



JX2-IO16
Version Update
from V2.01 to V3.00



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1 Introduction

Overview of Version Updates			
Version	Description	New	Fixed
V3.00	Fast Inputs	✓	
	Software filter (for fast inputs)	✓	
	Counter Function	✓	
	Frequency measurement - Input # 5	✓	
	Troubleshooting - Data buffer overflow with system bus communication	✓	
V2.01	Input state is read out incorrectly		✓
	Register Interface	✓	
	Fault message - output driver	✓	
	Initialization of outputs	✓	
	Manual pulse stretching	✓	
V2.00	Register Interface	✓	
	Pulse stretching	✓	
	Counter Function	✓	
	Diagnostics and Administration	✓	

1.1 System Requirements

Software Versions of Controllers and the Submodule JX6-SB(-I)	
Controller	Minimum Software Version
JC-241, JC-243, JC-246	3.20
NANO-B, NANO-C, NANO-D	3.53
JX6-SB(-I) (for JC-647, DELTA, JC-800)	2.12

2 New Features

2.1 Fast Inputs

Starting from firmware version 3.00, inputs 5 - 8 are equipped with a 50 μ s hardware filter instead of a 3 ms filter. The 3 ms hardware filter of inputs 1 - 4 remains unchanged.

The frequency of the hardware filter for inputs 5 - 8 has been reduced to allow shorter pulses to be captured. The minimum pulse length for high or low pulses, which was so far 3 ms, has been reduced to 250 μ s by means of a new hardware filter, as well as by shorter sampling intervals in the software. Therefore, inputs 5 - 8 are called "fast inputs".

To ensure compatibility of fast inputs with older JX2-IO16 modules, these inputs are equipped with a software filter. This software filter allows to set the filter interval for each of the fast inputs. For more information refer to chapter 2.2 "Software Filter", page 5. The default setting of the filter interval is compatible with the filter interval of older JX2-IO16 modules.

2.2 Software Filter

The fast inputs 5 - 8 are provided with a software filter. Read/write access to the filter interval is carried out through register array elements 45 - 48:

Register 3xx8 = 45 - 48 Register 3xx9: Software filter - Filter interval of inputs 5 - 8	
Function	Description
Read	Set filter interval
Write	New filter interval (will immediately become effective)
Value range	0 ... 255 (x 128 μ s)
Value following reset	21

The filter interval is a multiple of 128 ms:

0: Filter is disabled
 1: 128 μ s
 ...
 255: 32.64 ms

2.3 Counter Function

The counter function has been enhanced as follows:

- Inputs 5 - 7 are now provided with a single-channel counter function. So far, only input 8 was equipped with a single-channel counter.
- Counting frequency of single-channel counter has been increased (see below).
- Inputs 5 - 6 are used as dual-channel counters with quadruple evaluation. Inputs 5 - 6 are used either for two single-channel counters, or together for one dual-channel counter.

2.3.1 Single-channel counter

Read/write access to the readings is carried out through register array elements 25 - 28:

Register 3xx8 = 25 - 28	
Register 3xx9: Counter reading (inputs 5 - 8)	
Function	Description
Read	Current counter reading
Write	New counter reading (will immediately become effective)
Value range	- 8.388.608 ... + 8.388.607
Value following reset	0

Besides using the register array, read and write access to the counter readings of inputs 5 and 8 can be made via registers 3xx6 and 3xx7.

Register 3xx6: Counter reading of input 5	
Function	Description
Read	Current counter reading
Write	New counter reading (will immediately become effective)
Value range	- 8.388.608 ... + 8.388.607
Value following reset	0

Register 3xx7: Counter reading of input 8	
Function	Description
Read	Current counter reading
Write	New counter reading (will immediately become effective)
Value range	- 8.388.608 ... + 8.388.607
Value following reset	0

The minimum pulse length for high or low pulses (counter input 8), which was so far 3 ms, has been reduced to 250 µs for each counter input.

At 50 % duty cycle, this results in a maximum counting frequency of 2 kHz.



Note!

To reach a counting rate exceeding 150 Hz (pulse length = 3 ms), the software filter of the corresponding inputs has to be adjusted. For more information refer to chapter 2.2 "Software Filter", page 5.

2.3.2 Dual-channel counter

Bit 10 in register 3xx0 is used to switch inputs 5 - 6 between single-channel and dual-channel counter mode.

Register 3xx0: Status / Controller	
Function	Description
Read	Present module status
Write	Setting the module to a new mode, only bits 8 - 11. Validity depending on bit.
Value range	Bit-coded, 24 bits
Value following reset	0b 00000000 00000001 00000000

Controller

Meaning of the individual bits:

Bit 8: Communication error - Response (only for commissioning)

Bit 9: Reserved

Bit 10: Counter configuration

Meaning of the individual bits:

Counter configuration for inputs 5 - 6 (becomes immediately effective).

0 = Inputs 5 - 6 are used as single-channel counters

1 = Inputs 5 - 6 are used as dual-channel counters with quadruple evaluation

Value following reset: 0

Bit 11: Reserved

Read/write access to the counter reading is carried out through register array element 25, or register 3xx6. Refer to chapter 2.3.1 "Single-channel counter", page 6.

The maximum counting rate of the dual-channel counter is 1 kHz.



Note!

To reach a counting rate exceeding 150 Hz (pulse length = 3 ms), the software filter for input 5 - 6 has to be adjusted. For more information refer to chapter 2.2 "Software Filter", page 5.



Note!

If pulse stretching is enabled for input 5 or 6, this does **not affect** the dual-channel counter.

2.4 Frequency Measurement - Input # 5

For the fast input 5, the JX2-IO16 module supports frequency measurements of counting pulses. The JX2-IO16 module measures counting pulses which are sensed during an adjustable time base.

Once the time base has elapsed, the JX2-IO16 module subtracts the current reading of input 5 from the reading which has been sensed last, and calculates the difference by the following formula:

$$\text{CounterReadingDifference} = \text{CounterReading}_n - \text{CounterReading}_{n-1}$$

Read/write access to the time base is carried out through register array element 9:

Register 3xx8 = 9 Register 3xx9: Timebase for counter reading difference - Input 5	
Function	Description
Read	Present time base
Write	New time base (will immediately become effective)
Value range	1 ... 255 (x 10 ms)
Value following reset	10 (= 100 ms)

The time basis is a multiple of 10 ms.

1: 10 ms

...

255: 2.550 s

The difference in counter readings is read out of register array element 8:

Register 3xx8 = 8 Register 3xx9: Counter reading difference - Input 5	
Function	Description
Read	Present counter reading difference
Write	Illegal
Value range	- 32.768 ... + 32.767
Value following reset	0

This function is always active, irrespective of the fact whether input 5 is used as single-channel or dual-channel counter. It is of special interest when using the dual-channel counter. Refer to chapter 2.3.2 "Dual-channel counter", page 7.

The user may calculate the frequency by the following formula:

$$\text{Frequency (Hz)} = \frac{\text{CounterReadingDifference}}{\text{TimeBaseforCounterReadingDifference} \times 10 \text{ ms}}$$

2.5 Diagnostic Function - Data Buffer Overflow

The following error message has been added to the diagnostic function: Buffer overflow with system bus communication.

Data buffer overflow indicates that the JX2-IO16 has received more system bus requests than the data buffer memory can hold.



Note!

This error message indicates an overload of the system bus or the JX2-IO16 module. Along with this error message, the controller may display a timeout for the JX2-IO16 module.

This error message is displayed like all other errors: Red LED, set error bit in register array element 2, etc.

Register 3xx8 = 2 Register 3xx9: Error	
Function	Description
Read	Present error message
Write	Resetting the errors
Value range	Bit-coded, 8 bits
Value following reset	0

When errors have occurred, the register array element is zeroed by entering any value. At the same time, bit 15 in register "Status / Controller" is reset, too.

Meaning of the individual bits:

Bit 0: Reserved

Bit 1: Error in the output circuit

Bit 2: Timeout with system bus communication

Bit 3: Reserved

Bit 4: Reserved

Bit 5: Reserved

Bit 6: Reserved

Meaning of the individual bits:

Bit 7: System bus communication - Data buffer overflow

**Note!**

Troubleshooting: Increase the access times for register requests and output changes of JX2-IO16 in the application program.