
MAGIO

MAGIO Serial M
MAGIO Ethernet M

Modbus register list

Bithouse Oy

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For firmware version:
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Introduction

Normal usage of card:

- 1)** Set channels to desired modes.
- 2)** Read input values from present value registers (for input channels).
- 3)** Write output values to present value registers (for output channels).

32-bit register order

All 32 bit registers are in the order of: MSW, LSW (big endian). For example, the value 123456 (0x0001E240):
register 200: 0x0001 (0001)
register 201: 0xE240 (57920)

Channel modes

Write the desired channel mode to the channel mode registers. See table on next page for values.

Note: analog channel modes can only be set to even channels (2, 4, 6...)

REGISTER	DESCRIPTION	CHANNEL	DATATYPE	READ/WRITE
0	Channel mode	CH01	uint16	R/W
1	Channel mode	CH02	uint16	R/W
2	Channel mode	CH03	uint16	R/W
3	Channel mode	CH04	uint16	R/W
4	Channel mode	CH05	uint16	R/W
5	Channel mode	CH06	uint16	R/W
6	Channel mode	CH07	uint16	R/W
7	Channel mode	CH08	uint16	R/W
8	Channel mode	CH09	uint16	R/W
9	Channel mode	CH10	uint16	R/W
10	Channel mode	CH11	uint16	R/W
11	Channel mode	CH12	uint16	R/W
12	Channel mode	CH13	uint16	R/W
13	Channel mode	CH14	uint16	R/W
14	Channel mode	CH15	uint16	R/W
15	Channel mode	CH16	uint16	R/W

VALUE	CHANNEL MODE	DESCRIPTION	RANGE
0	Uninitialized	Unused (default).	-
1	Ground	Like DO, but always on. Measures current.	0...1 A
4	AI resistance	Resistance measurement.	0...1 MOhm
5	AI voltage	Voltage measurement.	0...10.5 V
6	AI high current	Inaccurate current measurement with large range (e.g. for actuator).	0...1 A
7	AI low current	Current measurement with external resistor. ¹⁾	0...87.5 mA
8	AO voltage	Voltage output.	0...10.5 V
10	DI	Digital input (connect to ground).	0/1
11	DI ext. voltage	Digital input (connect to V+).	0/1
12	Pulse counter	Counts pulses (connect to ground).	-
13	DO	Digital output. Connects channel ground if on.	0/1
14	PWM	Pulse Width Modulation output. Like DO.	-
20	PT1000	Temperature element.	-50 ... 120°C
21	NI1000	Temperature element.	-50 ... 120°C
22	NI1000LG	Temperature element.	-50 ... 120°C
23	NTC10	Temperature element.	-50 ... 120°C

¹⁾ Default 120 Ohm. More accuracy with a larger resistor; larger range with a smaller resistor. 1...500 Ohm accepted. Same maximum voltage as with voltage input – for example with 120 Ohm resistor maximum measured current is 10.5 V / 120 Ohm = 87.5 mA.

Present value

With input modes (AI/DI) you can read the measurement from this register.

With output modes (AO/DO) you can write the output value here.

There are three types of registers:

- Int16 – the most simple and most compatible.
- Int32 – as int16, but allows larger values (resistance, pulse counter). Two sequential registers.
- Float32 – 32 bit floating point value. Two sequential registers.

Present value int16

REGISTER	DESCRIPTION	CHANNEL	DATATYPE	REGISTER
100	Present value int16	CH01	int16	R/W
101	Present value int16	CH02	int16	R/W
102	Present value int16	CH03	int16	R/W
103	Present value int16	CH04	int16	R/W
104	Present value int16	CH05	int16	R/W
105	Present value int16	CH06	int16	R/W
106	Present value int16	CH07	int16	R/W
107	Present value int16	CH08	int16	R/W
108	Present value int16	CH09	int16	R/W
109	Present value int16	CH10	int16	R/W
110	Present value int16	CH11	int16	R/W
111	Present value int16	CH12	int16	R/W
112	Present value int16	CH13	int16	R/W
113	Present value int16	CH14	int16	R/W
114	Present value int16	CH15	int16	R/W
115	Present value int16	CH16	int16	R/W

The values are scaled with the following multipliers:

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

Present value int32

Int32 registers work like int16 registers, but allow larger values (for resistance or pulse counter).

REGISTER	DESCRIPTION	CHANNEL	DATATYPE	READ/WRITE	NUM OF REGISTERS
200	Present value int32	CH01	int32	R/W	2 regs
202	Present value int32	CH02	int32	R/W	2 regs
204	Present value int32	CH03	int32	R/W	2 regs
206	Present value int32	CH04	int32	R/W	2 regs
208	Present value int32	CH05	int32	R/W	2 regs
210	Present value int32	CH06	int32	R/W	2 regs
212	Present value int32	CH07	int32	R/W	2 regs
214	Present value int32	CH08	int32	R/W	2 regs
216	Present value int32	CH09	int32	R/W	2 regs
218	Present value int32	CH10	int32	R/W	2 regs
220	Present value int32	CH11	int32	R/W	2 regs
222	Present value int32	CH12	int32	R/W	2 regs
224	Present value int32	CH13	int32	R/W	2 regs
226	Present value int32	CH14	int32	R/W	2 regs
228	Present value int32	CH15	int32	R/W	2 regs
230	Present value int32	CH16	int32	R/W	2 regs

Int32 scaling multipliers equal Int16 scaling multipliers.

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

Present value float32

Float32 registers contain the present value as a floating point value.

REGISTER	DESCRIPTION	CHANNEL	DATATYPE	READ/WRITE	NUM OF REGISTERS
300	Present value float32	CH01	float32	R/W	2 regs
302	Present value float32	CH02	float32	R/W	2 regs
304	Present value float32	CH03	float32	R/W	2 regs
306	Present value float32	CH04	float32	R/W	2 regs
308	Present value float32	CH05	float32	R/W	2 regs
310	Present value float32	CH06	float32	R/W	2 regs
312	Present value float32	CH07	float32	R/W	2 regs
314	Present value float32	CH08	float32	R/W	2 regs
316	Present value float32	CH09	float32	R/W	2 regs
318	Present value float32	CH10	float32	R/W	2 regs
320	Present value float32	CH11	float32	R/W	2 regs
322	Present value float32	CH12	float32	R/W	2 regs
324	Present value float32	CH13	float32	R/W	2 regs
326	Present value float32	CH14	float32	R/W	2 regs
328	Present value float32	CH15	float32	R/W	2 regs
330	Present value float32	CH16	float32	R/W	2 regs

Present value float32 has been scaled in engineering units:

CHANNEL MODE		UNIT / MULTIPLIER
4	AI resistance	1 Ohm
5	AI voltage	1 V
6	AI high current	1 mA
7	AI low current	1 mA
8	AO voltage	1 V
14	PWM	0.1%
20...23	Temperature	1°C

Additional registers per each channel

Current measurement

You can read the channel current e.g. in DO mode. Scaling as per int16 present value.

REGISTER	DESCRIPTION	CHANNEL	DATATYPE	READ/WRITE
400	Channel current	CH01	uint16	RO
401	Channel current	CH02	uint16	RO
402	Channel current	CH03	uint16	RO
403	Channel current	CH04	uint16	RO
404	Channel current	CH05	uint16	RO
405	Channel current	CH06	uint16	RO
406	Channel current	CH07	uint16	RO
407	Channel current	CH08	uint16	RO
408	Channel current	CH09	uint16	RO
409	Channel current	CH10	uint16	RO
410	Channel current	CH11	uint16	RO
411	Channel current	CH12	uint16	RO
412	Channel current	CH13	uint16	RO
413	Channel current	CH14	uint16	RO
414	Channel current	CH15	uint16	RO
415	Channel current	CH16	uint16	RO

The values have been scaled according to this table:

CHANNEL MODE		UNIT / MULTIPLIER
1	Ground	1 mA
6	AI high current	1 mA
7	AI low current	0.01 mA
13	DO	0.1 mA
14	PWM	0.1 mA

Modbus watchdog / Relinquish default

The default value for outputs. Magio will use the default value on card startup, and if no Modbus packets arrive within set time.

REGISTER	DESCRIPTION	CHANNEL	DATATYPE	READ/WRITE
500	Modbus watchdog	CH01	int16	R/W
501	Modbus watchdog	CH02	int16	R/W
502	Modbus watchdog	CH03	int16	R/W
503	Modbus watchdog	CH04	int16	R/W
504	Modbus watchdog	CH05	int16	R/W
505	Modbus watchdog	CH06	int16	R/W
506	Modbus watchdog	CH07	int16	R/W
507	Modbus watchdog	CH08	int16	R/W
508	Modbus watchdog	CH09	int16	R/W
509	Modbus watchdog	CH10	int16	R/W
510	Modbus watchdog	CH11	int16	R/W
511	Modbus watchdog	CH12	int16	R/W
512	Modbus watchdog	CH13	int16	R/W
513	Modbus watchdog	CH14	int16	R/W
514	Modbus watchdog	CH15	int16	R/W
515	Modbus watchdog	CH16	int16	R/W

Factory default is 0, and **the card will turn outputs off** (AO 0V and DO off).

The default value is scaled as int16 present value registers are. For negative values Magio will use the previous value (0 on startup). The watchdog time can be set on card settings (registers in the range 3000+).

Pulse counter offset

The pulse counter value can be adjusted in two ways: by writing the desired value to present value, or by writing an offset to the following registers.

REGISTER	DESCRIPTION	CHANNE L	DATATYPE	READ/WRITE	NUM OF REGISTERS
600	Pulse counter offset	CH01	int32	R/W	2 regs
602	Pulse counter offset	CH02	int32	R/W	2 regs
604	Pulse counter offset	CH03	int32	R/W	2 regs
606	Pulse counter offset	CH04	int32	R/W	2 regs
608	Pulse counter offset	CH05	int32	R/W	2 regs
610	Pulse counter offset	CH06	int32	R/W	2 regs
612	Pulse counter offset	CH07	int32	R/W	2 regs
614	Pulse counter offset	CH08	int32	R/W	2 regs
616	Pulse counter offset	CH09	int32	R/W	2 regs
618	Pulse counter offset	CH10	int32	R/W	2 regs
620	Pulse counter offset	CH11	int32	R/W	2 regs
622	Pulse counter offset	CH12	int32	R/W	2 regs
624	Pulse counter offset	CH13	int32	R/W	2 regs
626	Pulse counter offset	CH14	int32	R/W	2 regs
628	Pulse counter offset	CH15	int32	R/W	2 regs
630	Pulse counter offset	CH16	int32	R/W	2 regs

Damping, averaging

It's possible to increase averaging for measurements. Value 0/1 = off. Larger values mean slower measurements.

REGISTER	DESCRIPTION	CHANNEL	DATATYPE	READ/WRITE
700	Damping setting	CH01	uint16	R/W
701	Damping setting	CH02	uint16	R/W
702	Damping setting	CH03	uint16	R/W
703	Damping setting	CH04	uint16	R/W
704	Damping setting	CH05	uint16	R/W
705	Damping setting	CH06	uint16	R/W
706	Damping setting	CH07	uint16	R/W
707	Damping setting	CH08	uint16	R/W
708	Damping setting	CH09	uint16	R/W
709	Damping setting	CH10	uint16	R/W
710	Damping setting	CH11	uint16	R/W
711	Damping setting	CH12	uint16	R/W
712	Damping setting	CH13	uint16	R/W
713	Damping setting	CH14	uint16	R/W
714	Damping setting	CH15	uint16	R/W
715	Damping setting	CH16	uint16	R/W

Card settings / info

Settings that affect the whole card (all channels). Datatype uint16.

REG.	DESCRIPTION	READ/ WRITE	UNIT	INFO
3000	DI pulse counter half cycle width	R/W	1 ms	Min 10 ms. Magio can measure pulses on minimum timing, if there are a maximum of 4 pulse measurement channels per card. (This limitation applies in practise to particularly time-sensitive devices only.) If there are more measurement channels, then the half cycle width will rise up to < 15 ms. (the register setting may be 10 ms in that case). Note: a 20 ms half cycle needs a 10 ms cycle width.
3001	DO PWM pulse width	R/W	1 s	
3002	AO/DO relinquish time	R/W	1 s	Modbus-watchdog. Sets channels to relinquish default, if communication stops. 0=off. Default: 180 s.
3003	IP reset request	R/W	-	Removed from use.
3004	Modbus RTU address	RO	-	1-100. Rotary switch "00" → address 100. For addon cards.
3005	Software version	RO	-	>11000
3006	Eeprom save counter	RO	-	Saves since card startup.
3007	Eeprom save request	R/W	-	A new value will set a save request (any rising or falling edge).
3008	Ext. resistor value (AI small current)	R/W	0.1 Ohm	
3009	RS485 current parity	RO		Value based on the 10x switch.
3010	RS485 current bandwidth	RO		Value based on the 1x switch.
3011	RS485 parity to set	R/W		Value based on the 10x switch.
3012	RS485 bandwidth to set	R/W		Value based on the 1x switch.
3013	RS485 apply settings	R/W		Value 0 → 21075 ("rising edge") will apply settings on registers 3011 and 3012.
3014	Active flash bank (0/1)	RO		For Firmware upgrades.
3015	Bootloader version number	RO		For Firmware upgrades.. Uint16.