
22	La La			-{END	

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

* Copy channel values to R0	~R1 via I/O mapping				
*/ 22 SM100 Always ON a fter RUN		[MOV	R0	D0 ]	Map CH1 into R0 device
		[MOV	R1	D1 ]	Map CH2 into R1 device
38				[END ]	

#### 6.3 BD monitoring interface and buffer memory

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

model change Paste - 1 U t 3V Cut (~ R Copy Project Clipboard	do do do do do do do do do do do do do d	調査 計 <b>創</b> Edit : 読 計 記		all	model Por Transfer Setting: Werky With PCC Device Monitor C PLC dock setting for Mode () Por Transfer Setting: RC diagnostics C PCC dock setting tor Edd (W)	Automatic backup USB flash disk download DRC encryption tool Generate download file Therefore the calculation of total program steps Tool		
anagement 😽 🖶 🛪	Scanning MAIN	Extended Function	BD Board Configuration	Module	e monitoring -1 ×		(	
rogram { Scanning	Module type O Exp	paneio 💿 BD board	Operating mode   Or	line mo Off	fine	Current module info :: LX5V-2PTS(1)	Refresh	Cust
MAIN Event	Address	Value	Data type	Sisplay format	t Description		Module info.	Solution Info
Subroutine	- 0x2000	1	Byte [unsigned]	Decimal	Channel 1 channel enable. 0: Channel off; 1: Channel on		LX5Y-2PTS	30101011110
Interrupt	0x2001	0	Byte [unsigned]	Decimal	Channel 1 sensor type, 0: PT100			
Device Comment	-0x2002	4	Byte [unsigned]	Decimal	Channel 1 filter intensity			
arameter	- 0x2080	32767	Word [Signed]	Decimal	Channel 1 channel value, unit: 0.1℃			
levice memory	- 0x2082	2	Word [Unsigne	Decimal	Channel 1 status information. 0: Channel off; 1: Channel on; 2: Channel value is out of range			
xtended Function	- 0x2084	1	Word [Unsigne	Decimal	Channel 1 error code. 0: No error; 1: Channel value is out of range			
Electronic CAM table	- 0x2100	1	Byte [unsigned]	Decimal	Channel 2 channel enable. 0: Channel off; 1: Channel on			
BD Board Configuration	-0x2101	0	Byte [unsigned]	Decimal	Channel 2 sensor type, 0: PT100			
Bo Board Comiguration	-0x2102	4	Byte [unsigned]	Decimal	Channel 2 filter intensity			
	- 0x2180	32767	Word [Signed]	Decimal	Channel 2 channel value, unit: 0.1°C			
	- 0x2182	2	Word [Unsigne	Decimal	Channel 2 status information. 0: Channel off; 1: Channel on; 2: Channel value is out of range			
	- 0x2184	1	Word [Unsigne	Decimal	Channel 2 error code. 0: No error; 1: Channel value is out of range			
	- 0x0200	60	Word [Unsigne	Decimal	Current maximum package length			
	- 0x0202	0	Word [Unsigne	Decimal	Number of regarding solids			
	- 0x0204	0	Word [Unsigne	Decimal	Number of retransmissions of subpackages			
	0x0206	0	Word [Unsigne	Decimal	Received times of sync frame			
	- 0x0208	0	Word [Unsigne	Decimal	Sent times of sync frame			
	- 0x020A	46	Word [Unsigne	Decimal	Sent times of control			
	- 0x020C	47	Word [Unsigne	Decimal	Received times of control			
	- 0x020E	37315	Word [Unsigne	Decimal	Sent times of subscribe			
	0x0210	0	Word [Unsigne	Decimal	Received times of subscribe			
	- 0x0212	0	Word [Unsigne	Decimal	Latest error code. 0: Clear error code			
	- 0x0214	6731087	Double word [	Decimal	Number of bytes sent			
	- 0x0218	710302	Double word [	Decimal	Number of valid bytes sent			
	- 0x021C	6023467	Double word [	Decimal	Number of bytes received			
	0x0220	2702	Double word [	Decimal	Number of valid bytes received			
	- 0x0224	63	Double word [	Decimal	Communication time, unit: s			
	Enter 8FM						Help	Save Ck
	Progress							
	1> Program: MAIN	I: Generated						
	1> Program: MAIN	V: Compiled successful	lly (error: 0; warning: 0)					
	Success: 1; F	ailure: 0						

#### (1) PTS buffer memory (BFM): Used for BD module status monitoring.

BFM address	Power -off hold	Read/ write	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 sensor type	0	0	0: PT100
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	32767	-32768 to 32767	Unit: 0.1℃
0x2082	×	R	Channel 1 status information	1	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 sensor type	0	0	0: PT100
0x2102	×	R/W	Channel 2 filter intensity	4	0 to 9	0: Minimum filter strength; 9: Maximum filter strength
0x2180	×	R	Channel 2 channel value	32767	-32768 to 32767	Unit: 0.1°C

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0x2182	×	R	Channel 2 status information	1	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 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 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	٧	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