Local functions user manual

EX1608DD module

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1. Module requirements

The functions described in this manual have been introduced with the firmware release "**r.01.005**". So verify, with the "Test module" function of "Modbus-Tool" utility, that in the module is installed this firmware or a later release. Alternatively the device serial number with the final field greater or equal to "**N05376**" insures that the new firmware is installed.

However, since new features can be added at a later time, check the minimum version of the firmware as described in the documentation of the specific function.

1.1. The local functions

The I/O slave modules make available to the master PLC their specific resources using words of only input type and holding registers that are generally words with read and write access. Normally the holding registers are associated to output resources, but are also used for the configuration resources of the module. In addition to this, a memory area, of holding register type, has been defined for the management of a series of "special functions" of the module. These functions are defined as local because the operations are executed by software running locally on the module itself, alleviating the master PLC from the management of tasks that can weigh down on its cycle time and particulary overload the bus communication.

1.2. Functions area of EX1608DD module

The EX1608DD slave module offers, for this purpose, an area of **500 holding registers** starting at address **1000**. In particular **16 areas**, size of **10 words** each, are assigned respectively to the 16 digital inputs of the module. The first word of each area (offset +0) is used to enable and configure the function associated with a specific input . The **0 value** disables the function and values greater than 0 enable different functions. The word with offset from +**1 to +9** are used for the management of the particular function and their meaning changes according to the function code configured in the word +0:

Holding Register	Description
1000	Function configuration of input channel 00
1001	First data word used by the function of input channel 00

1009	Last data word used by the function of input channel 00
1010	Function configuration of input channel 01
1011	First data word used by the function of input channel 01

1019	Last data word used by the function of input channel 01

1150	Function configuration of input channel 15
1151	First data word used by the function of input channel 15

1159	Last data word used by the function of input channel 15

2. Counting functions

Codes 1 through 9 are dedicated to the enabling of counting functions. The EX1608DD module is a generic digital I/O module and is not dedicated to the particular tasks that require high reading speed as in the case of encoder in positioning systems. The module can instead be used for counting of pulses whose frequency do not exceed **1KHz** with square waveform type.

NOTE: The module does not provide the backup of counters in permanent memory so, each time the device is powered, the counters contain the value 0.

2.1. Function 1: up counting on rise edge

The code 1 enables count function with an increase of one unit every rising power of the corresponding input. The count word is available for reading and writing at the address with offset +1 with refer to the area dedicated to the channel. When the counter reaches the value 65535, it restarts from counting value 0. To reset or preset the counter the same holding register can be over-written:

Holding Register	Read/Write	Description
+0 = 1	R / W	Enable of up counting
+1 = value	R / W	Current value of counter

2.2. Function 2: down counting on rise edge

The code 2 enables count function with a decrease of one unit every rising power of the corresponding input. The count word is available for reading and writing at the address with offset +1 with refer to the area dedicated to the channel. When the counter reaches the value 0, it restarts from counting value 65535. To reset or preset the counter the same holding register can be over-written:

Holding Register	Read/Write	Description
+0 = 2	R / W	Enable down counting
+1 = value	R / W	Current value of counter

2.3. Function 3: up counting on fall edge (from r.01.008 / P03452)

The code 3 enables count function with an increase of one unit every falling power of the corresponding input. The count word is available for reading and writing at the address with offset +1 with refer to the area dedicated to the channel. When the counter reaches the value 65535, it restarts from counting value 0. To reset or preset the counter the same holding register can be over-written:

Holding Register	Read/Write	Description
+0 = 3	R / W	Enable of up counting
+1 = value	R / W	Current value of counter

2.4. Function 4: down counting on fall edge (from r.01.008 / P03452)

The code 4 enables count function with a decrease of one unit every falling power of the corresponding input. The count word is available for reading and writing at the address with offset +1 with refer to the area dedicated to the channel. When the counter reaches the value 0, it restarts from counting value 65535. To reset or preset the counter the same holding register can be over-written:

Holding Register	Read/Write	Description
+0 = 4	R / W	Enable down counting
+1 = value	R / W	Current value of counter

3. Impulse capture functions

Codes 10 through 19 are dedicated to the enabling of impulse capture functions. The EX1608DD module can store the detection of short-duration signals which can be lost in the case of I/O update at lower frequencies. The input of module must remain in a defined logic state for a minimum of **0.5ms** so that it can be recognized the related signal.

NOTE: The module does not provide the backup of the detected values in permanent memory so, each time the device is powered, the reading returns the value 0.

3.1. Function 10: rise and fall edge capture (from r.01.008 / P03452)

The code 10 enables capture function for the rising and falling edge of the power applied to the related input. A word is available for reading and writing at the address with offset +1 with refer to the area dedicated to the channel. The bit 0 of the word is forced to 1 by the module when it detects a rising edge, while the bit 1 is activated to 1 when a falling edge is detected. The word can be cleared by writing the holding register. However, for ease of management, the module automatically provides to clear the word after its reading:

Holding Register	Read/Write	Description
+0 = 10	R / W	Enable edges capture
+1 = value	R / W	BIT 0: rise edge detected, BIT 1: fall edge detected

4. Frequency measure functions

Codes 100 through 109 are dedicated to the enabling of frequency measure functions. The maximum frequencies that the EX1608DD module can measure do not exceed **1KHz** with square waveform type.

4.1. Function 100: frequency measure on 1" interval

The code 100 enables the function of frequency measure for the signal applied to the digital input channel. For every rising power of input, an internal counter is incremented by one. An internal clock, at regular intervals of 1 second, samples the current counting, updates the measured value in the holding register and then resets the counter for the next reading:

Holding Register	Read/Write	Description
+0 = 100	R / W	Frequency measure on 1" interval
+1 = value	R	Current value of frequency (units 1Hz)

4.2. Function 101: frequency measure on 10" interval

The code 101 enables the function of frequency measure for the signal applied to the digital input channel. For every rising power of input, an internal counter is incremented by one. An internal clock, at regular intervals of 10 seconds, samples the current counting, updates the measured value in the holding register and then resets the counter for the next reading:

Holding Register	Read/Write	Description
+0 = 101	R / W	Frequency measure on 10" interval
+1 = value	R	Current value of frequency (units 0.1Hz)