

# Technical Datasheet DK-NP5-4A

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## 1 Connecting the NP5 control via the *Discovery Board*

The *NP5 Discover Board* helps you during tests and during the evaluation of the *NP5* control.

The connectors necessary for the boards are supplied already installed.

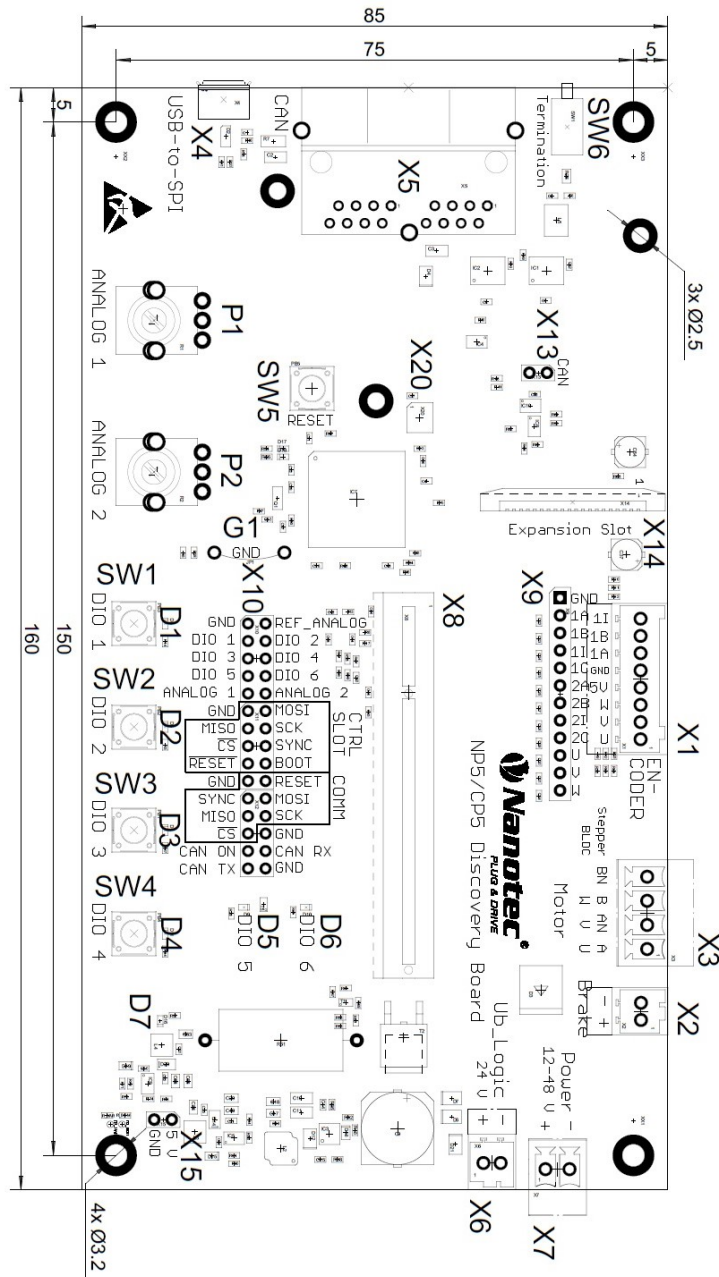
**Jumper X13** must be set if CANopen (*NP5-08*) is used; otherwise, you must remove it..

### 1.1 Technical data – *NP5 Discover Board*

Property	Description / value
Operating voltage +UB:	12 ... 48 V DC $\pm 5\%$
Logic voltage +UB_Logic:	24 V DC $\pm 5\%$
Current consumption +UB:	Max. 100 mA (without connected NP5)
Current consumption +UB_Logic:	Max. 100 mA (without connected NP5)
Communication interface:	SPI, CANopen, Modbus RTU
Analog reference voltage:	3.3 V DC $\pm 5\%$ , max. 10 mA
Digital input voltage:	Max. 3.3 V DC
DC output voltage:	5 V DC $\pm 3\%$ , max. 300 mA
Status indicator:	4x green LEDs for GPIO 1 to 4 2x blue LEDs for GPIO 5 and GPIO 6 1x green LED for Discovery Board (+3.3 V DC)
Ballast resistor:	15 $\Omega$ /5 W
Mounting holes:	4x $\varnothing$ 3.2 mm for Discovery Board
Additional board Modbus RTU.	3x $\varnothing$ 2.5 mm
Weight:	0.12 kg

### 1.2 Dimensioned drawings – *NP5 Discover Board*

Dimensions are in [mm].



### 1.3 Pin assignment – NP5 Discovery Board

Connector	Function
X1	Encoder 1 and Hall sensor
X2	Brake
X3	Motor
X5	CAN
X6	Logic voltage
X7	Operating voltage
X8	Slot for NP5 control
X9	Encoder 1/2 and Hall sensor
X10	GPIO and communication interface
X13	Jumper for activating / deactivating the CANopen communication

Connector	Function
X14	Ribbon cable socket for Modbus RTU additional board
X15	+5 V DC output
P1	Potentiometer for analog input 1
P2	Potentiometer for analog input 2 (for setting the slave address and baud rate for Modbus RTU, see also <b>P2 - Analog input 2</b> )
SW1 to SW4	Buttons for GPIO 1 to GPIO 4
SW5	Reset button for the <i>Discovery Board</i>
SW6	Switch for 120 ohm termination resistor (CANopen)
D1 to D6	Status indicator for GPIO 1 to GPIO 6
D7	Status indicator for the <i>Discovery Board</i> (+3.3 V DC)
G1	Earth connection

### 1.3.1 Connector X1 – encoder 1 and Hall sensor

Connector X1 has the following features:

- Connector type: Phoenix base strip, MCV-0,5/8-G-2,5
- Voltage level: +5 V logic level
- Maximum admissible current: Max. 300 mA (together with +5 V DC output voltage on pin header X15)
- Hall inputs: Internally by means of 2.7 kΩ pull-up resistor connected to +5 V DC

Pin	Name / function
1	Hall_U (H1)
2	Hall_V (H2)
3	Hall_W (H3)
4	+5 V DC
5	GND
6	ENC1_A
7	ENC1_B
8	ENC1_I

### 1.3.2 Connector X2 – brake

Connector X2 has the following features:

- Connector type: Phoenix base strip, MCV-0,5/2-G-2,5

Pin	Name / function
1	Brake + (connected with +UB)
2	Brake – (PWM-controlled open-drain output, max 1.5 A)

### 1.3.3 Connector X3 – motor

Connector X3 has the following features:

- Connector type: Phoenix base strip, MCV-1,5/4-G-3,5
- Max. rated current 6 A RMS
- Max. peak current 10 A RMS (for 1 s)

Pin	Stepper motor	BLDC motor
1	A	U
2	A\	V
3	B	W
4	B\	

### 1.3.4 Connector X5 – CANopen

Connector X5 has the following features:

- Connector type: RJ45 Duo Port, horizontal

Pin	Name / function
1	CAN+
2	CAN-
3	GND
4	N.C
5	N.C
6	CAN_Shield
7	GND
8	+UB_Logic (24 V DC $\pm 5\%$ )

### 1.3.5 Connector X6 – logic voltage

Connector X6 has the following features:

- Connector type: Phoenix base strip, MCV-0,5/2-G-2,5

Pin	Name / function
1	+UB_Logic (24 V DC $\pm 5\%$ )
2	GND

### 1.3.6 Connector X7 – operating voltage

Connector X7 has the following features:

- Connector type: Phoenix base strip, MCV-1,5/2-G-3,5

Pin	Name / function
1	+UB (12 ... 48 V DC $\pm 5\%$ )
2	GND

### 1.3.7 Connector X9 – encoder and Hall sensors

Connector X9 has the following features:

- Connector type: Pin header, single row, RM 2.54 mm, 12-pin, vertical
- Voltage level: +3.3 V DC logic level

Pin	Name / function
1	GND
2	ENC1_A
3	ENC1_B
4	ENC1_I
5	ENC1_CAP
6	ENC2_A
7	ENC2_B
8	ENC2_I
9	ENC2_CAP
10	Hall_U (H1)
11	Hall_V (H2)
12	Hall_W (H3)

### 1.3.8 Connector X10 – I/O and communication interface

Connector X10 has the following features:

- Connector type: Pin header, two rows, RM 2.54 mm, 2x 15-pin, vertical

Pin	Name	Type	Note
1	GND	Earth	
2	U_REF_ANALOG	Out	Analog reference voltage
3	DIO1_IO_CS	I/O	General I/O
4	DIO2_CD_CLK	I/O	General I/O
5	DIO3_CD_DIR	I/O	General I/O
6	DIO4_IO_MOSI	I/O	General I/O
7	DIO5_IO_MISO	I/O	General I/O
8	DIO6_IO_CLK	I/O	General I/O
9	ADC_ANALOG_1	In	AD converter 1
10	ADC_ANALOG_2	In	AD converter 2
11	GND	Earth	
12	SLOT_SPI_MOSI	-	SPI 1
13	SLOT_SPI_MISO	-	SPI 1
14	SLOT_SPI_SCK	-	SPI 1
15	SLOT_SPI_CS	-	SPI 1
16	SLOT_SYNC	-	System function, reserved
17	SLOT_RESET	-	System function, reserved
18	SLOT_BOOT	-	System function, reserved
19	GND	Earth	
20	COMM_RESET	-	System function, reserved
21	COMM_SYNC	-	System function, reserved
22	COMM_SPI_MOSI	-	SPI 2
23	COMM_SPI_MISO	-	SPI 2
24	COMM_SPI_SCK	-	SPI 2
25	COMM_SPI_CS	-	SPI 2

Pin	Name	Type	Note
26	GND	Earth	
27	CAN ON	-	CAN ON
28	I2CSCL_CANRX	-	I <sup>2</sup> C Clock or CANopen RX
29	I2CSDA_CANTX	-	I <sup>2</sup> C Data or CANopen TX
30	GND	Earth	

### 1.3.9 Connector X13 – jumper for activating / deactivating the CANopen communication

Connector X13 has the following features:

- Connector type: Pin header, RM 2.54 mm, 2-pin, vertical
- Bridged with jumper: CANopen activated
- Not bridged with jumper: CANopen deactivated

Pin	Name / function
1	+3.3V
2	CAN ON

### 1.3.10 Connector X15 – +5 V DC output

Connector X15 has the following features:

- Connector type: Pin header, RM 2.54 mm, 2-pin, vertical
- Maximum admissible current: Max. 300 mA (together with +5 V DC output voltage on pin header X1)

Pin	Name / function
1	+5 V DC
2	GND

### 1.3.11 P2 - Analog input 2

The slave address and the baud rate are defined via analog input 2. You can find further details in the chapter commissioning of the NP5 technical manual on the homepage [us.nanotec.com](http://us.nanotec.com).

To use the factory settings, set the potentiometer to 0 (turn counterclockwise as far as it will go). The factory settings are:

Configuration	Object	Factory settings
Slave address	2028 <sub>h</sub>	5
Baud rate	202A <sub>h</sub>	19200
Parity	202D <sub>h</sub>	0x04 (Even)

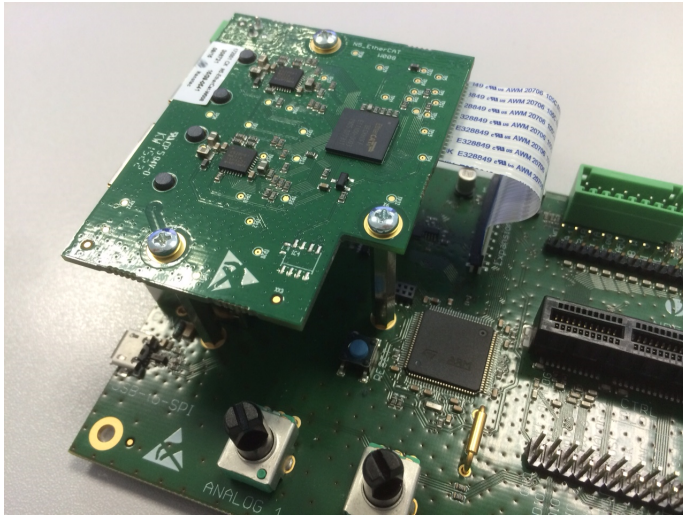
The number of data bits is always "8" here. The number of stop bits is dependent on the parity setting:

- No parity: 2 stop bits
- "Even" or "Odd" parity: 1 stop bit



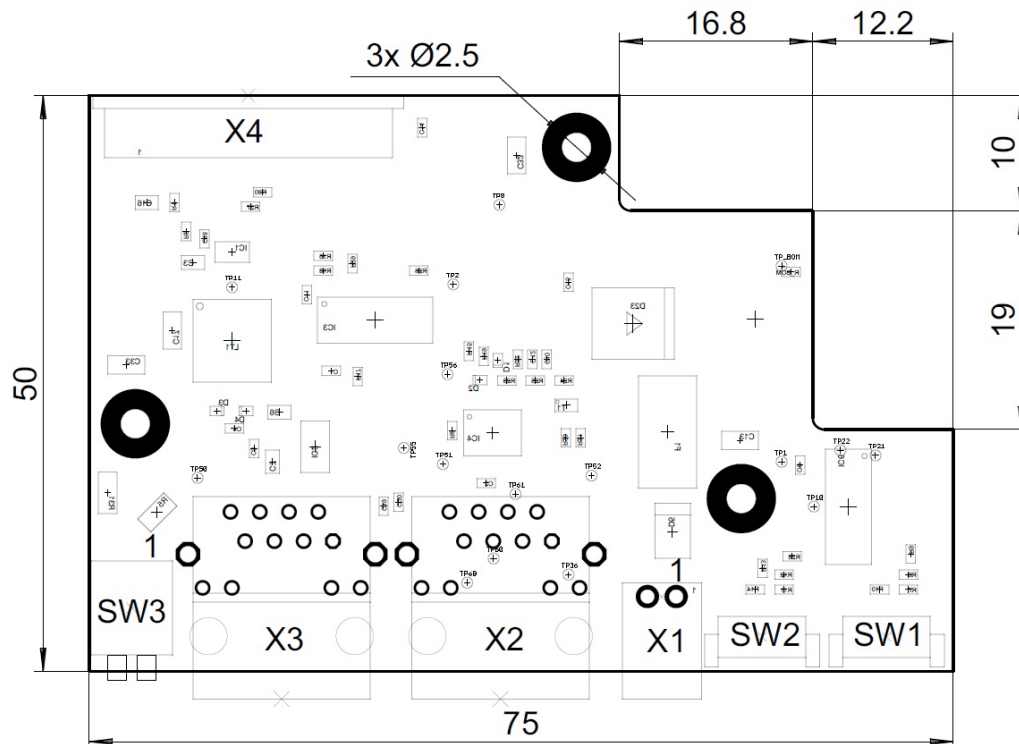
## 1.4 Extension for Modbus RTU (additional board)

Discovery Board DK-NP5-4A is equipped with an additional board for communication via Modbus RTU (RS-485).



### 1.4.1 Dimensioned drawings – Modbus RTU additional board

Dimensions are in [mm].



### 1.4.2 Hardware overview – Modbus RTU additional board

Name	Function	Note
X2	Modbus RTU IN	
X3	Modbus RTU OUT	

Name	Function	Note
X4	Connection to <i>Discovery Board NP5</i>	
SW1	Reserved	
SW2	Reserved	
SW3	Switch for 150 Ω termination resistor	
	Pin 1	150 Ω termination resistor (switch set to ON)
	Pin 2	Reserved

Following table shows the Pin assignments of X2 and X3:

PIN	Function	Note
1	n.c.	
2	n.c.	
3	n.c.	
4	D1 (RS-485 +)	
5	D0 (RS-485 -)	
6	n.c.	
7	n.c.	PIN 7 on X2 is internally connected to PIN 7 on X3
8	Common	Common signal and supply

## 2 Commissioning the Modbus RTU via the *Discovery Board*

To establish a connection with the *NP5-02*, proceed as follows:

1. Plug in the *NP5-02* at X8.
2. Unplug jumper X13.
3. Set potentiometer P2 to 0 (counterclockwise as far as it will go)
4. Switch on the termination resistor (switch SW3 of the Modbus board to ON).
5. Connect your RS485 cable to X2 of the Modbus board.
6. Connect your supply voltage to X7.