Transmit Signals while Saving Space and Wiring Effort

- More economical than previous multipoint transmission terminals.
- Transmit 16 input signals over just 2 wires (or 3 wires if only one Terminal has power supply.)
- Models available with normal I/O delay time (19.2 ms typical) or short I/O delay time (3 ms typical).
- Models available with the HOLD function or LOAD OFF function for processing transmission errors.
- A series of B7AS models as compact as 10-point screw terminal models are available.

Ordering Information

■ Model Number Legend

Input Models

B7A□ - T 6 □ □
1 2 3 4 5

1. Series
None: Standard
S: Small

2. Input/Output Classification
T: Input

3. Number of I/O Points
6: 16

4. Input Logic/Internal I/O Common

4	Input logic	Internal I/O common
A	NPN compatible	– common
B	NPN compatible	+/– common
C	PNP compatible	+/– common
D	PNP (TTL) compatible	---

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

5	I/O delay time	Appearance
1	19.2 ms	Screw terminals
2	19.2 ms	Module
6	3 ms	Screw terminals
7	3 ms	Module

Output Models

B7A□ - R 6 □ □ □
1 2 3 4 5 6

1. Series
None: Standard
S: Small

2. Input/Output Classification
R: Output

3. Number of I/O Points
6: 16

4. Output Logic/Output Capacity

3	Output logic	Output capacity
A	NPN open collector	0.05 A/point
B	NPN open collector	0.1 A/point
C	NPN open collector	0.5 A/point
F	PNP open collector	0.1 A/point
G	PNP open collector	0.5 A/point

5. Error Processing
1: HOLD
3: LOAD OFF
5: HOLD/LOAD OFF

6. I/O Delay Time (Typical)/Appearance

5	I/O delay time	Appearance
1	19.2 ms	Screw terminals
2	19.2 ms	Module
6	3 ms	Screw terminals
7	3 ms	Module

■ 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
Communications method	Unidirectional, time-division multiplex	
Transmission distance (see note 1)	500 m max.	100 m max. (see note 2)
I/O delay time	Typical: 19.2 ms; 31 ms max.	Typical: 3 ms; 5 ms max.
Minimum input time (see note 3)	16 ms	2.4 ms
Operating voltage range	12 to 24 VDC (10.8 to 26.4 VDC) (see note 1)	
Insulation resistance	100 MΩ min. (500 V) between each terminal and external parts	
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between each terminal and external parts	
Noise immunity (see note 4)	Noise level: 1.5 kV; pulse width: 100 ns to 1 μs (on transmission line due to coupling)	
Vibration resistance	10 to 55 Hz, 1.5-mm double amplitude	
Shock resistance	300 m/s^2	
Ambient temperature	Operating: –10 to 55°C (with no icing) Storage: –25 to 65°C (with no icing)	
Ambient humidity	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. Refer to *Power Supply* on page 21 for details.

2. A shielded transmission cable or a VCTF cable with a thickness of 0.75 mm^2 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 B7A/B7AS to read an input signal.

4. For high-speed models, these values are possible without grounding the shielded line.

Input Models

Item	Screw terminal models		
	B7A-T6A1/-T6A6	**B7A-T6B1/-T6B6**	**B7AS-T6B1/-T6B6**
Compatible inputs (see note 1)	Switches, two-wire sensors with DC output, three-wire NPN sensors		
Input logic	Active low		
I/O delay time	B7A□-T6□1: normal speed (typical 19.2 ms); B7A□-T6□6: high speed (typical 3 ms)		
Current consumption (see note 2)	120 mA max. with all input 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)		
Minimum input time	B7A□-T6□1: 16 ms; B7A□-T6□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.		
Mounting strength	No damage when 49-N pull is applied for 1 min each in all directions (except in direction of DIN track)		
Terminal strength	No damage when 49-N pull is applied each in all directions		
Tightening torque	0.78 to 1.18 N • m		
Weight	Approx. 160 g		Approx. 130 g

Note: 1. All B terminals of the B7A-T6A□ are negative terminals; 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 breeder resister to eliminate this restriction.)

2. Consumption when all 16 points are ON. Excludes external sensor current for Input Terminals.

Item	Screw terminal models	Modular models	Compact modular models
	B7A-T6C1/-T6C6	B7A-T6D2/-T6D7	B7A-T6D7-D
Compatible inputs	Switches, two-wire sensors with DC output, 3-wire PNP sensors	TTLs, switches, 3-wire PNP sensors (see note 2)	TTLs, switches, 3-wire PNP sensors
Input logic	Active high		Active low
I/O delay time	B7A-T6C1: normal speed (typical 19.2 ms); B7A-T6C6: high speed (typical 3 ms)	B7A-T6D2: normal speed (typical 19.2 ms); B7A-T6D7: high speed (typical 3 ms)	---
Current consumption (see note 3)	120 mA max. with all input terminals ON	60 mA max. with all input terminals ON	
Operating voltage range	12 to 24 VDC		---
Input voltage range	0 VDC to supply voltage		
Input current range	3 to 6 mA/point	0.2 to 2 mA/point (input voltage: 5 to 24 VDC)	–1.1 to –0.5 mA/point (flowing out from terminals)
Minimum input time (see note 4)	B7A-T6C1: 16 ms; B7A-T6C6: 2.4 ms	B7A-T6D2: 16 ms; B7A-T6D7: 2.4 ms	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.	ON voltage: 2.2 V min. OFF voltage: 0.8 V max.	ON voltage: 3 V max. OFF voltage: 6 V max.
Mounting strength	No damage when 49-N pull is applied for 1 min each in all directions (except in direction of DIN track)	---	---
Terminal strength	No damage when 49-N pull is applied each in all directions	---	---
Tightening torque	0.78 to 1.18 N • m	---	---
Weight	Approx. 160 g	Approx. 23 g	Approx. 25 g

Note: 1. If there is a possibility of noise interference from the power supply, input, and/or output lines, add appropriate noise protection circuits. Refer to *Noise Protection Circuits* on page 101 for details.

2. A 3-wire NPN sensor with a residual voltage of 0.8 V maximum and a built-in collector load can be used. In this case, however, when the output transistor of the sensor is ON, the B7A will be OFF.

3. Consumption when all 16 points are ON. Excludes external sensor current for Input Terminals.

4. The minimum input time is required for the B7A to read an input signal.

Output Models

Item	Screw terminal models (100 mA/point)		
	B7A-R6B11/-R6B16/ -R6B31/-R6B36	B7AS-R6B11/-R6B16/ -R6B31/-R6B36	B7A-R6F11/-R6F16/ -R6F31/-R6F36
Output configuration	NPN open collector		PNP open collector
I/O delay time	B7A□-R6□□1: normal speed (typical 19.2 ms); B7A□-R6□□6: high speed (typical 3 ms)		
Error processing	B7A□-R6□1□: HOLD; B7A□-R6□3□: LOAD OFF		
Current consumption (see note)	80 mA max. with all output terminals ON	120 mA max. with all output terminals ON	80 mA max. with all output terminals ON
Power supply voltage	12 to 24 VDC		
Rated load voltage	5 to 24 VDC		
Output residual voltage	0.8 V max.		
Output current	Sync. current, 100 mA max./ point		Source current, 100 mA max./ point
Mounting strength	No damage when 49-N pull is applied for 1 min each in all directions (except in direction of DIN track)		
Terminal strength	No damage when 49-N pull is applied each in all directions (except in direction of DIN track)		
Tightening torque	0.78 to 1.18 N • m		
Weight	Approx. 160 g	Approx. 130 g	Approx. 160 g

Note: Consumption when all 16 points are ON. Excludes external load current and error load current for Output Terminals.

Item	Screw terminal models (500 mA/point)		Modular models	Compact modular models
	B7A-R6C11/-R6C16/ -R6C31/-R6C36	B7A-R6G11/-R6G16/ -R6G31/-R6G36	B7A-R6A52/-R6A57	B7A-R6A57-D
Output configuration	N-channel MOS-FET open drain (NPN compatible)	P-channel MOS-FET open drain (PNP compatible)	NPN open collector	
I/O delay time	B7A-R6□□1: normal speed (typical 19.2 ms); B7A-R6□□6: high speed (typical 3 ms)		B7A-R6A52: normal speed (typical 19.2 ms) B7A-R6A57: high speed (typical 3 ms)	---
Error processing	B7A-R6□1□: HOLD; B7A-R6□3□: LOAD OFF		HOLD (H/L terminals open) LOAD OFF (H/L terminals connected to 0 V)	
Current consumption (see note 1)	100 mA max. with all output terminals ON		40 mA max. with all output terminals ON	
Power supply voltage	12 to 24 VDC			---
Rated load voltage	5 to 24 VDC			
Output residual voltage	0.8 V max.			
Output current	Sync. current, 500 mA max./point (see note 2)	Source current, 500 mA max./point (see note 2)	Sync. current, 50 mA max./point	
Mounting strength	No damage when 49-N pull is applied for 1 min each in all directions (except in direction of DIN track)		---	---
Terminal strength	No damage when 49-N pull is applied each in all directions (except in direction of DIN track)		---	---
Tightening torque	0.78 to 1.18 N • m		---	---
Output logic	---		Active high (N/P terminals open) Active low (N/P terminals connected to 0 V) (see note 3)	Active low
Weight	Approx. 170 g		Approx. 23 g	Approx. 25 g

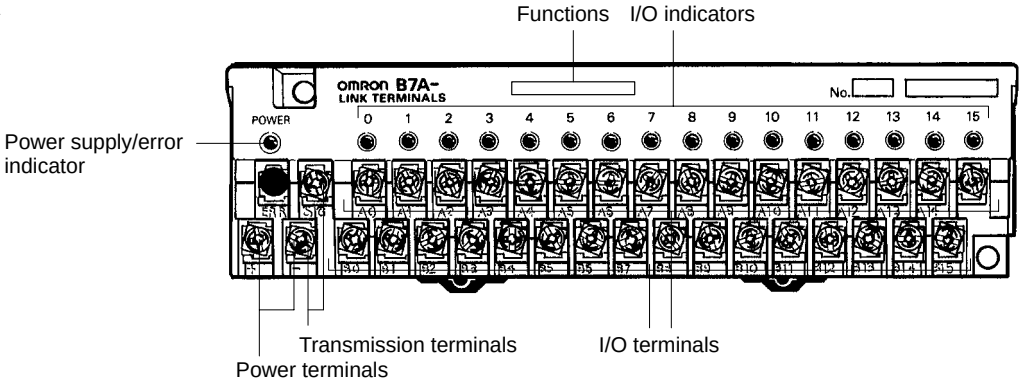
Note: 1. Consumption when all 16 points are ON. Excludes external load current and error load current for Output Terminals.

2. If a single power supply is connected to the Input or Output Link Terminal via a VCTF cable with a thickness of 0.75 mm^2 minimum, the current flow must not exceed 1.8 A.

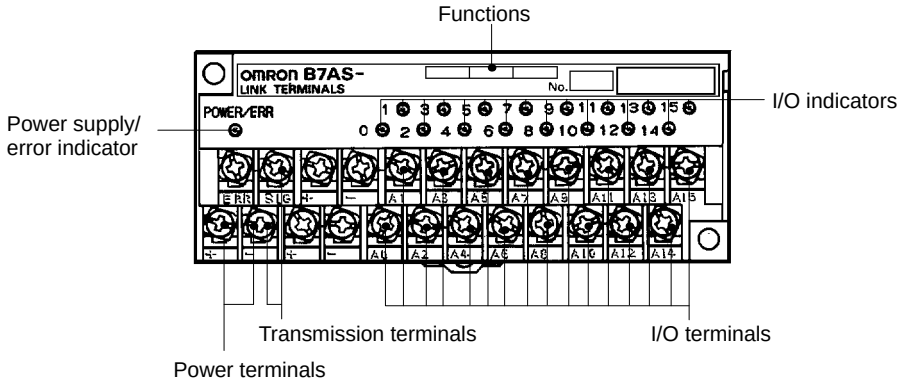
3. Refer to *I/O Status* on page 102 for the relationship between the output logic and output ON/OFF status of the B7A.

Nomenclature

B7A



B7AS



Indicator Operation

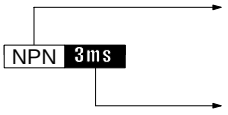
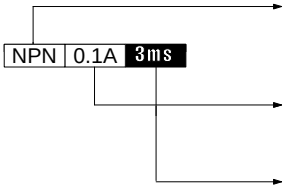
Indicator		Function
POWER (Input Terminal)	G	Lit when power is supplied and the Terminal is operating.
	N	Not lit when power is not supplied.
POWER/ERR (Output Terminal)	G	Lit when power is supplied and the Terminal is operating without error.
	R	Lit during transmission errors.
	N	Not lit when power 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^2 (AWG#18)	RAV 1.25 to 3.5 (vinyl-insulated round wire) or RAP 1.25 to 3.5 (nylon-insulated round wire)
1.25 mm^2 (AWG#16)	

Functions

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

Operation

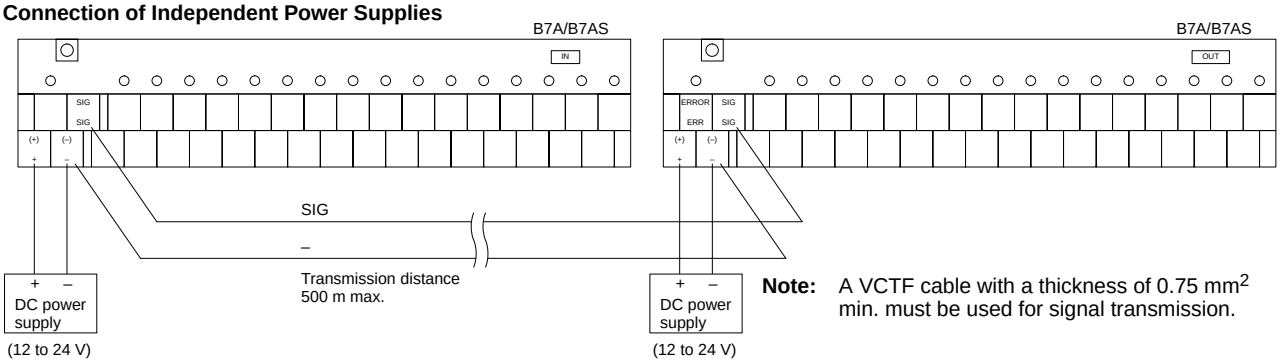
■ Power Supply

There are normal-speed and high-speed 16-point models, which are different in recommended transmission cable and transmission distance. If only a single power supply is connected to either the input model or output model, the current on the power line will be limited.

Screw Terminal Models

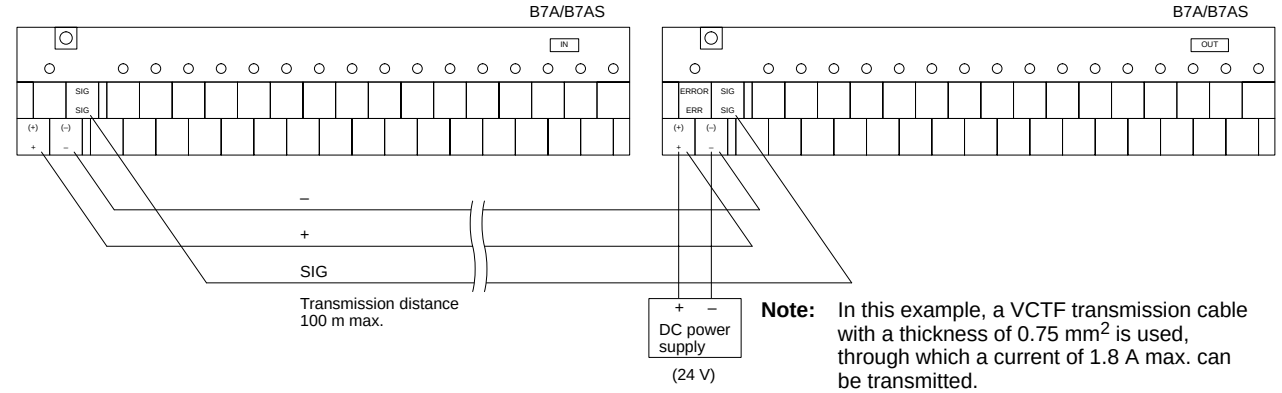
I/O Delay: Normal Speed

Connection of Independent Power Supplies



Note: A VCTF cable with a thickness of 0.75 mm^2 min. must be used for signal transmission.

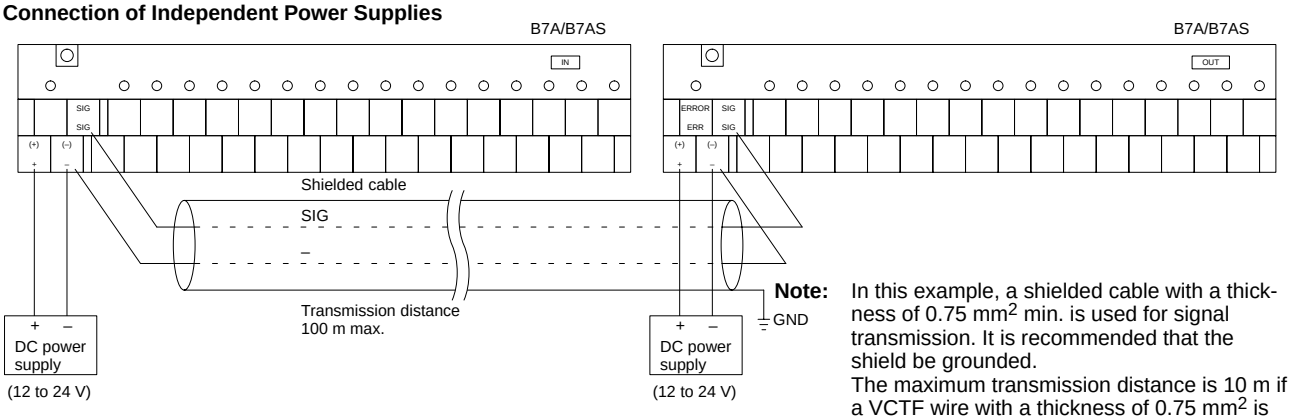
Connection of Single Power Supply to Input or Output Terminal



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

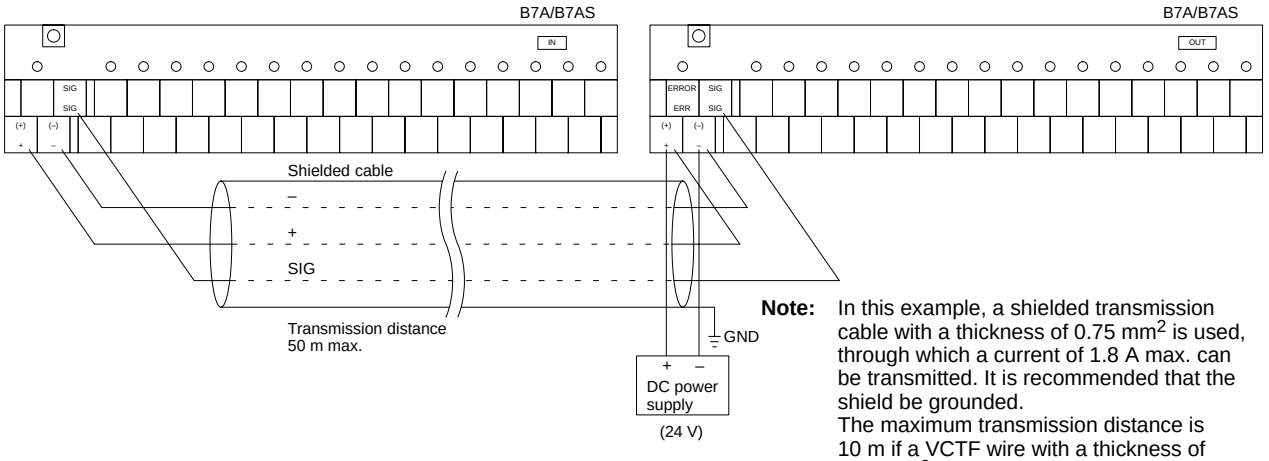
I/O Delay: High Speed

Connection of Independent Power Supplies



Note: In this example, a shielded cable with a thickness of 0.75 mm^2 min. is 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^2 is used instead of a shielded cable for the transmission path.

Connection of Single Power Supply to Input or Output Terminal

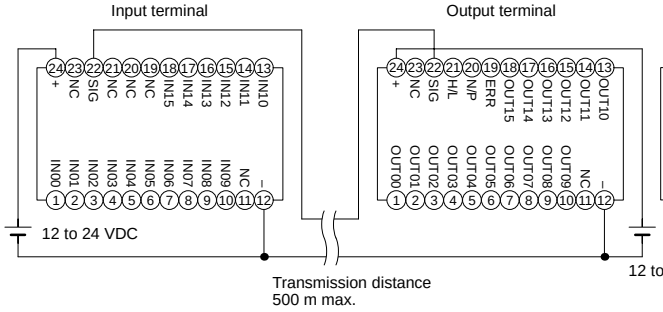


Note: In this example, a shielded transmission cable with a thickness of 0.75 mm^2 is used, through which a current of 1.8 A max. can be transmitted. It is recommended that the shield be grounded.
The maximum transmission distance is 10 m if a VCTF wire with a thickness of 0.75 mm^2 is used instead of a shielded cable for the transmission path.

Modular Models

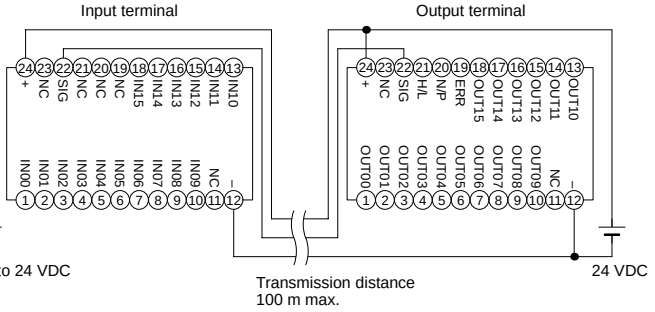
I/O Delay: Normal Speed

Connection of Independent Power Supplies



Note: A VCTF cable with a thickness of 0.75 mm^2 min. must be used for signal transmission.

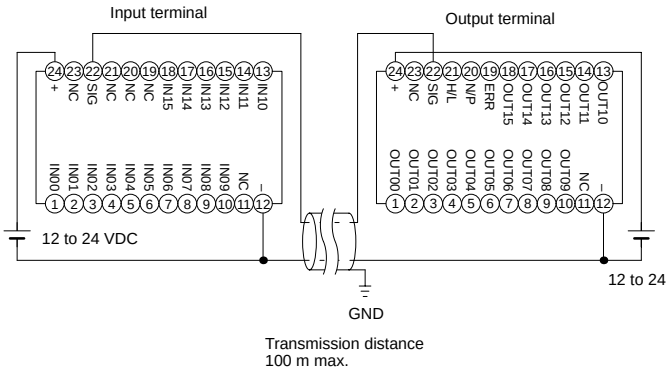
Connection of Single Power Supply to Input or Output Terminal



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

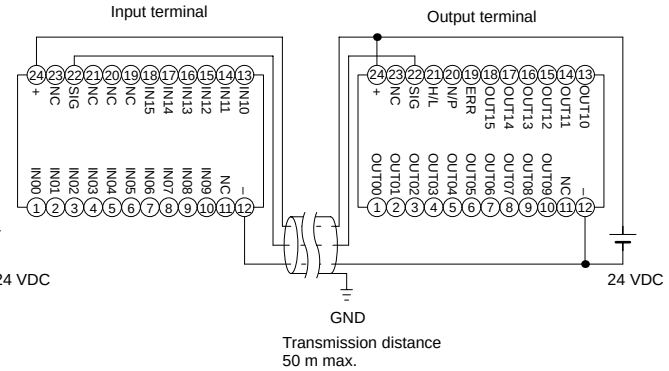
I/O Delay: High Speed

Connection of Independent Power Supplies



Note: A shielded cable with a thickness of 0.75 mm^2 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^2 is used instead of a shielded cable for the transmission path.

Connection of Single Power Supply to Input or Output Terminal



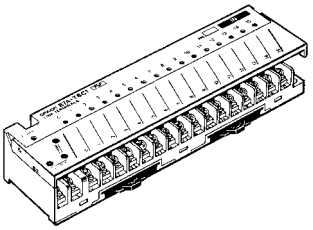
Note: In this example, a shielded transmission cable with a thickness of 0.75 mm^2 min. is used, through which a current of 1.8 A max. can be transmitted. It is recommended that the shield be grounded.
The maximum transmission distance is 10 m if a VCTF wire with a thickness of 0.75 mm^2 is used instead of a shielded cable for the transmission path.

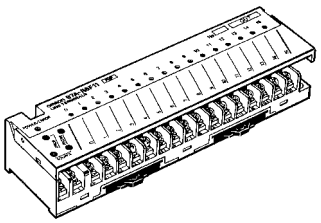
Dimensions

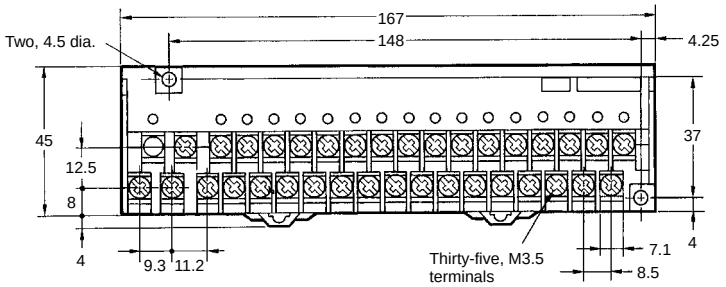
Note: All units are in millimeters unless otherwise indicated.

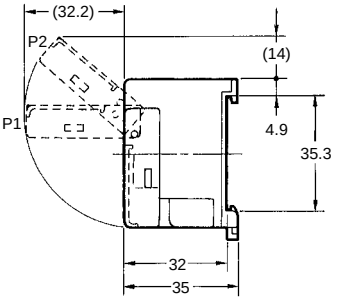
Screw Terminal Models

B7A



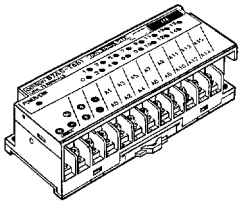


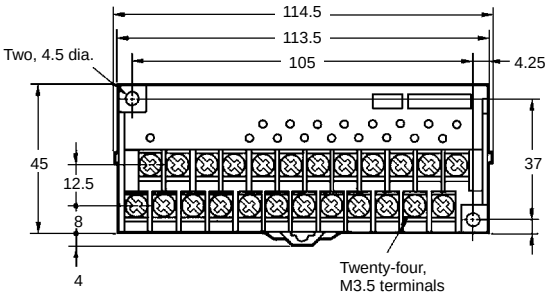


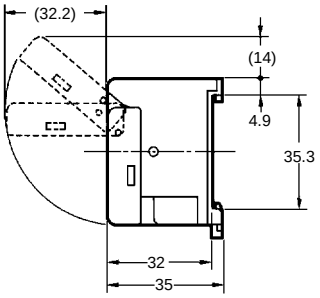


Compact Models

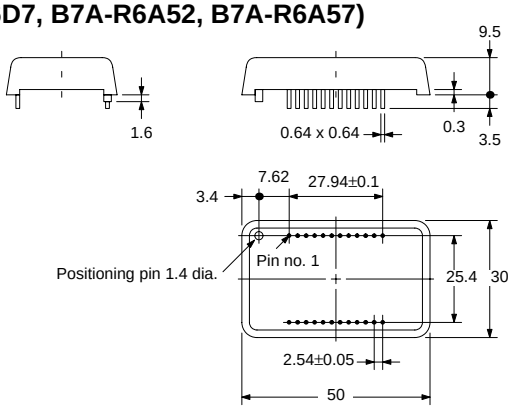
B7AS



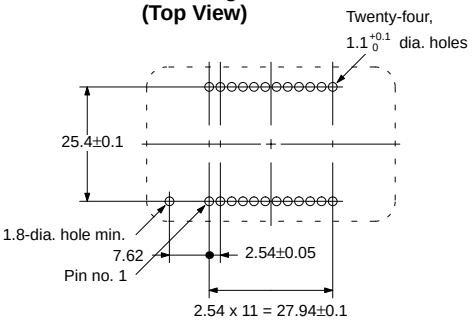




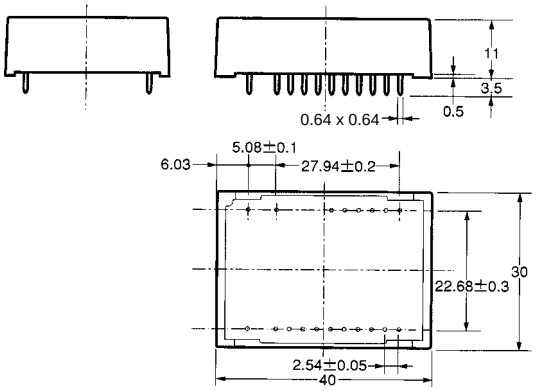
Modular Models (B7A-T6D2, B7A-T6D7, B7A-R6A52, B7A-R6A57)



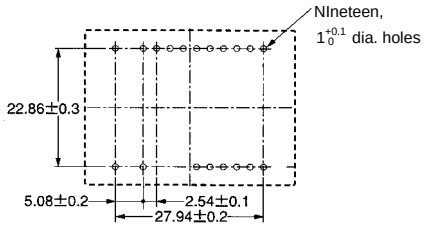
Mounting Holes (Top View)



Compact Modular Models
(B7A-T6D7-D, B7A-R6A57-D)



Mounting Holes
(Top View)

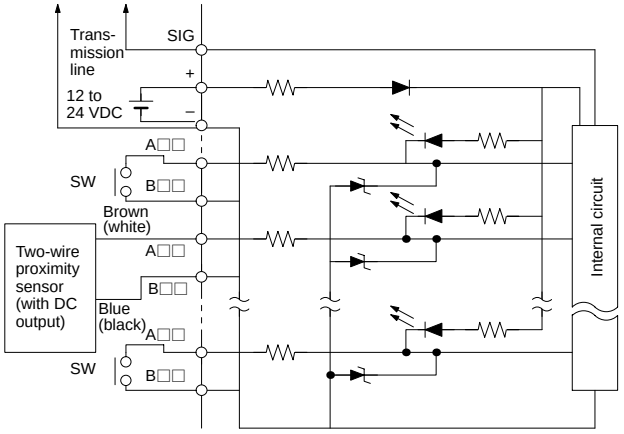


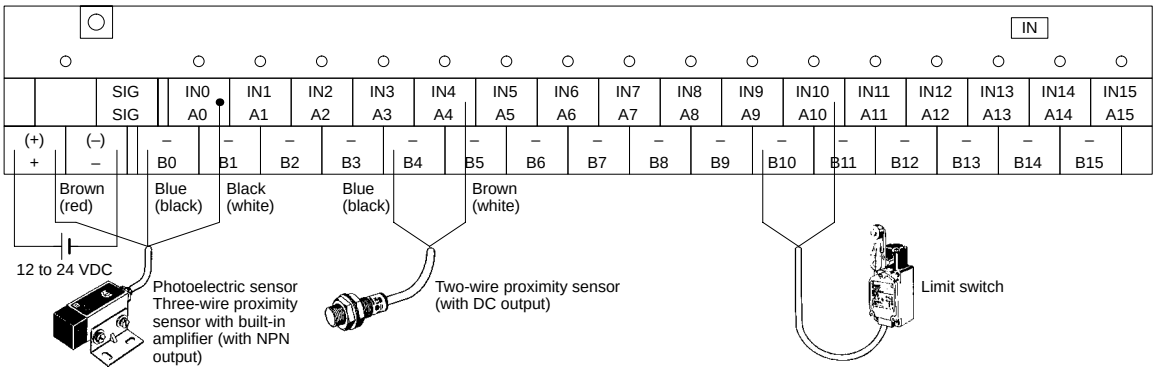
Installation

■ Internal Circuits and Terminal Arrangement

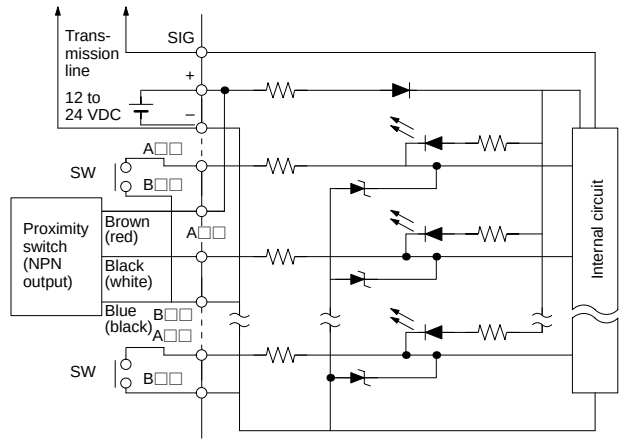
Screw Terminal Models

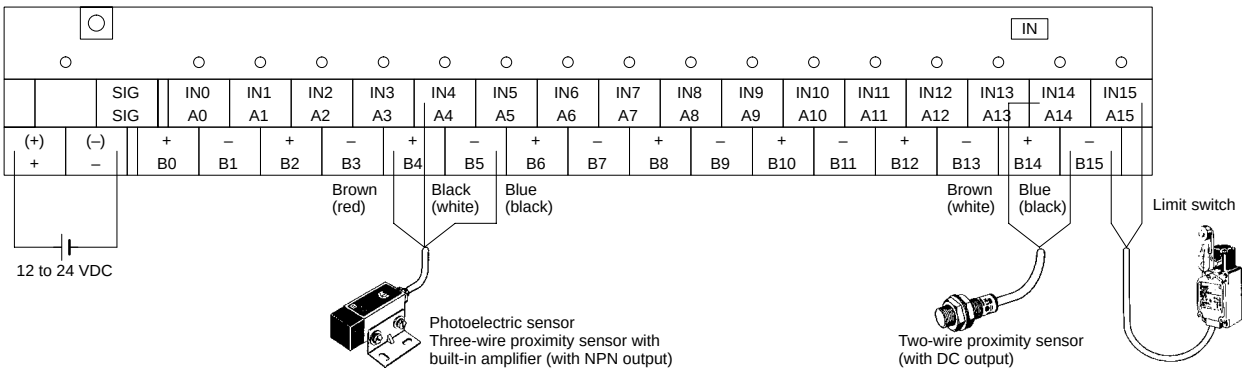
B7A-T6A1/-T6A6
(Input, Active Low)



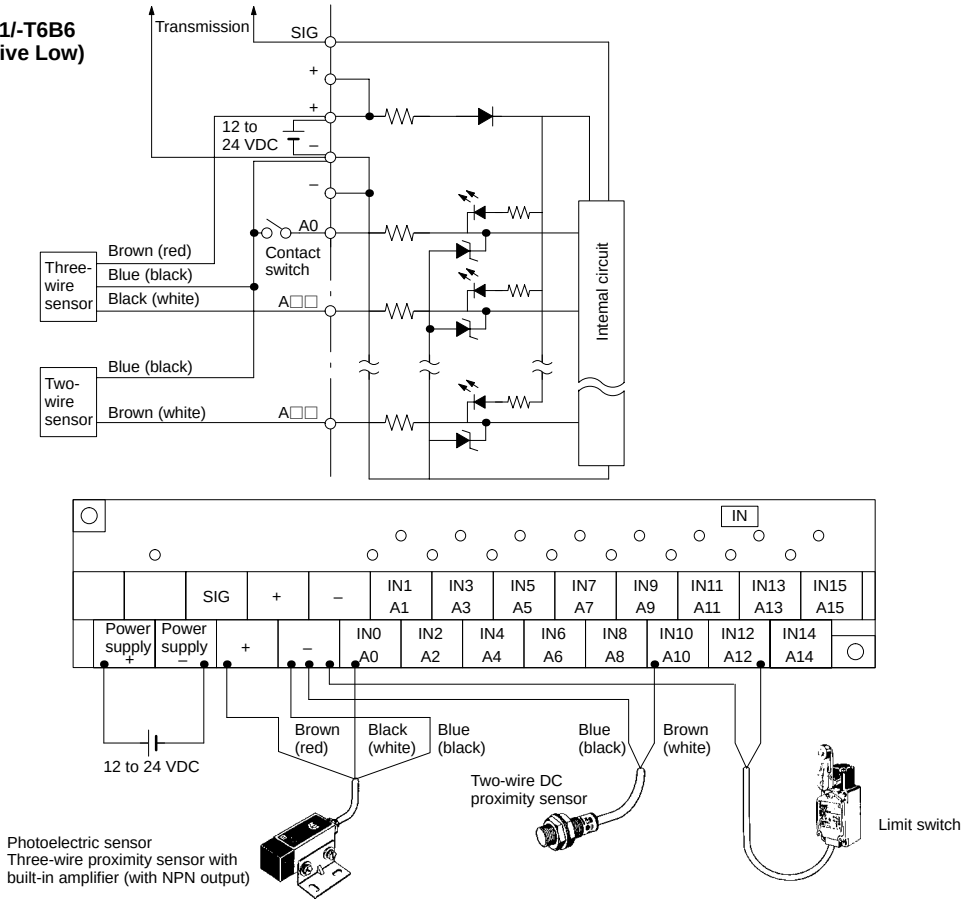


B7A-T6B1/-T6B6
(Input, Active Low)





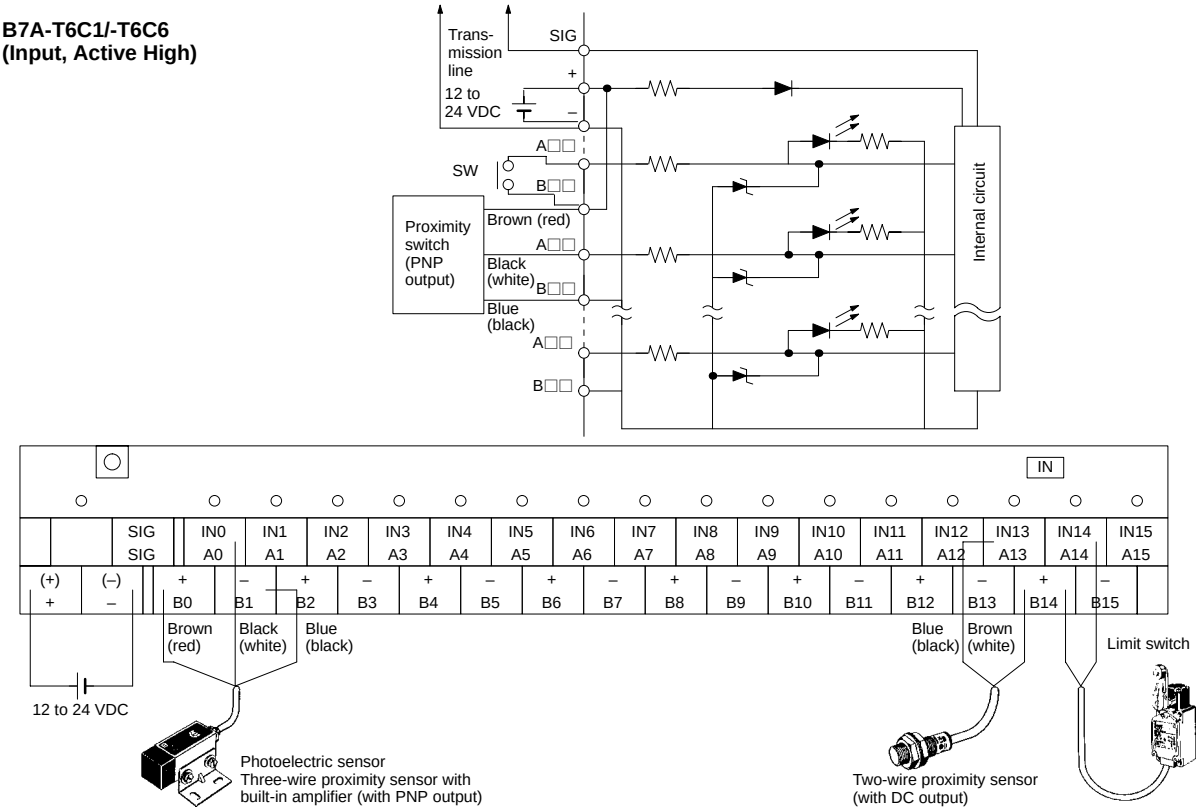
B7AS-T6B1/-T6B6
(Input, Active Low)



Note: 1. 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.

2. Do not short-circuit the SIG terminal with the positive power supply terminal, negative power supply terminal, or a B□□ terminal, otherwise the internal elements of the B7A will be damaged and no transmission will be possible.

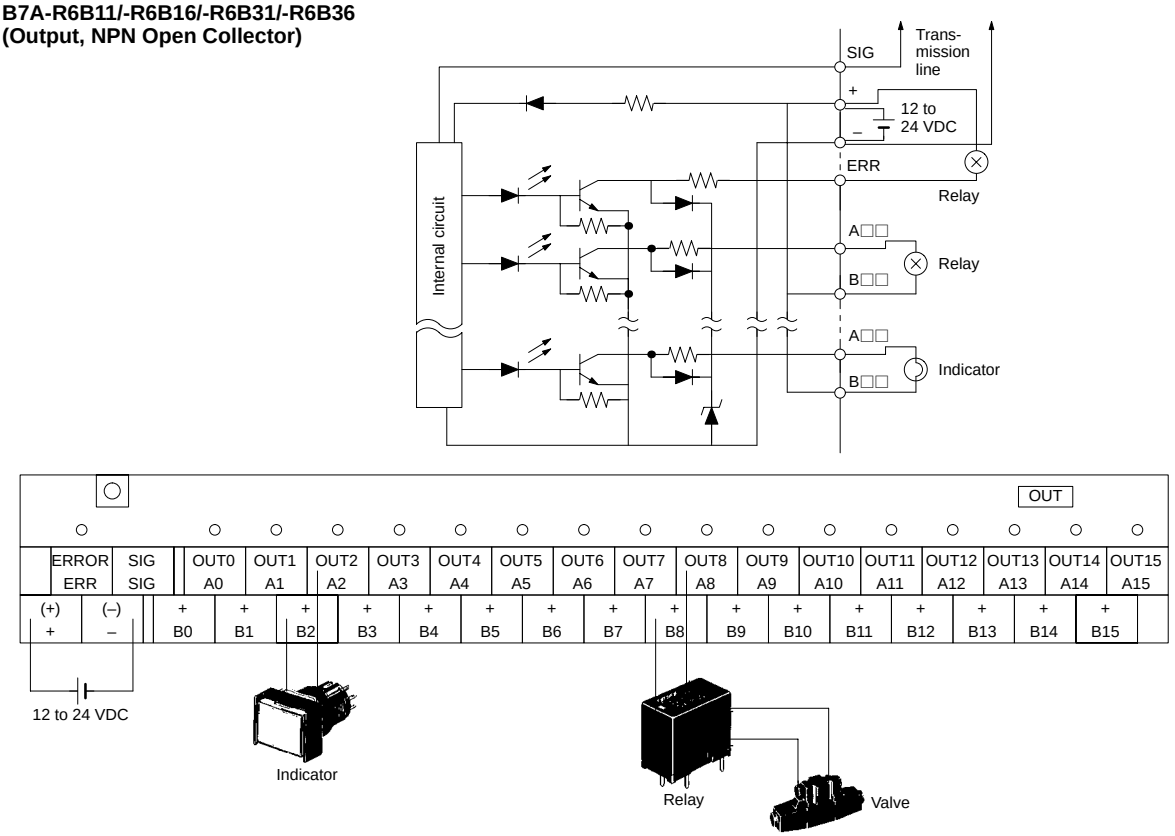
B7A-T6C1/-T6C6
(Input, Active High)



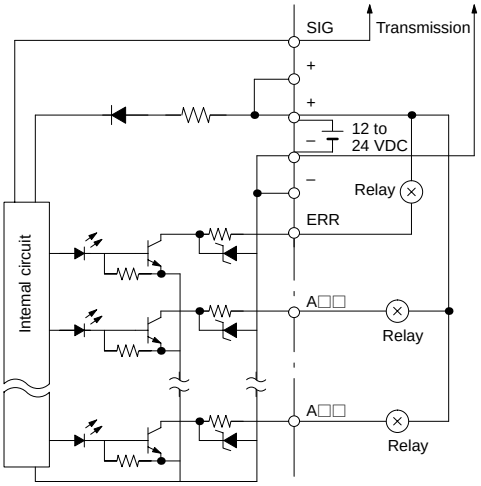
Note: 1. The wire colors have been changed in accordance with the revision of the Japanese Industrial Standards for photoelectric sensors and proximity sensors. The colors in parentheses refer to the old colors.

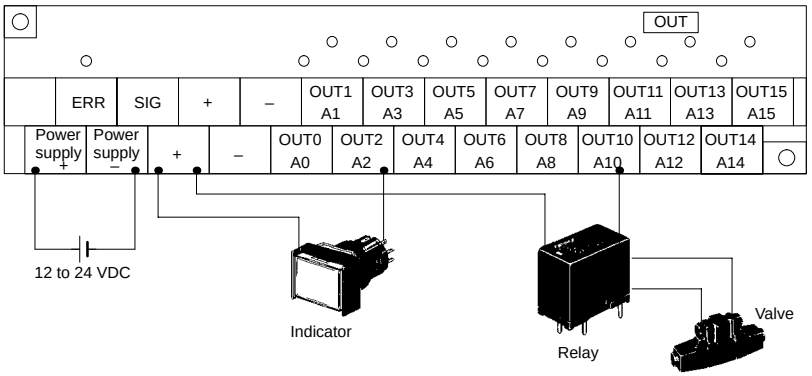
2. Do not short-circuit the SIG terminal with the positive power supply terminal, negative power supply terminal, or a B□□ terminal, otherwise the internal elements of the B7A will be damaged and no transmission will be possible.

B7A-R6B11/-R6B16/-R6B31/-R6B36
(Output, NPN Open Collector)



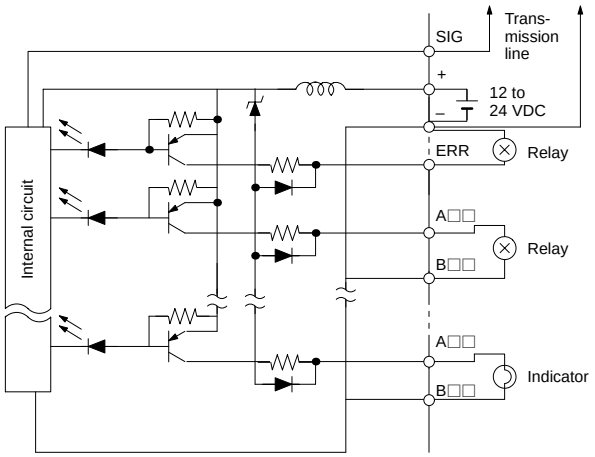
B7AS-R6B11/-R6B16/-R6B31/-R6B36
(Output, NPN Open Collector)

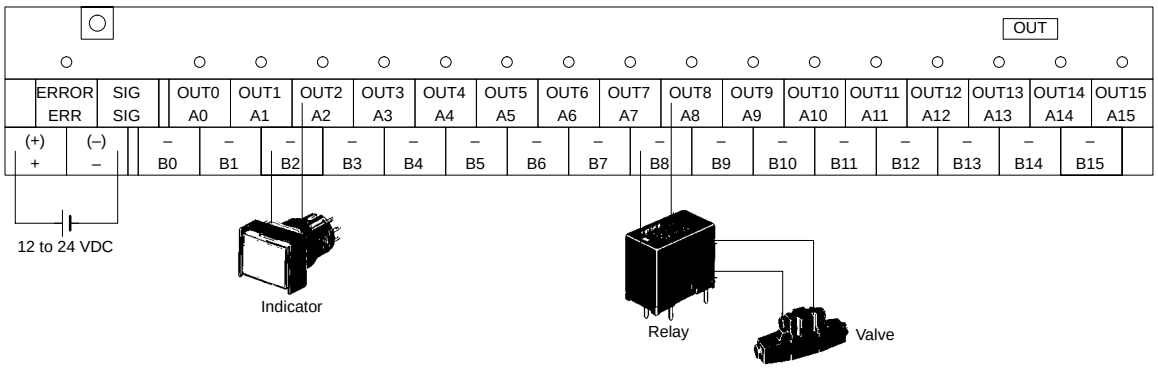




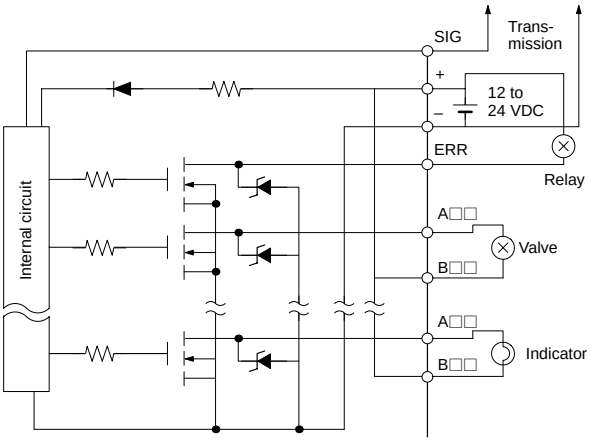
Note: Do not short-circuit terminals A□□ and B□□, otherwise the internal element(s) of the B7A may be damaged.

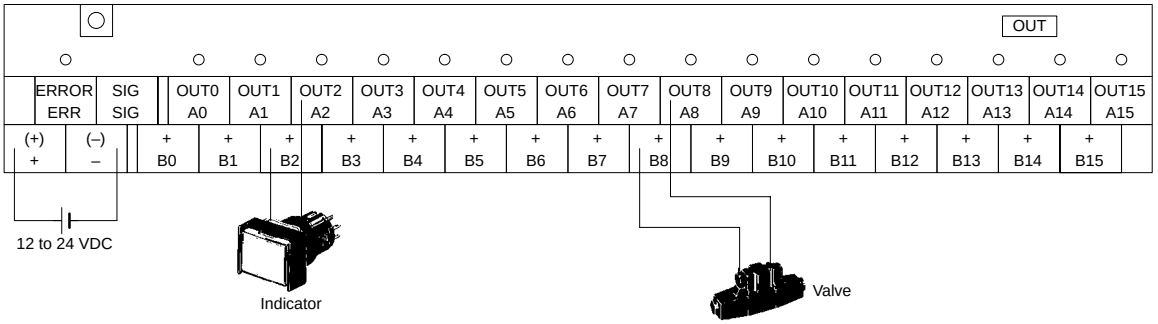
B7A-R6F11/-R6F16/-R6F31/-R6F36
(Output, PNP Open Collector)



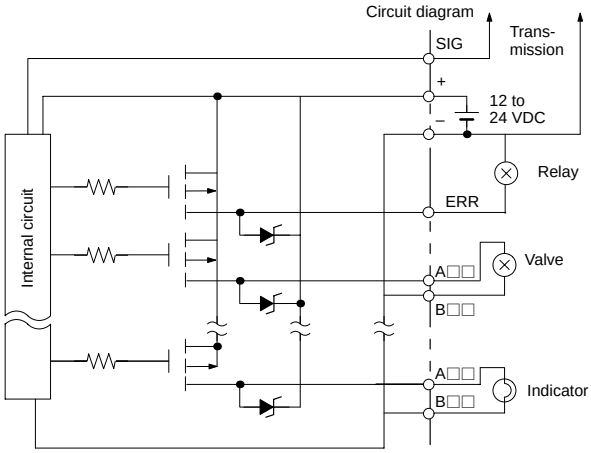


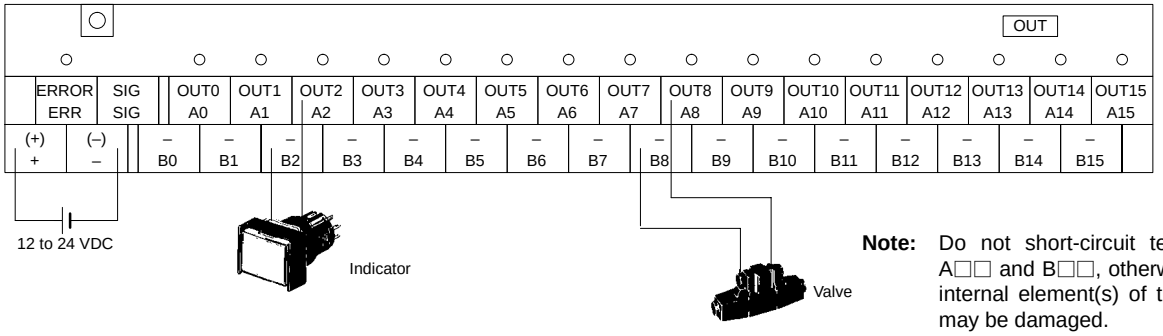
B7A-R6C11/R6C16/-R6C31/-R6C36 (N-channel MOS-FET Open Drain Output, NPN Compatible)





B7A-R6G11/-R6G16/-R6G31/-R6G36 (P-channel MOS-FET Open Drain Output, PNP Compatible)

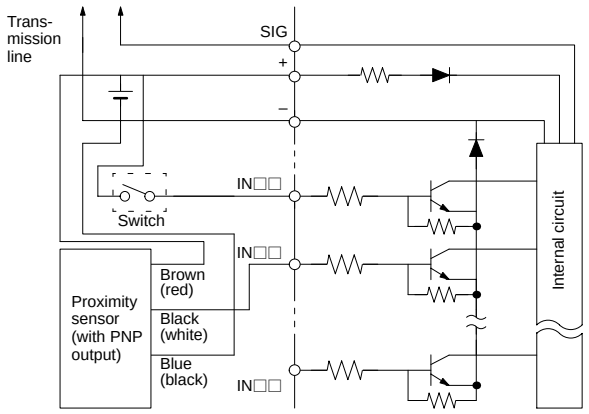




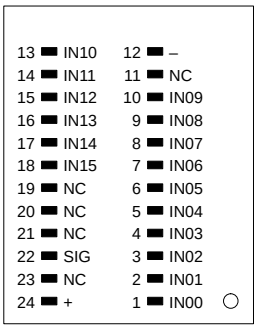
Note: Do not short-circuit terminals A□□ and B□□, otherwise the internal element(s) of the B7A may be damaged.

Modular Models

B7A-T6D2/-T6D7
(Input, Active High)



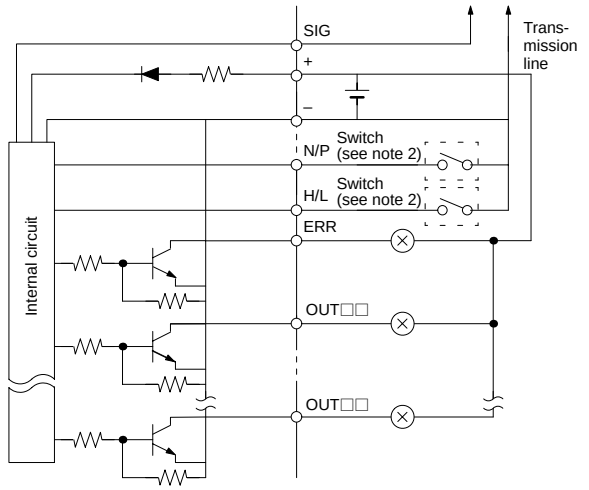
Top View



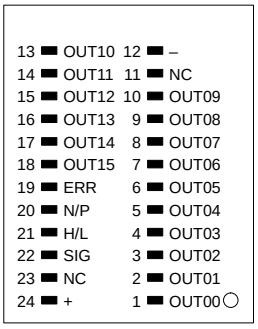
Note: 1. The wire colors have been changed in accordance with the revision of the Japanese Industrial Standards for photoelectric sensors and proximity sensors. The colors in parentheses refer to the old colors.

2. Do not short-circuit the SIG terminal with a positive or negative power supply terminal, otherwise the internal elements of the B7A will be damaged and no transmission will be possible.

B7A-R6A52/-R6A57
(Output, NPN Open Collector)



Top View



Note: 1. Do not short-circuit any output terminal with the positive terminal, otherwise the internal elements of the B7A will be damaged.

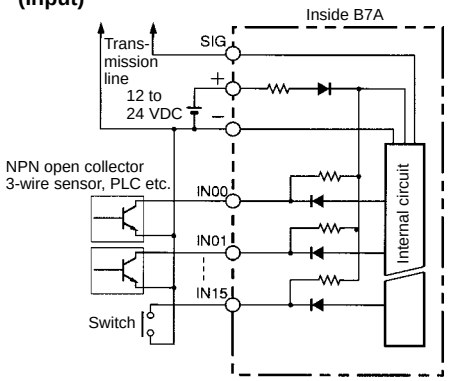
2. Logic output processing and error output processing methods can be selected with the selectors. The selectors are not required when the B7A is used with its output fixed to the output logic.

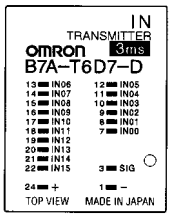
N/P: Negative/Positive		H/L: HOLD/LOAD OFF	
Terminal processing	**Function**	**Terminal processing**	**Function**
Open	Output logic active H	Open	Error output processing: HOLD
Connected to 0 V	Output logic active L	Connected to 0 V	Error output processing: LOAD OFF

Compact Modular Models

B7A-T6D7-D (Input)

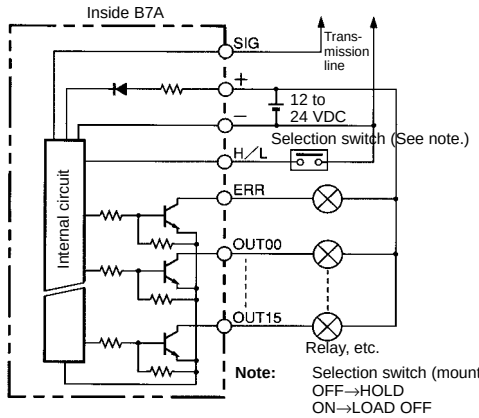
Circuit Diagram

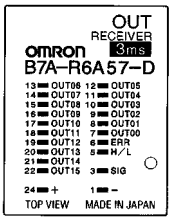




B7A-R6A57-D (Output)

Circuit Diagram





Note: Selection switch (mounted externally):
OFF→HOLD
ON→LOAD OFF