

OVERDIGIT

compact I/O modules

EX04AIO

- ✓ I/O interface remotable on RS485 fieldbus
- ✓ 4 analog input/output channels, 12 bits, isolated
- ✓ 10V / 20 mA configurable input and output
- ✓ Indipendent V / I selection for input and output
- ✓ Channels configurable separately from each other
- ✓ Input and output with high speed conversion
- ✓ I/O protected from voltage and current over-load
- ✓ 12 bits channel with internal temperature sensor
- RS485 serial port with high speed (1Mb/s max)
- ✓ Modbus RTU protocol, configurable over RS485
- ✓ CoDeSys libraries for configuration and use
- ✓ PC tool for configuring and testing modules
- ✓ Compact dimension on 17.5mm of DIN rail

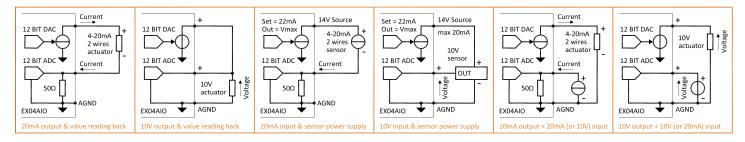
Compact module with 4 analog input/output channels, Modbus RTU protocol

The EX04AIO module is a flexible product that is suitable for all the needs of interfacing to analog sensors and actuators that use the 10V or 20mA standard.

Each of the four channels of the module have one analog input and one analog output and are indipendently configurable. The output does not require an external power supply because it provides a 10V voltage or 20mA current by its own internal source.

The arrangement of the connections simplifies the use of input for the verification of the correct value supplied by the output. However the input can also be used indipendently from the output.

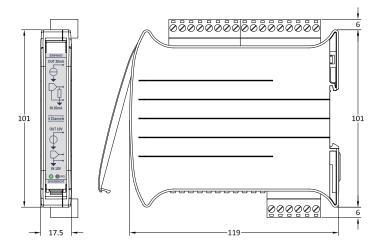
Configurable over fieldbus by IEC function block and easy integrable into "PLC Configuration" menu of CoDeSys using a configuration file. Extensions of the Modbus protocol for updating the I/O up to 1Mb/s in a single frames exchange.



GENERAL SPECIFICATION		
Analog channels	4 single-ended input and output channels	
Isolation	1500Vac max (from bus and power supply)	
Voltage input	0-10V, 12 bits, impedance > $100k\Omega$	
Current input	0-20mA, 12 bits, 50Ω shunt resistor	
Inputs speed	Programmable filter from 10ms to 1s	
Inputs reading	+20% nominal value (word = 4914)	
Inputs protection	±80V max (10V input), ±26V max (20mA input)	
Voltage output	0-10V, 12 bits, min load $1k\Omega$ (short-cir. 24mA)	
Current output	0-20mA, 12 bits, max load 600Ω (@ 4x20mA)	
Outputs speed	15ms (99% of final value)	
Outputs driving	+10% nominal value, 14.5V max on mA output	
Output protection	+26V max applied on 10V and 20mA outputs	
In/Out accuracy	Precision: ±0.05% FS. Linearity: ±0.025% FS	

Thermal drift	50 ppm/°C
Temperature sensor	Internal NTC -20°C ÷ 80°C, res. 0.1°C, ±0.5°C
Fieldbus	RS485 with EMI filter, thermal prot. / ESD 15kV
Max nodes / Termin.	64 / insertable 120Ω load
Baudrate	300b/s ÷ 1Mb/s (continuosly prog.)
Protocol	Modbus RTU, address 1 ÷ 247, parity N/O/E
Function codes	3, 4, 6, 16, 17, 23, 100, 101, 102, 109, 110
Max performance	Complete I/O update within 600µs (@ 1Mb/s)
Power supply	24Vdc ±15% / 80mA ÷ 160mA max (@ 4x20mA)
Operative temp.	-20°C to 70°C
Connections	Plug-in screw terminals 28÷12AWG / 2.5mm²
Box	ABS with 35mm DIN rail mount / IP20
Max dimensions	113 x 17.5 x 119 mm (H x W x D)

Dimensions



Module configuration

To configure the Modbus communication parameters, refer to the "EX_Modules-Configuration_EN.pdf" document containing general and common information on the EX series.

The configuration of the type (10V or 20mA) of analog input and analog output of each channel requires the setting of a numerical coding on the relative Holding Register.

The code can be written (even once because the value is stored permanently in the module) with the **Modbus-Tool** software or by integrating in the PLC application the necessary calls to the Modbus functions. There is also a **CoDeSys program** for configuring and testing the module with graphical visualization interface (EX04AIO_Configurator).

Each channel can be configured indipendently from the others by setting the value of a specific Holding Register. The least significant byte of the word configures the analog input while the most significant byte configures the analog output of the channel:

Channel code = 256 x (Output code) + (Input code)

- Code 0 disables input or output of channel
- Code 1 configures input or output to 10V
- Code 2 configures input or output to 20mA

For the analog input it is also possible to configure a **filter** obtained by the arithmetic mean of several readings. In this case a specific filter code must be added to the previous channel code:

Code	Filter
16	10 ms
32	20 ms
48	30 ms
64	40 ms
80	50 ms

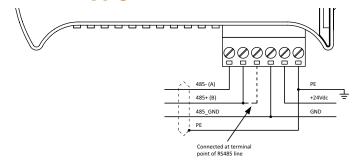
Code	Filter
96	60 ms
112	70 ms
128	80 ms
144	90 ms
160	100 ms

Code	Filter
176	150 ms
192	200 ms
208	250 ms
224	500ms
240	1 s

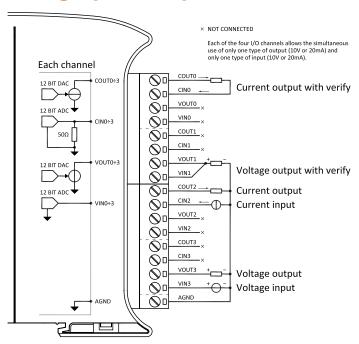
If nothing is addes (Code = 0) for the input filter it is considered the **default (50ms)** value.

The analog output can also be used as **power source** for sensors applied to the input. It is preferable to use the current output because capable of saturating to about **14V** while the voltage output can reach up to 11V. For this purpose the output word must be forced to the value 4505 equivalent to +10% of the nominal value or at a higher value than the required maximum supply current of sensor.

Power supply and RS485 fieldbus



Analog inputs / outputs



Modbus data model

The resources available in the module are mapped to Modbus data areas using the following format:

Address	Fun. codes	Description
Input Registers		
0 ÷ 3	4	Input words AIN0 ÷ AIN3
4	4	Errors of input channels
5	4	Internal temperature (x 0.1°C)
Holding Registers		
0 ÷ 3	3, 6, 16, 23	Output words AOUT0 ÷ AOUT3
4 ÷ 7	3, 6, 16, 23	CH0 ÷ CH3 configuration words

The value of the Input Register with address 4 contains two flags for the **signaling error** of each of 4 input channels and one flag for each of 4 output channels:



Order codes	
EX04AIO	Modbus slave, 4 channels 12 bits analog In/Out

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