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MV800 CANopen Communication Option

User Manual

Version: V00

1 Product information

1.1 Designation rule

1.2 Functions and specifications

MV810-CANopen option provides communication expansion for the MV800 drive series. Its functions and specifications are explained below:

1.2.1 Function features

MV800 CANopen card provides the following services:

(1) NMT (network management)
(2) Node guard message
(3) Heartbeat message
(4) 4 TxPDOs, 4 RxPDOs
(5) Quick SDO reading/writing of the drive function codes
(6) Emergency message
(7) Synchronous mode

1.2.2 Technical specifications

CANopen connector	Interface	4-Pin 5.08 mm pitch connector
	Transmission mode	CAN bus
	Transmission media	4-Core shielded twisted pair cable
	Galvanic isolation	500 V DC
Communication	Network standard	CANopen
	Transmission protocol	CAN2.0A
	Transmission	Negatively correlated with the baud rate.

	distance	Refer to 1.3.4.
	Bus transmission speed	Max. 1 Mbps
	Module name	MV810-CANopen01
	EDS file	MV800_Canopen.eds
Electrical specifications	Power voltage	3.3 V DC (provided by the drive)
	Insulation voltage	500 V DC
	Power consumption	1 W
	Weight	25 g
Environment specifications	Noise immunity	ESD (IEC 61800-5-1, IEC 6100-4-2) EFT (IEC 61800-5-1, IEC 6100-4-4) Surge test (IEC 61800-5-1, IEC 6100-4-5) Conducted susceptibility test (IEC 61800-5-1, IEC 6100-4-6)
	Operating/Storage environment	Operating: -10 to 50 (temperature), 90% (humidity) Storage: -45 to 70 (temperature), 95% (humidity)
	Vibration/Shock resistance	GB 4798.3-2007 GB 12668.501-2013 / IEC 61800-5-1 (IEC 60068-2-6)

1.3 Terminal description

1.3.1 Layout

The front and back views of MV810-CANopen01 are shown in Fig. 1.

Fig. 1

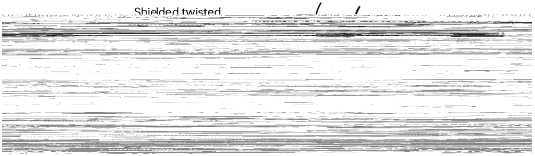
1.3.2 Interface description

Description of MV810-CANopen01 interfaces:

Terminal screen printing		Terminal name	Function
CANopen terminal	1	PE	Grounding
	2	CANH	CAN bus positive terminal
	3	CANL	CAN bus negative terminal
	4	CGND	CAN communication shield
Terminal resistor switch	1	S2-1	Terminal resistor selection Valid only when S2-1/S2-2 is switched to ON position.
	2	S2-2	

1.3.3 Network topology

The network topology of CAN bus is shown in the figure below. It is recommended to employ the shielded twisted pair cable for CAN bus connection. Each end of the bus shall be connected to a 120 Ohms terminal resistor to prevent signal reflection. As a general rule, the 120 Ohms terminal resistor would be added to the master station and the last slave station on the sequence. For MV800 CANopen options, turn the terminal resistor switch 1 and switch 2 to ON position.



1.3.4 Transmission distance

The transmission distance of CAN bus is directly correlated with the baud rate and the communication cable. The relation between the maximum bus length and the baud rate is shown in the table below:

Baud rate (bps)	Length (m)
1M	25
500k	100
250k	250
125k	500

100k	500
50k	1000
20k	1000

1.3.5 Parameter settings for CANopen network connection

To operate the MV800 drive using MV810-CANopen01, you need to set the operation command channel and the frequency source of the MV800 drive to the bus communication card, as shown in the following table.

Drive parameter	Value	Function description
P02.02	2	Set the operation command channel to communication control
P02.03	3	Set the communication command channel to CANopen
P02.05	8	

The installation position, interface and steps of MV810-CANopen01 are described below:

2.2.1 Installation position

MV800 provides two installation positions for accessory cards/options, as shown in Fig. 2 (taking enclosure B as an example, similar for other enclosures). Position 1 is for the installation of various PG cards; position 2 is for the installation of CANopen bus options, ECAT bus options, Modbus TCP bus options, I/O options, etc.

2.2.2 Installation interface

The electrical interface of the CANopen option for the MV810 drive and the corresponding installation interface of the MV810 drive are shown in Fig. 3.

Fig. 2

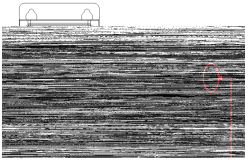


Fig. 3

2.2.3 Installation steps

Installation method: CANopen option front side mounting

(1) When the drive is powered off, press the granulated area on the middle-upper part of the lower cover, slide it down with a certain amount of force to remove the lower cover, as shown in Fig. 4-a.

(2) Use a straight screwdriver to pry open the dust-proof cap, as shown in Fig. 4-b.

(3) Install the CANopen option: hold the expansion box (a bus card inside) upwards (indicators up), align the expansion box with the electrical bus interface in the installation position 2, and press down horizontally to buckle the spring snap of the expansion box into the groove at the lower part of the drive, as shown in Fig. 4-c and Fig. 4-d.

(4) The bus option is successfully installed, as shown in Fig. 4-e.

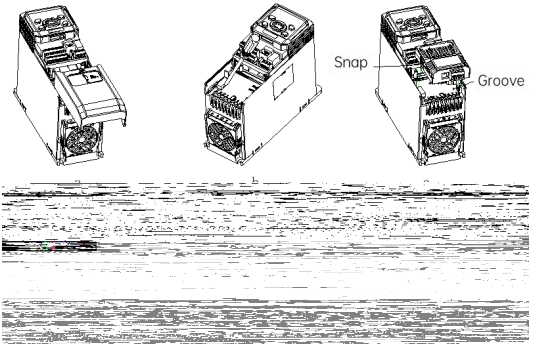


Fig. 4 CANopen option installation steps

(5) Grounding: MV810-CANopen01 must be grounded during wiring, as shown in Fig. 5. You need to prepare and crimp the cable by yourself.

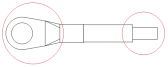


Fig. 5 Grounding terminal connection

Grounding method: connect the B end of the grounding cable to the option's grounding terminal block, and you can check the grounding cable diameter and torque by referring to Table 1; connect the A end of the grounding cable to the grounding rack PE (grounding mark, circled in Fig. 6) of the drive (taking enclosure B as an example, similar for others), and you can check the grounding screw specifications and torque by referring to Table 2.

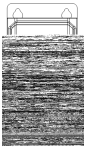


Fig. 6

Table 1 Recommended diameter and torque for the grounding cable

Accessory card	Screw	Diameter	Stripped part	Torque (±10%)
MV810-CANopen01	M2.0	0.5 to 1.5 mm²/ 28 to 16 AWG	5 to 6 mm	2 kg-cm / 1.7 lb.in / 0.2 N·m

Table 2 Recommended grounding screw and torque

Enclosure	Screw	Torque (±10%)
B	M3	7 kg-cm / 6.08 lb-in / 0.68 N·m
C	M4	15 kg-cm / 13.0 lb-in / 1.47 N·m
D		

3 PDO data description

MV810-CANopen supports 4 TxPDOs and 4 RXPDOs. Each PDO enables four 16-bit data mapping. Access to the following data is available via PDO. Refer to the MV800_Canopen.eds file for details.

RxPDO (sent by the master, and received by the slave):

Index/ Sub-index	Indication	Description	Value range	Access rights
6040h/0	Control word	Bit0: Forward running Bit1: Reverse running Bit2: Forward JOG Bit3: Reverse JOG Bit4: Stop Bit5: Coast to stop Bit6: Fault reset Bit7: Emergency stop	0: Disabled; 1: Enabled 0: Disabled; 1: Enabled 0: Disabled; 1: Enabled 0: Disabled; 1: Enabled 0: Disabled; 1: Enabled 0: Disabled; 1: Enabled 0: Disabled; 1: Enabled 0: Disabled; 1: Enabled	Read/ Write
2100h/0	Drive torque upper limit	Unit: 0.1%	0.0 to 300.0% (corresponding to 0 to 3000)	Read/ Write
2101h/0	Braking torque upper limit	Unit: 0.1%	0.0 to 300.0%	Read/ Write
2102h/0	FWD frequency upper limit	Unit: 0.01 Hz	0.00 to 599.00 Hz (corresponding to 0 to 59900)	Read/ Write
2103h/0	REV frequency upper limit	Unit: 0.01 Hz	0.00 to 599.00 Hz	Read/ Write

2104h/0	Voltage reference (VF separation)	Unit: 1 V	0 to 1000 V	Read/ Write
2105h/0	DO	Bit0: DO1 terminal Bit1: DO2 terminal Bit2: DO3 terminal Bit3: RO terminal	0: Disabled; 1: Enabled 0: Disabled; 1: Enabled 0: Disabled; 1: Enabled 0: Disabled; 1: Enabled	Read/ Write
2106h/0	AO1	Unit: 0.01%	0.00 to 100.00% (corresponding to 0 to 10000)	Read/ Write
2107h/0	HDO1	Unit: 0.001 kHz	0.000 to 50.000 kHz (corresponding to 0 to 50000)	Read/ Write
2108h/0	HDO2	Unit: 0.001 kHz	0.000 to 50.000 kHz	Read/ Write
2109h/0	PID reference value	Unit: 0.1%	-100.0 to 100.0% (corresponding to -1000 to 1000)	Read/ Write
210Ah/0	PID feedback value	Unit: 0.1%	-100.0 to 100.0%	Read/ Write
210Bh/0	Position reference	Null	Null	Read/ Write
210Ch/0	Torque reference	Unit: 0.1%	-300.0 to 300.0%	Read/ Write
210Dh/0	Frequency reference	Unit: 0.01 Hz	0.00 to 599.00 Hz	Read/ Write

TxPDO (sent by the slave, and received by the master):

Index/ Sub-index	Indication	Description	Value range	Access rights
6041h/0	Status word	Bit0: Forward running Bit1: Reverse running Bit2: Stop Bit3: Fault	0: Disabled; 1: Enabled 0: Disabled; 1: Enabled 0: Disabled; 1: Enabled 0: Disabled; 1: Enabled	Read only

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			3000)	
2209h/0	Power output	Unit: 0.1 kW	0.0 to 6553.5 kW corresponding to 0 to 65535	Read only
220Ah/0	Actual position value	Null	Null	Read only
603Fh/0	Error code	Refer to section 5.2 *Drive fault code*		Read only

4 Access to function codes

This CANopen option enables access to the drive function codes via the quick SDO message. The drive function code group (P00 to P98) is mapped to the section (0x2000 to 0x2062) in the CANopen object dictionary, with an addition of 1 to the number on the last digit of each function code to form its sub-index in the dictionary. For example:

Drive function code P02.05 is mapped to the main index 0x2002 in the object dictionary, with the sub-index 0x06;

Drive function code P03.07 is mapped to the main index 0x2003 in the object dictionary, with the sub-index 0x08.

5 Emergency message and fault description

5.1 Emergency message

The 8-byte data of the emergency message is explained in the table below:

Emergency error code	Error register	Error code designated by the manufacturer
0 to 1	2	3 to 7

Emergency error code: refer to the related chapters in the DS301 document; "0x8100" for communication error; "0xFF00" for error designated by the manufacturer.

Error register: refer to the 1001H data in the object dictionary in the related DS301 document chapters; bit0 for generated error flag; bit4 for communication error flag; bit7 for error designated by the manufacturer.

Error code designated by the manufacturer: corresponding to the drive fault

codes in section 5.2.

5.2 Drive fault code

The standard fault codes of MV800 are explained in the table below. For more details, refer to the *MV810 High-Performance Vector Control Drive User Manual*.

Drive fault information	Drive fault information	Drive fault information
0: No error generated 1: Overcurrent during acceleration (OC1) 2: Overcurrent during deceleration (OC2) 3: Overcurrent during operation at constant speed (OC3) 4: Overvoltage during acceleration (OV1) 5: Overvoltage during deceleration (OV2) 6: Overvoltage during operation at constant speed (OV3) 7: Undervoltage fault (Uv) 8: Input phase loss (SPI) 9: Output phase loss (SPO) 10: Power module protection (drv) 11: Inverter overheat (OH1) 12: Rectifier bridge overheat (OH2) 13: AC drive overload (OL1) 14: Motor overload (OL2) 15: External fault (EF) 16: EEPROM read/write fault (EEP)	17: 485 communication error (CE) 18: EtherCAT communication timeout (E-CAt) 19: Current detection error (ItE) 20: CANopen communication timeout (E-CAN) 21: PID feedback loss (FbL) 22: Reserved 23: Braking resistor overcurrent (brOC) 24: Auto-tuning fault (tUN) 25: Reserved 26: Profinet communication timeout (E-Pn) 27: I/O card communication timeout (E-Io) 28: Modbus TCP communication timeout (E-TCP) 29 to 32: Reserved 33: Short-to-ground fault (GdF)	34: Speed deviation fault (dEv) 35 to 38: Reserved 39: Motor overheat (OH3) 40: Reserved 41: 24 V power supply overload (24OL) 42 to 45: Reserved 46: Board-level communication error (bCE) 47: Reserved 48: BootLoader failure (bLt) 49: Power board software version mismatching (vEr) 50: Parameter upload and download timeout (UPdnE) 51: AI1 current input overcurrent (AIOC) 52: Reserved 53: Fan locked-rotor (FAn) 54: Pre-overload (POL1) 55: I/O card 24 V overload (IO-OL)

6 Fault diagnosis

6.1 LED indicator description and fault removal

MV810-CANopen01 has three LED indicators (see Fig. 1). Their descriptions are shown below:

LED	Status	Description	Action
LED1 (Red)	Off	No power supply for CANopen	Check whether the CANopen option is properly connected to the drive
	Steady on	Normal power supply for CANopen	No need for actions
LED2 (Green)	Off	State machine in Stopped state	Check whether the CANopen option is properly connected to the host controller
	Flashing	State machine in Pre-OP state	Check whether the CANopen option is properly connected to the host controller
	Steady on	State machine in OP state	No need for actions
LED3 (Red)	Off	Normal	No need for actions
	Flashing	CANopen station	

addresses have the same setting. Check whether the DIP switch is correctly set in place, and whether the main controller baud rate and address are properly configured.

Check whether the terminal resistors are connected to the two ends of the bus only. Power off the whole unit, and measure the resistance between CANH and CANL in the bus using a multimeter. If the value sits in the range of 50 to 60 Ohms, it indicates a normal state of resistance.

Check whether the node CANH and node CANL are reversely connected, and whether the bus port CGND end is connected (in normal state, it is required to connect the CGND ends of all devices only, and grounding is not required).

6.3 Function code reading/writing fault

The object dictionary of the index 0x2064 indicates the drive function code reading/writing fault by the CANopen master station: the data corresponding to the sub-index 1 indicates the fault code, with high 8 bits indicating a writing error and low 8 bits indicating a reading error. The data corresponding to the sub-index 2 indicates the index of the function code with reading/writing errors. For example, 0x0200 indicates that there is an error of reading/writing the function code P02.00. Types of fault codes are shown below:

Fault	Fault code
Wrong password	0xF1
Index for operation does not exist	0xF4
Invalid parameter	0xF5
Parameter read only	0xF6
System lock	0xF7
EEPROM performing storage	0xF8

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Service email: driveservice@megmeet.com

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Warranty bill of communication option

Customer company:	
Detailed address:	
Contact:	Tel:
Option model:	
Option number:	
Purchase date:	
Service unit:	
Contact:	Tel:
Maintenance date:	

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Shenzhen Megmeet Electrical Co., Ltd.

Certificate

Checker: _____

Manufacturing date: _____

The product has been tested in line with design standards and approved for leaving the factory.