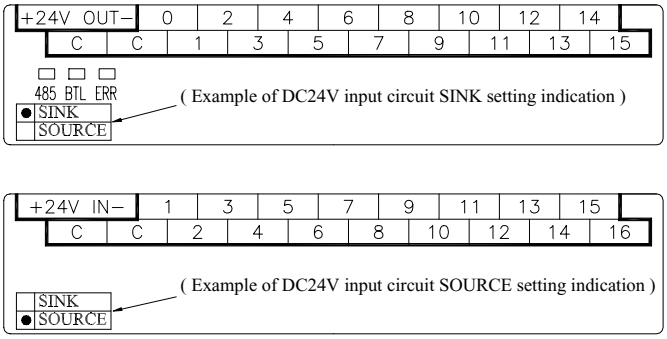
Chapter 5 Digital Input Circuit

The FBN model possesses two mixed digital input types, one DC5V high speed input type and one DC24V regular digital input type. The other models possess only DC24V input. All DC24V input circuits possess two different settings division of SINK input or SOURCE input, these settings are accomplished in factory before delivery, and indicated by "●" on SINK/SOURCE indication column of input nameplate, the figure below shows examples of DC24V SINK input or SOURCE input nameplate indication:



5.1 Digital Input (DI) Specifications

Items / Specifications		5VDC differential input	24VDC single end input		Notes
		High speed (FBN main unit) (512KHz)	Medium speed (mail unit) (20KHz) *1	Low speed (200Hz) *2	
Input signal voltage		5VDC±10%	24VDC±10%		
Threshold current	ON	>6mA	>4mA		
	OFF	<2mA	<1.5mA		
Maximum input current		20mA	6.3mA		
Output indication		LED turn on is "ON", LED turn off is "OFF" status			
Noise filtering methods		DHF(200nS～250μS)	DHF(200nS～250μS) + AHF(40μS) + DSF(0mS～30mS)	AHF(40μS) + AHF(3.3mS)	DHF: Digital hardware filter AHF: Analog hardware filter DSF: Digital software filter
Isolation method		Photocouple isolation			
SINK/SOURCE polarity setting		Set by wiring	Set by jumper (Except for high density input)		
Response speed division of various model	FBN-20MC	X0～X3	X4～X11		
	FBN-28MC	X0～X7	X8～X15		
	FBN-40MC	X0～X15		X16～X23	
	FBE-20MA		X0～X7	X8～X11	
	FBE-28MA		X0～X7	X8～X15	
	FBE-40MA		X0～X7	X8～X23	
	FBE-20MC		X0～X11		
	FBE-28MC		X0～X15		
	FBE-40MC		X0～X15	X16～X23	
	Expansion unit/module			all input points	

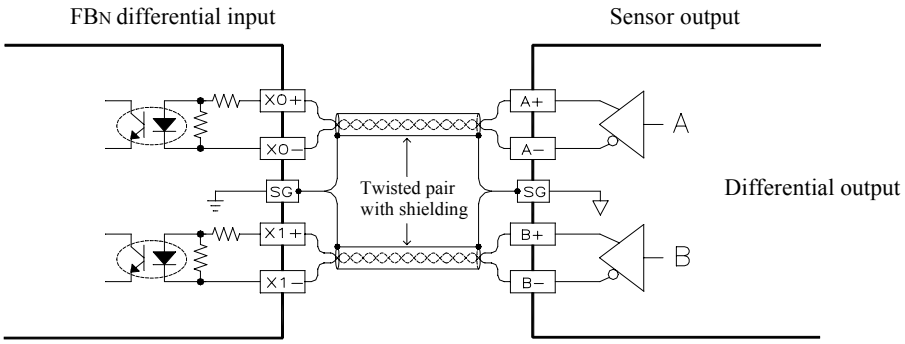
*1：The total counting frequency of SHSC is limited by 8KHz.

*2：Although low-speed single end input can up to 200Hz CPU scan time will determinate whether the input can be detected by CPU.

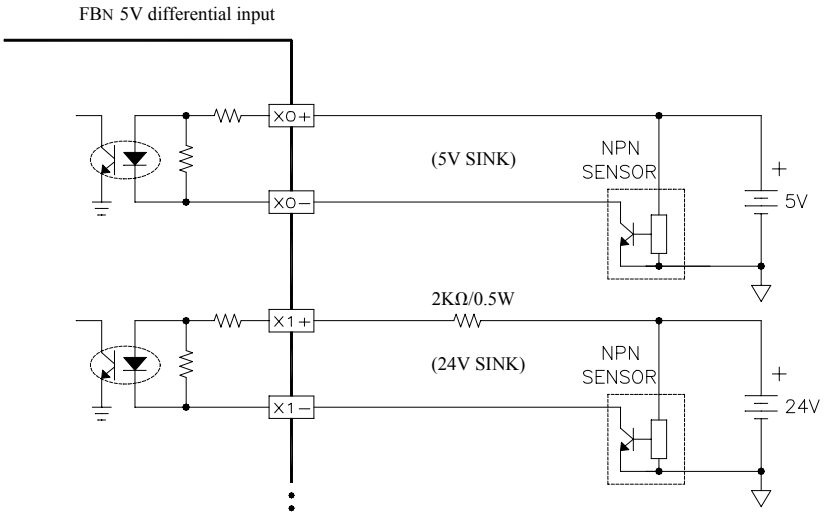
5.2 Structure and Wiring of FBN DC5V High Speed Differential Input Circuit

X0~X3 of FBN-19MCT, X0~X7 of FBN-26MCT and X0~X15 of FBN-36MCT are all DC5V high-speed differential inputs (the others are DC24V inputs). The working frequency of these high speed inputs can go up to 512KHz, which is mainly used in connection of differential (dual line) LINE DRIVER output, but single ended DC5V SINK/SOURCE input may be used in low noise and frequency (less than 50KHz) condition, or in serial with a 2KΩ/0.5W resistor to change to single ended DC24V SINK/SOURCE input.

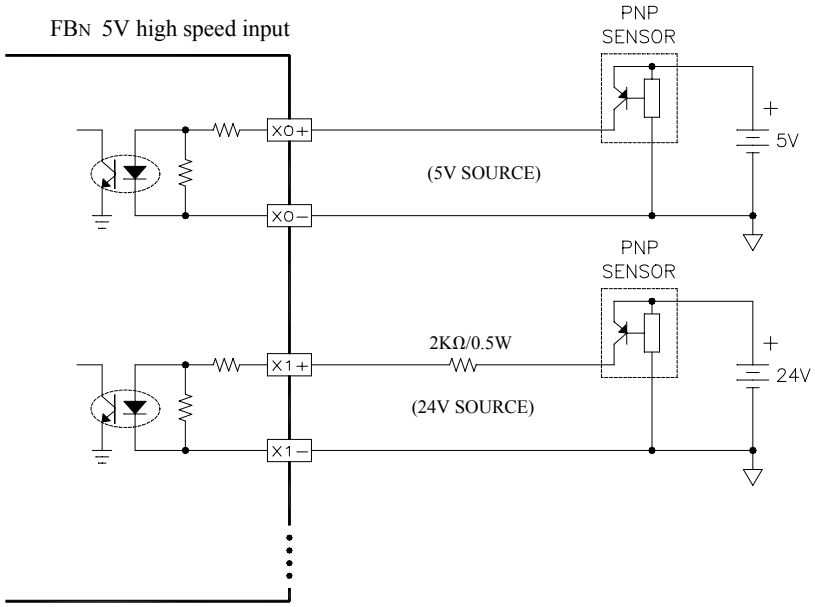
(A) Connection of differential input （for high speed, high noise）



(B) Method of converting DC5V differential input to DC24V single ended SINK input



(C) Method of converting DC5V input to DC24V single ended SOURCE input

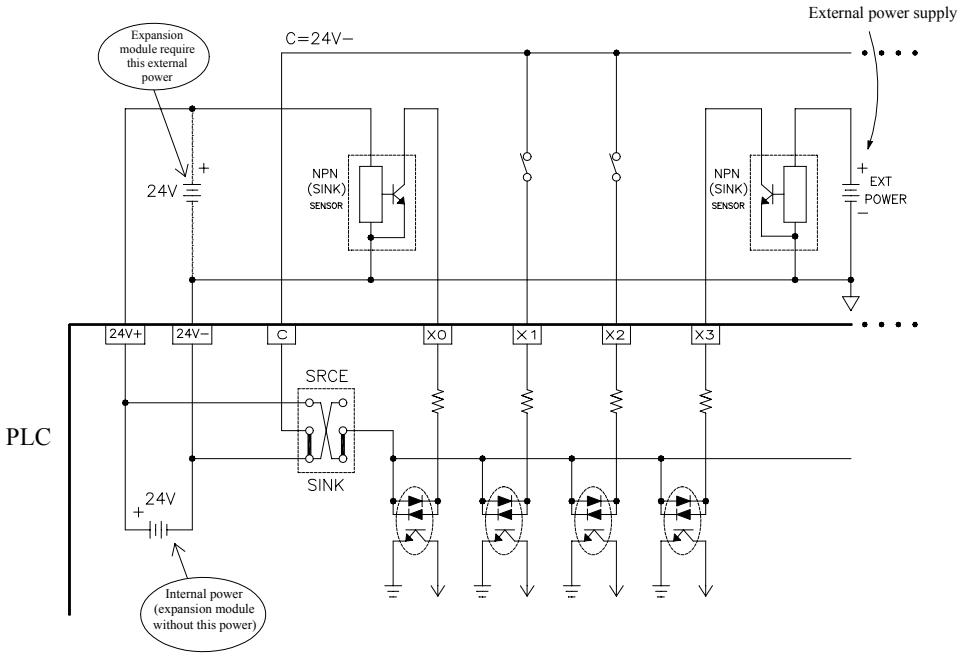


5.3 DC24V Single End Input

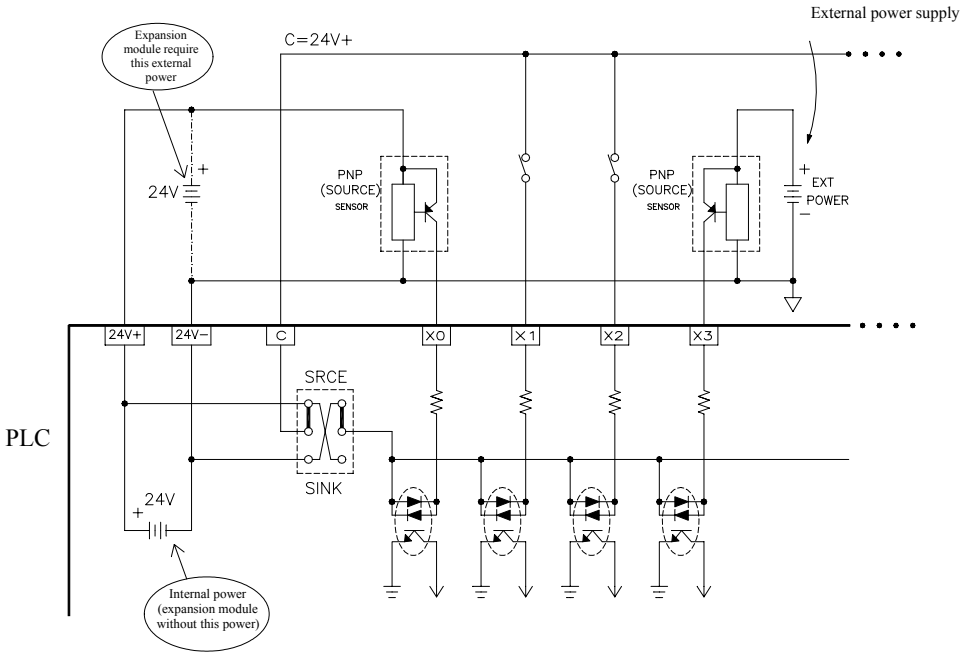
5.3.1 Structure and Wiring of DC24V Single End Input Circuit

The inputs other than DC5V differential input on FBN are DC24V input circuit. Regardless of being a main unit or expansion unit/module, there is medium speed and low speed response in DC24V input on main unit, and the DC24V input on the expansion units and expansion modules have low speed inputs.

- SINK method



- SOURCE method

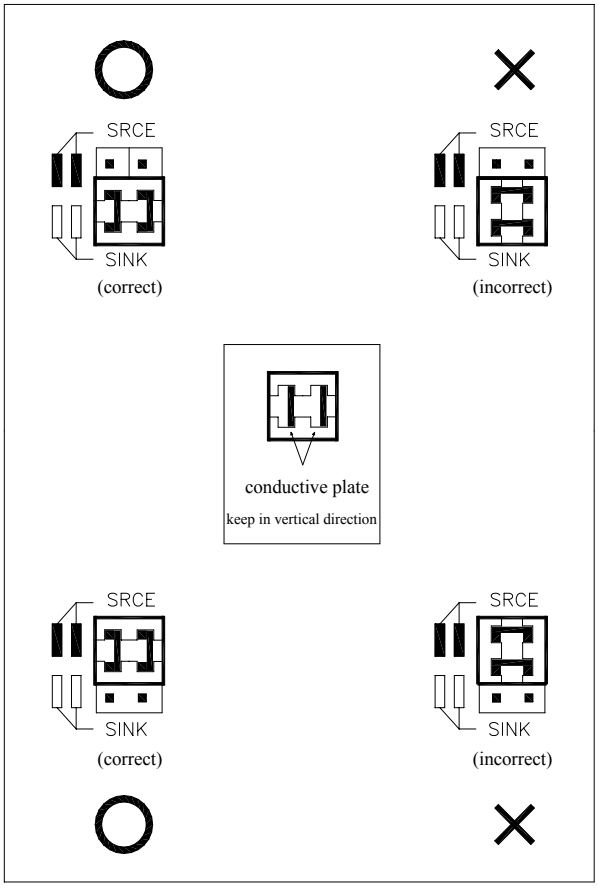


⚠ Warning
There is a DC24V power supply provided for external sensors in the PLC main unit or expansion unit, but with limited capacity. External power supply is required in case of insufficient power as illustrated at above. Pay special attention for the negative of the external power supply and should be connected to the negative of the DC24V provided by the PLC. But never connect the positive side of both (i.e. no parallel connection). Parallel connection will cause conflict of both power supply and burn the PLC power supply or both, resulting unpredictable PLC output and may lead to death of personnel and major loss of equipment and property.

5.3.2 Setting Procedure of SINK or SOURCE Input Type of DC24V Input circuit

⚠ Warning
1. The setting of the SINK or SOURCE input of the input circuit is done before delivery; the user should specify the model of SINK or SOURCE input. Tampering of settings is not allowed. 2. Professional personnel may change the SINK or SOURCE setting as per following procedure, but there must be consistence in order to avoid maintenance problem later. Pay special attention to the orientation of the conductive plate of the jumper while setting the pin. Plug into the SINK or SOURCE position vertically according to the indication symbol on the pin of the left side of JP1. If incorrectly placed in transverse direction, it will cause short circuit of DC24V power supply, resulting in overload of the internal power of the PLC causing no output or burning the external 24V power supply, or leading to unpredictable output of the PLC causing death of personnel and major loss of property.

1. All settings should be done under power off condition to the PLC.
2. Open middle small cover plate on the upper cover, remove the lithium batteries from the battery holder on the upper cover, unscrew the screws surrounding the upper cover and remove the cover, JP1 can be found at the upper right terminal block of the PCB board.
3. Follow the instructions in the figure below to set the SINK or SOURCE type with JP1.



4. Replace the upper cover and put in the screws and tighten them, place the lithium batteries back into the battery holder and plug into the battery connector securely.
5. Replace the middle small cover on the upper cover and change the SINK/SOURCE indication column to be consistent with the new settings.

5.3.3 Structure and Wiring of DC24V Single End Input Circuit of High Density

The high density expansion module only provides the DC24V single end SINK type inputs, it is not allowed to change the input type to be source type. The internal circuit and wiring diagram is shown below: