JETTER
PROCESS-PLC

System NANO
Programmer's Reference

101197

Base Module Registers

General Register Survey (all modules)

0 .. 199	NANO-A: 24 bit user registers
0 .. 1999	NANO-B: 24 bit user registers
0 .. 1999 and	
20000 .. 27999	NANO-C: 24 bit user registers
65024 .. 65279	NANO-C: Floating point registers
10100 .. 10199	NANO-B: SM axis of the CPU
10200 .. 10299	NANO-B: slave module 1
10300 .. 10399	NANO-B: slave module 2
10400 .. 10499	NANO-B: slave module 3

Operating System (Error) Messages

2000	Software version
2001	Status register
2002	Runtime register
2006	Cycle time for complete program run
2008	Operating system errors
2009	Error task number
2010	Program address of error
2011	Timeout I/O module with number (2,3,4,5, ...)
2012	Timeout slavemodule with axis number (02..04)
2013	Number of plugged I/O modules
2014	Number of plugged slave modules
2015	Index for module array (2016)

2016 Module array, 2015 is index pointer
- 2015 = 0: 2016 = Number of modules
- 2015 = 1 2016 = Code first module
- 2015 = 2 2016 = ...

Codes:
- 0 = OD8
- 1 = ID8
- 128 = SV1
- 129 = DIMA
- 255 = not identified

Task Control

2100 ..	
2131	Task state
2200 ..	
2231	Task index
2300 ..	
2331	Task timer registers
2004	Task switch conditions
2005	Task timeout time
2007	Greatest user task

User Interface Control (LCD Displays)

2805	Number of characters per line
2804	Number of characters
2806	Text selection for DISPLAY_TEXT_2 0 = text 1, 1 = text 2
2807	Divisor (USER_INPUT)
2808	Number of digits behind decimal point (USER_INPUT)
2809	Divisor (DISPLAY_REG)
2810	Number of digits behind decimal point (DISPLAY_REG)
2812	Field width for integer register display 0 = space supression 1 = not reasonable since sign 2-9 = number of places, flush right
2813	Field width USERINPUT
2814	Indirect cursor position
2815	Default (USER_INPUT)
2816	Sign suppression
2817	Status of USER_INPUT

2818 Monitor function restriction, 0=disable, 1=enable
- bit0 = 0 R, I/O key without monitor function (but sets flag)
- bit0 = 1 R key with monitor function
- bit1 = 0 R key without monitor function
- bit1 = 1 R, I/O key with flag input function
- bit2 = 0 R, I/O key without output number input
- bit2 = 1 R, I/O key with output number input
- bit3 = 0 R, I/O key without input number input
- bit3 = 1 R, I/O key with input number input
- bit4 = 0 = key can not change register content
- bit4 = 1 = key changes register content
- bit5 = 0 = key can not change flags
- bit5 = 1 = key changes flags
- bit6 = 0 = key can not change outputs
- bit6 = 1 = key changes outputs
- bit7 = 0 = key has no acces to inputs
- bit7 = 1 = key display input state

and DISPLAY_REG

2819	Display time of monitor functions
2820	Switch to monitor screen
2821	Display language, 0 = german, 1 = english
2822	Baudrate User Interfaces 0 = 150, 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5 = 4800, 6 = 9600, 7 = 19200

Network Control

2700	Network number
2701	Baud rate 0 = 150, 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5 = 4800, 6 = 9600, 7 = 19200, 8 = 38400, 9 = 57600, 10 = 115200
2702	Register offset
2703	Flag offset
2704	Input offset
2705	Output offset
2706	Output mask

Timer Registers

2300..	
2331	Task timer registers

2002 Runtime register
2003 Time base for DELAY and timer instructions
Time base for START-TIMER, TIMER-END?

Single / Dual Channel Counter

2901 Single / Dual Channel Counter

Analog Inputs and Outputs

2902 Analog Out1 (8 Bit)
2903 Analog IN1 (10 Bit)
2904 Analog IN2 (10 Bit)
2905 Anaolg IN3 (10 Bit)
2906 Analog IN4 (10 Bit)

Real Time Clock

2911 Seconds
2912 Minutes
2913 Hours
2914 Day of week
2915 Day
2916 Month
2917 Year

Periphery Control Register

2900 Periphery Control register
bit0 = 1 A/D conversion active
bit1 = 1 Single channel counter
bit1 = 0 Dual channel counter

Stepper Motor Control

10100 Status register
bit0 referenced
bit1 AXARR position was reached
bit2 actual position in destination
bit3 not used
bit4 negative limit switch active
bit5 positive limit switch active
bit6 reference switch active
bit7 not used
bit8 limit switch was active
bit9 not used
bit10 not used
bit11 not used
bit12 reference run error
bit13 BUSY (command 9 to 12)
bit16 axis within stop ramp
10101 Command register
0 AXARR with stop ramp
1 not used
2 not used
3 set reference
4 clear reference
5 .. 8 not used
9 automatic reference run, -> +, rec. ref
10 automatic reference run, ->-, rec. ref
11 automatic reference run, -> +, ign. ref
12 automatic reference run, ->-, ign. ref
13 .. 16 not used
17 relative positioning
18 absolute positioning
19 continue breaked relative positioning
10102 Nominal position
10103 Nominal speed (frequency)
10104 Polarities
bit0 = 0 ref. switch negative
bit0 = 1 ref. switch positive
bit1 = 0 limit switch is negative
bit1 = 1 limit switch is positive
bit2 = 0 low DIR level for positive direction
bit2 = 1 high DIR level for positive direction
bit4 = 0 INPUT2 reference input
bit4 = 1 no reference input
bit5 = 0 INPUT3 -, INPUT4 + limit switch
bit5 = 1 no limit switches
10105 Start ramp (Hz/4ms)
10106 Stop ramp (Hz/4ms)
10107 Destination window range
10108 Start/stop frequency
10109 Actual position
10110 not used
10111 not used
10112 Actual frequency

24 Combined Inputs

2400	101..108	201..208	301..308
2401	201..208	301..308	401..408
...			
2413	1401..1408	1501..1508	1601..1608

RS232 Interface (PC)

2823 Baud rate PC interface
0 = 150, 1 = 300, 2 = 600, 3 = 1200, 4 = 2400,
5 = 4800, 6 = 9600, 7 = 19200

Free Programmable Interface

10000 Configuartion free programmable interface
0 = no free programmable interface
1 = RS232 interface (RS232)
2 = user interface (LCD)
3 = network interface (RS485)
10001 Baud rate
for RS232, user interface (LCD)
0 = 150, 1 = 300, 2 = 600, 3 = 1200, 4 = 2400,
5 = 4800, 6 = 9600, 7 = 19200
for network interface (RS485)
0 = 150, 1 = 300, 2 = 600, 3 = 1200, 4 = 2400,
5 = 4800, 6 = 9600, 7 = 19200, 8 = 38400,
9 = 57600, 10 = 115200
10002 Interface control
0 = 7 bit, even
1 = 7 bit, odd
2 = 8 bit, even
3 = 8 bit, odd
4 = 8 bit, non
10003 Transmission register
10004 Transmission buffer filling level
10005 Reception register
10006 Reception register filling level

16 Combined Inputs

2420	101..108	201..208
2421	201..208	301..308
...		
2434	1501..1508	1601..1608

8 Combined Inputs

2440	101..108
2441	201..208
...	
2455	1601..1608

24 Combined Outputs

2500	101..108	201..208	301..308
2501	201..208	301..308	401..408
...			
2513	1401..1408	1501..1508	1601..1608

16 Combined Outputs

2520	101..108	201..208
2521	201..208	301..308
...		
2534	1501..1508	1601..1608

8 Combined Outputs

2540	101..108
2541	201..208
...	
2555	1601..1608

Overlay Flag - Registers

2600	0..23
2601	24..47
...	
2610	240..255

Special Flags

2050	Fatal CAN-Bus error
2056	PC task after each user task
2057	LCD task after each user task
2048	Timeout I/O module
2049	Timeout slave module
2064	Selection between slave registers and registers using 50000er numbers

Servo Module Registers

Register Number Pattern

1xyzz y is slot number of intelligent module:
01,02,03,04 (1=CPU)
z is register number 0 .. 99

Axis Number Pattern

x x is slot number of intelligent module:
1,2,3,4 (1=CPU)
y Axis number

1yy00 Status register
- bit0 referenced
- bit1 AXXAR position was reached
- bit2 actual position in destination window
- bit3 tracking error recognized
- bit4 negative limit switch active
- bit5 positive limit switch active
- bit6 reference switch active
- bit7 software limit switch was active
- bit8 limit switch was active
- bit9 position controller active
- bit10 'control after AXARR' active
- bit11 enable controller (relay)
- bit12 reference run error
- bit13 BUSY (only for commands 9 to 12)
- bit14 software limit switch active (write access activates the function)
- bit15 reserved
- bit16 axis within stop ramp
- bit17 do not deactivate on tracking error (write access activates the function)
- bit18 found no print mark
- bit19..22 reserved
- bit23 tracking error compensation (disable by write access)

1yy01 Command register
- 0 AXARR with stop ramp
- 1 Activate and release all controllers
- 2 cancel controller release
- 3 set reference

4 clear reference
5 AXARR with position control
6 AXARR without position control
7 activate position control after AXARR
8 deactivate position control after AXARR
9 automatic reference run, -> +, rec. ref
10 automatic reference run, -> -, rec. ref
11 automatic reference run, -> +, ign. ref
12 automatic refefence run, -> -, ign. ref
13 do not control on limit switch (0V)
14 control on limit switch
17 relative positioning
18 absolute positioning
19 continue breaked relative positioning
22 activate halt at reference point
23 deactivate halt at reference point
28 .. 47 resereved
48 right rotation direction
49 left rotation direction
50 optimize distance
51 deactivate commands 48 to 50
56 endless positioning in positve direction
57 endless positioning in negative direction
70 unipolar DAC output
71 bipolar DAC output

1yy02 Nominal position
1yy03 Nominal speed
1yy04 Input polarities
1yy05 Start ramp
1yy06 Stop ramp
1yy07 Destination window
1yy08 Digital offset
1yy09 Actual position
1yy10 P gain of position controller
1yy11 Nominal speed of the position controller
1yy12 Actual speed
1yy14 Positive software limit switch
1yy15 Negative software limit switch
1yy16 Digital analog offset
1yy17 Number of encoder lines
1yy18 Maximum speed of servo/motor combination
1yy19 Tracking error
1yy20 Tracking error threshold
1yy21 Reference value for register xy003
1yy22 Relation user/encoder resolution
1yy24 P gain of digitial speed loop
1yy25 Nominal current
1yy26 I coefficient speed loop
1yy27 Current limitation of speed loop
1yy28 Current I coefficient of speed loop
1yy29 I coefficient limitation of speed loop
1yy64 Encoder word width
1yy65 Offset for reference position
1yy66 Bit mask word width
1yy67 Relative position for positioning with start input
1yy68 Last nominal position of relative mode
1yy81 Threshold for unipolar DAC output
1yy85 Absolute maximum position
1yy98 Mode selection
1yy99 Version number

Progamming Language

Instructions

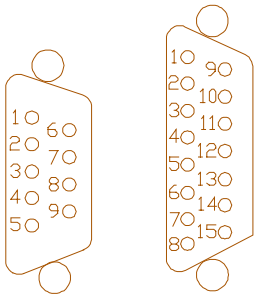
ACTUAL_POS	AP
AXARR	AX
BIT_CLEAR	BC
BIT_SET	BS
CALL	CA
CLEAR_FLAGS	CF
COPY	CO
DELAY	DE
DISPLAY_REG	DR
DISPLAY_TEXT	DT
ELSE	E
FLAG	F
GOTO	G
IF	IF
IN	IN
LABEL	LA
LIMITS	LI
NET-GET-REGISTER	NG
NET-SEND-REGISTER	NS
NOT	NO
NOP	NP
OR	OR
OUT	OU
POS	PO
REG	RE
REG_CLEAR	RC
REGDEC	RD
REGINC	RI
REGISTER_LOAD	RL
REGZERO	RZ
RETURN	RT
START-TIMER	S
TASKBREAK	TB
TASKCONTINUE	TC
TIMER-END?	TE
TASKRESTART	TR
THEN	TH
USER_INPUT	U
WAND	WA
WHEN	WH
WHEN_MAX	WM
WOR	WO
WXOR	WX

Numbers:

Binary number	NB
Decimal number	ND
Hexadecimal number	NH

Terminal Description

1.1 Servo Module



9 pin female Sub-D - Analog Out

Terminal	*Signal*	*Meaning*
1	Gnd	Power supply
2	nc	
3	Relay contact 1	Enable servo amplifier
4	Relay contact 2	Enable servo amplifier
5	nc	
6	nc	
7	nc	
8	Gnd analog out	
9	Analog speed out	-10V .. +10V

Attention

At least lines 8 and 9 have to be shielded.

15 pin female Sub-D - Encoder

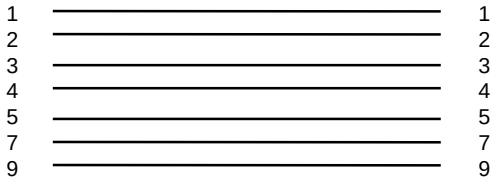
Terminal	*Signal*	*Meaning*
1	Gnd	Power supply
2	K0+	
3	K0-	
4	K1+, D+ (SSI)	
5	K1-, D- (SSI)	
6	K2+	
7	K2-	
8	Clock- (SSI)	
9	Clock+ (SSI)	
10	5V DC (50mA)	Power supply
11	nc	
12	nc	
13	nc	
14	nc	
15	nc	

Attention

Lines 1 to 10 have to be shielded.

1.2 CAN Bus

The modules of the NANO are connected via CAN bus. The CAN bus cable pin assignment is shown in the figure below.



9 pin male Sub-D 9 pin female Sub-D