MODBUS PROTOCOL JAxx PRO SERIES 1.1.6

R2-03-19

NORME CE
EC RULES(STANDARD EC)
NORMAS DE LA CE

Direttiva Bassa Tensione
Low Voltage Directive
Directiva de baja tensión
} **2014/35/UE**

Direttiva EMC Compatibilità Elettromagnetica
EMC electromagnetic compatibility directive
EMC directiva de compatibilidad electromagnética
} **2014/30/UE**

GENERAL SAFETY GUIDELINES

Danger! In emergencies the instrument should be switched off immediately! Disconnect the power cable from the power supply!

When installing always observe local regulations!

Manufacturer is not liable for any unauthorized use or misuse of this product that may cause injury, damage to persons and / or materials.

Caution! Instrument must be accessible at all times for both operating and servicing. Access must not be obstructed in any way!

Feeder should be interlocked with a no-flow protection device to automatically shut-off the pumps when there is no flow!

Pumps and accessories must be serviced and repaired by qualified and authorized personnel only!

Always discharge the liquid end before servicing the instrument!

Empty and rinse the liquid end before work on a pump which has been used with hazardous or unknown chemicals!

Always read chemical safety datasheet!

Always wear protective clothing when handling hazardous or unknown chemicals!

Instrument must be operated / serviced by trained technicians only!

All connection operations must be performed while the instrument is not connected to main supply!

MODBUS

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” devi ce 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 ot llowed.
Request
In addition to the “slave” address and the function code (01), message contains starting address on two by tes 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	DATA start	DATA bit #	DATA bit #	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: eply 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 o ead rom 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 num ber 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 va riable 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: ON request to slave 47 on bit 4.

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

Preset Single Register (06)

This function allows to set the value of a single 16-bit register.
In addition to the address of the slave and the function code (06), the message contains the address of the variable expressed in two bytes, and the value to be assigned.

Example: 928 request to slave 35 at 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

Answer
Reading for setpoint status **See Read Status (07)**

Read Status (07)

This function allows to read the status of eight predefined bits with a compact message.

Example: Status check from the slave 25.

ADDR	FUNC	CRC HI	CRC LO
19	07	5E	07

Answer
In addition to the address of slave and function code (07), the message includes a character containing the bits status.

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

The bits status:
0 setpoint successfully modified
1 wait for setpoint being edited
2 error setpoint change

ERRORS MANAGEMENT

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

Exception code

CODE	NAME	DESCRIPTION
01	ILLEGAL FORMAT	messagge format error
02	ILLEGAL DATA ADDRESS	Referred address for requested data is not valid for adressed slave
03	ILLEGAL DATA VALUE	function error
04	CRC ERROR	checksum CRC error

The time between one interrogation and another must be greater than or equal to: 500 ms (thousand seconds)

LIST ADDRESS VALUE:

Address	No. register	Format	Property	Function	Description
Setpoint					
40007	2	Int16	R/W	03/06	SETPOINT OUT 1 VALUE 1 4 DIGIT
40008	2	Int16	R/W	03/06	SETPOINT OUT 1 VALUE 2 4 DIGIT
40009	2	Int16	R/W	03/06	SETPOINT OUT 1 mode: 0 : OUT disabled 1 : OUT Enabled
40010	2	Int16	R/W	03/06	SETPOINT OUT 1 Perc 1 3 DIGIT
40011	2	Int16	R/W	03/06	SETPOINT OUT 1 Perc 2 3 DIGIT
40012	2	Int16	R/W	03/06	working mode 0 PROP 1 ON/OFF 2 PID
40018	2	Int16	R/W	03/06	SETPOINT OUT 2 VALUE 1 4 DIGIT
40019	2	Int16	R/W	03/06	SETPOINT OUT 2 VALUE 2 4 DIGIT
40020	2	Int16	R/W	03/06	SETPOINT OUT 2 mode: 0 : OUT disabled 1 : OUT Enabled
40021	2	Int16	R/W	03/06	SETPOINT OUT 2 Perc 1 3 DIGIT
40022	2	Int16	R/W	03/06	SETPOINT OUT 2 Perc 2 3 DIGIT
40023	2	Int16	R/W	03/06	working mode 0 PROP 1 ON/OFF 2 PID
40029	2	Int16	R/W	03/06	SETPOINT OUT IS VALUE 1 4 DIGIT
40030	2	Int16	R/W	03/06	SETPOINT OUT IS VALUE 2 4 DIGIT
40031	2	Int16	R/W	03/06	SETPOINT OUT IS mode: 0 : OUT disabled

					1 : OUT Enabled
40032	2	Int16	R/W	03/06	SETPOINT OUT IS Perc 1 3 DIGIT
40033	2	Int16	R/W	03/06	SETPOINT OUT IS Perc 2 3 DIGIT
40034	2	Int16	R/W	03/06	working mode 0 PROP 1 ON/OFF 2 PID
40040	2	Int16	R/W	03/06	Compensation Fixed temperature (x10)
40041	2	Int16	R/W	03/06	Compensation mode 1 :Enable 0: Disable
40042	2	Int16	R/W	03/06	Alpha (x10)
40043	2	Int16	R/W	03/06	Compensation Automatic / Manual 1: Fixed temperature 0 : Read Temperature
40045	2	Int16	R/W	03/06	Enable FLOW 0: Disable 1: Enable
40046	2	Int16	R/W	03/06	Contact FLOW 0 N_O_ 1 N_C_
40047	2	Int16	R/W	03/06	Delay FLOW 00 to 59 sec
40048	2	Int16	R/W	03/06	Recovery FLOW 00 to 59 min
40057	2	Int16	R/W	03/06	Enable STANDBY 0: Disable 1: Enable
40058	2	Int16	R/W	03/06	Contact STANDBY 0 N_O_ 1 N_C_
40059	2	Int16	R/W	03/06	Delay STANDBY 00 to 59 sec
40060	2	Int16	R/W	03/06	Recovery STANDBY 00 to 59 min
40062	2	Int16	R/W	03/06	Out mA (mode) 0: 0/20mA 1: 4/20mA
40063	2	Int16	R/W	03/06	SETPOINT OUT mA VALORE at 20 mA 4 DIGIT
40064	2	Int16	R/W	03/06	SETPOINT USCITA mA VALORE at 0 or 4 mA 4 DIGIT
40065	2	Int16	R/W	03/06	Enable out mA on Alarm: 0 : No 1: Si
				RUNTIME	
40071	2	Int16	R	03	Channel: 0x01: pH 0x02 : cl

					0x04 : mV 0x05: CD 0x14: CDIND
40072	2	Int16	R	03	Measure: unit_nS 0x00 unit_uS 0x01 unit_mS 0x02 unit_S 0x03 unit_ppm 0x04 unit_NaCl 0x05 unit_NaOH 0x06 unit_HCl 0x07 unit_HNO3 0x08 unit_H2SO4 0x09 unit_H3PO4 0x0A unit_OHM 0x0B unit_mOHM 0x0C unit_KOHM 0x0D unit_MOHM 0x0E unit_PH 0x0F unit_RH 0x10 unit_ppk 0x11 unit_cl2 0x12 unit_clo2 0x13 unit_clt 0x14 unit_h2o2 0x15 unit_o3 0x16 unit_paa 0x17 unit_o2 0x18 unit_br2 0x19 unit_cdind3 0x1A unit_cdind30 0x1B unit_cdind300 0x1C unit_cdindppm 0x1D unit_fissa_nS_2 0x1E (xx.xx) unit_fissa_nS_3 0x1F(xxx.x) unit_fissa_uS_1 0x20(x.xxx) unit_fissa_uS_2 0x21(xx.xx) unit_fissa_uS_3 0x24(xxx.x) unit_fissa_mS_1 0x25(x.xxx) unit_fissa_mS_2 0x26(xx.xx) unit_fissa_mS_3 0x27(xxx.x) unit_fissa_S 0x28 unit_ppm_CaCO3 0x22 unit_ppm_NaCl 0x23
40073	2	Int16	R	03	Read Temperature (x10)
40074	2	Int16	R	03	Current measure dividing factor. Values: 1, 10, 100, 1000 1: (x.xxx) 2: (xx.xx) 3:(xxx.x) 4: xxxx
40075	2	Int16	R	03	Temperature Format 0: EUROPE 1: AMERICA
40076	2	Int16	R	03	Read channel
40077	2	Int16	R	03	Probe number: Probe F.S. Number Scl 1/2 2.000 0 Scl 1/5 5.000 1 Scl 1/20 20.00 2 Scl 1/200 200.0 3 Scl 2/2 2.000 4 Scl 2/20 20.00 5 Scl 3/2 2.000 6

					Scl 3/10	10.00	7
					Scl 3/20	20.00	8
					Ecl 6,7,12,20	10.00	9
					Scl 8/2	2.000	10
					Scl 8/20	20.00	11
					Scl 9/200	200.0	12
					Scl 9/2000	2000	13
					Scl 10/1	1.000	14
					Scl 10/10	10.00	15
					Scl 11/200	200.0	16
					Scl 11/2000	2000	17
					Scl 13	60.00	18
					Scl 17/10	10.00	19
					Scl 18/10	10.00	20
					Ecl 6,7,12,20 br	10.00	21
					mV	999	22
					pH	14.00	23
					CD	300.0	24
					CD	3000	25
					CD	30.00	26
					CD	300.0	27
					Scl 17/2	2.000	42
					Scl 18/2	2.000	43
					SBR 1/20	20.00	44
					SCL SC	2.000	51
					mV	- 999/999	56
					SCL 17/20	20.00	59
					SCL 18/20	20.00	60
					SCL 10/2	2.000	61
					SCL 10/20	20.00	62
					SCLT/2	2.000	63
					SCL11/50	50.00	64
					SCL9/50	50.00	74
					SCL2/0,5	0,50	78
					ClO2 sensor	5,00	79
					xJACDIND		
					CD	3.000	84
					CD	30.00	85
					CD	300.0	86
					CD	300.0	87
					CD JA	77	
					SCL3/0,5	0,50	88
					SCL17/0,5	0,50	89
					SCL18/0,5	0,50	90

Registri per gestione DATA e ORA

40078	2	Int16	R	03	HOUR
40079	2	Int16	R	03	MINUTES
40080	2	Int16	R	03	SECONDS
40081	2	Int16	R	03	TIME FORMAT (AM : 0 PM :1)
40082	2	Int16	R	03	DAY
40083	2	Int16	R	03	MONTH
40084	2	Int16	R	03	YEAR
40085	2	Int16	R	03	STAND BY STATUS (1: ALARM 2: NO ALARM)
40086	2	Int16	R	03	FLOW STATUS (1: ALARM 2: NO ALARM)

When dismantling this instrument please separate material types and send them according to local recycling disposal requirements.
We appreciate your efforts in supporting your local Recycle Environmental Program.
Working together we'll form an active union to assure the world's invaluable resources are conserved.