WS90 Modbus RTU V1.0.2

History

Versions	Date	Revise
V1.0.0	2022/11/21	Initial version
V1.0.1	2022/12/27	Add an atmospheric pressure register
V1.0.2	2023/03/22	Add measurement command (Light, UVI, Temperature, Humidity, Wind, Gust, Wind direction, Rain, Barometric pressure). Modify the invalid temperature value.

Catalogue

1.Modbus

1.1 **Parameters**

Code	8bits binary
Data bits	8
Parity	None
Stop	1
Checksum	CRC (polynomial 0x8005)
Baud rate	User Define (default 9600 bps)

1.2 **Data Frame Definition**

Host Inquiry:

Address	Function	Start register address	Register size	CRC LSB	CRC MSB
1 byte	1 byte	2 bytes	2 bytes	1 byte	1 byte

Slave Reply:

Address	Function	Payload	Data Set 1	Data Set 2	Data Set N	CRC LSB	CRC MSB
1 byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes	1 byte	1 byte

1.3 **Register**

Register Address	Function	W/R	Description
0160 H	Device name	RO	Device code (90 H)
0161 H	Data Rate	RW	1:4800 2:9600 3:19200 4:115200
0162 H	Device Address	RW	1~252
0163 H	Device ID MSB	RO	
0164 H	Device ID LSB	RO	
0165 H	Light	RO	Value in hex Light=value*10 (Range: 0lux -> 300,000lux) If invalid fill with 0xFFFF

0166 H	UVI	RO	Value in hex Uvi=UVI value/10 (Range: 0 -> 150) If invalid fill with 0xFFFF
0167 H	Temperature	RO	Value in hex 10.5 C = 1F9h -10.5 C = 127h with 400 offset added (Range: -40.0C -> 60.0C) If invalid fill with 0xFFFF
0168 H	Humidity	RO	data in hex (Range: 1% - 99%) If invalid fill with 0xFFFF
0169 H	Wind Speed	RO	Value in hex If invalid fill with 0xFFFF.Wind Speed = WIND value*0.1m/s(0~40m/s)
016A H	Gust Speed	RO	Value in hex If invalid fill with 0xFFFF.Gust Speed = GUST value*0.1m/s(0~40m/s)
016B H	Wind Direction	RO	Value in hex (Range: 0° - 359°) If invalid fill with 0xFFFF
016C H	Rainfall	RO	Value in hex Rain = value*0.1mm 1.8mm=12H
016D H	ABS Pressure	RO	Value in hex ABS = value*0.1hPa 1002.6hPa=272AH If invalid fill with 0xFFFF
9C92 H	Measuring light	RO	Value in hex Light=value*10 (Range: 0lux -> 300,000lux) If invalid fill with

			0xFFFF (Measurement rate 113ms)
9C93 H	Measuring UVI	RO	Value in hex Uvi=UVI value/10 (Range: 0 -> 150) If invalid fill with 0xFFFF (Measurement rate 113ms)
9C94 H	Measuring temperature	RO	Value in hex 10.5 C = 1F9h -10.5 C = 127h with 400 offset added (Range: -40.0C -> 60.0C) If invalid fill with 0xFFFF (Measurement rate 31ms)
9C95 H	Measuring humidity	RO	data in hex (Range: 1% - 99%) If invalid fill with 0xFFFF (Measurement rate 31ms)
9C96 H	Measuring wind speed	RO	Value in hex If invalid fill with 0xFFFF.Wind Speed = WIND value*0.1m/s(0~40m/s) (Measurement rate 31ms)
9C97 H	Measuring gust speed	RO	Value in hex If invalid fill with 0xFFFF.Gust Speed = GUST value*0.1m/s(0~40m/s) (Measurement rate 31ms)
9C98 H	Measuring wind direction	RO	Value in hex (Range: 0° - 359°) If invalid fill with 0xFFFF

			(Measurement rate 31ms)
9C99 H	Measuring rainfall	RO	Value in hex Rain = value*0.1mm 1.8mm=12H (Measurement rate 8.75s)
9C9A H	Measuring ABS pressure	RO	Value in hex ABS = value*0.1hPa 1002.6hPa=272AH If invalid fill with 0xFFFF (Measurement rate 136ms)

1.4 Example

1.4.1 Normal

Example 1: Read Light.

Inquiry:

Address	Function	Register address	Payload size	CRC LSB	CRC MSB
0x90	0x03	0x01 0x65	0x00 0x01	0x89	0x68

Reply:

Address	Function	Payload size	Light data	CRC LSB	CRC MSB
0x90	0x03	0x02	0x07 0xB0	0x46	0x1D

Light is 1968 Lux.

Example2: Read light, UVI, temperature, humidity, wind speed, gust speed, wind direction and rainfall.

Inquiry:

Address	Function	Register address	Payload size	CRC LSB	CRC MSB
0x90	0x03	0x01 0x65	0x00 0x08	0x49	0x6E

Reply:

Address	Function	Payload size	payload	CRC LSB	CRC MSB
0x90	0x03	0x10	0x06E7 0x000D 0x0296	0xBD	0x2F

			0x003C 0x0000 0x0000 0x0096 0x0000		

Data:
Light= 1767 Lux
UVI= 13
Temperature= 26.2℃
Humidity= 60%
Wind speed= 0 m/s
Gust speed= 0 m/s
Wind direction= 150°
Rinfall= 0 mm
Example 3: Change to 4800 Baud Rate.
Inquiry:

Address	Function	Register address	Data	CRC LSB	CRC MSB
0x90	0x06	0x01 0x61	0x00 0x01	0x04	0xA9

Reply:

Address	Function	Payload size	Payload	CRC LSB	CRC MSB
0x90	0x06	0x02	0x00 0x01	0x84	0x95

Example 4: Change device to 0x34.
Inquiry:

Address	Function	Register address	Data	CRC LSB	CRC MSB
0x90	0x06	0x01 0x62	0x00 0x34	0x34	0xBE

Reply:

Address	Function	Payload size	Payload	CRC LSB	CRC MSB
0x90	0x06	0x02	0x00 0x34	0x44	0x82

1.4.2 Special

In case setting has been messed up. This is the command to check for status.
Host Inquiry:

Prefix	Read/wr bps	Device address	CRC LSB	CRC MSB
3 bytes	1 byte	1 byte	1 byte	1 byte

fixed: 0xFDFDFD	0:read bps 1:set to bps 4800 2:set to bps 9600 3:set to bps 19200 4:set to bps 115200	0：read device address 1~252：set device address to		

Slave Reply:

Prefix	bps	Device address	CRC LSB	CRC MSB
3 bytes fixed: 0xFDFDFD	1 byte 1: bps 4800 2: bps 9600 3: bps 19200 4: bps 115200	1 byte	1 byte	1 byte

Example 5：read baud rate and device address.

Inquiry:

Prefix	Code:Read bps	Code:Read Device address	CRC LSB	CRC MSB
0xFDFDFD	0x00	0x00	0xE9	0x88

Reply:

Prefix	BPS	Device address	CRC LSB	CRC MSB
0xFDFDFD	0x01	0x90	0xE8	0x74

BPS: 4800, Device address: 0x90.

Example 6：Set BPS to 9600.

Inquiry：

Prefix	Code:Set bps	Code:Read Device address	CRC LSB	CRC MSB
0xFDFDFD	0x02	0x00	0xE8	0xE8

Reply:

Prefix	BPS	Device address	CRC LSB	CRC MSB
0xFDFDFD	0x02	0x90	0xE8	0x84

Set to 9600 BPS, and read device address as 0x90.

Example 7：Set device address to 0x01.

Inquiry:

Prefix	Code:Read bps	Code:Set Device address	CRC LSB	CRC MSB
0xFDFDFD	0x00	0x01	0x28	0x48

Reply:

Prefix	BPS	Device address	CRC LSB	CRC MSB
0xFDFDFD	0x02	0x01	0x29	0x28

Set device address to 0x01, read data rate as 9600.

1.5 Error code

Error code	Content	Description
01	Illegal function	Code is not 0x03 or 0x06
02	Illegal address	Not in the range
03	Illegal data	Data length is over the limit
08	CRC fail	CRC not pass

Reply to error code should add function code 0x80. example.

Example 8: Reply

Address	Code	Error code	CRC LSB	CRC MSB
0x90	0x83	0x08	0x11	0x1B

2.Wiring

Color	Description	Remark
Red	VCC	5~12V DC
Black	GND	GND
Green	485_A	485_A
White	485_B	485_B

Appendix:

1. CRC tool

格西 CRC 计算工具 is for CRC calculation use.

2. Ecowitt ModbusRTU PC software