

### Transmission Units Transmitting Input and Output Signals

- Transmit eight input signals and eight output signals over three wires (or four wires if only one terminal has power supply).
- Transistor and relay inputs can be connected to the input terminals.
- Compact and space-saving.



### Ordering Information

#### ■ Model Number Legend

B7AM - 8 □ □ □  
1 2 3 4 5

##### 1. Classification

M: I/O combination model

##### 2. Number of I/O

8: Eight input points and eight output points

##### 3. Input/Output Configuration

B: NPN input and 100-mA NPN open collector output per point

F: PNP input and 100-mA PNP open collector output per point

##### 4. Error Processing

1: HOLD

3: LOAD OFF

##### 5. I/O Delay Time (Typical)

1: 19.2 ms (Screw terminals)

6: 3 ms (Screw terminals)

#### ■ Product List

Refer to page 114 for details.

#### ■ I/O Combinations

Refer to pages 1 to 5 for details.

# Specifications

## ■ Characteristics

### General

	Normal speed	High speed
<b>Communications method</b>	Unidirectional, time-division multiplex	
<b>Transmission distance (see note 1)</b>	500 m max.	100 m max. (see note 2)
<b>I/O delay time</b>	Typical: 19.2 ms; 31 ms max.	Typical: 3 ms; 5 ms max.
<b>Minimum input time (see note 3)</b>	16 ms	2.4 ms
<b>Operating voltage range</b>	12 to 24 VDC (10.8 to 26.4 VDC) (see note 1)	
<b>Insulation resistance</b>	100 MΩ min. (500 V) between each terminal and external parts	
<b>Dielectric strength</b>	1,000 VAC, 50/60 Hz for 1 min between each terminal and external parts	
<b>Noise immunity (see note 4)</b>	Noise level: 1.5 kV; pulse width: 100 ns to 1 μs (on transmission line due to coupling)	
<b>Vibration resistance</b>	10 to 55 Hz, 1.5-mm double amplitude	
<b>Shock resistance</b>	300 m/s <sup>2</sup>	
<b>Ambient temperature</b>	Operating: -10 to 55°C (with no icing) Storage: -25 to 65°C (with no icing)	
<b>Ambient humidity</b>	Operating: 35% to 85% (with no condensation)	

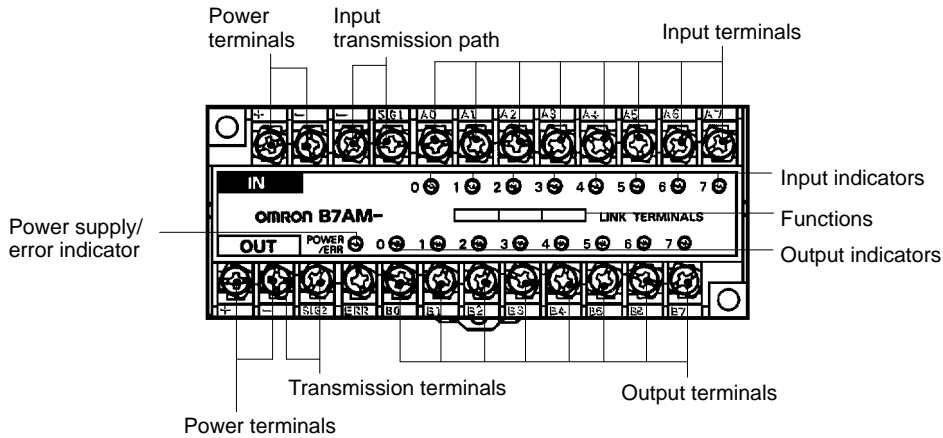
- Note:**
1. The transmission distance values stated in this table are possible if the Input or Output Link Terminal is connected to an independent power supply. If a single power supply is connected to the Input or Output Link Terminal, the supply voltage must be 24 VDC ±10%, in which case the transmission distance of a normal-speed model is 100 m maximum and that of a high-speed model is 50 m maximum.
  2. A shielded transmission cable or a VCTF cable with a thickness of 0.75 mm<sup>2</sup> minimum must be used for signal transmission. If the VCTF cable is used, however, the transmission distance will be 10 m maximum regardless of whether or not independent power supplies for the Input and the Output Link Terminals are used.
  3. The minimum input time is required for the B7AM to read an input signal.
  4. As for the high-speed model, these values are possible without grounding the shielded line.

## Screw Terminal Models

Item	B7AM-8B11/-8B31/-8B16/-8B36	B7AM-8F31
Compatible inputs (see note 1)	Switches, two-wire sensors with DC output, three-wire NPN sensors	Switches, two-wire sensors with DC output, three-wire PNP sensors
I/O delay time	B7AM-8B□1: normal speed (typical 19.2 ms); B7AM-8B□6: high speed (typical 3 ms)	Normal speed (typical 19.2 ms)
Input logic	Active low	Active high
Current consumption (see note 2)	120 mA max. with all input/output terminals ON	
Operating voltage range	12 to 24 VDC	
Input voltage range	0 VDC to supply voltage	
Input current range	-6 to -3 mA/point (current flowing from input terminals)	3 to 6 mA/point (current flowing from input terminals)
Minimum input time	B7AM-8B□1: 16 ms; B7AM-8B□6: 2.4 ms	
ON/OFF threshold	No-contact input: ON voltage: 4 V max. OFF voltage: 6 V min. Contact input: ON discrimination resistance: 660 Ω max. OFF discrimination resistance: 2 kΩ min.	
Output configuration	NPN open collector	PNP open collector
Rated load voltage	5 to 24 VDC	
Output residual voltage	0.8 V max.	
Output current	Sync. current, 100 mA max./ point	
Error processing	B7AM-8B1□: HOLD; B7AM-8B3□: LOAD OFF	LOAD OFF
Mounting strength	No damage when 49-N pull is applied for 1 min each in all directions	
Terminal strength	No damage when 49-N pull is applied for 1 min each in all directions	
Tightening torque	0.78 to 1.18 N • m	
Weight	Approx. 140 g	

- Note:**
- Power must be supplied to the three-wire sensor via the positive power supply terminal or from an independent power supply. Two-wire sensors must satisfy the following requirements:  
Residual voltage: 4 V max.  
Current leakage: 1.5 mA max.  
The lower limit of control output: 3 mA (Use a bleeder resistor to eliminate this restriction.)
  - Consumption when all 8 input/output points are ON. Excludes external sensor current for Input Terminals and external load current and error load current for Output Terminals.

# Nomenclature



## Indicator Operation

Indicator	Function
POWER/ERR	G Lit when power is supplied and the Terminal is operating without error.
	R Lit during transmission errors (SIG2).
	N Not lit when power is not supplied.
I/O	O Lit when the input signals are ON.
	N Not lit when the signals are OFF.

**Note:** G: Green indicator lit; R: Red indicator lit; O: Orange indicator lit; N: Not lit

## Recommended Solderless Terminals

Wire	JIS specifications
0.75 mm <sup>2</sup> (AWG#18)	RAV 1.25 to 3.5 (vinyl-insulated round wire) or RAP 1.25 to 3.5
1.25 mm <sup>2</sup> (AWG#16)	(nylon-insulated round wire)

## Functions

Display	Description
	<b>I/O configuration</b> Indicates the compatible transistor type.
	<b>Output current</b> Indicates the rated output current value of the B7A per point.
	<b>I/O delay time</b> Indicates the typical I/O delay time of the B7A. Use a combination of an Input and Output Link Terminal with the same I/O delay time.

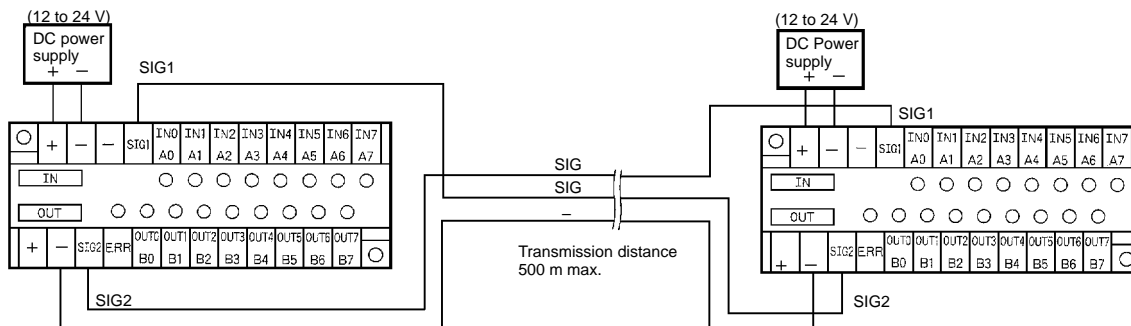
# Operation

## Power Supply

The two positive and three negative terminals on the terminal block are internally connected on the terminal block. Use a positive terminal and negative terminal for the power supply terminals and another negative terminal for the negative signal line. Connect the SIG1 terminals to SIG2 terminals for the signal lines.

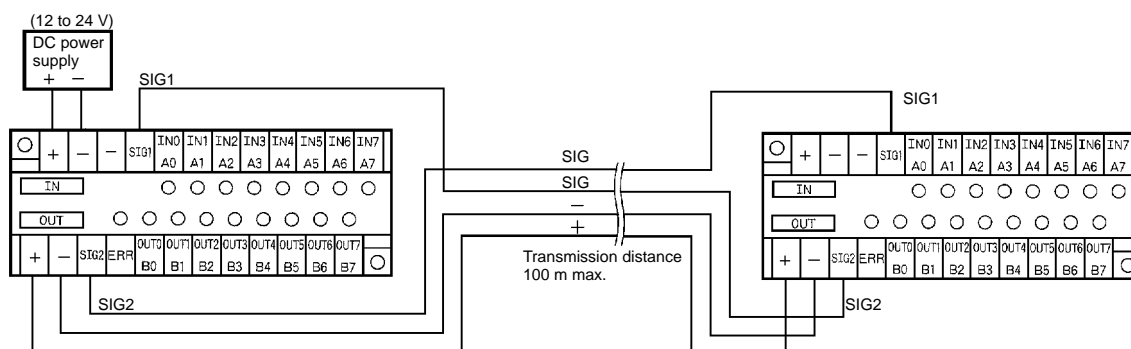
### I/O Delay: Normal Speed

#### Connection of Independent Power Supplies



**Note:** A VCTF cable with a thickness of 0.75 mm<sup>2</sup> min. must be used for signal transmission.

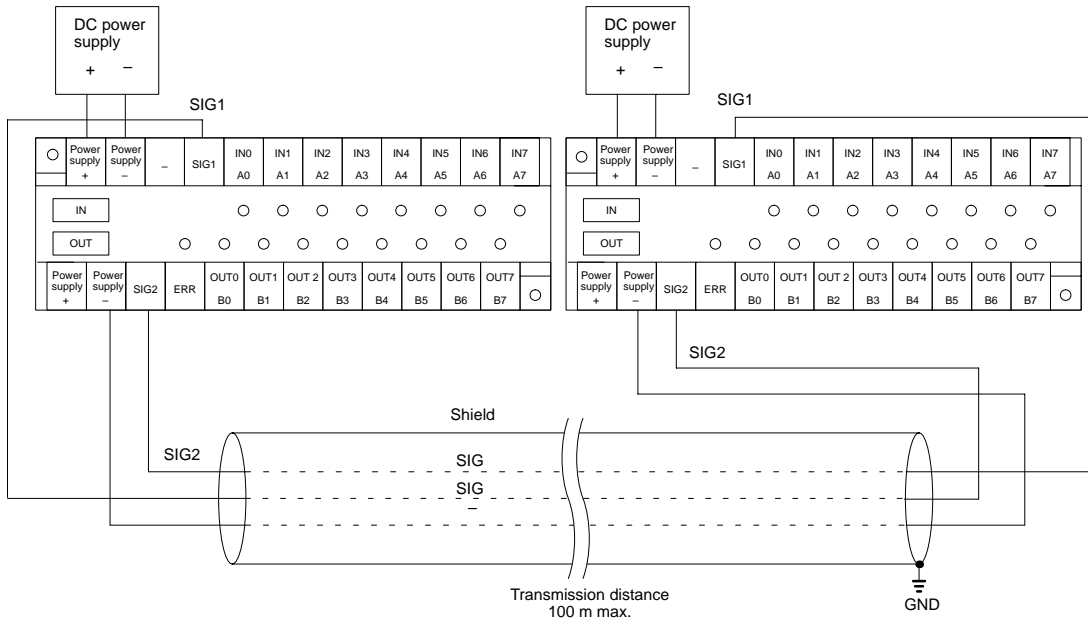
#### Connection of Single Power Supply to Input or Output Terminal



**Note:** In this example, a VCTF transmission cable with a thickness of 0.75 mm<sup>2</sup> min. is used, through which a current of 1.8 A max. can be transmitted.

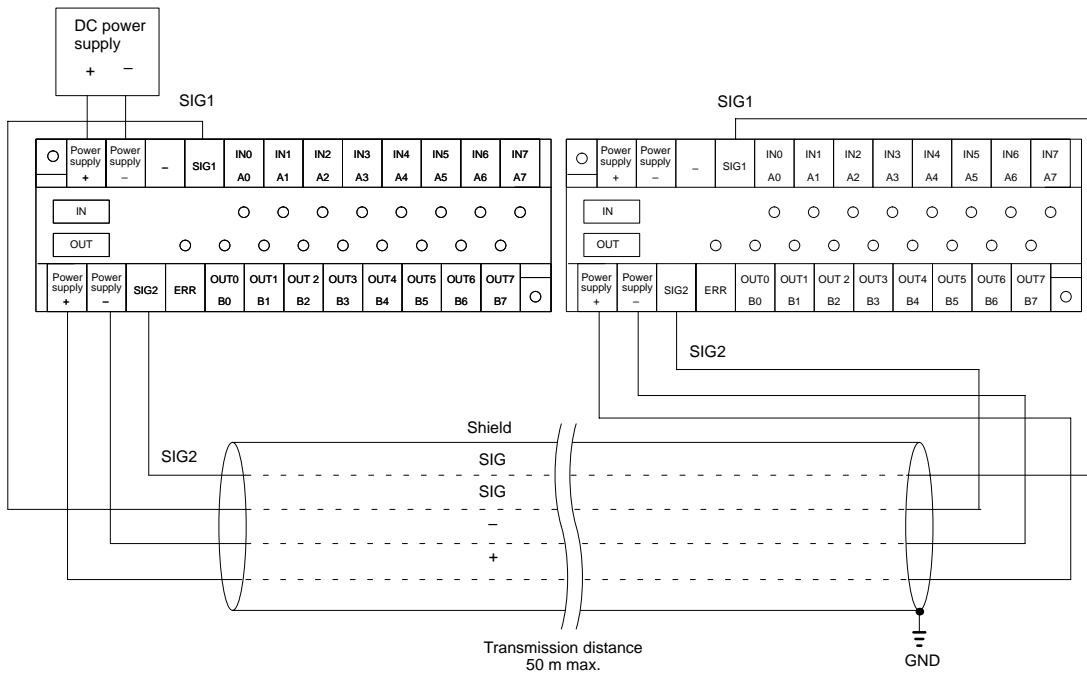
I/O Delay: High Speed

Connection of Independent Power Supplies



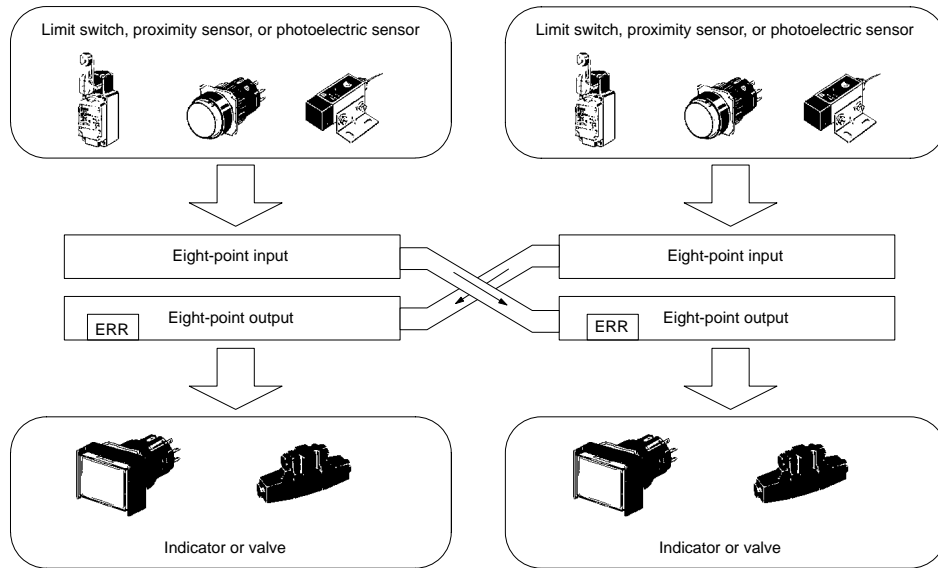
**Note:** A shielded cable with a thickness of 0.75 mm<sup>2</sup> min. must be used for signal transmission. It is recommended that the shield be grounded.  
 The maximum transmission distance is 10 m if a VCTF wire with a thickness of 0.75 mm<sup>2</sup> is used instead of a shielded cable for the transmission path.

Connection of Single Power Supply to Input or Output Terminal



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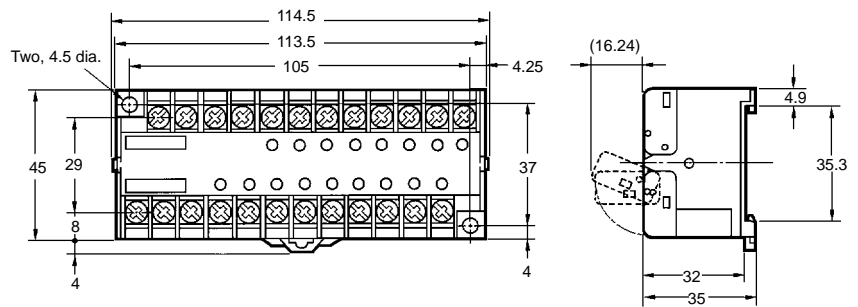
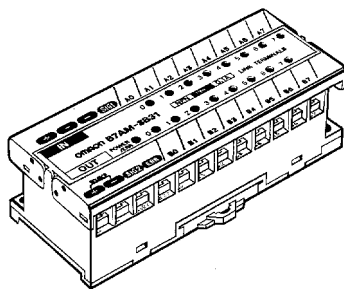
■ Operation



**Note:** The B7AM transmits input signals from SIG1 (input terminal) to SIG2 (output terminal). If an error results while the B7AM is transmitting input signals, an error signal is output from the output side only.

Dimensions

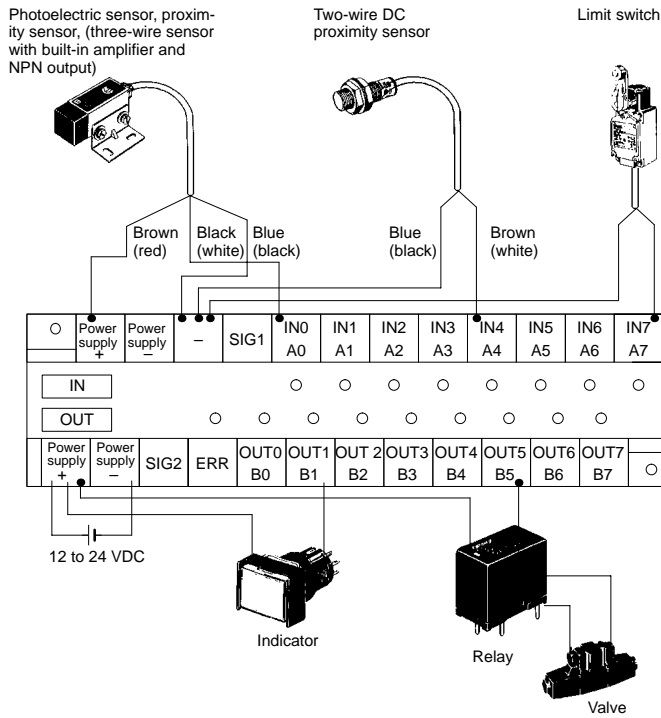
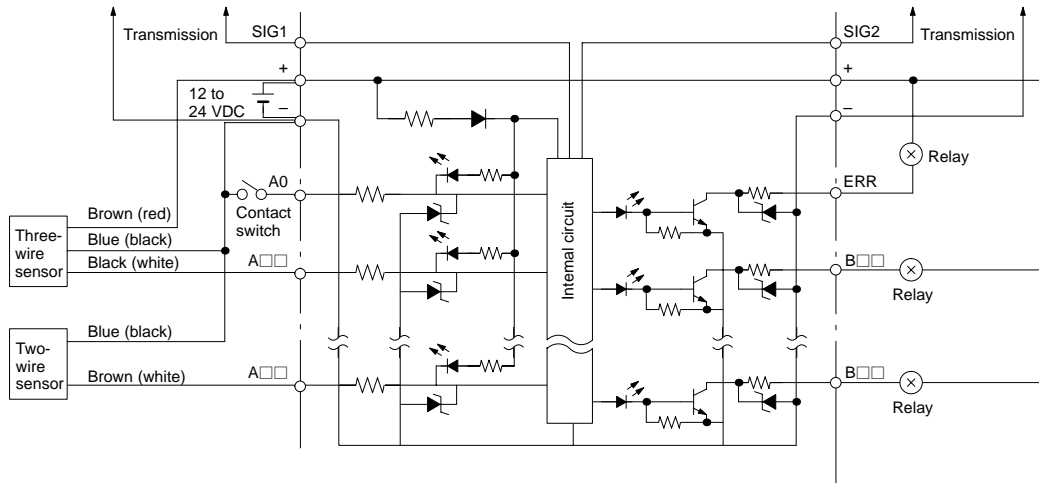
**Note:** All units are in millimeters unless otherwise indicated.



# Installation

## Internal Circuits and Terminal Arrangement

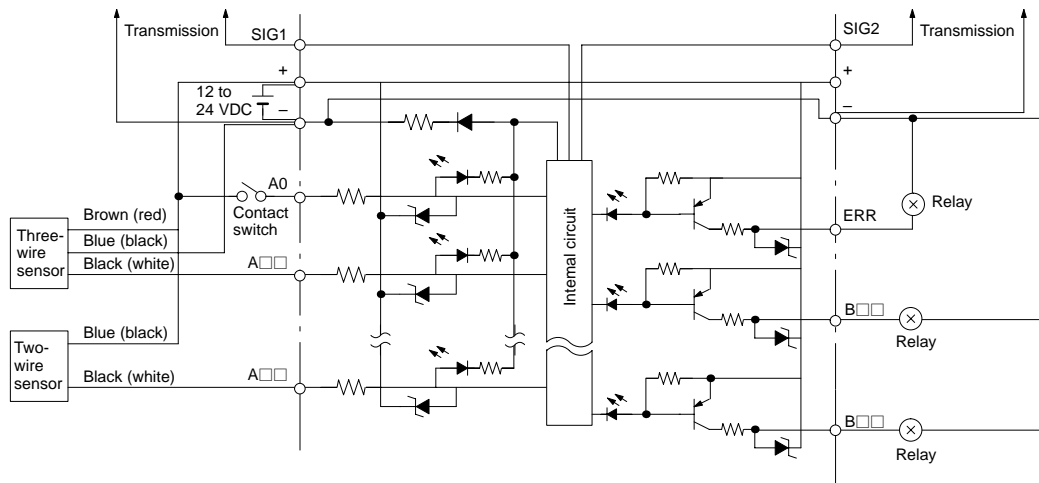
**B7AM-8B11/-8B16/-8B31/-8B36**  
 (Input, Active Low/Output, NPN Open Collector)



**Note:** The wire colors have been changed in accordance with the revision of the Japanese Industrial Standards for photoelectric sensors and proximity sensors. The colors in parentheses refer to the old colors.



**B7AM-8F31**  
 (Input, Active High/Output, PNP Open Collector)



Photoelectric sensor, proximity sensor, (three-wire sensor with built-in amplifier and NPN output)

Two-wire DC proximity sensor

Limit switch

