

DNA02 DeviceNet Slave Station Communication Module

Instruction Sheet

Warning

- ✓ Please read this instruction carefully before use and follow this instruction to operate the device in order to prevent damages on the device or injuries to staff.
- ✓ Switch off the power before wiring.
- ✓ This instruction sheet only provides introductory information on electrical specification, functions, wiring, trouble-shooting and peripherals for DNA02. Details of DeviceNet protocol are not included in this sheet. For more information on DeviceNet Protocol, please refer to relevant reference or literatures.
- ✓ DNA02 is an OPEN-TYPE device and therefore should be installed in an enclosure free of airborne dust, humidity, electric shock and vibration. The enclosure should prevent non-maintenance staff from operating the device (e.g. key or specific tools are required to open the enclosure) in case danger and damage on the device may occur.
- ✓ DNA02 is to be used for controlling the operating machine and equipment. In order not to damage it, only qualified professional staff familiar with the structure and operation of it can install, operate, wire and maintain it.
- ✓ DO NOT connect input AC power supply to any of the I/O terminals; otherwise serious damage may occur. Check all the wiring again before switching on the power and DO NOT touch any terminal when the power is switched on. Make sure the ground terminal Ⓢ is correctly grounded in order to prevent electromagnetic interference.

1 Introduction

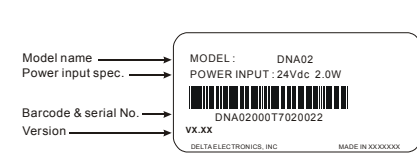
1.1 Model Explanation

Thank you for choosing Delta DNA02 DeviceNet communication module. DNA02 can be applied to the connection between DeviceNet and Delta's programmable logic controllers, AC motor drives, servo drives, temperature controllers and DOP human machine interfaces. In addition, DNA02 offers custom function, which can be applied to the connection between DeviceNet and self-defined equipments with Modbus protocol.

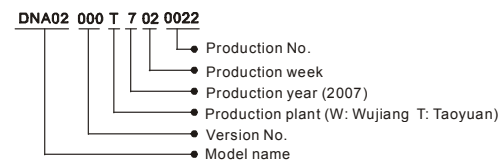
Features

- Supports Group 2 only servers
- Supports explicit connection in the pre-defined master/slave connection group
- Supports polling
- Supports EDS files in DeviceNet network configuration tools

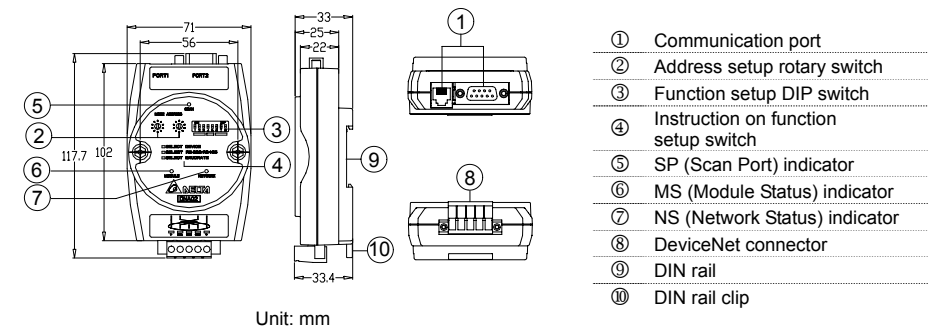
Nameplate explanation



Serial No. explanation



1.2 Product Profile and Outline



2 Specifications

DeviceNet Connector

Type	Removable connector (5.08mm)
Transmission method	CAN
Transmission cable	2 communication cables, 2 power cables and 1 shielded cable
Electrical isolation	500V DC

Communication

Message type	I/O polling; explicit
Series transmission speed	125 Kbps; 250 Kbps; 500 Kbps
Equipment type	12
Company ID	799 (Delta Electronics, Inc.)

Electrical Specifications

DeviceNet	Voltage: 11 ~ 25V DC (offered by the power cable in the network)
	Current: 28mA (typical), 125mA impulse current (24V DC)

Environment

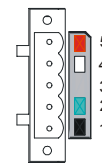
Standards	IEC 61131-2, UL508
Storage/Operation	Storage: -25°C ~ 70°C (temperature), 5 ~ 95% (humidity) Operation: 0°C ~ 55°C (temperature), 50 ~ 95% (humidity); pollution degree 2
Shock/Vibration immunity	International Standards: IEC61131-2, IEC 68-2-6 (TEST Fc)/IEC61131-2 & IEC 68-2-27 (TEST Ea)
Interference immunity	RS (IEC 61131-2, IEC 61000-4-3): 80MHz ~ 1,000MHz, 1.4GHz ~ 2GHz, 10V/m EFT (IEC 61131-2, IEC 61000-4-4): Analog & Communication I/O: 1KV ESD (IEC 61131-2, IEC 61000-4-2): 8KV Air Discharge
Certificates	CE, UL

3 Components

3.1 DeviceNet Connector

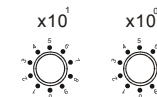
To connect with DeviceNet network, use the connector enclosed with DNA02 or any connectors you can buy in the store for wiring.

PIN	Signal	Color	Description
1	V-	Black	0 VDC
2	CAN_L	Blue	Signal-
3	SHIELD	-	shielded cable
4	CAN_H	White	Signal+
5	V+	Red	24 VDC



3.2 Address Setup Rotary Switch

The two rotary address setup switches set up the node addresses on DeviceNet network in decimal form. Setup range: 00 ~ 63 (64 ~ 99 are forbidden)



Example:

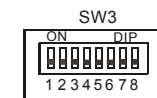
If you need to set the node address of DNA02 as 26, simply switch the corresponding rotary switch of X10¹ to "2" and the corresponding rotary switch of X10⁰ to "6".

Address Setting	Description
0...63	Valid DeviceNet communication address
Others	Invalid DeviceNet communication address

The changed values on switches are only valid when DNA02 is re-powered. When DNA02 is operating, changing the set value of communication address is invalid.

3.3 Function Setup DIP Switch

The DIP switch is to be used on the equipment connected to DNA02, the selection of communication ports and setting up the communication speed of DNA02 and the master station in DeviceNet.



3.3.1 Selecting Equipment Connected to DNA02

PIN 1	PIN 2	PIN 3	Equipment
ON	OFF	OFF	AC motor drive
OFF	ON	OFF	Programmable logic controller
ON	ON	OFF	Temperature controller
OFF	OFF	ON	Servo drive
ON	OFF	ON	Human machine interface
OFF	ON	ON	Custom equipment
ON	ON	ON	For internal system use

Example:

If the equipment connected to DNA02 is Delta servo drive, you only need to switch PIN 3 to "On", PIN 1 and PIN 2 to "OFF" and re-power it.

The changed setting of the switch is only valid when DNA02 is re-powered. When DNA02 is operating, changing the setting of DIP switch is invalid.

3.3.2 Selecting DNA02 Communication Mode

PIN 4	PIN 5	Communication Mode
OFF	OFF	RS-485
ON	ON	RS-232
ON	OFF	Incorrect setting
OFF	ON	

The changed setting of communication mode is only valid when DNA02 is re-powered. When DNA02 is operating, changing the setting of communication mode is invalid.

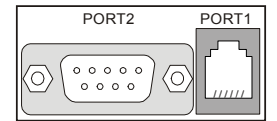
3.3.3 Setting up Baud Rate

PIN 6	PIN 7	PIN 8	Slave Device Baud Rate
OFF	OFF	Reserved	125K bps
ON	OFF		250K bps
OFF	ON		500K bps
ON	ON		Auto baud rate detection

The changed setting of the baud rate of DeviceNet is only valid when DNA02 is re-powered. When DNA02 is operating, changing the communication speed is invalid.

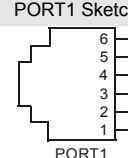
3.4 Communication Ports on DNA02

The communication ports on DNA02 are used for connection with equipments (Delta PLC, Delta AC motor drive, Delta temperature controller, Delta servo drive, Delta human machine interface and custom equipments)



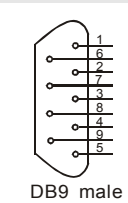
3.4.1 PORT1

PORT1 PIN definition

PORT1 Sketch	Terminal No.	Description
	1	N.C.
	2	GND
	3	DATA-
	4	DATA+
	5	N.C.
	6	N.C.

PORT1 supports RS-485 communication mode only.

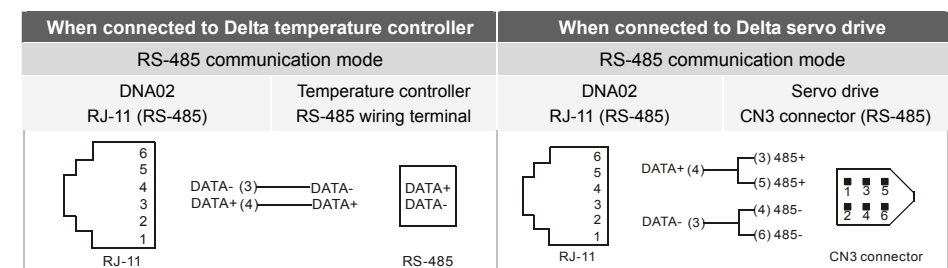
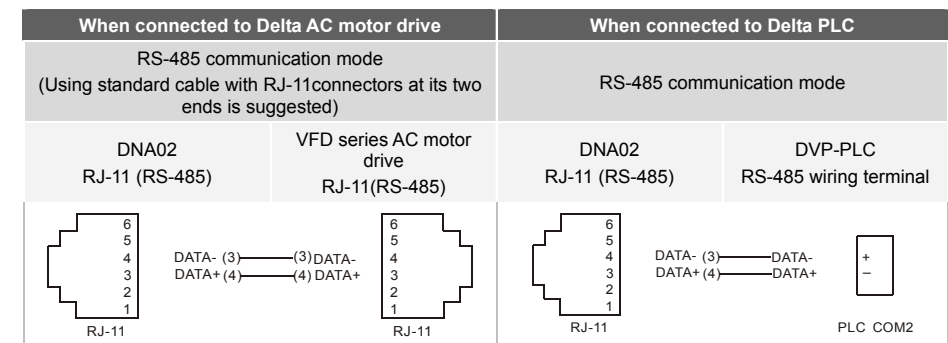
3.4.2 PORT2

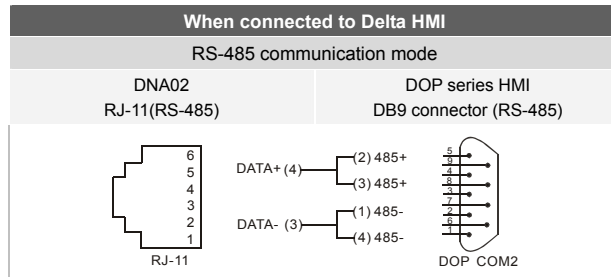
PORT2 Sketch	Terminal No.	RS-232	RS-485
	1	N.C.	N.C.
	2	RXD	N.C.
	3	TXD	DATA-
	4	N.C.	N.C.
	5	GND	GND
	6	N.C.	N.C.
	7	N.C.	N.C.
	8	N.C.	DATA+
	9	N.C.	N.C.

PORT2 supports RS-232 and RS-485 communication mode only.

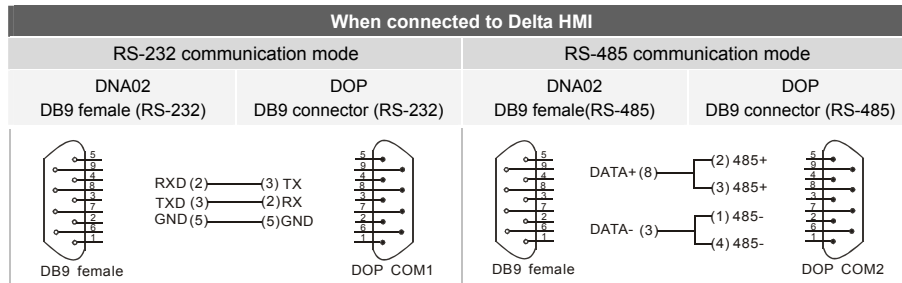
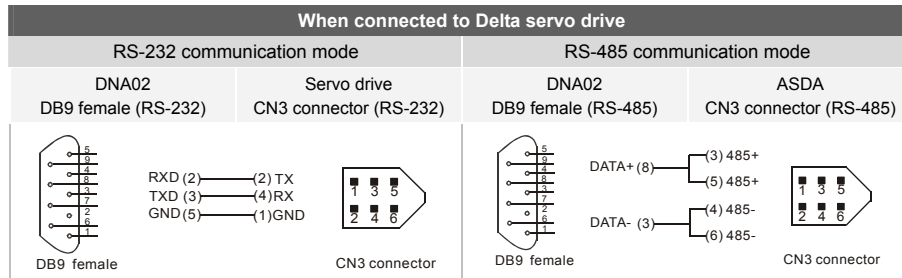
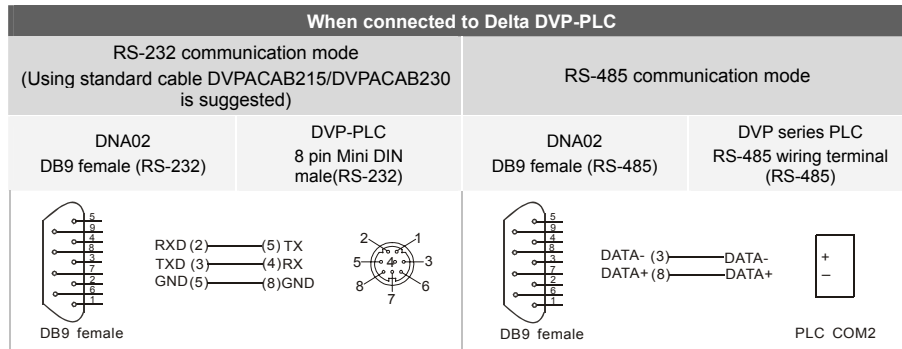
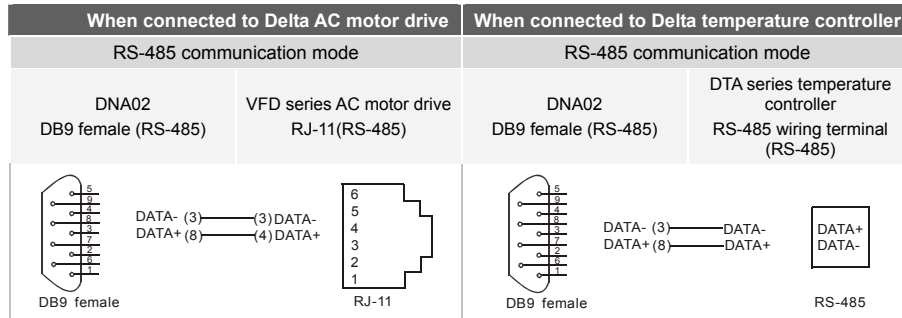
4 Connectors for DNA02 and the Equipments

See below communication wiring when DNA02 is connected to an equipment through PORT1.





See below communication wiring when DNA02 is connected to an equipment through PORT2.



5 Communication between DNA02 and the Equipments

DNA02 is able to read, write and set up the parameters of all equipments (Delta PLC, AC motor drive, servo drive, temperature controller, HMI and custom equipments).

5.1 Setting up Baud Rate and Format (when connected to AC motor drive)

Before connecting Delta AC motor drive to the BUS, first set up the communication address of the AC motor drive as 01, baud rate as 38,400bps and communication format as 8, N, 2; RTU (the format is fixed; other formats will be invalid). To adjust the baud rate, follow the steps listed below.

- Set up the DIP switch of DNA02 to custom equipment mode.
- Connect DNA02 to the BUS of DeviceNet.
- Modify the content of Class9F>>Instance3>>Attribute1:
 - Class9F>>Instance3>>Attribute1 = 1 → 19,200; 8, N, 2 : RTU
 - Class9F>>Instance3>>Attribute1 = 2 → 38,400; 8, N, 2 : RTU (default)

- Return the DIP switch of DNA02 back to AC motor drive mode and re-power DNA02.
- Adjust the baud rate of the AC motor drive to the corresponding one.

5.2 Setting up Baud Rate and Format (when connected to PLC)

Before connecting Delta PLC to the BUS, first set up the communication address of the PLC as 01, baud rate as 115,200bps and communication format as 7, E, 1; ASCII (the format is fixed; other formats will be invalid). To adjust the baud rate, follow the steps listed below.

- Set up the DIP switch of DNA02 to custom equipment mode.
- Connect DNA02 to the BUS of DeviceNet.
- Modify the content of Class9F>>Instance3>>Attribute2:
 - Class9F>>Instance3>>Attribute2 = 1 → 19,200; 7, E, 1 : ASCII
 - Class9F>>Instance3>>Attribute2 = 2 → 38,400; 7, E, 1 : ASCII
 - Class9F>>Instance3>>Attribute2 = 3 → 57,600; 7, E, 1 : ASCII
 - Class9F>>Instance3>>Attribute2 = 4 → 115,200; 7, E, 1 : ASCII (default)
- Return the DIP switch of DNA02 back to PLC mode and re-power DNA02.
- Adjust the baud rate of the PLC to the corresponding one.

5.3 Setting up Baud Rate and Format (when connected to temperature controller)

Before connecting Delta temperature controller to the BUS, first set up the communication address of the temperature controller as 01, baud rate as 38,400bps and communication format as 7, E, 1; ASCII (the format is fixed; other formats will be invalid). Before communicating with DTA series temperature controller, first set the content of H471A as H0001 to allow the write-in of communication. To adjust the baud rate, follow the steps listed below.

- Set up the DIP switch of DNA02 to custom equipment mode.
- Connect DNA02 to the BUS of DeviceNet.
- Modify the content of Class9F>>Instance3>>Attribute3:
 - Class9>>Instance3>>Attribute3 = 1 → 19,200; 7, E, 1 : ASCII
 - Class9>>Instance3>>Attribute3 = 2 → 38,400; 7, E, 1 : ASCII (default)
- Return the DIP switch of DNA02 back to temperature controller mode and re-power DNA02.
- Adjust the baud rate of the temperature controller to the corresponding one.

5.4 Setting up Baud Rate and Format (when connected to servo drive)

Before connecting Delta servo drive to the BUS, first set up the communication address of the servo drive as 01, baud rate as 115,200bps and communication format as 7, E, 1; ASCII (the format is fixed; other formats will be invalid). To adjust the baud rate, follow the steps listed below.

- Set up the DIP switch of DNA02 to custom equipment mode.
- Connect DNA02 to the BUS of DeviceNet.
- Modify the content of Class9F>>Instance3>>Attribute4:
 - Class9>>Instance3>>Attribute4 = 1 → 19,200; 7, E, 1 : ASCII
 - Class9>>Instance3>>Attribute4 = 2 → 38,400; 7, E, 1 : ASCII
 - Class9>>Instance3>>Attribute4 = 3 → 57,600; 7, E, 1 : ASCII
 - Class9>>Instance3>>Attribute4 = 4 → 115,200; 7, E, 1 : ASCII (default)
- Return the DIP switch of DNA02 back to servo drive mode and re-power DNA02.
- Adjust the baud rate of the servo drive to the corresponding one.

5.5 Setting up Baud Rate and Format (when connected to HMI)

Before connecting Delta HMI to the BUS, first set up the communication address of the HMI as 01, baud rate as 115,200bps and communication format as 7, E, 1; ASCII (the format is fixed; other formats will be invalid). HMI as the master and DNA02 as the slave. There are 64 virtual D devices (D0 ~ D63) in DNA02 and DeviceNet master and HMI are able to read and write the virtual D devices in DNA02. In this case, set up the address of the slave (DNA02) monitored by HMI as 01 by the HMI editing software. To adjust the baud rate, follow the steps listed below.

- Set up the DIP switch of DNA02 to custom equipment mode.
- Connect DNA02 to the BUS of DeviceNet.
- Modify the content of Class9F>>Instance3>>Attribute5:
 - Class9>>Instance3>>Attribute5 = 1 → 19,200; 7, E, 1 : ASCII
 - Class9>>Instance3>>Attribute5 = 2 → 38,400; 7, E, 1 : ASCII
 - Class9>>Instance3>>Attribute5 = 3 → 57,600; 7, E, 1 : ASCII
 - Class9>>Instance3>>Attribute5 = 4 → 115,200; 7, E, 1 : ASCII (default)
- Return the DIP switch of DNA02 back to HMI mode and re-power DNA02.
- Adjust the baud rate of the HMI to the corresponding one.

5.6 Setting up Baud Rate and Format (when connected to custom equipment)

Before connecting the custom equipment to the BUS, first set up the communication address of the equipment as 01, baud rate as 19,200bps and communication format as 8, N, 2; RTU (the format is fixed; other formats will be invalid). To adjust the baud rate, follow the steps listed below.

- Set up the DIP switch of DNA02 to custom equipment mode.
- Connect DNA02 to the BUS of DeviceNet.
- Modify the content of Class9F>>Instance3>>Attribute6:
 - Class9F>>Instance3>>Attribute6 = 1 → 19,200; 8, N, 2 : RTU (default)
 - Class9F>>Instance3>>Attribute6 = 2 → 38,400; 8, N, 2 : RTU
 - Class9F>>Instance3>>Attribute6 = 3 → 57,600; 8, N, 2 : RTU
 - Class9F>>Instance3>>Attribute6 = 4 → 115,200; 8, N, 2 : RTU
- Re-power COA02.
- Adjust the baud rate of the custom equipment to the corresponding one.

6 LED Indicators and Trouble-Shooting

There are 3 LED indicators on DNA02, Network Status LED, Module Status LED and Scan Port LED, for displaying the connection status of the communication.

5.1 Network Status LED

LED status	Indication	How to deal with it?
Off	Device is not on-line. - The device has not completed the Dup_MAC_ID test yet. - The device may not be powered.	1. Check the power of DNA02 and see if the connection is normal. 2. Check if the node communication on the BUS is normal. 3. Make sure at least 1 node is normally communicating with the network through DNA02.
Green light flashes	Device is on-line but has no connections in the established state. - The device has passed the Dup_MAC_ID test, is on-line, but has no established connections to other nodes. - This device is not allocated to a master.	-
Green light on	The device is on-line and has connections in the established state. - The device is allocated to a Master.	-
Red light flashes	I/O Connections are in the timed-out state.	-
Red light on	Failed communication device. The device has detected an error that has rendered it incapable of communicating on the network (Duplicate MAC ID fail, or Bus-off).	1. Make sure all the node addresses on the BUS are not repeated. 2. Check if the network installation is normal. 3. Check if the communication speed of DNA02 is consistent with that of the BUS. 4. Check if the station No. of DNA02 is valid. 5. Check if your choice of switch on DNA02 is consistent with the actual connected the equipment. 6. Check if DNA02 is correctly wired with the equipment.

5.2 Module Status LED

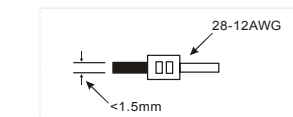
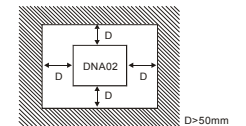
LED status	Indication	How to deal with it?
Off	There is no power applied to the device.	Check the power of DNA02 and see if the connection is normal.
Green light flashes	The device needs commissioning due to configuration missing, incomplete or incorrect. The device may be in the standby state.	-
Green light on	The device is operating in a normal condition.	-
Red light flashes	Recoverable fault	1. Reset parameters in DNA02. 2. Check if DNA02 is correctly wired with the equipment.
Red light on	The device has an unrecoverable fault; may need replacing.	Send back to factory for repair.

5.3 Scan Port Status LED

LED status	Indication	How to deal with it?
Off	Power is off	Check the power of DNA02 and see if the connection is normal.
Green light flashes	DNA02 is reading the preset value in the equipment. DNA02 obtains the parameters from the equipment and initializes some of the attributes.	-
Green light on	Communication between DNA02 and the equipment is normal.	-
Red light flashes	CRC check fails, or the equipment sends back error information.	1. Check if the communication format of the equipment is correctly set up. 2. Check carefully if the installation is correct.
Red light on	Connection fails, or no connection.	1. Check if DNA02 is correctly connected with the equipment. 2. Restart the connection and make sure the communication cable meets the specification.

7 Installation & Wiring

- Install DNA02 in an enclosure with sufficient space around it to allow heat dissipation (see the figure).
- DO NOT place the I/O signal wires and power supply wire in the same wiring circuit.



- Use 28-12AWG (1.5mm) single or multiple core wire on I/O wiring terminals. See the figure for its specification.
- The terminal screws shall be tightened to 5.19 kg-cm (4.5 in-lbs).
- Use 60°C /75°C copper wires only.