

HDM - **CAN**^{open} OPERATING INSTRUCTIONS

Heavy-Duty Multimach - CANopen valves provide an interface between HDM islands and CANopen network. They comply with CiA DS 401 and provide diagnostic functions. Configurations are available with up to 16 outputs and 16 outputs + 8 inputs.

 **CAUTION**

Failure to comply with these instructions may cause damage or injury.

NETWORK DESIGN PRINCIPLES

The following rules must be followed when manufacturing the CANopen network

- Assign a univocal address to each node
- Make sure the transmission speed of the master and all the nodes in the network is the same
- Make sure branches do not exceed the maximum length
- Mount a terminating resistance at the end of all the segments
- Use CANopen certified connecting cables
- Follow the general technical rules

1. CHARACTERISTICS

1.1 POWER SUPPLY

An M12 power connector is used. The power supply is separate from that of the bus so, in the event of an alarm, the power can be cut off and the bus line remains active. Power failure is indicated by the red EXT FAULT light coming on. The module can also be configured to be powered directly by the BUS IN connector in accordance with CiA DR 303 - 1.

1.2 PROTECTION

The slave has reverse polarity protection but for an effective protection it is still necessary to use a 2 A fuse on the module's 24V DC power supply.

The output drivers provide added protection against overloads and short-circuits on each single valve. In the event of a short-circuit, which is indicated by the red EXT FAULT light coming on, only the faulty valve is disconnected. The faulty is relayed to the MASTER, which manages the alarm.

 **CAUTION**

Switch off the power supply and compressed air supplies before remedying the fault or replacing/adding any valve modules.

IP65 protection is achieved with the valve island fully assembled and all the connectors connected. Any unused connectors must be plugged.

1.3 CONNECTIONS

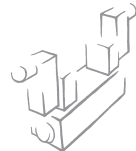
The Bus connectors are the M12 type with type A coding in accordance with CiA DR 303 - 1. Standard pre-wired CANopen cables can also be used, to prevent malfunctions due to faulty wiring.

For the bus connection, an alternative to pre-wired cables is the use of metal M12 male connectors, connecting the cable shield to the connector body. Connection between the BUS IN and BUS OUT connector shields is via the M12 thread on the metal cover of the module.

The slave must be earthed, using one of the threaded holes in the metal body not used for mounting the island.

 **CAUTION**

The lack of an earth connection may cause malfunctions and irreversible damage in the presence of an electrostatic discharge.



2. CONNECTING ELEMENTS AND SIGNALS

2.1 ELECTRICAL CONNECTIONS: PIN CONFIGURATION

- Code A M12 male connector for supplying the outputs (4)

1 = NC	
2 = +24Vdc	auxiliary valve supply
3 = 0 V	
4 = NC	
5 = NC	

- BUS IN M12 male connectors (5) and BUS OUT M12 female connectors (6) for connecting to the CANopen network

1 = (CAN_SHLD)	Optional CAN shield
2 = (CAN_V+)	Optional CAN external positive supply
3 = CAN_GND	Optional external supply reference (Ground / 0V)
4 = CAN_H	Bus line
5 = CAN_L	Bus line
Metal ring =	Shield

IMPORTANT

The CAN_V+ signal must only be used for distributing the auxiliary supply.
For correct communication, use CANopen cables.

- M12 female connectors for linking INPUTS X1-X2X7-X8

Use M12x1 connectors to connect the sensors. Tighten the ring nut to prevent the connectors from coming loose.
Any unused connectors must be plugged. This is the only way to guarantee IP65 protection.

Sensor type	2 - and 3 - wire PNP			
Input conformity	to IEC 61131-2, types 1, 2 and 3			
Supply voltage	24 VDC \pm 10%			
Max sensor supply current	200 mA			
Status 1 guaranteed	U > 14V and I > 4 mA			
Status 0 guaranteed	U < 2 V and I < 2 mA			
Protection	Against overloads and short-circuits			
Diagnosics	Green input active LEDs EXT FAULT overload and short-circuit LEDs The peripheral defect is active and accessible from the master station			
Connector pin assignment M12 x 1	X1 - X2	X3 - X4	X5 - X6	X7 - X8
	1 : +24 V	1 : +24 V	1 : +24 V	1 : +24 V
	2 : input 2	2 : input 3	2 : input 5	2 : input 7
	3 : 0 V	3 : 0 V	3 : 0 V	3 : 0 V
	4 : input 1	4 : input 4	4 : input 6	4 : input 8

3. INSTALLATION AND NODE CONFIGURATION

⚠ IMPORTANT

Switch off the power supply before inserting or removing connectors (risk of functional damage).
 Earth the module using an appropriate conductor. One of the free mounting holes can be used.
 The lack of an earth connection may cause malfunctions and irreversible damage in the presence of an electrostatic discharge.

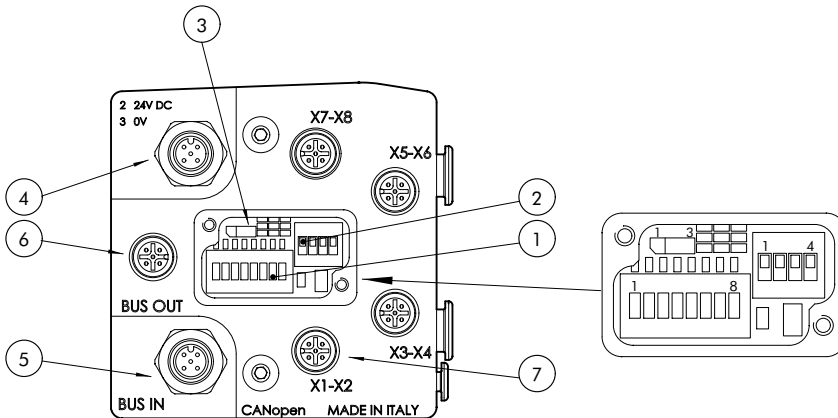
Use only fully assembled valve units.

For the supply use only IEC 742/ EN60742/VDE0551 power packs with a minimum insulation resistance of 4kV (PELV). Use a 2 A time-delayed safety fuse on the module's 24 Vdc supply.

3.1 NODE CONFIGURATION

Under the cover there are:

- The switches for address assignment (1)
- Transmission speed setting and terminating resistance activation (2)
- Auxiliary supply configuration are located under the cover. The cover can be removed by unscrewing the two screws using a 2.5 mm hex spanner.

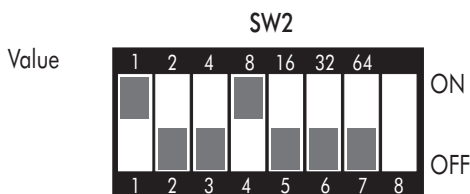


⚠ IMPORTANT

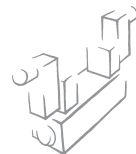
All the networked devices must have a different address.

• Address assignment:

Before connecting a slave to the bus system, it is advisable to assign it an unused address.
 Use DIP SWITCHES 1-7 (1), and enter the node number using binary code. Node numbers 1 to 127 can be used. DIP SWITCH 8 is not used.

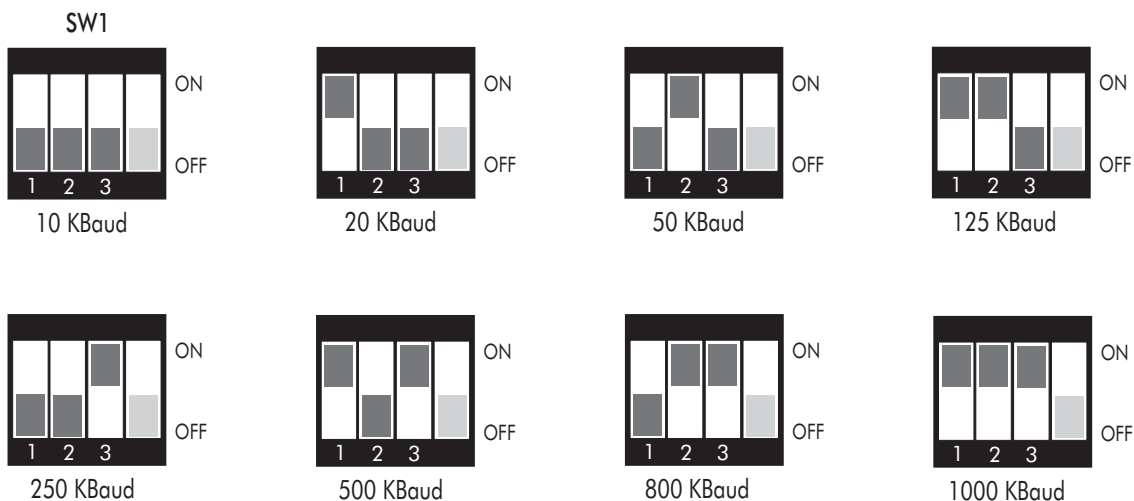


Node number: 9 (1+8)



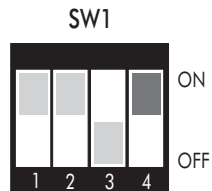
• **Communication speed setting:**

Use DIP SWITCHES 1-3 (2)



• **Terminating resistance activation**

The last node of each branch of the CANopen network must be terminated with a resistance. This is to prevent reflection errors during master-slave communication, which can generate malfunctions. To activate, set DIP SWITCH 4 (2) to ON.



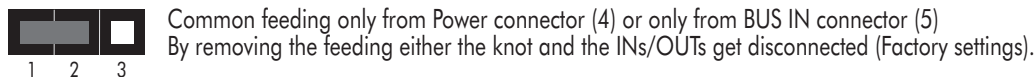
Terminating resistance activated

• **Auxiliary supply configuration**

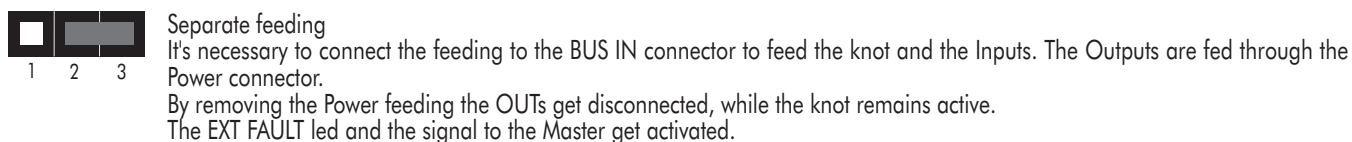
Via configuration of the jumper (3), you can decide whether the OUT auxiliary supply comes from supply connector M12 or from pin 2-CAN_V+ M12 BUS IN connector.

⚠ IMPORTANT
 The CAN_V+ signal must only be used for the auxiliary supply.

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










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4. DIAGNOSTICS

Diagnostics of an HDM-CANopen module is displayed by the status of the interface LEDs in accordance with CiA DR 303-3.

Green LED Power ON	Green LED BUS OK	Red LED BUS error	Red LED EXT fault	Meaning
OFF 	OFF 	OFF 	OFF 	The module is not powered on.
ON 	Flash 	OFF 	OFF 	PRE-OPERATIONAL status. The module is powered on.
ON 	ON 	OFF 	OFF 	OPERATIONAL status. The module operates correctly.
ON 	OFF 	ON 	OFF 	Communication error. The module does not communicate with the network.
ON 	Flash 	OFF 	OFF 	STOPPED status
ON 	OFF 	Flash 	OFF 	Configuration error.
ON 	ON 	Single Flash 	OFF 	Sent/received data package error limit.
ON 	ON 	Double Flash 	OFF 	GUARD TIME error.
ON 	ON 	OFF 	ON 	No auxiliary supply. Output fault. Input fault.

5. ALLARM RESET

In the event of an output short-circuit or overload, the safety circuit disconnects the faulty output, but all the others remain active. A local signal (EXT FAULT LED on) and a signal to the master are both activated simultaneously. Switch off the electricity and compressed air supplies before attempting to remedy the fault. The fault signal resets automatically when the power supply is switched back on.

When the output auxiliary supply is cut off, a local signal (EXT FAULT LED on) and an error signal to the master are both activated. The signal resets automatically when the power supply comes back on. CANopen communication remains active.



6. DATA BIT ASSIGNMENT TO SINGLE NODE OUTPUTS

bit 0	bit 1	bit 2	bit 3	...	bit 15
Out 1	Out 2	Out 3	Out 4	...	Out 16

6.1 SOLENOID OUTPUT ADDRESSES FOR EACH NODE - EXAMPLE:

Bistable valve	Monostable valve	Monostable valve	Bistable valve	Bistable valve	Monostable valve
Out 1	Out 3	Out 4	Out 5	...	Out 16
Out 2			Out 6	...	

Address mapping depends on the master configuration.

7. DATA BIT ASSIGNMENT TO SINGLE NODE INPUTS

bit 0	bit 1	bit 2	bit 3	...	bit 8
In 1	In 2	In 3	In 4	...	In 8

Address mapping depends on the master configuration.

8. SPECIFICATIONS

For general features, refer to the description of the pneumatic part.

Description	CANopen module for HDM valves
Factory settings: address	1
Supply	24 VDC +/- 10%
Protection	Slave protected against overloads and reversed polarity. Outputs protected against overloads and short-circuits
Max input current (all valves ON)	~ 650 mA
Addressing	via DIP SWITCH
Max settable address number	127
Peripheral fault diagnostics	Local LED activation and signal to the master
Faults indicated	Output short-circuit or overload Input short-circuit or overload No auxiliary supply
Module status with a peripheral fault	CANopen communication active An alarm code is generated which is sent to the master
Data bit value	0 = not active 1 = active
Output status with no communication	Inactive

NOTE: EDS configuration file is available on www.metalwork.eu in the section "Software download"

