

**User Guide – MODBUS protocol  
 Firmware Version : 9000**

**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 <sup>2</sup> 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	--Reserved--	R/W	*
40012÷18	--Reserved--	R	
40019	Communication	R/W	*
40020÷26	--Reserved--	R	
40027	Analogue Input #1	R	
40028	Analogue Input #2	R	
40029÷32	--Reserved--	R	
40033	Analogue Output #1	R/W	
40034	Analogue Output #2	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 'E<sup>2</sup>P' 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)**

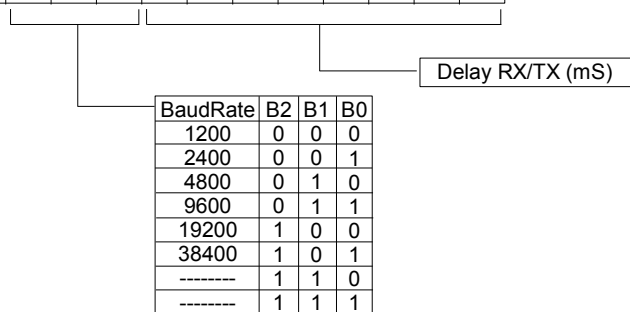
This register allows to command directly the relay outputs and the digital output (0 = OFF ; 1 = ON).

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

### **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.  
 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 it is necessary to use the software Dev9K.

### **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