Autonics

DeviceNet Digital Remote I/O
Standard Terminal Block Type
ARD SERIES
INSTRUCTION MANUAL

CE DeviceNet

Thank you very much for selecting Autonics products.
For your safety, please read the following before using.

◼ 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

1. **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.
2. **Do not disassemble or modify the unit.**
Failure to follow this instruction may result in fire.
3. **Do not connect, repair, or inspect the unit while connected to a power source.**
Failure to follow this instruction may result in fire.
4. **Check 'Connections' before wiring.**
Failure to follow this instruction may result in fire.

⚠ Caution

1. **Use the unit within the rated specifications.**
Failure to follow this instruction may result in fire or product damage.
2. **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.
3. **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.
4. **Keep metal chip, dust, and wire residue from flowing into the unit.**
Failure to follow this instruction may result in fire or product damage.
5. **Do not disconnect terminal or power, when the product is operating.**
Failure to follow this instruction may result in fire or malfunction.

◼ Ordering Information

| AR | D | – | D | I | 08 | A | E |

| | No mark | Basic unit |
| Structure | E | Expansion unit |

	A	AC voltage
I/O specification	N	NPN open collector
	P	PNP open collector
	R	Relay
	S	SSR

| I/O point | 08 | 8 points type |
| | 16 | 16 points type |

I/O type	I	Input type
	O	Output type
	X	I/O mixed type

| Digital/Analog | D | Digital type |

| Network | D | DeviceNet type |

| Item | AR | Autonics Remote I/O |

◼ Models

| Model | | Specification |
Basic unit	Expansion unit	
ARD-DI08A	ARD-DI08AE	8 points of 75-250VAC input(13mA/point)
ARD-DI16N	ARD-DI16NE	16 points of 10-28VDC NPN input(10mA/point)
ARD-DI16P	ARD-DI16PE	16 points of 10-28VDC PNP input(10mA/point)
ARD-DO08R	ARD-DO08RE	8 points of Relay output(2A/point), Life cycle of contact: 100,000 times
ARD-DO08S	ARD-DO08SE	8 points of SSR output(1A/point)
ARD-DO16N	ARD-DO16NE	16 points of NPN output(0.5A/point)
ARD-DO16P	ARD-DO16PE	16 points of PNP output(0.5A/point)
ARD-DX16N	ARD-DX16NE	8 points of 10-28VDC NPN input(10mA/point), 8 points of NPN output(0.5A/point)
ARD-DX16P	ARD-DX16PE	8 points of 10-28VDC PNP input(10mA/point), 8 points of PNP output(0.5A/point)

※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 and the technical descriptions (catalog, homepage).

◼ Functions

○ **Auto communication speed recognition:** The unit enables to recognize communication speed automatically when connecting with master unit.
○ **Network power voltage monitoring:** If PV is lower than setting value, the unit enables to receive abnormal flag for network power voltage monitoring as Explicit message.
○ **Single byte I/O:** Reads/writes on single byte.
○ **Multi-byte I/O:** Reads/writes on multi bytes.
○ **Additional expansion units:** Available to connect expansion units up to 3. I/O points can be expanded up to max. 64.
○ **Reading the number of expansion units:** Reads the number of connected expansion units.
○ **Reading the unit specification:** Reads the specification of connected units.

◼ Specifications

Model	ARD-DI08A / ARD-DI08AE	ARD-DI16N / ARD-DI16NE	ARD-DI16P / ARD-DI16PE	ARD-DO08R / ARD-DO08RE	ARD-DO08S / ARD-DO08SE	ARD-DO16N / ARD-DO16NE	ARD-DO16P / ARD-DO16PE	ARD-DX16N / ARD-DX16NE	ARD-DX16P / ARD-DX16PE
Power supply	Rated voltage: 24VDC⎓, Voltage range: 12-28VDC⎓								
Power consumption	Max. 3W								
Isolation type	Photocoupler isolated								
I/O points	8 points of AC input	16 points of NPN input	16 points of PNP input	8 points of Relay output	8 points of SSR output	16 points of NPN output	16 points of PNP output	Each 8 points of NPN input + output	Each 8 points of PNP input + output
Control I/O Voltage	75-250 VAC~	10-28VDC⎓		Normally Open (N.O.) 250VAC ~2A 1a	30-250 VAC~	10-28VDC⎓ (Voltage drop: Max. 0.5V)			
Control I/O Current	13mA/ point	10mA/point		1A/ point	0.5A/point (Leakage current: Max. 0.5mA)			Input: 10mA, Output: 0.5A/point (Leakage current: Max. 0.5mA)	
Common	8 points, Common			1 point, 1 COM	8 points, Common				
Insulation resistance	Min. 200MΩ(at 500VDC megger)								
Noise strength	±240V the square wave noise(pulse width:1μs) by the noise simulator								
Dielectric strength	1,000VAC 50/60Hz for 1 minute								
Vibration	1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours								
Shock	500m/s²(Approx. 50G) in X, Y, Z directions for 3 times								
Environment Ambient temperature	-10 to 50℃(at non-freezing status), Storage: -25 to 75℃								
Environment Ambient humidity	35 to 85%RH, Storage: 35 to 85%RH								
Protection	IP20(IEC standard)								
Protection circuit	Surge, Reverse polarity protection circuit (Common) • TR output type: Overcurrent protection circuit(NPN type: Operated at min. 1.9A - Power is resupplied in overcurrent status, PNP type: Operated at min. 0.7A), Overheating protection(over 165℃), Short-circuit protection								
Indicator	Network status(NS) LED(Green, Red), Unit status(MS) LED(Green, Red), I/O status LED(Input: Green, Output: Red)								
Material	Front case, Body Case: PC, Rubber cap: NBR								
Mounting	DIN rail or Screw lock type								
Unit weight	Approx. 150g	Approx. 140g		Approx. 160g	Approx. 170g	Approx. 140g			
Approval	DeviceNet / CE DeviceNet								

※Environment resistance is rated at no freezing or condensation.

◼ DeviceNet Communication

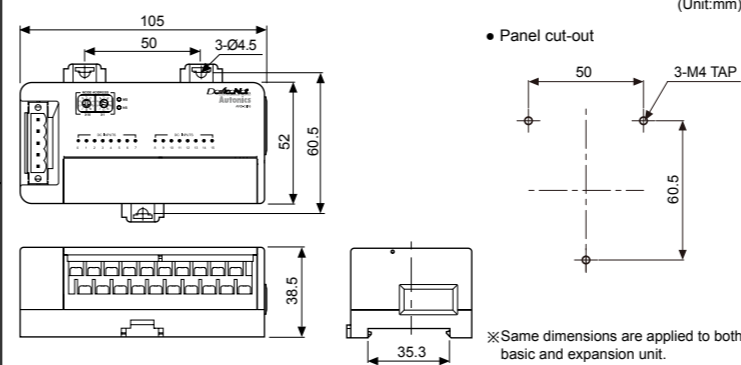| Item	Specification
Communication	I/O Slave messaging(Group 2 Only slave) - Poll command: Yes - Bit_strobe command: Yes - Cyclic command: Yes - COS command: Yes
Communication distance	Max. 500m(125kbps), Max. 250m(250kbps), Max. 100m(500kbps)
Node address setting	Max. 64node(Set by front rotary switch)
Communication speed※1	125, 250, 500kbps (Automatic setting when connecting with Master)
Insulation	I/O and inner circuit: Photocoupler insulation, DeviceNet and inner circuit : Non-insulated, Power of DeviceNet: Non-insulated
Power supply	- Rated voltage: 24VDC - Voltage: 12-28VDC - Power consumption: Max. 3W
Approval	ODVA Conformance tested

※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.

◼ Part Descriptions

○ **Basic unit**

2. **Rotary switch for address:** Rotary switch for setting node address. ×10 represents tens digit and ×1 represents ones digit.
3. **Status LED:** It displays the status of unit(MS) and network(NS).
4. **I/O status LED:** It displays each I/O status.
5. **Rail lock:** It is used for mounting DIN rail or with screw.
6. **Connector output part:** It connects an expansion unit.
7. **I/O terminal block:** It is used for connecting external device I/O.

1. DeviceNet Connector			
No.	Color	For	Organization
5	Red	24VDC(+)	□ V+
4	White	CAN_H	□ CAN_H
3	None	SHIELD	□ SHIELD
2	Blue	CAN_L	□ CAN_L
1	Black	24VDC(-)	□ V-

○ **Expansion unit**

1. **Connector input part:** It connects expansion unit and is joined into expansion connector output.
2. **I/O status LED:** It displays each I/O status.
3. **Rail lock:** It is used for mounting DIN rail or with screw.
4. **Connector output part:** It connects an expansion unit.
5. **I/O terminal block:** It is used for connecting external device I/O.

◼ Dimensions

(Unit:mm)

105 / 50 / 3-Ø4.5 / 52 / 60.5 / 38.5 / 35.3

● Panel cut-out
50 / 3-M4 TAP / 60.5

※Same dimensions are applied to both basic and expansion unit.

◼ Installation and Setup

○ **Setting of node address**
- Two rotary switches are used for setting node address.
- ×10 switch represents tens digit and ×1 switch represents ones digit. The node address can be set 00 to 63.
- After setting the desired node address, re-supply the unit power for applying the changed 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.
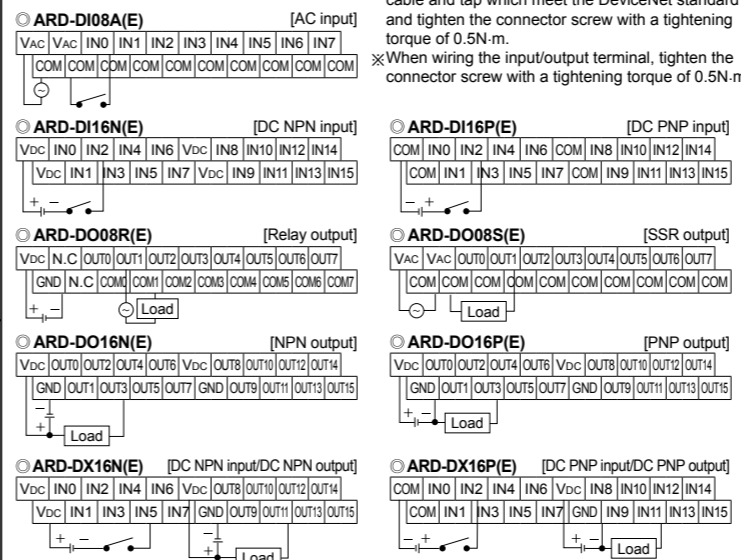
(E.g.) X10 X1

○ **Unit Installation**
● **Mounting on panel**
①Pull 3 Rail locks on the rear part of a unit, there is a fixing screw hole.
②Place the unit on a panel to be mounted.
③Make a hole on a fixing screw position.
④Fasten the screw to fix the unit tightly.

● **Mounting on DIN rail**
①Pull 3 Rail locks on the rear part of unit.
②Place the unit on DIN rail to be mounted.
③Press Rail locks to fix the unit tightly.

● **Connection of basic and expansion unit**
①Turn OFF the power of a basic unit.
②Place the expansion unit to be installed next to the basic unit.
③Connect the cable of expansion unit to the connector of basic units.
④Connected expansion units are installed as the right figure.
⑤Supply power to the basic unit.

○ **Terminating resistance**
120Ω, 1% of metallic film, 1/2W
※Do not install terminal resistance on the unit or, it may cause network terminating problems (Impedance can be too high or low) and trouble.
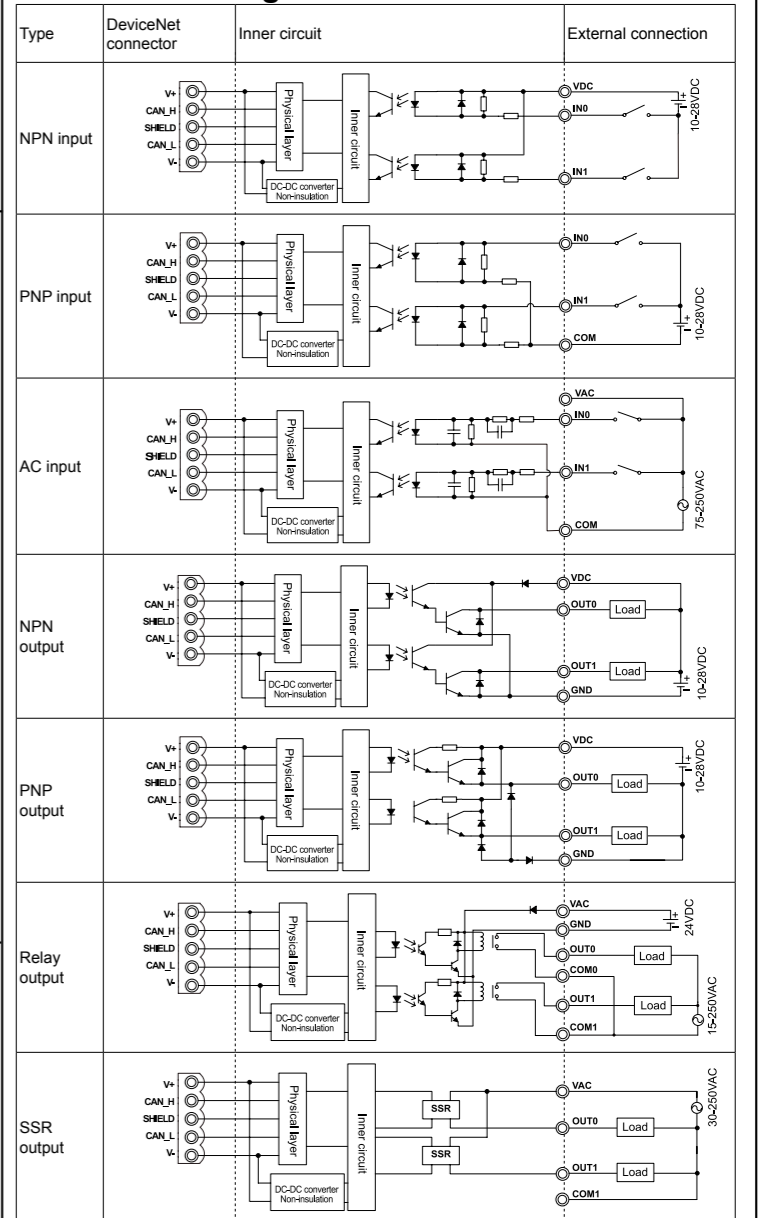※Connect terminating resistance on the both ends of the trunk line.

◼ Connections

○ **ARD-DI08A(E)** [AC input]
| VAC | VAC | IN0 | IN1 | IN2 | IN3 | IN4 | IN5 | IN6 | IN7 |
| COM | COM | COM | COM | COM | COM | COM | COM | COM | COM |

○ **ARD-DI16N(E)** [DC NPN input]
| VDC | IN0 | IN2 | IN4 | IN6 | VDC | IN8 | IN10 | IN12 | IN14 |
| VDC | IN1 | IN3 | IN5 | IN7 | VDC | IN9 | IN11 | IN13 | IN15 |

○ **ARD-DI16P(E)** [DC PNP input]
| COM | IN0 | IN2 | IN4 | IN6 | COM | IN8 | IN10 | IN12 | IN14 |
| COM | IN1 | IN3 | IN5 | IN7 | COM | IN9 | IN11 | IN13 | IN15 |

○ **ARD-DO08R(E)** [Relay output]
| VAC | N.C | OUT0 | OUT1 | OUT2 | OUT3 | OUT4 | OUT5 | OUT6 | OUT7 |
| GND | N.C | COM0 | COM1 | COM2 | COM3 | COM4 | COM5 | COM6 | COM7 |

○ **ARD-DO08S(E)** [SSR output]
| VAC | VAC | OUT0 | OUT1 | OUT2 | OUT3 | OUT4 | OUT5 | OUT6 | OUT7 |
| COM | COM | COM | COM | COM | COM | COM | COM | COM | COM |

○ **ARD-DO16N(E)** [NPN output]
| VDC | OUT0 | OUT2 | OUT4 | OUT6 | VDC | OUT8 | OUT10 | OUT12 | OUT14 |
| GND | OUT1 | OUT3 | OUT5 | OUT7 | GND | OUT9 | OUT11 | OUT13 | OUT15 |

○ **ARD-DO16P(E)** [PNP output]
| VDC | OUT0 | OUT2 | OUT4 | OUT6 | VDC | OUT8 | OUT10 | OUT12 | OUT14 |
| GND | OUT1 | OUT3 | OUT5 | OUT7 | GND | OUT9 | OUT11 | OUT13 | OUT15 |

○ **ARD-DX16N(E)** [DC NPN input/DC NPN output]
| VDC | IN0 | IN2 | IN4 | IN6 | VDC | OUT8 | OUT10 | OUT12 | OUT14 |
| VDC | IN1 | IN3 | IN5 | IN7 | GND | OUT9 | OUT11 | OUT13 | OUT15 |

○ **ARD-DX16P(E)** [DC PNP input/DC PNP output]
| COM | IN0 | IN2 | IN4 | IN6 | VDC | IN8 | IN10 | IN12 | IN14 |
| COM | IN1 | IN3 | IN5 | IN7 | GND | OUT9 | OUT11 | OUT13 | OUT15 |

※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.

◼ Status LED

(ON: ☼, Flash: ✹, OFF: ●)

Item	LED Status Red	LED Status Green	Description
Unit status (MS) LED	☼	●	Unrecoverable error
	✹	●	Recoverable error & communication error of expansion unit
	●	☼	Normal operation
	●	●	Power is not supplied
Network status(NS) LED	●	✹	Normal standby
	●	☼	Network On-Line
	☼	●	Dupl, MAC ID / Bus-Off
	✹	●	Time out
	●	●	Network Off-Line

◼ Communication Distance

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

◼ I/O Circuit Diagram

Type	DeviceNet connector	Inner circuit	External connection
NPN input	V+ / CAN_H / SHIELD / CAN_L / V-	Physical layer, Inner circuit, DC-DC converter Non-insulation	VDC / IN0 / IN1 / 10-28VDC
PNP input	V+ / CAN_H / SHIELD / CAN_L / V-		VAC / IN0 / IN1 / COM / 10-28VDC
AC input	V+ / CAN_H / SHIELD / CAN_L / V-		VAC / IN0 / IN1 / COM / 75-250VAC
NPN output	V+ / CAN_H / SHIELD / CAN_L / V-		VDC / OUT0 Load / OUT1 Load / GND / 10-28VDC
PNP output	V+ / CAN_H / SHIELD / CAN_L / V-		VDC / OUT0 Load / OUT1 Load / GND / 10-28VDC
Relay output	V+ / CAN_H / SHIELD / CAN_L / V-		VAC / GND / OUT0 / OUT1 Load / COM0 / COM1 Load / 24VDC / 15-250VAC
SSR output	V+ / CAN_H / SHIELD / CAN_L / V-	SSR	VAC / OUT0 Load / OUT1 Load / COM1 / 30-250VAC

◼ Caution during Use

1. Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
2. 24VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
3. 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.
4. Do not connect or disconnect the expansion unit when power is being supplied.
5. This unit may be used in the following environments.
①Indoors (in the environment condition rated in 'Specifications')
②Altitude max. 2,000m
③Pollution degree 2
④Installation 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, CO₂, Nd:YAG)
■ 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