

# **ALSONIC**

Modbus Specifications v1.21

ALSONIC

## Contents

1	Introduction.....	3
2	Physical Layer .....	3
3	Data Layer .....	3
3.1	Transmission mode	3
3.2	Data blocks	3
3.3	Checksum (CRC16)	4
3.4	Implemented Modbus function	5
3.5	BAUD Rate	5
4	Register map .....	6
4.1	Periodically updated values	6

## 1 Introduction

Describe the role of the document

## 2 Physical Layer

Sensors can be configured to be compatible with any UART based physical protocols: UART, RS-232, RS-485.

The RS485 is implemented with 5V levels.

## 3 Data Layer

TBD

### 3.1 Transmission mode

The transmission mode is RTU (Remote Terminal Unit). The transmission of data is in binary format (hexadecimal) with 8 bits.

The LSB (least significant bit) is the first to be transmitted.

### 3.2 Data blocks

All data blocks have the same structure

Slave Address	Function code	Data field	Checksum CRC16
1 Byte	1 Byte	x Byte	2 Bytes

Each data block contains 4 fields:

- **Slave Address** - Device address of a specific slave
- **Function code** - Function selection (read, write words)
- **Data field** - Contains the information:
  - Word address (2 bytes)
  - Number of words (2 bytes)
  - Word value
- **Checksum**

### 3.3 Checksum (CRC16)

The checksum (CRC16) transmission errors are detected. If an error is identified during evaluation, the corresponding device does not respond.

Checksum parameters:

- Type: CRC-16 (Modbus)
- Initial value: FFFF (hex)
- Polynomial:  $x^{16} + x^{15} + x^2 + 1 = 8005$  (hex)
- XOR Out: 0
- Reflection In: ON
- Reflection Out: ON

Examples:

Data request: reading 2 words from address 1 (CRC16 = 0x0B20)

01	04	00	01	00	02	20	0B
Dev ID	Read Command	Register Address		Number of words		CRC16	

Answer: (CRC16 = 0xF789)

01	04	04	09	9B	00	00	89	F7
Dev ID	Read Command	Number of Data bytes	Word 1		Word 2		CRC16	

### 3.4 Implemented Modbus function

The following Modbus functions are supported:

Function number	Function
04	Read n words
16	Write n words

### 3.5 BAUD Rate

BAUD rates between 9600 and 1000000 are supported. BAUD rate can be limited by the selected MCU for a specific configuration or power consumption requirements.

Default BAUD rate is 115200.

Baud rate can be changed by writing the new BAUD rate to address 321-322 in UInt32 format. See section 4.2.

### 3.6 Device address

Default device address is 0x01. Supported addresses are between 1 and 247.

Device address can be changed by writing the new address to address 320. See section 4.2.

### 3.7 Parity

Parity is EVEN

### 3.8 Stop bit

Stop bit is 1.

## 4 Register map

This section describes the register access type and addresses.

### 4.1 Periodically updated values

Values that are updated after every measurement can be read using 04 function. These registers are read-only.

Register details are presented in the table below:

Address	Register name	Range	Resolution	Unit	Comments
0	Flow	Int32	0.1	l/h	
2	Temp Internal	Int16	0.01	°C	
3	Temp Remote	Int16	0.01	°C	(Optional)
4	Temp Difference	Int16	0.01	°C	(Optional)
5	Pressure	Int16	0.001	Bar	(Optional)
6	Power	Int32	0.01	kW	(Optional)
8	Error	UInt16		n/a	Not yet implemented
9	Warning	UInt16		n/a	Not yet implemented
10	Air Bubble signal	UInt16			0 – No air 1 – Air detected
11	Bubble detection level	UInt16			0 – No air 1 – Small amount of air 2 – Medium amount of air 3 – High amount of air 4 – Severe / completely air
12	Reserved	Int16			
13	Reserved	Int16			
14	Reserved	Int16			
15	Reserved	Int16			
500	Totalizer 1 Sum water volume	Int32	1	l	

<b>502</b>	<b>Totalizer 2 Power on time</b>	<b>Int32</b>	<b>1</b>	<b>s</b>	
<b>504</b>	<b>Totalized 3 Power on time with flow</b>	<b>Int32</b>	<b>1</b>	<b>s</b>	<b>Time with flow rate</b>
<b>506</b>	<b>Energy sum</b>	<b>Int32</b>	<b>0.01</b>	<b>kWh</b>	
<b>508</b>	<b>Reserved</b>	<b>Int32</b>			

## 4.2 Configuration parameters with Read/Write access

The following values can be written to memory. Values are updated after the memory write command is executed.

Register details are presented in the table below:

Address	Register name	Range	Resolution	Unit	Comments
320	Device ID	Int8	1		<b>1 to 247</b> Default: 1
321	BAUD Rate	UInt32	1	bps	<b>9600 to 115200</b> Default: 115200
323	Reserved	Int8			
324	Parity	Int8			<b>Not yet implemented</b> Default: Even
325	Stop bit	Int8			<b>Not yet implemented</b> Default: 1
326	Reserved	Int8			
327	Reserved	Int8			
328	Energy meas. config	Int8			<b>Not yet implemented</b>