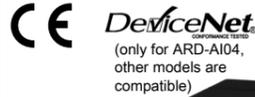


Autonics

DeviceNet Analog Remote I/O Standard Terminal Block Type ARD SERIES

INSTRUCTION MANUAL



Thank you for choosing our Autonics product.
Please read the following safety considerations before use.

■ Safety Considerations

- ※Please observe all safety considerations for safe and proper product operation to avoid hazards.
- ※⚠ symbol represents caution due to special circumstances in which hazards may occur.
- ⚠Warning Failure to follow these instructions may result in serious injury or death.
- ⚠Caution Failure to follow these instructions may result in personal injury or product damage.

⚠ Warning

- Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss.** (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)
Failure to follow this instruction may result in fire, personal injury, or economic loss.
- Do not disassemble or modify the unit.**
Failure to follow this instruction may result in fire.
- Do not connect, repair, or inspect the unit while connected to a power source.**
Failure to follow this instruction may result in fire.
- Check 'Connections' before wiring.**
Failure to follow this instruction may result in fire.

⚠ Caution

- Use the unit within the rated specifications.**
Failure to follow this instruction may result in fire or product damage.
- Use dry cloth to clean the unit, and do not use water or organic solvent.**
Failure to follow this instruction may result in electric shock or fire.
- Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.**
Failure to follow this instruction may result in fire or explosion.
- Keep metal chip, dust, and wire residue from flowing into the unit.**
Failure to follow this instruction may result in fire or product damage.
- Do not disconnect terminal or power, when the product is operating.**
Failure to follow this instruction may result in fire or malfunction.

■ Model

Model	Network	Digital/Analog	Input/Output	Input/Output point
ARD-AI04	DeviceNet	Analog	Input	4-point
ARD-AO04			Output	

■ DeviceNet Communication

Item	Specification
Communication	I/O Slave messaging (Group 2 only slave) · Poll command: Yes · Bit_strobe command: Yes · Cyclic command: Yes · COS command: Yes
Communication distance	Max. 500m (125 kbps), Max. 250m (250kbps), Max. 100m (500 kbps)
Node address	Max. 64 nodes
Communication speed*1	·125 kbps ·250 kbps ·500 kbps(automatically set when connecting with master)
Insulation	I/O and inner circuit: Non-insulated, DeviceNet and inner circuit: insulation, Power of DeviceNet: insulation
Approval	ARD-AI04 : DeviceNet conformance ARD-AO04 : DeviceNet compatible

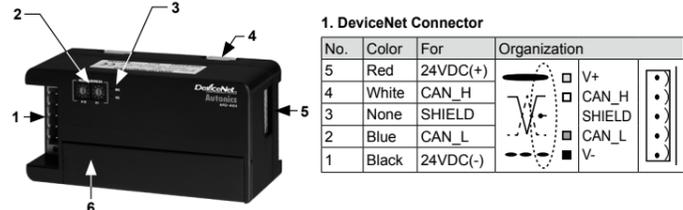
- ※1. The communication speed is automatically set to the communication speed of the Master (PC, PLC, etc.) When changing the communication speed during operation, the network status (NS) LED flashes in red and communication is not possible.
- ※The above specifications are subject to change and some models may be discontinued without notice.
- ※Be sure to follow cautions written in the instruction manual, user manual, and the technical descriptions (catalog, homepage).

■ Specifications

	ARD-AI04	ARD-AO04
Model	ARD-AI04	ARD-AO04
Power supply	Rated voltage: 24VDC=, Voltage range: 12-28VDC=	
Power consumption	Max. 3W	
Output points	4 points of input (enables to switch voltage/current)	4 points of output (voltage: 2CH, current: 2CH)
Control I/O	Voltage	0-10VDC=, -10-10VDC=, 0-5VDC=, 1-5VDC=, -5-5VDC= (input impedance: min. 1MΩ)
	Current	DC 4-20mA, DC0-20mA (input impedance: 250Ω)
	Max. allowable control I/O	±5% for rated output range
	Resolution	14-bit, 1/16,000
Accuracy	· At room temperature (25±5°C): ±0.3% F.S. · Out of room temperature ranges: ±0.6% F.S.	
Insulation resistance	Min. 200MΩ (at 500VDC megger)	
Noise resistance	±500V the square wave noise(pulse width: 1μs) by the noise simulator	
Dielectric strength	500VAC 50/60Hz for 1 minute (between external terminals and case, between output terminals and power terminals)	
Vibration	1.5mm amplitude at frequency of 10 to 55Hz (for 1 min.) in each X, Y, Z direction for 2 hours	
Shock	500m/s ² (approx. 50G) in each X, Y, Z direction for 3 times	
Environ-ment	Ambient temp.	-10 to 50°C, storage: -25 to 75°C
	Ambient humi.	35 to 85%RH, storage: 35 to 85%RH
Protection structure	IP20(IEC standard)	
Protection circuit	Surge, ESD protection, Reverse polarity protection circuit	
Indicator	· Network status (NS) LED: Green, Red · Unit status (MS) LED: Green, Red	
Material	Front case, Body Case: PC	
Mounting	DIN rail or screw lock type	
Insulation type	I/O and inner circuit: non-insulated, DeviceNet and inner circuit: insulated, Power of DeviceNet: insulated	
Approval	CE, DeviceNet, CE, DeviceNet compatible	
Weight*1	Approx. 210g (approx. 145g)	

- ※1: The weight includes packaging. The weight in parentheses is for unit only.
- ※Environment resistance is rated at no freezing or condensation.

■ Unit Description

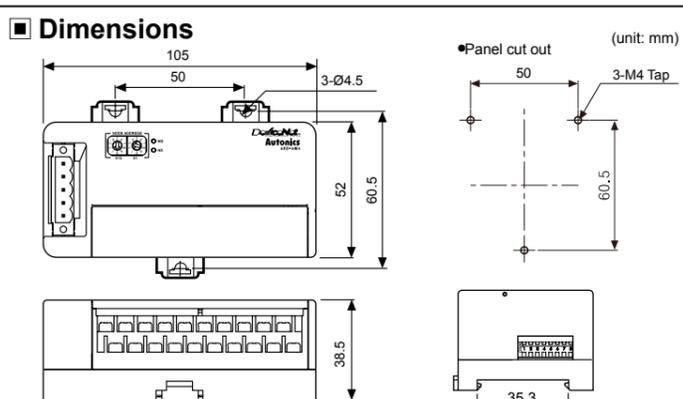


- DeviceNet Connector**
Table with 4 columns: No., Color, For, Organization. Rows include 5 (Red, 24VDC+), 4 (White, CAN_H), 3 (None, SHIELD), 2 (Blue, CAN_L), 1 (Black, 24VDC-).
- Rotary switch for node address**
Two rotary switches are used for setting node address. X10 switch represents the 10's multiplier and X1 switch represents the 1's multiplier.
- Status LED**
It displays the status of unit (MS) and network (NS).
- Rail lock**
It is used for holding DIN rail and fixing screw holes.
- DIP switch**
Set the range of I/O. (Factory default: All switches are OFF)

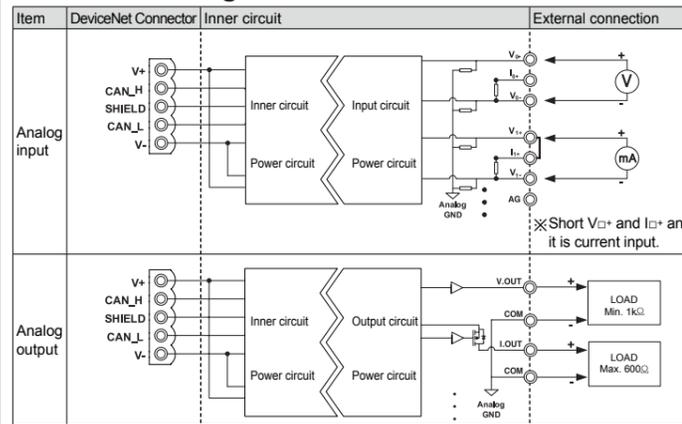
I/O range	ARD-AI04 (input model)						ARD-AO04 (output model)						SW7	SW8*1
	CH0, CH1	CH2, CH3	CH0, CH1	CH2, CH3	CH0, CH1	CH2, CH3								
0-5VDC	-	-	-	-	-	-	-	-	-	-	-	-	-	ON
1-5VDC	●	-	-	-	-	-	-	-	-	-	-	-	-	Used DIP switch
0-10VDC	-	●	-	-	-	-	-	-	-	-	-	-	-	OFF
-5-5VDC	●	-	-	-	-	-	-	-	-	-	-	-	-	Not used DIP switch
-10-10VDC	-	-	●	-	-	-	-	-	-	-	-	-	-	
DC4-20mA	●	-	-	-	-	-	-	-	-	-	-	-	-	
DC0-20mA	-	●	-	-	-	-	-	-	-	-	-	-	-	

- ※1: Turn ON SW8 and I/O range can be set by DIP switch(SW1 to SW6). Turn OFF SW8 and I/O range can be set by communication. By DIP switch, CH0 and CH1(CH2 and CH3) cannot be set separately. By communication, each CH can be set.

■ Dimensions



■ I/O Circuit Diagram



■ Input/Output Range

No.	Input/Output range	Max. allowable input/output range
0	0-5VDC	-0.25-5.25VDC
1	1-5VDC	0.8-5.2VDC
2	0-10VDC	-0.5-10.5VDC
3	-5-5VDC	-5.5-5.5VDC
4	-10-10VDC	-11-11VDC
5	DC4-20mA	DC3.2-20.8mA
6	DC0-20mA	DC0-21mA

■ Setup and Installation

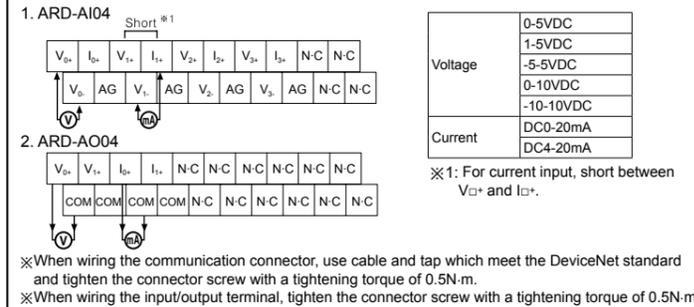
- Setting of node address**
Two rotary switches are used for setting node address. X10 switch represents the 10's multiplier and X1 switch represents the 1's multiplier. Node addresses are available from 0 to 63. Re-supply the power to the unit after changing the node address. The address of the connected unit must not be duplicated. When changing the address during operation, the unit status (MS) LED flashes in red and the unit communicates to the address before the change.
- Installation of Unit**
· Installation on panel
① Pull two rail locks on the rear part of unit, and there are fixing screw holes.
② Place this unit on a panel to be mounted.
③ Make holes on the each fixing screw hole position.
④ Place this unit on the two fixing screw holes and fix them tightly with 0.5 N·m tightening torque.
· Installation on DIN rail
① Pull two rail locks on the rear part of unit.
② Place this unit on a panel to be mounted.
③ Press the rail locks and fix it firmly.
- I/O cable connection**
Refer to the I/O circuit diagram and connections. Connect a sensor or the signal cable of external I/O device to the terminals. (Tightening torque: 0.5 N·m)
- DeviceNet cable connection**
① For stable system, it is recommended to use the DeviceNet cable.
② Connect the DeviceNet cable to the DeviceNet connector and tighten the fixed screw of the connector by a driver. (Tightening torque: 0.5 N·m)
③ Connect the DeviceNet connector to the ARD unit and supply the power to the network.

- Setting of master unit**
① Check the LED status of ARD unit when power is ON. Normal operation is as below table.
Table with 3 columns: Item, Status LED, Status description. Rows include Unit status LED (MS) and Network status LED (NS).
- ② Install the software from master unit manufacturing company.
- ③ Setting communication speed and node address in the software.
· Baud rate: 125/250/500 kbps
· Node address of master unit: Usually it is set 00 address.
- ④ Resistor connected unit in the network.
· There are two methods to resistor, automatically in on-line or manually in off-line. (Refer to the manual of the master unit.)
· ARD Series I/O assignment: Usually it is automatically assigned by the software.
· Setting of operation mode: Select among Poll, COS, Cyclic, Bit Strobe(Usually set Poll mode)
- Check operating status**
When installation and setting are completed, MS LED and NS LED turn ON in green. (Refer to the 'Status LED'.)
- Terminating resistance**
· 120 Ω · 1% of metallic film · 1/4 W
※Do not install terminating resistance on ARD unit, or it may cause network problem and malfunction. (Impedance can be too high or low.)
※Connect terminating resistance on the both ends of the trunk line.

■ Communication Distance

Baud Rate	Max. network length	Max. length of branch line	Allowable expansion length of branch line
125 kbps	500m	6m	156m
250 kbps	250m	6m	78m
500 kbps	100m	6m	39m

■ Connections



- ※When wiring the communication connector, use cable and tap which meet the DeviceNet standard and tighten the connector screw with a tightening torque of 0.5N·m.
- ※When wiring the input/output terminal, tighten the connector screw with a tightening torque of 0.5N·m.

■ Functions

Model	ARD-AI04(Input)	ARD-AO04(Output)
Basic	Communication speed auto-detection	●
	Network power voltage	●
	Power on total time	●
	Unit comment	●
	Last maintenance date stored	●
Analog	Scaling	●
	I/O comment	●
	Adjustment gradient	●
	Adjustment offset	●
	Number of AD Conversion Points Setting	●
	Moving Average Filter of Number	●
	Peak/Bottom hold	●
	Disconnected cable detection	●
	Comparator	●
	Hysteresis	●
Fault state	●	

■ Status LED

No	Type	LED status	Color	Description	Troubleshooting
1	MS	●	Green	Normal operation	-
	NS	●	Green	Output communication or message communication is working.	
2	MS	●	Green	Standby duplicated node address check	-
	NS	●	-	The status of standby for receiving message of duplicated node address check from master unit.	
3	MS	●	Green	Standby normal operation	-
	NS	●	Green	The status of standby for establish connection from master unit.	
4	MS	●	Red	Watchdog timer error	Change the slave unit.
	NS	●	-	Watchdog timer error occurs at the slave unit.	
5	MS	●	Red	Switch setting error	Change the switch with valid value and re-supply the power.
	NS	●	-	The status that DIP switch or another switch setting is invalid.	
6	MS	●	Red	Changed node address during normal operation	Change the initial node address when supplying the power.
	NS	●	Green	The status that node address is changed while it is operating normally.	
7	MS	●	Green	Invalid node address	Change valid node address and re-supply the power.
	NS	●	Red	The status of setting node address wrongly.	
8	MS	●	Red	Duplicated node address	Change node address not duplicated. Power on the slave unit again. Check master unit, communication, cable, terminating resistance and noise of network.
	NS	●	Red	The status of duplicated node address in the network. Bus-Off error The communication is stopped with Bus-Off.	
9	MS	●	Green	Input/Output Connection time out	Check the master setting and the user program.
	NS	●	Red		

■ Manual

For the detail information and instructions, please refer to user manual, and be sure to follow cautions written in the technical descriptions (catalog, homepage). Visit our homepage (www.autonics.com) to download manual.

■ Caution during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- 24VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- Keep away from high voltage lines or power lines to prevent inductive noise. In case installing power line and input signal line closely, use line filter or varistor at power line and shielded wire at input signal line. Do not use near the equipment which generates strong magnetic force or high frequency noise.
- This unit may be used in the following environments.
 - ① Indoors (in the environment condition rated in 'Specifications')
 - ② Altitude max. 2,000m
 - ③ Pollution degree 2
 - ④ Installation category II

■ Major Products

- Photoelectric Sensors
- Fiber Optic Sensors
- Door Sensors
- Door Side Sensors
- Area Sensors
- Proximity Sensors
- Pressure Sensors
- Rotary Encoders
- Connector/Sockets
- Switching Mode Power Supplies
- Control Switches/Lamps/Buzzers
- I/O Terminal Blocks & Cables
- Stepper Motors/Drivers/Motion Controllers
- Graphic/Logic Panels
- Field Network Devices
- Laser Marking System(Fiber, Co., Ndyag)
- Laser Welding/Soldering System
- Temperature Controllers
- Temperature/Humidity Transducers
- SSR/Power Controllers
- Counters
- Timers
- Panel Meters
- Tachometer/Pulse(Rate)/Meters
- Display Units
- Sensor Controllers

Autonics Corporation
http://www.autonics.com

HEADQUARTERS:
18, Bansong-ro 513beon-gil, Haeundae-gu, Busan, South Korea, 48002
TEL: 82-51-519-3232
E-mail: sales@autonics.com