Autonics

DeviceNet DIGITAL REMOTE I/O
ARD SERIES
M A N U A L

CE
DeviceNet

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

■ Caution for your safety

※Please keep these instructions and review them before using this unit.

※Please observe the cautions that follow;

⚠ **Warning** Serious injury may result if instructions are not followed.

⚠ **Caution** Product may be damaged, or injury may result if instructions are not followed.

※The following is an explanation of the symbols used in the operation manual.
⚠Caution : Injury or danger may occur under special conditions.

⚠ Warning

1. **In case of using this unit with machinery(Ex: nuclear power control, medical equpment, ship, vehicle, train, airplane, combustion apparatus, safety device, crime/disaster prevention equipment, etc) which may cause damages to human life or property, it is required to install fail-safe device.**
It may cause a fire, human injury or damage to property.
2. **Do not connect, inspect and repair this unit when power is ON.**
It may cause electric shock or a fire.
3. **Do not disassemble or modify this unit. Please contact us if it is required.**
It may cause electric shock or a fire.
4. **Do not insert metallic substance into the unit.**
It may cause electric shock, a fire, or malfunction.

⚠ Caution

1. **This unit shall not be used outdoors.**
It may shorten the life cycle of the product or cause electric shock.
2. **Do not use this unit in place where there is flammable or explosive gas.**
It may cause a fire or explosion.
3. **Do not use this unit in place where there is vibration or impact.**
It may cause a breakdown of the product.
4. **Please connect power terminal and communication cable exactly after checking the connection diagram.**
It may cause a fire and malfunction.
5. **Tighten communication cable connector as tight as possible for stable cable connection.**
In case of unstable cable connections, it may cause serious commnucation or network malfunction.
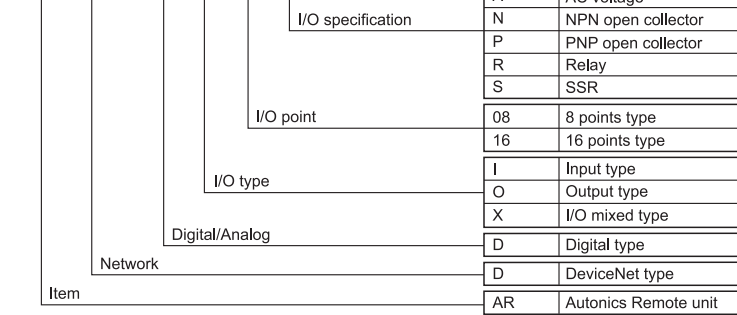6. **In cleaning the unit, do not use water or or organic solvent. And use dry cloth.**
It may cause electric shock and breakdown of the product.
7. **Please observe the rated specifications.**
It may cause electric shock, human injury and breakdown of the product.
8. **Please separate as industrial waste when disusing this unit.**

■ Ordering information

AR	D	–	D	I	08	A	E

	Structure		No mark	Basic unit
			E	Expansion unit

I/O specification		A	AC voltage
		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 unit

■ Model

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.

■ 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.
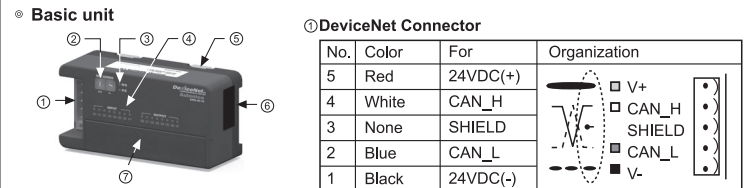
■ Specifications

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	30-250 VAC	10-28VDC (Voltage drop: Max. 0.5V)		Input: 10mA, Output: 0.5A/point (Leakage current: Max. 0.5mA)	
Control I/O — Current	13mA/ point	10mA/point		2A 1a	1A/ point	0.5A/point (Leakage current: Max. 0.5mA)			
Common	8 points, Common			1 point, 1COM	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								
Environ-ment — Ambient temperature	-10 to 50℃(at non-freezing status), Storage: -25 to 75℃								
Environ-ment — 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(NPN type: Operated at min. 1.9A - Power is resupplied in overcurrent status, PNP type: Operated at min. 0.7A), Overheating protection(165℃ Typical), 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	DeviceNet	DeviceNet CE					

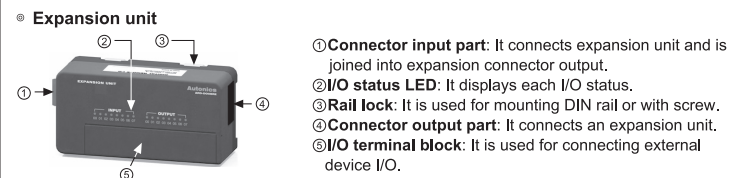※ Environment resistance is rated at no freezing or condensation.

■ 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	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

■ Part description

● **Basic unit**

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-

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.

● **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)

●Panel cut-out

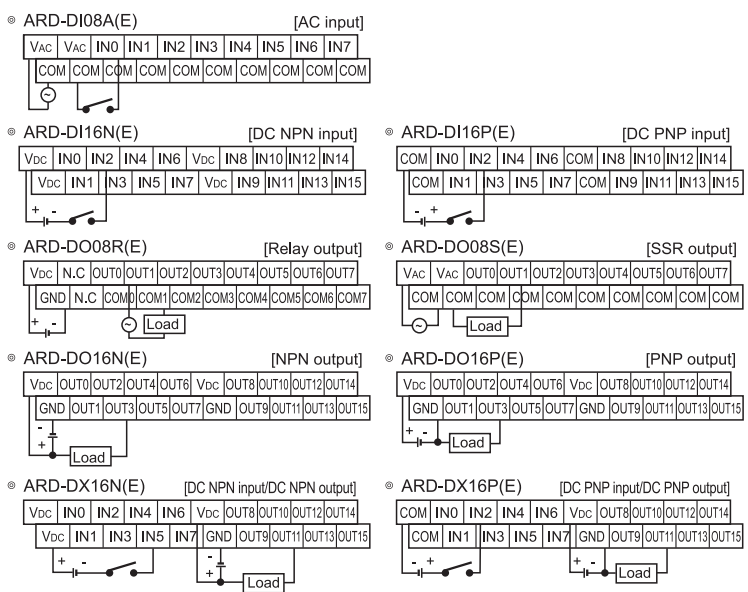※Same dimensions are applied to both basic and expansion unit.
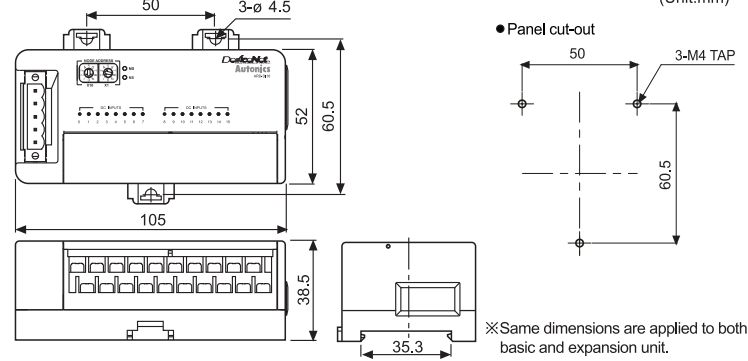
■ Installation and setup

● **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.

(Ex)
X10 X1

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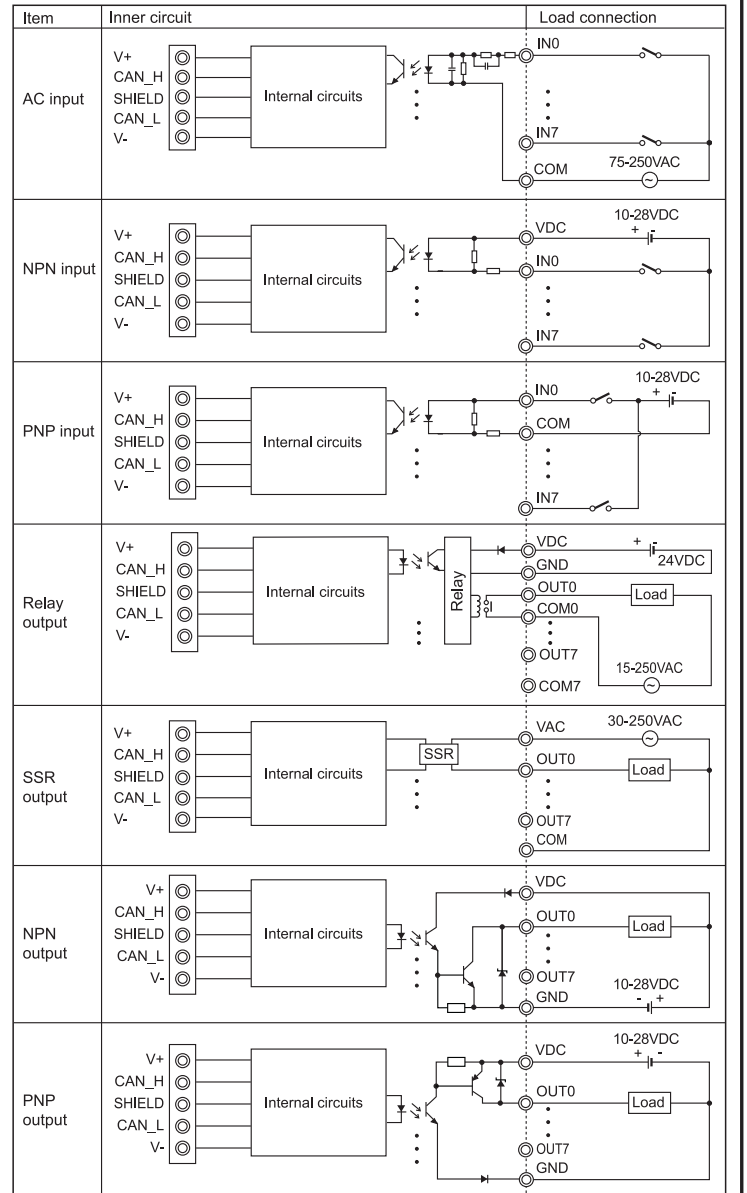
■ Connections

● 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]

VDC	N.C	OUT0	OUT1	OUT2	OUT3	OUT4	OUT5	OUT6	OUT7
GND	N.C	COM0	COM1	COM2	COM3	COM4	COM5	COM6	COM7

Load

● ARD-DO08S(E) [SSR output]

VAC	OUT0	OUT1	OUT2	OUT3	OUT4	OUT5	OUT6	OUT7
COM	COM	COM	COM	COM	COM	COM	COM	COM

Load

● 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

Load

● 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

Load

● 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

Load

● ARD-DX16P(E) [DC PNP input/DC PNP output]

COM	IN0	IN2	IN4	IN6	VDC	OUT8	OUT10	OUT12	OUT14
COM	IN1	IN3	IN5	IN7	GND	OUT9	OUT11	OUT13	OUT15

Load

■ Status LED

(ON:☆, Flash: ☀, OFF: ●)

Item	LED Status		Description
	Red	Green	
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

Item	Inner circuit	Load connection
AC input	V+ / CAN_H / SHIELD / CAN_L / V- — Internal circuits	IN0 … IN7 COM 75-250VAC
NPN input	V+ / CAN_H / SHIELD / CAN_L / V- — Internal circuits	10-28VDC VDC / IN0 … IN7
PNP input	V+ / CAN_H / SHIELD / CAN_L / V- — Internal circuits	10-28VDC IN0 / COM … IN7
Relay output	V+ / CAN_H / SHIELD / CAN_L / V- — Internal circuits, Relay	VDC / GND / OUT0 / COM0 … OUT7 / COM7 24VDC Load 15-250VAC
SSR output	V+ / CAN_H / SHIELD / CAN_L / V- — Internal circuits, SSR	VAC / OUT0 … OUT7 / COM 30-250VAC Load
NPN output	V+ / CAN_H / SHIELD / CAN_L / V- — Internal circuits	VDC / OUT0 … OUT7 / GND 10-28VDC Load
PNP output	V+ / CAN_H / SHIELD / CAN_L / V- — Internal circuits	VDC / OUT0 … OUT7 / GND 10-28VDC Load

■ Caution for using

1. Turn OFF the power before connecting or disconnecting expansion units.
2. Node addresses of connected units on network should not be duplicated. If you change a node address during operation, unit status (MS) red LED flashes and it communicates with a previous node address. Re-supply power and the changed node address is applied.
3. Communication speed which is set on master is set automatically. If you change the communication speed during operation, network status (NS) red LED turns ON and it does not communicate. Resupply power and it operates normally.
4. Make sure to use DeviceNet standards communication cables, and taps. It may cause communication error if non-standards products are used.
5. Make sure to examine disconnection or short-circuit before connecting cables.
6. Avoid installing the units where severe dust exists or where corrosion may occur.
7. Installation environment
   ① It shall be used indoor. ② Altitude Max. 2,000m
   ③ Pollution Degree 2 ④ Installation Category II
   ※It may cause malfunction if above instructions are not followed.

■ Major products

- Photoelectric sensors
- Fiber optic sensors
- Door sensors
- Door side sensors
- Area sensors
- Proximity sensors
- Pressure sensors
- Rotary encoders
- Connectors/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
- Tachometer/Pulse(Rate)meters
- SSR/Power controllers
- Sensor controllers
- Display units
- Panel meters
- Counters
- Timers