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mod. IO-CB

M.I. IOD-CB-3/19.03
Cod.: ISTR-MI-S2-CBDIG-ENG

Installation Manual

Contents

CANopen Digital I/O Modules

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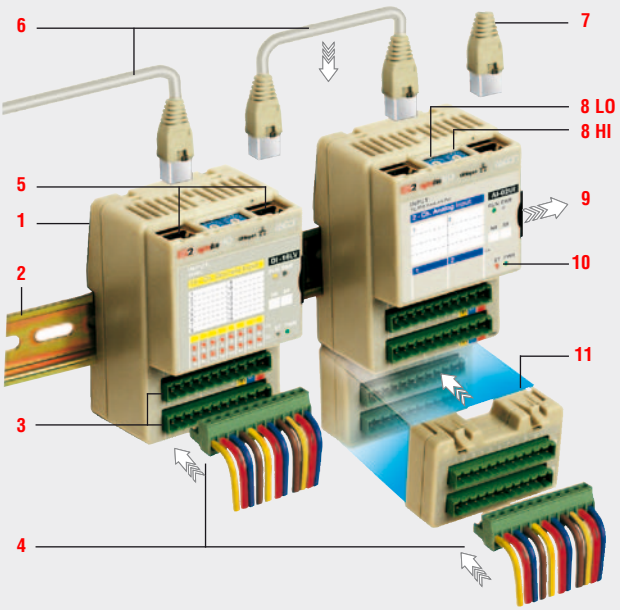
IO-CB/DO-16TS: 16 Isolated Digital Outputs
IO-CB/DO-32TS: 32 Isolated Digital Outputs

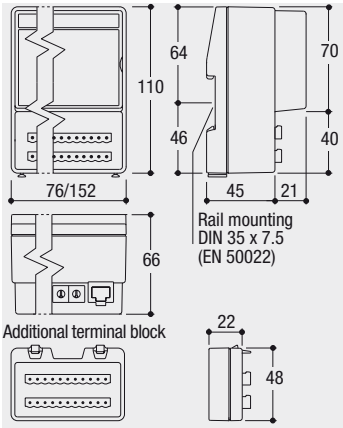
General description



1 - Model identification label (on the back side of the module)
2 - DIN RAIL 35 x 7.5 (EN50022)
3 - 2 male 11 pole plugs, pitch 5.0mm
4 - 2 + 2 female, 11 pole, fast snap-ON connectors, pitch 5.0mm, with screw or spring terminals to connect the power supply or the I/O (accessory)
5 - Two RJ45 plugs to connect the fieldbus
6 - CANopen cable with two RJ45 connectors (accessory)
7 - RJ45 plugs with internal termination circuitry (accessory)
8 - 2 rotary switches having 16 positions to set Node ID and Baud rate
9 - Removable and writable label to identify the connected I/O (TAG number)
10 - 4 status LEDs: identify the diagnostic and the module status
11 - Additional terminal block 2 x 11 poles (accessory)

Installation

Dimensions (mm)



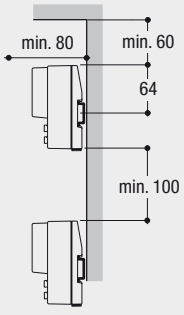
Operating conditions

Environmental condition		Suggestion
Operating conditions	Temperature -10... +65°C	
	Rh 5... 95% non condensing	
Special conditions	Temperature > 65°C	Use forced ventilation
	Conducting atmosphere	Warm up
	Corrosive atmosphere	Use filter
Forbidden conditions	Corrosive atmosphere	
	Explosive atmosphere	

Mounting position

- Mount the module vertically
- In order to help the ventilation flow of air, respect the distances between modules and walls or other modules.

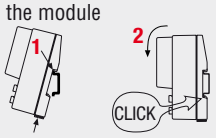
Mounting position (mm)



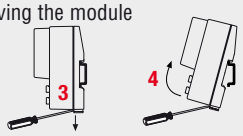
Mounting/removing the modules on/from the DIN rail

1 Close the spring slide, then clip the upper part of the module on the rail
2 Rotate the module downwards till to the click
3 Switch OFF the Power Supply
Lower the spring slide by inserting a flat-blade screwdriver as indicated
4 Turn and lift the module upwards.

Mounting the module



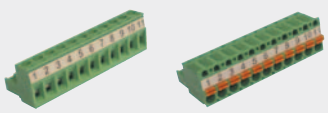
Removing the module



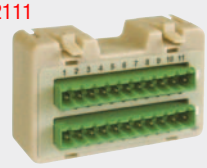
Accessories

Power supply 24 Vdc
APS2ALNDR75-24 - 75 W 3.5 A
APS2ALEDR12024 - 120 W 5 A
APS2ALNDR240-24 - 240 W 10 A

11 poles connectors
With screw terminals: APS2SPINAV11
With spring terminals: APS2SPINAM11



Additional terminal block
APS2TB2111



Field bus cables with RJ45 connectors
140 mm: APS2LOCALBUS76
220 mm: APS2LOCALBUS152
500 mm: APS2LOCALBUS500

Connector with termination circuitry
APS2TERMCAN

CAN connection

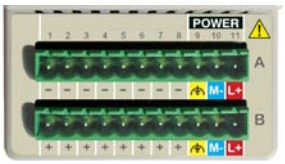
1 Install the modules on the DIN rail (max. 60, up to 127 with repeaters);
2 Connect the modules mounted side by side using the standard cables (140/220mm);
3 Connect the remote modules using a cable having the proper length (see the "***Bit rate***" paragraph);
4 Terminate the two ends of the CAN network using the connectors with the termination circuitry.

⚠ To substitute a broken module, see the "***Hot swapping the modules***" paragraph at the end of this manual.

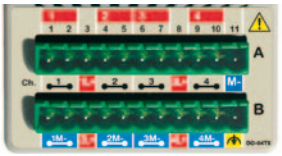
Electrical connections

Terminals connections and plugs

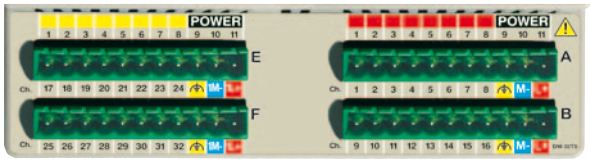
DI-16LV



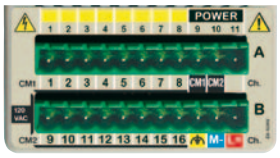
DO-04TX



DM-32TS



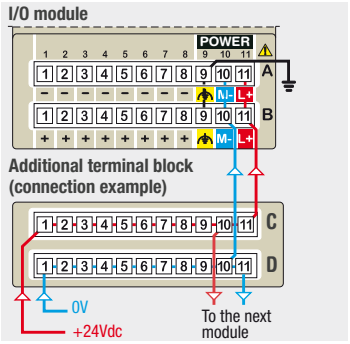
DI-16HV



Description		Terminals	CANopen
Flexible cable section:		0.2...2.5 mm² AWG24... AWG12	CAT 5 UTP, 8 x AWG24
	Stripped wire	Screw: 7mm; Spring: 10 mm	RJ45 mounting tool
	Flat blade screwdriver	0.6 x 3.5 mm	
	Tightening torque	0.5...0.6 Nm	

Technical data:
- Two/Four 11 poles plugs, pitch 5.0 mm
- Made with self extinguishing material as required by UL94 V0 standard
- Overvoltage cathegory/pollution degree II/2
- Max. load current/section 8A/2.5mm² at 65°C
- Test pulse voltage: 4 kVp.

Additional terminal block APS2TB2111 (1st connection example)

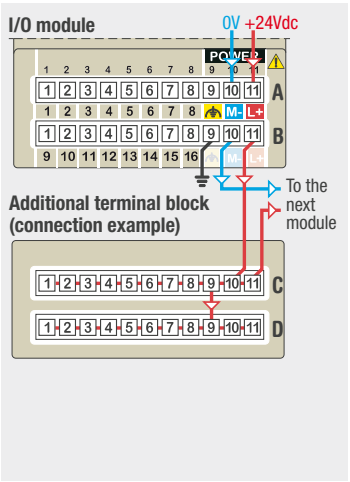


An additional terminal block can be installed on the I/O module using the two slides located in the lower part of the module case (item 11 in "General description" paragraph).

The additional terminal block has no active components inside, only two 11 contacts connectors.

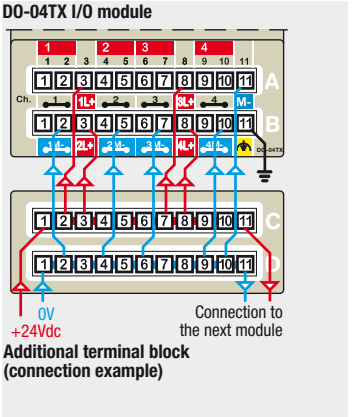
All the 11 contacts of each connector (C and D) are internally connected and can be used to make multiple connections (see the example).

Additional terminal block APS2TB2111 (2nd connection example)



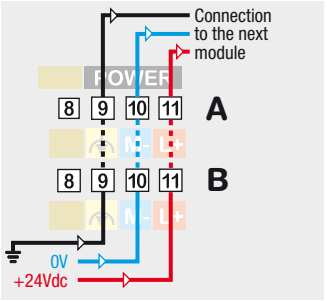
Terminals of connectors C and D are connected to +24Vdc in order to power the I/O external devices

Additional terminal block APS2TB2111 (DO-32TX connections)



Terminals of connectors C and D are connected to +24Vdc in order to power the different sections of the DO-04TX I/O module

Power supply (except DO-04TX)



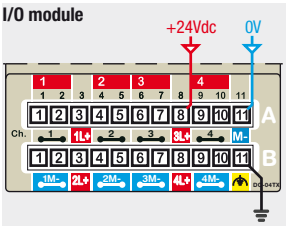
- 24Vdc (–15... +25%), 2.5W max.
- The power supply terminals A9 - B9, A10 - B10, A11 - B11 are internally connected; in this way it is possible to bring the power supply to other modules using terminals A10, A11 and B10, B11.

Functional earth terminal. This type of earthing does not protect against electrical shocks.

Power supply warnings

- Please note that the maximum current capacity for each terminal is 8A
- Make sure that the overall current absorption (modules and field devices) matches the power supply
- In order to avoid excessive voltage drops, install the most power consuming modules closer to the power supply.

Power supply (DO-04TX)

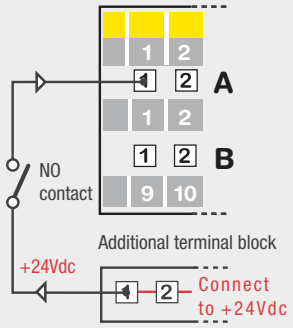


- 24Vdc (–15...+25%), 3W max. The module is powered by the terminals A8 (3L+ = +24Vdc) and A11 (M- = 0Vdc).
- The power supply terminals of the channels, A3 (1L+), A8 (3L+), B3 (2L+), B8 (4L+), are not internally connected as each output channel may switch up to 6 A.
- For the correct functioning of the loads, connect each load to its proper 0V: terminals 1M- for channel 1, 2M- for channel 2, 3M- for channel 3, 4M- for channel 4.

Functional earth terminal. This type of earthing does not protect against electrical shocks.

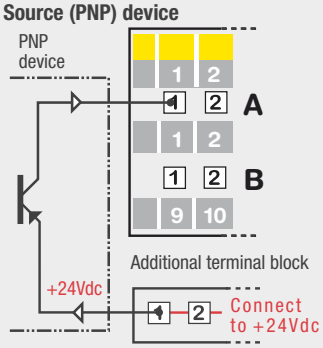
Digital Inputs Type II (EN6131-2)

Contact input



- Respect the polarity;
- When present the shield must be connected to a proper earth (at only one end).

Source (PNP) device

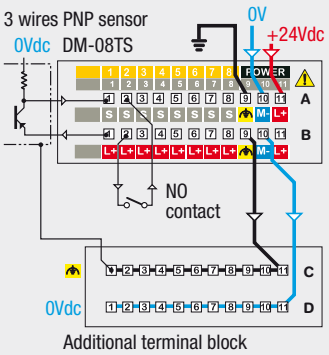


- Respect the polarity.
- When present the shield must be connected to a proper earth (at only one end);
- If the input device needs to be powered by the module, verify that the current consumption does not exceed the power supply limits.

DI-xxLV

Digital Inputs Type II (EN6131-2)

NO contact and Source (PNP) output devices

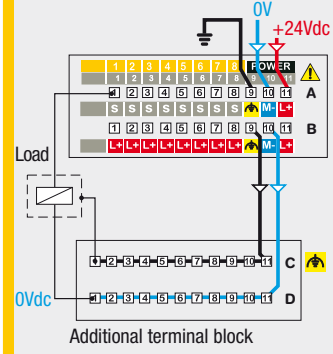


24 Vdc inputs,
- Respect the polarity;
- When present the shield must be connected to a proper earth at one end using, for example, the additional terminal block TB-211-1;
- Inputs 1 and 2 can be set to enable the following functions:
  - pulse counting measuremens;
  - pulse frequency measurements;
  - pulse width measurements.

DM-xxTS

Digital Outputs

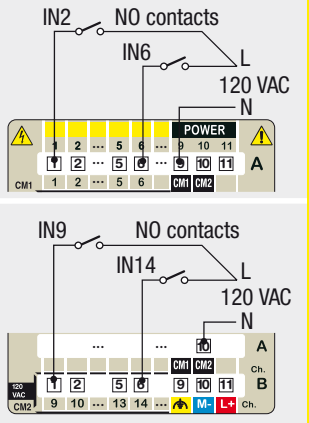
Source (PNP) digital output 24Vdc 0.5A



- Each of 8 channels can be set through the MODBUS as either input or output
- Output 3 and 4 can be configured as PWM (Pulse Width Modulation) output or pulse output
- In order to protect the output circuits, clamp diodes are installed in the module. However, when high inductive loads are to be switched or when more loads are to be switched at the same time, external damping circuits should to be provided.

⚠ 120Vca Digital Inputs 1...16 Type II (EN61131-2)

120 VAC inputs



⚠ **DANGER**
High voltage inputs, pay extreme attention to these input connections.

⚠ Terminal A9 (CM1) is the common (neutral) terminal of the 120Vac digital inputs 1...8 (at terminals A1...A8); terminal A10 (CM2) is the common (neutral) terminal of the 120Vac digital inputs 9...16 (at terminals B1...B8).

⚠ Respect the polarity shown, each common terminal is shared by 8 digital inputs.

DI-16HV

CE Electric safety and electromagnetic compatibility

Class II instrument, rear panel mounting.
This instrument has been designed in compliance with:
Regulations on electrical equipment: according to regulations on the essential protection requirements in electrical equipment EN 61010-1
Regulations on Electromagnetic Compatibility according to:
- Regulations on RF emissions: EN61000-6-4 industrial environments;
- Regulation on RF immunity: EN61000-6-2 industrial equipment and system.

It is important to understand that it's responsibility of the installer to ensure the compliance of the regulations on safety requirements and EMC.
This controller has no user serviceable parts and requires special equipments and specialised engineers to be repaired. For this purpose, the manufacturer provides technical assistance and the repair service for its Customers. Please, contact your nearest Agent for further information.
All the information and warnings about safety and electromagnetic compatibility are marked with the CE sign, at the side of the note.

Before installing the module read the following instructions

Precautions CE

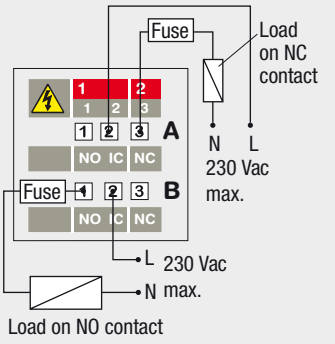
All wirings must comply with the local regulations
- The supply wiring should be routed away from the power cables
- Avoid to use electromagnetic contactors, power relays and high power motors nearby
- Avoid power units nearby, especially if controlled in phase angle
- Keep the low level sensor input wires away from the power lines and the output cables. If this is not achievable, use shielded cables on the sensor input, with the shield connected to earth.

Notes

1 Make sure that the power supply voltage is the same indicated on the instrument label;
2 Switch ON the power supply only after having completed the electrical connections.

Relay Digital Output

DO-XXRL

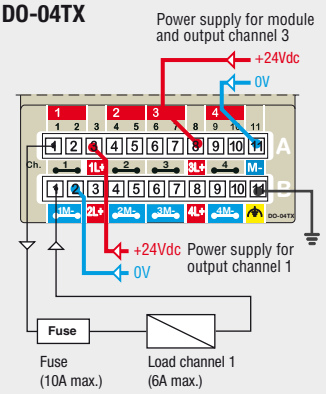


- Protect loads with fast type fuses
- For Solid State Relays models, the max. ac current that can flow in the SSR is 1A at 25°C. For higher ambient temperatures derate linearly to 0.5A at 65°C
- Contact terminals A1-B1... A8-B8 are internally connected. This would be useful for multiple loads.

DO-xxRL

6A Digital Outputs

DO-04TX

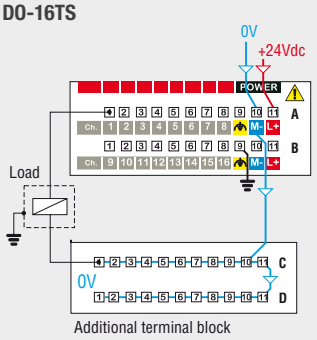


- Respect the polarity.
- When present the shield must be connected to a proper earth (at only one end);
- Protect loads with fast type fuses adequate to the power consumption of each load (10A max.)

DO-04TX

Source Type (PNP) Digital Output

DO-16TS

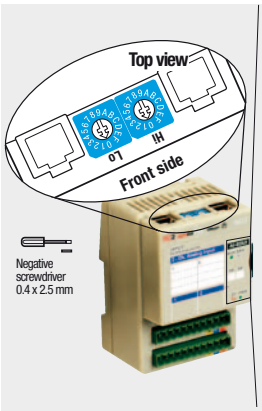


24 Vdc, 0.5A digital outputs
- Respect the polarity
- When present the shield must be connected to a proper earth (at only one end).

DO-xxTS

Hardware Set-up

Hexadecimal rotary switches, service and I/O LEDs



LED	Status	Meaning
RUN ●	ON	Operational
	Blinking	Pre-operational (CANopen)
	Single flash	STOPPED
	OFF	Device in RESET state
ERR ●	ON	BUS OFF
	Single flash	Warning limit reached
	Double flash	Error Control Event
	Triple flash	Sync Error (CANopen)
	OFF	No error. Device working
ST ●	ON	DIAG Error
	Blinking	INIT and DIAG running
	Single flash	Baud rate setting
	OFF	Module OK and ready
PWR ●	ON	Module Power Supply ON
	OFF	Module Power Supply OFF

Procedure for Node ID and Bit Rate configuration

The HI and LO hexadecimal rotary swithches set the module's Bit Rate and CAN Node ID. During the configuration, the module must be **off line** and the CAN bus must be physically disconnected.
To configure the module, follow the procedure:

1. Turn the Power OFF
2. Set the **HI** switch to "F"
3. Select the desired Bit Rate value by setting the **LO** switch following the table (e.g. "8" for 1 Mbps)
4. Turn the Power ON
5. Shift the **HI** switch to "E" (all the module service LEDs should flash)
6. Turn the Power OFF. Now configure Node ID
7. Set the **HI** and **LO** switches to the desired valid Node ID following the table
8. Turn the Power ON.

Alternatively, at step 7 set the value 00h. Then, at the next Power ON, the last valid stored value will be resumed as Node ID.
Default values: Bit Rate = 500 kbps, Node ID = 127D

Bit Rate/Node ID configuration/CAN signals

Bit rate

Lo switch	Baud rate	Bus length
1	20 kbps	2500 m
2	50 kbps	1000 m
3	100 kbps	500 m
4	125 kbps	500 m
5	250 kbps	250 m
6 *	500 kbps	100 m
7	800 kbps	50 m
8	1000 kbps	25 m

Node ID

Hi switch	Lo switch	Valid ID node
0	1	01h (address 1)
0	2	02h (address 2)
↓	↓	↓
F	F	7Fh (address 127D)*

Note: * Default value

CAN Signals

The signals present in the two RJ45 connectors are connected in parallel in order to link the modules to CAN.

Pin	Signal
1	CANH
2	CANL
3	GNDCAN
4	Reserved
5	Reserved
6	GNDSHLD (1)
7	GNDCAN
8	CANV+

(1) Shield to protect the communication cables (when the bus network is longer than 100m).

Hot swapping the modules

Node ID and Baud rate of the new module must already be correctly set.
The procedure to minimize the CAN disconnection time follows:

1. Remove all the cabled connectors from their plugs (item 4 in "General description" paragraph), do not extract the RJ45 connectors yet;
2. Remove the module from the DIN rail;
3. Mount the new and already configured module on the DIN rail;
4. Extract the left side RJ45 connector from the module and insert it in the new module;
5. Extract the right side RJ45 connector from the module and insert it in the new module
6. Insert all the cabled connectors in the new module.