LX3V-2ADI2DAI-BD

User manual

1. Installation Instructions

Before installation, it is necessary to ensure that the associated equipment of the PLC host and the terminal of the BD module are reliably powered off.

This module comes with two standard terminals; please plug the terminals into the module terminals after wiring. Confirm the installation of host, module and wiring are correct and then power on.

Caution：

1) When using current output, make sure that the external load resistance is ≤500Ω. If the external load resistance> 500Ω, the output current will be lower than normal;
2) The input must not exceed the absolute maximum (-2mA/30mA) or cause the module to be damaged;
3) The fastening torque is 0.3-0.6N.m. Firmly screw down to prevent malfunctions;
4) The PLC main unit of the LX3V can only use one BD module. Don't try to use two or more BD modules (these BD modules will not work);
5) When mounting module to PLC, all the lights are blinking after powering ON PLC, which means this PLC can't support it, please purchase new PLC.

Warnings：

Cut off the electricity before installation/disassembly of the unit or connection of wires onto the unit, to prevent electric shock or product damage.

2. Features of LX3V-2ADI2DAI-BD

1) It could use LX3V-2ADI2DAI-BD to add 2 analog input points and 2 analog output points. It is internally installed in the top of PLC, thus it is not necessary to change the PLC's installation area.
2) The digital analog conversion of the LX3V-2ADI2DAI-BD module is the voltage inputs (4~20mA), and the data of all the channels after conversion are stored inside a special digital memory, but the converted characteristics of the analog data cannot be adjusted. The allocation of the relevant channel addresses is in the following table.

Table 2- 1

| Address	Instructions		Address	Instruction
M8112	CH1:flag of the input mode OFF: Current input mode	ON: Disabled	D8112	Digital value of CH1
M8113	CH2: flag of the input mode OFF: Current input mode		D8113	Digital value of CH2
M8114	CH3: Flag of the output mode OFF: Current output mode		D8114	Digital value of CH3
M8115	CH4: flag of the output mode OFF: Current output mode		D8115	Digital value of CH4

3. Dimension
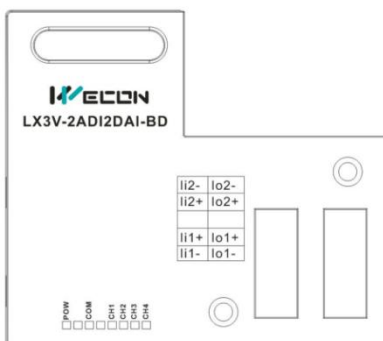
Figure 3- 1

Table 3- 1

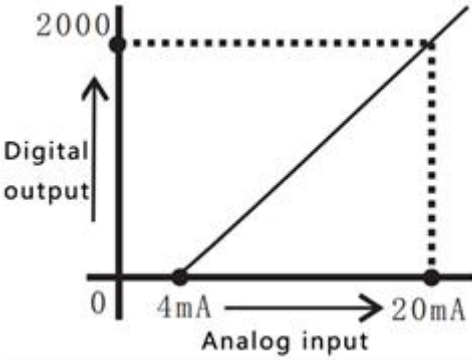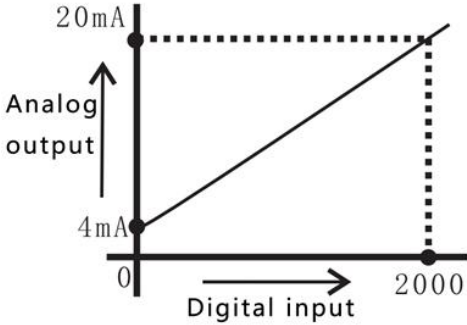| IN-2ADI Part Input current ranges: 4~20mA		OUT-2DAI Part Output current ranges: 4~20mA	
Ii1+	The anode of CH1 current input	Io1+	The anode of the CH1 current output
Ii 1-	The cathode of CH1 current input	Io 1-	The cathode of the CH1 current output
▪	Disconnect	▪	Disconnect
Ii 2+	The anode of CH2 current input	Io 2+	The anode of the CH2 current output
Ii 2-	The cathode of CH2 current input	Io 2-	The cathode of the CH2 current output

LED lights indicating:

● POW LED: Constantly ON when PLC power ON;

● COM LED: Lit when communicating PLC, OFF when timeout;

● CH1 LED: LED for CH1, constantly ON when analog signal in range, lit when analog signal out of range (4~20mA). OFF when M8112 turns ON.

● CH2 LED: LED for CH2, constantly ON when analog signal in range, lit when analog signal out of range (4~20mA). OFF when M8113 turns ON.

● CH3 LED: LED for CH3, constantly ON when M8114 turns OFF, OFF when M8114 turns ON.

● CH4 LED: LED for CH4, constantly ON when M8115 turns OFF. OFF when M8115 turns ON.

4. Specifications

1) **General specification:** The same as the PLC main unit.（Please refer to the attached instructions supplied with the main unit of the PLC.）

2) **Power specification:** Powered from inside of the programmable controller.

3) **Performance specifications**

Table 4- 1

Item	Specification
Power supply	24VDC±10%, 50mA; 5VDC±10%, 70mA (Powered by PLC host)
Analog input (ADI)	
Analog input range	DC 4~20mA (input resistance 250KΩ). Absolute maximum input: -2mA, +30mA
Rated range	4~20mA: 0~2000
The maximum display range	-500~2048
Resolution	8uA[4mA ~20mA / 2000]
Precision	±0.5% of full scale (4~20mA:±0.08mA)
AD conversion time	One PLC scanning cycle
Input characteristics	
Insulation	No insulation in each PLC channel
Occupied points	None
Analog output (DAI)	
Rated range	4~20mA: 0~2000
Analog output	DC 4~20mA (the external load resistance is no less than 500Ω)
Digital output	12 bit binary
Resolution	8uA[4~20mA / 2000]

Precision	±0.5% of full scale
AD conversion time	One PLC scanning cycle
Input characteristics	The external load is 250Ω and 0-2000 is converted to 4-20mA
Insulation	No insulation in each PLC channel
Occupied points	None

5. Wire Connection

Warning:

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

Caution:

1) Please keep the signal cable from the high-voltage cable at lease 100mm.
2) The shielding wire cable shall be grounded. But their grounding point can be the same with high-voltage lines.
3) Never connect cable with forbidden size.
4) Fix the cable, so that the stress does not act on the terminal board or the cable connection area.
5) The screwing torque of the terminal is from 0.5 to 0.6N.m. Fasten tight to prevent malfunction.
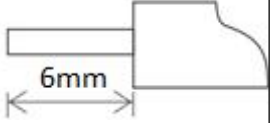6) Keep the redundant terminals empty.

5.1 Applicable Cables

Use AWG25-16 to connect the output equipment

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

The use of different types of cables might cause poor contact between the terminals. It is better to use pressed terminals.
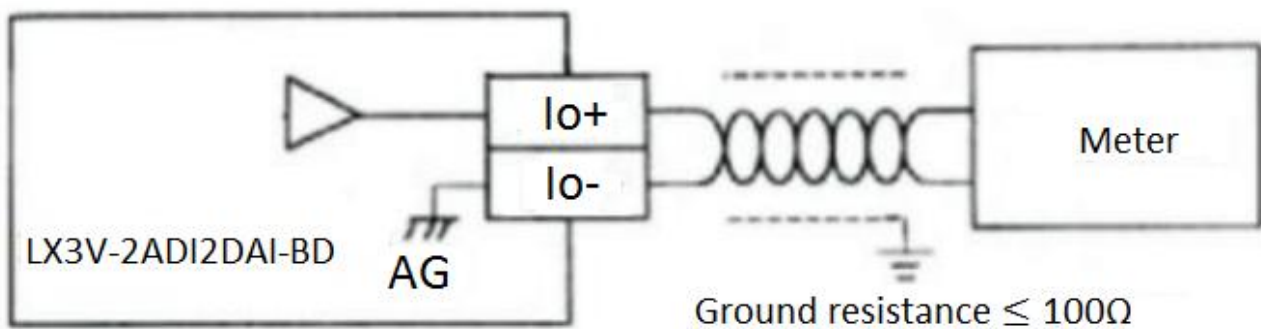
Table 5- 1

Line type	Cross sectional area(mm²)	End-of-pipe treatment	
AWG26	0.1288	Stranded cable: stripped jacket, rub Conductor, then connect the cable. Single-core cable: stripped jacket, Then connect the cable.	6mm
……	……		
AWG16	1.309		

5.2 Input and Output mode

1) Current Input Mode
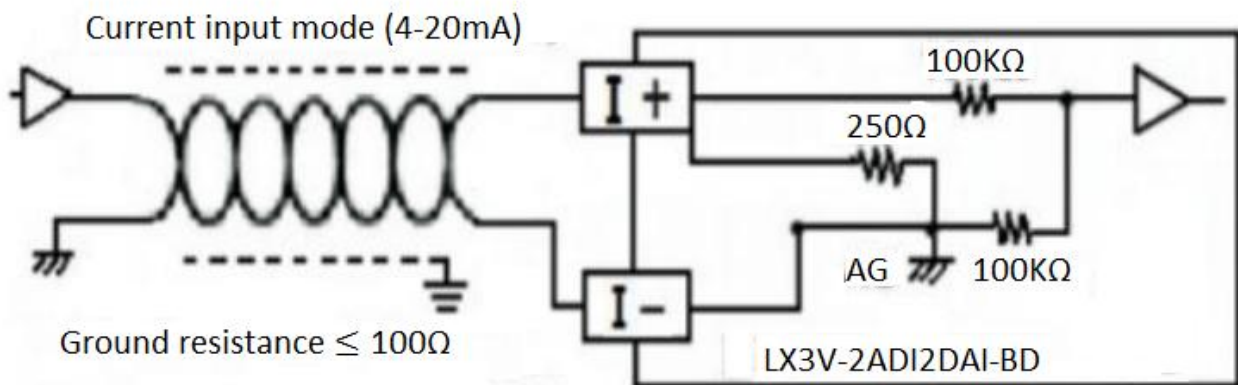
2) Current Output Mode

6. Example

The analog value (4~20mA) in each channel will be saved in system address (D8112, D8113). It will

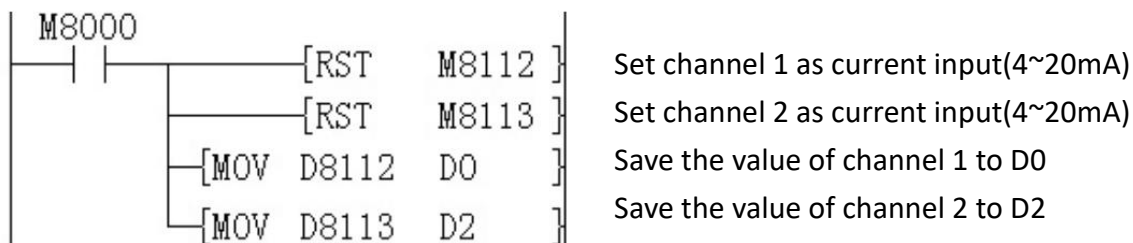be saved automatically when "END", and convert into digital value.

On the contrary process, digital value in each channel will be converted into analog value and output in system address (D8114, D8115).
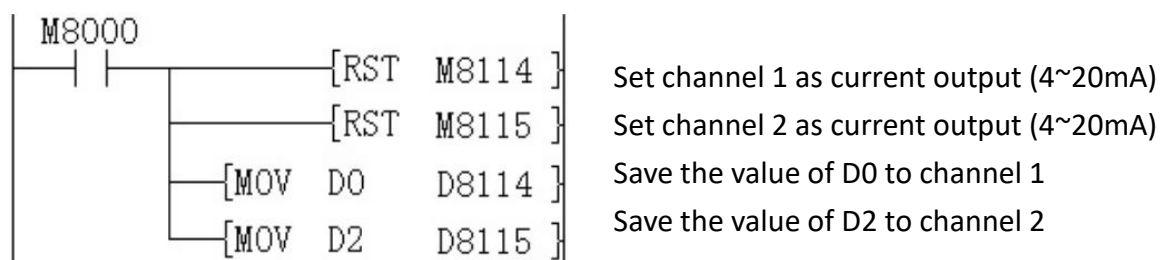
6.1 Basic program

Caution:

1) Trigger M8122 and M8113, and set the characteristic of conversion.
2) When M8112 ~ M8115 is ON, the corresponding channel does not perform the conversion action, and all display as 0, that is, the channel is diabled.
3) Do not change the value of D8112 and D8113.

AD conversion:

```
M8000
 ├──┤ ├──────────────[RST     M8112 ]      Set channel 1 as current input(4~20mA)
                     [RST     M8113 ]      Set channel 2 as current input(4~20mA)
                  [MOV D8112   D0     ]     Save the value of channel 1 to D0
                  [MOV D8113   D2     ]     Save the value of channel 2 to D2
```

DA conversion:

```
M8000
 ├──┤ ├──────────────[RST     M8114 ]      Set channel 1 as current output (4~20mA)
                     [RST     M8115 ]      Set channel 2 as current output (4~20mA)
                  [MOV   D0    D8114 ]     Save the value of D0 to channel 1
                  [MOV   D2    D8115 ]     Save the value of D2 to channel 2
```

6.2 Application example

LX3V-2ADI2DAI-BD has no offset and gain function.

Caution:

1) There are extra program for multiplication and division, so the real accuracy and resolution of analog-digital conversion are different from product specifications;
2) The range for analog output is constant;

Current input mode

In current input mode, it changes the analog value (4-20mA) to digital value (0-2000). If users need 4000-20000 digital range, it requires a conversion.

As following program shows, the digital value is saved in D8112 and D8113, because the digital range is changed from 0-2000 to 4000-20000, so the resolution of LX2ADI2DAI-BD is not 8uA.
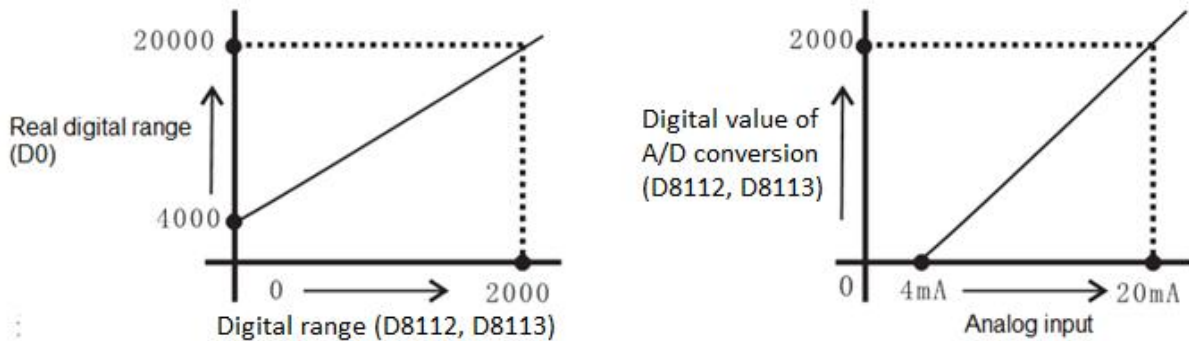
Suppose the user needs 4000-20000, and save in D0, so D0=8*(D8112 or D8113) +4000, the program as following shows.

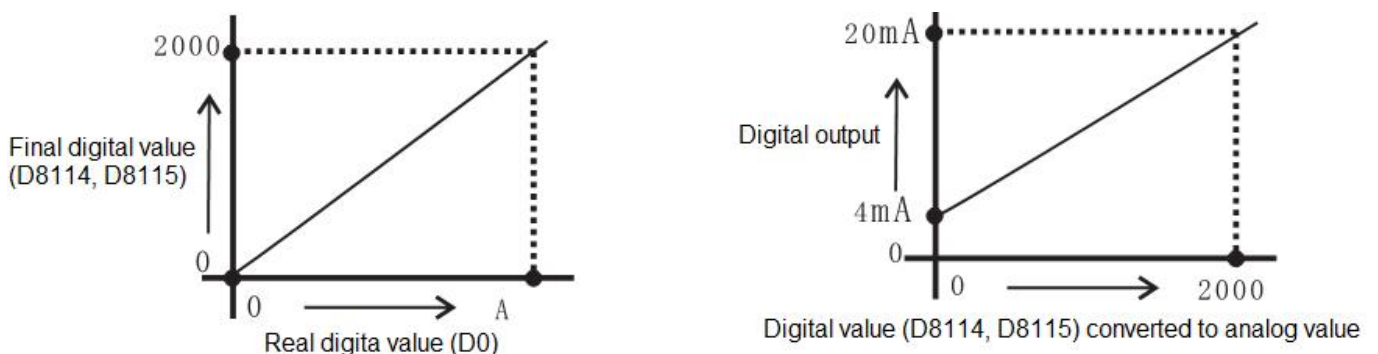**Current output mode**

In current output mode, it changes the digital value (0-2000) to analog value (4-20mA). If the real digital range is 0-A (A means any value), it must be converted to 0-2000, as the following program shows, the final digital need to be saved in D8114.
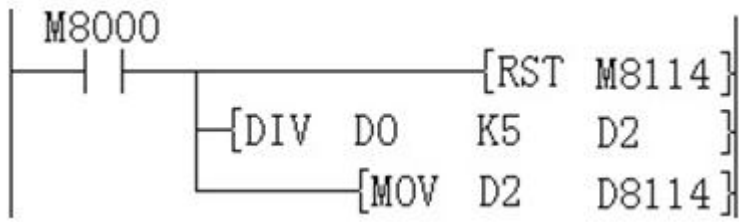

Suppose user needs 0-A digital range.

D8114=2000*D0/A

=2000*D0/10000 (A=10000)

=D0/5

```
 M8000
├──┤ ├──┬─────────────────────────[RST  M8114]
          ├──[DIV  D0    K5    D2    ]
          └───────[MOV  D2    D8114]
```