MODBUS

This device use MODBUS RTU protocol and it is a “slave”.

What is MODBUS?

It is a application-layer messaging protocol. It provides client/server communication between devices connected on networks.

Devices with MODBUS protocol use 8, N, 1 data format: 8 data bits, no parity, 1 stop bit.
Communication speed rate (baud) can be set from devices communication menu directly.

MODBUS transactions are related always to the “master”, that manage the line and a “slave” device per time (except for broadcast messages).

Each “slave” device is univoquely identified by an **address**.

First character of the message always contains the “slave” device’s numeric address.

Permitted addresses are from 1 to 255. 0 is used only for broadcast messagges, directed to all “slave” devices at the same time.

Second character of the message contains the master’s request. The “slave” device replies with same character to mean the request has been executed.

Frequently used requests are :

Function	Description
01	Read Coil Status
02	Read Input Status
03	Read Holding Registers
04	Read Input registers
05	Force Single Coil
06	Preset Single register
07	Read Status

Last two character of the message contains Cyclic Redundancy Check obtained by CRC16 algorithm.

MODBUS FUNCTIONS

Read Output Status (01)

The function asks the ON / OFF of binary logic variables.
Broadcast is not allowed.
Request
In addition to the “slave” address and the function code (01), message contains starting address on two bytes and the number of bits to be read also on two bytes. The address numbering starts from zero (bit1 = 0) for the MODBUS.

Example: Request to read from the slave's 17-bit 04-015.

ADDR	FUNC	DATA start Addr HI	DATA start Addr LO	DATA bit # HI	DATA bit # LO	CRC HI	CRC LO
11	01	00	03	00	0C	CE	9F

Reply

In addition to the "slave" address and the function code (01), message contains the number of data bytes and characters containing the data.
Data are packed so that a byte represent an 8 bit status, less significant bit of the first byte contains the bit corresponding to the starting Address and so on.
If the number of bits to be read is not multiple of 8, the last character is completed with zeros in the most significant bits.

Example: Reply to the previous request.

ADDR	FUNC	DATA byte count	DATA bit 04..11	DATA bit 12..15	CRC HI	CRC LO
11	01	02	CD	0B	6D	68

Read Output Registers (03)

This function allows to request value of 16-bit (word) registers containing numeric variables.
In addition to the "slave" address and the function code (03), the message contains the starting address on two bytes and the number of words to be read also on two bytes. The maximum number of words that can be read is 125.

Example: : Request to read from slave 25 of registers from 4069 to 40071.

ADDR	FUNC	DATA start Addr HI	DATA start Addr LO	DATA bit # HI	DATA bit # LO	CRC HI	CRC LO
19	03	00	44	00	03	46	06

Reply
In addition to the "slave" and the function code (03), message contains a character that contains the number of data bytes and characters containing the data.
The registers require two bytes each, the first of which contains the most significant part.

Example: Reply to the previous request.

ADDR	FUNC	DATA byte count	DATA byte 69 HI	DATA byte 69 LO	DATA byte 70 HI	DATA byte 70 LO	DATA byte 71 HI	DATA byte 71 LO	CRC HI	CRC LO
19	03	06	02	2B	00	00	00	64	AF	7A

Force Single Coil (05)

This function allows to force a single binary variable state ON or OFF.
In addition to the “slave” address and the function code (05), the message contains the address of the variable to force two bytes and two characters of which the first is set to FF hex (255) to force ON state and 00 hex to force OFF state, the second is set to zero in every case.

Example: Request to force ON on “slave” 47 bit 4.

ADDR	FUNC	DATA bit HI	DATA bit LO	DATA ON/OFF	DATA (Zero)	CRC HI	CRC LO
2F	05	00	03	FF	00	7A	74

Reply
Reply consists in reading setpoint status modification. **See Read Status (07)**

Preset Single Register (06)

This function allows to set a 16 bit single register value.
In addition to the “slave” address and the function code (06) the message contains the address of the variable on two byte and the value to be assigned to.

Example: Request to force 928 on “slave” 35 address 26.

ADDR	FUNC	DATA bit HI	DATA bit LO	DATA WORD HI	DATA WORD LO	CRC HI	CRC LO
23	06	00	19	03	A0	5E	07

Replay

Reply consists in reading setpoint status modification. **See Read Status (07)**

Read Status (07)

This function allows to read status an 8 bit message predetermined with a compact message.
Example: Request on “slave” 25 status.

ADDR	FUNC	CRC HI	CRC LO
19	07	5E	07

Replay
In addition to the “slave” address and the function code (07) the message contains a character with the status bits.

ADDR	FUNC	Status_send	CRC HI	CRC LO
2F	05	00	7A	74

Dove status-send:

0 setpoint changed succesfully
1 wait setpoint changing
2 setpoint changing error

ERROR MANAGEMENT

ADDR	FUNC	DATA exept. code	CRC HI	CRC LO
0A	81	02	7A	74

Exceptional codes

CODE	NAME	DESCRIPTION
01	ILLEGAL FORMAT	Uncorret format message
02	ILLEGAL DATA ADDRESS	Address referred is not allowed on the "slave" .
03	ILLEGAL DATA VALUE	Uncorrect function
04	CRC ERROR	CRC checksum error

ADDRESS LIST VALUE:

Address	No. register	Format	Property	Function	Description
40002	2	Int16	R	03	Channel reading without decimal point
40004	2	Int16	R	03	Current measure dividing factor. Values: 1, 10, 100, 1000
40006	2	Int16	R	03	mA or mSec based on pulse sender water meter settings
40008	2	Int16	R	03	Division factor mA (always 2)
40036	4	Int32	R	03	mch
40040	4	Int32	R	03	Liters totalizer
40052	2	Int16	R	03	Temperature
Alarms					
06	1Bit	Bit	R	01	STAND BY 0: No alarm 1: alarm
05	1Bit	Bit	R	01	PROBE FAIL CH2 0: No alarm 1: alarm
04	1Bit	Bit	R	01	DOSING ALARM 0: No alarm 1: alarm
03	1Bit	Bit	R	01	DOSING ALARM 0: No alarm 1: alarm
02	1Bit	Bit	R	01	OUT OF RANGE ALARM 0: No alarm 1: alarm
01	1Bit	Bit	R	01	FLOW 0: No alarm 1: alarm

00	1Bit	Bit	R	01	CH2 LEV 0: No alarm 1: alarm
Output					
40026	2	Int16	R	03	Out Digital: 0 Disable. Off 1 Enable. On 2 Enable Off
40028	2	Int16	R	03	Out Prop: 0 to 180 Stroke
40030	2	Int16	R	03	Out Digital: 0 Disable. Off 1 Enable. On 2 Enable Off
40032	2	Int16	R	03	Out Prop: 0 to 180 Stroke
Setpoint					
40068	2	Int16	R/W	03/06	xxxx First proportional setpoint value
40070	2	Int16	R/W	03/06	xxxx Second proportional setpoint value
40072	2	Int16	R/W	03/06	xxx P/m first value
40074	2	Int16	R/W	03/06	xxx P/m second value
40076	2	Int16	R/W	03/06	ON/OFF standby or mc/h for prop+WM mode
40078	2	Int16	R/W	03/06	x working mode 0 ON/OFF 1 PROP 2 Dis.
40082	2	Int16	R/W	03/06	xxxx First setpoint relais value
40084	2	Int16	R/W	03/06	xxxx Second setpoint relais value
40086	2	Int16	R/W	03/06	xxx first value percentage
40088	2	Int16	R/W	03/06	xxx second value percentage
40090	2	Int16	R/W	03/06	x working mode 0 PROP PWM 1 ON/OFF 2 Fixed PWM 3 Dis
40140	2	Int16	R/W	03/06	xxxx First proportional setpoint value
40142	2	Int16	R/W	03/06	xxxx Second proportional setpoint value
40144	2	Int16	R/W	03/06	xxx P/m first value

40146	2	Int16	R/W	03/06	xxx P/m second value
40148	2	Int16	R/W	03/06	xxxxx ON/OFF standby or mc/h for prop+WM mode
40150	2	Int16	R/W	03/06	x working mode 0 ON/OFF 1 PROP 2 Dis.
40154	2	Int16	R/W	03/06	xxxx First setpoint relais value
40156	2	Int16	R/W	03/06	xxxx Second setpoint relais value
40158	2	Int16	R/W	03/06	xxx first value percentage
40160	2	Int16	R/W	03/06	xxx second value percentage
40162	2	Int16	R/W	03/06	x working mode 0 PROP PWM 1 ON/OFF 2 Fixed PWM 3 Dis
40164	2	Int16	R/W	03/06	xxxx First setpoint relais value
40284	2	Int16	R/W	03/06	% at mc/h set in prop+WM Pulse 1
40286	2	Int16	R/W	03/06	% at 0 mc/h set in prop+WM Pulse 1
40288	2	Int16	R/W	03/06	mc/h set in prop+WM relays out 1
40290	2	Int16	R/W	03/06	% at mc/h set in prop+WM relays 1
40294	2	Int16	R/W	03/06	% at 0 mc/h in prop+WM relays 1
40298	2	Int16	R/W	03/06	% at mc/h set in prop+WM Pulse 2
40300	2	Int16	R/W	03/06	% at 0 mc/h set in prop+WM Pulse 2
40302	2	Int16	R/W	03/06	mc/h set in prop+WM relays out 2
40304	2	Int16	R/W	03/06	% at mc/h set in prop+WM relays 2
40308	2	Int16	R/W	03/06	% at 0 mc/h in prop+WM relays 2
40312	2	Int16	R/W	03/06	PID mode 0: + 1: -
40314	2	Int16	R/W	03/06	Time Integrative
40316	2	Int16	R/W	03/06	Time Derivative
40318	2	Int16	R/W	03/06	Perturbative

					0:dis 1:ADD 2: Molt
40322	2	Int16	R/W	03/06	Perturbative % mode
40320	2	Int16	R/W	03/06	Perturbative mc/h mode
40324	2	Int16	R/W	03/06	WM 0: L/P 1:P/L 2: 0-20mA 3: 4-20mA
40326	2	Int16	R/W	03/06	L/P or P/L mode or mc/h at 20mA based on pulse sender water meter settings
40328	2	Int16	R/W	03/06	Timeout
Clock Read					
40044	2	Int16	R		MOUNTH|DAY
40046	2	Int16	R		HOUR | YEAR
40048	2	Int16	R		00|MINUTES
Parameter					
40520	2	Int16	R/W	03/06	Tau
40522	2	Int16	R/W	03/06	Delay
40542	2	Int16	R/W	03/06	Password
Dosing Alarm					
40428	2	Int16	R/W	03/06	Time for ch2 probe
44	1Bit	Bit	R/W	01/05	Mode 0: Dose 1 : Stop
Alarm Probe					
40444	2	Int16	R/W	03/06	Time for ch2
75	1Bit	Bit	R/W	01/05	Mode 0: Dose 1 : Stop
Flow					
40526	2	Int16	R/W	03/06	Mode0:Disable 1:Reverse 2: Direct
40524	2	Int16	R/W	03/06	Time in minutes
Clock Setpoint					
41624	2	Int16	R/W	03/06	MOUNTH|DAY
41626	2	Int16	R/W	03/06	HOUR | YEAR
41628	2	Int16	R/W	03/06	00|MINUTES
45	1Bit	Bit	R/W	01/05	Am 1: Yes 0: No
46	1Bit	Bit	R/W	01/05	Pm 1: Yes 0: No
47	1Bit	Bit	R/W	01/05	Format 0: Europe 1: USA
Log Setpoint					
48	1Bit	Bit	R/W	01/05	1: Enable 0: disable
40530	2	Int16	R/W	03/06	Time Hour = Value /100 Time Minute= Value%100
40532	2	Int16	R/W	03/06	Every Hour = Value /100 Every Minute= Value%100
54	1Bit	Bit	R/W	01/05	Time Am if =1
55	1Bit	Bit	R/W	01/05	Time Pm if =1

mA Setpoint					
49	1Bit	Bit	R/W	01/05	Mode ch1 0: 0/20 mA 1:4/20mA
40124	2	Int16	R/W	03/06	Max ch1
40126	2	Int16	R/W	03/06	Min ch1
50	1Bit	Bit	R/W	01/05	Mode ch2 0: 0/20 mA 1:4/20mA
40128	2	Int16	R/W	03/06	Max ch2
40130	2	Int16	R/W	03/06	Min ch2
40134	2	Int16	R/W	03/06	1: 4/20 0: 0/20
40132	2	Int16	R/W	03/06	0 : all channels disabled 1: PID pulse 1 2: PID pulse 2 3: PID relays 1 4: PID relays 2
MinMax					
51	1Bit	Bit	R/W	01/05	Mode ch1 High 0:disable 1 : Enable
40438	2	Int16	R/W	03/06	Value ch1 High
52	1Bit	Bit	R/W	01/05	Mode ch1 Low 0:disable 1 : Enable
40442	2	Int16	R/W	03/06	Value ch1 Low
53	1Bit	Bit	R/W	01/05	Mode ch1 0: Dose 1 : Stop
40440	2	Int16	R/W	03/06	Time ch1
Service					
40056	2	Int16	R	03/06	Mv probe
LabelRead					
40844	2	Int16	R/W	03/06	Label “chr0-chr1”
40845	2	Int16	R/W	03/06	Label “chr2-chr3”
40846	2	Int16	R/W	03/06	Label “chr4-chr5”
40847	2	Int16	R/W	03/06	Label “chr6-chr7”
40848	2	Int16	R/W	03/06	Label “chr8-chr9”
40849	2	Int16	R/W	03/06	Label “chr10-chr11”
40850	2	Int16	R/W	03/06	Label “chr12-chr13”
40851	2	Int16	R/W	03/06	Label “chr14-chr15”
40852	2	Int16	R/W	03/06	Label “chr16-chr17”
40853	2	Int16	R/W	03/06	Label “chr18-chr19”
40854	2	Int16	R/W	03/06	Label “chr20-chr21”
40855	2	Int16	R/W	03/06	Label “chr22-chr23”
40856	2	Int16	R/W	03/06	Label “chr24-chr25”
40857	2	Int16	R/W	03/06	Label “chr26-chr27”
Circo Read					
56	1Bit	Bit	R/W	01/05	1:enabled 0:Disabled
Self Clean					
40536	2	Int16	R/W	03/06	Loop
40538	2	Int16	R/W	03/06	Clean Time
40540	2	Int16	R/W	03/06	Restore Time
57	1Bit	Bit	R/W	01/05	Clean On alarm 1: Clean on alarm NO