

# TX1N-2AD-BD User' s Manual

( Analog I/O Expansion Board )

This manual contains text, diagram and explanation which will guide the reader in the correct installation, safe use and operation of the TX1N-2AD-BD analog I/O expansion board and should be read before attempting to install or use it. Further information can be found in the TX1N series hardware manual and programming manual. Specifications are subject to change without notice.

## 1. Introduction

The TX1N-2AD-BD analog I/O expansion board(hereinafter called "2AD" or "Expansion board" ) is to be installed in the TX1N series PLC, to increase the analog input by 2 points and analog output by 1 point.

### 1.1 Feature of TX1N-2AD-BD

- 1) Analog input of two points can be increased by using 2AD. If a 2AD is used, internal mounting in the top of the PLC means that there is no need for a change to the installation area of the PLC.
- 2) Voltage input (0~10V) or current input (4~20mA) for analog to digital conversion can be set by switching the auxiliary relays assigned to each channel. Moreover, a digital value after conversion of each channel is stored in the special data register allocated to each channel, as shown in the table below. However, the analog to digital conversion characteristic cannot be adjusted.

Table 1.1 : Allocated device

Device	Description
M8112	Switch of input mode of Ch1 flag OFF : Voltage input mode ( 0~10V ) ON : Current input mode ( 4~20mA )
M8113	Switch of input mode of Ch2 flag OFF : Voltage input mode ( 0~10V ) ON : Current input mode ( 4~20mA )
D8112	Digital value of Ch1
D8113	Digital value of Ch2

### 1.2 External dimensions and each part name

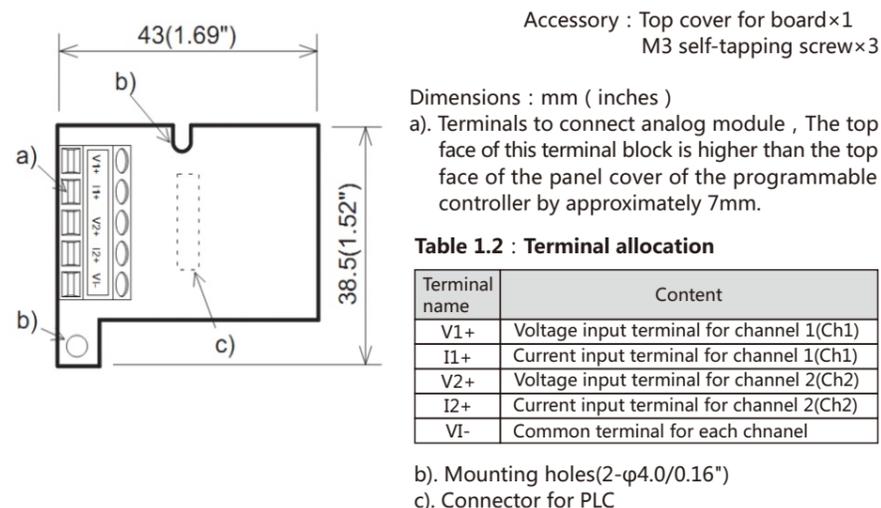


Table 1.2 : Terminal allocation

Terminal name	Content
V1+	Voltage input terminal for channel 1(Ch1)
I1+	Current input terminal for channel 1(Ch1)
V2+	Voltage input terminal for channel 2(Ch2)
I2+	Current input terminal for channel 2(Ch2)
VI-	Common terminal for each channel

### 1.3 System configuration

- Only one expansion board can be used on one TX1N PLC main unit. Do not try to install two or more expansion boards. (They will not function.)
- The 2AD cannot be used with TX1N-EEPROM-8L or TX1N-5DM.

## 2. Specifications

### 2.1 General specifications

Same as the TX1N series programmable controller main unit. (Refer to the programmable controller main unit manual)

### 2.2 Power supply specifications

Power supplied by internal feed of the programmable controller main unit.

### 2.3 Performance specifications

Items	Specifications	
	Voltage input	Current input
Range of analog input	DC : 0~10V ( input resistance 300KΩ ) Absolute maximum input : -0.5V , +15V	DC : 4~20mA ( input resistance 250Ω ) Absolute maximum input : -2mA , +60mA
Digital output	12-bit binary	
Resolution	2.5mV (10V/4000)	8uA {(4mA~20mA)/2000}
Integrated accuracy	±1% against the full scale ( 0~10V : ±0.1V )	±1% against the full scale ( 4~20mA : ±0.16mA )
A/D conversion time	Approx. 30ms [15ms x 2 channels] (D8112 or D8113 are updated after the END instruction)	
Input characteristics		
Insulation	No insulation between each channel or the PLC.	
Occupied points	0 points (2AD is not subject to the standard maximum number of control points in the host PLC, as it operated via data registers)	

## 3. Wiring

### 3.1 Applicable cables

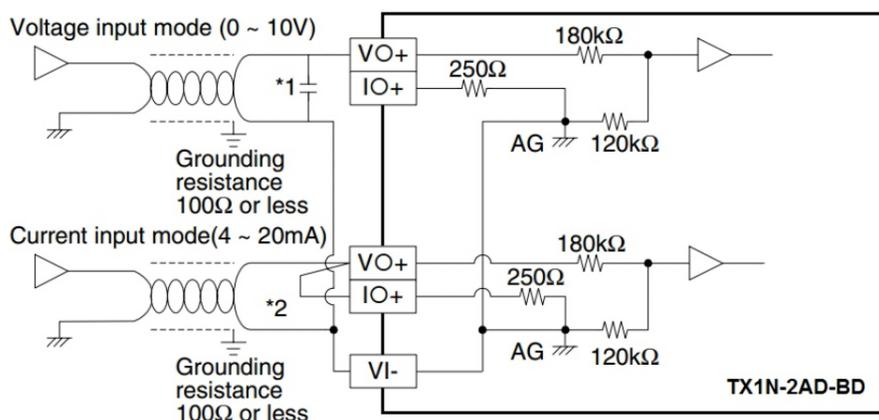
- Use AWG25 ~ 16 for connection with output.
- The terminal tightening torque is 0.5 ~ 0.6 N•m.
- When using a different type of cable, defective contact at the terminal is possible. Use a crimp terminal to achieve a good contact.

### Linear and sectional area

Linear	Sectional Area (mm <sup>2</sup> )	Terminal
AWG26	0.1288	Stranded cable: remove sheath, twist core wires, then connect cable.
...	...	
AWG16	1.309	Single cable: remove sheath, then connect cable.

### 3.2 Wiring

The channel not used is short-circuit and uses the terminal "VO+" and the terminal "VI-". The channel number enters "0".



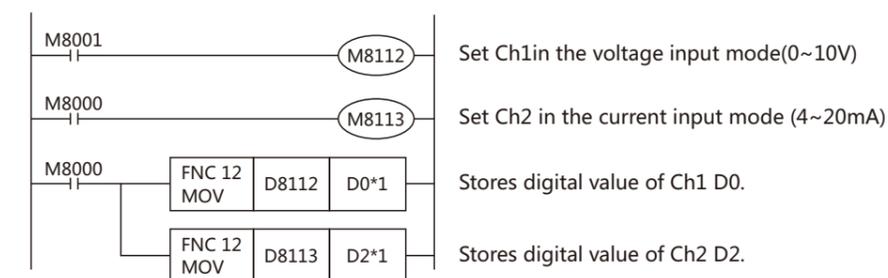
- \*1 Connect a 0.1~0.47uF at 25VDC capacitor in position "1" when there is voltage ripple in the voltage input or there will be a lot of noise.
- \*2 For current input, short circuit "VO+" and "IO+" as shown in the diagram.

## 4. Example program

Analog amount (0~10V, 4~20mA) input to each terminal is stored in data register (D8112, D8113) as digital values. The values are stored automatically at each END instruction and calculated using the analog to digital conversion characteristic, specified with special auxiliary relays M8112 and M8113.

### 4.1 Basic example program

The following program example set Ch1 in the voltage input mode, Ch2 in the current input mode, with the A/D converted digital value of each channel stored in D0 and D2.



- \*1. If a digital value is not stored in D0 or D2, D8112 and D8113 can be used directly for set values and other instructions, etc. of timers and counters.

### 4.2 Example Application Program

As the 2AD does not have Offset and Gain capabilities, if values are required outside the standard specification range, additional program commands are required to either multiply or divide the conversion values. For an example application, please see TX programming manual II.

## 5. Safety precautions

- If in doubt at any stage during the installation of the TX1N-2AD-BD, always consult a professional electrical engineer who is qualified and trained to the local and national standards. If in doubt about the operation or use of TX1N-2AD-BD, please consult the nearest HCFA distributor.
- All the examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. HCFA Corporation will accept no responsibility for actual use of the product based on these illustrative examples.
- Owing to the very great variety in possible application of this equipment, you must satisfy yourself as to its suitability for your specific application.
- This manual confers no industrial property rights or any rights of any other kind, nor does it confer any patent licenses. HCFA Corporation cannot be held responsible for any problems involving industrial property rights which may occur as a result of using the contents noted in this manual.
- Under no circumstances will HCFA Corporation be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.

Manual number	DOC-TX1N-2AD-BD-V1.0
Manual version	V1.0
Date	April, 2014