

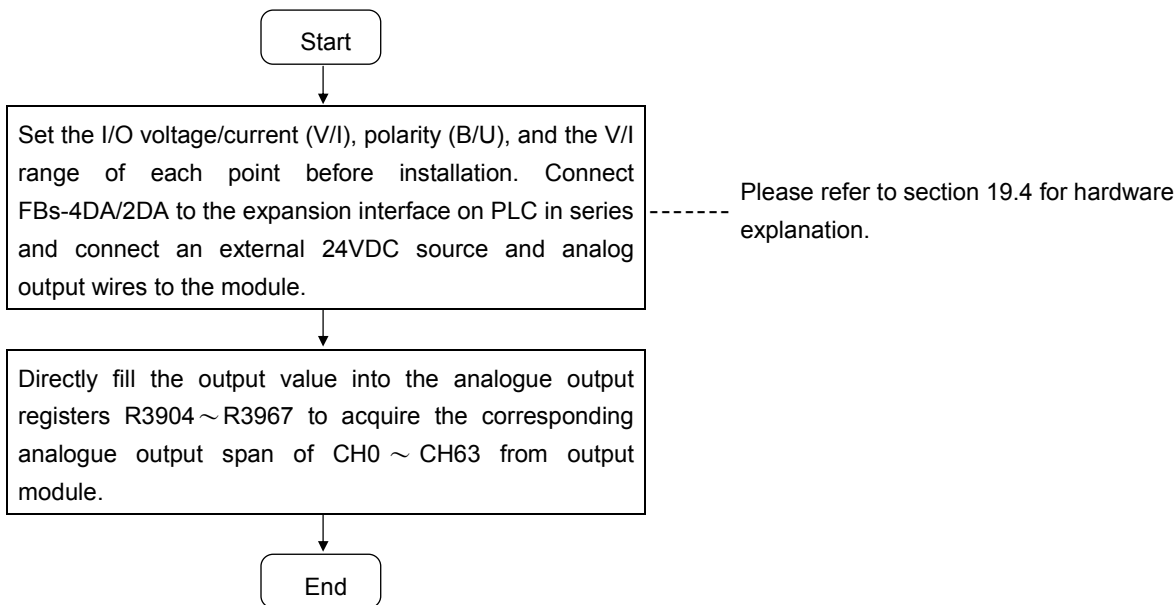
Chapter 19 FBs-4DA/2DA Analog Output Module

FBs-4DA and FBs-2DA are two of the analog output modules of FATEK FBs series PLC. They provide 4 and 2 channels 14 bits D/A output respectively. Base on the different jumper settings it can provide varieties of current or voltage output signal. The output code can be configured as unipolar or bipolar which makes the relation of output code and real output signal more intuitive. For safety, the output signal will be automatically forced to zero(0V or 0mA) when the module is not serviced by CPU for 0.5 second.

19.1 Specifications of FBs-4DA/2DA

Item		Specifications		Remark
Total Channel		4 Channel (FBs-4DA) 、 2 Channel (FBs-2DA)		
Digital Output Value		-8192~+8191(Bipolar) or 0~16383(Unipolar)		
Span Of Analog output	Bipolar*	*10V	*1. Voltage : -10~10V 5. Current : -20~20mA	* : It means the default setting
		5V	2. Voltage : -5~5V 6. Current : -10~10mA	
	Unipolar	10V	3. Voltage : 0~10V 7. Current : 0~20mA	
		5V	4. Voltage : 0~5V 8. Current : 0~10mA	
Resolution		14 bits		
Finest resolution		0.3mV(Voltage) 、 0.61μA(Current)		
I/O Points Occupied		4(4DA) or 2(DA) OR(Output register)		
Accuracy		Within ±1% of full scale		
Conversion Time		Updated each scan		
Maximum accommodation for resistance loading		Voltage : 500Ω~1MΩ Current : 0Ω~500Ω		The deviation will be enlarged if exceeding this range
Isolation		Transformer(Power) and photocouple(Signal)		
Indicator(s)		5V PWR LED		
Internal Power Consumption		5V 、 20mA		
Operating Temperature		0~60 °C		
Storage Temperature		-20~80 °C		
External power supply		24V-15%/+20% 、 120mA(4DA) 、 70mA(2DA)		
Dimensions		40(W)x90(H)x80(D) mm		

19.2 The procedure of using FBs-4DA/2DA analog output module



19.3 Address allocation of FBs-PLC analog outputs

FBs-4DA/2DA Provides 4 points of outputs(4DA) or 2 points of outputs(2DA). The I/O addressing of output is beginning from the module closest to main unit; it is orderly numbered as CH0~CH1 (1st module), CH2~CH3 (2nd module), CH4~CH5 (3rd module)..... and increased with occurring order number, which reaches 64 points in total, and they are corresponding to the respective internal analogue output registers (so called OR register) R3904~R3967. User needs only to expand connecting FBs-DA modules through expansion interface, and main unit will automatically detect the quantity of the outputs and send out the value to corresponding output of each DA modules. The following table is detailed OR registers (R3904~R3967) corresponding to the expansion analogue outputs (CH0~CH63). WinProladder will automatically detect and calculate the ORs on the system after connecting to the PLC. 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-2DA

Numeric Output Register (OR)	Contents (CH0~CH63)														Output lable Of FBs-2DA		
	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2		B1	B0
OR+0	*	*	B13	CH0 output value											B0	CH0	} FBs-2DA
OR+1	*	*	CH1 output value												CH1		
OR+2	*	*	CH2 output value												CH0	} FBs-2DA	
OR+3	*	*	CH3 output value												CH1		
⋮	⋮	⋮	⋮											⋮	⋮	} Other modules	
⋮	⋮	⋮	⋮											⋮	⋮		
⋮	⋮	⋮	⋮											⋮	⋮		
⋮	⋮	⋮	⋮											⋮	⋮		
⋮	⋮	⋮	⋮											⋮	⋮		
R3966	Depends on module type														CHX		
R3967	Depends on module type														CHX		

* * ----- Unipolar code output (0~16383) , B14 · B15 = 00
 Bipolar code output (-8192~8191) , B14 · B15 = B13

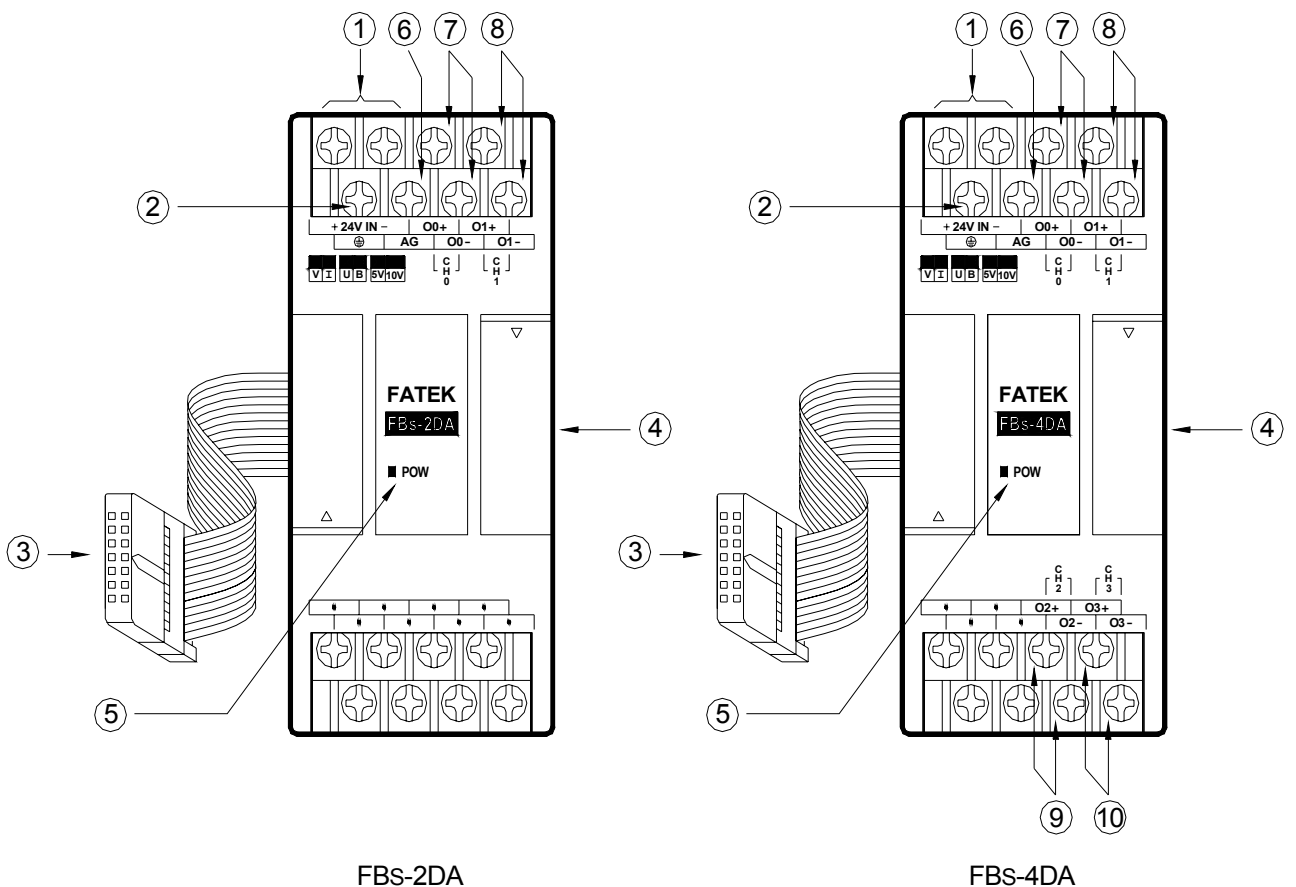
I/O allocation of FBs-4DA

Numeric Output Register (OR)	Contents (CH0 ~ CH63)														Output lable Of FBs-4DA
	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	
OR+0	*	*	CH0 output value											B0	CH0
OR+1	*	*	CH1 output value												CH1
OR+2	*	*	CH2 output value												CH2
OR+3	*	*	CH3 output value												CH3
⋮	⋮	⋮	⋮											⋮	⋮
⋮	⋮	⋮	⋮											⋮	⋮
⋮	⋮	⋮	⋮											⋮	⋮
R3964	Depends on module type														CHX
R3965	Depends on module type														CHX
R3966	Depends on module type														CHX
R3967	Depends on module type														CHX

FBs-4DA

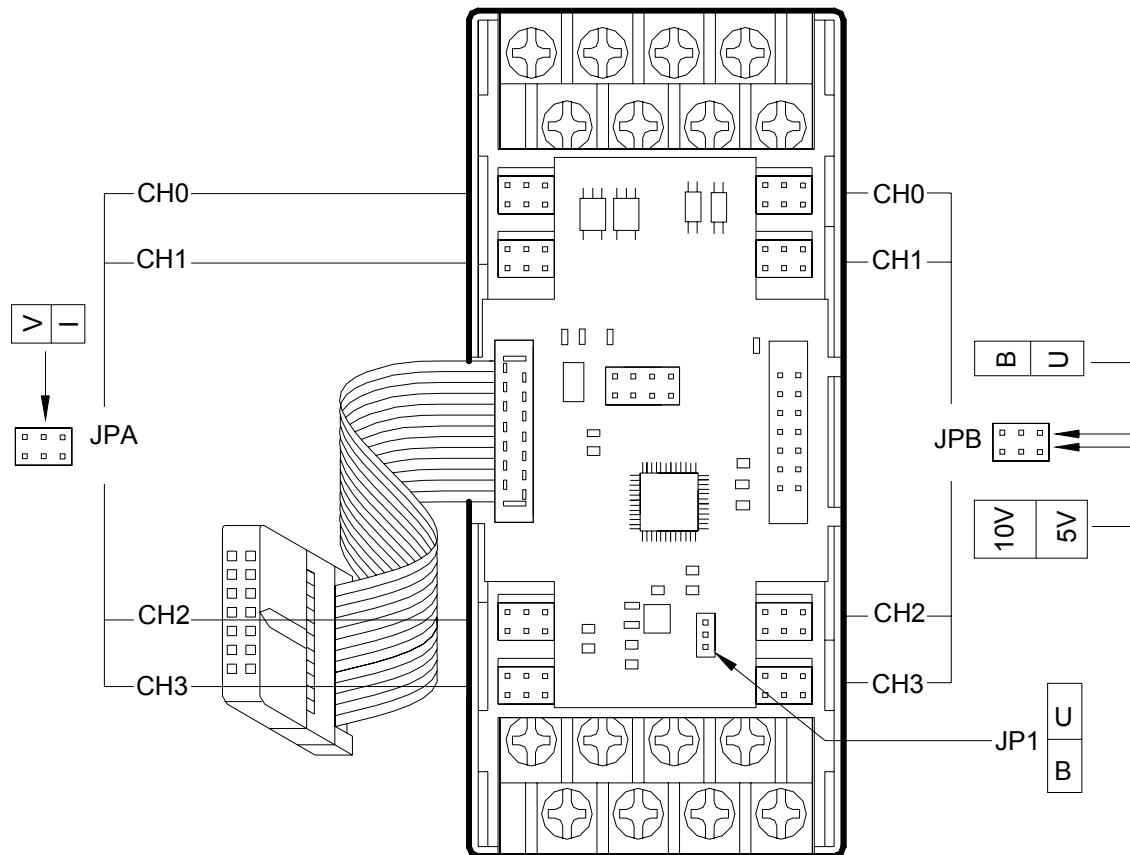
Other modules

19.4 FBs-4DA/2DA hardware description



- ① External power input terminal: Power supply of analogue circuit for this module, the voltage can be 24VDC±20% and should be supplied with 4W of power at least.
- ② Protecting ground terminal : Connect to the shielding signal cable.
- ③ Expansion input cable : It should be connected to the front expansion unit, or the expansion output of main unit.
- ④ Expansion output connector : Provides the connection for next expansion unit.
- ⑤ Power indicator : It indicates whether the power supply at analogue circuit and external input power source are normal.
- ⑥ AG Ground : No connection is needed in general; except when the common mode signal is too high. See examples overleaf for details.
- ⑦ 、 ⑧ : Output terminal of CH0~CH1.
- ⑨ 、 ⑩ : Output terminal of CH2~CH3.



19.4.1 FBs-4DA/2DA hardware jumper setting



FBs-4DA/2DA Jumper location

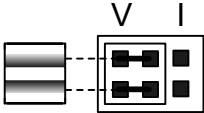
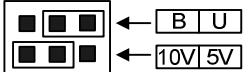

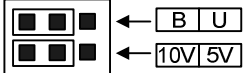

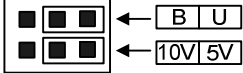
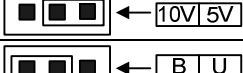
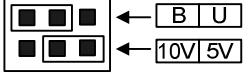
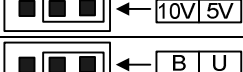
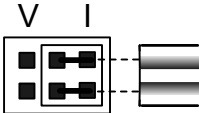
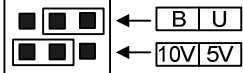
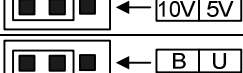
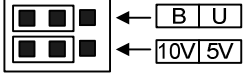

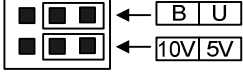

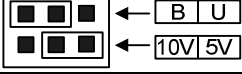
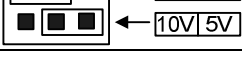
Output code format selection (JP1)

Users can select between unipolar and bipolar codes. The output range of unipolar codes and bipolar codes is 0~16383 and -8192~8191, respectively. The two extreme values of these formats correspond to the lowest and highest output signal values, respectively (see table below). In general, the output code format is selected according to the form of output signals; i.e. unipolar codes for unipolar output signals; and bipolar codes for bipolar output signals. In doing so, their correlations will become more heuristics. Yet, as the format of output code on all channels is selected from JP1, it is the user's choice to select unipolar or bipolar codes if both are used on different channels. See diagram above for location of JP1 :

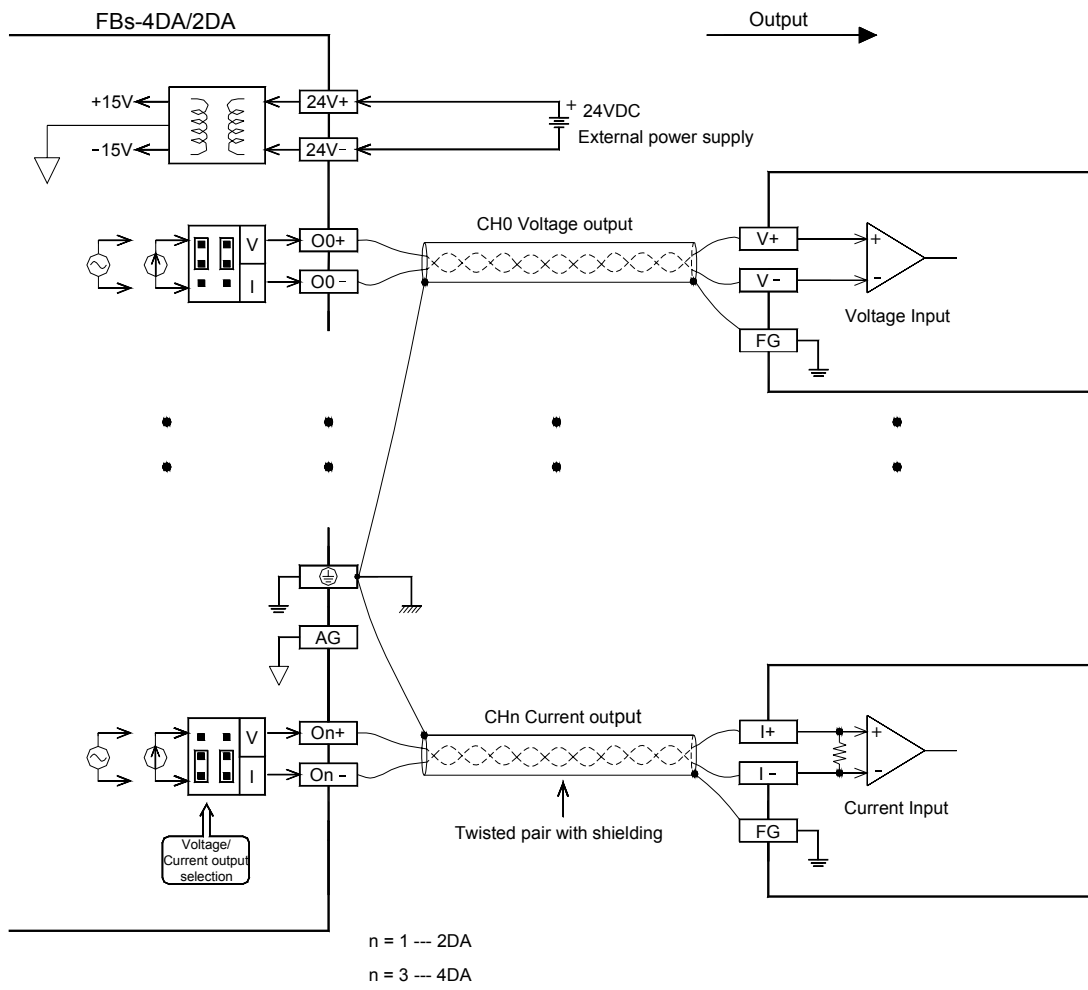
Output Code Format	JP1 Setting	Output Value Range	Corresponding Input Signals
Bipolar	JP1 	-8192 ~ 8191	-10V ~ 10V(-20mA ~ 20mA) -5V ~ 5V(-20mA ~ 20mA)
Unipolar	JP1 	0 ~ 16383	0V ~ 10V(0mA ~ 20mA) 0V ~ 5V(0mA ~ 10mA)

Output signal form setup (JPA&JPB)

Users can set the output signal form (voltage/current) of individual channels; except the polarity and amplitude which are common.

Signal Form	JPA (voltage/current) Setting	JPB (polarity/amplitude) Setting
0V ~ 10V		 ← B U  ← 10V 5V
-10V ~ 10V		 ← B U  ← 10V 5V
0V ~ 5V		 ← B U  ← 10V 5V
-5V ~ 5V		 ← B U  ← 10V 5V
0mA ~ 20mA		 ← B U  ← 10V 5V
-20mA ~ 20mA		 ← B U  ← 10V 5V
0mA ~ 10mA		 ← B U  ← 10V 5V
-10mA ~ 10VmA		 ← B U  ← 10V 5V

19.5 FBs-4DA/2DA output circuit diagram



19.6 FBs-4DA/2DA output characteristics and jumper setting

Users can select the output ranges of FBs-4DA/2DA from the jumpers described above, such as V/I, U/B (I/O codes), U/B (signal form), 5V/10V, etc. The Output signals conversion characteristics of these settings are illustrated below. Users can adjust different Output forms by coordinating the conversion curve with various V/I (voltage/current) Output settings. See Section 19.4 for details of V/I settings :

Diagram 1 : Bipolar 10V (20mA) Span

Output Range	Voltage	-10V ~ 10V	Jumper Setting		
	Current	-20mA ~ 20mA			

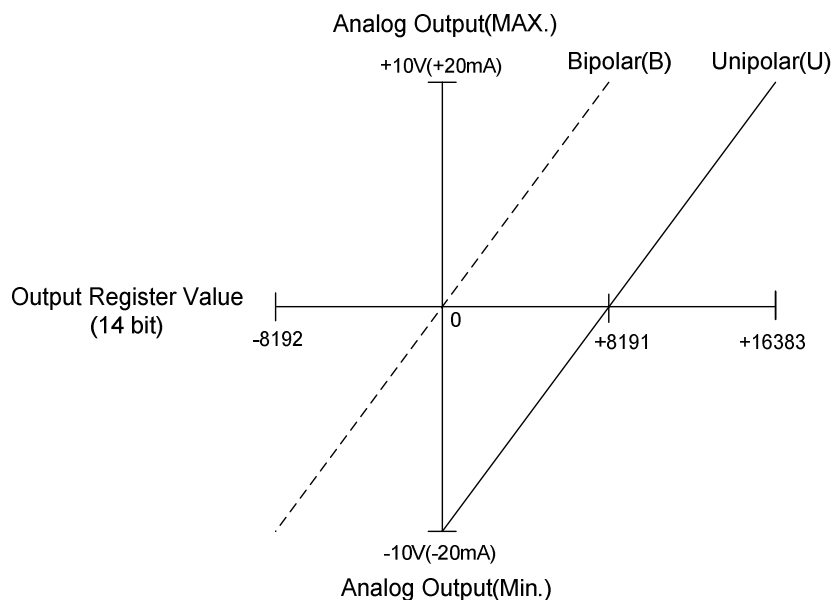


Diagram 2 : Bipolar 5V (10mA) Span

Output Range	Voltage	-5V ~ 5V	Jumper Setting		
	Current	-10mA ~ 10mA			

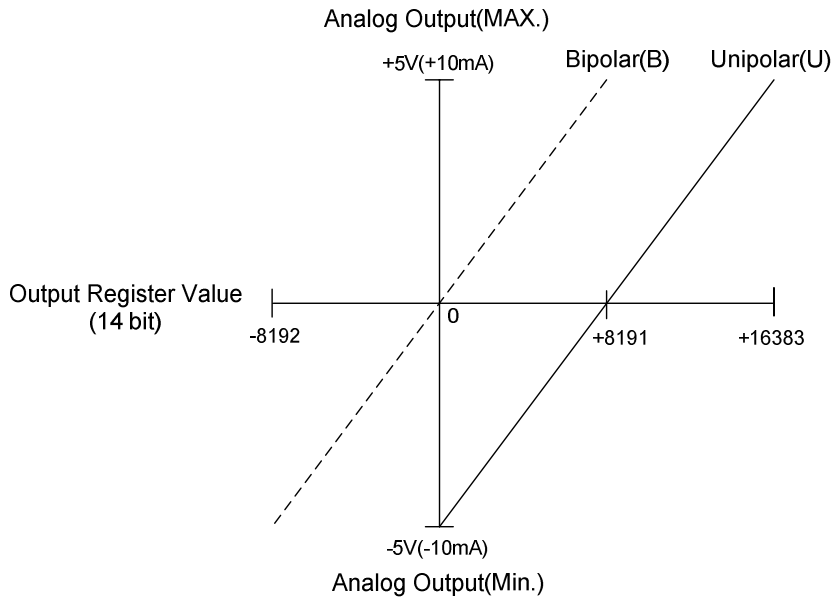


Diagram 3 : Unipolar 10V (20mA) Span

Output Range	Voltage	0V ~ 10V	Jumper Setting		
	Current	0mA ~ 20mA			

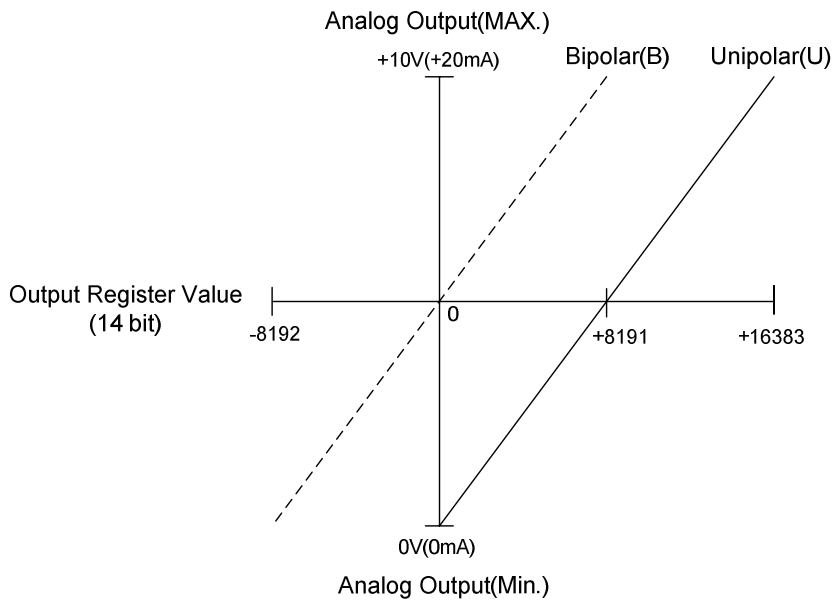
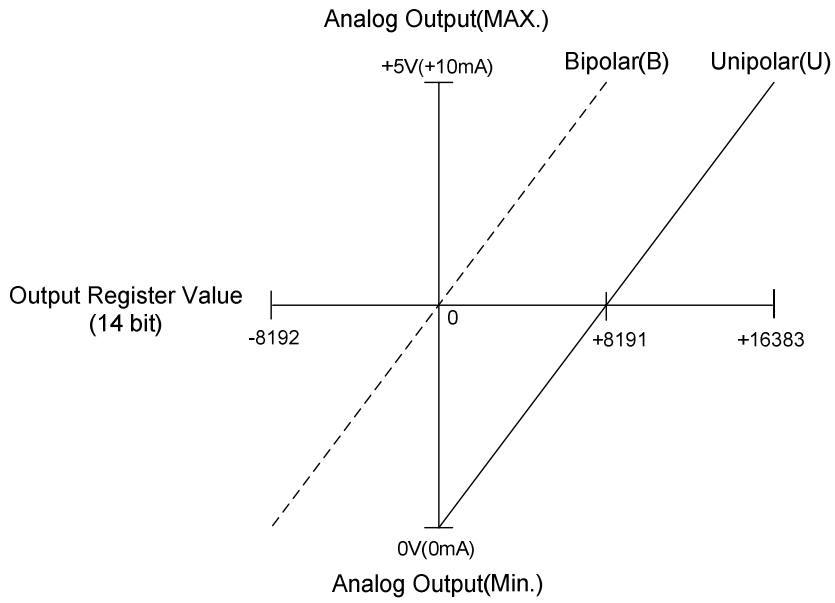


Diagram 4 : Unipolar 5V (10mA) Span

Output Range	Voltage	0V ~ 5V	Jumper Setting		
	Current	0mA ~ 10mA			





MEMO

