

**User Guide – MODBUS protocol
 Firmware Version : 1300**

DAT 3011

PRELIMINAR DESCRIPTION

All the data variables shared by a Modbus module are shown in tables, where each data is linked to one address. Each data can be of two types:

- “COIL”, composed by a single bit, can be associated to digital input (switch), digital outputs (relays), logic states (alarms).
- “REGISTER”, composed by 2 bytes (16 bits), can be associated to analogue input or outputs, variables, set-point, etc...

A register can also include the image of more coils, for example the 16 digital inputs of a device can be read and write as bit, one by one, addressing the relative coil, or they can be read or write as a single 16-bit port addressing the associated register, where for example the last significant bit will respond to the first coil.

In the Modbus protocol, coils and registers are divided in banks:
 0xxx and 1xxx = Coils (bits)
 3xxx and 4xxx = Registers (words)

REGISTERS TABLE

Register	Description	Access	E ² P
40001	--Reserved--	R/W	
40002	Firmware Version	R	
40003		R	
40004	Device Name	R/W	*
40005		R/W	*
40006	--Reserved--	R	*
40007	Address	R/W	*
40008	--Reserved--	R	*
40009	Digital input	R	*
40010	Digital Output	R/W	
40011	System Flags	R/W	
40012	WatchDog Time	R/W	*
40013÷18	--Reserved--	R	
40019	Communication	R/W	*
40020÷26	--Reserved--	R	
40027	Analog Input #1	R	
40028	Analog Input #2	R	
40029÷32	--Reserved--	R	
40033	Analog Output #1	R/W	
40034	Analog Output #2	R/W	
41217	Analog Input Type	R/W	*

IMPLEMENTED MODBUS FUNCTIONS

Function	Description
03	Read multiple registers (4xxxx bank)
04	Read multiple registers (3xxxx bank)
06	Write single register
16	Write multiple registers

NOTE:

The registers marked with '*' in the 'E²P' column are saved in EEPROM each time they are written, to be automatically reloaded to each power-on of the device.

NOTE:

For DAT3000 series devices, the bank 0xxxx is a mirror of bank 1xxxx, as the 3xxxx bank is a mirror of bank 4xxxx, as for i.e. the first register can be read indifferently as 30001 (with the function 04) or 40001 (with the function 03)

REGISTER DESCRIPTION

40002 / 40003 : FIRMWARE VERSION

Read-only 2-register field, that hold the manufacturer firmware identifier.

- Manufacturer default: 9000 (hex)

40004 / 40005 : DEVICE NAME

2-registers field (4 byte or 4 ASCII characters) user free, that can hold the device name or a function identifier. Each byte can be written with each value from 0 to 255, than ASCII characters too.

- Manufacturer default: "3011" (ASCII).

40007 : ADDRESS

Specify the net address of the device; there are allowed the address from 1 to 255.

Each device connected to the same net must have a unique address.

The address 255 is used for broadcast functions (i.e. synchronized sampling)

- Manufacturer default: 01

40009 : DIGITAL INPUTS (COILS)

This register shows the digital input state (0 = OFF , 1 = ON), the values of Latch on rising edge and the values of Latch on falling edge.

Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Descr.	Falling edge Latch				Input				Rising edge Latch							
Input	-	#2	#1	#0	-	#2	#1	#0	-	-	-	-	-	#2	#1	#0

40010 : DIGITAL OUTPUTS (COILS)

This register allows to command directly the relay outputs and the digital output (0 = OFF ; 1 = ON).

Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Output	-	-	-	-	-	#2	#1	#0	-	-	-	-	-	-	-	-

40011 : SYSTEM FLAGS

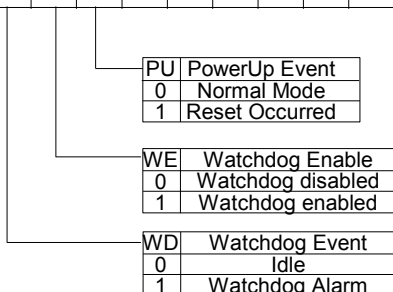
This register contains the system flags:

- PU = Power Up Event flag. This bit is forced to 1 at each power up of the device. Force manually to 0, this bit can be used to monitor the reset of the device.

- WE = WatchDog Enable flag. Enable the watchdog function. While the Enable flag is 1 and the device doesn't receive modbus commands for the time set in the register 40012, the WatchDog Alarm status will be forced (digital and analog outputs will be forced to 0).

- WD = WatchDog Event flag. Contains the WatchDog Alarm status

Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Coil	-	-	-	WD	WE	PU	-	-	-	-	-	-	-	-	-	-



40012 : WATCHDOG TIME

This register contains the Watchdog timeout, expressed in step of 0.5s (i.e. 10 = 5 sec.).

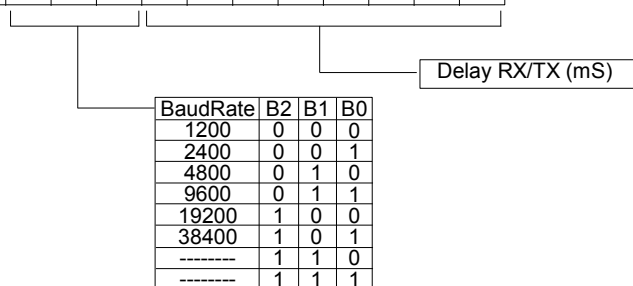
Refer to register 40011 description for the WatchDog function.

40019 : COMMUNICATION

The bits of this register must be set in function of the following table in order to configure the baud rate and the delay between the reception of one command and the sending of relative answer.

- Manufacturer default : 38400 bps, delay = 0

Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Desc.	-	-	-	-	-	B2	B1	B0	-	-	-	-	-	-	-	-



40027 : ANALOGUE INPUT # 1 VALUE**40028 : ANALOGUE INPUT # 2 VALUE**

These registers contain the measure of each channel converted in engineering units:
 The values are expressed as mV, mA or Ohm for normalized signals, °C for the inputs coming from temperature sensors, % for Potentiometer input.
 The data format is a 16 bit signed integer; the number of the decimals depends on the input type as shown in the table on the side.

Input type	Decimals
± 100 mV	2
± 1000 mV	1
± 10 V	3
Thermocouples	1
RTDs	1
Potentiometer	1
Current	3

To configure the input type set the proper value in the register 41217.

40033 : ANALOGUE OUTPUT # 1 VALUE**40034 : ANALOGUE OUTPUT # 2 VALUE**

The value written in these registers is converted to an analogue signal on the correspondent output.

The value are expressed as uA for current outputs:

0 = 0 mA
 20000 = 20 mA

41217 : ANALOG INPUT TYPE

Contain the programming of the two analogue input channels.

Bit 0-7: programming input channel 0 (universal input).

Bit 8-15: programming input channel 1 (Volt – mA input).

Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Descr.	Input type channel #1							Input type channel #0								

Input	Value
Disabled	0
10 V	2
20 mA	3

Input	Value
Disabled	0
100 mV	1
10 V	2
20 mA	3
Tc J	4
Tc K	5
Tc R	6
Tc S	7
Tc T	8
Tc B	9
Tc E	10
Tc N	11
Res 600 ohm	12
Pt100	13
Pt1K	14
Ni100	15
Ni1K	16
Pot	17
Res 2Kohm	18