Modbus RTU Protocol User Guide

for MAG X2

arkon
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1. Introduction

This manual describes the MAGX2 Modbus-RTU communication protocol.

1.1 Definitions and Abbreviations

CRC	Cyclic Redundancy Check, Used for error-checking in Modbus RTU. See appendix
Modbus master	A Modbus device, which is able to access data in one or more connected Modbus slaves
Modbus slave	A Modbus device, which is able to respond to requests from a single Modbus master
Modbus address	Throughout this document the following notation is used to address Modbus RTU registers:
	1234 - Holding register 1234 (addressed in messages by 1233)
RS232	Refers to the communication standard defined by EIA/TIA-232C. (Physical layer) EIA/TIA232C
USB	Refers to the USB Specification usb.org
RS485	Refers to the 2-wire communication standard defined by EIA/TIA-485. (Physical layer)
RTU	Remote Terminal Unit - Standard Modbus transmission mode

1.2 References

Reference 1	**Modbus over Serial Line** Specification & Implementation guide v. 1.0 Modbus.org 12/02/02
Reference 2	**Modbus Application Protocol Specification** v. 1.1 Modbus.org 12/06/02
Reference 3	**MAGX2 manual**
Reference 4	**GSM SMS Module Specification**

2. Technical data

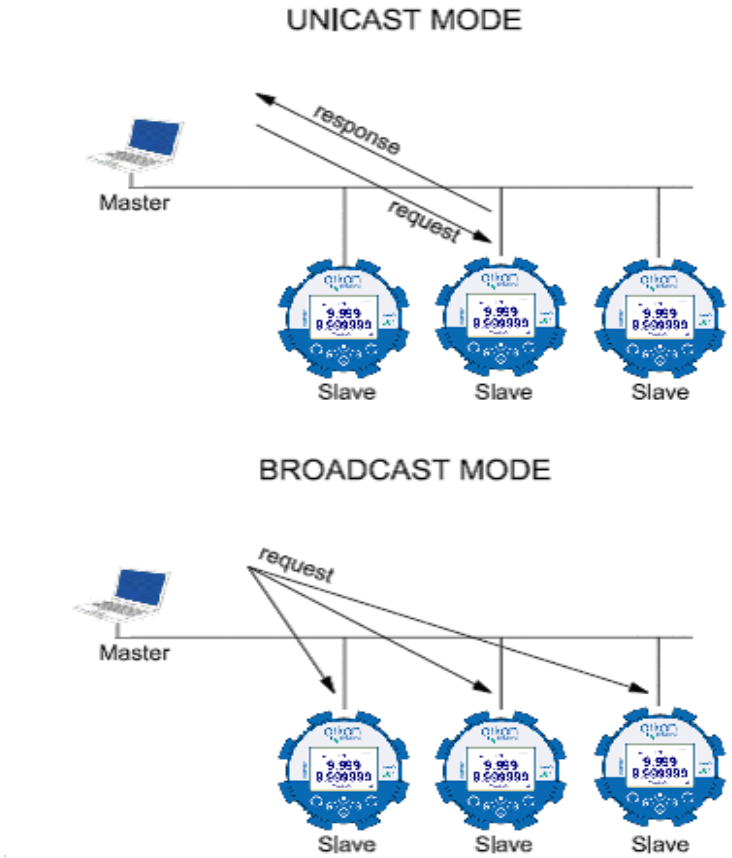
ARKON Flowmeter Modbus RTU specification	
Device type	Slave
Baud rates	4800, 9600, 19200, 38400 bits/sec.
Number of stations Recommended:	max. 31 per segment without repeaters
Device address range	1-247
Protocol	Modbus RTU (Other Modbus protocols like ASCII, Plus or TCP/IP are not supported)
Electrical interface	RS232, RS485 - 2 wire, USB, TCP/IP, Bluetooth
Supported function code	3 read holding registers
	16 write multiple registers
	17 report slave ID
Broadcast	No
Maximum cable length	Reference 3
Standard Modbus over serial line v1.0)	
Certified	No

2.1 General Modbus RTU

The module complies with the Modbus serial line protocol [Reference 1].

Among other things, this implies a **master-slave** protocol at level 2 of the OSI model. One node, (the master), issues explicit commands to one of the „slave"-nodes and processes responses. Slave nodes will not transmit data without request from the master node, and do not communicate with other slaves. Modbus is a mono **master system**, which means that only one **master** can be connected at any single point in time.

Two modes of communication are possible, **Unicast** and **Broadcast**. **Unicast** mode is where the **master** sends a request to one **slave device**, and waits a specified time for a response. In **Broadcast** mode the master sends out a request to address „0", which means that the information is for all **slave devices** on the network. In **Broadcast** mode there is no response from the **slave devices**.



The Modbus frame is shown below, and is valid for both requests and responses.

SLAVE ADRESS	FUNCTION CODE	DATA	CRC
1 Byte	1 Byte	0-252 Bytes	2 Bytes

Further details of the Modbus protocol can be found in Reference 1 and 2.

3. Commissioning

Before communicating with the master, Baud rate, slave ID and Parity must be selected. This can be done from the display. Please look at into the MAGX2 transmitter manual to locate the Modbus menu. (see Reference 3.)

Item	Value	Comments
Slave address	1 - 247	Device address [Factory setting: 1]
Baud rate	4800, 9600, 19200, 38400	Communication speed [Factory setting: 9600]
Parity/framing	Even, 1 stopbit	Communication parameters [Factory setting: Even, 1 stopbit]
	Odd, 1 stopbit	
	None, 2 stopbit	
	None, 1 stopbit	

4. Modbus addressing module

The module allows R/W access to the following standard Modbus data register blocks:

- Holding registers

I.e. the module will not support the other standard data register blocks:

- Coils
- „Discrete input“
- „Input registers“

4.1 Modbus function codes

This device supports following function codes: 3, 16 and 17.

Function code 3 and 16 are used for accessing registers. Function code 17 (report slave ID) will return a structure of identification information of the device. Below the different function code exceptions are described.

Function code 3 (Read holding registers)
General exceptions:

- Requesting less than 1 or more than 125 registers => Exception 3 (Illegal data value)
- Requesting more than max. message size => Exception 2 (Illegal data address)
- Requesting data above/crossing limitation of max. register address (0xFFFF) => Exception 2 (Illegal data address)
- If the end address is only part of a mapped holding register item (e.g. one half of a longint value) => Exception 2 (Illegal data address)

Application exceptions:

- Application errors => Exception 2 (Illegal data address)

Holes/register alignment:

- The read command always returns data if no exception is given. Bad start/end alignment will result in only parts of the data item being read.
- Holes in the holding register map return Exception 2 (Illegal data address)

Function code 16 (Write multiple registers)
General exceptions:

- Exceeding max. message size => Exception 2 (Illegal data address)
- Writing data above/crossing limitation of max. register address (0xFFFF) => Exception 2(Illegal data address)

Application exceptions:

- Application errors => Exception 2 (Illegal data address)
- Application errors include writing to ReadOnly holding registers

Holes / register alignment:

- If start-address is not the start of a mapped holding register => Exception 2 (Illegal data address)
- Writing to holes is not allowed => Exception 2 (Illegal data address)
- If the end address is only part of a mapped holding register item (e.g. one half of a longint value), the action depends on the datatype.
- If the end address is only part of a mapped holding register item (e.g. one half of a longint value) => Exception 2 (Illegal data address)

Function code 17 (Report Slave ID)

- There are no exceptions for this function

5. Modbus holding registers

Below, the holding registers for the MAGX2 Modbus RTU module are described.

Modbus Start Register	Section
2	Password
100	Real-time measurement
1000	Info
1500	Display
2000	User settings
3000	Service settings
4000	Factory settings
5000	Authorize
10000	Datalogger

Holding registers memory map

When writing to the Holding registers, data validity is not checked. Writing incorrect values can result in unexpected behaviour of the device. In any further explanations, the following data types are used:

Longint – Number consisting of 32 bits, formed by 2 Modbus registers. It is necessary to write both Low and High Word of this item, the register number always has to be an even number. Not meeting these requirements will cause an Exception 2 error (Illegal data address). In case information about the number of decimals is available, then the final number is given by the following formula: Y = X * 10^(-DEC), where Y is the final number, X the read number, and DEC the number of decimals.

Bool – this item can be read, but its value has no meaning. Writing value 1 to this item will cause an unspecified operation to be performed (erasing the Memory module, resetting the flow totalizers, etc. Reference 3). It is necessary to write both Low and High Word of this item, the register number always has to be an even number. Not meeting these requirements will cause an Exception 2 error (Illegal data address).

Modbus register	Data Type	Low/High Word
2	Longint	L
3		H
4	Bool	L
5		H

Data type memory map

5.1 Password

To enter the "User settings, Service settings, Factory settings, and Authorize" sections, it is necessary to enter a password in the same way as for the MAGX2 flowmeter menu, see reference 3.

Modbus register	Modbus address	No. of bytes	Data type	No. of decimal	Min Value	Max Value	Description	Read/ Write
2	1	4	Longint	0	0	9999	Password (User)	R*/W
4	3	4	Longint	0	0	9999	Password (Service)	R*/W
6	5	4	Longint	0	0	9999	Password (Factory)	R*/W
8	7	4	Longint	0	0	9999	Password (Authorize)	R*/W

*) For safety purposes, it is not possible to read this item directly. In case a 0 is read from this register, it means that no valid password was entered, and the given section is not accessible. In case a 1 is read, a valid password was entered and hence the given section can be accessed freely. To close the section, you write any possible invalid password to the password entry.

Password (User) – default user password “1111”

5.2 Real-time measurement

Modbus register	Modbus address	No. of bytes	Data type	No. of decimal	Min Value	Max Value	Description	Read/ Write
100	99	4	Longint	3	-10^7	10^7	FLOW	R
102	101	4	Longint	0	0	2^32	TOTAL *	R
104	103	4	Longint	6	0	2^32	TOTAL DEC *	R
106	105	4	Longint	0	0	2^32	AUX *	R
108	107	4	Longint	6	0	2^32	AUX DEC *	R
110	109	4	Longint	0	0	2^32	TOTAL+ *	R
112	111	4	Longint	6	0	2^32	TOTAL+ DEC *	R
114	113	4	Longint	0	0	2^32	TOTAL- *	R
116	115	4	Longint	6	0	2^32	TOTAL- DEC *	R
118	117	4	Longint	1	0	2^32	TEMP	R
120	119	4	Longint	-	0	0xFFFFFFFF	Actual Error	R

*) The final number is given by the sum of the whole and the decimal. Example: Resulting Total measurement = (TOTAL) + (TOTAL DEC*10^-3).

Flow

Unit: m3/h - it is not possible to change it. Real value = Actual value divided by 1000.

TOTAL (TOTAL +, TOTAL -, AUX +)

Unit: m^3 – it is not possible to change it. Real value = Actual value divided by 1000.

Temp

Real value = Actual value divided by 10.

Actual Error

Actual error is represented in Hex format. For decode it has to be conversed to binary format, where each bit represent specific error. (See MAGX2 manual, MAGX2 Error Code Table)

5.3 Info

Modbus register	Modbus address	No. of bytes	Data type	No. of decimal	Min Value	Max Value	Description	Read/ Write
1000	999	4	Longint	0	-	-	Unit No.	R
1002	1001	4	Longint	0	-	-	Sensor Unit No.	R
1004	1003	4	Longint	0	-	-	Error [min]	R
1006	1005	4	Longint	0	-	-	OK [min]	R
1008	1007	4	Longint	0	-	-	Diameter [mm]	R
1010	1009	4	Longint	3	-	-	Flow Qn [m3/h]	R
1012	1011	4	Longint	2	-	-	FirmWare No.	R
1014	1013	4	Longint	0	-	-	Actual Error	R
1016	1015	4	Longint	0	-	-	Power Frequency [Hz]	R
1018	1017	4	Longint	0	0	1	SD Card Present, 0=No, 1=Yes	R
1020	1019	4	Longint	0	0	1	GSM Module present, 0=No, 1=Yes	R
1022	1021	4	Longint	0	0	0xffffffff	GPRS IP Address	R
1024	1023	4	Longint	0	0	100	GSM Signal [%]	R

Unit no. – unique number for each Flowmeter. If there are any problems, please refer to this number.

Error [min] – the number of minutes the device was measuring with some error.

OK [min] - the number of minutes that the device measured correctly.

Diameter [mm] – the nominal sensor diameter.

Flow Qn [m3/h] – nominal flow.

Firmware No. – this item shows the current firmware version

Actual Error - Actual error is represented in Hex format. For decode it has to be converted to binary format, where each bit represent each error. (See MAGX2 manual, MAGX2 Error Code Table).

Power Frequency – Frequency of power network.

SD Card Present – Value represent if SD card is present. (0 = not, 1 = is present).

GSM Module present - Value represent if GSM Module is present (0 = not, 1 = is present) [Reference 4].

GPRS IP Address - Actual IP address of GPRS module.

GSM Signal – Signal strength of GSM module [Reference 4].

5.4 Display

Modbus register	Modbus address	No. of bytes	Data type	No. of decimal	Min Value	Max Value	Description	Read/ Write
1500	1499	4	Longint	-	0	4	Unit Flow, 0=UKG/min, 1=USG/min, 2=m3/h, 3=l/min, 4=l/s	R/W
1502	1501	4	Longint	-	0	3	Unit Volume, 0=UKG, 1=USG, 2=m3, 3=l	R/W
1504	1503	4	Longint	-	0	1	Unit Temperature 0 = °C, 1 = °F	R/W
1506	1505	4	Longint	-	0	1	Language, 0 = ENG, 1 = SPA	R/W
1508	1507	4	Longint	-	0	100	Contrast [%]	R/W

Unit Flow – actual flow unit (default m^3/h)

Unit Volume – totalizer unit (default m^3)

Language = Language of transmitter menu

Contrast – Set display's contrast.

5.5 User settings

Modbus register	Modbus address	No. of bytes	Data type	No. of decimal	Min Value	Max Value	Description	Read/ Write
2000	1999	4	Longint	-	0	1	Measurement, 0 = Run, 1 = Stop	R/W
2002	2001	4	Longint	-	0	10	Datalogger Interval, 0 = OFF, 1 = 1min, 2 = 5min, 3 = 10min, 4 = 15min, 5 = 30min, 6 = 1h, 7 = 2h, 8 = 6h, 9 = 12h, 10 = 24h	R/W
2004	2003	4	Longint	-	0	1	CSV Format, 0 = Coma (,), 1 = Semicolon (;)	R/W
2006	2005	4	Longint	-	0	1	Air Detector 0 = OFF, 1 = ON	R/W
2008	2007	4	Longint	3	0	0,999	Air Constant	R/W
2010	2009	4	Bool	-	0	1	Delete Auxiliary Volume?	R/W
2012	2011	4	Longint	0	0	120	Start Delay [s]	R/W
2014	2013	4	Longint	0	1	120 (60)	Samples per Avg.	R/W
2016	2015	4	Longint	-	0	5	Low Flow Cutoff, 0 = 0.5%, 1 = 1%, 2 = 2%, 3 = 5%, 4 = 10%, 5 = OFF	R/W
2018	2017	4	Longint	3	0	36 000	Flow Qn [m3/h]	R/W
2020	2019	4	Longint	-	0	1	Invert Flow, 0 = No-invert, 1 = Invert	R/W
2022	2021	4	Longint	-	0	6	Current Loop Setting - Signal, 0 = Flow+, 1 = Flow-, 2 = Error, 3 = Air detector, 4 = Fixed,	R/W

							5 = Direct driving, 6 = OFF	
2024	2023	4	Longint	3	0	36 000	Flow min. [m3/h]	R/W
2026	2025	4	Longint	3	0	36 000	Flow max. [m3/h]	R/W
2028	2027	4	Longint	0	4	20	Current min. [mA]	R/W
2030	2029	4	Longint	0	4	20	Current max. [mA]	R/W
2032	2031	4	Longint	0	4	20	Current Loop Calibration point 1 [mA]	R/W
2034	2033	4	Longint	0	4	20	Current Loop Calibration point 2 [mA]	R/W
2036	2035	4	Longint	4	0.5	1.5	Current Loop Calibration const 1	R/W
2038	2037	4	Longint	4	0.5	1.5	Current Loop Calibration const 2	R/W
2040	2039	4	Longint	-	0	6	Voltage Output Setting - Signal, 0 = Flow+, 1 = Flow-, 2 = Error, 3 = Air detector, 4 = Fixed, 5 = Direct driving, 6 = OFF	R/W
2042	2041	4	Longint	3	0	36 000	Flow min. [m3/h]	R/W
2044	2043	4	Longint	3	0	36 000	Flow max. [m3/h]	R/W
2046	2045	4	Longint	0	0	10	Voltage min. [V]	R/W
2048	2047	4	Longint	0	0	10	Voltage max. [V]	R/W
2050	2049	4	Longint	-	0	9	Relay 1 Setting - Signal, 0 = OFF, 1 = Fixed, 2 = Flow+, 3 = Flow-, 4 = Error, 5 = Air Detect, 6 = On In, 7 = On Out, 8 = On<F1, 9 = On>F1	R/W
2052	2051	4	Longint	-	0	9	Relay 2 Setting - Signal, 0 = OFF, 1 = Fixed, 2 = Flow+,	R/W

							3 = Flow-, 4 = Error, 5 = Air Detect, 6 = On In, 7 = On Out, 8 = On<F1, 9 = On>F1	
2054	2053	4	Longint	3	0	36 000	Flow 1 [m3/h]	R/W
2056	2055	4	Longint	3	0	36 000	Flow 2 [m3/h]	R/W
2058	2057	4	Longint	3	0	36 000	Hysteresis 1 [m3/h]	R/W
2060	2059	4	Longint	3	0	36 000	Hysteresis 2 [m3/h]	R/W
2062	2061	4	Longint	-	0	8	Relay 3 Setting – Signal, 0 = OFF, 1 = ON, 2 = Flow+, 3 = Flow-, 4 = Error, 5 = Air Detect, 6 = Pulse/Litre+, 7 = Pulse/Litre-, 8 = Dosing	R/W
2064	2063	4	Longint	-	0	8	Relay 4 Setting – Signal, 0 = OFF, 1 = ON, 2 = Flow+, 3 = Flow-, 4 = Error, 5 = Air Detect, 6 = Pulse/Litre+, 7 = Pulse/Litre-, 8 = Dosing	R/W
2066	2065	4	Longint	0	0	99 999	Pulse / Litre + [l]	R/W
2068	2067	4	Longint	0	0	99 999	Pulse / Litre – [l]	R/W
2070	2069	4	Longint	0	0	99 999	Dose (Batch) [l]	R/W
2072	2071	4	Longint	-	0	6	Frequency Settings – Signal, 0 = OFF, 1 = Fixed, 2 = Flow+, 3 = Flow-, 4 = Error, 5 = Air Detect, 6 = Direct Driving	R/W
2074	2073	4	Longint	3	0	36 000	Flow 1 [m3/h]	R/W
2076	2075	4	Longint	3	0	36 000	Flow 2 [m3/h]	R/W

2078	2077	4	Longint	0	0	1 000	Frequency min [Hz]	R/W
2080	2079	4	Longint	0	0	1 000	Frequency max [Hz]	R/W
2082	2081	4	Longint	0	1	99	Duty Cycle [%]	R/W
2084	2083	4	Bool	-	0	1	Load Default Settings	R/W
2086	2085	4	Longint	0	0	31 129 999	Date Settings	R/W
2088	2087	4	Longint	0	0	235 959	Time Settings	R/W
2090	2089	4	Longint	0	0	9 999	User Password	R/W
2092	2091	4	Longint	0	0	247	Modbus Slave Address	R/W
2094	2093	4	Longint	0	0	3	Modbus Baudrate, 0 = 4800, 1 = 9600, 2 = 19200, 3 = 38400	R/W
2096	2095	4	Longint	0	0	3	Parity, 0 = Even, 1stopbit, 1 = Odd,1stopbit, 2 = None, 2stopbits, 3 = None, 1stopbit	R/W
2098	2097	4	Longint	0	0	2	Electrode Cleaning, 0 = OFF, 1 = ON, 2 = ON Start	R/W
2100	2099	4	Longint	0	1	9999	Clean Time [s]	R/W
2102	2101	4	Bool	-	0	1	Start Now?	R/W
2104	2103	4	Longint	0	0	1	Totalizer Cycling, 0 = ON, 1 = OFF	R/W
2106	2105	4	Longint	5	0	50000	GSM Data Interval [min]	R/W
2108	2107	4	Longint	8	0	99999999	GSM Phone 1 High	R/W
2110	2109	4	Longint	8	0	99999999	GSM Phone 1 Low	R/W
2112	2111	4	Longint	8	0	99999999	GSM Phone 2 High	R/W
2114	2113	4	Longint	8	0	99999999	GSM Phone 2 Low	R/W
2116	2115	4	Longint	8	0	99999999	GSM Phone 3 High	R/W
2118	2117	4	Longint	8	0	99999999	GSM Phone 3 Low	R/W

2120	2119	4	Longint	-	0	1	GSM Empty Pipe Event, 0 = OFF, 1 = ON	R/W
2122	2121	4	Longint	-	0	1	GSM Zero Flow Event, 0 = OFF, 1 = ON	R/W
2124	2123	4	Longint	-	0	1	GSM Error Detect Event, 0 = OFF, 1 = ON	R/W
2126	2125	4	Longint	-	0	1	GSM Empty Pipe Event Settings, 0 = ON and OFF, 1 = Only ON	R/W
2128	2127	4	Longint	-	0	1	GSM Empty Pipe Event Settings, 0 = ON and OFF, 1 = Only ON	R/W
2130	2129	4	Longint	0	0	0xFFFFFFFF	GPRS_GateWay0	R/W
2132	2131	4	Longint	0	0	0xFFFFFFFF	GPRS_GateWay1	R/W
2134	2133	4	Longint	0	0	0xFFFFFFFF	GPRS_GateWay2	R/W
2136	2135	4	Longint	0	0	0xFFFFFFFF	GPRS_GateWay3	R/W
2138	2137	4	Longint	0	0	0xFFFFFFFF	GPRS_GateWay4	R/W
2140	2139	4	Longint	0	0	0xFFFFFFFF	GPRS_GateWay5	R/W
2142	2141	4	Longint	0	0	0xFFFFFFFF	GPRS_GateWay6	R/W
2144	2143	4	Longint	0	0	0xFFFFFFFF	GPRS_GateWay7	R/W
2146	2145	4	Longint	0	0	0xFFFFFFFF	GPRS_GateWay8	R/W
2148	2147	4	Longint	0	0	0xFFFFFFFF	GPRS_GateWay9	R/W
2150	2149	4	Longint	0	0	0xFFFFFFFF	GPRS _GateWay10	R/W
2152	2151	4	Longint	0	0	0xFFFFFFFF	GPRS_GateWay11	R/W
2154	2153	4	Longint	0	0	0xFFFFFFFF	GPRS_GateWay12	R/W
2156	2155	4	Longint	0	0	0xFFFFFFFF	GPRS_GateWay13	R/W
2158	2157	4	Longint	0	0	0xFFFFFFFF	GPRS_GateWay14	R/W

2160	2159	4	Longint	0	0	0xFFFFFFFF	GPRS_GateWay15	R/W
2162	2161	4	Longint	0	0	0xFFFFFFFF	GPRS_User0	R/W
2164	2163	4	Longint	0	0	0xFFFFFFFF	GPRS_User1	R/W
2166	2165	4	Longint	0	0	0xFFFFFFFF	GPRS_User2	R/W
2168	2167	4	Longint	0	0	0xFFFFFFFF	GPRS_Password0	R/W
2170	2169	4	Longint	0	0	0xFFFFFFFF	GPRS_Password1	R/W
2172	2171	4	Longint	0	0	0xFFFFFFFF	GPRS_Password2	R/W
2174	2173	4	Longint	0	0	1 024	GPRS_Port	R/W
2176	2175	4	Longint	0	0	9 999	GPRS_PIN	R/W

Measurement – 0 = Stop – the unit shows actual flow, but the totalizers are stopped.
1 = Running – totalizers are active. Default Stop.

Datalogger Interval – this function selects how often data is written to the datalogger.

CSV Format – Set separator between each data. Set comma or semicolon.

Air Detector – this option allows selecting empty pipe check. Default OFF.

Air Constant – constant value to determine the Empty pipe detection limit. Default 188.

Delete Aux + Volume – write value different to zero for erasing the auxiliary flow totalizer.

Start Delay – Value represent how long is stabilize all component. (actual flow is “0” at this time).

Samples per Avg. – the number of samples that the flowmeter will use for calculation of its displayed average flow value. Default 15. (Maximal value for sensor v.8 and later is 120 and for sensor v.7 is 60)

Low Flow Cutoff – this function serves to set the minimum flow the flowmeter will react on. Default 2%.

Flow Qn – set nominal flow (automatic set if changing the diameter).

Invert Flow – this function serves to change the direction of the flow. Default No-invert.

Current Loop Setting - see chapter Current Loop in MAGX2 manual.

Flow min - see chapter User Setting Menu - Current Loop in MAGX2 manual.

Flow max - see chapter User Setting Menu - Current Loop in MAGX2 manual.

Current min - see chapter User Setting Menu - Current Loop in MAGX2 manual.

Current max - see chapter User Setting Menu - Current Loop in MAGX2 manual.

Current Loop Calibration point 1 - see chapter User Setting Menu - Current Loop in MAGX2 manual.

Current Loop Calibration point 2 - see chapter User Setting Menu - Current Loop in MAGX2 manual.

Current Loop Calibration constant 1 - see chapter User Setting Menu - Current Loop in MAGX2 manual.

Current Loop Calibration constant 2 - see chapter User Setting Menu - Current Loop in MAGX2 manual.

Voltage output Setting – see chapter User Setting Menu – Voltage Output in MAGX2 manual.

Flow min - see chapter User Setting Menu – Voltage Output in MAGX2 manual.

Flow max - see chapter User Setting Menu – Voltage Output in MAGX2 manual.

Voltage min - see chapter User Setting Menu – Voltage Output in MAGX2 manual.

Voltage max - see chapter User Setting Menu – Voltage Output in MAGX2 manual.

Relay 1 setting – see chapter User Setting Menu – Pulse Output in MAGX2 manual.

Relay 2 setting – see chapter User Setting Menu – Pulse Output in MAGX2 manual.

Flow 1 - see chapter User Setting Menu – Pulse Output in MAGX2 manual.

Flow 2 - see chapter User Setting Menu – Pulse Output in MAGX2 manual.

Hysteresis 1 - see chapter User Setting Menu – Pulse Output in MAGX2 manual.

Hysteresis 2 - see chapter User Setting Menu – Pulse Output in MAGX2 manual.

Relay 3 setting – see chapter User Setting Menu – Pulse Output in MAGX2 manual.

Relay 4 setting – see chapter User Setting Menu – Pulse Output in MAGX2 manual.

Volume plus - see chapter User Setting Menu – Pulse Output in MAGX2 manual.

Volume minus - see chapter User Setting Menu – Pulse Output in MAGX2 manual.

Dose (Batch) - see chapter User Setting Menu – Pulse Output in MAGX2 manual.

Frequency setting – see chapter User Setting Menu – Frequency Output in MAGX2 manual.

Flow 1 - see chapter User Setting Menu – Frequency Output in MAGX2 manual.

Flow 2 - see chapter User Setting Menu – Frequency Output in MAGX2 manual.

Frequency 1 - see chapter User Setting Menu – Frequency Output in MAGX2 manual.

Frequency 2 - see chapter User Setting Menu – Frequency Output in MAGX2 manual.

Duty cycle - see chapter User Setting Menu – Frequency Output in MAGX2 manual.

Load default settings – Load default factory setting or users changing setting on function Save setting.

Date Settings - date write in BCD format YYYYMMDD (i.e. 25.03.2010 = (hex)0x20100325)

Time Settings - time write in BCD format HHMMSS (i.e. 08:33:15 = (hex)0x00083315)

Password Setup – Set password (user).

Modbus Slave Address – Modbus device address. Default 1

Modbus Baudrate – setup communication speed. Default 9600.

Modbus Parity – setup communication parameters. Default Even, 1 stopbit.

Electrode Cleaning – Set electrode cleaning

Clean Time – number of seconds, how long run electrode cleaning, when select “On Start” or “Start Now”

Start Now? – If set, start electrode cleaning now for Clean Time.

Totalizer Cycling – If set, each 3 seconds change totalizer on Main screen**.**

GSM Data Interval – For more info see GSM SMS Module Specification (chapter Set Sending Interval) [Reference 4].

GSM Phone 1 H, GSM Phone 2 H, GSM Phone 3 H – High part of phone number (i.e. 4207 for phone number +420777123456). Do not enter character +. The character + is added automatically. All phone numbers must be in international format (i.e. +420123456789). For more info see GSM SMS Module Specification [Reference 4].

GSM Phone 1 L, GSM Phone 2 L, GSM Phone 3 L – Low part of phone number (i.e. 77123456 for phone number +420777123456) [Reference 4].

GSM Empty Pipe Event – For more info see GSM SMS Module Specification [Reference 4].

GSM Zero Flow Event – For more info see GSM SMS Module Specification [Reference 4].

GSM Error Detect Event – For more info see GSM SMS Module Specification [Reference 4].

GSM Empty Pipe Event Settings – For more info see GSM SMS Module Specification [Reference 4].

GSM Zero Flow Event Settings – For more info see GSM SMS Module Specification [Reference 4].

5.6 Service Settings

Modbus register	Modbus address	No. of bytes	Data type	No. of decimal	Min Value	Max Value	Description	Read/ Write
3000	2999	4	Bool	-	0	1	Error Delete?	R/W
3002	3001	4	Bool	-	0	1	OK Delete?	R/W
3004	3003	4	Bool	-	0	1	Delete Volume (-)?	R/W
3006	3005	4	Bool	-	0	1	Delete Volume (+)?	R/W
3008	3007	4	Bool	-	0	1	Delete Volume Total?	R/W
3010	3009	4	Longint	0	0	1	Flow simulation, 0=ON, 1=OFF	R/W
3012	3011	4	Longint	3	0	36 000 000	Simulated flow [m3/h]	R/W

Delete Error (min) – write value different to zero for erasing the Error min counter.

Delete OK (min) – write value different to zero for erasing the OK min counter.

Delete Total – Volume – write value different to zero for erasing the Total – flow totalizer.

Delete Total + Volume – write value different to zero for erasing the Total + flow totalizer.

Delete Total Volume – write value different to zero for erasing the Total flow totalizer.

Flow Simulation – switch off/on the simulation flow function. Default OFF.

Simulated Flow – write simulated flow.

5.7 Factory Settings

Modbus register	Modbus address	No. of bytes	Data type	No. of decimal	Min Value	Max Value	Description	Read/ Write
4000	3999	4	Longint	0	10	1 000	L = Diameter	R/W
4002	4001	4	Longint	0	0	9 999 999	Unit No.	R/W
4004	4003	4	Longint	3	0.015	36 000 000	Calibration Point1	R/W
4006	4005	4	Longint	3	0.015	36 000 000	Calibration Point2	R/W
4008	4007	4	Longint	3	0.015	36 000 000	Calibration Point3	R/W
4010	4009	4	Longint	0	-10000000	10000000	Calibration Data1	R/W *
4012	4011	4	Longint	0	-10000000	10000000	Calibration Data2	R/W *
4014	4013	4	Longint	0	-10000000	10000000	Calibration Data3	R/W *
4016	4015	4	Bool	-	0	1	Zero Flow?	R/W
4018	4017	4	Longint	0	-10000000	10000000	Zero Flow Constant	R/W
4020	4019	4	Bool	-	0	1	Zero Flow Erase?	R/W
4022	4021	4	Longint	-	0	1	Excitation frequency, 0=3.125Hz, 1=6.250Hz	R/W
4024	4023	4	Longint	-	0	1	Excitation, 0=ON, 1=OFF	R/W
4026	4025	4	Longint	-	0	1	Service Mode, 0=ON, 1=OFF	R/W
4028	4027	4	Bool	-	0	1	Save Settings?	R/W

Diameter – diameter of the sensor.

Unit No. – set serial number of the unit

Calibration Point 1 – calibration flow 1

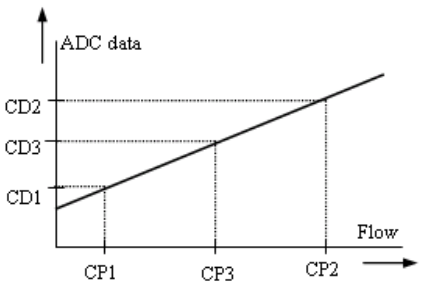
Calibration Point 2 – calibration flow 2

Calibration Point 3 – calibration flow 3

Calibration Data 1 – calibration data 1

Calibration Data 2 – calibration data 2

Calibration Data 3 – calibration data 3



CD1 = Calibration data 1
CD2 = Calibration data 2
CD3 = Calibration data 3
CP1 = Calibration point 1
CP2 = Calibration point 2
CP3 = Calibration point 3
ADC data = data from AD converter

Note: CP1 < CP3 < CP2 and CD1 < CD3 < CD2.
The calibration point 3 and the calibration data 3 could be set to zero. CP1 < CP2 and CD1 < CD3.

Zero Flow? – after activation this function, average value from ADC converter (number of samples for average is value of Samples per Average).

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Zero Flow Constant – Set manually value for zero flow constant.

Zero Flow Erase – erase zero flow constant.

Excitation Frequency – choose the excitation frequency.

Excitation – write zero for turn OFF the excitation. Default ON.

Service Mode – write value different to zero for turn ON the service mode. Default OFF.

Save Settings? – Save setting to battery backed up RAM, next time will be load with Load Default Settings function.

5.8 Authorize

Modbus register	Modbus address	No. of bytes	Data type	No. of decimal	Min Value	Max Value	Description	Read/ Write
5000	4999	4	Longint	0	0	9 999	User Password Setup	R/W

Password Setup – Set password (user).

5.9 Datalogger

Modbus register	Modbus address	No. of bytes	Data type	No. of decimal	Min Value	Max Value	Description	Read/ Write
10000	9999	4	Longint	0	0	99991231	Request Date	R/W
10002	10001	4	Longint	0	0	235959	Request Time	R/W
10004	10003	4	Longint	0	0	235959	Datalogger Date	R
10006	10005	4	Longint	0	0	235959	Datalogger Time	R
10008	10007	4	Longint	0	0	235959	Total + DIG	R
10010	10009	4	Longint	0	0	235959	Total + DEC	R
10012	10011	4	Longint	0	0	235959	Total – DIG	R
10014	10013	4	Longint	0	0	235959	Total – DEC	R
10016	10015	4	Longint	0	0	235959	Error min	R
10018	10017	4	Longint	0	0	235959	Error	R

Request Date – Date which is needed to read from datalogger

Request Time – Time which is needed to read from datalogger

Datalogger Date – date of datalogger record

Datalogger Time – time of datalogger record

Total + DIG – Positive totalizer integral fraction

Total + DEC – Positive totalizer decimal fraction (always 3 decimal numbers, i.e.: 25 = 0.025)

Total – DIG – Negative totalizer integral fraction

Total – DEC – Negative totalizer decimal fraction (always 3 decimal numbers, i.e.: 25 = 0.025)

Error min – the number of minutes the device was not measuring because of errors.

Error – Error code, for decode see MAGX2 manual.

6. Contact

Technical support: support@arkon.co.uk
Skype: support.arkon
Sales office: office@arkon.co.uk

Office hours:
8:30 – 18:00 (GMT+1)

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