

## Chapter 19 Analog Input/Output Expansion Board

Since the main units, which have less than 14 points, of FBs Series does not provide right expansion module input/output interface, FATAK has developed a special series of analog expansion I/O boards for the units. This series includes analog input expansion board (FBs-B4AD), analog output expansion board (FBs-B2DA), and analog I/O expansion board (FBs-B2A1D). Thus, when customers using the main units have less than 14 points, they will be able to connect to the surrounding analog signals to achieve economic advantages of the application. An introduction of three analog expansion boards is shown in the following:

FBs-B4AD is the analog input signal expansion board of FATEK FBs series PLC. It provides 4 channels 12-bit analog input measurement signal (14-bit expression). When applications occurred, it will be able to determine the location of wiring input or output signal type (voltage or current).

FBs-B2DA is the analog output signal expansion board of FATEK FBs series PLC. It provides 2 channels 12-bit (14-bit expression) analog output signal. When applications occurred, it will be able to determine the location of wiring input or output signal type (voltage or current). For safety, the output signal will be automatically forced to zero (0V or 0mA) when the modules is not serviced by CPU for 0.5 seconds.

FBs-B2A1D is the analog I/O signal expansion board. It provides 1 channel 12-bit (14-bit expression) analog output signal and measurable 2 channels 12-bit (14-bit expression) analog input signal. When applications occurred, it will be able to determine the location of wiring input or output signal type (voltage or current). For safety, the output signal will be automatically forced to zero (0V or 0mA) when the modules is not serviced by CPU for 0.5 seconds.

### 19.1 Specifications of FBs Analog Expansion Boards

#### FBs-B4AD Specifications

Item		Specifications	Remark
Input Point		4 points( 4AD )	
Resolution		12-bit	
Numeric Expression		14 bits(0 ~ 16380)	
Finest Resolution		2.44mV(Voltage) 、 4.88μA(Current)	
I/O Points Occupied		4 Registers(D4072~D4075)	
Conversion Time		Updated each scan	
Span of Analog Input	Voltage	0~10V	
	Current	0~20mA	
Accuracy		Within ±1% of full scale	
Input Resistance		100KΩ(Voltage) 、 125Ω(Current)	
Internal Consumption		5V 、 100mA	
Working Temperature		0 ~ 60 °C	
Storage Temperature		-20 ~ 80 °C	

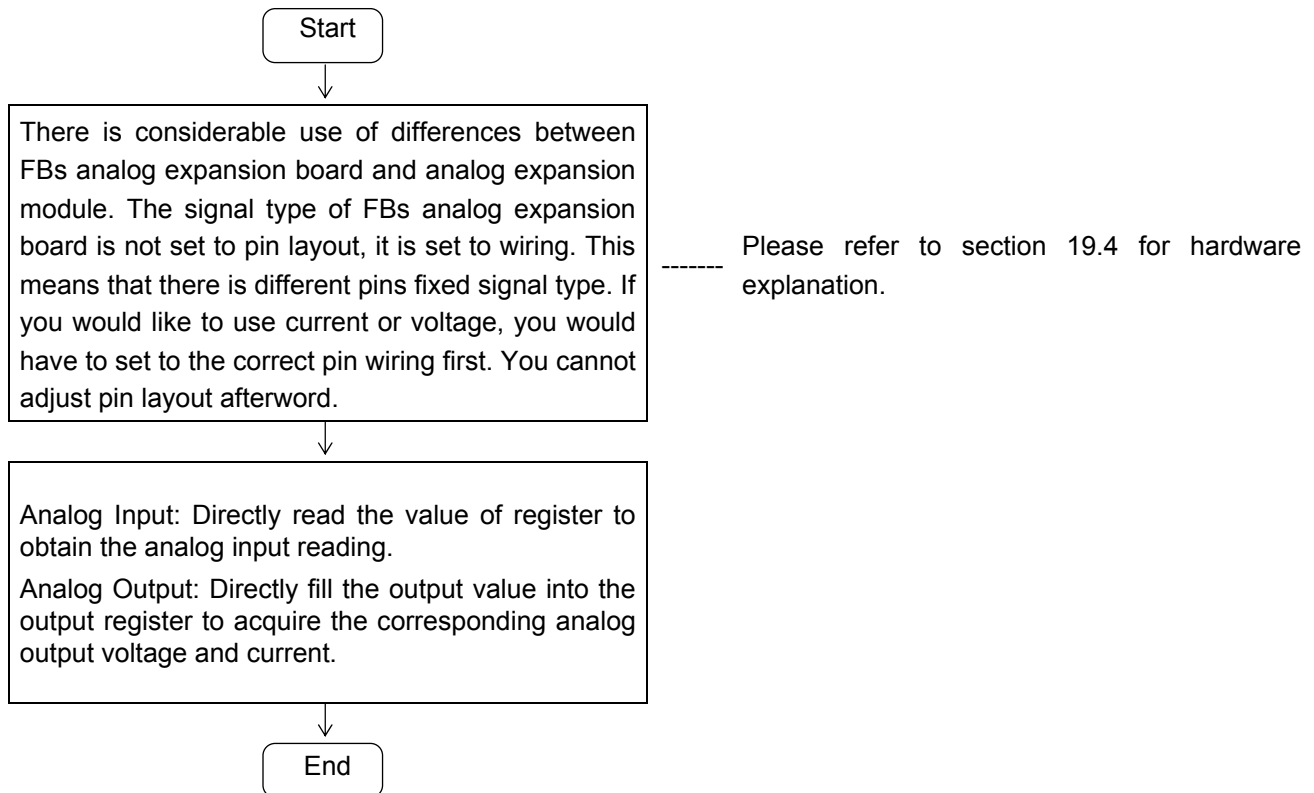
### FBs-B2DA Specifications

Item		Specifications	Remark
Output Channel		2 channels ( 2DA )	
Resolution		12-bit	
Numeric Expression		14 bits(0 ~ 16380)	
Finest Resolution		2.44mV(Voltage) 、 4.88μA(Current)	
I/O Points Occupied		2 Registers(D4076~D4077)	
Conversion Time		Updated each scan	
Span of Analog Output	Voltage	0~10V	
	Current	0~20mA	
Accuracy		Within ±1% of full scale	
Internal Consumption		5V 、 120mA	
Working Temperature		0 ~ 60 °C	
Storage Temperature		-20 ~ 80 °C	

### FBs-B2A1D Specifications

Detailed Analog Input Specifications			
Item		Specifications	Remark
Input Channel		2 channels( 2AD )	
Resolution		12-bit	
Numeric Expression		14 bits(0 ~ 16380)	
Finest Resolution		2.44mV(Voltage) 、 4.88μA(Current)	
I/O Points Occupied		2 Registers (D4072~D4073)	
Conversion Time		Updated each scan	
Span of Analog Input	Voltage	0~10V	
	Current	0~20mA	
Accuracy		Within ±1% of full scale	
Detailed Analog Output Specifications			
Item		Specifications	Remark
Output Channel		1 channel( 1DA )	
Resolution		12-bit	
Numeric Expression		14 bits(0 ~ 16380)	
Finest Resolution		2.44mV(Voltage) 、 4.88μA(Current)	
I/O Points Occupied		1 Register (D4076)	
Conversion Time		Updated each scan	
Span of Analog Output	Voltage	0~10V	
	Current	0~20mA	
Accuracy		Within ±1% of full scale	
Detailed Specifications of Common Parts			
Item		Specifications	Remark
Internal Consumption		5V 、 150mA	
Working Temperature		0 ~ 60 °C	
Storage Temperature		-20 ~ 80 °C	

## 19.2 The Procedure of Using FBs Analog Expansion Boards



## 19.3 Address Allocation of FBs Analog Expansion Boards

The address allocation of analog expansion board also has difference to FBs series analog expansion module. The occupied analog expansion board system resources is no longer numerical input register (IR register) R3840~R3903 or numerical output register (OR register) R3904~R3967, but a data register D4072~D4075 (analog input expansion board) or D4076~D4077 (analog output expansion board). The three types of analog expansion boards occupied the resources are listed in below.

Meanwhile, after WinProladder connect with PLC, it will automatically detect and configure the register. Users may refer to the I/O Module Number Configuration provided by WinProladder in order to find out the exact I/O address of each expansion module to facilitate programming.

### I/O allocation of FBs-B4AD

Channel		Occupied I/O Resources
Analog Input	CH0	D4072 ( 0 ~ 16380 )
	CH1	D4073 ( 0 ~ 16380 )
	CH2	D4074 ( 0 ~ 16380 )
	CH3	D4075 ( 0 ~ 16380 )

#### I/O allocation of FBs-B2DA

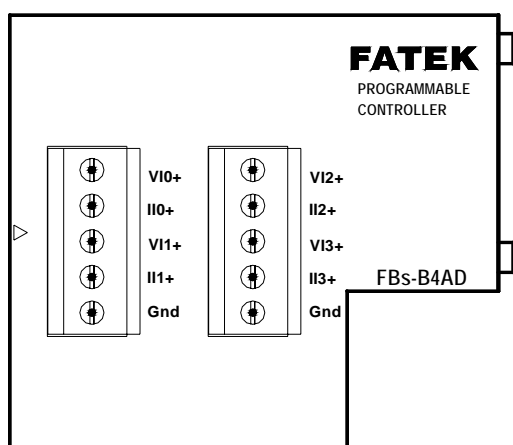
Channel		Occupied I/O Resources
Analog Output	CH0	D4076 ( 0 ~ 16380 )
	CH1	D4077 ( 0 ~ 16380 )

#### I/O allocation of FBs-B2A1D

Channel		Occupied I/O Resources
Analog Input	CH0	D4072 ( 0 ~ 16380 )
	CH1	D4073 ( 0 ~ 16380 )
Analog Output	CH0	D4076 ( 0 ~ 16380 )

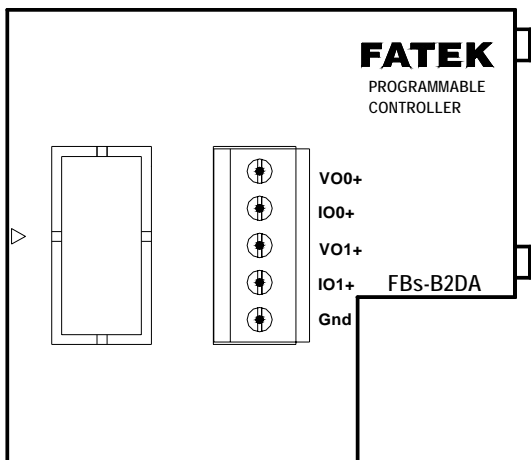
## 19.4 Hardware Description of FBs Analog Expansion Boards

#### FBs-B4AD outlook and top view



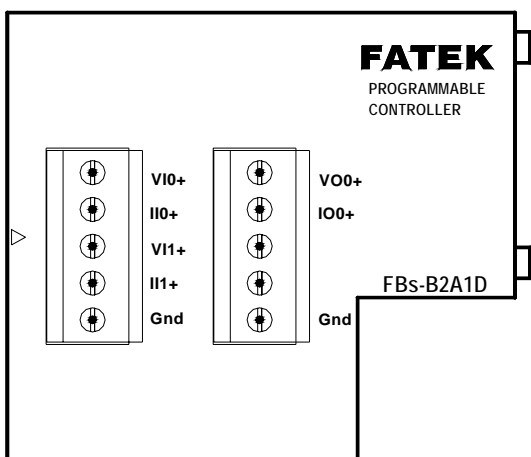
Pin Position	Explanation
VI0+	Channel 0 Analog Voltage Input
II0+	Channel 0 Analog Current Input
VI1+	Channel 1 Analog Voltage Input
II1+	Channel 1 Analog Current Input
VI2+	Channel 2 Analog Voltage Input
II2+	Channel 2 Analog Current Input
VI3+	Channel 3 Analog Voltage Input
II3+	Channel 3 Analog Current Input
GND	Ground Wire

FBs-B2DA outlook and top view



Pin Position	Explanation
VO0+	Channel 0 Analog Voltage Output
IO0+	Channel 0 Analog Current Output
VO1+	Channel 1 Analog Voltage Output
IO1+	Channel 1 Analog Current Output
GND	Ground Wire

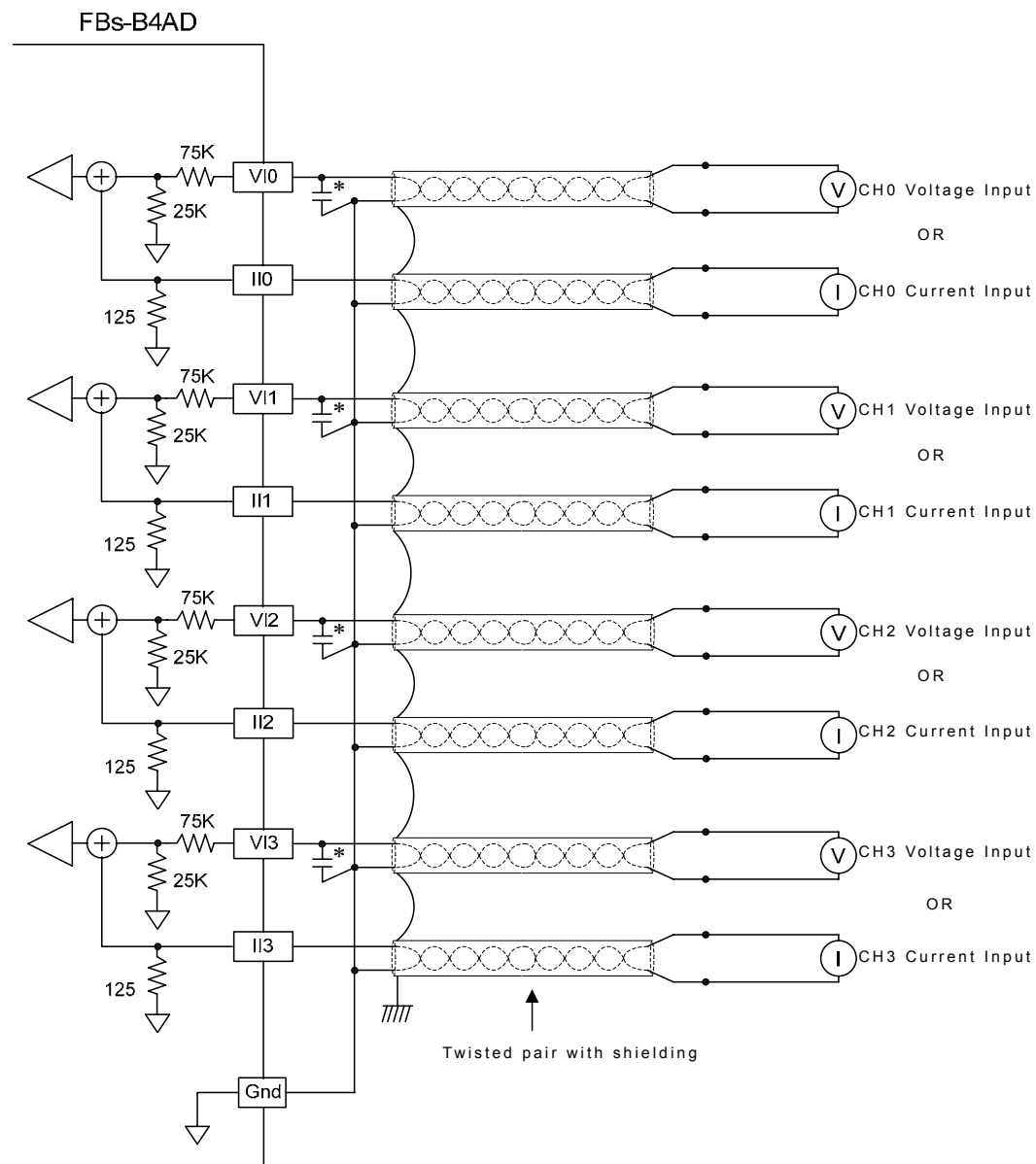
FBs-B2A1D outlook and top view



Pin Position	Explanation
VI0+	Channel 0 Analog Voltage Input
II0+	Channel 0 Analog Current Input
VI1+	Channel 1 Analog Voltage Input
II1+	Channel 1 Analog Current Input
GND	Ground Wire
VO0+	Channel 0 Analog Voltage Output
IO0+	Channel 0 Analog Current Output
GND	Ground Wire

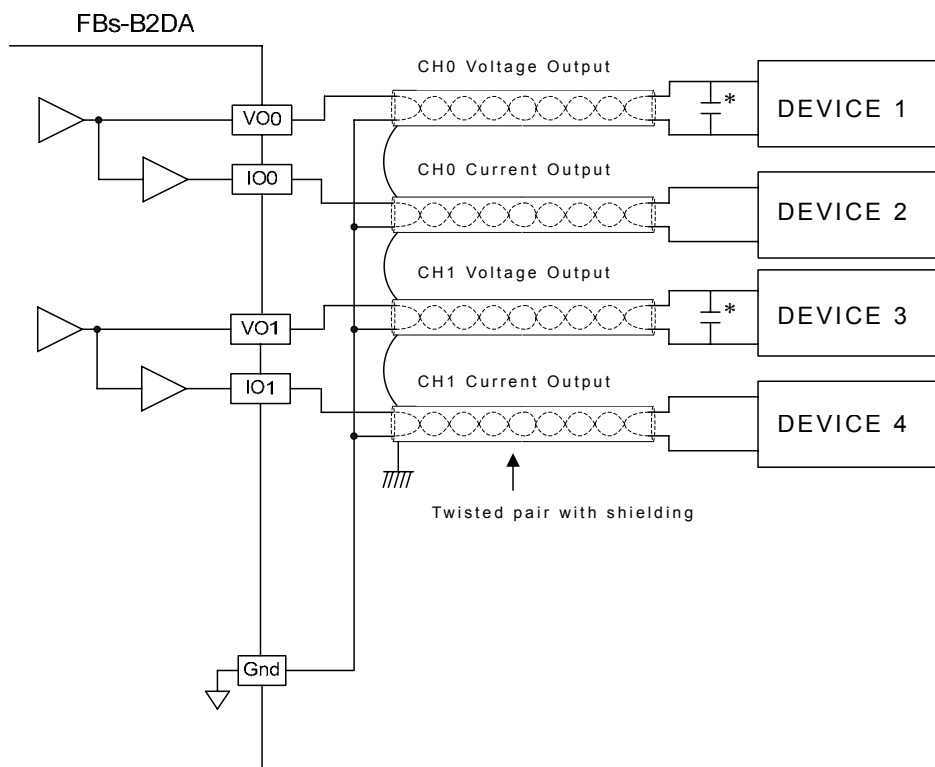
## 19.5 FBs Analog Expansion Boards I/O Circuit Diagram

### 19.5.1 FBs-B4AD Analog Input Circuit Diagram



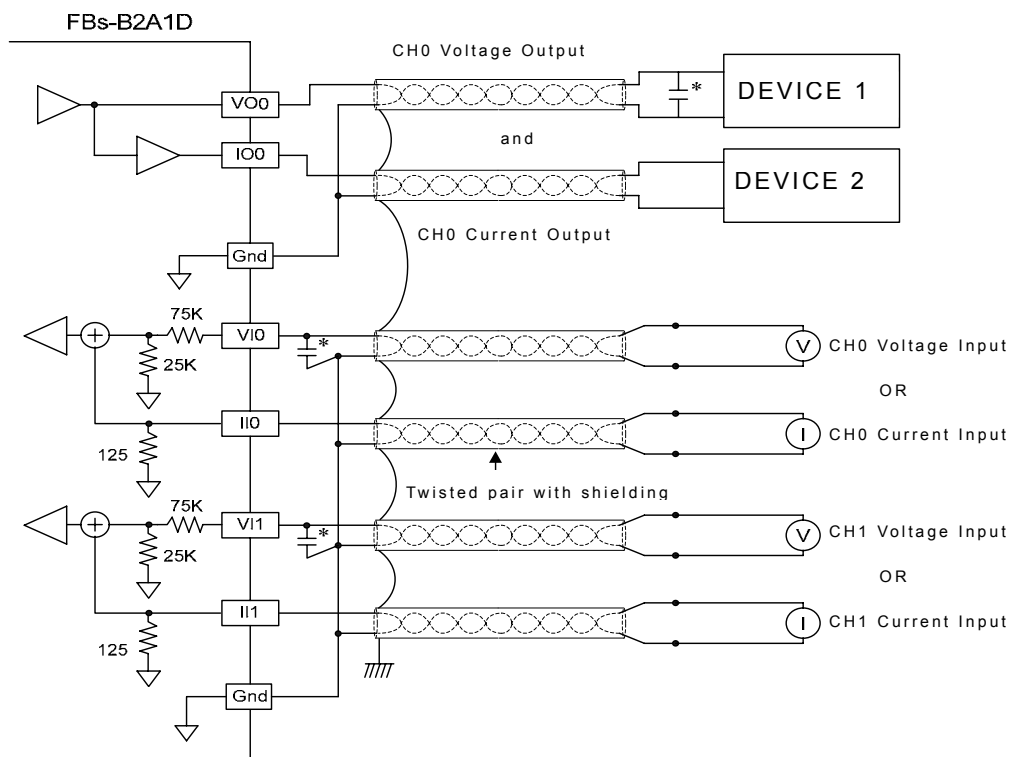
\*0.1~0.47uF capacitor (to filter noise).....Advice to install, but not necessary!!

### 19.5.2 FBs-B2DA Analog Output Circuit Diagram



\*0.1~0.47uF capacitor (to filter noise).....Advice to install, but not necessary!!

### 19.5.3 FBs-B2A1D Analog I/O Circuit Diagram



\*0.1~0.47uF capacitor (to filter noise).....Advice to install, but not necessary!!

## 19.6 FBs Analog Expansion Board I/O Characteristics

The analog I/O conversion characteristics of these settings are illustrated below. Users can adjust different I/O forms by coordinating the conversion curve with various V/I (Voltage/Current) I/O settings.

Figure 1 : Analog Input Characteristics Curve

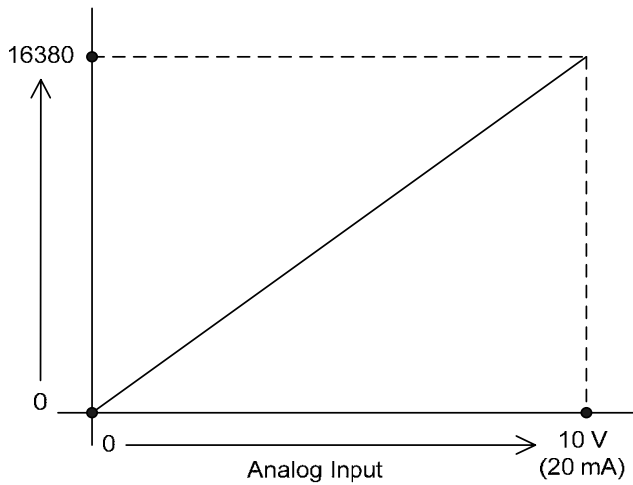


Figure 2 : Analog Output Characteristics Curve

