http://www.delta.com.tw/industrialautomation/

2007-05-24

5011656801-OAE1

COA02 CANopen Slave Station Communication Module

Instruction Sheet

⚠ Warning

- ✓ *This instruction only provides introductory information on electrical specifications, functions, wiring, trouble-shooting and peripherals for COA02. Details of CANopen protocol are not included in this sheet. For more information on CANopen protocol, please refer to relevant reference or literatures.*
- ✓ *COA02 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.*
- ✓ *COA02 is 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 COA02 can install, operate, wire and repair it.*
- ✓ *Please read this instruction sheet carefully before use and follow the sheet to operate COA02 in order to prevent damages on the device or injuries to staff.*
- ✓ *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.*

❶ Introduction

1.1 Model Explanation

Thank you for choosing Delta COA02 CANopen slave station communication module. COA02 can be applied to the connection between CANopen network and Delta's programmable logic controller, AC motor drive, servo drive, temperature controller and human machine interface. In addition, the custom function of COA02 allows the custom equipment with Modbus protocol to be connected to the CANopen network.

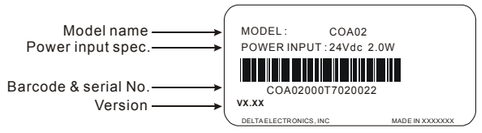
Functions supported:

- CAN2.0A protocol
- CANopen DS301 V4.02

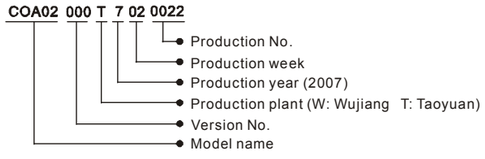
Service supported:

- Process Data Object (PDO)
- Service Data Object (SDO)
- Special Object Protocol (SOP)
- Network Management (NMT)

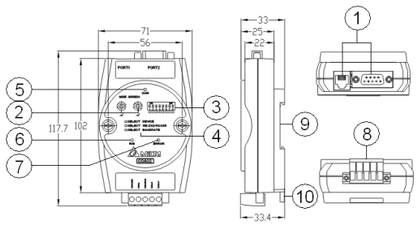
Nameplate Explanation



Serial No. Explanation



1.2 Product Profile and Outline



Unit: mm

①	Communication port
②	Address setup rotary switch
③	Function setup DIP switch
④	Instructions on the DIP switch
⑤	SCAN indicator
⑥	RUN indicator
⑦	ERROR indicator
⑧	CANopen connector
⑨	DIN rail
⑩	DIN rail clip

❷ Specifications

CANopen Connector

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

Communication

Message type	PDO, SDO, SYNC (synchronous object), Emergency (emergency object), NMT
Series transmission speed	10K, 20K, 50K, 125K, 250K, 500K, 800K, 1M bps (bits per second)
Equipment type	0 (Non-Profile)
Company ID	477 (Delta Electronics, Inc.)

Electrical Specifications

Voltage	11 ~ 25V DC
Current	28mA (typical), 125mA impulse current (24V DC)

Environment

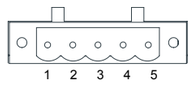
Standards	IEC 61131-2, UL508
Storage/Operation	Storage: -25°C ~ 70°C (temperature), 5 ~ 95% (humidity) Operation: 0°C ~ 55°C (temperature), 50 ~ 95% (humidity); pollution degree 2
Shock/Vibration immunity	International Standards: IEC 61131-2, IEC 68-2-6 (TEST Fc)/IEC 61131-2 & IEC 68-2-27 (TEST Ea)
Interference immunity	RS (IEC 61131-2, IEC 61000-4-3): 80MHz ~ 1,000MHz, 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

❸ Components

3.1 CANopen Connector

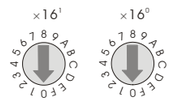
To connecto with CANopen, use the connector enclosed with COA02 or any connectors you can buy in the store for wiring.

PIN	Signal	Description
1	V-	0V DC
2	CAN_L	Signal-
3	SHIELD	Shielded cable
4	CAN_H	Signal+
5	V+	24V DC



3.2 Address Setup Rotary Switch

The two rotary address setup switches set up the node addresses on the CANopen network in hexadecimal form. Setup range: 01 ~ 7F (00 and 80 ~ FF are forbidden)



Example:

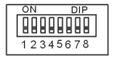
If you need to set the communication address of COA02 as 26 (H1A), simply switch the corresponding rotary switch $\times 16^1$ to "1" and the corresponding rotary switch $\times 16^0$ to "A".

Address Setting	Description
01 ~ 7F	Valid CANopen communication address
00, 80 ~ FF	Invalid CANopen communication address

***Note:** The changed value on the switch is only valid when COA02 is re-powered. When COA02 is operating, changing the set value of the communication address will be invalid.*

3.3 Function Setup DIP Switch

The DIP switch is to be used on the equipment connected to COA02, the selection of communication ports and setting up the communication speed of COA02 and the master station in CANopen.



3.3.1 Selecting the Equipment Connected to COA02

PIN 1	PIN 2	PIN 3	Equipment
ON	OFF	OFF	AC motor drive
OFF	ON	OFF	Programmable logic controller (PLC)
ON	ON	OFF	Temperature controller

PIN 1	PIN 2	PIN 3	Equipment
OFF	OFF	ON	Servo drive
ON	OFF	ON	Human machine interface (HMI)
OFF	ON	ON	Custom equipment
ON	ON	ON	For internal system use

Example:

If the equipment connected to COA02 is Delta servo drive, you only need to switch PIN 3 of the DIP switch to "On", PIN 1 and PIN 2 to "Off" and re-power COA02.

***Note:** The changed setting of the DIP switch is only valid when COA02 is re-powered. When COA02 is operating, changing the setting of the DIP switch will be invalid.*

3.3.2 Selecting COA02 Communication Mode

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

***Note:** The changed setting of the communication mode is only valid when COA02 is re-powered. When COA02 is operating, changing the setting of the communication mode will be invalid.*

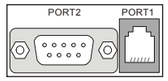
3.3.3 Setting up Baud Rate

PIN 6	PIN 7	PIN 8	Baud Rate
OFF	OFF	OFF	10K bps
ON	OFF	OFF	20K bps
OFF	ON	OFF	50K bps
ON	ON	OFF	125K bps
OFF	OFF	ON	250K bps
ON	OFF	ON	500K bps
OFF	ON	ON	800K bps
ON	ON	ON	1M bps

***Note:** The changed setting of the baud rate of CANopen is only valid when COA02 is re-powered. When COA02 is operating, changing the baud rate will be invalid*

3.4 Communication Ports on COA02

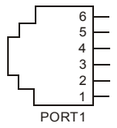
The communication ports on COA02 are used for the connection with other equipments (Delta PLC, AC motor drive, temperature controller, servo drive, HMI and custom equipments).



3.4.1 PORT1

PORT1 PIN Definition

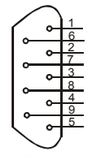
PORT1 Sketch	Terminal No.	Description
	1	N.C.
	2	GND
	3	DATA-
	4	DATA+
	5	N.C.
	6	N.C.



***Note:** 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	N.C.
	6	N.C.	N.C.
	7	N.C.	N.C.
	8	N.C.	DATA+
	9	N.C.	N.C.

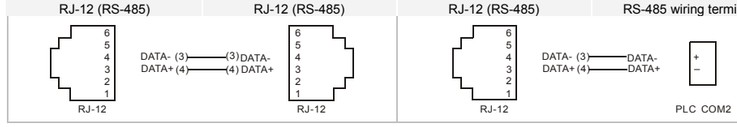


***Note:** PORT2 supports RS-232 and RS-485 communication mode only.*

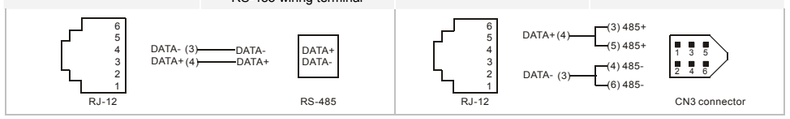
❹ Connectors for COA02 and the Equipments

See below communication wirings when COA02 is connected to an equipment through PORT1.

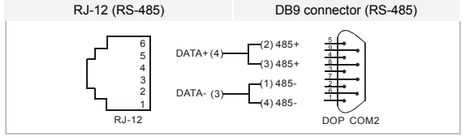
When connected to Delta AC motor drive		When connected to Delta PLC	
RS-485 communication mode (Using standard cable with RJ-12 connectors at its two ends is suggested.)		RS-485 communication mode	
COA02 RJ-12 (RS-485)	VFD series AC motor drive RJ-12 (RS-485)	COA02 RJ-12 (RS-485)	DVP series PLC RS-485 wiring terminal



When connected to Delta temperature controller		When connected to Delta servo drive	
RS-485 communication mode		RS-485 communication mode	
COA02 RJ-12 (RS-485)	DTA series temperature controller RS-485 wiring terminal	COA02 RJ-12 (RS-485)	ASDA series servo drive CN3 connector (RS-485)

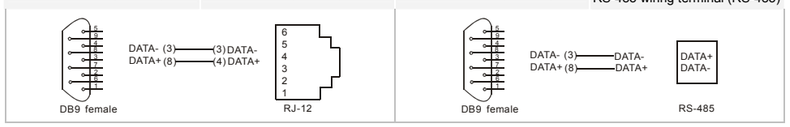


When connected to Delta human machine interface	
RS-485 communication mode	
COA02 RJ-12 (RS-485)	DOP series HMI DB9 connector (RS-485)

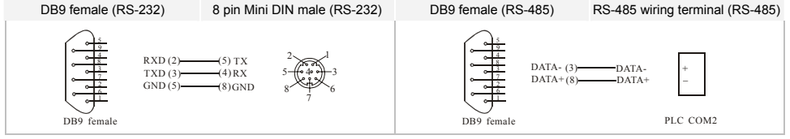


See below communication wirings when COA02 is connected to an equipment through PORT2.

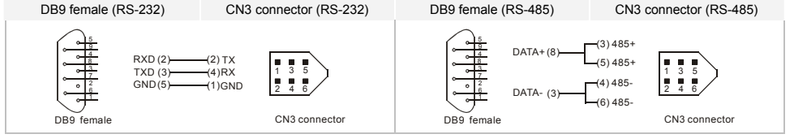
When connected to Delta AC motor drive		When connected to Delta temperature controller	
RS-485 communication mode		RS-485 communication mode	
COA02 DB9 female (RS-485)	VFD series AC motor drive RJ-12 (RS-485)	COA02 DB9 female (RS-485)	DTA series temperature controller RS-485 wiring terminal (RS-485)



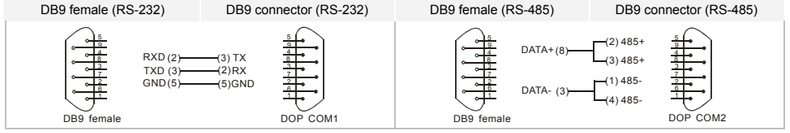
When connected to Delta PLC			
RS-232 communication mode （Using standard communication cable DVPACAB215/DVPACAB230 is suggested）		RS-485 communication mode	
COA02 DB9 female (RS-232)	DVP series PLC 8 pin Mini DIN male (RS-232)	COA02 DB9 female (RS-485)	DVP series PLC RS-485 wiring terminal (RS-485)



When connected to Delta servo drive			
RS-232 communication mode		RS-485 communication mode	
COA02 DB9 female (RS-232)	ASDA series servo drive CN3 connector (RS-232)	COA02 DB9 female (RS-485)	ASDA series servo drive CN3 connector (RS-485)



When connected to Delta human machine interface			
RS-232 communication mode		RS-485 communication mode	
COA02 DB9 female (RS-232)	DOP series HMI DB9 connector (RS-232)	COA02 DB9 female (RS-485)	DOP series HMI DB9 connector (RS-485)



❺ Communication between COA02 and the Equipments

COA02 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 COA02 to custom equipment mode.
- Connect COA02 to the BUS of CANopen and enable the operation of COA02.
- Modify the index parameter 5003/02 (main index: H5003, sub index H02).
  1. 5003/02 = 1 → 19,200; 8, N, 2; RTU
  2. 5003/02 = 2 → 38,400; 8, N, 2; RTU (default)
- Return the DIP switch of COA02 back to AC motor drive mode and re-power COA02.
- 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 COA02 to custom equipment mode.
- Connect COA02 to the BUS of CANopen and enable the operation of COA02.
- Modify the index parameter 5003/03 (main index: H5003, sub index: H03).
  1. 5003/03 = 1 → 19,200; 7, E, 1; ASCII
  2. 5003/03 = 2 → 38,400; 7, E, 1; ASCII
  3. 5003/03 = 3 → 57,600; 7, E, 1; ASCII
  4. 5003/03 = 4 → 115,200; 7, E, 1; ASCII (default)
- Return the DIP switch of COA02 back to PLC mode and re-power COA02.
- 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 COA02 to custom equipment mode.
- Connect COA02 to the BUS of CANopen and enable the operation of COA02.
- Modify the index parameter 5003/04 (main index: H5003, sub index: H04).
  1. 5003/04 = 1 → 19,200; 7, E, 1; ASCII
  2. 5003/04 = 2 → 38,400; 7, E, 1; ASCII (default)
- Return the DIP switch of COA02 back to temperature controller mode and re-power COA02.
- 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 COA02 to custom equipment mode.
- Connect COA02 to the BUS of CANopen and enable the operation of COA02.
- Modify the index parameter 5003/05 (main index: H5003, sub index: H05).
  1. 5003/05 = 1 → 19,200; 7, E, 1; ASCII
  2. 5003/05 = 2 → 38,400; 7, E, 1; ASCII
  3. 5003/05 = 3 → 57,600; 7, E, 1; ASCII
  4. 5003/05 = 4 → 115,200; 7, E, 1; ASCII (default)
- Return the DIP switch of COA02 back to servo drive mode and re-power COA02.
- 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 COA02 as the slave. There are 64 virtual D devices (D0 ~ D63) in COA02 and CANopen master and HMI are able to read and write the virtual D devices in COA02. In this case, set up the address of the slave (COA02) 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 COA02 to custom equipment mode.
- Connect COA02 to the BUS of CANopen and enable the operation of COA02.
- Modify the index parameter 5003/06 (main index: H5003, sub index: 06).
  1. 5003/06 = 1 → 19,200; 7, E, 1; ASCII
  2. 5003/06 = 2 → 38,400; 7, E, 1; ASCII
  3. 5003/06 = 3 → 57,600; 7, E, 1; ASCII
  4. 5003/06 = 4 → 115,200; 7, E, 1; ASCII (default)
- Return the DIP switch of COA02 back to HMI mode and re-power COA02.
- 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.

- Modify the index parameter 5003/07 (main index: H5003, sub index: H07).
  1. 5003/07 = 1 → 19,200; 8, N, 2; RTU (default)
  2. 5003/07 = 2 → 38,400; 8, N, 2; RTU
  3. 5003/07 = 3 → 57,600; 8, N, 2; RTU
  4. 5003/07 = 4 → 115,200; 8, N, 2; RTU
- Re-power COA02.
- Adjust the baud rate of the custom equipment to the corresponding one.

❻ LED Indicators & Trouble-shooting

There are 3 LED indicators on COA02, RUN, ERROR and SCAN, for displaying the connection status of the communication in COA02.

6.1 RUN LED

LED Status	COA02 Status	How to deal with it
Off	No power	Check the power of COA02 and make sure the connection is normal.
Green light 1 flash	Stop	
Green light flashes	Pre-operation	
Green light On	Operating	
Red light On	NODE-ID error	Check if the setting of NODE-ID of COA02 is correct.

6.2 ERROR LED

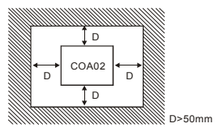
LED Status	COA02 Status	How to deal with it
Off	No error	COA02 operation is normal.
Red light 2 flashes	Erroneous control occurs.	1. Check if the connection between COA02 and the master station is intact. 2. Check if the communication between COA02 and the master station is normal.
Red light On	BUS OFF	1. Check if the BUS connection is normal. 2. Re-power COA02.

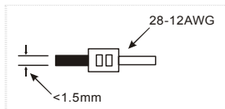
6.3 SCAN LED

LED Status	COA02 Status	How to deal with it
Off	No power	Check the power of COA02 and make sure the connection is normal.
Green light flashes	The correct information of the equipment connected has not been detected.	Re-connect COA02 to the equipment.
Green light On	The communication with the equipment connected is normal.	
Red light flashes	CRC check fails	1. Check if the communication cable between COA02 and the equipment is correct. 2. Check if there is electromagnetic interference nearby.
Red light On	Connection fails, or no connection	1. Check if the communication format of the equipment is correct. 2. Check if COA02 and the equipment are correctly connected. 3. Restart the connection and make sure the communication cable meets the specification.

❼ Installation & Wiring

- Install COA02 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.