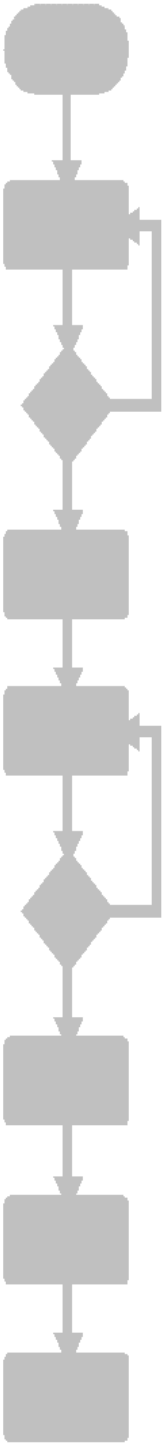

NANO-B:
Version Update
from V2.01 to V2.02

Jetter

Edition 1.00

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Edition 1.00

Table of Contents

1 Introduction

Version Update - Survey			
Version	**Function**	**upgraded**	**corrected**
V2.02	Display Instructions Cursor Position	✓	✓
	Special Registers Time of creating the application program Timer for Milliseconds	✓	
	System Bus Festo CPX and SMC valve terminal have been integrated Function- and Power Level Terminals JX-SIO	✓	✓
	LCD-, PC- and JETWay-Interface Monitoring	✓	✓
	User Interfaces No "Data Error“ After Power-On		✓
	User-Programmable Interface Initializing after Power-On		✓
	Networking via JETWay	✓	✓
V2.01	System bus, commissioning of intelligent JX2-slave modules		✓
V2.00	System Bus	✓	✓
	Special Registers	✓	
	DISPLAY Instructions	✓	
	Special Functions	✓	

By updating onto operating system version 2.02, the NANO-B has been equipped with a large number of new functions.

Important!

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

2 Expansions

2.1 Display Instructions

If display instructions are to be used in order to output texts and register values via PRIM interface or a JX2-SER1 expansion module, the cursor position must be considered. In front of each display instruction, voids, dependent on the cursor position, will be output now.

For using display instructions, the following issues must be considered:

- The text that is to be output, must always begin at cursor position 1.
- If the value of the cursor position is greater than 1, voids will be output as ASCII code 20_{hex} up to the start of the text.
- For diverting the display instructions onto the PRIM interface, device "9" must be selected.
- For diverting the display instructions onto the JX2-SER1 expansion module, device "11" must be selected. The module number of the expansion module will be output in register `2838`.

Example 1: Output on a JX2-SER1 Expansion Module

On a JX2-SER1 module, texts and register contents are output in different ways.

```
                              // ASCII-sequence in HEX on a JX2-SER1
DISPLAY_TEXT (11, 1, "Hello") // 48 61 6C 6C 6F
DISPLAY_TEXT (11, 3, "Hello") // 20 20  48 61 6C 6C 6F


REG_LOAD (1400, 1234)         // Register for output
REG_LOAD (2810, 0)            // Quantity of post-comma-places (default)
REG_LOAD (2812, 8)            // Field width (default)
REG_LOAD (2816, 0)            // Sign suppression (default)
                              // ASCII-sequence in HEX on a JX2-SER1
DISPLAY_REG (11, 1, 1400)     // 20 20 20 20 31 32 33 34
DISPLAY_REG (11, 3, 1400)     // 20 20  20 20 20 20 31 32 33 34
```

2.2 Register for Milliseconds

Register 2037: Timer for Milliseconds	
Function	**Description**
Read	present value of the timer for milliseconds Value after reset: 0
Write	Illegal
Value range	0 – 65535

The NANO-C will increment the millisecond timer by one every millisecond. It will start automatically after switching on the NANO-C. Stopping the timer is not possible.

2.3 System Bus

2.3.1 Further Modules

Besides modules produced by Jetter AG, further modules can also be connected to the system bus of the NANO-B. In general, these modules are handled like a JX-SIO module.

The following modules are supported by a NANO-B of the software version 2.02:

Further Modules	
Manufacturer	**Product Designation**
Bürkert GmbH & Co. KG	Valve terminal type 8640 Bürkert_BI_100_user information
Festo AG & Co.	CPV10-GE-CO2-8 CPV14-GE-CO2-8 CPV18-GE-CO2-8 CPX-FB14 Festo_BI_100_user information
SMC Pneumatik GmbH	SI-unit EX120 - SCA1 SI-unit EX121 - SCA1 SI-unit EX122 - SCA1 SMC_BI_100_user information

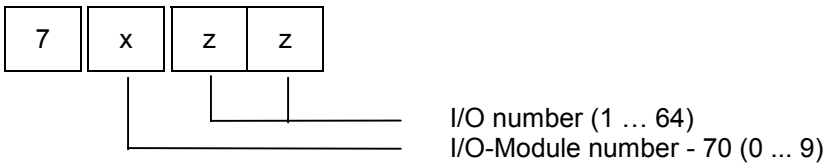
Further modules are recognized and commissioned automatically. Another commissioning software will not be needed. For connecting these modules, please consider the operating instructions of the respective manufacturers.
In addition, user information has been provided by Jetter AG, in which the operation of these modules being connected to the Jetter system bus is described.

2.3.1.1 Register- and I/O-Numbers

The inputs and outputs of the system bus further modules can be accessed with the help of the I/O instructions of the JetSym language. The registers of these modules can also be accessed with the help of these register instructions.
The individual I/Os and registers are distinguished by their numbering.

I/O- and Register Areas	
Area	**Description**
IN 7000 ... IN 7999	digital inputs of further modules
OUT 7000 ... OUT 7999	digital outputs of further modules
Reg 5000 ... Reg 5999	I/O register overlay of digital and analog inputs
Reg 6000 ... Reg 6999	I/O register overlay of digital and analog outputs
Reg 7000 ... Reg 7999	Registers for configuring and diagnose

Coding of I/O Numbers



Coding of the registers for I/O register overlay and for analog inputs

Coding of the registers for I/O register overlay and for analog outputs

Coding of the registers for configuring and diagnose

2.3.1.2 Module Array

When a module produced by another manufacturer has been recognized, it will be stored in the module array by an unambiguous code. The module array can be accessed via registers 2015 and 2016.

Register 2015: Pointer unto Module Array	
Function	**Description**
Read	selected module
Write	select a certain module
Value range	0 through amount of I/O modules
Value after reset	0

Register 2016: Module Array	
Function	**Description**
Read	Module Array 2015 = 0 -> 2016 = amount of modules 2015 = 1 -> 2016 = Code of the first module 2015 = 2 -> 2016 = Code of the second module Code: **JX2-I/O Modules** 0 JX2-OD8 1 JX2-ID8 2 JX2-IO16 3 JX2-IA4 4 JX2-OA4 5 JX2-CNT1 6 JX2-PRN1 7 JX2-SER1 **JX-SIO and further modules** 64 JX-SIO 65 Festo CPV Direct 66 Festo Terminal CPX 67 Buerkert valve terminal type 8640 SMC SI-unit EX12# - SCA1 **JX2 slave modules** 128 JX2-SV1 129 CAN-DIMA 130 JX2-SM2 131 JX2-SM1D 132 JX2-PID1 133 JX2-PROFI1 135 JetMove 200 Serie 136 JX2-ProfiM 146 JetMove 600 series **Dummy-modules** 252 JX-SIO dummy-module 253 JX2-Slave dummy-module 254 JX2-I/O dummy-module 255 Not identified
Write	Illegal
Value range	0 - 255
Value after reset	Quantity of expansion modules

2.3.2 Function and power-level terminals at the JX-SIO

Besides digital and analog I/O terminals, function and power-level terminals can also be connected to the JX-SIO. Below, only the term "function terminal" will be used for both function and power-level terminals.
The following function terminals are supported by the JX-SIO:

- IB IL 400 MLR 1-8A
- IB IL 400 ELR 1-3A
- IB IL 400 ELR R-3A
- INLINE CAM by Deutschmann Automation GmbH

JX-SIO Function Terminals: Register Survey	
Register Number	**Description**
7x04	Index of function terminals
7x05	Status of function terminals
7x06	Input data of function terminals
7x07	Output data of function terminals

The communication between CPU and function terminals has been described in detail in the user information on Smart I/O modules.

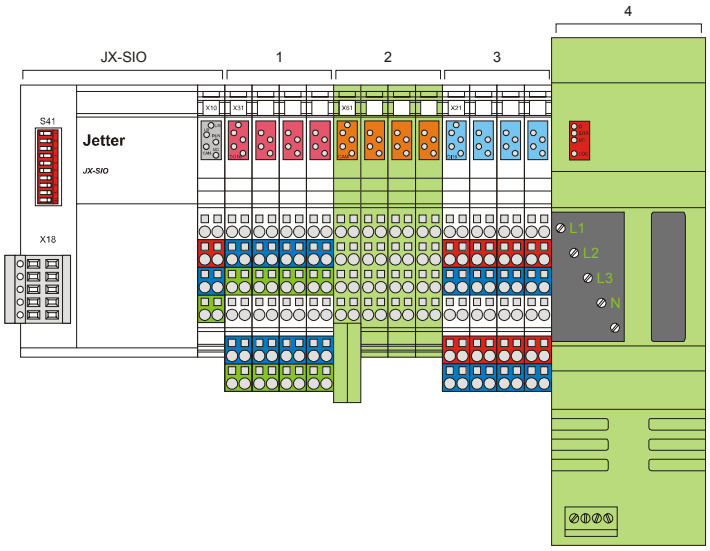


Fig. 1: Smart I/O module with function terminal INLINE CAM and power-level terminal IB IL 400 MLR 1-8A

2.3.3 Special Flags for the System Bus

With the help of a special flag, the NANO-B indicates certain errors. This makes a detailed error analysis possible. After start-up, the NANO-B will clear all special flags.

Survey of the Special Flags for the System Bus	
Special Flag	**Description**
2048	Timeout at access to a JX2-I/O module
2049	Timeout at access to a JX2 slave-module
2050	Timeout at access to a JX2-I/O module
2065	Error signalizing at output driver errors has been activated.
2067	Fatal system bus error
2068	Errors have accumulated at the system bus interface
2270	Timeout at access to a JX-SIO which is not active
2272	Access to an unknown JX-SIO-register
2273	Access to a register which is not supported by this JX-SIO, e.g. configuration of an analog input, although there is no analog input terminal
2274	Timeout at JX-SIO monitoring
2275	JX-SIO has carried out an internal reset, which means it is not ready for operation
2276	Overflow at a read access to a 32-bit register

2.3.4 Access to JX-SIO Analog Values

Up to now, registers 5x60 through 5x71, as well as registers 6x60 through 6x71 have been written, respectively read, while a REGISTER instruction was being processed.
In order to achieve an increase in performance, the NANO-B reads all analog inputs in the background, when all tasks have been processed. If special flag `2059` has been set, the analog inputs are even read after each task switch.
All changed analog outputs are written to the JX-SIO at the end of a task.

2.4 Monitoring the activities of interfaces

With the help of two special flags per interface, the activities of any connected communication partner that is communicating with the NANO-B via LCD, PC or JETWay interface, can be monitored through the application program. This way it can be checked, whether, for example, there is still a connection to an operating and display module.

Note

Monitoring the interface activity by PRIM via special flag is not possible for user-programmable interfaces.

The first special flag will be set by the operating system, when a valid telegram has been received. A monitoring time can be set in a register; it will be started simultaneously with receiving the telegram. Any further telegram will re-start the monitoring time.
Another special flag can be set by the user. If no valid telegrams are received any more, both special flags will be reset when the monitoring time has elapsed. As the second special flag has not been set by the operating system, the user can check whether the connection had been interrupted for a short time. In this case, the NANO-B would, after an interruption, reset the first special flag only for a short instance and after this set it again immediately.
The monitoring time can be defined via register by the user for each interface individually. By setting the monitoring time to zero, activity monitoring will be switched off.
For activity monitoring, cyclic data exchange on the interface must be active.
If operator panels, such as LCD9, LCD 34, LCD 19, … are used, the monitoring time should not be set to less than 200 ms. If values smaller than 200 ms are set, errors might be reported in multi-display mode or in big-sized user interfaces in spite of active communication.
In process monitoring systems – such as VIADUKT or JETLink, as well as in JetSym – the interrogation time can either be set or else communication can be stopped altogether. This must be considered for activity monitoring.

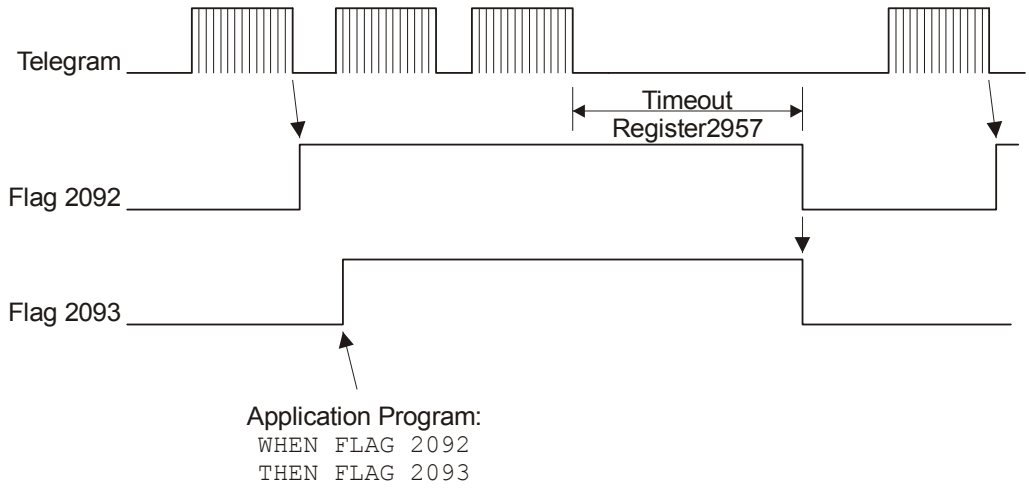


Fig. 1 Monitoring of the LCD interface

2.4.1 Register for Monitoring the Activities of Interfaces

Register 2956:	Monitoring time of the PC interface
Function	**Description**
Read	present monitoring time in milliseconds
Write	new monitoring time in milliseconds **Note** Monitoring the interface activity is always deactivated for user-programmable (PRIM) interfaces.
Value range	0 .. 65535
Value after reset	0 (no monitoring)

Register 2957:	Monitoring time of the LCD interface
Function	**Description**
Read	present monitoring time in milliseconds
Write	new monitoring time in milliseconds **Note** Monitoring the interface activity is always deactivated for user-programmable (PRIM) interfaces.
Value range	0 .. 65535
Value after reset	0 (no monitoring)

Register 2958:	Monitoring time of the JETWay interface
Function	**Description**
Read	present monitoring time in milliseconds
Write	new monitoring time in milliseconds **Note** Monitoring the interface activity is always deactivated for user-programmable (PRIM) interfaces.
Value range	0 .. 65535
Value after reset	0 (no monitoring)

Register 10019:	Amount of errors on the PC interface
Function	**Description**
Read	present amount of errors on the PC interface **Note** The error-count is not supported, if PRIM interfaces are used.
Write	reset the error counter
Value range	0 – 65535
Value after reset	0

Register 10039:	Amount of errors on the LCD interface
Function	**Description**
Read	present amount of errors on the LCD interface **Note** The error-count is not supported, if PRIM interfaces are used.
Write	reset the error counter
Value range	0 – 65535
Value after reset	0

Each time a character has been received on the PC and the LCD interface, the NANO-B checks, whether an error has occurred during transmission. The error counts will be incremented by one, if the following errors have occurred:

Overrun Error	The UART of the interface received characters, although the receiving buffer had already been full.
Parity Error	The parity of the received character was not correct.
Framing Error	The received character had no valid stop bit.

2.4.2 Special Flag for Monitoring the Activities of Interfaces

Spezial flag 2090 through 2095:	**Monitoring the activities of interfaces**	
Special Flag	**Interface**	**Description**
2090	PC interface	operating system flag 0 = no valid telegrams 1 = the interface is active
2091		user flag 0 = no valid telegrams to be set by the user
2092	LCD interface	operating system flag 0 = no valid telegrams 1 = the interface is active
2093		user flag 0 = no valid telegrams to be set by the user
2094	JETWay interface	operating system flag 0 = no valid telegrams 1 = the interface is active
2095		user flag 0 = no valid telegrams to be set by the user

2.5 Time of Generating the Application Program

The programming system JetSym generates a file of the ending `*.end` when an application program is converted for the NANO-B. This file can be found in the "debug" directory of the JetSym project.
The time of generating this file will be stored in the application program and will also be transferred to the NANO-B during download. The time of generating the application program, which has been stored in the flash, can be read out of registers `2970` through `2974`. The time of generating the application program, which can be read out of the registers, corresponds with the date of the `*.end` file.

Time of generating the application program	
Register number	**Description**
2970	Minutes
2971	Hours
2972	Day
2973	Month
2974	Year

Note

If the function "autoflash" has not been activated in the project settings, the generating time written in registers `2970` through `2974` remains unchanged during download. Not before the application program has been transferred from the RAM into the flash, the time of generating the application program will be updated.
At start-up, the NANO-B always copies the application program, which has been stored in the flash, into the RAM.

3 Eliminated Software Bugs

3.1 User Interfaces

3.1.1 Behaviour during Start-Up

Starting from operating system version 2.01 of the NANO-B, the text "data error" would appear on a connected user interface at power-up. This was mainly dependent on the duration of the power-on delay and did not influence the functioning of the user interface.
Starting from operating system version 2.02, the text "P-SPS timeout" will be shown on the user interface, until the initializing phase of the NANO-B has been completed.

3.1.2 JX-SIO Inputs and Outputs

The digital inputs and outputs of the JX-SIO expansion modules with the I/O numbers 7001 through 7964 can now be read and written via user interface.

3.2 Display Instructions

When registers are mapped onto a JX2-SER1 or a JX2-PRN1 module with the help of `DISPLAY_REG`, the amount of characters to be edited will be limited to the field width set in register `2812` "Field width for the display of interregisters“.
Up to version 2.01, 10 characters would always be edited.

3.3 Network Operation

The NANO-B will only accept a token in a JETWay network, if it has been configured as a master. The token will be passed on among the individual masters belonging to a JETWay network.

3.4 Application Program RAM-> Flash

Now, the copying process of the application program from RAM into flash is interrupted by the NANO-B; this way, further data can be exchanged via serial interfaces.
Especially in the programming system JetSym, setting a long timeout time for the interface will not be necessary.

3.5 System Bus

3.5.1 Erroneous Behaviour of the Analog Outputs in Smart I/O Modules

For Smart I/O modules, erroneous behaviour of the analog outputs can be configured. The Smart I/O modules will recognize an interruption of the system bus connection to the NANO-B and will then output the configured values at the analog outputs.
Up to version 2.01, the configuring data would not be transmitted correctly; at the analog outputs value 0000_{hex} would always be output.

3.5.2 Read Access to Register 7x90

In the context of JX-SIO and most further modules, register `7x90` contains the error register and the status register byte of the highest value.
Some other modules, though, only support the error register. This lead to a timeout message at read access to register `7x90`, because the NANO-B-CPU had received an error message from the module itself when reading the status register byte of highest value.
Starting from operating system version 2.02, a timeout message will not be generated any more at read access to register `7x90` for modules that do not support the status register.

3.6 User-Programmable Interface

After power-up, registers `10004` "occupancy of the sending buffer" and `10006` "occupancy of the receiving buffer“ are set to zero. Up to now, these registers would not be set to zero as user-programmable registers until configuring was carried out.