

# **NANO-C**

## **Version Update**

### **V 3.04 to V 3.50**



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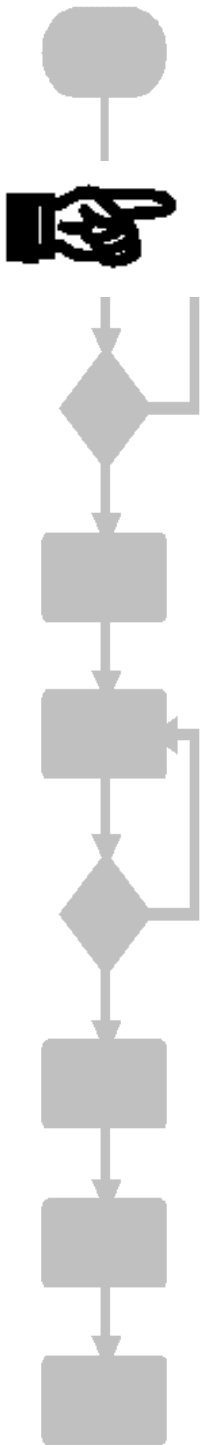
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# 1 Introduction

## Important Note on the NANO-C Hardware Change

The hardware of all NANO-C controllers as of serial number 20040301070300 has been changed.

The previous operating systems V. 1.00 through V. 2.04 for NANO-C cannot be transferred to the new hardware any more.

Only operating systems as of version 3.50 can be transferred to the new NANO-C hardware.

Version Updates - Survey			
Version	Function	upgraded	corrected
V 3.50	<p>is only compatible with NANO-C controllers as of serial number 20040301070300</p> <p>The remanent registers are buffered by means of an exchangeable battery</p> <p>Power supply of the directly connected JX2 expansion modules is safeguarded by an automatically resetting circuit braker</p> <p>After restarting the controller, the analog inputs of JX-SIO are read out.</p> <p>The battery voltage is read by means of registers</p> <p>The application program is processed faster than before</p> <p>I/O register overlay is compatible with NANO-D</p> <p>New supported modules at the system bus</p> <p>Valve terminal EX250 (SMC Pneumatik GmbH)</p> <p>ecostep drives (Jenaer Antriebstechnik)</p> <p>NX frequency converters (Vacon GmbH)</p>	<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>	<p>✓</p>
V3.04	<p>Analog inputs of basic device</p> <p>Special registers</p> <p>millisecond timer</p>	<p>✓</p>	<p>✓</p>
V3.03	<p>Floating point registers</p> <p>Access has again been enabled</p>		<p>✓</p>
V3.02	<p>System bus</p> <p>LJX7-Compactbox module has been integrated</p> <p>Lenze frequency inverter has been integrated</p> <p>Festo CP-FB module with JX-SIO</p>	<p>✓</p>	

	Special registers Creation time of application program Supply voltages Analog inputs of basic device Behavior after Power On	✓	✓  ✓
V3.01	Display instructions Special registers System Bus Interfaces for LCD, PC and JETWay User interfaces Networking via JETWay	✓ ✓ ✓ ✓  ✓	✓  ✓ ✓ ✓ ✓
V3.00	System Bus Special registers Display instructions Special functions Application program management Floating point registers	✓ ✓ ✓ ✓  	✓    ✓ ✓

**Important!**

While the operating system is being updated, the voltage supply of the NANO-C must not be interrupted.

## 2 Expansions

### 2.1 System Bus

As of operating system version 3.50 for NANO-C, a great number of modules can be connected with the system bus directly.

The modules that have been recognized and commissioned can be read out by means of the module array in registers 2015 and 2016.

Coding of Modules		
JX2-I/O Modules		
Coding of Modules	Designation	Comment
0	JX2-OD8	8 digital outputs
1	JX2-ID8	8 digital inputs
2	JX2-IO16	8 digital inputs and 8 digital outputs
3	JX2-IA4	4 analog inputs
4	JX2-OA4	4 analog outputs
5	JX2-CNT1	Counter input
6	JX2-PRN1	Module with Centronics interface
7	JX2-SER1	Module with serial interface
9	JX-TP20	Module equipped with 20 keys; it can be used as a user interface
10	LJX7-CSL-108-ID16	16 digital inputs, IP67
11	LJX7-CSL-109-ID16-NPN	16 digital inputs (n), IP67
12	LJX7-CSL-107-OD8-2A	16 digital outputs, IP67
13	LJX7-CSL-114-OD16	8 digital outputs, IP67
14	LJX7-CSL-113-ID8-OD8	8 digital inputs and 8 digital outputs, IP67
JX-SIO and Third-Party Modules		
Coding of Modules	Designation	Comment
64	JX-SIO	System bus coupler for Smart I/O
65	CPV-Direct Valve Terminal	Festo AG & Co.
66	Terminal CPX	Festo AG & Co.
67	Valve block type 8640	Bürkert GmbH & Co. KG
68	SI unit EX12# - SCA1	SMC Pneumatik GmbH
70	Frequency converter 8200 vector	Lenze Drives Systems GmbH

<b>Coding of Modules</b>		
71	SI unit EX250	SMC Pneumatik GmbH
103	Milan drive	Werner Riester GmbH & Co. KG (auma)
104	Ecostep	Jenaer Antriebstechnik
105	NX frequency converter	Vacon GmbH
<b>JX2-Slave Modules</b>		
<b>Coding of Modules</b>	<b>Designation</b>	<b>Comment</b>
128	JX2-SV1	Position feedback controller, frequency converter ...
129	CAN-DIMA	Position feedback controller with integrated servo amplifier
130	JX2-SM2	Module for controlling 2 stepper motor amplifiers
131	JX2-SM1D	Module with integrated power unit for controlling a stepper motor
132	JX2-PID1	Module with 4 PID controllers
133	JX2-PROFI1	Slave for Profibus-DP
135	JetMove 200 Series	Position feedback controller with integrated servo amplifier
136	JX2-ProfiM	Master for Profibus-DP
146	JetMove 600 Series	Position feedback controller with integrated servo amplifier
<b>Dummy Modules</b>		
<b>Coding of Modules</b>	<b>Designation</b>	<b>Comment</b>
252	JX-SIO dummy-module	
253	JX2-Slave dummy module	
254	JX2-I/O Dummy Module	
255	not identified	



## 2.1.1 Valve Terminal EX250

The valve terminals EX250 of SMC Pneumatik GmbH can be connected to the system bus. For information on how to connect the valve terminals to the system bus, please refer to the corresponding user information.

### Valve Terminal EX250

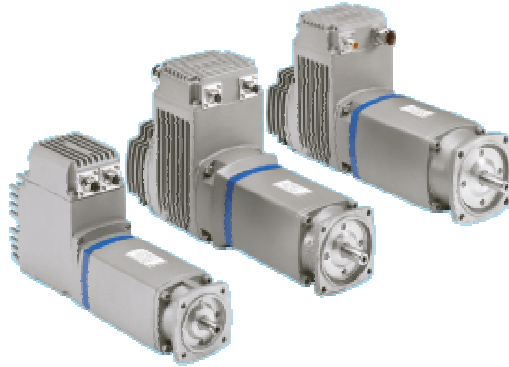


Technical Data of the EX250 Valve Terminal	
Maximum number of LIX7-Compactbox modules with NANO-C  The maximum number of modules is limited by the maximum allowable I/O sum of the respective controller	1
Size of I/Os	64
Supported EX250	SI units EX250 - SCA1 All solenoid valves that can be connected to the SI unit are supported

## 2.1.2 Milan Drives

The system bus allows for connection of Milan Drives made by Werner Riester GmbH & Co. KG. For information on how to connect Milan Drives to the system bus, please refer to the corresponding user information.

### Milan Drives

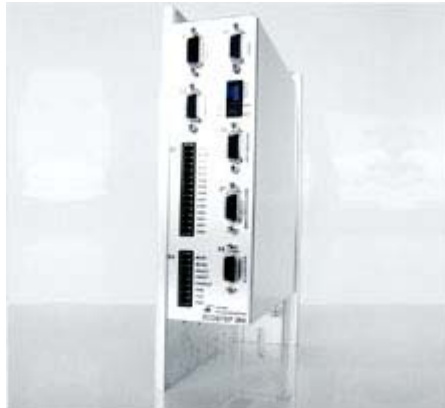


Technical Data of Milan Drives	
Maximum number of Milan Drives connected with a NANO-C controller	3
Size of I/Os	1 JX2-slave module
Supported Milan Drives	MI 1.5/075 MI 2/090 MI 4/110

## 2.1.3 Ecostep Drives

The system bus allows for connection of Ecostep drives made by Jenaer Antriebstechnik. For information on how to connect Ecostep drives to the system bus, please refer to the corresponding user information.

### Ecostep Drives



Technical Data of Ecostep Drives	
Maximum number of Ecostep drives connected with a NANO-C controller	3
Size of I/Os	1 JX2-slave module
Supported Ecostep drives	100-AA-000 100-LA-000 100-PA-000 200-AA-000 200-PA-000 200-ZA-000 200-QA-000 216-AA-000 216-PA-000 216-ZA-000 216-QA-000

## 2.2 Monitoring JX2-I/O Modules

The monitoring function of JX2-I/O modules can be freely configured and adjusted to the requirements of the specific controllers.

<b>Register 2760: Configuring the Timeout of JX2-I/O Modules</b>	
<b>Function</b>	<b>Description</b>
Read	Actual JX2-I/O timeout configuration
Write	New JX2-I/O timeout configuration
Value range	0 – 255
Value after reset	5

By means of configuring the JX2-I/O timeout, the maximum permitted number repeating an I/O upload to a JX2-IO module is set. The NANO-C will not report a timeout error via status register 2008, before the I/O update for a specific module has reached the configured value.

<b>Register 2761: Index to a JX2-I/O Timeout Monitoring Array</b>	
<b>Function</b>	<b>Description</b>
Read	Present index The index corresponds to the I/O module number
Write	New index
Value range	2 – 32, 70 – 79
Value after reset	2

<b>Register 2762: JX2-I/O Timeout Monitoring Array</b>	
<b>Function</b>	<b>Description</b>
Read	Actual value of the JX2-I/O timeout monitoring array Reg 2761 = 2 -> Reg 2762 : Entry for I/O module 2  Reg 2761 = 3 -> Reg 2762 : Entry for I/O module 3  Reg 2761 = 70 -> Reg 2762 : Entry for JX-SIO module 70
Write	By writing value zero into the register, the entry for the presently selected I/O module will be set to zero.
Value range	0 – 65535
Value after reset	0

If the NANO-C controller has not received a reply from a JX2-I/O or a JX-SIO module within the timeout time configured in register 2763, the value assigned to the module will be increased by one in the JX2-I/O timeout monitoring array.

By means of the JX2-I/O timeout monitoring array, the quality of the connection between the NANO-C controller and the individual expansion modules can be evaluated.

<b>Register 2763: JX2-I/O Monitoring Timeout</b>	
<b>Function</b>	<b>Description</b>
Read	Actual JX2-I/O monitoring timeout
Write	New JX2-I/O monitoring timeout
Value range	0 – 255
Value after reset	10

The maximum permitted time of the NANO-C controller waiting for a reply sent by the expansion module during I/O update can be configured via register 2763. Not before this time has expired, the entry assigned to the respective expansion module in the JX2-I/O timeout monitoring array will be incremented by one.

## 2.3 Battery for Data Storage

While the NANO-C controller is not being supplied with voltage, a lithium battery SL 300 will be needed for data storage of the remanent registers and for the operation of the realtime clock. The NANO-C is delivered with the battery already being built-in.

If the operating conditions are met, the battery is maintenance-free. If it is still necessary to replace the battery, please send the NANO-C controller to Jetter AG.

<b>Register 2001: Status Register</b>	
<b>Function</b>	<b>Description</b>
Read	Present status Bit 4 = 0: Battery voltage ok Bit 4 = 1: Indicates the battery voltage has reached critical level Bit 5 = 0: Battery voltage ok Bit 5 = 1: Battery is empty
Write	illegal
Value range	0 - 5
Value after reset	Present state

Bits 4 and 5 indicate the status of the battery in the status register. These status bits of the battery voltage are refreshed each time when switching on the NANO-C and after each read access to register 2950.

<b>Register 2950: Battery Voltage</b>	
<b>Function</b>	<b>Description</b>
Read	present battery voltage in millivolts
Write	illegal
Value range	0 - 3600
Value after reset	present battery voltage

**Note!**

The value of the battery voltage in millivolts can be read from this register. However, read access to this register takes a computing time of approx. 5 ms. For monitoring the status of the battery voltage during operation, it is more useful to use register 2001.

<b>Register 2951: Critical Battery Voltage Threshold in Millivolts</b>	
<b>Function</b>	<b>Description</b>
Read	present battery warning threshold in millivolts
Write	New battery warning threshold in millivolts
Value range	Best: 2500 - 3600
Value after reset	Latest battery voltage (remanent register)

## 2.4 Processing Speed of the NANO-C

The new hardware helped to improve the processing speed of the NANO-C as of serial number 20040301070300. Partially, the speed has increased by 100 %.

## 2.5 Supply of the JX2 Modules

Up to five JX2-IO modules can directly be plugged into the NANO-C. The voltage supply of the NANO-C serves the JX2-IO modules as well. Up to now, the supply voltage used to be safeguarded by a non-renewable fuse. As of serial number 20040301070000, the NANO-C has now been equipped with a self-healing fuse for safeguarding the supply voltage of the JX2-IO modules.

## 2.6 I/O-Register Overlaying

By means of I/O register overlaying, several digital inputs and outputs can be accessed by only one register instruction made in JetSym. Besides registers 2400 through 2555, registers 4000 through 4295 will also be supported; up to now, they were only available for NANO-D.

I/O Register Overlaying - Inputs		
24 Combined Inputs		
Registers		Description
2400	4000	IN 101 ... IN 308
2401	4001	IN 201 ... IN 408
2402	4002	IN 301 ... IN 508
...		
2411	4011	IN 1201 ... IN 1408
2412	4012	IN 1301 ... IN 1508
2413	4013	IN 1401 ... IN 1608
16 Combined Inputs		
Registers		Description
2420	4040	IN 101 ... IN 208
2421	4041	IN 201 ... IN 308
2422	4042	IN 301 ... IN 408
...		
2432	4052	IN 1301 ... IN 1408
2433	4053	IN 1401 ... IN 1508
2434	4054	IN 1501 ... IN 1608
8 Combined Inputs		
Registers		Description
2440	4080	IN 101 ... IN 108
2441	4081	IN 201 ... IN 208
2442	4082	IN 301 ... IN 308
...		
2453	4093	IN 1401 ... IN 1408
2454	4094	IN 1501 ... IN 1508
2455	4095	IN 1601 ... IN 1608

<b>I/O Register Overlaying - Outputs</b>		
<b>24 Combined Inputs</b>		
<b>Registers</b>		<b>Description</b>
2500	4200	OUT 101 ... OUT 308
2501	4201	OUT 201 ... OUT 408
2502	4202	OUT 301 ... OUT 508
...		
2511	4211	OUT 1201 ... OUT 1408
2512	4212	OUT 1301 ... OUT 1508
2513	4213	OUT 1401 ... OUT 1608
<b>16 Combined Inputs</b>		
<b>Registers</b>		<b>Description</b>
2520	4240	OUT 101 ... OUT 208
2521	4241	OUT 201 ... OUT 308
2522	4242	OUT 301 ... OUT 408
...		
2532	4252	OUT 1301 ... OUT 1408
2533	4253	OUT 1401 ... OUT 1508
2534	4254	OUT 1501 ... OUT 1608
<b>8 Combined Inputs</b>		
<b>Registers</b>		<b>Description</b>
2540	4280	OUT 101 ... OUT 108
2541	4281	OUT 201 ... OUT 208
2542	4282	OUT 301 ... OUT 308
...		
2553	4293	OUT 1401 ... OUT 1408
2554	4294	OUT 1501 ... OUT 1508
2555	4295	OUT 1601 ... OUT 1608



## **3 Eliminated Software Bugs**

### **3.1 Reading Back the Analog Outputs from the JX-SIO**

After switching on the NANO-C, the actual values of the digital and analog outputs at the JX-SIO will be read back once by the controller.

This way, at restarting the NANO-C, the configured error statuses at the outputs of the JX-SIO will agree with the process I/O image of the controller.

Reading back the analog outputs is now possible as of version 3.50.