ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *OMRON B7A-R6B31* at our website: *Click HERE*

OMRON

Technical Reference Data

B7A

The following information applies to all B7A Series Link Modules

- Connecting B7A to a programmable controller
- Peripheral circuits of printed circuit board B7A models
- Noise protection circuits recommended
- Transmission errors and output signals
- Signal configuration examples for inputs and outputs
- I/O ON/OFF conditions
- Precautions
- Recommended cables
- Mounting guidelines

Operation

■ CONNECTING B7A TO A PROGRAMMABLE CONTROLLER

Each terminal of the B7A should be used for only single signal transmission without a transmission host. Therefore the B7A cannot be connected to OMRON's SYSMAC BUS Remote I/O System. To transmit signals from the B7A to a programmable controller, connect the B7A's terminals to an I/O module mounted on the PLC.

■ RECOMMENDED COMBINATIONS OF OMRON PLC I/O MODULES AND B7A LINKS

Outputs

B7A Link Module	Conditions of PLC	C500 I/O Modules			C200H I/O Modules				
		ID213	ID218	ID219	ID212	ID215	ID501	ID216	ID217
		12 to 24 VDC	12 to 24 VDC	24 VDC	24 VDC	24 VDC	5 VDC	24 VDC	24 VDC
		+ common	+/- common	+ common	+/- common	+/- common	+/- common	+/- common	+/- common
		16 points	32 points	64 points	16 points	32 points	32 points	32 points	64 points
B7A-R6B11 B7A-R6B31 B7A-R6B16 B7A-R6B36 B7A-R6A52 B7A-R6A57 B7AS-R6B11 B7AS-R6B31 B7AS-R6B16 B7AS-R6B36 B7AM-6BS B7AM-8B11 B7AM-8B31 B7AM-8B16 B7AM-8B36 B7A-R10SC01 B7A-R10MC	DC or AC/DC input and + common or +/− common (− common if the PLC with non−voltage input is used.)	Yes	Yes	Yes	Yes	Yes	Yes (See Note)	Yes	Yes
B7A-R6F11 B7A-R6F31 B7A-R6F16 B7A-R6F36	DC or AC/DC input and − common or +/− common (+ common if the PLC with non−voltage input is used.)	No	Yes	No	Yes	Yes	No	Yes	Yes

Note: An independent power supply for the PLC is required due to the difference in operating voltage between the PLC and B7A.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Input

B7A Link Module	Conditions of PLC	C500 I/O Module			C200H I/O Module				
		OC221	OD212	OD412	OC225	OD215	OD212	OD218	OD219
		Relay output	PNP output	NPN output	Relay	NPN output	NPN output	NPN output	NPN output
		24 VDC	12 to 24 VDC	12 to 48 VDC	24 VDC	5 to 24 VDC	24 VDC	5 to 24 VDC	24 VDC
		16 points	32 points	32 points	16 points	32 points	16 points	32 points	64 points
B7A-T6A1 B7A-T6A6 B7A-T6B1 B7A-T6B6 B7AS-T6B1 B7AS-T6B6 B7AM-6BS B7AM-8B11 B7AM-8B31 B7AM-8B16 B7AM-8B36 B7A-T10S1 B7A-T10S3	NPN transistor output (residual voltage must be 1.6 V max. if the B7A has 10 output points.) Relay output	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
B7A-T6C1 B7A-T6C6	PNP transistor output, relay output	Yes	Yes	No	Yes	No	No	No	No
B7A-T6D2 B7A-T6D7	TTL output (See Note 1), PNP transistor output	See note 2	Yes	See note 2	See note 2	See note 2	See note 2	See note 2	See note 2
B7A-T10M2	TTL output (See Note 1)	See note 2	See note 2	See note 2	See note 2	See note 2	See note 2	See note 2	See note 2

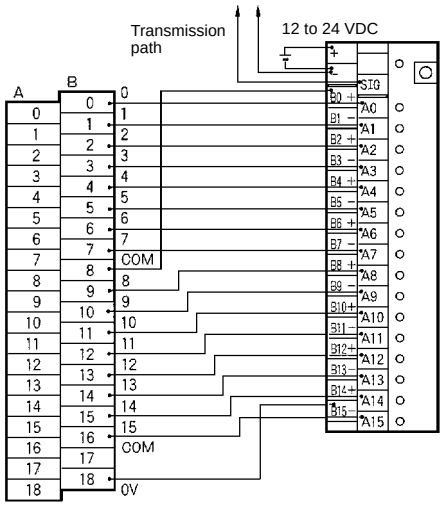
Note: 1. An independent power supply for the PLC is required due to the difference in operating voltage between the PLC and B7A.
2. An external interface unit is required.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

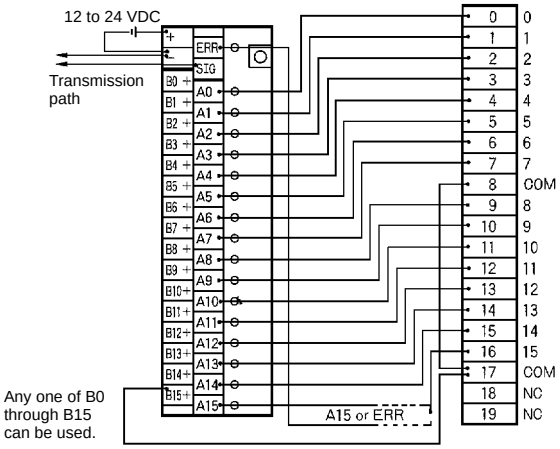
■ EXAMPLES OF CONNECTIONS WITH PLC I/O MODULES

PLC output	B7A input	B7A output	PLC input

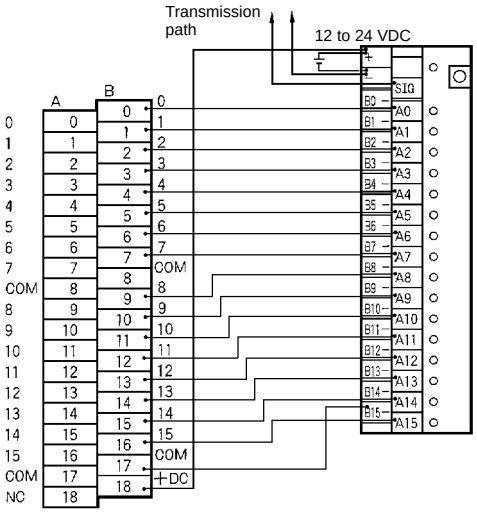
3G2A5-OD212 — **B7A-T6C□**



B7A-R6B□□ — **3G2A5-ID213**

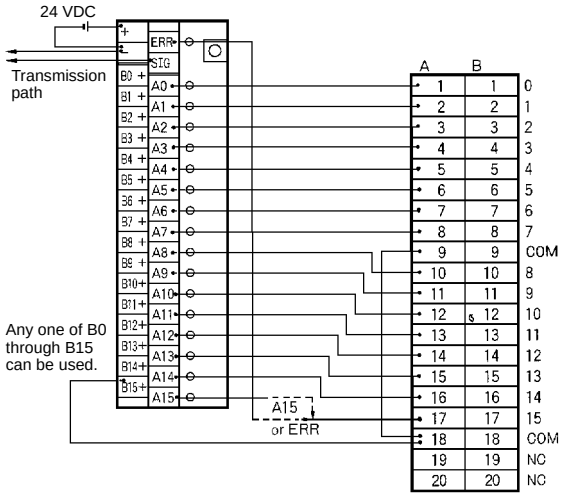


3G2A5-OD412 — **B7A-T6A□**

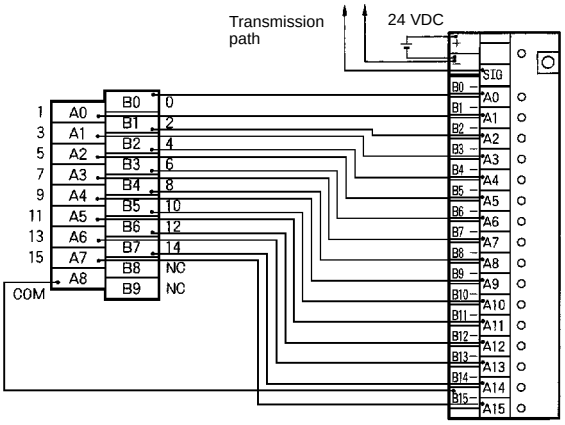


Note: The B7A-T6B□ can be connected in the same method.

B7A-R6B□□ — **3G2A5-ID219**

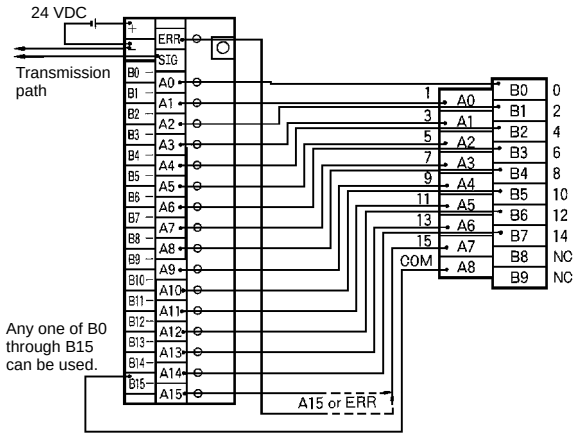


C200H-OC225 — **B7A-T6A□**



Note: The B7A-T6B□ can be connected in the same method.

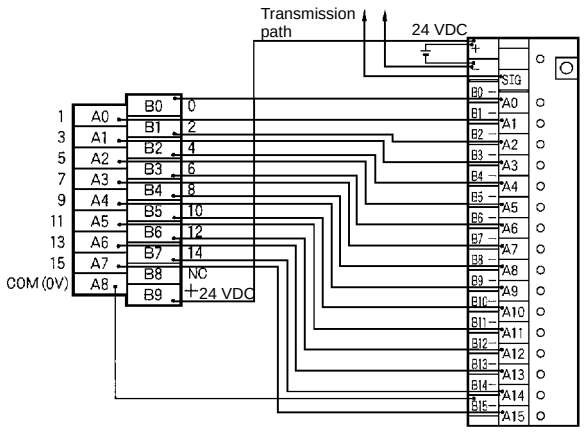
B7A-R6F□□ — **C200H-ID212**



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

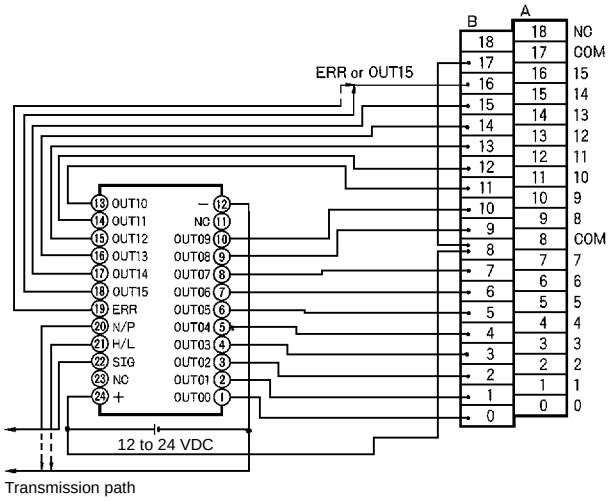
PLC output	B7A input	B7A output	PLC input

C200H-OD212 — **B7A-T6A□**

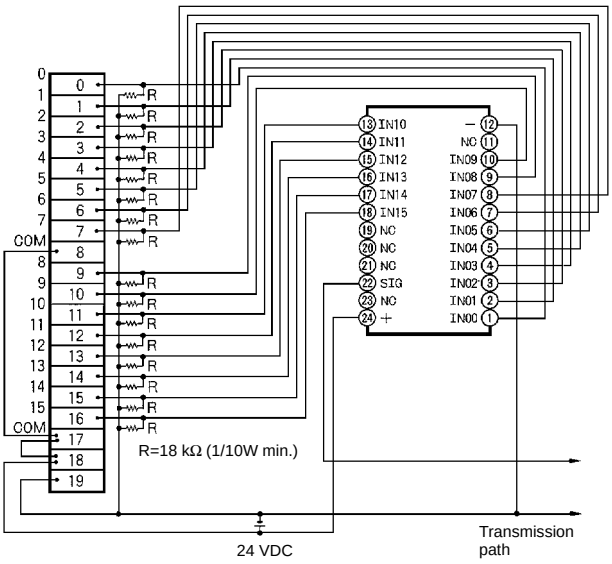


Note: The B7A-T6B□ can be connected in the same method.

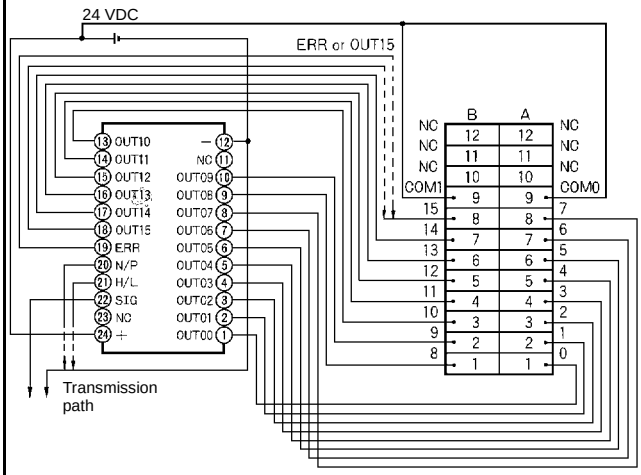
B7A-R6A5□ — **3G2A5-ID218**



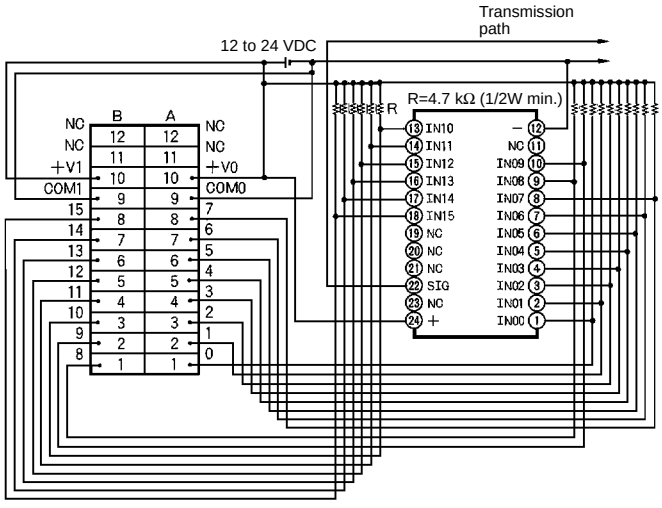
3G2A5-OC221 — **B7A-T6D□**



B7A-R6A5□ — **C200H-ID215**



C200H-OD215 — **B7A-T6D□**



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

■ PERIPHERAL CIRCUITS OF PRINTED CIRCUIT BOARD MODELS

Input Interface Circuit

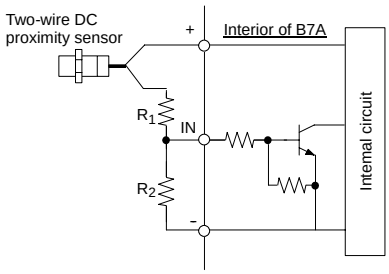
The printed circuit board model has a minimum ON discrimination voltage of 2.2 V and a maximum OFF discrimination voltage of 0.8 V, which are suitable for TTL circuits. If sensors are used for input, the following input circuits are required.

Two-wire DC Sensor Input

If a two-wire DC sensor is used for input, current limit resistor R_1 and leakage current diverter R_2 are required as shown in the diagram below. The following table lists R_1 and R_2 values for the E2E-XD-N Two-wire DC Proximity Sensor (with a current leakage of 0.8 mA maximum, a residual voltage of 3 V maximum, and a minimum control output current of 3 mA).

Input Interface (E2E-XD-N)

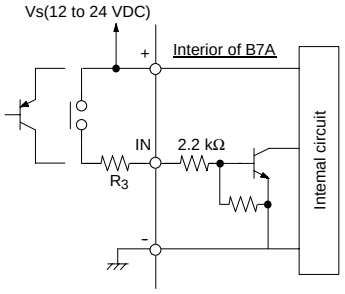
Supply voltage	12 V	24 V
R_1	1,800 Ω	5,600 Ω
R_2	820 Ω	820 Ω



Input with B7A and Common Power Supply
12 to 24 VDC, 10-point PCB Model only

The 10-point printed circuit board model has an input voltage range of 0 to 5 VDC. If a common power supply is connected, current limit resistor R_3 is required as shown in the diagram below. Use the following formula to calculate the value of R_3.

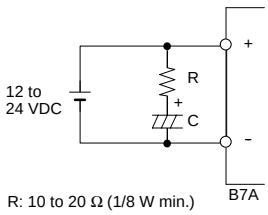
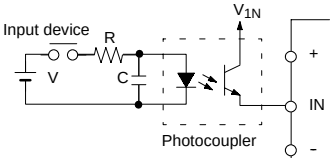
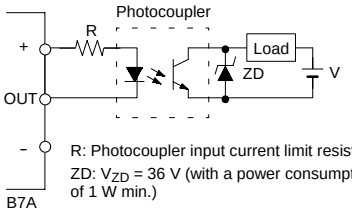
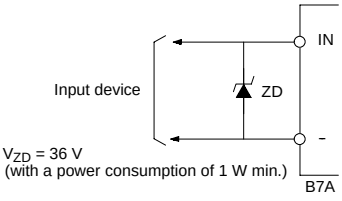
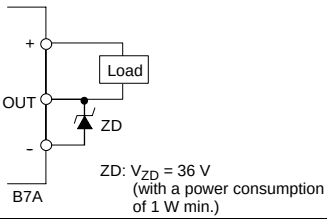
$$R_3 = \frac{\text{Supply voltage } V_S \text{ (V)} - 1.4 \text{ (V)}}{\text{Input current } (2 \times 10^{-3} \text{ (A)})} - 2{,}200\ (\Omega)$$



Note: The 16-point module's input voltage range is 0 V to the power supply voltage. Therefore no current limit resistor is required.

■ NOISE PROTECTION CIRCUIT

If there is a possibility of noise interference from the power supply, input, and/or output lines, add the following noise protection circuits.

Power supply noise protection circuit	Input noise protection circuit	Output noise protection circuit
 R: 10 to 20 Ω (1/8 W min.) C: 33 μF min. with a dielectric strength of 50 V min.	 C: 0.1 μF min. R: Photocoupler input current limit resistor	 R: Photocoupler input current limit resistor ZD: V_{ZD} = 36 V (with a power consumption of 1 W min.)
	 ZD: V_{ZD} = 36 V (with a power consumption of 1 W min.)	 ZD: V_{ZD} = 36 V (with a power consumption of 1 W min.)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

■ TRANSMISSION ERRORS AND OUTPUT SIGNALS

Transmission errors occur in the following cases:

- When the signal or 0 V wire is disconnected.
- When the signal is influenced by high-level external noise or the signal is excessively deformed because the length of the transmission path is more than the permissible distance.
- When the supply voltage to the Link Terminals are not within the operating voltage range (12 to 24 V ±10%).
- Immediately after the Link Terminals are turned on. (An error is reset within 300 ms after the power is turned on.)

Output Signals

HOLD: When an error occurs, the output signals just before the occurrence of the error will be maintained.

LOAD OFF: When an error occurs, all output signals will be turned OFF.

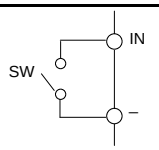
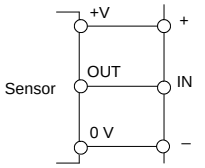
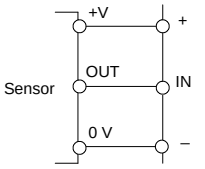
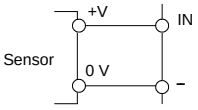
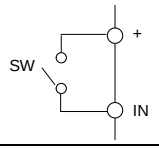
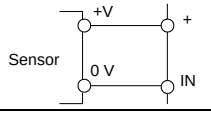
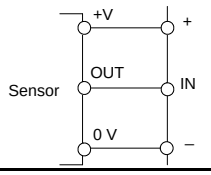
Automatic Reset

When the error is corrected, the Link Terminals will automatically reset themselves.

■ I/O STATUS

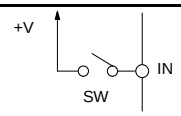
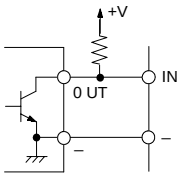
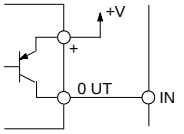
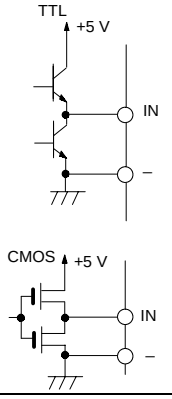
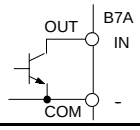
Signal Configuration

Input Models

Type	Applicable model	ON/OFF	Circuit	Suitable input example
Screw terminals	B7A-T6A1 B7A-T6A6 B7AM-6BS B7AM-8B11 B7AM-8B31 B7AM-8B16 B7AM-8B36 B7A-T10S1	For switches ON: Switch is closed. OFF: Switch is open.		A3G Push-button Switch (microload) WL01□ Limit Switch
	B7A-T10S3	For photoelectric sensors and proximity sensors (NPN) ON: Sensor signal is ON (residual voltage is 1.6 V max.). OFF: Sensor signal is OFF.		E2E-X□E 3-wire DC Inductive Proximity Sensor E3S Photoelectric sensor
	B7A-T6B1 B7AS-T6B1 B7A-T6B6 B7AS-T6B6 B7AM-6BS B7AM-8B11 B7AM-8B31 B7AM-8B16 B7AM-8B36	For photoelectric sensors and proximity sensors (NPN) ON: Sensor signal is ON (residual voltage is 4 V max.). OFF: Sensor signal is OFF.		
	B7A-T6A1 B7A-T6A6 B7A/S-T6B1 B7A/S-T6B6 B7AM-6BS B7AM-8B11 B7AM-8B31 B7AM-8B16 B7AM-8B36	For proximity sensors (two-wire sensor with DC output) ON: Sensor signal is ON (residual voltage is 4 V max.). OFF: Sensor signal is OFF (leakage current is 1.5 mA max.).		E2E-XD-N 2-wire DC Inductive Proximity Sensor
	B7A-T6C1 B7A-T6C6 B7AM-8F31	For switches ON: Switch is closed. OFF: Switch is open.		A3G Push-button Switch (microload) WL01□ Limit Switch
		For proximity sensors (two-wire sensor with DC output) ON: Sensor signal is ON (residual voltage is 4 V max.). OFF: Sensor signal is OFF (leakage current is 1.5 mA max.).		E2E-XD-N 2-wire DC Inductive Proximity Sensor
		For photoelectric sensors and proximity sensors (PNP) ON: Sensor signal is ON (residual voltage is 4 V max.). OFF: Sensor signal is OFF.		E2E-X□F 3-wire DC Inductive Proximity Sensor E3S Photoelectric sensor (PNP output type)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

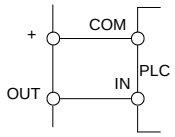
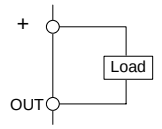
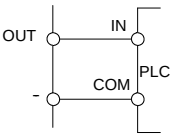
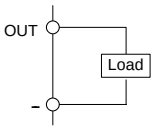
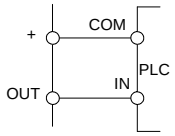
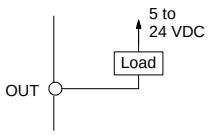
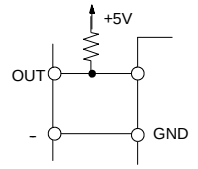
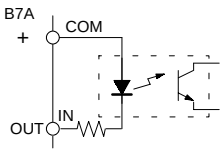
Input Models

Type	Applicable model	ON/OFF	Circuit	Suitable input example
Printed circuit board models (see note)	B7A-T6D2 B7A-T6D7 B7A-T10M2	For switches ON: Switch is closed. OFF: Switch is open.		A3G Push-button Switch (microload) WL01□ Limit Switch
		For NPN open-collector inputs ON: Transistor is OFF. OFF: Transistor is ON. (residual voltage is 0.8 V max.)		3G2A5-OD213 C200H-OD215 PLC Transistor Output Module
		For PNP open-collector inputs ON: Transistor is ON. OFF: Transistor is OFF.		C200H-OD216 C200H-OD217 PLC PNP Output Module
		For IC (TTL, CMOS) inputs ON: Output is 2.2 V min. OFF: Output is 0.8 V max.		3G2A5-OD501CN C200H-OD501 PLC TTL Output Module
PLC Link Terminal Adapter	B7A-T6E3 B7A-T6E8 B7A-T3E3 B7A-T3E8	For PLC output unit, NPN open collector ON: Transistor ON OFF: Transistor OFF		---

Note: The positive input voltage range of the B7A-T6D□ printed circuit board model is 0 to 24 VDC and the positive input voltage of the B7A-T10M2 printed circuit board model is 5 VDC.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Output Models

Type	Output configuration	Applicable model	ON/OFF	Circuit
Screw terminals	NPN open collector	B7A/S-R6B11 B7A/S-R6B31 B7A/S-R6B16 B7A/S-R6B36 B7AM-6BS B7AM-8B11 B7AM-8B31 B7AM-8B16 B7AM-8B36 B7A-R10SC01	For PLC input ON: PLC is ON. OFF: PLC is OFF.	
			For relays and solenoids ON: Operates. OFF: Reset.	
	PNP open collector	B7A-R6F11 B7A-R6F31 B7A-R6F16 B7A-R6F36 B7AM-8F31	For PLC input ON: PLC is ON. OFF: PLC is OFF.	
			For relays and solenoids ON: Operates. OFF: Reset.	
Printed circuit board model	NPN open collector	B7A-R6A52 B7A-R6A57 B7A-R10MC	For PLC input ON: PLC is ON. OFF: PLC is OFF.	
			For relays and display terminal ON: Operates. OFF: Reset.	
			For IC (TTL, CMOS) ON: Input is Low. OFF: Input is High.	
Link master adapter	NPN open collector	B7A-R6A13 B7A-R6A18 B7A-R6A33 B7A-R6A38 B7A-R3A13 B7A-R3A18 B7A-R3A33 B7A-R3A38	For PLC input module, + common photocoupler input ON: PLC is ON. OFF: PLC is OFF.	

■ I/O ON/OFF CONDITIONS

Input		Output			
		Screw terminal	Printed circuit board		Link master adapter
			Active high (N/P open)	Active low (N/P 0 V)	
Screw terminal	ON	ON	OFF	ON	ON
	OFF	OFF	ON	OFF	OFF
Printed circuit board	ON	ON	OFF	ON	ON
	OFF	OFF	ON	OFF	OFF
Link master adapter	ON	ON	OFF	ON	ON
	OFF	OFF	ON	OFF	OFF

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Precautions

■ GENERAL

Each terminal of the B7A-series should be used for only single signal transmission without a transmission host. The B7A-series cannot be connected to OMRON's SYSMAC BUS Remote I/O System.

Avoid places subject to corrosive gasses or continual shock and/or vibration.

If high-level electrostatic discharge is generated at the installation site (e.g., for transfer of a molding material, powder, or liquid through a pipe), separate the Link Terminals as far as possible from the source of the electrostatic discharge.

If the Input and Output Terminals are connected via a three-conductor cable to transmit signals with a single power supply (i.e., the power supply is connected directly to one of the Link Terminals and indirectly to the other), the transmission distance greatly varies with the diameter of the cable. This is due to the potential difference between the current on the 0 V transmission wire and on the 0 V I/O transmission line caused by the resistance of the cable. By increasing the diameter of the cable (decreasing its resistance), the transmission distance can be increased. By reducing the resistance of the transmission path to 2.5 Ω or less for example (i.e., increasing the thickness of the wire to 1.25 mm^2 or more), a transmission distance of 160 m will be achieved.

It is recommended that a switch for minute loads be connected to the 16-point screw terminal model because there is a contact input current of only 3 to 6 mA to the model from the connected switch or relay.

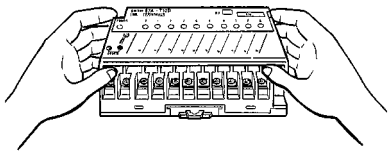
The Output Terminal has an error of 300 ms maximum after the Output Terminal is turned on. The user should be well aware of this before using error outputs.

Note: The 10-point and 16-point models cannot be connected to each other because their transmission signal data formats are not compatible.

■ SCREW TERMINAL MODELS

Apply a torque of 8 to 12 kgf • cm (0.78 to 1.18 N • m) to tighten wiring terminals.

Lift both edges of the terminal cover to open it.



If the Input or Output Terminal is mounted to a panel with screws, apply a torque of 6 to 10 kgf • cm (0.59 to 0.98 N • m) to tighten the screws.

■ PRINTED CIRCUIT BOARD MODELS

Soldering (with a soldering iron or in a soldering bath) must be completed within 5 s at a temperature of 260°C or less.

The supply voltage must be within the operating voltage range. Do not use a power supply which generates irregular voltages or large ripples.

Do not apply a strong acidic or alkaline solvent to the printed circuit board to remove the flux. The 10-point PCB version of B7A does not have sealed construction, so the cleaning solvent must not remain on the bottom of the module after it is cleaned. The 16-point PCB version of B7A does have sealed construction.

The input and output circuits are not isolated. If Link Terminals are influenced by external noise, use photocouplers to isolate the I/O circuits.

■ LINK MASTER ADAPTERS

Apply a torque of 8 to 12 kgf • cm (0.78 to 1.18 N • m) to tighten wiring terminals.

Wire the screw terminals of the adapter while disconnected from the PLC I/O module. This avoids imposing excessive force on the PLC's I/O connector.

Use the correct combination of B7A modules and PLC modules or the B7A may be damaged. The following are correct combinations.

B7A Input Module and PLC Output Module
B7A Output Module and PLC Input Module

■ WIRING

Separate the transmission lines from high voltage or power lines as far away as possible and do not wire the transmission lines in parallel with high voltage or power lines. If Link Terminals are used near a device that generates noise, make sure that the Link Terminals do not malfunction due to the noise generated from the device.

Make sure to turn off the Link Terminals while wiring in order to avoid a short-circuiting accident that may damage the internal element(s) of the Link Terminals.

Link Terminals will malfunction if the SIG terminal is short-circuited with one of the power terminals or B□□ terminal. Before turning the power on, make sure that the SIG terminal is not short-circuited with these terminals.

Before checking the insulation resistance of the transmission path, disconnect the wires from the Link Terminals.

If the OUT terminal and positive power terminal of the Output Link Terminal is short-circuited during signal transmission, the Link Terminal will malfunction. Apply an appropriate load between these terminals.

When measuring the current, use a multimeter without disconnecting the load.

■ RECOMMENDED CABLES

For B7A with Normal Speed I/O Delay
VCTF Cable

When a single power supply is used for two Input Terminals or Output Terminals:

VCTF 0.75 x 4 C (B7AM)
VCTF 0.75 x 3 C (B7A/S/C)

When independent power supplies are connected to each Link Terminal:

VCTF 0.75 x 3 C (B7AM)
VCTF 0.75 x 2 C (B7A/S)

The following cable can also be used.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Twisted-pair Wire

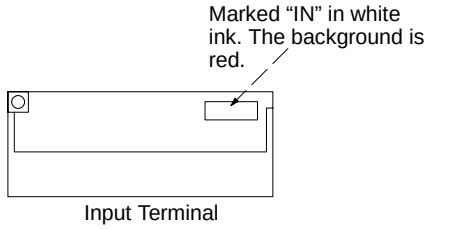
When a single power supply is connected to either the Input Terminal or Output Terminal, the thickness of the wire must be 0.75 mm^2 or greater.
Transmission distance: 100 m max.

For B7A with High Speed Shielded Wire

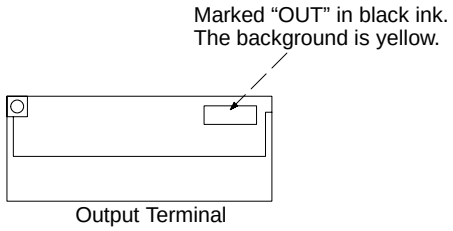
Use a shielded wire with a thickness of 0.75 mm^2 min.

■ COLOR

Screw Terminal Models



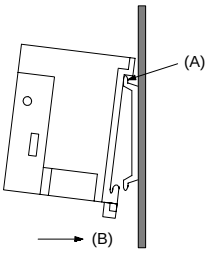
Input Terminal



Output Terminal

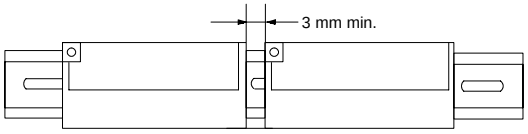
■ MOUNTING

To mount the Input or Output Terminal to a DIN track, hook the upper part (A) on the DIN track first. Then press the Input or Output Terminal in the (B) direction.

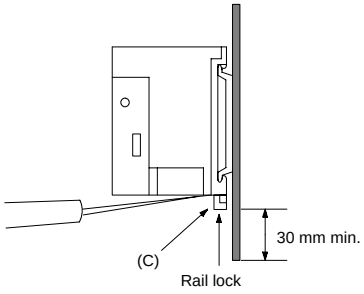


When mounting more than two Input or Output Terminals side by side, leave a space of 3 mm minimum between each Terminal.

It is recommended that PFP-S Spacers be used to maintain a space of 3 mm between each Input or Output Terminal.



Insert a flat-blade screwdriver to part (C) to remove the Input or Output Terminal from a DIN track.



NOTE: DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters to inches divide by 25.4.

OMRON®

OMRON ELECTRONICS, INC.
One East Commerce Drive
Schaumburg, IL 60173
1-800-55-OMRON

OMRON CANADA, INC.
885 Milner Avenue
Scarborough, Ontario M1B 5V8
416-286-6465

Cat. No. GC RIO-1 04/00 Specifications subject to change without notice. Printed in U.S.A.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP