



LX3V-2PTS-BD

User manual



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1. Mounting instruction

Before the installation must be ensure that the PLC host and BD associated equipment power off. Please install the BD module in the corresponding position of the PLC, and lock the four standard screws. If environmental dust is bigger, please cover BD right part by PLC's cover. Please do not power operation.

Caution

1) This BD module only support the following firmware versions or later. Users can check the PLC firmware version in D8001.

- LX3VP:25106;
- LX3VE: 25205;
- LX3V-A2:25016;
- LX3V-A1: 22008;
- LX2V-A: 24007;
- LX3VM: 25302
- LX2E: 25015

When mounting module to PLC, PWR turn off and other lights are blinking after power ON PLC please purchase new PLC.

- 2) Please fixed BD module on the PLC, poor contact may lead to failure.
- 3) BD module and top cover of PLC's tightening torque is 0.3 ~ 0.6 N.m.

Warning

Make sure to power off the PLC before mounting or removing the BD module and put the cover in right place.

2. Special feature

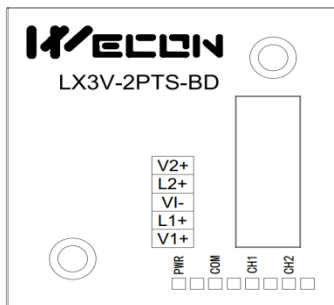
- 1) It adds two analog inputs (if access two BD modules can be increased 4 analog inputs). The module is mounted on top of PLC, so there is no need to change the PLC installation area.
- 2) Digital to analog conversion is performed by PT100 in LX3V-2PTS-BD, the suggestion temperature range is $-190^{\circ}\text{C} \sim 600^{\circ}\text{C}$ and the converted digital value is stored in a special registers. However, the characteristics of the analog to digital converter cannot be adjusted. The soft elements corresponding to the different expansion ports are also different. Address

assignment in the following table.

Extension port 1		Extension port 2 (near PLC LED)	
Address	Description	Address	Description
M8112	The flag of RTD type in CH1 OFF: RTD Type is PT100 ON: turn off	M8116	The flag of RTD type in CH1 OFF: RTD Type is PT100 ON: turn off
M8113	The flag of RTD type in CH2 OFF: RTD Type is PT100 ON: turn off	M8117	The flag of RTD type in CH2 OFF: RTD Type is PT100 ON: turn off
D8112	CH1's temperature at 0.1 °C units	D8116	CH1's temperature at 0.1 °C units
D8113	CH2's temperature at 0.1 °C units	D8117	CH2's temperature at 0.1 °C units

3. Dimension

Table 3-1



Sensor type: 2 or 3 wires PT100	
V2+	Second channel PT100 V signal (+)
L2+	Second channel PT100 L signal (+)
VI-	Common
L1+	First channel PT100 L signal (+)
V1+	First channel PT100 V signal (+)

LED lights indicating

- 1) PWR: ON when power ON, flicker when not calibrated
- 2) COM: flicker when communication work, OFF when timeout.
- 3) CH1: On indicates enable, flicker indicates exceeding the measurement range (-190 °C~ 600 °C).
- 4) CH2: On indicates enable, flicker indicates exceeding the measurement range (-190 °C~ 600 °C).

Note:

- 1) If the BD module is plugged into the PLC with old firmware version, all LEDs besides PWR in BD module will be flicker.
- 2) The recommended range is -190 °C ~ 600 °C, the maximum display range is -200 °C ~ 610 °C

4. Specifications

- 1) Please refer to the LX3V user manual for the general specification of LX3V-2PTS-BD.
- 2) LX3V-2PTS-BD is powered supply by LX3V main unit.

Table 3-2

Item	Explanation
Analog circuitry	DC 24V \pm 10%, 50mA
Digital circuitry	DC 5V, 90mA (From the PLC internal power supply)
Celsius	Read data by buffers
Analog input signal	PT100 sensor, 3 wires, 2 channels (CH1, CH2)
Sensor current	1mA, 100 Ω , (PT100)
Compensation range	-190 °C - 600 °C (Out of range display 32767)
Digital output	-2000 - 6100
	16 bits total, 15 bits for data and 1 bit for sign
Accuracy	0.05 °C
Overall accuracy	\pm 0.5% of the full range (compensation range)
Conversion rate	50ms
Conversion characteristics	<p>The graph illustrates the conversion characteristics of the device. The horizontal axis represents the Temperature input in degrees Celsius, ranging from -190 to +600. The vertical axis represents the Digital output, ranging from -1900 to +6000. A straight line is plotted, passing through the origin (0,0). The line shows a linear relationship between temperature and digital output. Key points on the line are marked: at -190 °C, the digital output is -1900; at 0 °C, the digital output is 0; and at +600 °C, the digital output is +6000. Dotted lines connect these points to their respective values on the axes. An arrow labeled 'Temperature input' points to the x-axis, and an arrow labeled 'Digital output' points to the y-axis.</p>

5. Wiring

Explanation:

- 1) 2-wire PT100: when using channel 1, short-circuit L1+ and V1+, connect PT100's 2 wires to L1+ and VI- respectively. The same wiring in channel 2.
- 2) 3-wire PT100: when using channel 1, two same color wires, connected to the L1+ and V1+, the third one connect to VI-. The same wiring for channel 2.

Warning:

Make sure cut off the electricity before installation/disassembly, to prevent electric shock or product damages.

Caution:

- 1) Stay away from high-voltage cables to avoid interference or surge;
- 2) Grounding is required, but please do not share the ground site with high-voltage cable;
- 3) Do not weld any cable ends, and make ensure that the number of connecting cables, no more than a predetermined number;

5.1 Suitable cable

Use AWG25-16 to connect the output equipment

The maximal screwing torque is from 0.5 to 0.6N.m

Table 3-3

Line type	Cross sectional area(mm ²)	End-of-pipe treatment	
AWG26	0.1288	Stranded cable: stripped jacket, rub Conductor, then connect the cable.	
.....	Conductor, then connect the cable.	
AWG16	1.309	Single-core cable: stripped jacket, Then connect the cable.	

5.2 Input mode

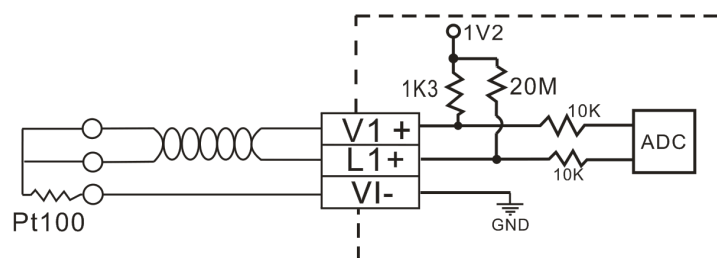


Figure 3-1

6. Examples

The value of each channel's PT100 is storage in the registers (D8112, D8113) in the form of digital. For output, in each "END" instruction, M8114 and M8115 convert the digital value into an analog

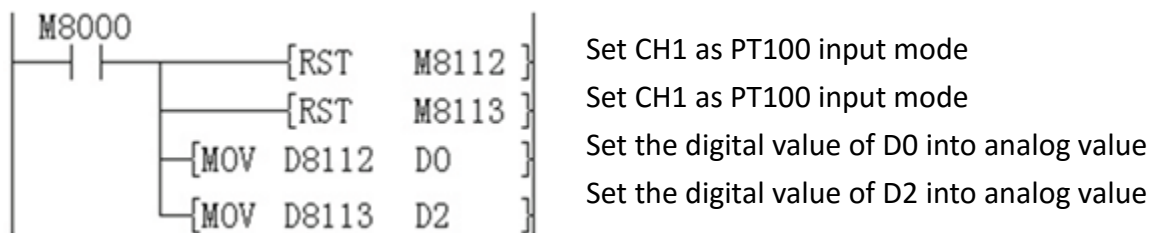
output.

6.1 Basic Program Examples

Caution

- 1) LX3V-2PTS-BD only supports PT100;
- 2) Don't try to change the value in D8112 or D8113, when finished the A/D conversion;

The following project sets CH1 and CH2 as PT100 input mode, and the value is storage in D0 and D2.



6.2. Examples of Applications

Since the LX3V-2PTS-BD does not have offset and gain functions, if it needs for the values out of the standard specifications, Additional programming orders will be needed to multiply or divide the converted value.

Caution

- 1) Since the use of additional programming orders, the converted precision and resolution of the analog value are different with the specifications.
- 2) The original range of the analog output does not change.

PT100 input mode

In RTD input mode, 2PTS converts analog value to digital value in degrees Celsius. If in the program was a degree Fahrenheit as a unit it needs to be converted to Celsius value.

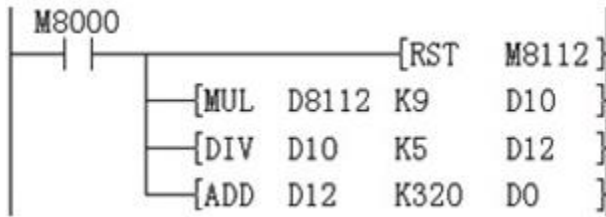
Fahrenheit and Celsius conversion formula, Fahrenheit = Celsius * 9/5 + 32, the unit is 0.1 °C

D10=D8112*9

D12=D10/5

D0=D12+320

D0=D8112*9/5+320



7. Expansion function

This is a new function in BD module, which can get BD model and firmware information by CPAVL instruction, and display in addresses.

7.1 Instruction information

CPAVL instruction

Name	Function	Bits	Pulse	Format	Steps
CPAVL	Parameters configuration	16	No	CPAVL S D M	11

S: it is start address for parameters (D register), the address range is D0~D7999;

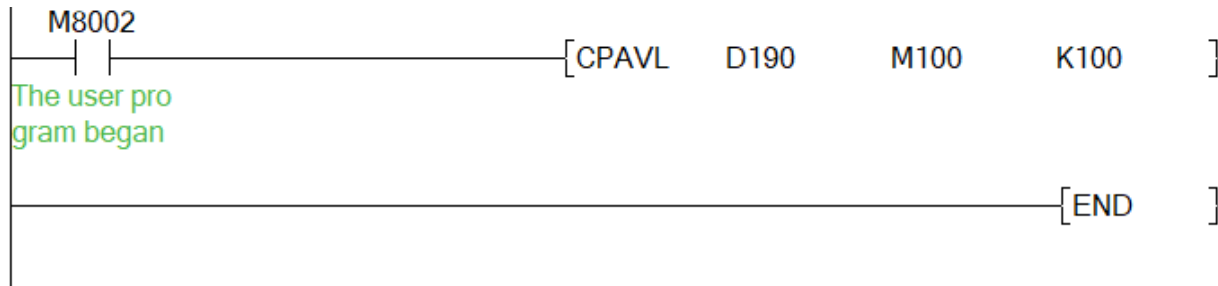
D: it is start address for parameters (M register), the address range is M0~M7999;

M: connection number, it is for setting BD module installation position, the detailed, please refer to below table;

Connection number description		
	Port	Connection number
CPAVL instruction	Expansion port 1 (far away from PLC LEDs)	100
	Expansion port 2 (near to PLC LEDs)	101

Detailed information

Ladder example



Address explanation

Address	Explanation	Address	Explanation
S			
D190~199	Reserved	D207	Reserved
D200	Model	D208	Reserved
D201	Firmware version	D209	Reserved
D202	Reserved	D210	Reserved
D203	State code of CH1	D211	Temperature of CH1 (Unit: 0.1 °C)
D204	State code of CH2	D212	Temperature of CH2 (Unit: 0.1 °C)
D205	Reserved	D213~234	Reserved
D206	Reserved		
D			
M100~234	Reserved		
M			
K100	Expansion port 1 (far away from PLC LEDs)	K101	Expansion port 2 (near to PLC LEDs)

7.2 Example

When enabling expansion function, the temperature value will no longer be stored in D8112 and D8113 but in the address corresponding to the CPAVL instruction.

Note:

- 1) This new function only available in 200 and advanced firmware version of BD module;
- 2) The DB module contains DAI/DAV, if users use non-latched word addresses (D0~D199) for it, the digital output will be 0 when PLC in STOP mode;
- 3) If users use non-latched bit addresses (M0~M499), all bit addresses will be reset when PLC in STOP mode;

PT100 input mode

In RTD input mode, 2PTS converts analog value to digital value in degrees Celsius. If in the program was a degree Fahrenheit as a unit it needs to be converted to Celsius value.

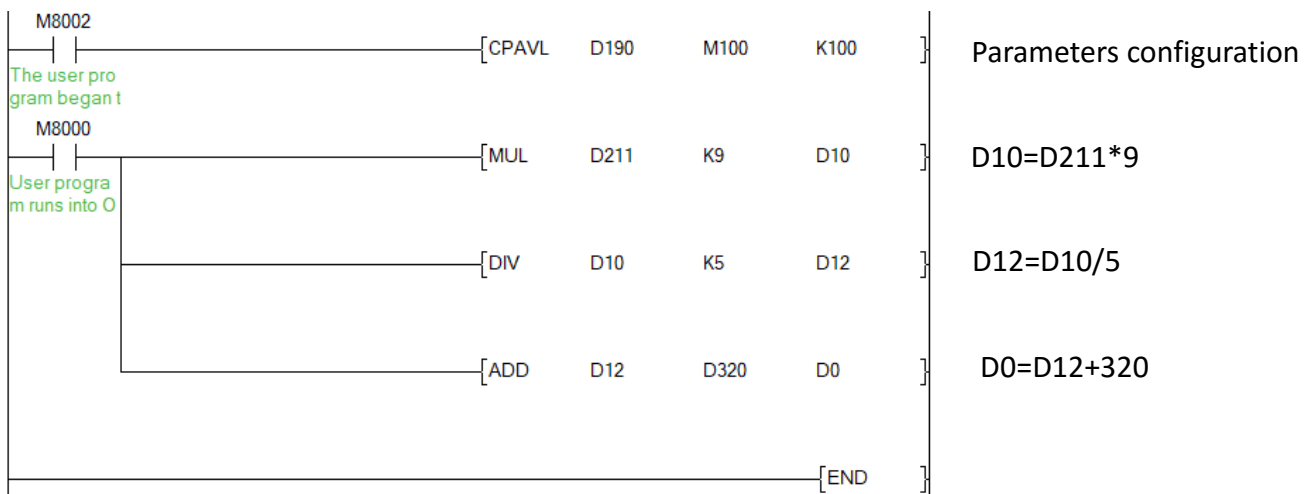
Fahrenheit and Celsius conversion formula, Fahrenheit = Celsius * 9/5 + 32, the unit is 0.1 °C

$$D10 = D8112 * 9$$

$$D12 = D10 / 5$$

$$D0 = D12 + 320$$

$$D0 = D8112 * 9 / 5 + 320$$



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