Development Board for nanoMODULs

Hardware-Manual

Edition June 2002

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Preface

This manual describes only the functions of the PHYTEC Development Board for nanoMODULs. The controllers and boards are not described herein. Additional controller- and board-level information and technical descriptions can be found in support documentation like "nanoMODUL-164 Hardware Manual" or "Infineon Cxxx User's Manual". If software is included please also refer to additional documentation for this software.

In this hardware manual and in the attached schematics, low active signals are denoted by a "/" in front of the signal name (i.e.: /RD). A "0" indicates a logic-zero or low-level signal, while a "1" represents a logic-one or high-level signal.

Declaration regarding EMV-Conformity of the PHYTEC Development Board for nanoMODULs

PHYTEC Development Boards for nanoMODULs (henceforth products) are designed for installation in electrical appliances or as dedicated Evaluation Boards (i.e.: for use as a test and prototype platform for hardware/software development) in laboratory environments.

Note:
PHYTEC products lacking protective enclosures are subject to damage by ESD and, hence, may only be unpacked, handled or operated in environments in which sufficient precautionary measures have been taken in respect to ESD-dangers. It is also necessary that only appropriately trained personnel (such as electricians and engineers) handle and/or operate these products. Moreover, PHYTEC products should not be operated without protection circuitry if connections to the product's pin header rows are longer than 3 m.

PHYTEC products fulfil the norms of the EMVG-statute only in accordance to the descriptions and rules of usage indicated in this hardware manual (particularly in respect to the pin header row connectors, power connector and serial interface to a host-PC).Implementation of PHYTEC products into target devices, as well as user modifications and extensions of PHYTEC products, is subject to renewed establishment of conformity to, and certification of, EMV-Statutes. Only after doing so the devices are allowed to be put into circulation.

This Development Board supports the nanoMODUL-164.

PHYTEC supports all common 8- , 16- and 32-bit controllers in two ways:

(1) as the basis for Starter Kits in which user-designed hardware can be implemented on a wrap-field around the controller and
(2) as insert-ready, fully functional micro- / mini- and nanoMODULS which can be embedded directly into the user's peripheral hardware design.

PHYTEC's microcontroller modules allow engineers to shorten development horizons, reduce design costs and speed project concepts from design to market. Please contact PHYTEC for additional information:

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1 Introduction

The PHYTEC Development Board, in EURO-card dimensions (160 x 100 mm.), is a universal carrier board for start-up and programming of all Single Board Computers belonging to the PHYTEC nanoMODUL serie. It is fully equipped with all mechanical and electrical components necessary for the speedy and secure insertion of PHYTEC modules. The nanoMODUL can be plugged into the Development Board like a “big chip”.

A wire wrap (70 x 65 mm) allows the Development Board to serve as an excellent prototyping vehicle for the target hardware into which a stand-alone PHYTEC nanoMODUL can be subsequently inserted. Alternately, PHYTEC can design a customer specific board adding your circuitry to the nanoMODUL-layout.

The Development Board offers the following features:

- improved interference safety through multi-layer technology
- single power source via a low-voltage socket (unregulated 8 V= - 13 V=/500 mA) or via VG96 connector (regulated + 5 V=/500 mA)
- Reset-switch
- Boot-switch
- pin header connectors accommodating nanoMODULs
- DB9-socket for RS-232 interface
- second DB9-plug which can be configured as a CAN interface according to user needs and the underlying controller
- VG96-connector
- simple jumper configuration allowing use of the Development Board with various nanoMODUL configurations
- one freely programmable LED
- provision to connect a silicon serial number (for identification purpose within network applications)
- wire wrap field (70 x 65 mm.) supporting development of userdesigned peripheral hardware

1.1 Overview of the Development Board

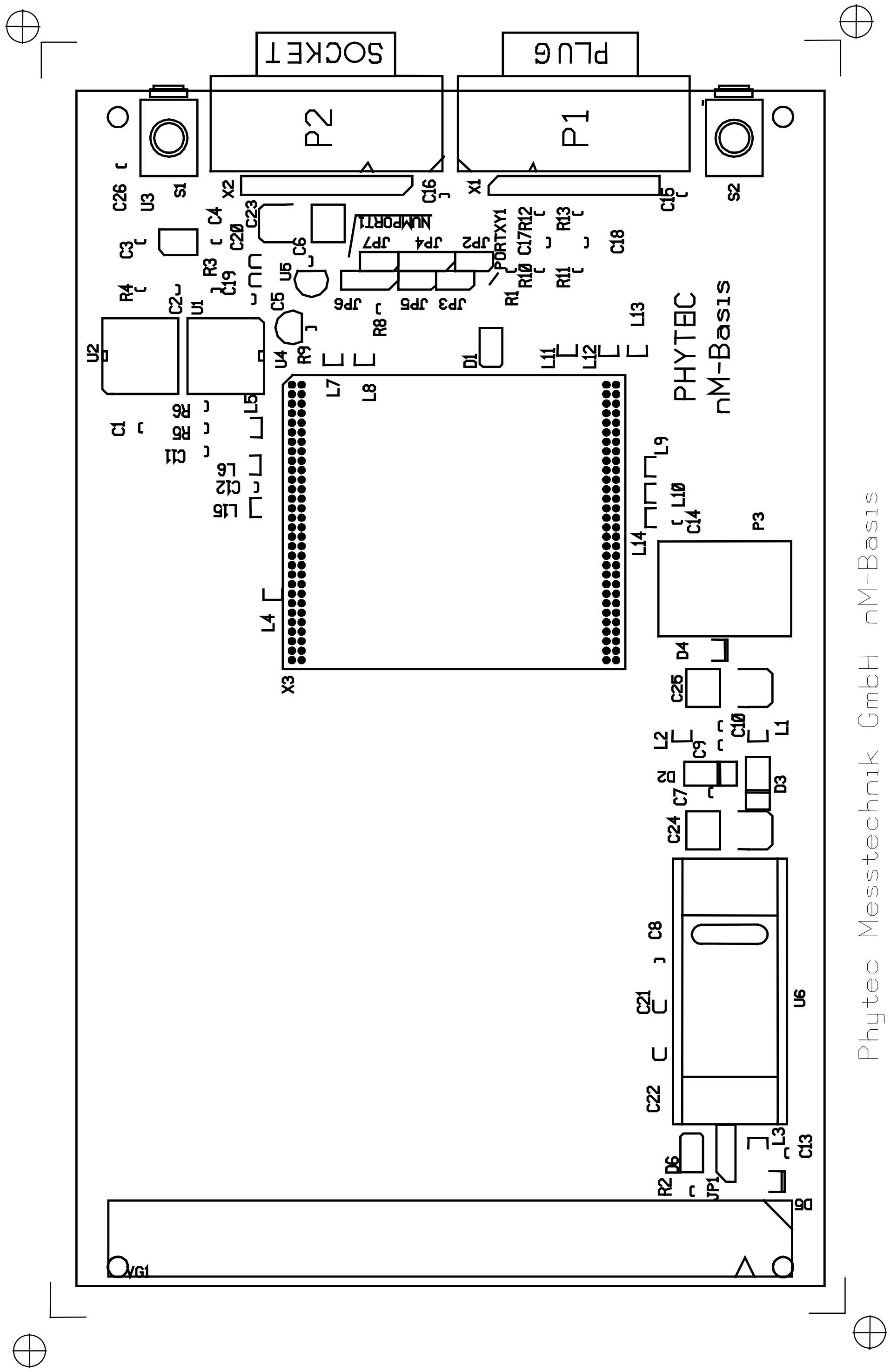

Figure 1: Development Board Overview (component side)

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2 Development Board Connectors

Please note that all connections are not to exceed their expressed maximum voltage or current. Maximum signal input values are indicated in the corresponding controller manuals/data sheets. As damage from improper connections varies according to use and application, it is the user's responsibility to take appropriate safety measures to ensure that the module connections are protected from overloading through connected peripherals.

As depicted below, the following connectors are available on the Development Board:

X3	– pin connector to install nanoMODULs
VG1	– VG96-connector to attach the power source and for custom specific connections
P3	– low-voltage power source connector
P1, X1, P2, X2	– various interfaces (RS-232, CAN etc.)
NUMPORT1, PORTXY1	– two soldering holes to connect the silicon serial number U4 and the LED D1.

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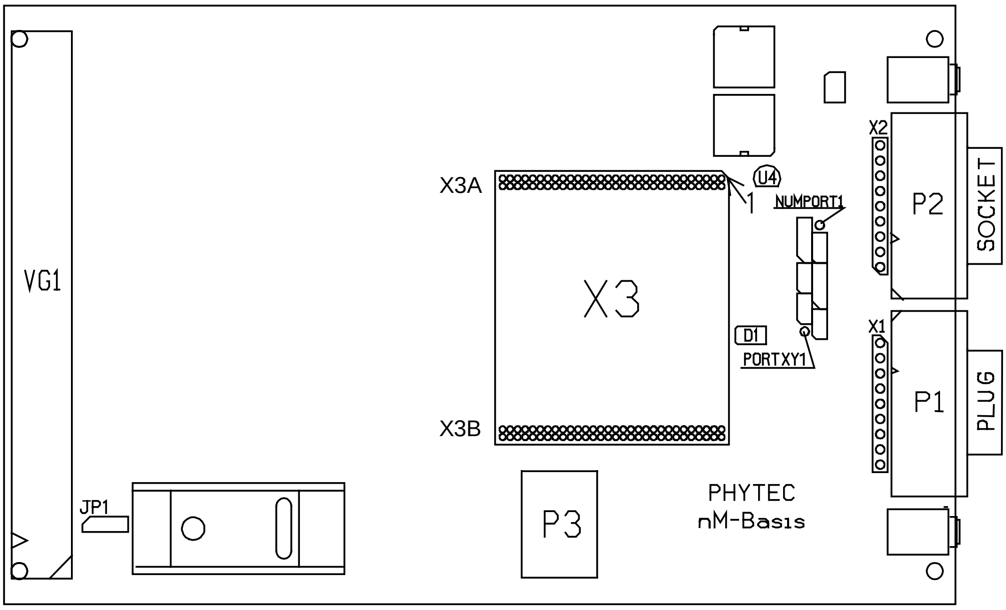

Figure 2: Location of the Connectors

A detailed description follows in the next sections.

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2.1 Power Connectors VG1, P3

There are two ways to provide power to the Development Board:

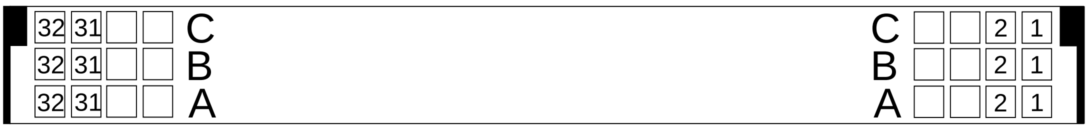
- connection via the VG96 connector at VG1
- connection via the low voltage socket at P3

Caution:
Please do not use a laboratory or variable power supply, as power spikes during power-up could destroy the PHYTEC module mounted on the Development Board.
Please also avoid changing Jumpers or modules while the Development Board is powered up.

2.1.1 Connecting via VG96-connector VG1

The Jumper JP1 has to be connected at pads (1+2) to enable power supply via VG96 connector at VG1. A power supply via the VG96 connector requires a constant voltage of + 5 V/500 mA at the following pins:

Pin 1abc + 5 V regulated



Pin 32abc GND

Figure 3: Numbering of the VG96-connector VG1 (front view)

Note that only pins 1abc and 32abc are preconnected at the VG96 connector. All other connector pins are freely available to the user.

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2.1.2 Connection via the Low Voltage Socket P3

An unregulated power supply in the range of + 8 V=...13 V=/500 mA can be connected to the Development Board at low voltage socket P3. In order to connect a power supply at P3, Jumper JP1 must be set at positions (2+3). If a power supply is connected at P3, the regulated + 5 V is not available at the VG96 connector. A power supply connected to P3 must support a current draw of 300 mA.
Ensure the right polarity of the power supply as depicted in the figure below.

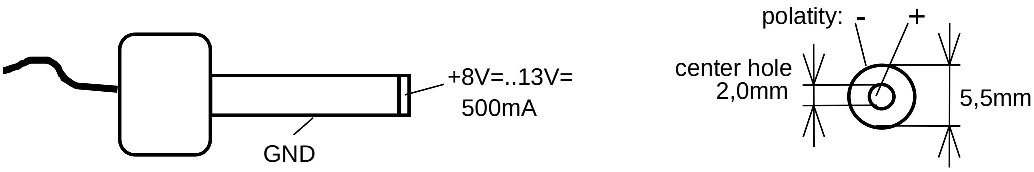
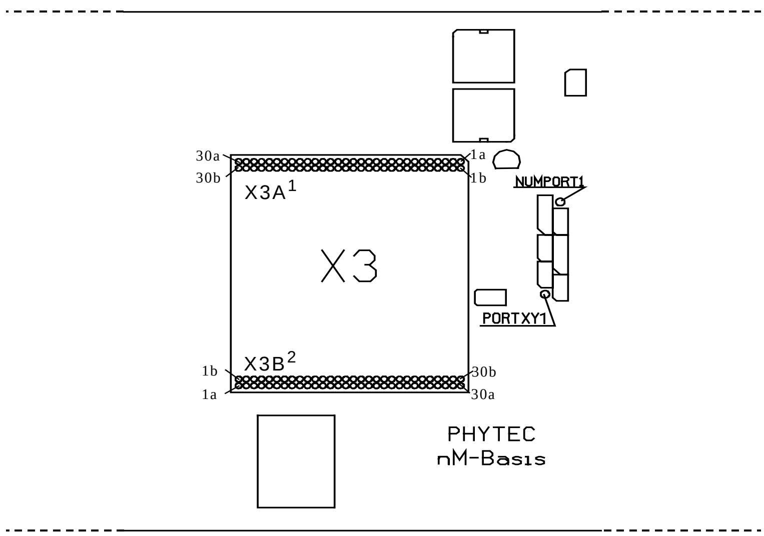


Figure 4: Polarity of the Power Supply

2.2 Pin Connector X3

The pin connector X3 enable easy mounting of a nanoMODUL on the Development Board. A detailed pinout is shown in *Figure 5*.



1: Connector to attach pin header receptacle X1 of the nanoMOUL

2: Connector to attach pin header receptacle X2 of the nanoMOUL

Figure 5: Numbering of the Pin Connector X3

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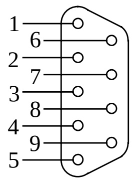
2.3 DB9-socket P1 and Wire Wrap Row X1

The DB-9 socket at P1 and the wire wrap row X1 can be used as RS-232 interfaces. The pinout is shown in the figure below:

DB9-socket P1 — Wire Wrap Row X1



DB9-socket P1		Wire Wrap Row X1
Pin 2:	TXD0 (RS-232)	Pin 3
Pin 3:	RXD0 (RS-232)	Pin 5
Pin 5:	GND	Pin 9

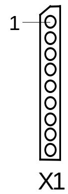
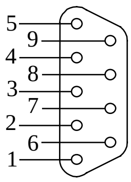


Figure 6: *Pinout of the DB-9 socket at P1 (front view) and of the Wire Wrap Row X1*

2.4 DB9-plug P2 and Wire Wrap Row X2

The DB-9 plug at P2 and the wire wrap row X2 can be configured to serve as a CAN interface. The pinout is shown in the figures below:

DB9-plug P2 — Wire Wrap Row X2



DB9-plug P2		Wire Wrap Row X2
Pin 2:	CAN_L	Pin 3
Pin 7:	CAN_H	Pin 4
Pin 3,6:	CAN_GND	Pin 5,2
Pin 9:	CAN_VCC	Pin 8

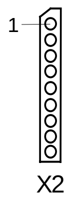


Figure 7: *Pinout of the DB-9 plug at P2 (front view) and of the Wire Wrap Row X2 (CAN Mode)*

The DB-9 plug P2 can be alternately configured to transmit signals of your choice instead of CAN signals. To do so Jumpers JP6 and JP7 must be opened. The desired signals can then be routed via X2 to DB-9 plug P2.

Caution:
Pins 4 and 3 of the wire wrap row X2 are connected to the CAN transceiver, while pins 5.2 and 8 are connected to the power supply of the CAN interface, even if no CAN is used. These connections might be an additional load for your own circuitry.

2.5 Connecting a Silicon Serial Number via NUMPORT1

In order to integrate the Development Board with PHYTEC networking software (such as phyPX, SLIOtools, Bus Monitor and Network Monitor), a DS2401 silicon serial number (referred to as number chip) must be solder-mounted on the Development Board at U4, as indicated in *Figure 2*. This chip must then be connected to a port-pin of the nanoMODUL mounted on the Development Board. To do so connect the silicon serial number chip DS2401 with a port-pin of your choice using the soldering hole labeled NUMPORT1. The soldering hole is located above Jumper JP7 (refer to *Figure 2*). On the module, any bi-directional pin from the underlying controller may be used. However, we recommend use of port-pin 4.0. Otherwise, the corresponding port-pin must be changed in the configuration file of the networking software (phyPX, SLIOtools, Bus Monitor, Network Monitor).

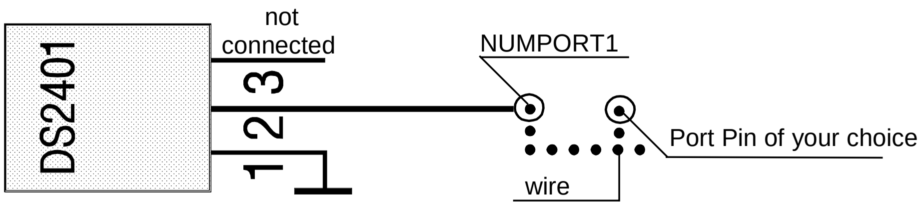


Figure 8: Connecting the Silicon Serial Number to the nanoMODUL

The following example shows the configuration for phyPX on a CAN network. For SLIOtools, Network Monitor and Bus Monitor configurations are set in the same manner.

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Example:

In this example the number chip shall be connected to port pin 4.0. Connect the soldering hole labeled NUMPORT1 (pin 2 of the number chip) with port-pin 4.0 (*refer to Figure 8*). The utilized port and pin-number must be entered into the configuration file ***cancfg.a51***.

DS2401Port	**EQU**	**FFC8h**	**indicate port address (P4 = FFC8h)**
DS2401Pin	EQU	00000001b	PIN-Position: P4.0 = 1
DS2401NotPin	EQU	11111110b	PIN-Position: P4.0 = 0

After the port and pin settings have been changed within the configuration file, the software must be rebuilt using the A166 assembler.

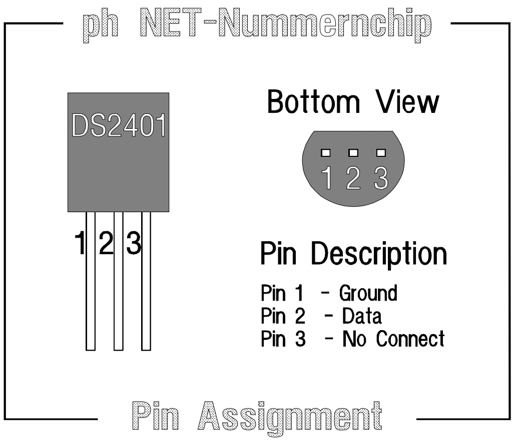

Figure 9: Pinout of the Silicon Serial Number

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3 Jumper Layout

To configure the board, the Development Board for nanoMODULs has 7 insertable Jumpers. *Figure 10* shows the numbering of the Jumper-pads, while *Figure 11* illustrates the location of the Jumpers on the board.

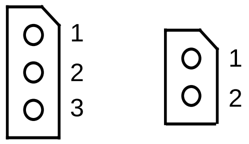

Figure 10: Numbering of the Jumper-pads

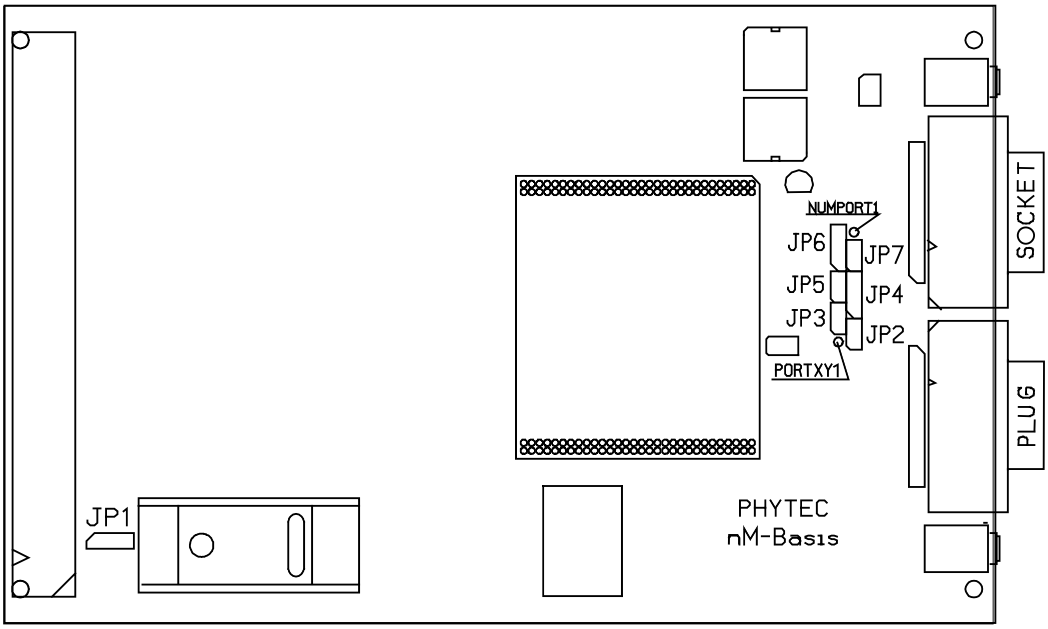

Figure 11: Location of the Jumpers (top side)

3.1 Jumper JP1

This Jumper selects the connector at which the power is supplied to the Development Board *(also refer to section 2.1 "Power Connectors VG1, P3").*

Power Supply at	**JP1**
VG96 connector	1 + 2
low voltage socket	2 + 3

3.2 Jumper JP2 and JP3

Jumpers JP2 and JP3 activate the MODE-Function of the underlying nanoMODUL mounted on the Development Board. Closing Jumpers JP2 and JP3 connect the module pins to GND; while open Jumpers connect these module pins to Vcc via pull-up resistors located on the nanoMODUL.

Modul-PIN /MODE1 16X	**JP2**
X3B = PIN 17b	closed /MODE1 16X = 0
X3B = PIN 17b	open (Pull-up on the nanoMODUL = 1)

Modul-PIN /MODE0 16X	**JP3**
X3B = PIN 17a	closed /MODE0 16X = 0
X3B = PIN 17a	open (Pull-up on the nanoMODUL = 1)

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3.3 Jumper JP4 and JP5

Jumpers JP4 and JP5 activate the NMI/Boot function of the nanoMODUL mounted on the Development Board. JP4 enables connection of the Boot-switch with the appropriate nanoMODUL pin. Jumper JP5 allows short-circuit of the Boot-switch.

Module Pin BOOT/NMI	**JP4**	**JP5**
X3A = pin 19b NMI-16x connected with GND	1 + 2	open
X3A = pin 25a D4 connected with pull-down resistor	2 + 3	open

3.4 Jumper JP6 and JP7

These jumpers enable connection of the optically-isolated CAN-driver with an external voltage supply (in the range +9... 12 VDC) via the DB-9 socket at P2. The CAN-driver can also be connected to the nanoMODUL's internal power supply.

Power Supply via	**JP6**	**JP7**
nanoMODUL-internal Source	1 + 2	closed
External Source	2 + 3	open

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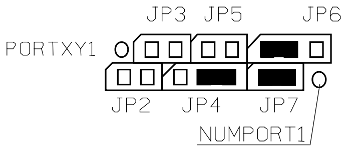
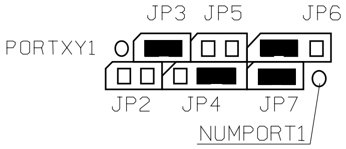
4 Jumper Settings for the Modules

nanoMODUL-164 (with external optically-isolated CAN-driver)
Configuration for Flash Download



nanoMODUL-164 (with external optically-isolated CAN-driver)
Configuration for use of Monitor



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5 Technical Specifications

The physical dimensions of the Development Board are shown in *Figure 12*.

The height of the Development Board, when mounted with a nanoMODUL, is approximately 18 mm. The Development Board itself is 1.5 mm thick. Components rise ca. 13 mm from the face of the Development Board, and ca. 3 mm from the underside of the board. It is possible to house the Development Board in a 19" casing.

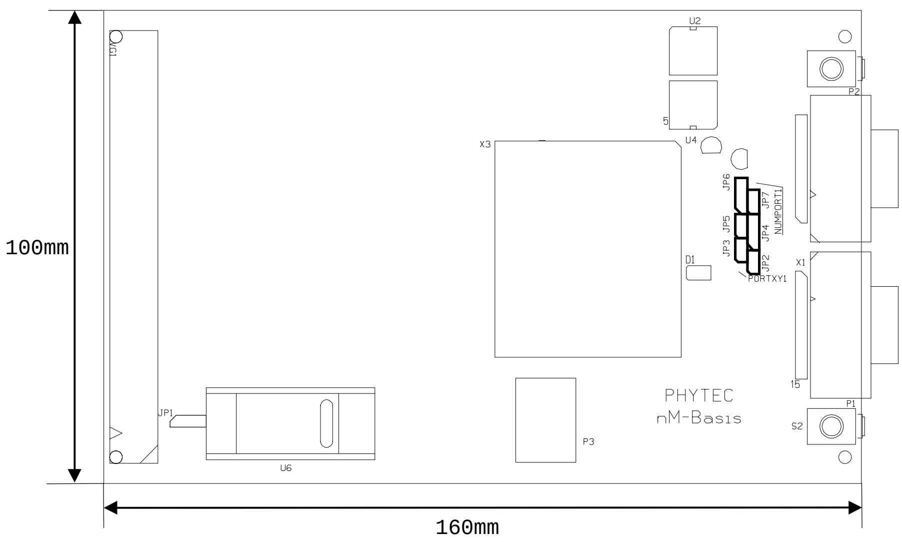

Figure 12: *Physical Dimensions*

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