WiMo / WiMo Plus

MODBUS PROTOCOL

version 1.2 (16.04.25)

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1 Introduction

Both WiMo and WiMo Plus sondes are able to communicate with external system using Modbus RTU protocol. User can switch off the functionality in the WiMo sonde html interface. Please refer to the user manual for Modbus communication settings.

2 Mechanical interface

The mechanical interface is composed of 6 pin micro series subconn connector located at the opposite side of the sensor cap :



IO numbering is as follows :

RS485

Pin number SUBCONN	Description
1	**GND**
2	**12V**
3	Reserved
4	Reserved
5	**B/RI**
6	**A/DO**

RS232

Pin number SUBCONN	Description
1	**GND**
2	**12V**
3	Reserved
4	Reserved
5	**Rx**
6	**Tx**

3 Electronic interface

WiMo and WiMo Plus sondes use the Modbus protocol with RS485 or RS232 serial link. User selects the serial link during setup step. Please refer to the user manual for Modbus communication settings.

Serial link parameters	
Type	RS-485 / RS232
Baud rate	9600
Data bits	8
Parity	None
Stop bit	1

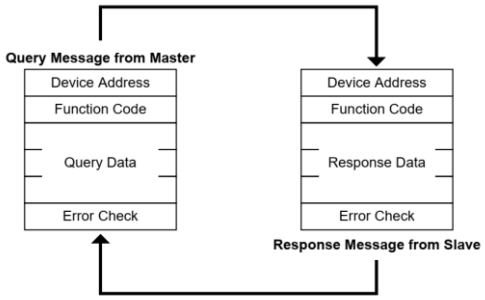
You must use an external power supply for Modbus communication. If no external power supply is detected Modbus communication will stay off.

The range of external power supply should be between 9VDC to 16VDC (Recommended : 12VDC)

4 Software interface

4.1 General description

Modbus protocol is a serial communication protocol between devices based on master/slave architecture. Each Slave has a unique address and can send messages on the bus initiated by the master.



The RTU mode can connect up to 32 slaves to a bus. The length of the twisted two-wire lines can reach 1200 m. The bus must be terminated by connecting a terminating resistor of 120 Ohms.

4.2 Communication parameters

Parameters	
Protocol	RTU
Address available	1…247 (128 par défaut)
Alignment	IEEE 754

4.3 Function 0x03 : Read Holding Register

Read the binary contents of 16 bits holding registers in the slave (1 to 127). Refer to Modbus register section for data addresses and their contents.

4.3.1 Query

Field name	Size	Data
Function	1 Byte	0x03
Starting Address	2 Bytes	*User defined*
No. of Registers	2 Bytes	0x0001
Error Check	2 Bytes	*Calculated*

4.3.2 Response

Field name	Size	Data
Function	1 Byte	0x03
Data size	1 Byte	0x02
Data	2 Bytes	*User defined*
Error Check	2 Bytes	*Calculated*

Example : Measurement status read (Measurement in progress)

TX : 80 03 0011 0001 CRC1 CRC2

Address	80 - One Byte Slave Address
Function	03 - One Byte Function Number
Addr	00 - Starting Register Address HI Byte
Addr	11 - Starting Register Address LO Byte
Data	00 - HI Number of Registers
Data	01 - LO Number of Registers
Checksum	Two Byte CRC

RX : 80 03 02 8000 CRC1 CRC2

Address	80 - One Byte Slave Address
Function	03 - One Byte Function Number
Byte Qty	02 - Number of data bytes in response
Data HI	80 - Data Register HI Byte
Data LO	00 - Data Register LO Byte
Checksum	Two Byte CRC

4.4 Function 0x06 : Preset Single Register

Presets a value into a single 16 bits holding register. Refer to Modbus register section for data addresses and their contents.

4.4.1 Query

Field name	Size	Data
Function	1 Byte	0x06
Address	2 Bytes	*User defined*
Data	2 Bytes	*User defined*
Error Check	2 Bytes	*Calculated*

4.4.2 Response

Field name	Size	Data
Function	1 Byte	0x06
Address	2 Bytes	*User defined*
Data	2 Bytes	*User defined*
Error Check	2 Bytes	*Calculated*

4.4.3 Error

Field name	Size	Data
Function	1 Byte	0x86
Data	1 Byte	0x04
Error Check	2 Bytes	*Calculated*

Example : Start wiper sequence

TX : 80 06 0020 8000 CRC1 CRC2

Address	80 - One Byte Slave Address
Function	06 - One Byte Function Number
Addr	00 - Register Address HI Byte
Addr	20 - Register Address LO Byte
Data	80 - Preset Data Value HI Byte
Data	00 - Preset Data Value LO Byte
Checksum	Two Byte CRC

RX : 80 06 0020 8000 CRC1 CRC2 (if ok)

Address	80 - One Byte Slave Address
Function	06 - One Byte Function Number
Addr	00 - Register Address HI Byte
Addr	20 - Register Address LO Byte
Data HI	80 - Preset Data Value HI Byte
Data LO	00 - Preset Data Value LO Byte
Checksum	Two Byte CRC

RX : 80 86 01 CRC1 CRC2 (if error)

Address	80 - One Byte Slave Address
Function	86 - One Byte Function Number
Exception Code	01 - Modbus RTU Protocol Exception Codes
Checksum	Two Byte CRC

4.5 Function 0x04 : Read Input Register

Read the binary contents of 16 bits input registers in the slave (1 à 127) . Refer to Modbus register section for data addresses and their contents.

4.5.1 Query

Paramètre	Taille	Données
Function	1 Byte	0x04
Address	2 Bytes	*User defined*
No. of Registers	2 Bytes	*User defined (N)*
Error Check	2 Bytes	*Calculated*

4.5.2 Response

Paramètre	Taille	Données
Function	1 Byte	0x04
Data size	1 Byte	2*N
Data	2 *N Bytes	-
Error Check	2 Bytes	*Calculated*

Exemple : Temperature measurement read (15,003) ABCD format

TX : 80 04 0103 0002 CRC1 CRC2

Address	80 - One Byte Slave Address
Function	04 - One Byte Function Number
Addr	01 - Register Address HI Byte
Addr	03 - Register Address LO Byte
Data	00 - Preset Data Value HI Byte
Data	02 - Preset Data Value LO Byte
Checksum	Two Byte CRC

RX : 80 04 04 41700C4A CRC1 CRC2

Address	80 - One Byte Slave Address
Function	04 - One Byte Function Number
Byte Count	04 - Register Address HI Byte
Data1	41 - Data Value HI Byte
Data1	70 - Data Value LO Byte
Data1	0C - Data Value HI Byte
Data1	4A - Data Value LO Byte
Checksum	Two Byte CRC

4.6 Modbus Register

Address	*Description*	*Type*	*Function code*			*Values*
	0x03	*0x04*		*0x06*		
0x0000	WiMO Modbus address	Int16				1 - 254
0x0001	WiMo serial number	Int16				0xHHHH
0x0002	WiMo interface type	Int16				0x32 : RS232 0x35 : RS485
0x0003	WiMo sofware version	Int16				
0x0010	Start measuring	Int16				0x8000 start measurement for all sensors
0x0011	Measuring status	Int16				0x0000 finish, 0x8000 running
0x0020	Start cleaning	Int16				0x8000 start cleaning optical sensors
0x0021	Wiper status	Int16				0x0000 finish ok, 0x0001 finish default, 0x8000 running
0x0100	Static pressure value « Big Endian »	Float32				Format ABCD
0x0101	Keller pressure value « Big Endian »	Float32				Format ABCD
0x0102	Keller Temperature value « Big Endian »	Float32				Format ABCD
0x0103	Temperature value « Big Endian »	Float32				Format ABCD
0x0104	Conductivity value « Big Endian »	Float32				Format ABCD
0x0105	Turbidity value « Big Endian »	Float32				Format ABCD
0x0106	Oxygen concentration value « Big Endian »	Float32				Format ABCD
0x0107	Oxygen saturation value « Big Endian »	Float32				Format ABCD
0x0108	pH value « Big Endian »	Float32				Format ABCD
0x0109	Turner Chlorophyll a value « Big Endian »	Float32				Format ABCD
0x010A	Turner PhycoC value « Big Endian »	Float32				Format ABCD
0x010B	Turner PhycoE value « Big Endian »	Float32				Format ABCD
0x010C	Turner CDOM value « Big Endian »	Float32				Format ABCD
0x010D	Fluo Chlorophyll-a value « Big Endian »	Float32				Format ABCD
0x0113	Turner Tryptophane value « Big Endian »	Float32				Format ABCD
0x0114	ISE Redox value « Big Endian »	Float32				Format ABCD
0x0115	ISE Ammonium value « Big Endian »	Float32				Format ABCD
0x0116	ISE Potassium value « Big Endian »	Float32				Format ABCD
0x0117	ISE Nitrate value « Big Endian »	Float32				Format ABCD
0x0118	ISE Chlorure value « Big Endian »	Float32				Format ABCD
0x0119	Oxygen temperature value « Big Endian »	Float32				Format ABCD
0x011A	Hydrocarbure value « Big Endian »	Float32				Format ABCD
0x011B	Refined oil value « Big Endian »	Float32				Format ABCD
0x0130	Salinity value « Big Endian »	Float32				Format ABCD
0x0131	Sound velocity value (SV) « Big Endian »	Float32				Format ABCD
0x0132	Conductivity 25 value « Big Endian »	Float32				Format ABCD
0x0133	Dissolved solids value (TDS) « Big Endian »	Float32				Format ABCD
0x0134	Chloride value « Big Endian »	Float32				Format ABCD
0x0135	Depth value (m) « Big Endian »	Float32				Format ABCD
0x0136	Total Suspended Solids (TSS) « Big Endian »	Float32				Format ABCD
0x0137	Fluo Chlorophyll-a value « Big Endian »	Float32				Format ABCD
0x0199	Constant value « Big Endian »	Float32				Format ABCD
0x0200	Static pressure value « little Endian »	Float32				Format DCBA
0x0201	Keller pressure value « little Endian »	Float32				Format DCBA
0x0202	Keller Temperature value « little Endian »	Float32				Format DCBA
0x0203	Temperature value « little Endian »	Float32				Format DCBA
0x0204	Conductivity value « little Endian »	Float32				Format DCBA
0x0205	Turbidity value « little Endian »	Float32				Format DCBA
0x0206	Oxygen concentration value « little Endian »	Float32				Format DCBA
0x0207	Oxygen saturation value « little Endian »	Float32				Format DCBA
0x0208	pH value « little Endian »	Float32				Format DCBA
0x0209	Turner Chlorophyll a value « little Endian »	Float32				Format DCBA
0x020A	Turner PhycoC value « little Endian »	Float32				Format DCBA
0x020B	Turner PhycoE value « little Endian »	Float32				Format DCBA
0x020C	Turner CDOM value « little Endian »	Float32				Format DCBA
0x020D	Fluo Chlorophyll-a value « little Endian »	Float32				Format DCBA
0x0213	Turner Tryptophane value « little Endian »	Float32				Format DCBA

0x0214	ISE Redox value « little Endian »	Float32				Format DCBA
0x0215	ISE Ammonium value « little Endian »	Float32				Format DCBA
0x0216	ISE Potassium value « little Endian »	Float32				Format DCBA
0x0217	ISE Nitrate value « little Endian »	Float32				Format DCBA
0x0218	ISE Chlorure value « little Endian »	Float32				Format DCBA
0x0219	Oxygen temperature value « little Endian »	Float32				Format DCBA
0x021A	Hydrocarbure value « little Endian »	Float32				Format DCBA
0x021B	Refined oil value « little Endian »	Float32				Format DCBA
0x0230	Salinity value « little Endian »	Float32				Format DCBA
0x0231	Sound velocity value (SV) « little Endian »	Float32				Format DCBA
0x0232	Conductivity 25 value « little Endian »	Float32				Format DCBA
0x0233	Dissolved solids value (TDS) « little Endian »	Float32				Format DCBA
0x0234	Chloride value « little Endian »	Float32				Format DCBA
0x0235	Depth value « little Endian »	Float32				Format DCBA
0x0236	Total Suspended Solids (TSS) « little Endian »	Float32				Format DCBA
0x0237	Fluo Chlorophyll-a value « little Endian »	Float32				Format DCBA
0x023A	Water Height value « little Endian »	Float32				Format DCBA
0x0299	Constant value « little Endian »	Float32				Format DCBA

0x0500	Static pressure register status	Int16				cf. sensor register status below
0x0501	Keller pressure register status	Int16				cf. sensor register status below
0x0502	Keller Temperature register status	Int16				cf. sensor register status below
0x0503	Temperature register status	Int16				cf. sensor register status below
0x0504	Conductivity register status	Int16				cf. sensor register status below
0x0505	Turbidity register status	Int16				cf. sensor register status below
0x0506	Oxygen concentration register status	Int16				cf. sensor register status below
0x0507	Oxygen saturation register status	Int16				cf. sensor register status below
0x0508	pH register status	Int16				cf. sensor register status below
0x0509	Turner Chlorophyll a register status	Int16				cf. sensor register status below
0x050A	Turner PhycoC register status	Int16				cf. sensor register status below
0x050B	Turner PhycoE register status	Int16				cf. sensor register status below
0x050C	Turner CDOM register status	Int16				cf. sensor register status below
0x050D	Fluo Chlorophyll-a register status	Int16				cf. sensor register status below
0x0513	Turner Tryptophane value « little Endian »	Int16				cf. sensor register status below
0x0514	ISE Redox value « little Endian »	Int16				cf. sensor register status below
0x0515	ISE Ammonium value « little Endian »	Int16				cf. sensor register status below
0x0516	ISE Potassium value « little Endian »	Int16				cf. sensor register status below
0x0517	ISE Nitrate value « little Endian »	Int16				cf. sensor register status below
0x0518	ISE Chlorure value « little Endian »	Int16				cf. sensor register status below
0x0519	Oxygen temperature value « little Endian »	Int16				cf. sensor register status below
0x051A	Hydrocarbure value « little Endian »	Int16				cf. sensor register status below
0x051B	Refined oil value « little Endian »	Int16				cf. sensor register status below
0x0530	Salinity register status	Int16				cf. sensor register status below
0x0531	Sound velocity register status (SV)	Int16				cf. sensor register status below
0x0532	Conductivity 25register status	Int16				cf. sensor register status below
0x0533	Dissolved solids register status (TDS)	Int16				cf. sensor register status below
0x0534	Chloride register status	Int16				cf. sensor register status below
0x0535	Depth register status	Int16				cf. sensor register status below
0x0536	Total Suspended Solids (TSS) register status	Int16				cf. sensor register status below
0x0537	Fluo Chlorophyll-a register status	Int16				cf. sensor register status below

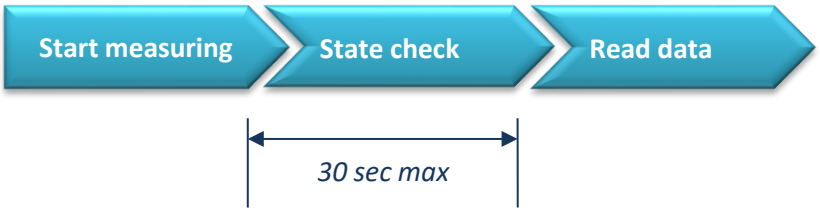
0x0600	Wiper register status	Int16				cf. wiper register status below

Sensor register status			
Description	N° Bit	State	
Availability	Bit 0	0 : Missing	1 : Available
Activation	Bit 1	0 : Off	1 : On
Errors	Bit 2	0 : ok	1 : No Answer
	Bit 3	0 : ok	1 : Out of range
	Bit 4	0: ok	1 : Communication error

Wiper register status			
Description	N° Bit	State	
Availability	Bit 0	0 : Missing	1 : Available
Configuration state	Bit 1	0 : No way	1 : Ok
Errors	Bit 2	0 : ok	1 : No Answer
	Bit 3	0 : ok	1 : Blocking
	Bit 4	0: ok	1 : Communication error

5 Description

5.1 Measurement process



5.1.1 Start measuring

To start measuring process you must write in 0x0010 register 0x8000.

5.1.2 State check

WiMo sonde starts measuring for all channels available (according to sonde settings). To know measurement state you must read the 0x0011 register. It gives process information (in progress or finished)

5.1.3 Data read

Once the measurement processing done you can recover the data. You need to read each channel register to pick up the values. For example reading 0x0103 register allow you to read the temperature in big endian format of the WiMo sonde.

5.2 Cleaning process



5.2.1 Start cleaning

To start cleaning process of optical sensors you must write in 0x0020 register 0x8000.

5.2.2 State check

WiMo sonde will wipe all optical sensors available. Three states can be met :

- Cleaning is in progress
- Wiper is blocked
- End of cleaning

Reading the status register 0x0021 gives you the information of cleaning process state.

5.3 Status registers

Whether for the measurement or the wiper there is a register to inform about the operating status.

For the measurement status register you are able to know by reading the register:

- if the channel is available for the WiMo
- if the channel is activated
- if errors are detected during process

There is the same register for the Wiper.

5.4 Constant registrer

A constant register is available to facilitate implementation of the Modbus protocol. The hexa value is 0x41424344 in ABCD format or 0x44434241 in DCBA format corresponding to 12.141422 float value.

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