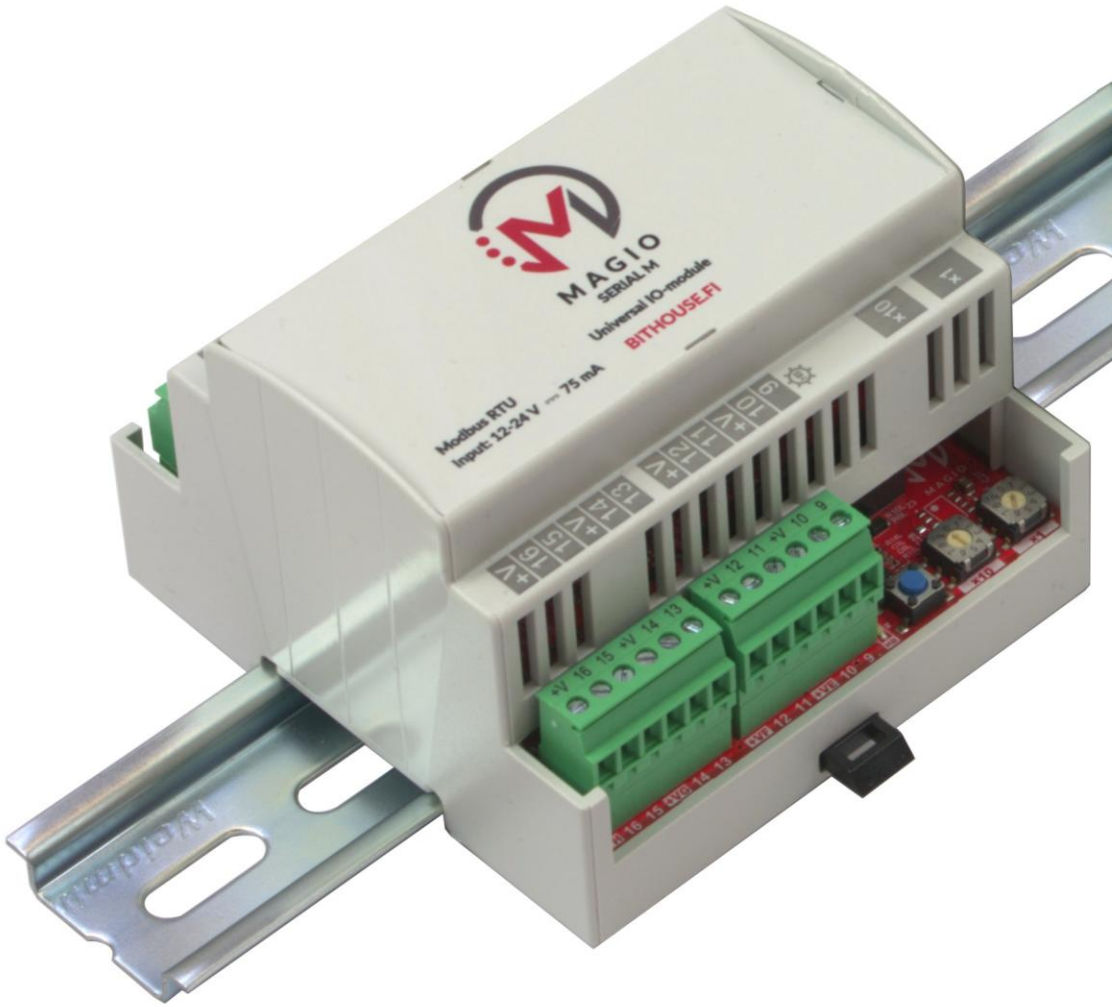
MAGIO SERIAL M

I/O-MODULE

DATA SHEET



BITHOUSE

every bit matters

Contents

About the document

Document scope

This document describes the **Magio Serial M I/O-module**, including installation and maintenance information.

Safety information

Intended use

The product is intended for building automation and light industrial applications.

Only appropriately trained personnel are authorized to work on and with this product. They must be familiar with applicable standards and regulations.

The product must be used in accordance with all applicable safety requirements, regulations and instructions provided in the product documentation, including this data sheet.

Only recommended conductors/cables and accessories/equipment may be used with the product.

Environmental Specifications

PARAMETER	VALUE	NOTE
Operating temperature	0–45°C	
Humidity	RH < 95 % (non-condensing)	

Disposal / Recycling

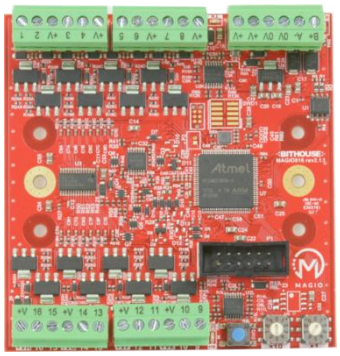
WEEE business products reception points:

www.elker.fi/en/reception-points-for-business-products/

About the Product

Product overview

Magio Serial M is a small I/O module enclosed and mounted on a DIN-rail. Casing dimensions are 88x97x62 mm.



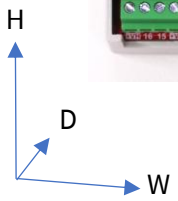
Magio Serial M board

- 16 universal I/O connection points
- Modbus RTU bus

The module also provides the **operating voltage** for the actuator, enabling the measurement of the actuator input current. Malfunctioning actuators can be easily detected when the behaviour of the input current changes outside preset limits, thus generating an alarm in the system.

- Operating voltage: regulated 12...24 V_{DC}
- Card current consumption: nominally 75 mA (24 V = 1,8 W)
- Max load
  - 1 A / channel
  - 6 A the whole board

Magio Serial M is available with screw or spring connectors. Max 1,5 mm^2 wire for connectors.

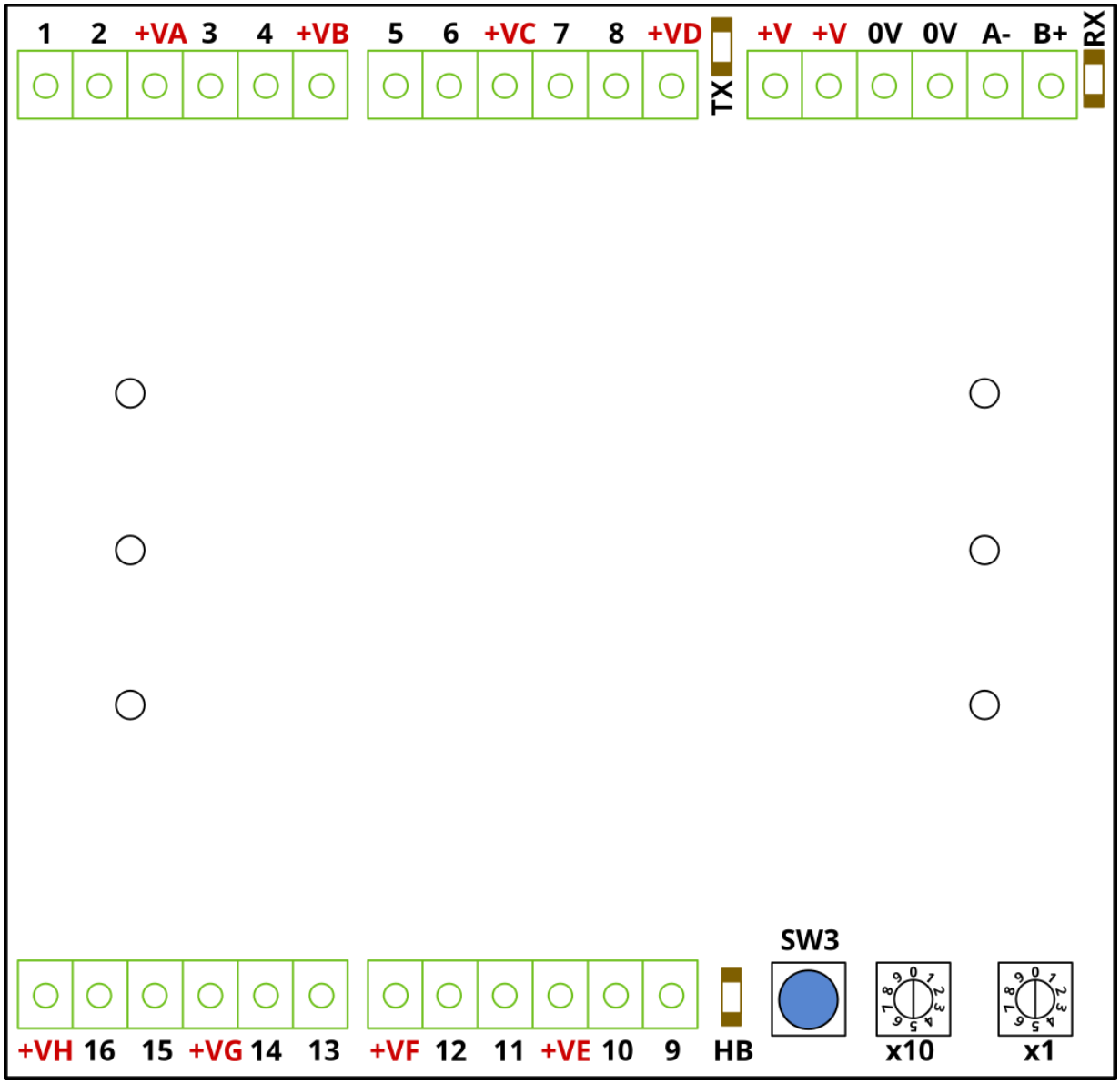


Technical Specifications

Dimensions

ASSEMBLY	PARAMETER	VALUE	NOTE
MAGIO Serial M card	Width	84 mm	
	Height	87 mm	
MAGIO Serial M DIN rail enclosure	Width	88 mm	5 DIN-modules
	Height	91 mm	
	Depth	62 mm	
MAGIO Serial M DIN rail enclosure with bracket	Height	97 mm	
	Weight	136 g	

Connectors and Components



CONNECTOR	DESCRIPTION
1...16	I/O channel
+V, +VA, +VB, ... +VH	12...24 V_{DC} power input. Physically linked on the PCB
0V	DC-voltage supply ground ground
A-, B+	RS485 bus

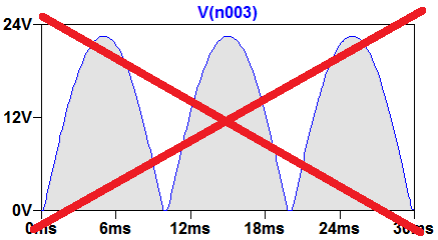
COMPONENT	DESCRIPTION
x10, x1	RS485: address switch
RX-LED	RS485: data moving on the bus
TX-LED	RS485: data sending from card
HB-LED	Heartbeat
SW3	Settings pushbutton

Operating Voltage

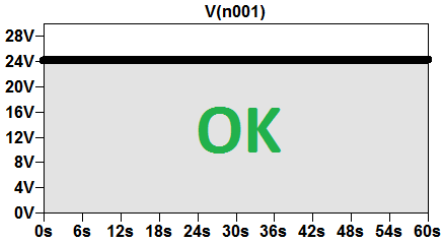
Operating voltage: regulated 12...24 V_{DC}

Regulated voltage

The voltage supplied must be regulated – a simple rectified voltage is unsuitable for the device.



Unsuitable: rectified +24 V voltage



Suitable: regulated +24 V_{DC}

PE and 0V connecting

0 V_{DC} and PE must be connected either at or outside the power supply (using a direct wire or an approx. 10 µF capacitor). This prevents measurement errors, especially regarding resistance measurements.

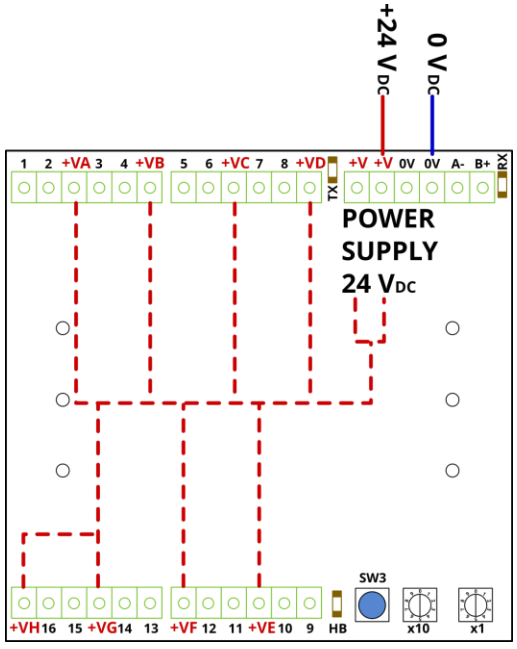
12...24 V_{DC}

Special care must be taken to ensure the supply voltage stays above the lower limit. A supply voltage below 12 V may cause errors in the 1-10 V signal.

Daisy-chaining the power

The card's supply voltage is connected to the +V and 0V terminals located next to the bus connector. Power can be daisy-chained from these terminals to another Magio card, within the limits of the maximum current.

For analog signals, the odd-numbered terminal adjacent to the I/O point is always reserved for the signal ground (0 V). This allows actuators or transmitters, including their power supply, to be connected directly to a single channel pair without external terminal blocks. The channel mode of other channels can also be set to ground (0 V) to simplify wiring.



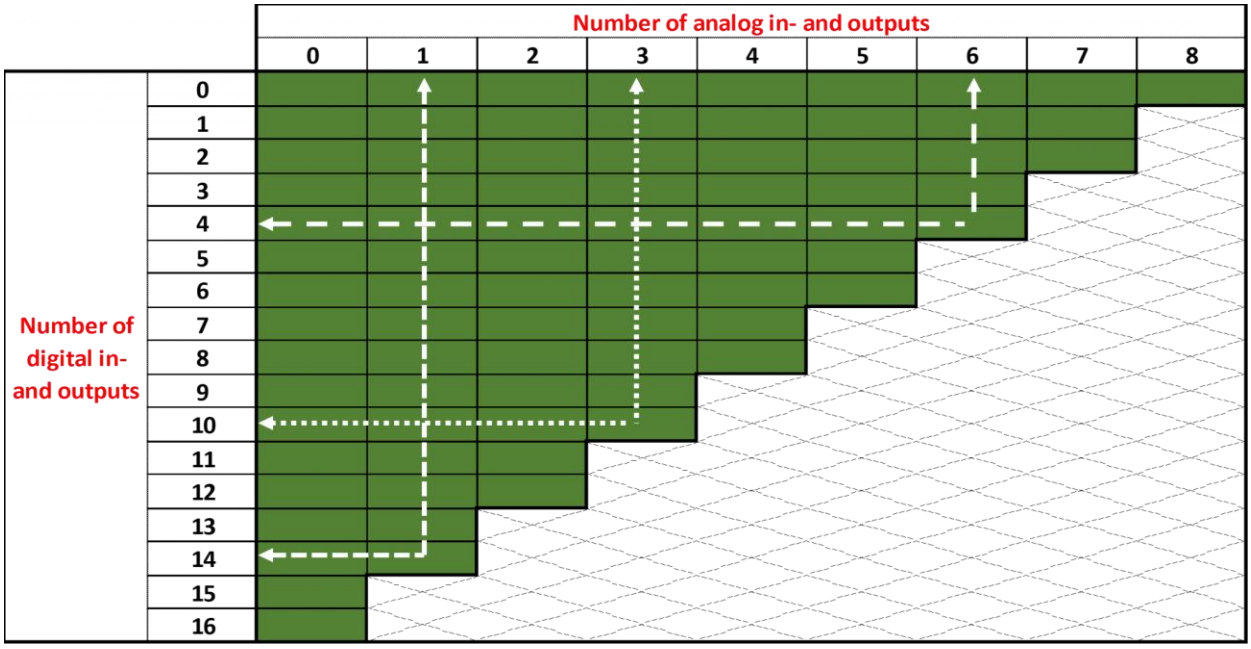
Kortin sisäinen kytkentä yhdistää +V -liittimelle kytketyn jännitteen I/O-pisteiden vieressä oleviin jänniteliittimiin.

Number of Channels

The universal I/O points can be programmed into any operating mode: DI, DO, AI, AO, or ground (0 V). These modes can be freely mixed within the same module, with the number of available terminals being the only limiting factor.

- Digital points (DI, DO) require **one** I/O connector.
- Analog points (AI, AO) require **two** I/O connectors.
    - The odd numbered connector is ground (0 V).

The Magio Serial M I/O module supports up to 16 digital or eight analog inputs/outputs. Analog signals occupy two consecutive terminals, where the even-numbered terminal is for the signal and the adjacent lower odd-numbered terminal serves as ground (0 V) – for example, terminals 2 and 1.

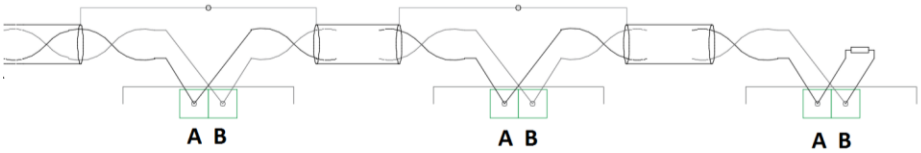


The different combinations of analog and digital in/outputs in Magio I/O module

Operating the Bus

Connecting the bus

Terminals A and B are connected in parallel (A↔A; B↔B). The cable must be a twisted pair (e.g. CAT6). It is also recommended to connect the ground planes to the same potential across different cards.



The bus settings

Magio Serial M operates on a Modbus RTU bus. The serial communication parameters include

- parity/stop bits
- baude rate

which are configured using the x10 and x1 rotary switches as follows:

1. Press the SW3 button. The HB-LED flashes at a steady rate (setting mode). Bus communication stops. *)
2. Turn the x10 and x1 rotary switches to the positions shown in the table below.
3. Activate the settings by holding down the button for approx. 2 seconds. The HB-LED flashes faster than in the set mode. Release the button.
4. Turn the switches back to the desired Modbus address.
5. Save the settings to non-volatile memory (two options). To indicate saving, the HB-LED flashes faster than in the set mode for 2 seconds.
    a. Press the button to resume bus communication with the new settings immediately.
    b. The card saves the settings automatically after 30 seconds.

*) The card automatically returns to normal mode after 30 seconds. Do the changes within this time frame.

ROTARY SWITCH			
x10		SWITCH POSITION	x1
PARITY	STOP BITS		BPS
Even	**1**	**1**	1 200
Even	2	**2**	2 400
None	1	**3**	4 800
None	2	**4**	9 600
Odd	1	**5**	**19 200**
Odd	2	**6**	38 400
		7	57 600
		8	115 200

Default settings for communication parameters are **8E1** and **19200** (”address” 15).

LED-indicators

- The HB-LED (heartbeat) indicates the normal function of the card
  - Setting mode and saving mode indicated separately (see table below)
- The RX-LED flashes when the card reads a byte from the bus.
  - This does not indicate whether the bus settings are correct.
- The TX-LED flashes when the card responds to a packet received from the bus.

RS485-LED (RX, TX)

STATUS	RX-LED	TX-LED
RS485 not connected OR broken bus cable.	ON	ON
RS485 one wire (A/B) connected. The other one broken	ON	ON
RS485 wiring ok, no traffic on bus.	ON	ON
RS485 A/B cross-wired, no traffic on bus.	OFF	OFF
RS485 A/B cross-wired, traffic detected.	Blinking	OFF
RS485 correctly connected, traffic detected on other devices.	Blinking	ON
RS485 correctly connected, traffic detected also **on this card**.	**Blinking**	**Blinks when the card responds**

HB-LED

STATUS	HB-LED		
	ON	OFF	DURATION
Normal	1900 ms	100 ms	Continuous
RS485-setting mode	250 ms	250 ms	Continuous (30 s timeout)
RS485-setting mode; saving to memory	75 ms	75 ms	2 s
EEPROM-save	75 ms	25 ms	2 s
IP-reset	75 ms	25 ms	10 s

Polarity check

The card attempts to detect if the RS485 bus A and B terminals are connected wrong way round (inverted). For this detection to function, biasing resistors must be connected to the bus. These are typically connected only to the bus master device. If the card detects that the connection is inverted, the TX LED remains off.

Procedures

Wiring Examples

Channels 1 and 2 are used in these examples. See the list below for relevant Modbus registers.

DESCRIPTION	REGISTER	DATA TYPE
Channel mode, CH1	0	uint16
Channel mode, CH2	1	uint16
Present value, CH1	100	int16
Present value, CH2	101	int16

The desired operating mode for the channel is written to the Channel mode registers from the list below.

VALUE	CHANNEL MODE
1	Ground
4	AI resistance
5	AI voltage
6	AI high current
7	AI low current
8	AO voltage
10	DI
11	DI ext. voltage
12	Pulse counter
13	DO
14	PWM
20	PT1000
21	NI1000
22	NI1000-LG
23	NTC10

The Present value register contains the current value of the channel. The units and multipliers are used in analog modes:

CHANNEL MODE		UNIT / MULTIPLIER
4	AI resistance	1 Ohm
5	AI voltage	1 mV
6	AI high current (or 1: Ground)	0.1 mA
7	AI low current	0.01 mA
8	AO voltage	10 mV (0.1 %)
20...23	Temperature	0.1°C

A comprehensive description of registers can be found on a separate register list.

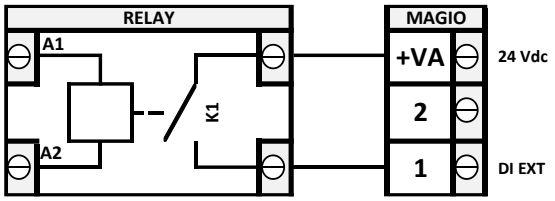
Digital input wiring examples (DI)

Digital signals can use both even and odd terminals as ground (unlike analog signals).

DI-EXT

Digital input where the card's supply voltage is routed through a contact.

The K1 contacts in the diagram must be potential-free.

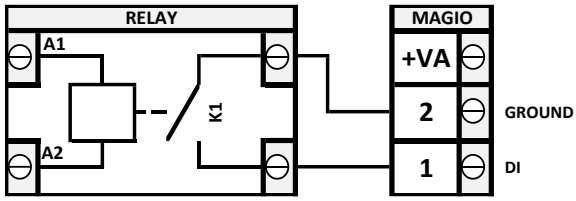


MODBUS

1) Set register **0** (channel 1) to value **11** (digital input, external voltage).
2) Read the present value of channel 1 from register **100**, in which:
0 = DI OFF
1 = DI ON

DI

Digital input where ground (0 V) is routed through the contact.

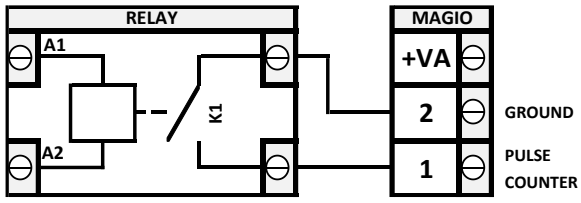


MODBUS

1) Set register **0** (channel 1) to value **10** (digital input).
2) Set register **1** (channel 2) to value **1** (ground).
Note. Using second channel is optional. You can also connect the ground with a direct wire.
3) Read the present value of channel 1 from register **100**, in which:
0 = DI OFF
1 = DI ON

DI Pulse counter

Pulse counter connection is identical to the DI connection. The recommended maximum number of pulse inputs per card is 4 (if pulse outputs have extremely strict timing requirements).



MODBUS

1) Set register **0** (channel 1) to value **12** (pulse counter).
2) Set register **1** (channel 2) to value **1** (ground).
Note. Using second channel is optional. You can also connect the ground with a direct wire.
3) Read the present value of channel 1 from register **100.**
4) The present value can be adjusted by writing the desired value to the same register or writing the channel's offset to register **600**.

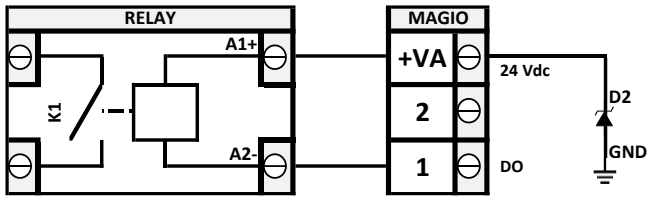
Digital output wiring examples (DO)

DO 2-wire (potential-free)

Potential-free control is implemented with a relay.

Terminal 1 is the switched ground and +VA is the continuous power supply.

The TVS diode (D2) protects against overvoltage exceeding 24 V.



MODBUS

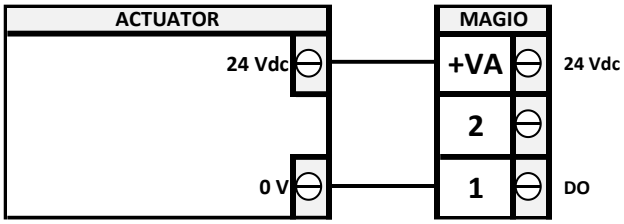
1) Set register **0** (channel 1) to value **13** (digital output).
2) Set values in register **100** as follows:
0 = DO OFF
1 = DO ON

DO 2-wire (non-potential-free)

Terminal 2 is the switched ground and +VA is the continuous power supply.

Note: the output has a 100 kΩ pulldown resistor.

Note: The grounding transistor shuts down under excessive load (e.g. short circuit).



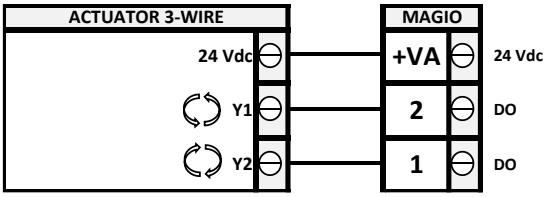
MODBUS

1) Set register **0** (channel 1) to value **13** (digital output).
2) Set values in register **100** as follows:
0 = DO OFF
1 = DO ON

DO 3-wire

Terminals 1 and 2 are switched ground terminals to drive the actuator to the open or closed position. +VA is the continuous power supply.

If the actuator requires two +24 V control signals and one ground, an intermediate relay must be used.



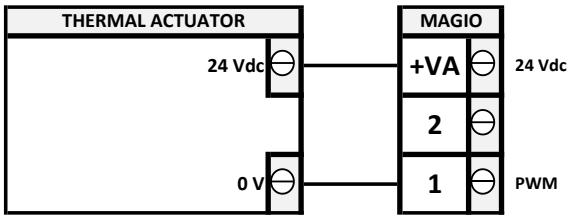
MODBUS

1) Set register **0** (channel 1) to value **13** (digital output).
2) Set register **1** (channel 2) to value **13** (digital output).
3) Set values in register **100** (channel 1) and **101** (channel 2) as follows:
0 = DO OFF
1 = DO ON

PWM

I/O terminal 1 is the switched ground used to control devices such as thermal actuators.

The PWM output operates electrically like a DO output.



MODBUS

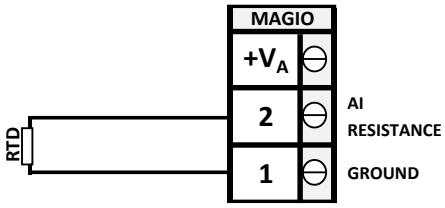
1) Set register **0** (channel 1) to value **14**.
2) Set value in register **100**. The coefficient of the value is 0.1 %.
Value 1 → active for 0.1 % of the cycle period (0.1 % * 10 s = 10 ms).
Value 1000 → active for 100 % of the cycle period.

Analog input wiring examples (AI)

Analog modes function only on even-numbered channels. The card automatically configures the preceding odd-numbered channel to mode 1 (ground).

AI Resistance

Measurement 0 Ω…1 MΩ.



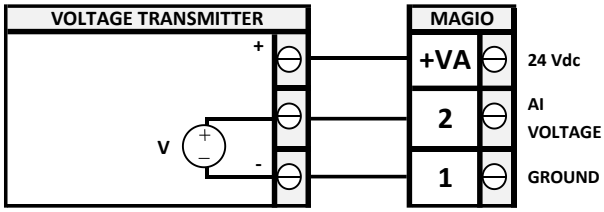
MODBUS

1) Set register **1** (channel 2) to value **4**.
2) Read the present value of channel 2 from register **101**, in which:
Value 1 = 1 Ω.
Value 32767 = 32767 Ω.

AI Voltage

Measurement 0…10 V.

The card can provide power to the transmitter. The measurement signal is connected to channel 2.



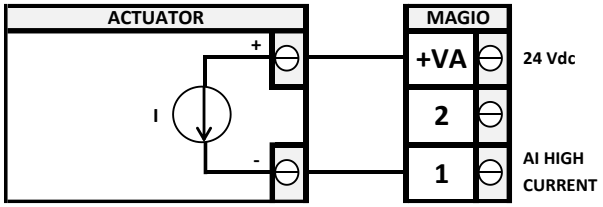
MODBUS

1) Set register **1** (channel 2) to value **5** (analog input voltage).
2) Read the present value of channel 2 from register **101**, in which:
Value 1 = 1 mV.
Value 10500 = 10500 x 1 mV = 10.5 V.

AI High Current (or Ground)

Measurement 0…1 A – *note: maximum current for the entire board is 6 A.*

This mode is less precise than AI low current and is not intended for high-accuracy measurements, but rather for tasks like actuator monitoring. It also functions on odd-numbered channels.



MODBUS

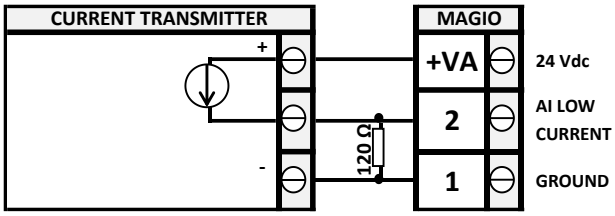
1) Set register **0** (channel 1) to value **6** (analog input high current).
2) Read the present value of channel 1 from register **100**, in which:
Value 1 = 0.1 mA.
Value 10000 = 10000 x 0.1 mA = 1000 mA = 1 A.

AI Low current

Measurement 0…20 mA.

Odd numbered terminal (1) is ground, even-numbered (2) is the measurement signal.

Requires a 120 Ω external resistor between terminals 1 and 2.



If a resistor of a different size is required, its value must be entered into the register. More detailed instructions are provided in the separate register document.

MODBUS	
	1) Set register **1** (channel 2) to value **7** (analog input low current). **2)** Read the present value of channel 2 from register **101**, in which: Value 1 = 0.01 mA. Value 2000 = 2000 x 0.01 mA = 20 mA.

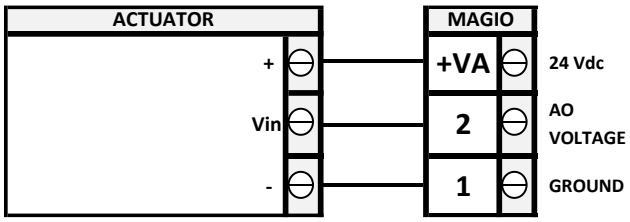
Analog output wiring examples (AO)

Analog modes function only on even-numbered channels. The card automatically configures the preceding odd-numbered channel to mode 1 (ground).

AO

Control signal 0–10 V.

The odd-numbered terminal (1) is ground, and the even-numbered terminal (2) is the control signal.



MODBUS	
	1) Set register **1** (channel 2) to value **8** (analog output voltage). **2)** Set desired value to register **101.** The unit of the value is 0.1 % of 0–10 V range (10 mV). Value 1 → output voltage 0.01 V. Value 1050 → output voltage 10.5 V.

Related Documents

MAGIO Modbus register list

Contact information

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