Transmit Signals while Saving Wiring Effort and Space between the B7A and PLC

- Connecting to an OMRON PLC and 16-point B7A with ease.
- Models with 16-point terminals and 32-point terminals are available.
- Transmit 16 input signals over just 2 wires (or over 3 wires if only one terminal has power supply) and 32 input signals over just 3 wires (or over 4 wires if only one terminal has power supply).

Ordering Information

■ Model Number Legend

Input Models

B7A - T □ E □
1 2 3 4

1. Input/Output Classification
T: Input

2. Number of I/O
6: 16
3: 32

3. Input Configuration
E: NPN compatible

4. I/O Delay Time (Typical)
3: 19.2 ms
8: 3 ms

Output Models

B7A - R □ A □ □
1 2 3 4 5

1. Input/Output Classification
R: Output

2. Number of I/O
6: 16
3: 32

3. Output Configuration/ Capacity
A: NPN open collector/ 50 mA/point

4. Error Processing
1: HOLD
3: LOAD OFF

5. I/O Delay Time (Typical)
3: 19.2 ms
8: 3 ms

■ 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 2)	500 m max.	100 m max. (see note 3)
I/O delay time	Typical: 19.2 ms; 31 ms max.	Typical: 3 ms; 5 ms max.
Minimum input time (see note 4)	16 ms (see note 5)	2.4 ms
Operating voltage range	12 to 24 VDC (10.8 to 26.4 VDC) (see note 2)	
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 6)	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. 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. 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 36 for details.

3. 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.

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

5. Set the timer of the PLC to 0.02 s minimum if a normal-speed model is connected to the PLC.

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

Input Models

Item	16-point	32-point
	B7A-T6E3/-T6E8	B7A-T3E3/-T3E8
Compatible inputs	PLC (NPN output), switches, three-wire NPN sensors	
Input logic	Active low	
Current consumption (see note)	60 mA max. with all input terminals ON	100 mA max. with all input terminals ON
Input voltage range	0 VDC to supply voltage	
Input current range	–1.5 to –0.6 mA/point (current flowing from input terminals)	
ON/OFF threshold	No-contact input: ON voltage: 1.6 V max. OFF voltage: 5.5 V min. Contact input: ON discrimination resistance: 1 kΩ max. OFF discrimination resistance: 9 kΩ min.	
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. 46 g	Approx. 71 g

Note: Consumption when all 16/32 points are ON. Excludes external sensor current for Input Terminals.

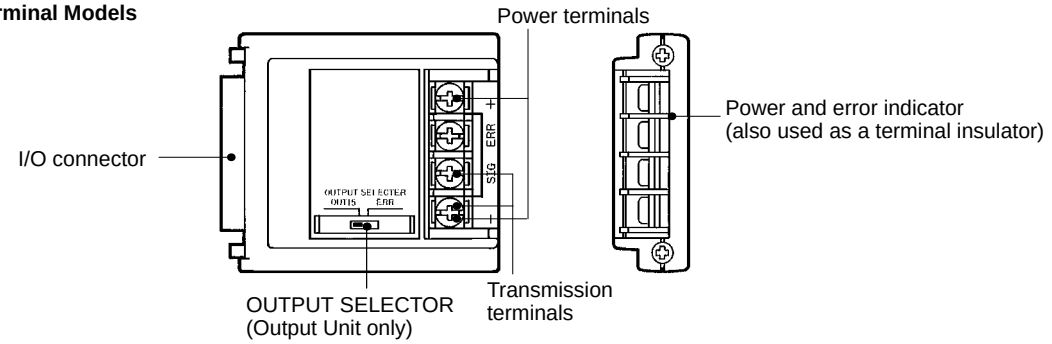
Output Models

Item	16-point	32-point
	B7A-R6A13/R6A18/R6A33/R6A38	B7A-R3A13/R3A33/R3A18/R3A38
Output configuration	NPN open collector	
Current consumption (see note)	50 mA max. with all input terminals ON	80 mA max. with all input terminals ON
Rated load voltage	5 to 24 VDC	
Output residual voltage	0.8 V max.	
Output current	Sync. current, 50 mA max./point	
Error output	Rated load voltage: 0 to 30 VDC Output current: sync. current, 100 mA max./point	
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. 46 g	Approx. 71 g

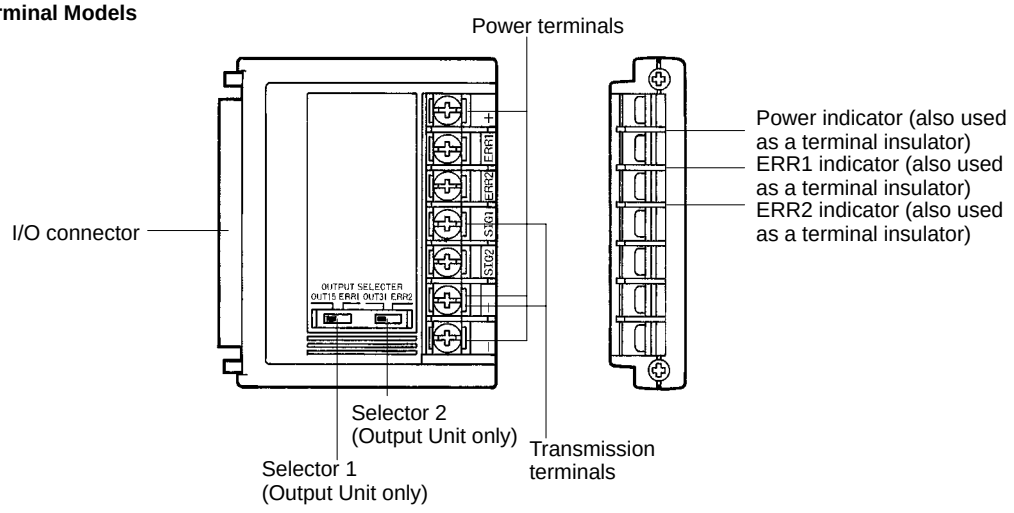
Note: Consumption when all 16/32 points are ON. Excludes external load current and error load current for Output Terminals.

Nomenclature

16-point Terminal Models



32-point Terminal Models



Indicator Operation

16-point Terminal Models

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.

Note: G: Green indicator lit; R: Red indicator lit; N: Not lit

32-point Terminal Models

Indicator		Function
POWER (Input Terminal)	G	Lit when power is supplied and the Terminal is operating.
	N	Not lit when power is not supplied.
ERR1/ERR2 (Output Terminal)	N	Not 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.

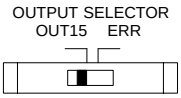
Note: G: Green indicator lit; R: Red indicator lit; N: Not lit

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)	

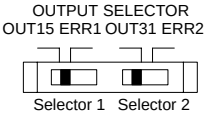
Setting of Output Selector (Output Unit Only)

16-point Terminal Models



Switch	
OUT15	**ERR**
Set the 16th output to OUT15.	Set the 16th output to ERR (the ERR output is ON only when there is a transmission error).

32-point Terminal Models



Switch 1		Switch 2	
OUT15	**ERR1**	**OUT31**	**ERR2**
Set the 16th output to OUT15.	Set the 16th output to ERR (the ERR output is ON only when there is a transmission error).	Set the 32nd output to OUT31.	Set the 32nd output to ERR (the ERR output is ON only when there is a transmission error).

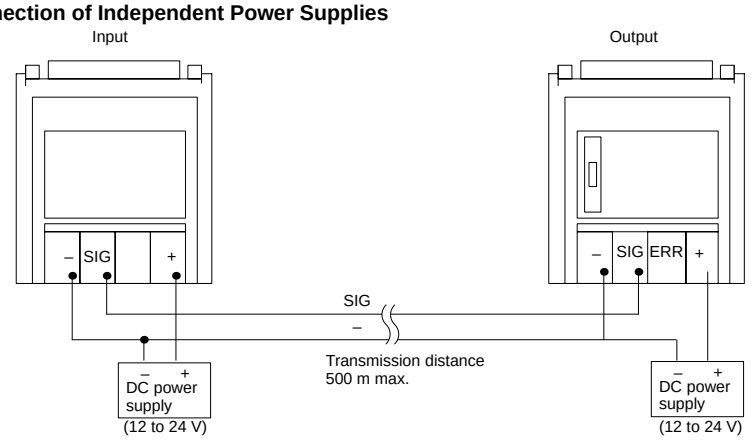
Operation

■ Power Supply

16-point Terminal Models

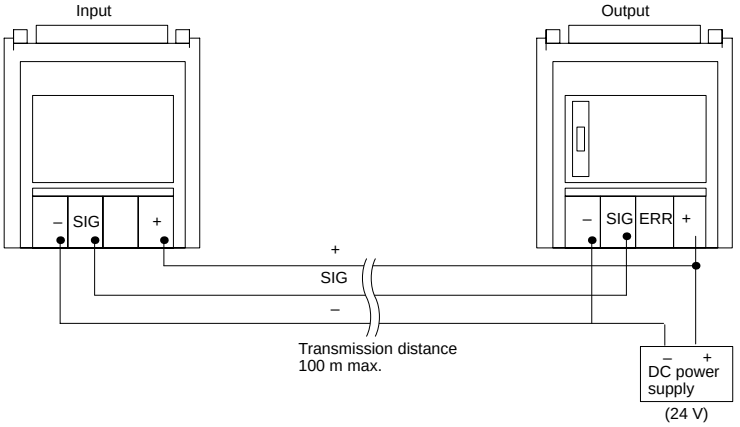
I/O Delay: Normal Speed

Connection of Independent Power Supplies



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

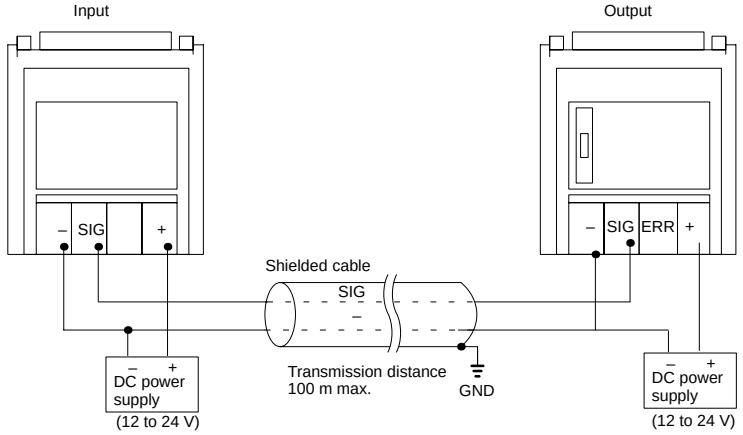
Connection of Single Power Supply to Input or Output Terminal



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

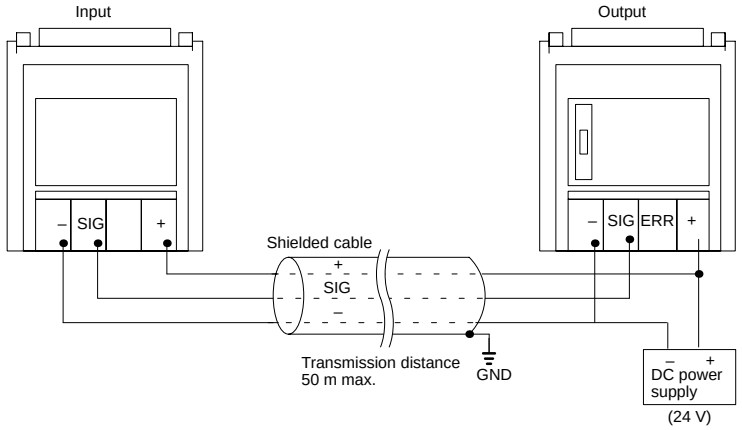
I/O Delay: High Speed

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.

Connection of Single Power Supply to Input or Output Terminal

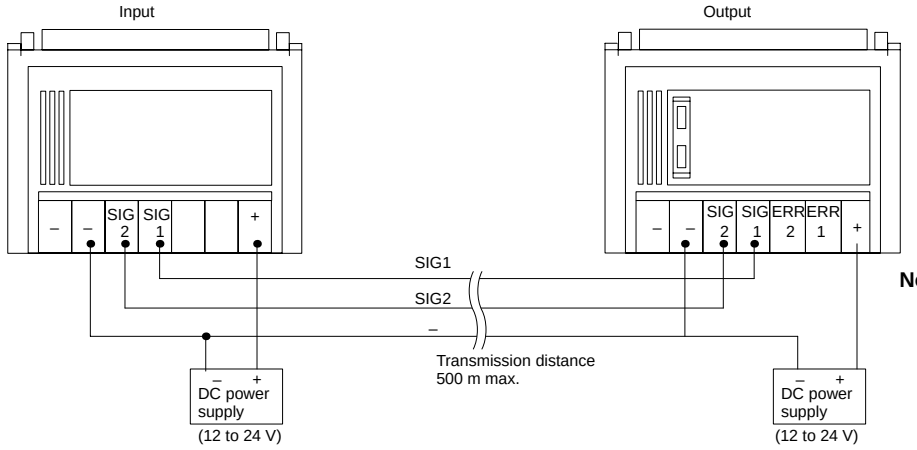


Note: In this example, a shielded transmission cable with a thickness of 0.75 mm^2 min. is used, through which a current of 1.8 A max. can be transmitted. It is recommended that the shield be grounded.

32-point Terminal Models

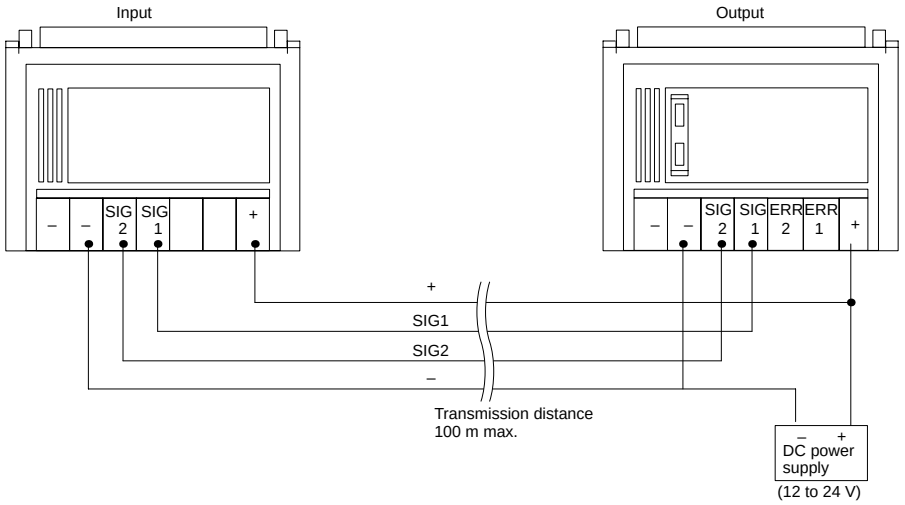
I/O Delay: Normal Speed

Connection of Independent Power Supplies



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

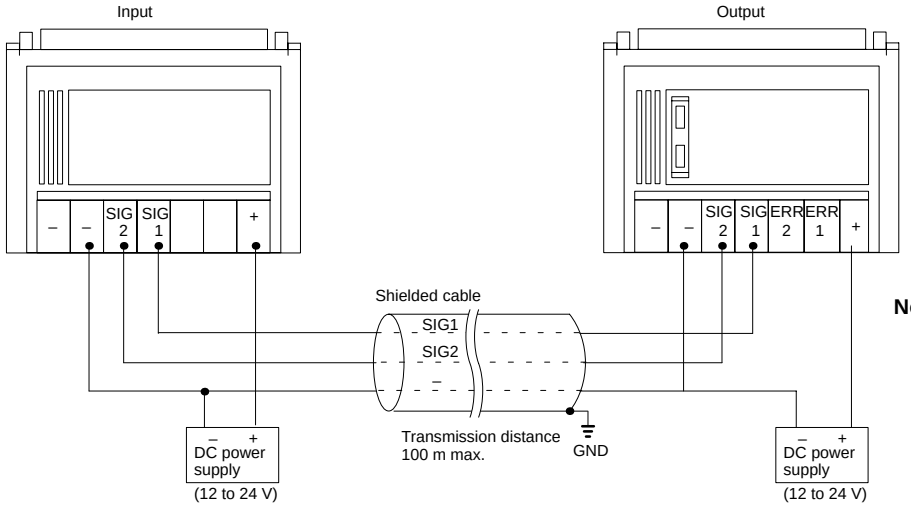
Connection of Single Power Supply to Input or Output Terminal



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

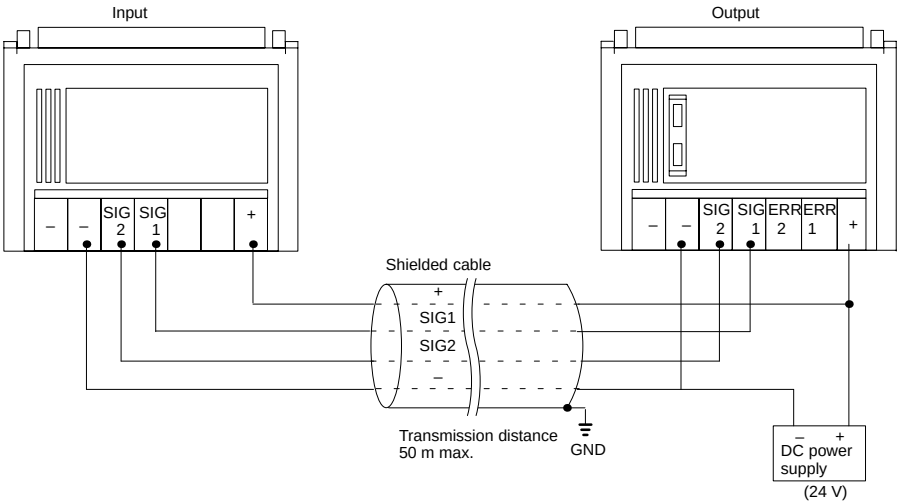
I/O Delay: High Speed

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.

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.

■ B7A-series Models with PLC Connectors and Connecting PLCs

Input

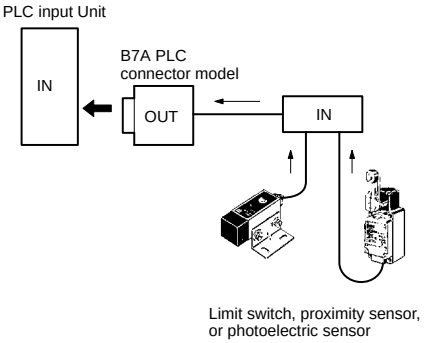
Model	I/O points	I/O delay	Input configuration	C200H					C500			CQM1
				MD115	MD215	OD215	OD218	OD219	MD211CN	OD415CN	OD213	OD213
B7A-T6E3	16	Normal speed	NPN compatible	Yes	Yes	Yes	---	---	Yes	Yes	---	---
B7A-T6E8		High speed		Yes	Yes	Yes	---	---	Yes	Yes	---	---
B7A-T3E3	32	Normal speed		---	---	---	Yes	Yes	---	---	Yes	Yes
B7A-T3E8		High speed		---	---	---	Yes	Yes	---	---	Yes	Yes

Output

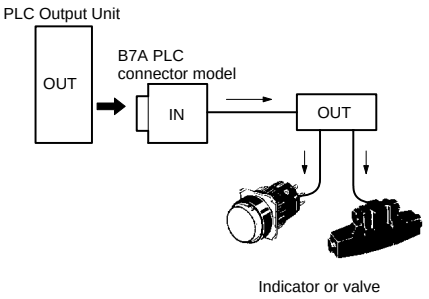
Model	I/O points	I/O delay	Error processing	C200H					C500				CQM1
				MD115	MD215	ID215	ID216	ID217	ID218CN	MD211CN	ID114	ID219	ID213
B7A-R6A13	16	Normal speed	HOLD	Yes	Yes	Yes	---	---	Yes	Yes	---	---	---
B7A-R6A33			LOAD OFF	Yes	Yes	Yes	---	---	Yes	Yes	---	---	---
B7A-R6A18		High speed	HOLD	Yes	Yes	Yes	---	---	Yes	Yes	---	---	---
B7A-R6A38			LOAD OFF	Yes	Yes	Yes	---	---	Yes	Yes	---	---	---
B7A-R3A13	32	Normal speed	HOLD	---	---	---	Yes	Yes	---	---	Yes	Yes	Yes
B7A-R3A33			LOAD OFF	---	---	---	Yes	Yes	---	---	Yes	Yes	Yes
B7A-R3A18		High speed	HOLD	---	---	---	Yes	Yes	---	---	Yes	Yes	Yes
B7A-R3A38			LOAD OFF	---	---	---	Yes	Yes	---	---	Yes	Yes	Yes

Connection with PLC

- Connect the B7A Output Unit incorporating a connector to the Input Unit for the PLC.



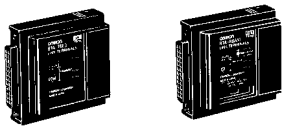
- Connect the B7A Input Unit incorporating a connector to the Output Unit for the PLC.

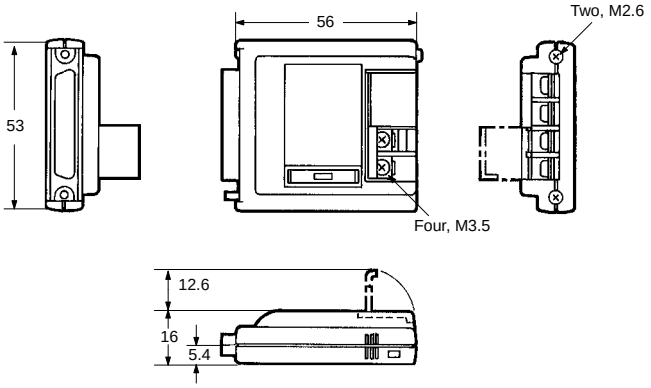


Dimensions

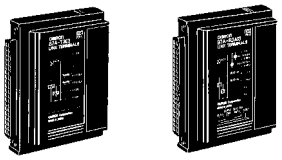
Note: All units are in millimeters unless otherwise indicated.

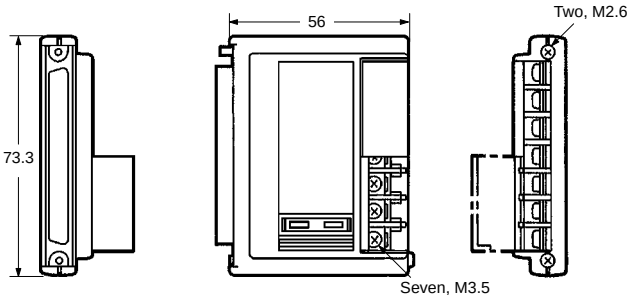
16-point Terminal Models





32-point Terminal Models



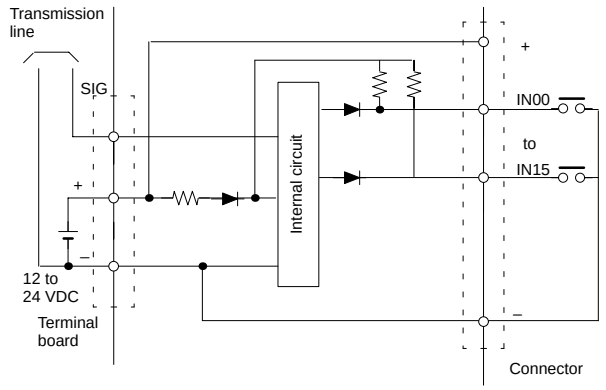


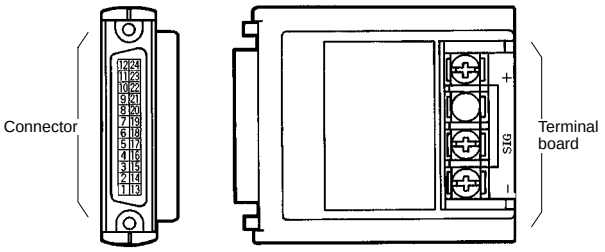
Installation

■ Internal Circuits and Terminal Arrangement

16-point Terminals

B7A-T6E3/-T6E8 (Input, Active Low)

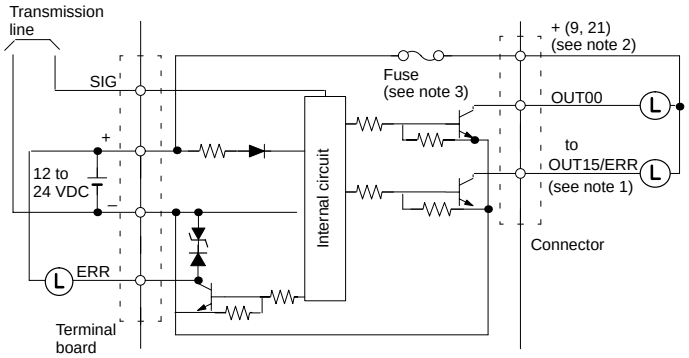


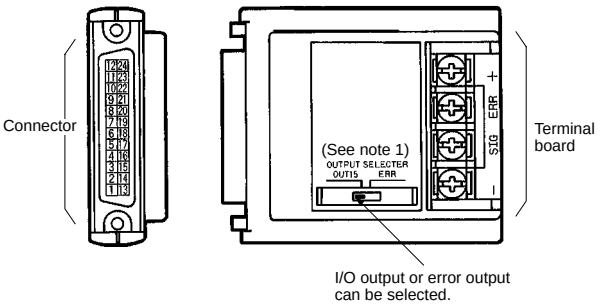


Terminal No.	Terminal	Terminal No.	Terminal
1	IN00	13	IN08
2	IN01	14	IN09
3	IN02	15	IN10
4	IN03	16	IN11
5	IN04	17	IN12
6	IN05	18	IN13
7	IN06	19	IN14
8	IN07	20	IN15
9	–	21	–
10	+	22	+
11	NC (open)	23	NC (open)
12	NC (open)	24	NC (open)

Note: 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-R6A13/-R6A18/-R6A33/-R6A38
(Output, NPN Open Collector)



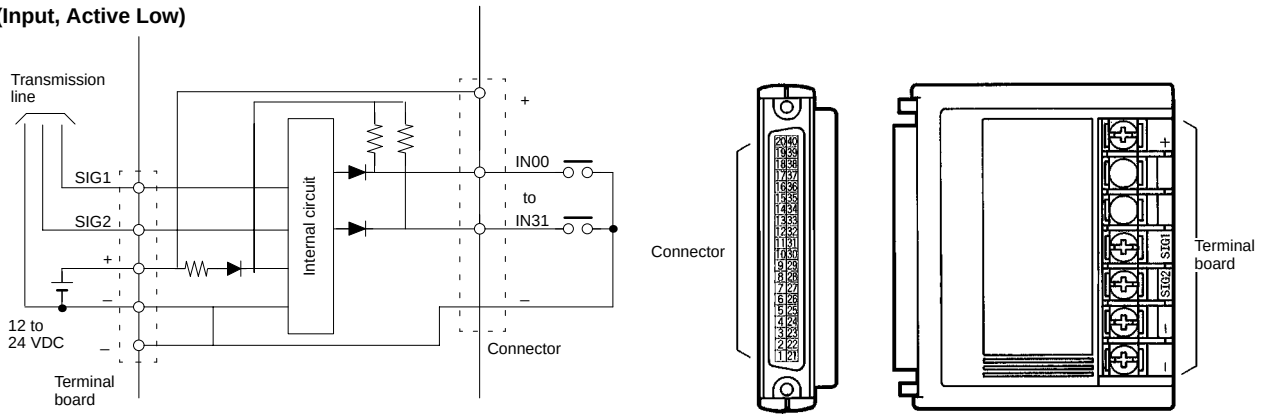


Terminal No.	Terminal	Terminal No.	Terminal
1	OUT00	13	OUT08
2	OUT01	14	OUT09
3	OUT02	15	OUT10
4	OUT03	16	OUT11
5	OUT04	17	OUT12
6	OUT05	18	OUT13
7	OUT06	19	OUT14
8	OUT07	20	OUT15/ERR (see note 1)
9	+ (see note 2)	21	+ (see note 2)
10	NC (open)	22	NC (open)
11	NC (open)	23	NC (open)
12	NC (open)	24	NC (open)

Note:
1. It is possible to select 16 I/O points or 15 I/O points and 1 error output point.
2. A maximum of 0.4 A can be supplied from each positive terminal.
3. The user cannot replace the fuse.
4. Do not short-circuit any output terminal with the positive terminal, otherwise the internal elements of the B7A will be damaged.

32-point Terminals

B7A-T3E3/-T3E8
(Input, Active Low)

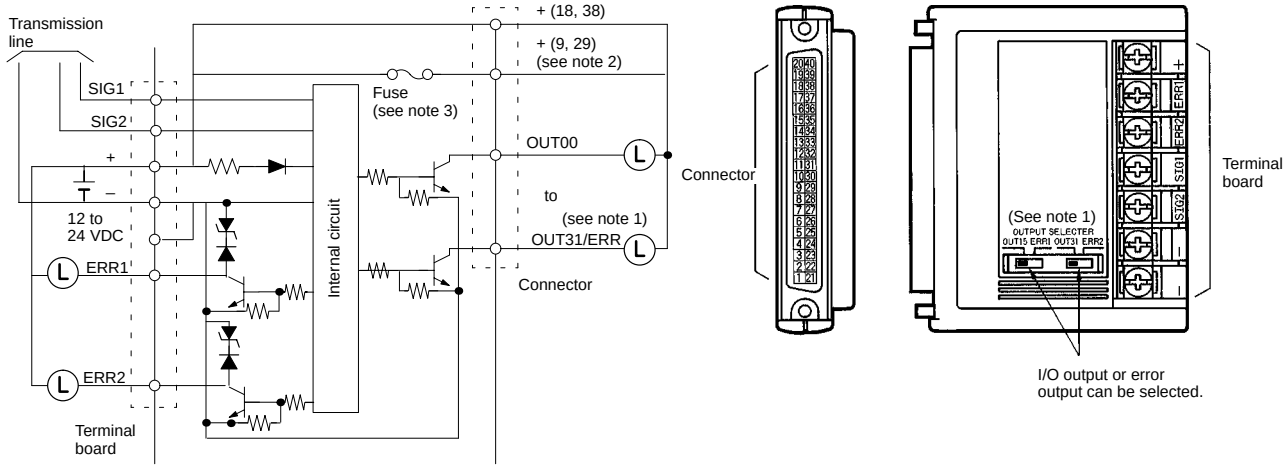


- SIG1: IN00 to IN15
  SIG2: IN16 to IN31

Terminal No.	Terminal	Terminal No.	Terminal	Terminal No.	Terminal
1	IN00	15	IN12	29	–
2	IN01	16	IN13	30	+
3	IN02	17	IN14	31	IN24
4	IN03	18	IN15	32	IN25
5	IN04	19	–	33	IN26
6	IN05	20	+	34	IN27
7	IN06	21	IN16	35	IN28
8	IN07	22	IN17	36	IN29
9	–	23	IN18	37	IN30
10	+	24	IN19	38	IN31
11	IN08	25	IN20	39	–
12	IN09	26	IN21	40	+
13	IN10	27	IN22		
14	IN11	28	IN23		

Note: 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-R3A13/-R3A33/-R3A18/-R3A38
(Output, NPN Open Collector)



- SIG1: OUT00 to OUT15
  SIG2: OUT16 to OUT31

Terminal No.	Terminal	Terminal No.	Terminal	Terminal No.	Terminal
1	OUT00	15	OUT13	29	+ (see note 2)
2	OUT01	16	OUT14	30	OUT24
3	OUT02	17	OUT15/ERR (see note 1)	31	OUT25
4	OUT03	18	+	32	OUT26
5	OUT04	19	NC (open)	33	OUT27
6	OUT05	20	NC (open)	34	OUT28
7	OUT06	21	OUT16	35	OUT29
8	OUT07	22	OUT17	36	OUT30
9	+ (see note 2)	23	OUT18	37	OUT31/ERR (see note 1)
10	OUT08	24	OUT19	38	+
11	OUT09	25	OUT20	39	NC (open)
12	OUT10	26	OUT21	40	NC (open)
13	OUT11	27	OUT22		
14	OUT12	28	OUT23		

Note: 1. It is possible to select 32 output points or 30 output points and two error output points.
2. A maximum of 0.4 A can be supplied from each positive terminal (9, 29).
3. The user cannot replace the fuse.
4. Do not short-circuit any output terminal with the positive terminal, otherwise the internal elements of the B7A will be damaged.