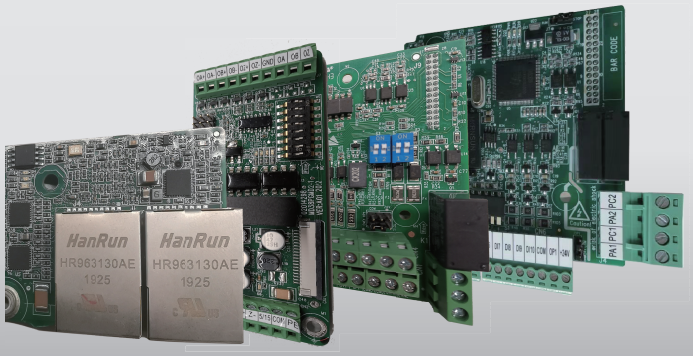
INOVANCE

FORWARD, ALWAYS PROGRESSING



AC Drive Expansion Card

Selection Guide

Industrial Automation

Intelligent Elevator

New Energy Vehicle

Industrial Robot

Rail Transit

Data code 19011906 A00

Preface

Introduction

This manual mainly introduces the relevant information of communication expansion card, encoder expansion card and IO expansion card commonly used in Inovance AC drives, including the installation dimensions, electrical specification, interface layout and terminal definition of expansion card.

Revision History

Date	Version	Revision
July 2022	A00	First release.

Acquisition

This user guide is not shipped with the product. You can obtain the PDF version of this document by the following method:

Log in to Inovance's website (*www.inovance.com*), choose "**Support**" > "**Download**", search for keywords, and then download the PDF file.

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Model Selection Table

Card type	Model	Order No.	Function	Applicable AC Drive
RS-485 communication card	MD38TX1	01013112	The MD38TX1 communication card is specially designed for the RS485 communication of MD480 series AC drives. It adopts isolation scheme with electrical parameters conforming to international standards. Users can select the expansion card to help control the AC drive operations and set parameters through remote serial ports.	MD290 MD480 MD500 MD500E MD500-PLUS MD510 MD520 CS290 CS710
CANlink communication card	MD310-CANL	01013143	The MD310-CANL is a communication card specialized for CAN communication of the MD310 series AC drives. It enables the AC drive to access the high-speed CAN communication network and implement field bus control.	MD310
CANlink communication card	MD38CAN1	01013100	The MD38CAN1 is a communication card specialized for CAN communication of the MD380 series AC drives. It enables the AC drive to access the high-speed CAN communication network and implement field bus control. It can not only realize CANlink communication, but also provide CANopen communication interface in MD520 series AC drives, to realize CANopen communication.	MD290 MD480 MD500 MD500E MD500-PLUS MD510 MD520 CS290 CS710
CANopen communication card	MD38CAN2	01013102	The MD38CAN2 is a communication card specialized for CAN communication of the MD series AC drives. It enables the AC drive to access the high-speed CAN communication network and implement field bus control.	MD290 MD480 MD500 MD500-PLUS MD510 CS290 CS710
EtherCAT communication card	MD500-ECAT	01040113	The MD500-ECAT expansion card is an EtherCAT fieldbus adapter card, which can be used in the ultra-high speed I/O network. This card features high efficiency, flexible topology, and easy operation. It is installed in the MD series AC drive to increase the communication efficiency and implement the AC drive networking function, which enables the AC drive to be a slave controlled by the field bus master station.	MD290 MD480 (3.7 kW and above) MD500 MD500-PLUS MD510 MD520

Card type	Model	Order No.	Function	Applicable AC Drive
EtherCAT communication card	SI-ECAT	01040120	The SI-ECAT expansion card can be used in the ultra-high speed I/O network. This card features high efficiency, flexible topology, and easy operation.	MD800
Profibus-DP communication Card	MD-SI-DP1	01040172	As a PROFIBUS-DP fieldbus adapter card, the MD-SI-DP1 expansion card meets international PROFIBUS fieldbus standards, improving the communication efficiency of the AC drive. By implementing the AC drive networking function, it enables the AC drive to be a slave controlled by the fieldbus master station. MD-SI-DP1 expansion card can realize PROFIBUS-DP communication.	MD290
				MD480 (3.7 kW and above)
				MD500
				MD500-PLUS
				MD510
				MD520
				CS290
				CS710
Profibus-DP communication Card	MD38DP2	01013144	As a PROFIBUS-DP fieldbus adapter card, the MD38DP2 expansion card meets international PROFIBUS fieldbus standards, improving the communication efficiency of the AC drive. By implementing the AC drive networking function, it enables the AC drive to be a slave controlled by the fieldbus master station. Besides PROFIBUS-DP communication, MD38DP2 also provides the CANlink communication interface.	MD290 (15 kW and above)
				MD480 (3.7 kW and above)
				MD500 (15 kW and above)
				MD500E (15 kW and above)
				MD500-PLUS (15 kW and above)
				MD510
				MD520 (15 kW and above)
				CS290 (15 kW and above)
				CS710 (15 kW and above)
Profinet communication card	MD500-PN1	01040098	The MD500-PN1 card is a PROFINET field bus adapter card complying with the international PROFINET standard. It is installed in the MD series AC drive to increase the communication efficiency and implement the AC drive networking function, which enables the AC drive to be a slave controlled by the field bus master station.	MD290
				MD480 (3.7 kW and above)
				MD500
				MD500-PLUS
				MD510
				MD520
				CS290
				CS710

Card type	Model	Order No.	Function	Applicable AC Drive
Profinet communication card	SI-PN	01040121	The SI-PN card is a PROFINET field bus adapter card complying with the international PROFINET standard. It is installed in the MD800 series AC drive to convert PROFINET protocol to CANopen protocol, which enables the AC drive to be a slave controlled by the field bus master station.	MD800
Ethernet/IP communication card	MD500-EN1	01040167	MD500-EN1 card is an Ethernet/IP field bus adapter card, which conforms to the international Ethernet/IP bus standard and has the advantages of high efficiency, flexible topology and easy operation. It is installed in the MD series AC drive to increase the communication efficiency and implement the AC drive networking function, which enables the AC drive to be a slave controlled by the field bus master station.	MD500-PLUS MD520
Resolver encoder card	MD38PG4	01013081	As a resolver PG card, MD38PG4 is a necessary option for closed-loop vector control of the AC drive, with an excitation frequency of 10kHz and a DB9 interface. Applicable encoder: resolver	MD480 MD500 MD500-PLUS MD510 MD520 CS710
Frequency-division resolver encoder card	MD38PG4D	01040008	MD38PG4D is a PG card specialized for resolvers, which features differential frequency division function and is suitable for many applications such as motorized spindle, master-slave control and synchronous control of machine tools. Applicable encoder: resolver	MD480 MD500 MD500-PLUS MD510 MD520 CS710
Multi-function encoder card	MD38PGMD	01013147	MD38PGMD is a multi-function PG card based on MD38PG1, MD38PG5 and MD38PG6D. It is compatible with differential input, open-collector input and push-pull input. And it can also support differential and open-collector output. So it can adapt to regular encoders and A/B phase input of the host controller MD38PGMD with CPLD version also has 0 to 63 multi-frequency output, adaptive filtering, automatic interlocking function and encoder disconnection detection function. Applicable encoder: ABZ incremental encoder	MD480 MD500 MD500-PLUS MD510 MD520 CS700 CS710

Card type	Model	Order No.	Function	Applicable AC Drive
Single-contact relay output card	IO-R1	01040123	IO-R2 is a relay expansion card 1 of MD800 series products, which contains 8 relay expansion resources with normally open functions, and can be flexibly configured as relay output functions of rectifier and inverter units according to requirements.	MD700
				MD800
Dual-contact relay output card	IO-R2	01040122	IO-R2 is a relay expansion card 2 of MD800 series products, which contains four relay expansion resources with normally open and normally closed functions, and can be flexibly configured as relay output functions of rectifier and inverter units according to requirements.	MD700
				MD800
Multi-function I/O expansion card	IO-M1	01040124	IO-M1 is a multi-function card for MD800 series products, which includes 8 ordinary DIs, 8 ordinary DOs and 2 AIs, and can be flexibly configured as input/output functions of rectifier and inverter units according to requirements.	MD700
				MD800
Multi-function I/O expansion card	MD38IO1	01013098	MD38IO1 is a multi-function I/O expansion card. It is equipped with five digital input (DI) terminals, an analog input (AI) terminal, a relay output terminal, a digital output (DO) terminal and an analog output (AO) terminal. It also has the RS485 communication interface and CAN communication interface for fieldbus control.	MD290 (15 kW and above)
				MD480 (3.7 kW and above)
				MD500 (15 kW and above)
				MD500E (15 kW and above)
				MD500-PLUS (15 kW and above)
				MD510
				MD520 (15 kW and above)
				CS290 (15 kW and above)
				CS710 (15 kW and above)
Mini I/O expansion card	MD38IO2	01013103	The MD38IO2 expansion card, which provides three DIs, is the simplified version of a multi-function I/O expansion card (MD38IO1).	MD290
				MD480
				MD500
				MD500E
				MD500-PLUS
				MD510
				MD520
				CS290
				CS710

Card type	Model	Order No.	Function	Applicable AC Drive
I/O expansion card 3	MD38IO3	01040051	MD38IO3 is a multi-function I/O expansion card, which can extends three DIs, one RS485 communication signal isolation input, and one NO relay output.	MD290
				MD480
				MD500
				MD500-PLUS
				MD510
				MD520
				CS290
				CS710
User programmable card	MD38PC1	01013104	MD38PC1 programmable card is an expansion card that integrates functions of the PLC. Users can install the expansion card on the AC drive, and program freely to achieve the required control and driving characteristics. The card is seamlessly connected with the AC drive in logic design, which can make the PLC control the AC drive simpler and faster. Compared with the networking method of the PLC and the AC drive, the PLC card features higher performance. The PLC card supports up to 8K user program space, which greatly meets the technological requirements of users.	MD290 (15 kW and above)
				MD480 (3.7 kW and above)
				MD500 (15 kW and above)
				MD500E (15 kW and above)
				MD510
				MD520 (15 kW and above)

Note

The default voltage level of adaptive AC drives is 380 V to 480 V in three phases. For details, consult our technical engineers.

1 Communication Card Information

1.1 MD38TX1 RS-485 Communication Card

1.1.1 Product Introduction

The MD38TX1 communication card is specially designed for the RS485 communication of MD480 series AC drives. It adopts isolation scheme with electrical parameters conforming to international standards. Users can select the expansion card to help control the AC drive operations and set parameters through remote serial ports.

1.1.2 Appearance and Dimensions

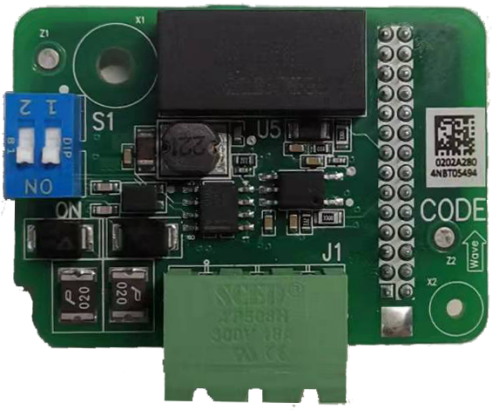


Figure 1-1 Appearance of MD38TX1 expansion card

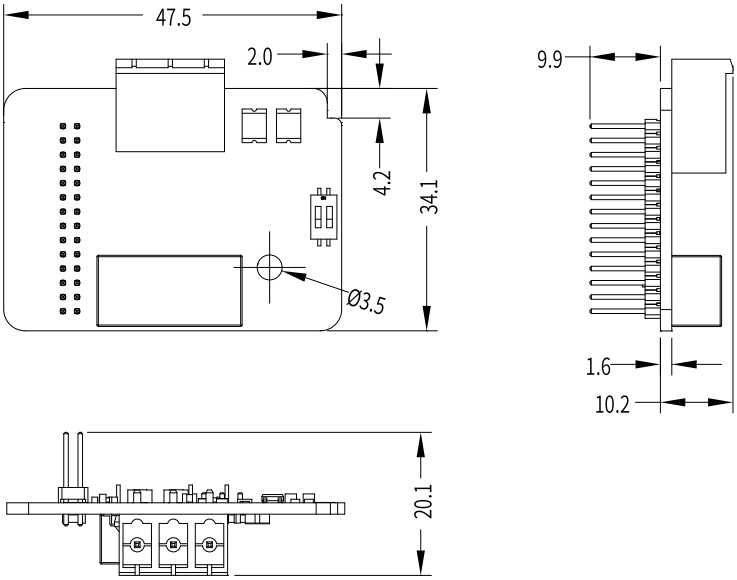


Figure 1-2 Dimensions of MD38TX1 expansion card

1.1.3 Interface Layout and Description

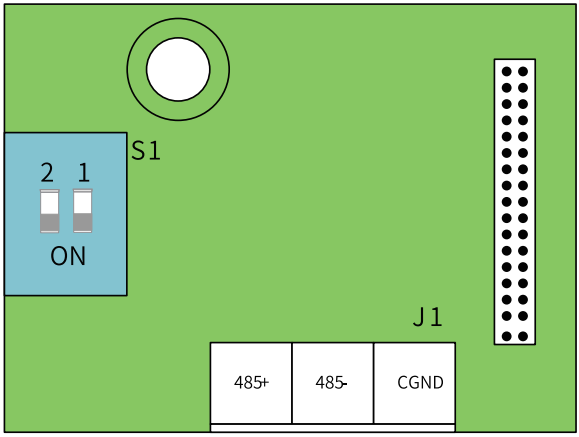


Figure 1-3 Interface layout of MD38TX1 expansion card

Table 1–1 Function descriptions of MD38TX1 terminals

Terminal code		Name	Function	Layout
J1	485+	RS485 positive communication signal	RS485 communication terminal with isolated input	
	485-	RS485 negative communication signal	RS485 communication terminal with isolated input	
	CGND	Reference ground of RS485 communication signal	Isolated Power supply	

Table 1–2 Jumper descriptions of MD38TX1 expansion card

Terminal code	Name	Function	Jumper/DIP switch position
S1	RS232 communication termination resistor DIP switch	Matching the termination resistor	
		Not matching the termination resistor	

Note

The jumper setting is based on the top view with main terminal block at the bottom, which is subject to the jumpers silk-screened on the board.

1.2 MD310-CANL CANlink Communication Card

1.2.1 Product Introduction

The MD310-CANL is a communication card specialized for CAN communication of the MD310 series AC drives. It enables the AC drive to access the high-speed CANlink communication network and implement field bus control.

CANlink is an open, CAN bus-based protocol developed by Inovance. All devices supporting this protocol can access CANlink network. Through CANlink network,

Inovance products such as AC drives, servo controllers and PLCs can be connected seamlessly. MD310-CANL card conforms to the CANlink field bus standard.

1.2.2 Appearance and Dimensions

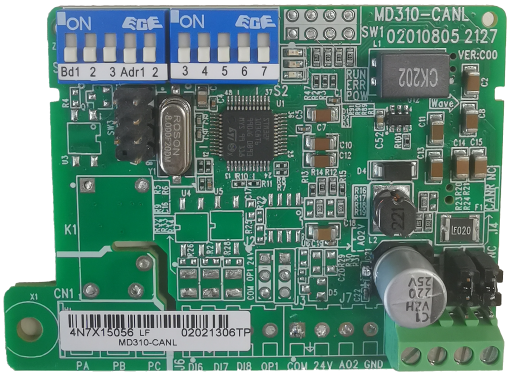


Figure 1-4 Appearance of MD310–CANL expansion card

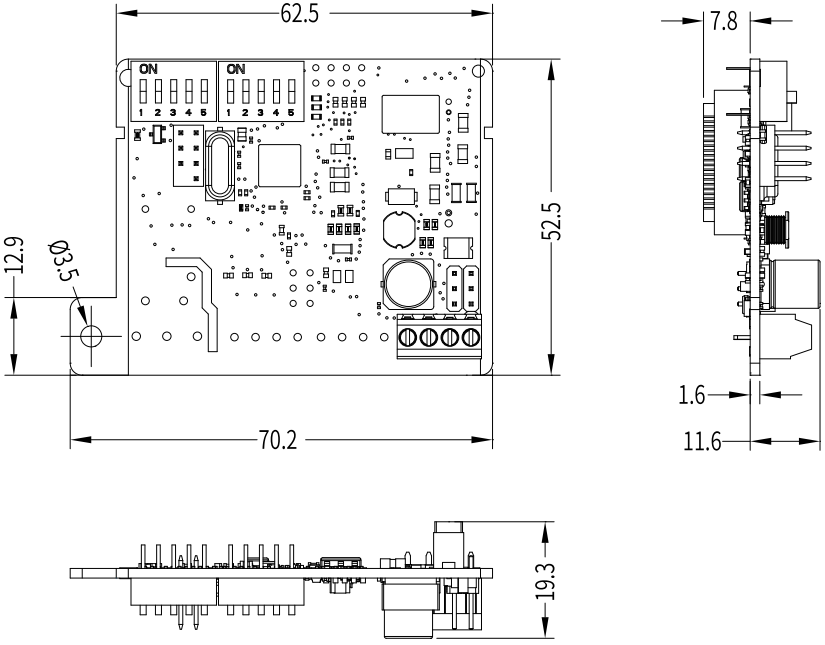


Figure 1-5 Dimensions of MD310–CANL expansion card

1.2.3 Interface Layout and Description

The interface layout of the MD310-CANL card is shown in the following figure. Terminal J8 is the CAN bus communication interface, and jumpers J4/J5 are used to configure the CAN bus termination resistor.

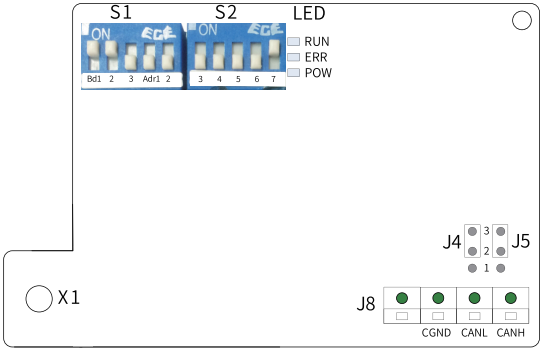


Figure 1-6 Interface layout of MD310-CANL expansion card

Table 1–3 Interface list of MD310-CANL expansion card

Symbol	Name	Function
S1/S2	DIP Switch	Used to set the baud rate and station No.
J8	Wiring terminal	CANlink wiring terminal
J4/J5	CAN termination resistor setting	Pins 2 and 3 shorted: resistor disabled Pins 1 and 2 shorted: resistor enabled
X1	Screw fixing hole	Expansion card mounting hole (reserved)
LED	Status indicator	Used to indicate the running state of the expansion card.

Communication Port

Terminal J8 is used to connect the CAN bus. It includes four interfaces (one of them is null terminal), as described in the following table.

No.	Terminal Code	Function
1	-	-
2	CGND	Connect the shield of the CAN bus.
3	CANL	Connect the negative pole of the CAN bus.
4	CANH	Connect the positive pole of the CAN bus.

Termination Resistor

The MD310-CANL card is configured with the termination resistors, which can be enabled by setting the jumpers J4/J5, as described in the following table. It is recommended that the termination resistor is used at two sides of the network topology structure.

Table 1–4 MD310-CANL jumper J4/J5 termination resistor

J2	Jumper position	Termination resistor
	Shorting pins 2 and 3	Not used
	Shorting pins 1 and 2	Used

Note

When accessing the termination resistor, both J4/J5 should be shorted to pins 1 and 2. Pin 1 is closer to the terminal.

DIP Switch

The MD310-CANL DIP switches S1 and S2 compose an 10-digit DIP switch for setting the baud rate and device address for CAN bus communication. The following figure shows the numbering of DIP switches. Bd 1, 2 and 3 are used to set the baud rate, and Adr 1 to 7 are used to set the CANlink device addresses. Toggling the DIP switch to "ON" means "1", and Toggling the DIP switch to the other end means "0". Modification of baud rate and station number will take effect immediately.

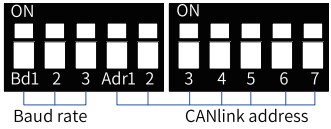


Figure 1-7 MD310-CANL DIP switch

Baud Rate

The following table describes the relationship between the DIP switch states and the baud rates.

Table 1–5 MD310-CANL baud rate

DIP switch No. Bd			Baud rate
1	2	3	
0	0	0	20 Kbps
0	0	1	50 Kbps

DIP switch No. Bd			Baud rate
1	2	3	
0	1	0	100 Kbps
0	1	1	125 Kbps
1	0	0	250 Kbps
1	0	1	500 Kbps
1	1	0	800 Kbps
1	1	1	1 Mbps

CANlink Device Address

The MD310-CANL card provides seven switches for setting the CANlink device addresses. Switch “Adr1” is the highest bit, and switch “Adr7” is the lowest bit. Switches Adr 1 to 7 correspond to b6 to b0 of an address station number. The address range to be set is 1 to 63, as listed in the following table. Address 0 and address 64 to 127 are reserved and cannot be used. If you set the reserved address, the MD310-CANL card will not work.

Table 1–6 Addresses set by the DIP switches of MD310-CANL

DIP switch No. Adr							Address
1	2	3	4	5	6	7	
0	0	0	0	0	0	0	Reserved
0	0	0	0	0	0	1	1
0	0	0	0	0	1	0	2
0	0	0	0	0	1	1	3
...							...
0	1	1	1	1	1	1	63
1	x	x	x	x	x	x	Reserved

Status Indicator

Table 1–7 Description of MD310-CANL status indicators

Indicator	State	Description
POW	ON	Power-on normal
	OFF	Power-on abnormal. Check whether the installation is correct.
ERR	OFF	No fault
	On	Connection with the master station has timed out. Check the connection.
	5Hz flashing	Abnormal address. Check the address.

Indicator	State	Description
RUN	OFF	CANlink bus not connected or disconnected
	ON	CANlink-based connection normal, but no data exchange.
	1 Hz flashing	Normal data exchange

1.3 MD38CAN1 CANlink Communication Card

1.3.1 Product introduction

The MD38CAN1 is a communication card specialized for CAN communication of the MD380 series AC drives. It enables the AC drive to access the high-speed CAN communication network and implement field bus control.

CANLINK is a network based on CAN bus developed by Inovance. It is an open protocol, and all devices supporting this protocol can access CANLINK network. Through CANLINK network, Inovance products such as AC drive, servo controller and HMI can realize seamless connection. MD38CAN1 card conforms to the CANlink field bus standard.

1.3.2 Appearance and Dimensions

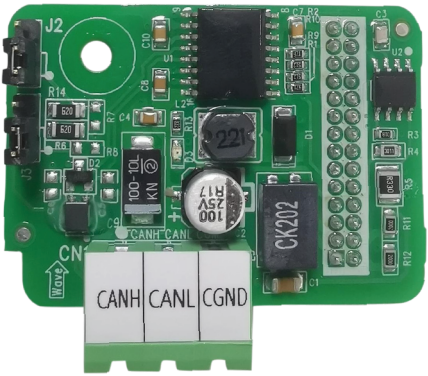


Figure 1-8 Appearance of MD38CAN1 expansion card

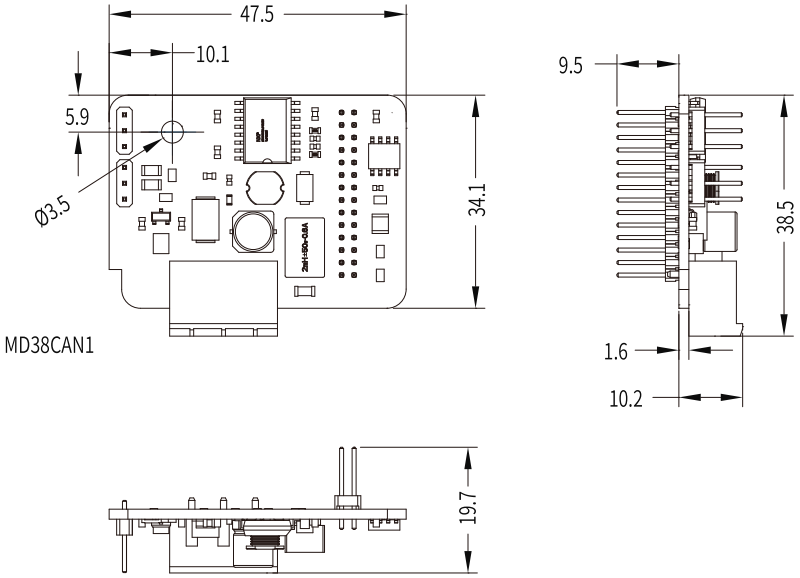


Figure 1-9 Dimensions of MD38CAN1 expansion card

1.3.3 Interface Layout and Description

The interface layout of MD38CAN1 card is shown in the following figure. Note that CN1 is the CAN bus communication interface, and jumper J2 is used to configure the CAN bus termination resistor.

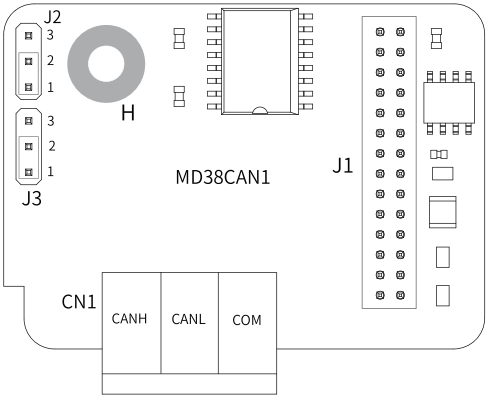


Figure 1-10 Interface layout of MD38CAN1 expansion card

Table 1–8 Interface lists of MD38CAN1 expansion card

Symbol	Name	Function
J1	Pin header	It is used to connect the card to the AC drive.
J2/J3	Bus termination resistor setting	Pins 2 and 3 shorted: resistor disabled Pins 1 and 2 shorted: resistor enabled
CN1	Wiring terminal	CANlink Bus wiring terminal
H	Screw fixing hole	Fix the expansion card with the M3×8 self-taping screw.

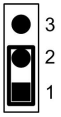
Communication Port

CN1 is the CAN bus communication interface, and its signal definition is shown in the following table.

No.	Pin Name	Signal
1	CANH	Connect positive pole of the CAN bus.
2	CANL	Connect negative pole of the CAN bus.
3	COM	Connect the shield of the CAN bus.

Jumper Configuration

The MD38CAN1 is configured with the termination resistors, which can be enabled by setting the jumper J2. It is recommended that the termination resistor is used at two sides of the network topology structure. See the following table for jumper setting.

J2	Jumper position	Termination resistor
	Shorting pins 2 and 3	Not used
	Shorting pins 1 and 2	Used

1.4 MD38CAN2 CANopen Communication Card

1.4.1 Product Introduction

The MD38CAN2 (CANopen) communication card is an expansion card specialized for CAN communication of the MD series AC drives. It enables the AC drive to access the high-speed CAN communication network and implements field bus control.

CANopen is a universal field bus standard, and devices that support this protocol can access the CANopen network.

1.4.2 Appearance and Dimensions



Figure 1-11 Appearance of MD38CAN2 expansion card

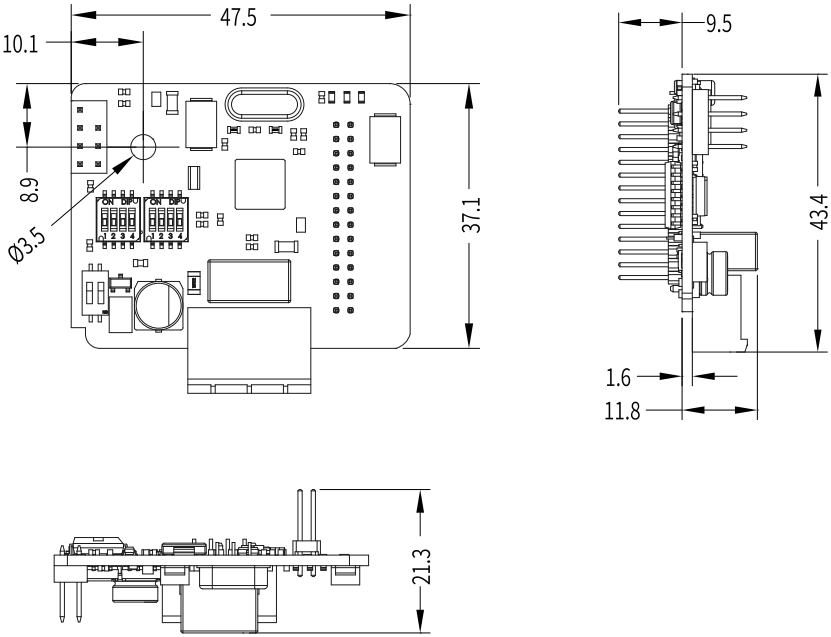


Figure 1-12 Dimensions of MD38CAN2 expansion card

1.4.3 Interface Layout and Description

The following figure shows the interface layout of MD380CAN2. CN1 is the CAN bus communication interface. DIP switch S1 is used to configure the CAN bus termination resistor. DIP switches S2 and S3 are used to set the baud rate and address for CAN communication. The three LED indicators indicate the running state. SW1 is the factory test interface that can not be connected.

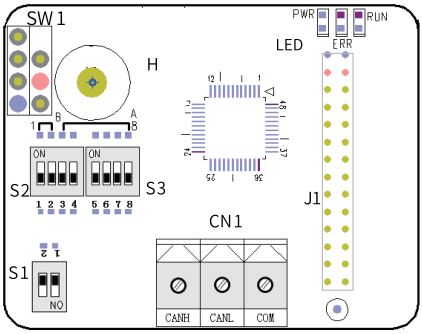


Figure 1-13 Interface layout of MD38CAN2 expansion card

Table 1–9 Interface lists of MD38CAN2 expansion card

Symbol	Hardware Name	Function
SW1	SW1 pin header	It is used for the factory test. Do not connect it.
S2/S3	DIP switch	It is used to set the baud rate and address for CAN communication.
S1	Termination resistor setting	It is used to set CAN bus termination resistor
J1	Pin header	It is used to connect the AC drive.
H	Screw fixing hole	It is used to fix the card with the M3*8 self-taping screw.
CN1	Wiring terminal	CANopen bus wiring terminal
LED	Status indicator	The three indicators are used to indicate the running state.

Communication Port

Terminal CN1 is used to connect the CAN bus. It includes three interfaces, as described in the following table.

Table 1–10 Interface Description

No.	Terminal code	Function
1	CANH	Connect positive pole of the CAN bus.
2	CANL	Connect negative pole of the CAN bus.
3	CGND	Connect the shield of the CAN bus.

Configuration Interface for Termination Resistor

The MD38CAN2 card configures the CAN bus terminal resistor through the dip switch S1. It is recommended that the terminal matching resistor beused at two sides of the network topology structure. Dialing to "ON" means "1", and dialing to the other end means "0".

Table 1–11 MD38CAN2 Termination Resistor Configuration

DIP switch No.		Termination resistor
1	2	
0	0	Not used
1	1	Used

DIP Switch

The MD38CAN2 DIP switch S1 composes an 2-digit DIP switch for setting the baud rate and device address for CAN bus communication. For details, see *" Configuration Interface for Termination Resistor" on page 22*.

The DIP switches S2 and S3 compose an 8-digit DIP switch for setting the baud rate and device address for CAN bus communication. The following figure shows the numbering of DIP switches. Switches 1 and 2 are used to set the baud rate, and switches 3 to 8 are used to set the CANopen device addresses. Dialing to "ON" means "1", and dialing to the other end means "0".

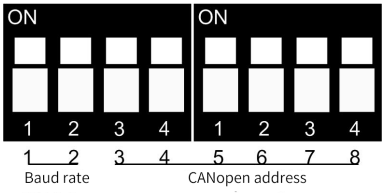


Figure 1-14 MD310-CANL DIP switch

Baud Rate

The following table describes the relationship between the DIP switch states and the baud rates.

Table 1–12 MD38CAN2 baud rate

DIP switch No.		Baud rate
1	2	
0	0	125Kbps
0	1	250Kbps
1	0	500Kbps
1	1	1Mbps

CANopen Device Address

The MD38CAN2 provides six switches for setting the CANopen device addresses. Switch 3 is the highest bit, and switch 8 is the lowest bit. Switches 3 to 8 correspond to b5 to b0 of a 16-bit binary integer. The address range to be set is 1–63, as listed in the following table. Address 0 is reserved and cannot be used. If you set address 0, the MD38CAN2 will not work.

Table 1–13 Addresses set by the DIP switches of MD38CAN2

DIP switch No.						Address
3	4	5	6	7	8	
0	0	0	0	0	0	Reserved
0	0	0	0	0	1	1
0	0	0	0	1	0	2
0	0	0	0	1	1	3
...						…
1	1	1	1	1	1	63

Status Indicator

Table 1–14 Description of MD38CAN2 status indicators

Indicator	State	Description
POW (red)	ON	Power-on normal
	OFF	Power-on abnormal (check whether the installation is correct)
ERR (red)	ON	Internal AC drive communication timeout
	Flashing quickly	CANopen address setting incorrect
	Flashing twice	CANopne emergency message indicating AC drive fault
RUN (green)	ON	Running
	Flashing	Pre-running
	OFF	Stop

1.5 MD500-ECAT EtherCAT Communication Card

1.5.1 Product Introduction

The MD500-ECAT expansion card is an EtherCAT fieldbus adapter card, which can be used in the ultra-high speed I/O network. The protocol is applicable on the I/O layer. This card features high efficiency, flexible topology, and easy operation. It is installed in the MD series AC drive to increase the communication efficiency and implement the AC drive networking function, which enables the AC drive to be a slave controlled by the field bus master station.

1.5.2 Appearance and Dimensions

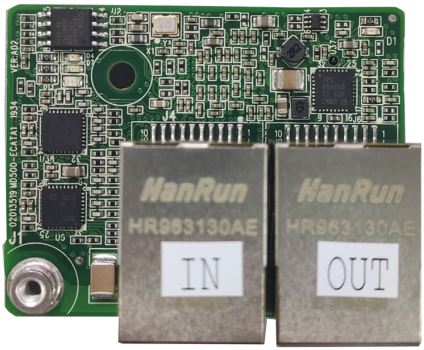


Figure 1-15 Appearance of MD500–ECAT expansion card

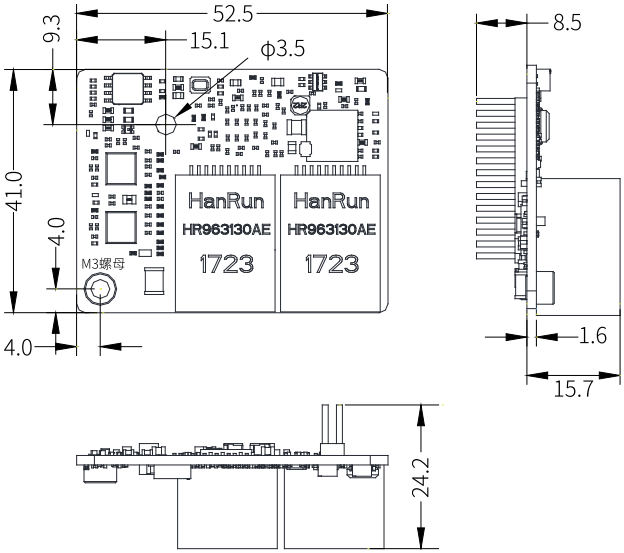


Figure 1-16 Dimensions of MD500–ECAT expansion card

1.5.3 Interface Layout and Description

The following figure shows the layout and indicators of the MD500-ECAT card. The pin header J7 on the back of the MD500-ECAT card is used to connect the AC drive. The MD500-ECAT card provides two network ports J4 and J6 to communicate with the master station (or the previous slave station) and the next slave station (if any).

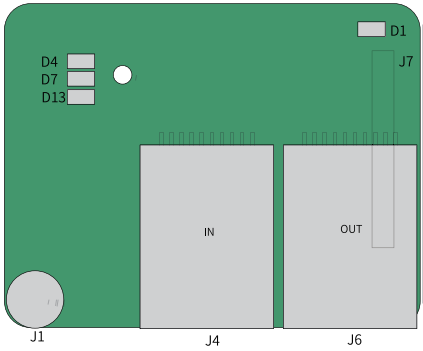


Figure 1-17 Interface layout of MD500-ECAT expansion card

Table 1–15 Layout and indicators of the MD500-ECAT card

Symbol	Hardware Name	Function Description
J7	Pin header	Used to connect the AC drive.
J4	Network port	Standard Ethernet RJ45 Ethernet ports are used to communicate with the master station (or the previous slave station) and the next slave station (if any).
J6		
J1	EMC grounding terminal	Used to connect the EMC ground terminal of the AC drive.
D13	Power indicator (green)	Used to indicate the power status. ON: Normal OFF: Abnormal (Check whether the card is installed properly.)
D1	AC drive communication status indicator (green)	For details, see *"Table 1–16 Description of MD500-ECAT status indicators" on page 27*
D4	EtherCAT interaction indicator (green)	
D7	ESC fault indicator (red)	

Caution

- The network port J4 of MD500-ECAT card is the input port ECAT IN, and J6 is the output port ECAT OUT. The input and output interfaces cannot be connected inversely.
- The Cat5e shielded twisted pair (STP) must be used for network cable to ensure stability.

Table 1–16 Description of MD500-ECAT status indicators

Indicator		State description	Solution
D1	Steady on in green	Normal	N/A
	Steady off	Abnormal communication with the AC drive	Set F0-28 to 1 and check whether the AC drive supports the MD500-ECAT card.
D4	Steady on in green	Working at OP state	N/A
	Flashing green	Working in PREOP/SAFEOP mode	Check the configuration. Check whether the AC drive supports the MD500-ECAT card and whether F0-28 is set to 1. Check whether the network port is connected correctly.
	Steady off	Master station disconnected or working in Initial mode	Check whether the master station and network port are connected correctly.
D7	Steady off	Normal	N/A
	Steady on in red	ESC internal fault	Contact Inovance or the agent for technical support.

1.6 SI-ECAT EtherCAT Communication Card

1.6.1 Product Introduction

The SI-ECAT expansion card can be used in the ultra-high speed I/O network. The protocol is applicable on the I/O layer. This card features high efficiency, flexible topology, and easy operation.

1.6.2 Appearance and Dimensions



Figure 1-18 Appearance of SI-ECAT expansion card

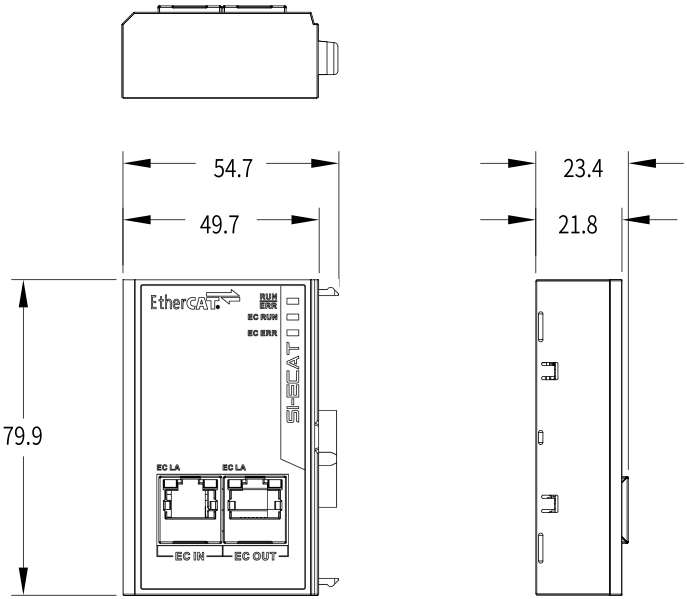


Figure 1-19 Dimensions of SI-ECAT expansion card

1.6.3 Interface Layout and Description

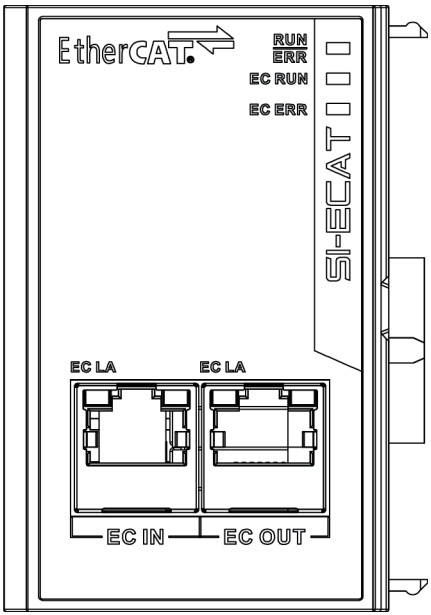


Figure 1-20 Interface layout of SI-ECAT expansion card

The EtherCAT communication expansion card (SI-ECAT) is connected to the EtherCAT master station using the standard Ethernet RJ45 socket. Its pin signal definitions are the same as those of the standard Ethernet pins. They can be connected using crossover cables or straight-through cables.

Table 1–17 Functions of SI-ECAT card terminals

Code	Name	Description
EC IN	Input terminal	After installation, EC IN is on the left and ECAT OUT is on the right when facing to the RJ45 interface. The two interfaces must be connected correctly. The Cat5e shielded twisted pair (STP) must be used for network cables to ensure stability. To improve the anti-interference capability of communication, it is recommended to install it in the expansion card slot 2.
EC OUT	Output terminal	

Table 1–18 Indicator description of SI-ECAT expansion card

Indicator		State Description	Solution
RUN/ ERR	Green indicator steady ON	Communication normal	N/A
	Red indicator steady ON	ECAT card and node communication timeout	Check the connector for interference.
	Red indicator blinking slowly	ECAT card and power supply unit communication timeout	1. Check that the communication card is installed correctly. 2. Check whether the power supply unit is normal.
	Red indicator blinking quickly	ECAT card faulty	Troubleshoot the fault according to the fault code displayed on the operating panel of the power supply unit.
EC RUN	Green indicator blinking slowly	EtherCAT state machine status: disconnection	N/A
	Green indicator OFF	EtherCAT state machine status: INIT = initializing	N/A
	Green indicator blinking quickly	EtherCAT state machine status: PREOP = pre-operational	N/A
	Green indicator blinking once	EtherCAT state machine status: SAFEOP = safe operation	N/A
	Green indicator steady ON	EtherCAT state machine status: OP = operating	N/A
EC ERR	Red indicator OFF	EtherCAT communication normal	N/A
	Red indicator steady ON	EtherCAT communicate faulty	Check the fault code on the operating panel of the power supply unit.

Indicator		State Description	Solution
EC LA	Yellow indicator OFF	No connection with the previous EtherCAT device	N/A
	Yellow indicator steady ON	Connected with the previous EtherCAT device	N/A
	Green indicator OFF	No data exchange with the network interface	N/A
	Green indicator blinking	Data exchange with the network interface	N/A

1.7 MD-SI-DP1 PROFIBUS-DP Communication Card

1.7.1 Product Introduction

As a PROFIBUS-DP fieldbus adapter card, the MD-SI-DP1 expansion card meets international PROFIBUS fieldbus standards, improving the communication efficiency of the AC drive. By implementing the AC drive networking function, it enables the AC drive to be a slave controlled by the fieldbus master station. MD-SI-DP1 expansion card supports PROFIBUS-DP communication.

See the following table for the difference between MD-SI-DP1 and MD38DP2.

Item	MD-SI-DP1	MD38DP2
Diagnosis	Supported	Supported
DPV1	Supported	Supported
PPO4	Supported	Supported
PPO type selection	Set by the Siemens software tool	Set by the Siemens software tool
PZD mapping address	Set by the Siemens software tool	Set by the Siemens software tool
Station number settings	Set by DIP switches 1 to 125	Set by DIP switches 1 to 125
Master station disconnection	The expansion card notifies the AC drive of the master station disconnection.	The expansion card notifies the AC drive of the master station disconnection.
Communication rate between the expansion card and the AC drive	Constant rate	Constant rate

Item	MD-SI-DP1	MD38DP2
Slave station fault	The expansion card notifies the master station of the slave station fault.	The expansion card notifies the master station of the slave station fault.
CAN communication	Not supported	Supported

1.7.2 Appearance and Dimensions

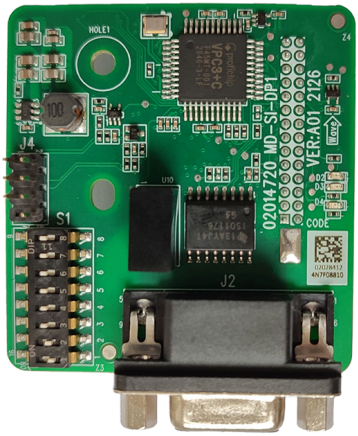


Figure 1-21 Appearance of MD-SI-DP1 expansion card

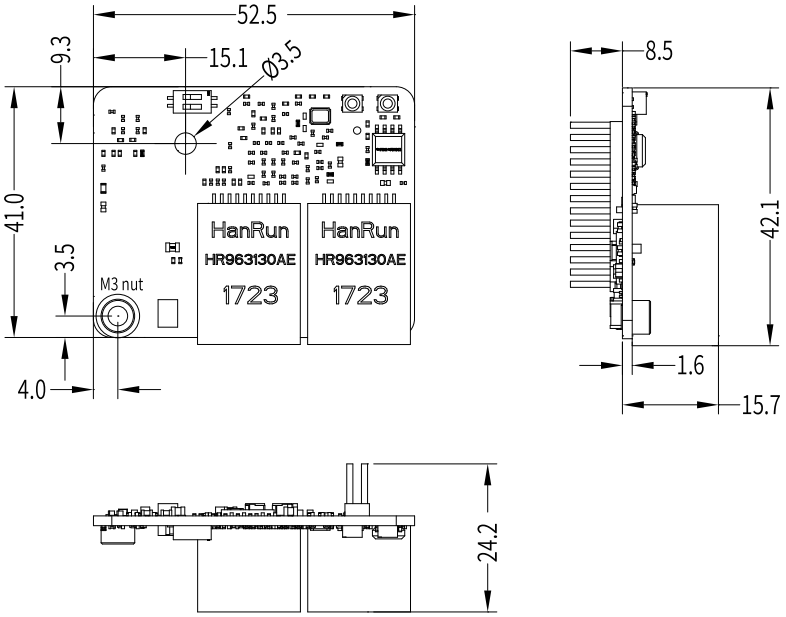


Figure 1-22 Dimensions of MD-SI-DP1 expansion card

1.7.3 Interface Layout and Description

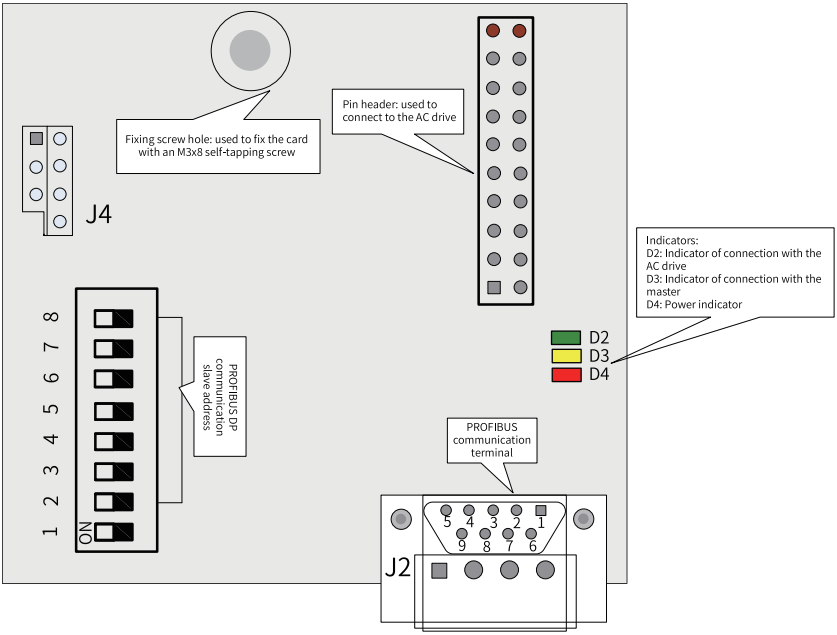
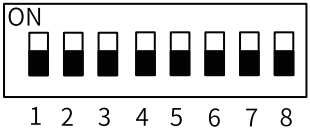


Figure 1-23 Interface layout of the MD-SI-DP1 card

DIP Switch



Digit	Function	Description
1	PROFIBUS DP card type switchover	OFF: MD-SI-DP1 (default) ON: Reserved
2 to 8	PROFIBUS DP communication slave address	The addresses of stations 1 to 125 can be set by the 7-digit binary DIP switch. Example: Address — DIP Switch Setting (digit 8: least significant bit) 1 — 000 0001 7 — 000 0111 20 — 001 0100 125 — 111 1101

Caution

The change of digit 1 is valid upon the next power-on. The change of slave addresses takes effect immediately after setting.

Standard 9-pin PROFIBUS Interface

The MD-SI-DP1 expansion card is connected to the PROFIBUS master using the standard DB9 socket. The pin signal definition and pin arrangement of the standard DB9 socket are the same as those of Siemens' DB9 socket, as shown in the following figure.

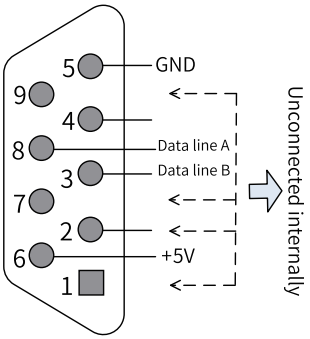


Figure 1-24 DB9 terminal pins

Control Terminals

Table 1–19 Function description of control terminals

Category	Symbol	Terminal Name	Function
PROFIBUS communication terminal (J3)	1, 2, 7, and 9	NC	Unconnected internally
	3	Data line B	Positive pole of the data line
	5	GND	Isolated 5 V power ground
	6	+5 V	Isolated 5 V power supply
	8	Data line A	Negative pole of the data line
Programming	J4	Programming	Interface for production and commissioning. Do not use it.

Category	Symbol	Terminal Name	Function
Indicator※	D4 (red)	Power indicator	• Steady ON: The AC drive is powered on. • OFF: The AC drive is disconnected from the power supply or the PROFIBUS DP card is installed incorrectly.
	D3 (yellow)	Indicator of communication between the MD-SI-DP1 expansion card and the master	• Steady ON: Communication between the MD-SI-DP1 card and the PROFIBUS master is normal. • OFF: There is no communication between the MD-SI-DP1 card and the PROFIBUS master (check the connection of PROFIBUS cables and the setting of the station number). • Blinking: The master is not running or a fault occurs in communication between the MD-SI-DP1 expansion card and the master.
	D2 (green)	Indicator of communication between the MD-SI-DP1 expansion card and the AC drive	• Steady ON: Communication between the MD-SI-DP1 expansion card and the AC drive is normal. • OFF: Communication between the MD-SI-DP1 card and the AC drive fails. (F0-28 is not set to 1 or the AC drive does not support the MD-SI-DP1 expansion card.) • Blinking: Interference exists in communication between the MD-SI-DP1 expansion card and the AC drive or the expansion card address is beyond the range of 1 to 125.

1.8 MD38DP2 PROFIBUS-DP Communication Card

1.8.1 Product introduction

As a PROFIBUS-DP fieldbus adapter card, the MD38DP2 expansion card meets international PROFIBUS fieldbus standards, improving the communication efficiency of the AC drive. By implementing the AC drive networking function, it enables the AC drive to be a slave controlled by the fieldbus master station. Besides PROFIBUS-DP communication, MD38DP2 also provides the CANlink communication interface.

The MD38DP2 expansion card can be used as MD38DP1 by setting the DIP switch to communication with the original AC drive. When it is used as MD38DP1, the original GSD file (MD38PFS2.GSD) and setting method are used.

1.8.2 Appearance and Dimensions

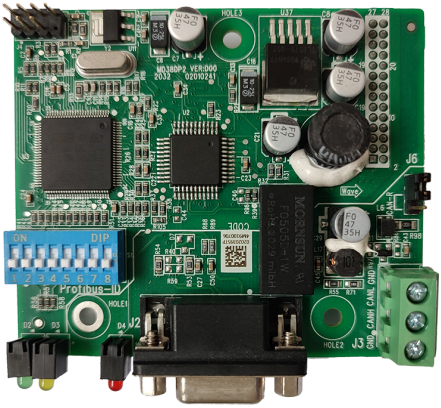


Figure 1-25 Appearance of MD38DP2 expansion card

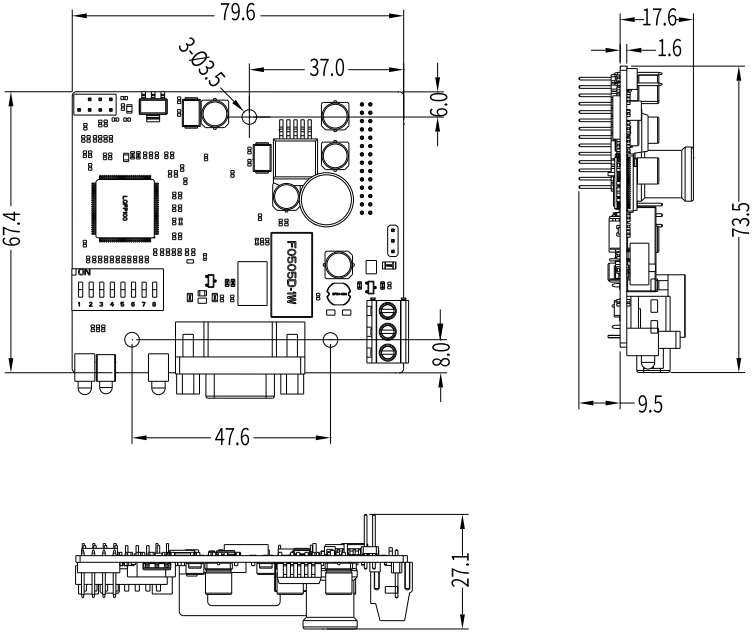


Figure 1-26 Dimensions of MD38DP2 expansion card

1.8.3 Interface Layout and Description

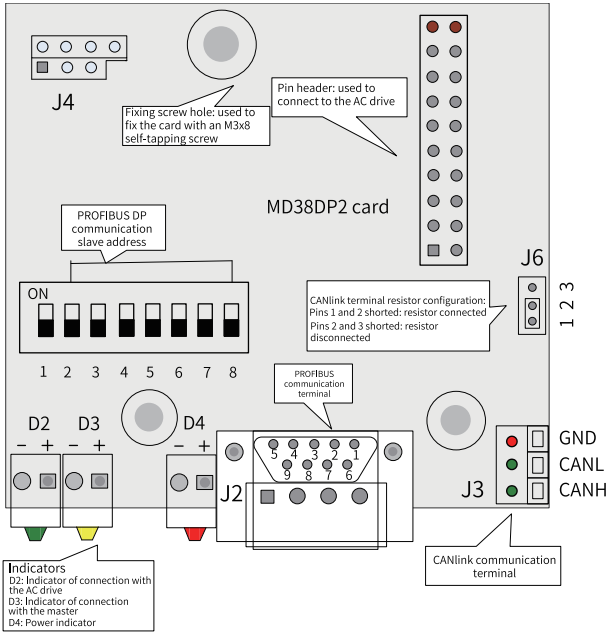


Figure 1-27 Interface layout of the MD38DP2 card

DIP Switch



MD38DP2 DIP switch description

Digit	Function	Description
1	PROFIBUS DP card type switchover	OFF: MD38DP2 (default) ON: MD38DP1
2 to 8	PROFIBUS DP communication slave address	The addresses of stations 1 to 125 can be set by the 7-digit binary DIP switch. Example: Address — DIP Switch Setting (digit 8: least significant bit) 1 — 000 0001 7 — 000 0111 20 — 001 0100 125 — 111 1101

Caution

The change of digit 1 is valid upon the next power-on. The change of slave addresses takes effect immediately after setting.

MD38DP1 DIP switch description

Digit	Function	Description
1	PROFIBUS DP card type switchover	OFF: MD38DP2 (default) ON: MD38DP1
2	Reserved	Reserved
3 to 8	PROFIBUS DP communication slave address	The addresses of stations 0 to 63 can be set by digits 3 to 8 of the 6-digit binary DIP switch. (digit 8: least significant bit) Example: DIP Switch Setting of Digits 3 to 8 Local Address 00 0000 Set by FD-02 00 0111 07 01 0100 20 (Note: When the DIP switch is set to 0, the local address is set by FD-02 of the MD380 series AC drive.)

Digit	Function	Description
1	PROFIBUS DP card type switchover	OFF: MD38DP2 (default) ON: MD38DP1
3 to 8	PROFIBUS DP communication slave address	The addresses of stations 0 to 63 can be set by digits 3 to 8 of the 6-digit binary DIP switch. (digit 8: least significant bit) Example: DIP Switch Setting of Digits 3 to 8 — Local Address 00 0000 — Set by FD -02 00 0111 — 07 010100 — 20

Caution

- This type of MD38DP1 expansion card can communicate with the AC drive only at the communication rate of 115.2 k (that is, the tens position of FD-00 must be set to 0).
- When MD38DP1 is used, the expansion card version cannot be viewed.
- The change of DIP switch digit 1 is valid upon the next power-on of the AC drive.
- Other information is consistent with that of the original MD380DP1 expansion card.

Standard 9-pin PROFIBUS Interface

MD38DP2 is connected to the PROFIBUS master using the standard DB9 socket. The pin signal definition and pin arrangement of the standard DB9 socket are the same as those of Siemens' DB9 socket, as shown in the following figure.

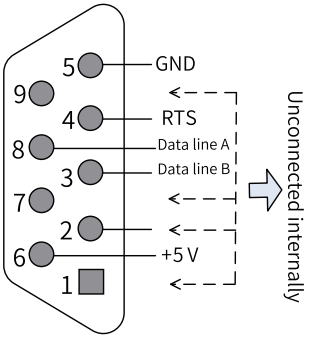


Figure 1-28 DB9 terminal pins

Control Terminals

Table 1–20 Function description of control terminals

Category	Symbol	Terminal Name	Function
PROFIBUS communication terminal (J2)	1, 2, 7, and 9	NC	Unconnected internally
	3	Data line B	Positive pole of the data line
	4	RTS	Request to send signal
	5	GND	Isolated 5 V power ground
	6	+5 V	Isolated 5 V power supply
	8	Data line A	Negative pole of the data line
CANlink communication terminal (J3, J9)	CANH	Positive CAN input	Positive pole of the data line
	CANL	Negative CAN input	Negative pole of the data line
	GND	Power ground	Isolated 5 V power ground
Programming	SW1	Programming	Interface for production and commissioning. Do not use it.
Jumper	J6	CANlink terminal resistor configuration	• Pins 1 and 2 shorted: resistor connected • Pins 2 and 3 shorted: resistor disconnected

Category	Symbol	Terminal Name	Function
Indicator[Note]	D4 (red)	Power indicator	• Steady ON: The AC drive is powered on. • OFF: The AC drive is disconnected from the power supply or the PROFIBUS DP card is installed incorrectly.
	D3 (yellow)	Indicator of communication between the PROFIBUS DP card and the master	• Steady ON: Communication between the PROFIBUS DP card and the PROFIBUS master is normal. • OFF: There is no communication between the PROFIBUS DP card and the PROFIBUS master (check the connection of PROFIBUS cables and the setting of the station number). • Blinking: The master is not running or a fault occurs in communication between the PROFIBUS DP card and the master.
	D2 (green)	Indicator of communication between the PROFIBUS DP card and the AC drive	• Steady ON: Communication between the PROFIBUS DP card and the AC drive is normal. • OFF: Communication between the PROFIBUS DP card and the AC drive fails. (F0-28 is not set to 1 or the AC drive does not support the MD38DP2 expansion card.) • Blinking: Interference exists in communication between the PROFIBUS DP card and the AC drive or the expansion card address is beyond the range of 1 to 125.

Note

Note: For some products, the indicator color and the terminal symbol may not match. In this case, the terminal symbol prevails. The indicators are D2, D3, and D4 from left to right. See *"Figure 1–27 " on page 38*.

1.9 MD500-PN1 Profinet Communication Card

1.9.1 Product Introduction

The MD500-PN1 card is a PROFINET field bus adapter card complying with the international PROFINET standard. It is installed in the MD series AC drive to increase the communication efficiency and implement the AC drive networking function, which enables the AC drive to be a slave controlled by the field bus master station.

1.9.2 Appearance and Dimensions

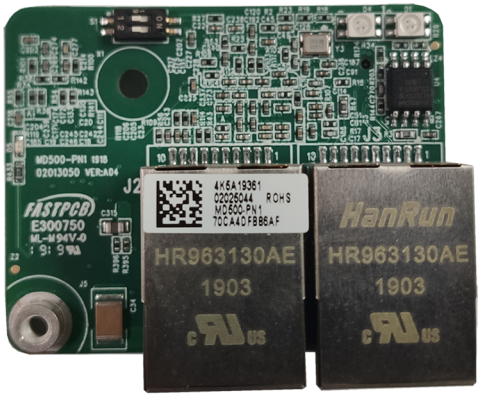


Figure 1-29 Appearance of MD500–PN1 expansion card

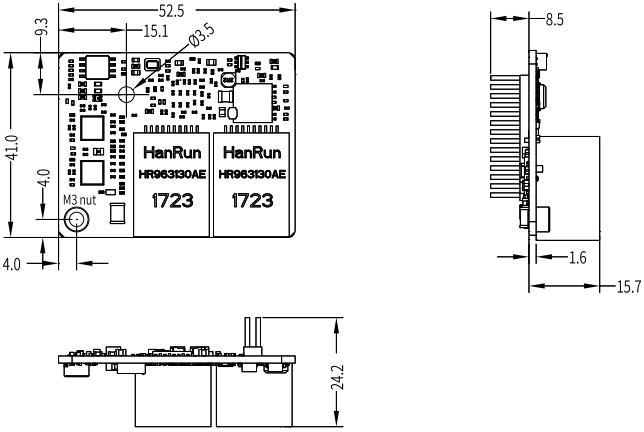


Figure 1-30 Dimensions of MD500–PN1 expansion card

1.9.3 Interface Layout and Description

The following figure shows the layout and indicators of the MD500-PN1 card. The pin header J1 on the back of the MD500-PN1 card is used to connect the AC drive. The MD500-PN1 card provides two network ports J2 and J3 for communication with the PROFINET card (PLC).

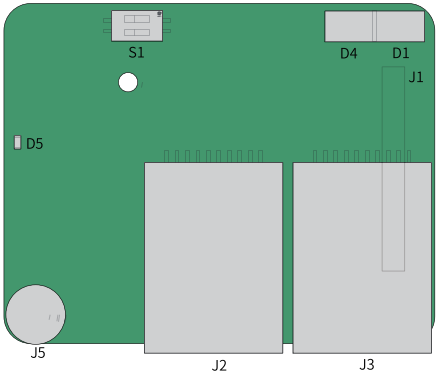


Figure 1-31 Interface layout of MD500-PN1 expansion card

Table 1–21 Description of indicators on the MD500-PN1

Symbol	Hardware Name	Function
J1	Pin header	Check whether FD-00 is 9 and whether FD-01 is 3.
J2	Network port	Standard Ethernet RJ45 type socket is used, direction insensitive. And J3 is used for communication between PN card and PN card (PLC).
J3		
D5	Power indicator	Used to indicate the status of the power supply. On: power-on normal; Off: power-on abnormal (Check whether the installation is correct)
D1	PLC communication status indicator (PLCLINK)	For details, see *"Table 1–22 " on page 45*
D4	AC drive communication status indicator (DSPLINK)	
S1	2-pin DIP switch	Used for upgrade by the manufacturer only.

Caution

- After the MD500-PN1 card is installed, J2 is on the left and J3 is on the right when facing the RJ45 interface. These two ports are direction-insensitive. You can connect either one to the near PLC end.
- The Cat5e shielded twisted pair network cable is recommended to ensure stability.

Table 1–22 Description of indicators on the MD500-PN1

Indicator		State description	Solution
DSPLINK	Steady green	Normal	N/A
	Steady yellow	MAC address abnormal	Replace the MD500-PN1 card.
	Flashing yellow	AC drive faulty	Clear the AC drive fault.
	Steady red	Abnormal communication with the AC drive	Set F0-28 to 1 and check whether the AC drive supports the MD500-PN1 card.
	Flashing in red	AC drive communication timeout	Check whether the AC drive software version supports the MD500-PN1 card. Restore the AC drive software to default settings.
PLCLINK	Steady green	Communication normal	N/A
	Flashing in green	Master station not found	Check whether a device name is assigned to the slave. Check whether the corresponding PLC is connected.
	Steady yellow	Configuration error	Check whether the GSD is correct.
	Steady red	Communication with the master station interrupted	Check the wiring and check whether the shield layer of the network cable is connected properly.
D1 and D4	Both in red	MD500-PN1 card software abnormal	Power off and then on the equipment. Replace the MD500-PN1 card.
		DIP switch abnormal	Check that the DIP switch S1 is OFF and re-power on the equipment.

1.10 SI-PN Profinet Communication Card

1.10.1 Product Introduction

The SI-PN card is a PROFINET field bus adapter card complying with the international PROFINET standard. It is installed in the MD800 series AC drive to convert PROFINET protocol to CANopen protocol, which enables the AC drive to be a slave controlled by the field bus master station.

1.10.2Appearance and Dimensions



Figure 1-32 Appearance of SI-PN card

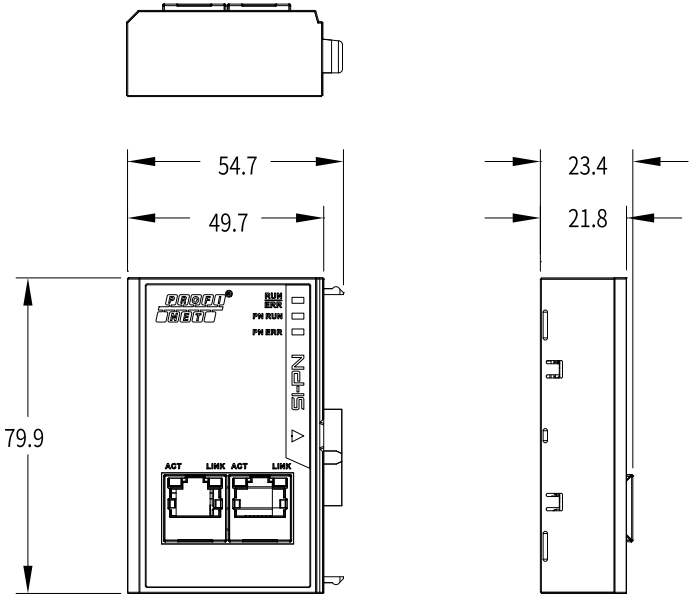


Figure 1-33 Dimensions of SI-PN expansion card

1.10.3Interface Layout and Description

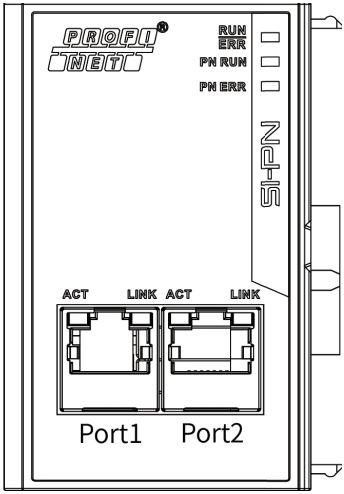


Figure 1-34 Interface layout of SI-PN expansion card

The PROFINET communication expansion card SI-PN is connected to the PROFINET master station using the standard Ethernet RJ45 socket. Its pin signal definitions are the same as those of the standard Ethernet pins. They can be connected using crossover cables or straight-through cables.

Table 1–23 Functions of SI-PN expansion card terminals

Terminal code	Terminal name	Description
Port1	Network port Port1	Connection terminals (Port1 for input and Port2 for output) After installation, Port1 is on the left and Port2 is on the right when facing to the RJ45 interface. The Cat5e shielded twisted pair (STP) network cable is recommended to ensure a stable operation. To improve the anti-interference capability of communication, it is recommended to install it in the expansion card slot 2.
Port2	Network port Port2	

Table 1–24 Indicator description of SI-PN expansion card

Indicator		State description	Solution
RUN/ERR	Green indicator steady ON	Communication normal	N/A
	Red indicator steady ON	PROFINET expansion card and node communication timeout	1. Restart the PROFINET card. 2. Eliminate field interference.
	Red indicator blinking quickly (500 ms)	PROFINET expansion card internal communication timeout	
	Red indicator blinking slowly (1s)	PROFINET expansion card and power supply unit timeout	
PN RUN	Steady ON	PROFINET expansion card communication normal	N/A
PN ERR	Steady ON	Communication with the master station interrupted	Check the wiring.
	Flashing	Flashing request sent by master station	N/A

1.11 MD500-EN1 Ethernet/IP Communication Card

1.11.1Product Introduction

The MD500 series Ethernet/IP communication expansion card (hereinafter referred to as MD500-EN1 card) is an Ethernet/IP fieldbus adapter card and meets international Ethernet/IP bus standards. This card features high efficiency, flexible topology, and easy operation. It is installed in the MD series AC drive to increase the communication efficiency and implement the AC drive networking function, which enables the AC drive to be a slave controlled by the field bus master station.

The MD500-EN1 card software version required in this user guide is 1.00 or above (checked by the parameter U0-67 on the AC drive after the card is installed and powered on). The corresponding EDS file is MD500P_EIP_V1.00.eds. This user guide is applicable only for the MD500-PLUS series AC drive. If you need to use the MD500-EN1 expansion card on other AC drives, contact our technical engineers.

1.11.2Appearance and Dimensions

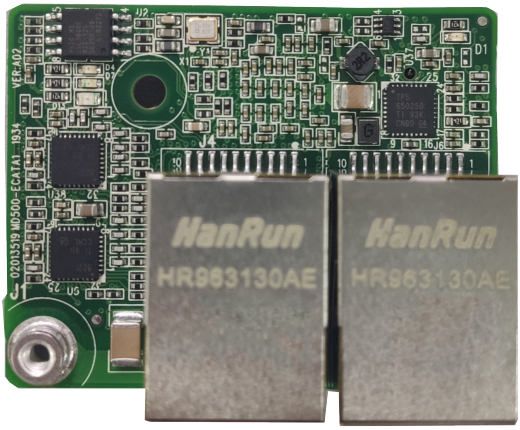


Figure 1-35 Appearance of the MD500-EN1 card

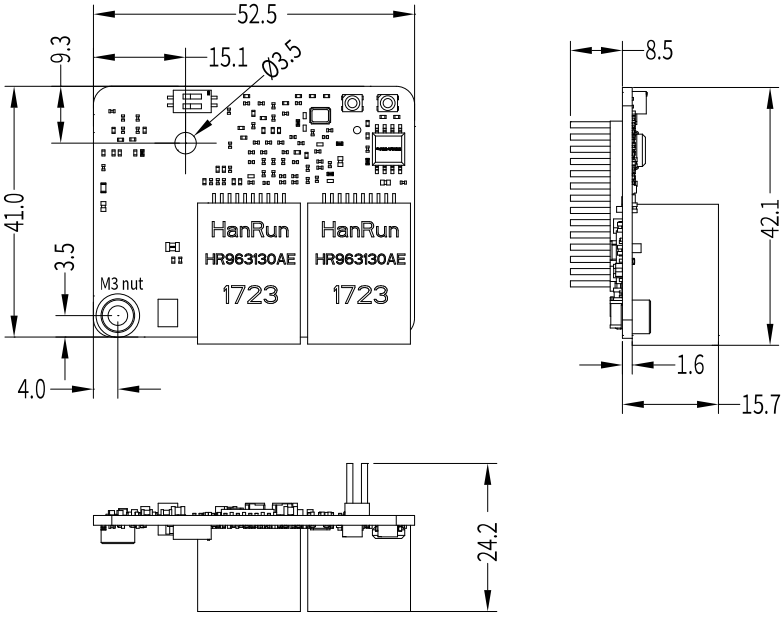


Figure 1-36 Dimensions of M500-EN1 card

1.11.3Interface Layout and Description

The hardware layout of MD500-EN1 card is shown as *"Table 1–25 " on page 50* . The pin header J7 on the back of the MD500-PN1 card is used to connect the AC drive. The MD500-EN1 card provides two network ports J4 and J6 to communicate with the EtherNet/IP master (or other slave). For details about the hardware, see *"Table 1–25 " on page 50*.

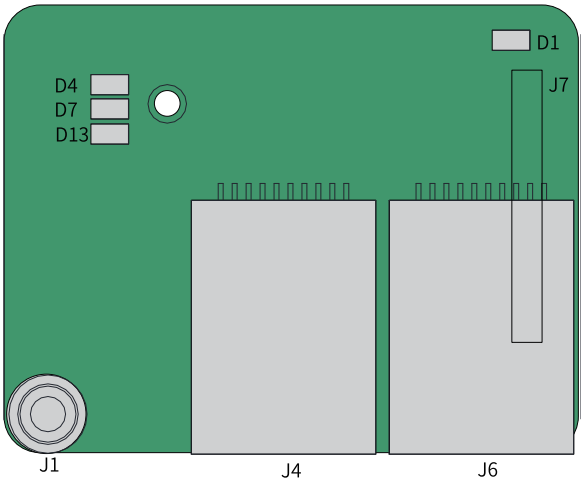


Figure 1-37 Interface layout of MD500-EN1 expansion card

Table 1–25 Interface description of MD500-EN1 expansion card

Symbol	Name	Function
J7	Pin header	Used to connect the AC drive.
J4	Network port	Standard Ethernet RJ45 type socket is used, direction insensitive. They are used for the connection between the MD500-EN1 and EtherNet/IP master station (or other slave stations). Their pin signal definitions are the same as those of the standard Ethernet pins. They can be connected using crossover cables or straight-through cables.
J6		
J1	EMC grounding terminal	Used to connect the EMC ground terminal of the AC drive.

Symbol	Name	Function
D13	Power indicator (green)	Used to indicate the status of the power supply. ON: power-on normal OFF: power-on abnormal (Check whether the card is installed properly.)
D1	AC drive communication status indicator (green)	For details, see *"Table 1–26 Description of indicators on the MD500-EN1" on page 51*
D4	Ethernet/IP operation indicator (green)	
D7	Ethernet/IP fault indicator (red)	

Caution

- After the MD500-PN1 card is installed, J2 is on the left and J3 is on the right when facing the RJ45 interface. These two ports are direction-insensitive. You can connect either one to the near PLC end.
- The Cat5e shielded twisted pair network cable is recommended to ensure stability.

Table 1–26 Description of indicators on the MD500-EN1

Indicator	State description	Solution
D1 steady on in green	Normal	N/A
D1 steady off	Abnormal communication with the AC drive	Check whether FD-00 is 9 and whether FD-01 is 3.
D4 steady off, D7 steady on in red	System fault	Check the AC drive fault codes and the troubleshooting measures.
D4 steady off, D7 flashing in red	Waiting to obtain IP address	The expansion card is in DHCP mode and uses BOOTP and DHCP to assign IP addresses to the device.
D4 flashing in red, D7 flashing in red	Disconnected or connection timeout	Check whether the network cable is connected properly and whether the master station is in operation.
D4 flashing in green, D7 steady off	Waiting to connect to the master station	Confirm whether the network cable is connected normally and whether the master station is running.
D4 steady on in green, D7 steady off	Normal connection	N/A

2 Encoder Expansion Card Information

2.1 MD38PG4 Resolver Encoder Card

2.1.1 Product Introduction

As a resolver PG card, MD38PG4 is a necessary option for closed-loop vector control of the AC drive, with an excitation frequency of 10kHz and a DB9 interface.

2.1.2 Appearance and Dimensions

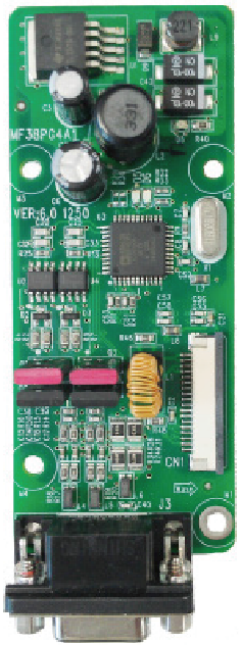


Figure 2-1 Appearance of MD38PG4D expansion card

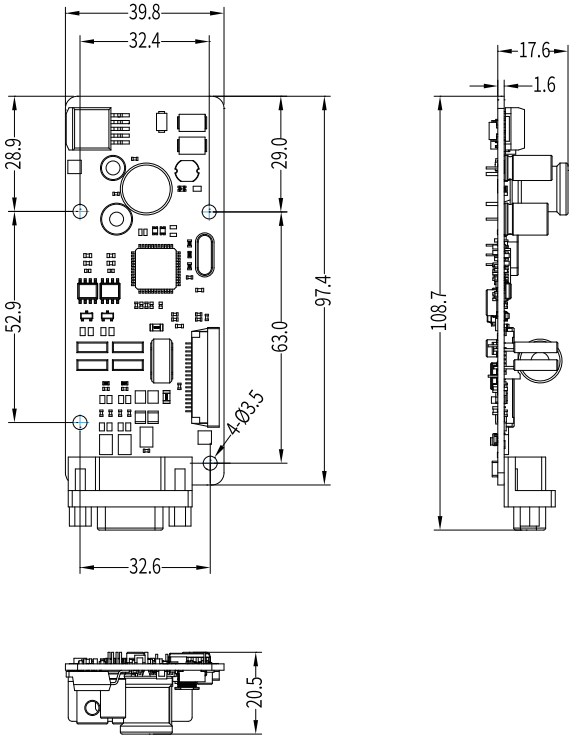


Figure 2-2 Dimensions of MD38PG4D expansion card

2.1.3 Interface Layout and Description

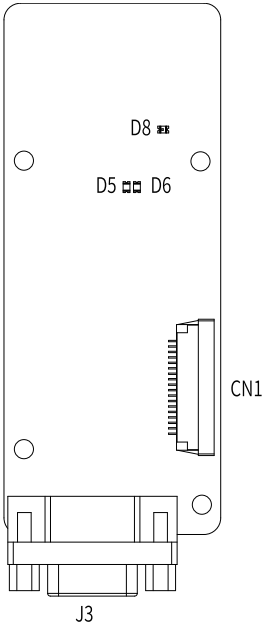


Figure 2-3 Interface layout of MD38PG4D expansion card

Table 2–1 Interface description of MD38PG4D expansion card

Name	Description
CN1	Interface connecting the PG card and the control board of the AC drive
J3	Resolver interface
D5 and D6	Working status indicators
D8	Power indicator

Table 2–2 Pin definition of J3 resolver interface

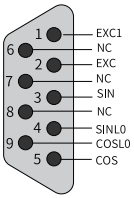
No.	Name	Function	Layout
1	EXC1	Exciting voltage (-)	
2	EXC	Exciting voltage (+)	
3	SIN	Sinusoidal input (+)	
4	SINL0	Sinusoidal input (-)	
5	COS	Cosine input (+)	
6/7/8	NC	-	
9	COSL0	Cosine input (-)	

Table 2–3 Working status indicators

Indicator	State	Function
D5 Indicator of signal amplitude upper limit	OFF	The encoder input signal is normal. The speed feedback does not exceed the upper limit or suffer any interference.
	ON/Flashing	The encoder input signal SIN/COS amplitude exceeds the upper limit. Or the signal feedback is abnormal.
D6 Indicator of signal amplitude lower limit	OFF	The encoder input signal is normal. The speed feedback does not exceed the lower limit or suffer any interference.
	ON/Flashing	The encoder input signal SIN/COS amplitude is too small. Or the signal is disconnected.

Table 2–4 Description of indicator status

D5	D6	Fault state of MD38PG4	Cause and Solution
OFF	OFF	Normal	N/A
ON/Flashing	OFF	Phase-lock loop unlocked	Phase lag of the resolver is very large.
OFF	ON/Flashing	Signal SIN/COS amplitude exceeding the upper limit	D6 flashing is normally caused by interference. Ground the motor well and connect the ground point of the resolver card to PE of the drive.
ON/Flashing	ON/Flashing	Signal SIN/COS amplitude too small	Generally, DB9 is not connected or wrongly connected, or even wire breaks. If the DB9 is connected properly, check whether the resolver model matches MD38PG4.

- The resolver model must fulfill the parameter requirements of MD38PG4, and the DC current resistance input of excitation must be larger than 17 Ω (measured by a multimeter). Otherwise, MD38PG4 cannot work properly.
- It is recommended to select a resolver with a maximum of four pole-pairs. Otherwise, MD38PG4 may be overloaded.
- If PG card feedback speed or position is unstable but the parameter settings are correct, it indicates the PG card suffers electromagnetic interference. In this case, connect the shield of encoder signal lines to the PE of the AC drive to control the electromagnetic interference.

2.2 MD38PG4D Frequency-division Resolver Expansion Card

2.2.1 Product Introduction

MD38PG4D is a PG card specialized for resolvers, which supports differential frequency division function and is suitable for many applications such as motorized spindle, master-slave control and synchronous control of machine tools.

2.2.2 Appearance and Dimensions

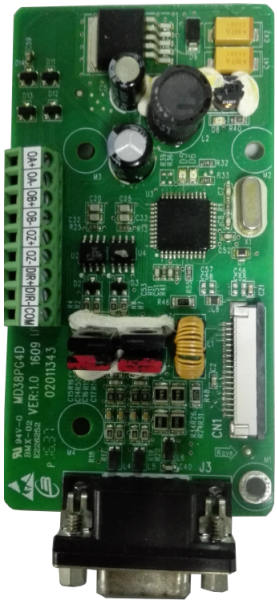


Figure 2-4 Appearance of MD38PG4D expansion card

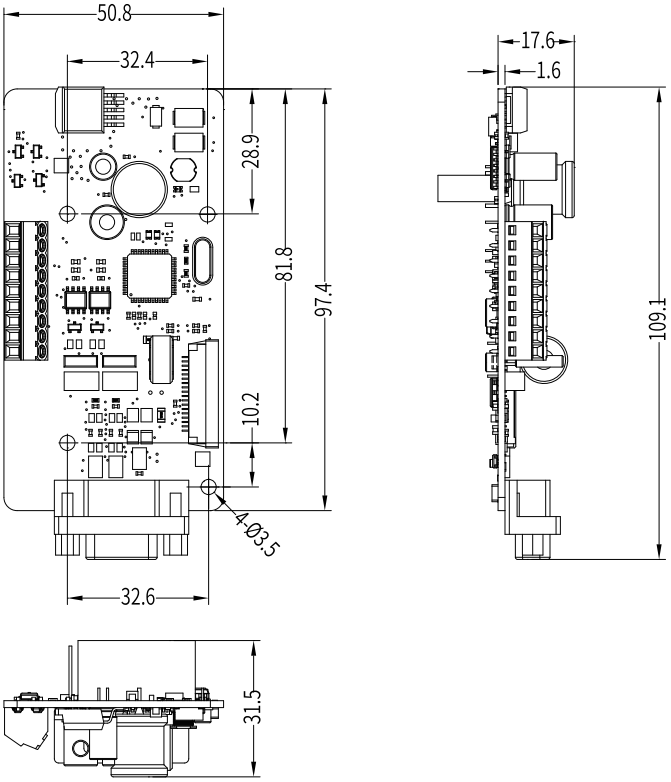


Figure 2-5 Dimensions of MD38PG4D expansion card

2.2.3 Interface Layout and Description

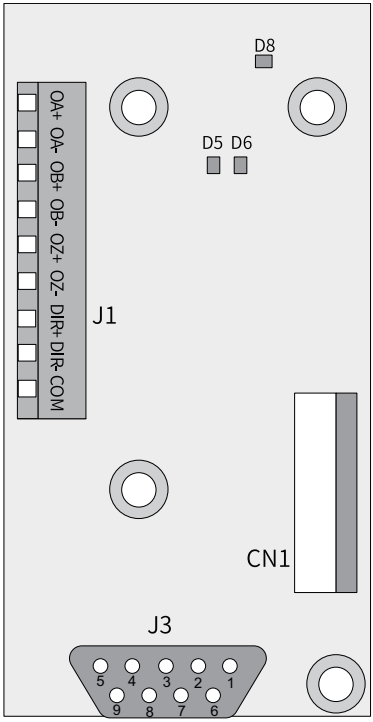


Figure 2-6 Interface layout of MD38PG4D expansion card

Table 2–5 Interface description of MD38PG4D expansion card

Type	Pin No.	Pin name	Function
Frequency division output interface (J1)	1	OA+	Frequency division output signal A (+)
	2	OA-	Frequency division output signal A (-)
	3	OB+	Frequency division output signal B (+)
	4	OB-	Frequency division output signal B (-)
	5	OZ+	Frequency division output signal Z (+)
	6	OZ-	Frequency division output signal Z (-)
	7	DIR+	Frequency division output direction signal (+)
	8	DIR-	Frequency division output direction signal (-)
	9	COM	Frequency division output reference ground
Resolver interface (J3)	1	EXC-	Excitation output signal (-)
	2	EXC+	Excitation output signal (+)
	3	SIN+	Feedback sine signal (+)
	4	SIN-	Feedback sine signal (-)
	5	COS+	Feedback cosine signal (+)
	6	-	Unconnected
	7	-	Unconnected
	8	-	Unconnected
	9	COS-	Feedback cosine signal (-)
Flat cable (CN1)	-	-	Interface connecting the PG card and the control board of the AC drive

Description of Indicators

There are three LED indicators on the PG card. D8 is the power indicator (green) while D5 and D6 are the PG card working status indicators (red). See the following table for the specific meaning of D5 and D6.

D5	D6	PG card working status
OFF	OFF	PG card works properly.
ON/Flashing	OFF	Phase-lock loop is unlocked. Phase lag of the resolver is too large.
OFF	ON/Flashing	Signal SIN/COS amplitude exceeds the upper limit. D6 flashing is normally caused by interference. Ground the motor well and connect the ground point of the resolver card to PE of the drive
ON/Flashing	ON/Flashing	Signal SIN/COS amplitude is too small. This is usually caused by an improperly-connected or disconnected DB9. If the above situation does not occur, it is necessary to check the data of the resolver to see whether the requirements described in the manual are met.

2.3 MD38PGMD Multi-function Encoder Card

2.3.1 Product Introduction

MD38PGMD is a multi-function PG card based on MD38PG1, MD38PG5 and MD38PG6D. It is compatible with differential input, open-collector input, push-pull input, differential output and open-collector output for regular encoders and A/B phase input of the host controller. MD38PGM card with CPLD also has 0 to 63 multi-frequency output, adaptive filtering, automatic interlocking function and encoder disconnection detection function.

2.3.2 Appearance and Dimensions

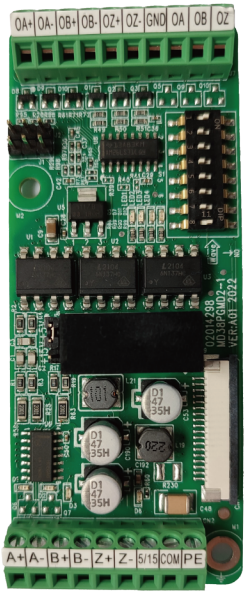


Figure 2-7 Appearance of MD38PGMD expansion card

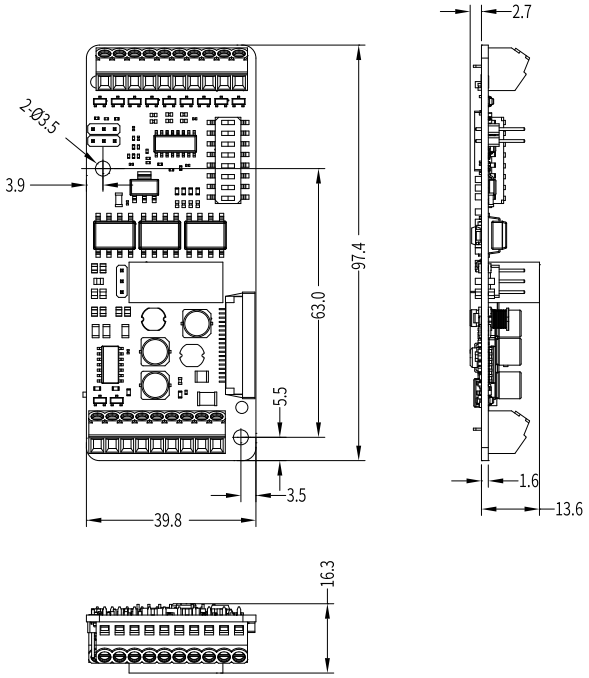


Figure 2-8 Dimensions of MD38PGMD expansion card

2.3.3 Interface Layout and Description

Interface Layout

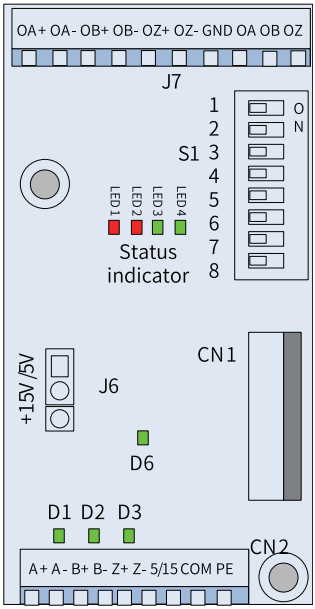


Figure 2-9 Interface layout of MD38PGMD expansion card

Name	Description	Note
CN1	Interface connecting the PG card and the control board of the AC drive	-
CN2	Encoder signal input terminal, supporting differential and collector input;	Refer to “Pin definition of CN2 encoder signal input terminal”
S1	DIP switch used to set the frequency division coefficient and the filtering function.	Only available for MD38PGMD expansion card.
J6	Jumper used to select the encoder power supply (5 V or 15 V output)	Set to 5V by default
J7	Frequency-division terminal: supporting differential and collector frequency-division output	-
LED1/LED2/LED3/ LED4	Status indicator	See the table below for specific meanings. Only available for MD38PGMD expansion card.

Name	Description	Note
D6	Power indicator	-
D1/D2/D3	Encoder input signal indicators: The indicators flash or remain steady on when the encoder has an input signal.	D1 corresponds to A +/A-, D2 corresponds to B +/B-, and D3 corresponds to Z +/Z-.

Interface description

Table 2–6 Pin definition of CN2 encoder signal input terminal

Pin No.	Terminal	Description
1	A+	Encoder output A signal (positive)
2	A-	Encoder output A signal (negative)
3	B+	Encoder output signal B positive
4	B-	Encoder output signal B negative
5	Z+	Encoder output signal Z positive
6	Z-	Encoder output signal Z negative
7	5V/15V	Encoder 5V/15V power supply
8	COM	Encoder power ground
9	PE	Shield connecting terminal

Table 2–7 Pin definition of J7 frequency-division output signal terminal

Pin No.	Terminal	Description
1	OA+	Differential frequency dividing output signal A positive
2	OA-	Differential frequency-division output signal A negative
3	OB+	Differential frequency-division output signal B positive
4	OB-	Differential frequency-division output signal B negative
5	OZ+	Differential frequency-division output signal Z positive
6	OZ-	Encoder output signal Z negative
7	GND	Frequency dividing output reference ground
8	OA	Open-collector frequency dividing output signal A

Pin No.	Terminal	Description
9	OB	Collector frequency-division output signal B
10	OZ	Collector frequency-division output signal Z

DIP switch S1

The DIP switch S1 is used to set the frequency division coefficient and select the filtering function. The code is 1 when the DIP switch is ON. Otherwise the code is 0. For details, refer to the following table.

Frequency-division coefficient	DIP switch								Filtering function
	Switch for setting frequency-division coefficient						Switch for setting filter function		
	1	2	3	4	5	6	7	8	
No output	0	0	0	0	0	0	0	0	Non-adaptive filter
1 frequency-division output	1	0	0	0	0	0			
2 frequency-division output	0	1	0	0	0	0	1	0	Adaptive filter
3 frequency division output	1	1	0	0	0	0			
-	-	-	-	-	-	-	0	1	Fixed interlock
-	-	-	-	-	-	-			

Frequency-division coefficient	DIP switch								Filtering function
	Switch for setting frequency-division coefficient						Switch for setting filter function		
	1	2	3	4	5	6	7	8	
-	-	-	-	-	-	-	1	1	Automatic interlock
63 frequency division output	1	1	1	1	1	1			

Filtering function description:

- Non-adaptive filter: The filter coefficient of the PG card is fixed and small. The PG card is applicable to scenarios with low or no interference, or high-speed applications.
- Adaptive filter: The filter coefficient of the PG card can be adjusted automatically. This filter mode has a strong interference-resistant capability, especially when the encoder feedback frequency is lower than 100 kHz. This mode is suitable for scenarios with high interference. It is the default mode.
- Fixed interlock: On the basis of adaptive filter function, the fixed interlock mode has a new function that can eliminate the jitter of the encoder feedback signal edge. This mode adds the capability to eliminate encoder feedback signal edge jitter on the basis of adaptive filter. It is applicable to scenarios where encoder feedback signals have jitter at the edge.
- Automatic interlock: Besides the function supported in fixed interlock mode, the automatic interlock mode also supports switchover between adaptive filtering and fixed interlock to adapt to zero-speed and non-zero-speed working conditions. This helps ensure no signals are taken as edge jitter and get eliminated in zero-speed condition.

Status indicator

No.	Type	State	Function
LED1	Encoder input signal quality indicator (red when flashing or on)	OFF	The input signal is normal, with stable speed and no interference.
		Steady ON	The input signal is slightly unstable when the motor accelerates or decelerates or when the encoder input signal is slightly interfered with.
		Slow flashing [Note]	The input signal is moderately unstable when the motor accelerates or decelerates or when the encoder input signal is moderately interfered with.
		Flashing quickly	The input signal is seriously unstable when the motor accelerates or decelerates rapidly or when the encoder input signal is seriously interfered with.
LED2	Signal processing quality indicator of PG card (red when flashing or on)	OFF	The PG card signal is normal, with stable speed and no interference.
		Steady ON	The PG card signal is slightly unstable when the motor accelerates or decelerates or when a small amount of interference in the encoder input signal is not filtered out by the PG card (less than 10 interference pulses are not filtered out per unit time).
		Slow blinking	The PG card signal is moderately unstable when the motor accelerates or decelerates or when a certain amount of interference in the encoder input signal is not filtered out by the PG card (less than 30 interference pulses are not filtered out per unit time).
		Flashing quickly	The PG card signal is severely unstable when the motor accelerates or decelerates or when a certain amount of interference in the encoder input signal is not filtered out by the PG card (more than 30 interference pulses are not filtered out per unit time).
LED3	Interlock status indicator (green when flashing or on)	ON	Inter-lock enabled
		OFF	Inter-lock disabled
LED4	System indicator (green when flashing or on)	Steady ON	Normal
		Flashing	The encoder cable breaks.

Note

Slow flash frequency: 2 Hz; Flash frequency: 10 Hz.

3 I/O Expansion Card Information

3.1 IO-M1 Multi-function I/O Expansion Card

3.1.1 Product Introduction

IO-M1 is a multi-function card for MD800 series products, which includes 8 ordinary DIs, 8 ordinary DOs and 2 AIs, and can be flexibly configured as input/output functions of rectifier and inverter units according to requirements.

3.1.2 Appearance and Dimensions



Figure 3-1 Appearance of IO-M1 expansion card

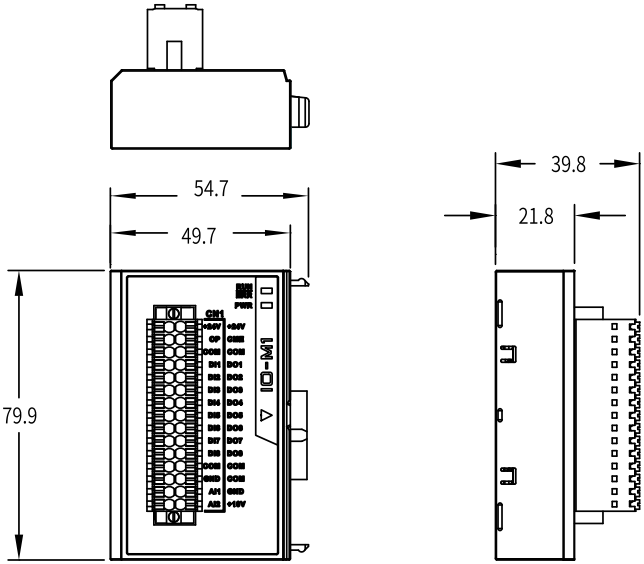


Figure 3-2 Dimensions of IO-M1 expansion card

3.1.3 Interface Layout and Description

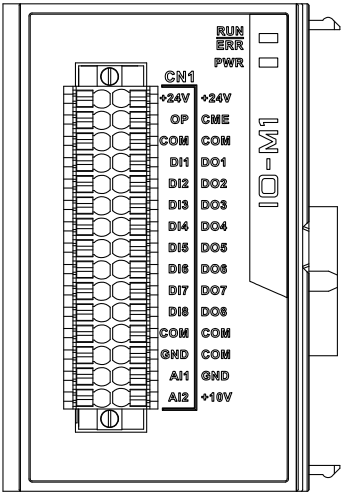


Figure 3-3 Terminal arrangement of the multi-functional card (IO-M1)

Table 3–1 Terminal functions of the multi-functional card (IO-M1)

Terminal Code	Terminal Function	Terminal Type	Specifications
+24V	24V power supply	-	24V±10%, maximum: 100 mA
OP	Common terminal for multi-functional input terminal	-	-
CME	Multi-functional output common terminal	-	-
COM	-	-	-
DI1	Digital input (DI) terminal 1	Digital input	DI1 to DI8 are ordinary DIs whose response time is 10 ms. They do no support for high-speed pulse input. Their input frequency is lower than 100 Hz. Photocoupler isolation is supported and they are compatible with bipolar input. Input impedance: 3.3 kΩ Effective level input voltage range: 15V to 30 V
DI2	DI terminal 2		
DI3	DI terminal 3		
DI4	DI terminal 4		
DI5	DI terminal 5		
DI6	DI terminal 6		
DI7	DI terminal 7		
DI8	DI terminal 8		
DO1	Digital output (DO) terminal 1	Digital output	DO1 to DO8 are ordinary isolated sink/source output terminals, which cannot be directly connected to the power supply. A pull-up resistor is required for connecting them to the power supply and the impedance is determined by the load requirements. The maximum output capacity is 24 VDC/50 mA.
DO2	DO terminal 2		
DO3	DO terminal 3		
DO4	DO terminal 4		
DO5	DO terminal 5		
DO6	DO terminal 6		
DO7	DO terminal 7		
DO8	DO terminal 8		
AI1	AI terminal 1	Analog input	Set as voltage input, current input, or temperature input through parameters. When used as voltage/current input, AI1 and AI2 support -10 V to +10 V/0 to 20 mA. Their resolution is 12-bit, correction accuracy is 0.3%, and input impedance is 22 kΩ for voltage input and 500 Ω for current input. Temperature detection for PT100, PT1000, KTY-84-130, and PTC-130 is available.
AI2	AI terminal 2		

Terminal Code	Terminal Function	Terminal Type	Specifications
+10V	10V power supply	10V power supply	10V±10%, maximum: 10mA
GND	Analog ground	Analog ground	

Table 3–2 Indicators of the multi-functional card (IO-M1)

Indicator		State description	Solution
RUN/ERR	Green indicator steady ON	Normal operational state	N/A
	Green indicator blinking	The expansion card is in initialization state.	N/A
	Green indicator OFF	Waiting for initialization of the power supply unit	N/A
	Red indicator steady ON	Hardware fault	Replace the expansion card.
	Red indicator blinking	Data frame loss or communication disconnection with the power supply unit or drive unit	1. Check the hardware connection. 2. Check whether the power supply unit or drive unit is normal. 3. If the hardware connection, power supply unit, and drive unit are normal, replace the expansion card.
	Red and green indicators blinking alternatively	Internal communication bus in the BUSOFF state, and communication restart in progress	Replace the expansion card if the state is not recovered.
PWR	Yellow indicator steady ON	Power normal	N/A
	Yellow indicator OFF	Power supply abnormal	Replace the expansion card.

3.2 IO-R1 Single-contact Relay Output Card

3.2.1 Product Introduction

IO-R2 is a relay expansion card 1 of MD800 series products, which contains 8 relay expansion resources with normally open functions, and can be flexibly configured as relay output functions of rectifier and inverter units according to requirements.

3.2.2 Appearance and Dimensions



Figure 3-4 Appearance of IO-R1 expansion card

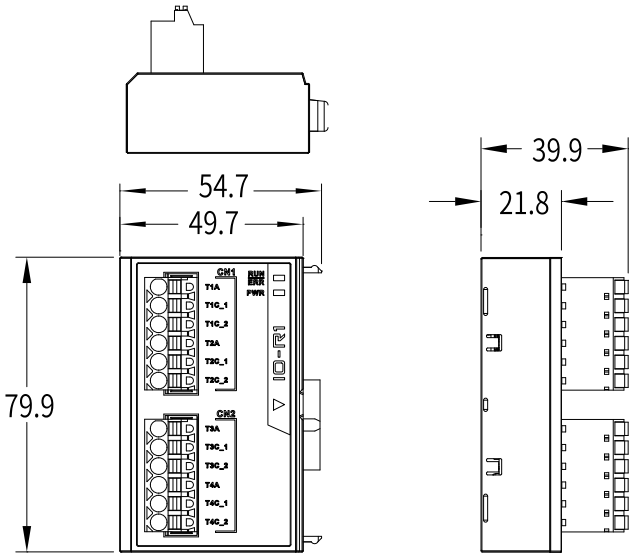


Figure 3-5 Dimensions of IO-R1 expansion card

3.2.3 Interface Layout and Description

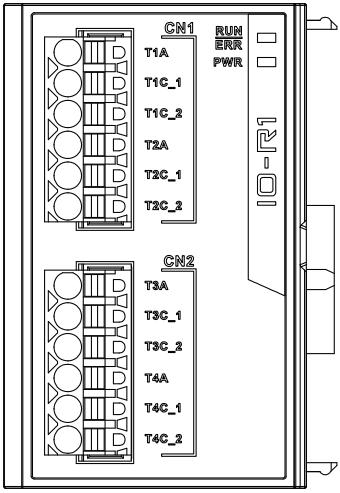


Figure 3-6 Terminal arrangement of the single-contact relay output card (IO-R1)

Table 3–3 Terminal functions of the single-contact relay output card (IO-R1)

Type	Label	Function	Specifications
CN1	T1A	Common terminal 1	TA-TC: NO Contact capacity: 30 VDC/3 A 250 VAC/3 A (Cosϕ = 0.4)
	T1C_1	NO terminal 1_1	
	T1C_2	NO terminal 1_2	
	T2A	Common terminal 2	
	T2C_1	NO terminal 2_1	
	T2C_2	NO terminal 2_2	
CN2	T3A	Common terminal 3	
	T3C_1	NO terminal 3_1	
	T3C_2	NO terminal 3_2	
	T4A	Common terminal 4	
	T4C_1	NO terminal 4_1	
	T4C_2	NO terminal 4_2	

Table 3–4 Indicators of the single-contact relay output card (IO-R1)

Indicator		State description	Solution
RUN/ERR	Green indicator steady ON	Normal operational state	N/A
	Green indicator blinking	The expansion card is in initialization state.	N/A
	Green indicator OFF	Waiting for initialization of the power supply unit	N/A
	Red indicator steady ON	Hardware fault	Replace the expansion card.
	Red indicator blinking	Data frame loss or communication disconnection with the power supply unit or drive unit	1. Check the hardware connection. 2. Check whether the power supply unit or drive unit is normal. 3. If the hardware connection, power supply unit, and drive unit are normal, replace the expansion card.
	Red and green indicators blinking alternatively	Internal communication bus in the BUSOFF state, and communication restart in progress	Replace the expansion card if the state is not recovered.
PWR	Yellow indicator steady ON	Power normal	N/A
	Yellow indicator OFF	Power supply abnormal	Replace the expansion card.

3.3 IO-R2 Dual-contact Relay Output Card

3.3.1 Product Introduction

IO-R2 is a relay expansion card 2 of MD800 series products, which contains four relay expansion resources with normally open and normally closed functions, and can be flexibly configured as relay output functions of rectifier and inverter units according to requirements.

3.3.2 Appearance and Dimensions



Figure 3-7 Appearance of IO-R2 expansion card

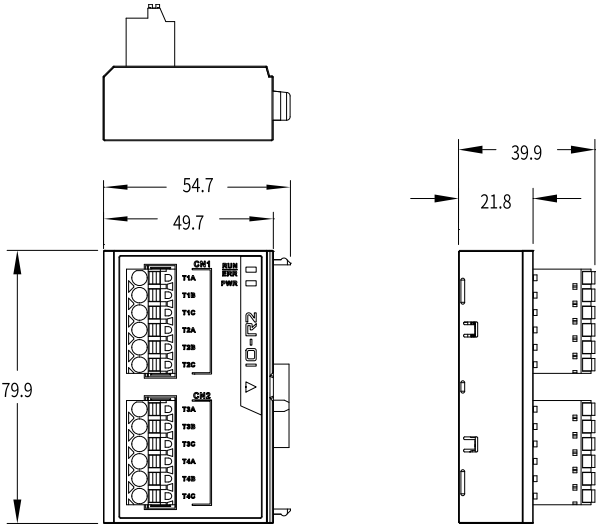


Figure 3-8 Dimensions of IO-R2 expansion card

3.3.3 Interface Layout and Description

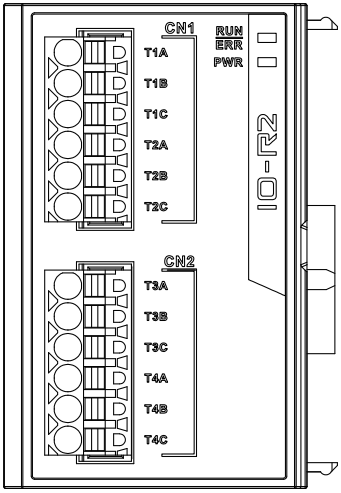


Figure 3-9 Terminal arrangement of the dual-contact relay output card (IO-R2)

Table 3–5 Terminal functions of the dual-contact relay output card (IO-R2)

Type	Label	Function	Specifications
CN1	T1A	Common terminal 1	TA-TB: NC TA-TC: NO Contact capacity: 30 VDC/3 A 250 VAC/3 A (Cosϕ = 0.4)
	T1B	NC terminal 1	
	T1C	NO terminal 1	
	T2A	Common terminal 2	
	T2B	NC terminal 2	
	T2C	NO terminal 2	
CN2	T3A	Common terminal 3	
	T3B	NC terminal 3	
	T3C	NO terminal 3	
	T4A	Common terminal 4	
	T4B	NC terminal 4	
	T4C	NO terminal 4	

Table 3–6 Indicators of the dual-contact relay output card (IO-R2)

Indicator		State description	Solution
RUN/ERR	Green indicator steady ON	Normal operational state	N/A
	Green indicator blinking	The expansion card is in initialization state.	N/A
	Green indicator OFF	Waiting for initialization of the power supply unit	N/A
	Red indicator steady ON	Hardware fault	Replace the expansion card.
	Red indicator blinking	Data frame loss or communication disconnection with the power supply unit or drive unit	1. Check the hardware connection. 2. Check whether the power supply unit or drive unit is normal. 3. If the hardware connection, power supply unit, and drive unit are normal, replace the expansion card.
	Red and green indicators blinking alternatively	Internal communication bus in the BUSOFF state, and communication restart in progress	Replace the expansion card if the state is not recovered.
PWR	Yellow indicator steady ON	Power normal	N/A
	Yellow indicator OFF	Power supply abnormal	Replace the expansion card.

3.4 MD38IO1 Multi-function I/O Expansion Card

3.4.1 Product Introduction

MD38IO1 is a multi-function I/O expansion card. It is equipped with five digital input (DI) terminals, an analog input (AI) terminal, a relay output terminal, a digital output (DO) terminal and an analog output (AO) terminal. It also has the RS485 communication interface and CAN communication interface for fieldbus control.

3.4.2 Appearance and Dimensions

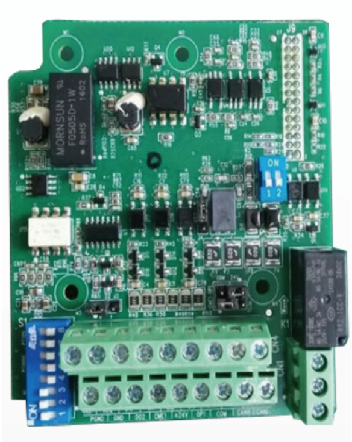


Figure 3-10 Appearance of MD38IO1 expansion card

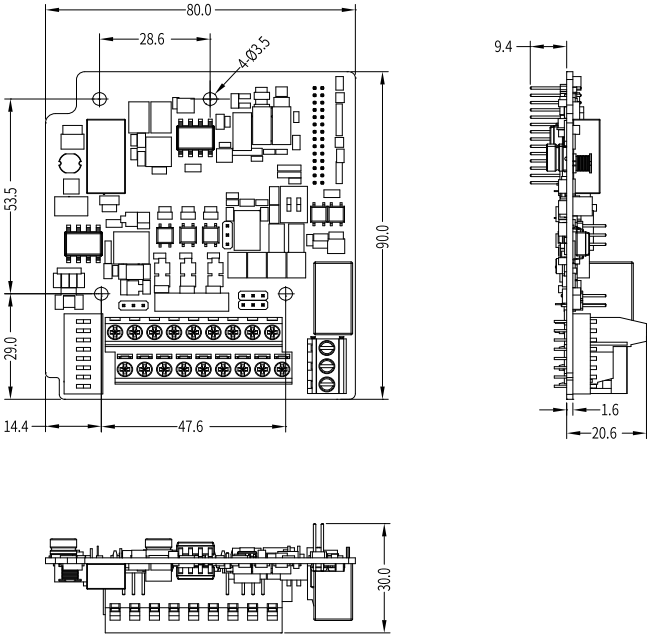


Figure 3-11 Dimensions of MD38IO1 expansion card

3.4.3 Interface Layout and Description

MD38IO1 is a multifunctional I/O expansion card designed for Inovance AC drives. It has five digital input (DI) terminals, an analog input (AI) terminal, a relay output terminal, a digital output (DO) terminal and an analog output (AO) terminal. It also has the RS485 communication interface and CAN communication interface for Fieldbus control.

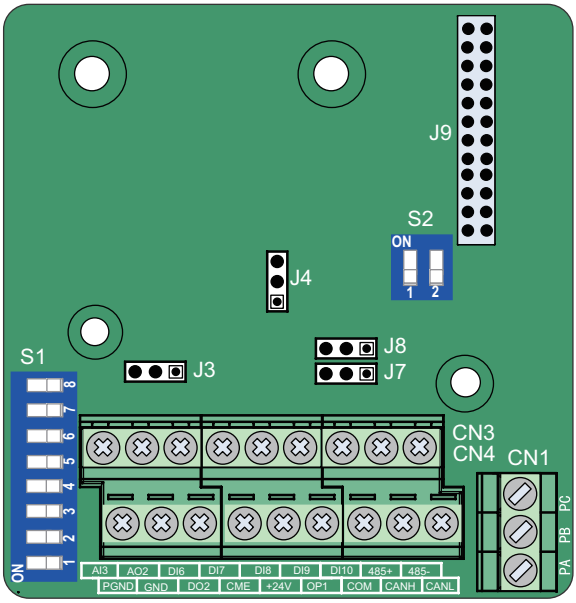
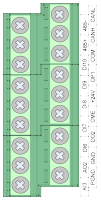
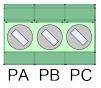


Figure 3-12 Interface layout of MD38IO1 expansion card

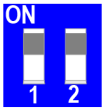
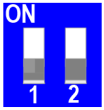
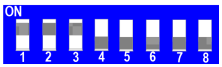
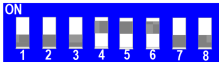
Table 3–7 Interface description of MD38IO1 expansion card

Terminal		Name	Function	Layout
CN4	+24V/COM	External 24 VDC power supply	Provides +24 V power supply to an external unit. It is generally used to supply power to the DI/DO terminals and external sensors, with the maximum output current 200 mA.	
	OP1	Digital input power terminal	OP1 and "+24V" are connected by the jumper J8 before delivery. When applying an external power supply, remove the jumper J8 and connect the OP1 to the external power supply.	
	DO2-CME	Digital output 2	1. Optical coupling isolation, compatible with dual polarity input 2. Output voltage range: 0 to 24 V 3. Output current range: 0 to 50 mA Note that CME1 and COM are internally insulated, but are shorted by jumper J7 internally. Remove the jumper if you need to apply an external power to DO2.	
	CANH/CANL/COM	Communication terminal	CANlink communication input terminal, isolated input	
CN3	AI3-PGND	Analog input 3	1. Optocoupler isolated input, differential voltage input and temperature detection resistor input 2. Input voltage range: DC-10V ~ 10V 3. PTC100, PT1000 temperature sensor 4. Dip switch S1 is used to determine input mode. Do not use multiple functions at the same time.	
	AO2-GND	Analog output 2	1. Output voltage amount: 0 to 10 V 2. Output current amount: 0 to 20 mA 3. Output current with resistance range: 0 to 500 Ω	
	DI6-OP1 to DI10-OP1	5 DIs	1. Optocoupler isolation, with bipolar input supported 2. Input impedance: 2.4 kΩ 3. Voltage range for level input: 9 to 30V	
	485+/485-/COM	Communication terminal	Modbus-RTU communication input and output terminal, isolated input	
CN1	PA-PB	Normally closed terminal	Contact driving capacity: 250 VAC, 3 A, Cos Φ = 0.4 PA-PC normally-open terminal DC 30V, 1A	
	PA-PC	Normally open terminal		

Note

- The RS485 communication terminals 485+/485-/COM and CANlink communication terminal of MD38IO1 are independent from CANH/CANL/COM and can be used at the same time.

Table 3–8 Jumper descriptions of MD38IO1 expansion card

Terminal	Name	Function	Jumper/DIP switch position
J3	AO2 output type setting jumper	Voltage type: 0 to 10 V	
		Current type: 0 to 20 mA	
J4	CAN termination resistor setting jumper	Matching the termination resistor	
		Not matching the termination resistor	
S2	Selection of C485 termination resistor	1 and 2 set to ON: matching terminal resistor	
		1 and 2 set to OFF: not matching the termination resistor	
S1	Function selection of AI, PT100 and PT1000	AI3: Switches 1, 2, and 3 set to ON	
		PT1000: Switches 4, 5, and 6 set to ON	
		PT100: Switches 6, 7, and 8 set to ON	

Note

- The jumper setting is based on the top view with main terminal block at the bottom, which is subject to the jumpers silk-screened on the board.
- When using CANlink or Modbus protocol for communication, match terminal resistor to the end AC drives by setting jumpers J4 or S2. The J4 or S2 of the middle AC drives must keep default state. If the jumper setting is incorrect, instable communication or communication failure will be caused and Err16 or Err55 will be detected.

3.5 MD38IO2 Mini I/O Expansion Card

3.5.1 Product Introduction

The MD38IO2 expansion card, which provides three DIs, is the simplified version of a multi-function I/O expansion card (MD38IO1).

3.5.2 Appearance and Dimensions

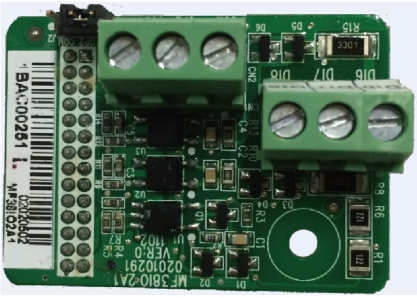


Figure 3-13 Appearance of MD30IO2 expansion card

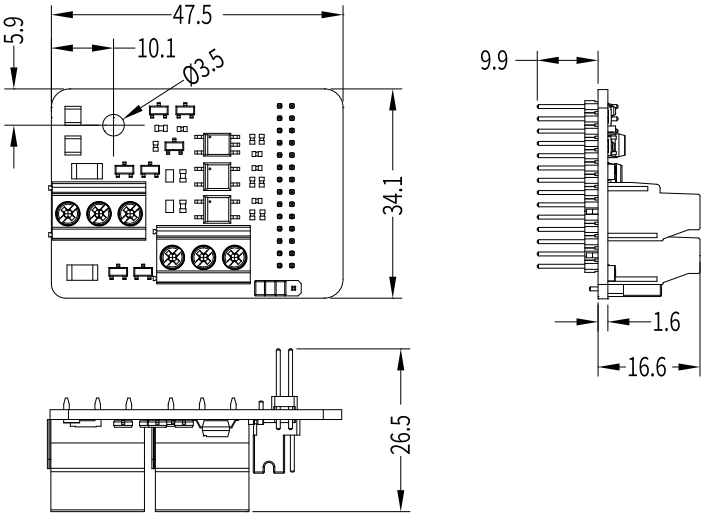


Figure 3-14 Dimensions of MD30IO2 expansion card

3.5.3 Interface Layout and Description

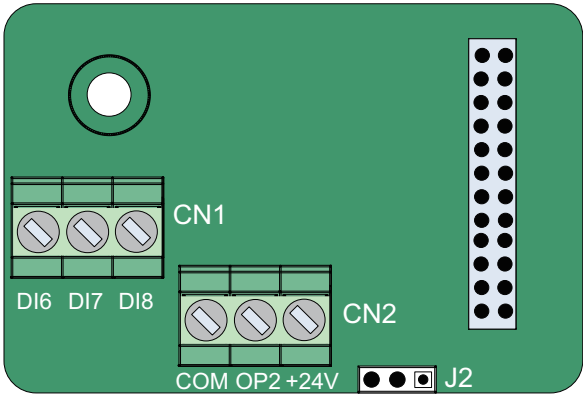


Figure 3-15 Interface layout of MD30IO2 expansion card

Table 3–9 Function descriptions of MD38IO2 terminals

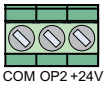
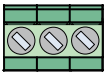
Terminal		Name	Function	Layout
CN2	+24V/ COM	External 24 VDC power supply	Provides +24 V power supply to an external unit. It is generally used to supply power to the DI/DO terminals and external sensors, with the maximum output current 200 mA.	 COM OP2 +24V
	OP2	Digital input power terminal	It is not connected to power supply by default. It can be connected either to external power or +24V according to the actual need.	
CN1	DI6-OP2 to DI8-OP2	3 DIs	1. Optical coupling isolation, compatible with dual polarity input 2. Input impedance: 3.3 kΩ for DI6 and DI7, 2.4 kΩ for DI8 3. Voltage range for level input: 9V to 30V 4. DI6, DI7 and DI8 are common input terminals, with input frequency less than 100Hz.	 DI6 DI7 DI8

Table 3–10 Jumper descriptions of MD38IO2 expansion card

Terminal	Name	Function	Jumper/DIP switch position
J2	DI terminal connecting mode setting jumper	If DI is connected in SINK mode, OP2 is connected to 24V.	
		If DI is connected in SOURCE mode, OP2 is connected to COM.	

Note

- The jumper setting is based on the top view with main terminal block at the bottom, which is subject to the jumpers silk-screened on the board.

3.6 MD38IO3 I/O Expansion Card 3

3.6.1 Product Introduction

MD38IO3 is a multi-function I/O expansion card, which can extends three DIs, one RS485 communication signal isolation input, and one NO relay output.

3.6.2 Appearance and Dimensions

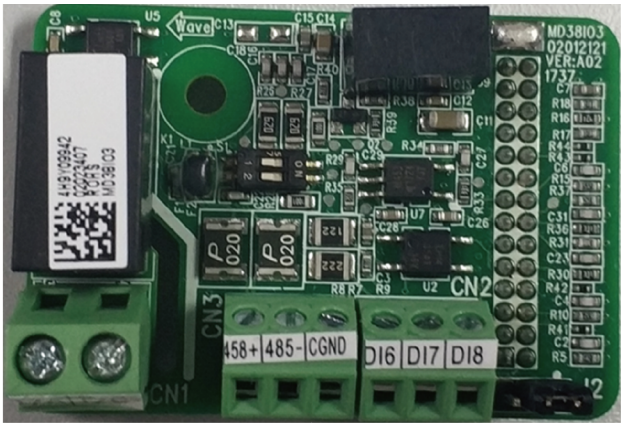


Figure 3-16 Appearance of MD38IO3 expansion card

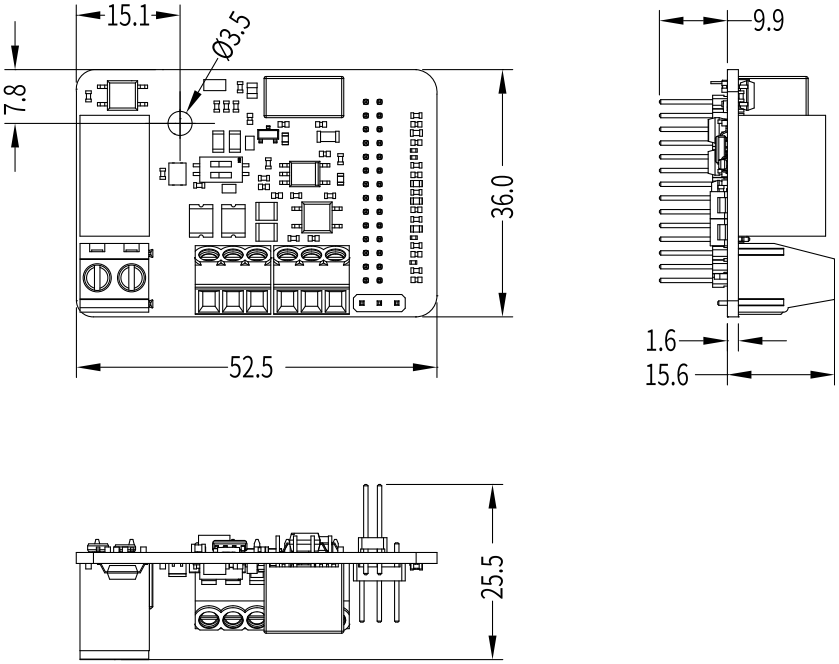


Figure 3-17 Dimensions of MD38IO3 expansion card

3.6.3 Interface Layout and Description

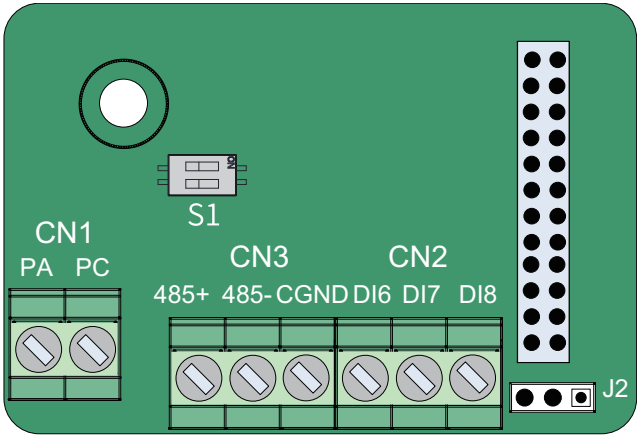


Figure 3-18 Interface layout of MD38IO3 expansion card

Table 3–11 Function descriptions of MD38IO3 terminals

Terminal code		Name	Function	Diagram
CN3	485+	RS485 positive communication signal	Modbus protocol supported, isolated input	CN3 485+ 485- CGND
	485-	RS485 negative communication signal		
	CGND	RS485 communication signal ground		
CN2	DI6 to DI8	3 DIs	1. Photocoupler isolation, with bipolar input supported; max. input frequency the ratio: 100 Hz 2. Input impedance: 3.4 kΩ 3. Voltage range for level input: 9 to 24 V	CN2 DI6 DI7 DI8

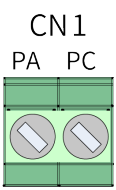
Terminal code		Name	Function	Diagram
CN1	PA-PC	Normally open terminal	Contact driving capacity: 250 VAC/5 A 30 VDC/5 A	
S1	Selection of C485 termination resistor	2-pin DIP switch	1 and 2 set to ON: matching termination resistor; 1 and 2 set to OFF: Not matching the termination resistor.	

Table 3–12 Jumper descriptions of MD38IO3 expansion card

Terminal code	Name	Function	Jumper/DIP switch position
J2	DI terminal connecting mode setting jumper	If DI connected in SINK mode, OP connected to 24V	
		If DI connected in SOURCE mode, OP connected to COM	

Note

The jumper setting is based on the top view with main terminal block at the bottom, which is subject to the jumpers silk-screened on the board.

4 MD38PC1 User Programmable Card

4.1 Product Introduction

MD38PC1 programmable card is an expansion card that integrates programmable controller PLC functions. Users can install the expansion card on the AC drive, and program freely to achieve the required control and driving characteristics. The card is seamlessly connected with the AC drive in logic design, which can make the PLC programming control the AC drive simpler and faster. Compared with the independent combination of PLC and AC drive, the PLC card has more performance advantages. The PLC card supports up to 8K user program space, which greatly meets the technological requirements of users.

4.2 Appearance and Dimensions

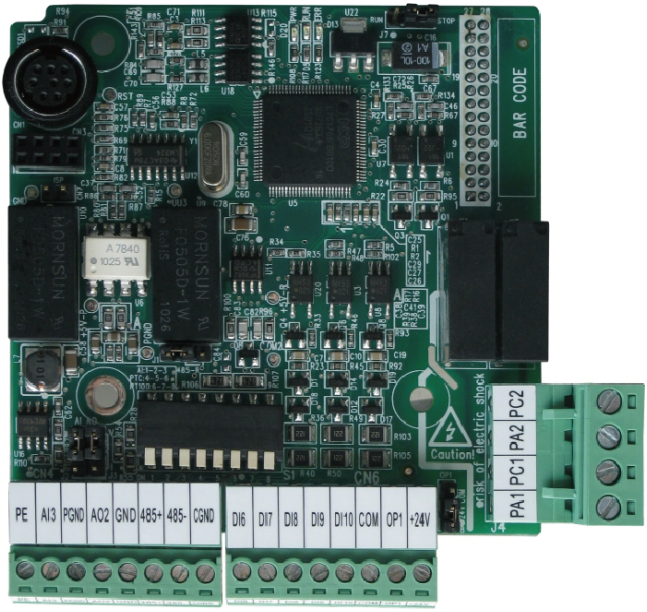


Figure 4-1 Appearance of MD38PC1 expansion card

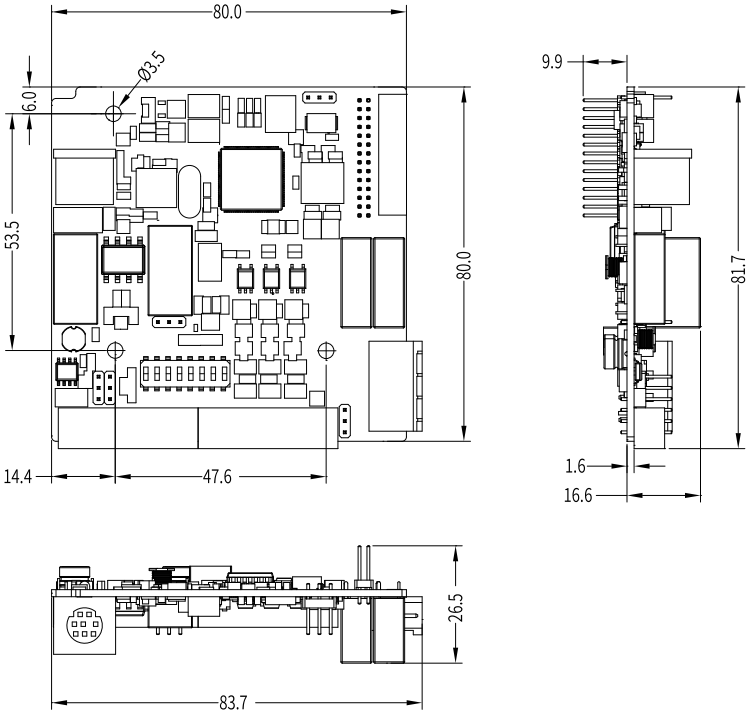


Figure 4-2 Dimensions of MD38PC1 expansion card

4.3 Interface Layout and Description

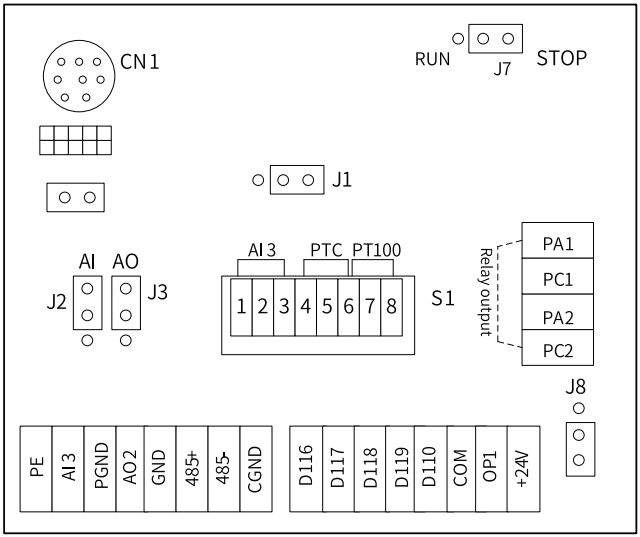


Figure 4-3 Interface layout of MD38PC1 expansion card

Table 4–1 Function descriptions of MD38PC1 control terminals

Type	Terminal code	Name	Function
Power supply	+24V-COM	+24V external power supply	Provides +24 V power supply to an external unit. It is generally used to supply power to the DI/DO terminals and external sensors, with the maximum output current 200 mA.
	OP1	Digital input power terminal	OP1 and "+24V" are connected by the jumper J8 before delivery. When applying an external power supply, remove the jumper J8 and connect the OP1 to the external power supply.
Analog input	AI3-PGND	Analog input 3	1. Optocoupler isolated input, differential voltage input, current input, temperature detection resistor input 2. Input voltage range: DC-10V ~ 10V 3. Input current range: DC-20mA ~ 20mA 4. PTC, PT100 temperature sensor 5. Dip switch S1 is used to determine input mode. Do not use multiple functions at the same time.

Type	Terminal code	Name	Function
Input terminal	DI6-OP1	Digital input 6	1. Photocoupler isolation, compatible with dual-polarity input 2. Input impedance: 2.4 kΩ Voltage range for inputs: 9 to 30 V
Input terminal	DI7-OP1	Digital input 7	
	DI8-OP1	Digital input 8	
	DI9-OP1	Digital input 9	
	DI10-OP1	Digital input 10	
Analog Output	AO2-GND	Analog output 2	1. Output voltage amount: 0 to 10 V 2. Output current amount: 0 mV to 20 mV
Relay output (RELAY x 2)	PA1- PC1	Relay 1 normally-open terminal	Contact driving capacity: 250 VAC, 3 A, COSø = 0.4 DC 30V, 1A
	PA2- PC2	Relay 2 normally-open terminal	
RS485 communication	485+/485-	RS485 communication terminal	Input/Output signal terminal of Modbus-RTU protocol, GND isolated input
	GND	RS485 communication isolated power ground	
RS422	CN1	User program download	User program download port (9-pin Mini port)

Table 4–2 Jumper descriptions of MD38PC1 expansion card

Jumper	Description
J2	AI3 input selection - voltage and current
J3	AO2 output selection - voltage and current
J1	Selection of RS485 termination resistor
J7	Run/Stop selection
J8	OP1 connecting mode selection
S1	AI, PT100 and PTC function selection (Do not select multiple functions at the same time.)

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