PHYTEC

Development Board for CAN-, micro- and miniMODULs

Hardware Manual

Edition December 2002

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	EUROPE	NORTH AMERICA
Address:	PHYTEC Technologie Holding AG Robert-Koch-Str. 39 D-55129 Mainz GERMANY	PHYTEC America LLC 203 Parfitt Way SW, Suite G100 Bainbridge Island, WA 98110 USA
Ordering Information:	+49 (800) 0749832 order@phytec.de	1 (800) 278-9913 info@phytec.com
Technical Support:	+49 (6131) 9221-31 support@phytec.de	1 (800) 278-9913 support@phytec.com
Fax:	+49 (6131) 9221-33	1 (206) 780-9135
Web Site:	http://www.phytec.de	http://www.phytec.com

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Preface

This manual describes only the functions of the PHYTEC Development Board for CAN, micro-/miniMODULs. The controllers and boards are not described herein. Additional controller- and board-level information and technical descriptions can be found in support documentation like "miniMODUL-5xx 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 micro-/miniMODULs

PHYTEC Development Boards for micro/miniMODULs (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.

Caution!

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.

The Development Board for CAN, micro-/miniMODULs supports al PHYTECs CAN,-micor-/miniMODULs which are available with different 8-bit and 16-bit controllers.

PHYTEC supports all common Infineon 8- and 16-bit 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- and miniMODULS 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:

	EUROPE	NORTH AMERICA
Address:	PHYTEC Technologie Holding AG Robert-Koch-Str. 39 D-55129 Mainz GERMANY	PHYTEC America LLC 255 Ericksen Avenue NE Bainbridge Island, WA 98110 USA
Web Site:	http://www.phytec.de	http://www.phytec.com
e-mail:	info@phytec.de	info@phytec.com
Voice:	+49 (6131) 9221-0	+1 (800) 278-9913
Fax:	+49 (6131) 9221-33	+1 (206) 780-9135

1 Introduction

The PHYTEC Development Board, in EURO-card dimensions (160 mm x 100 mm.), is a universal carrier board for start-up and programming of all Single Board Computers belonging to both the PHYTEC microMODUL and miniMODUL series. It is fully equipped with all mechanical and electrical components necessary for the speedy and secure insertion of PHYTEC modules. Simple jumper configuration readies the Development Board's connectivity to any PHYTEC module *(refer to section 3 of this manual)*, which plug pins down into the pin header contact strips mounted on the Development Board.

A wire wrap (60 mm x 65 mm) allows the Development Board to serve as an excellent prototyping vehicle for the target hardware into which a stand-alone PHYTEC micro- or miniMODUL can be subsequently inserted. Alternately, PHYTEC can design a customer specific board adding your circuitry to the micro-/miniMODUL-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 receptacles accommodating both micro- and miniMODULs
- DB9-socket for RS-232 interface
- second DB9-plug which can be configured as a CAN or RS-485 interface according to user needs and the underlying controller
- VG96-connector
- simple jumper configuration allowing use of the Development Board with various PHYTEC Single Board Computers
- provision to connect a silicon serial number (for identification purpose within network applications)
- wire wrap field (60 mm x 65 mm.) supporting development of user-designed peripheral hardware

1.1 Overview of the Development Board

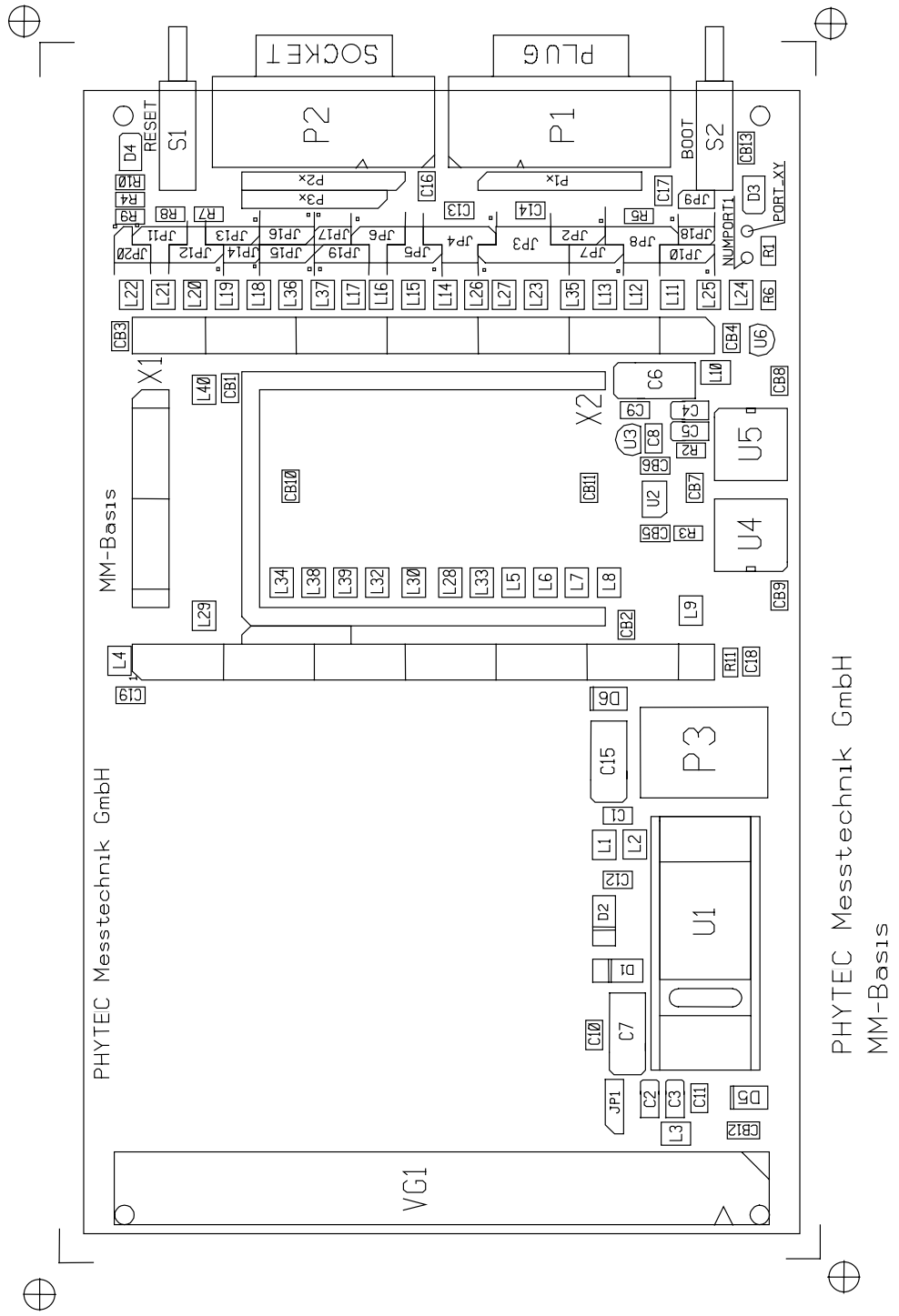


Figure 1: Development Board Overview

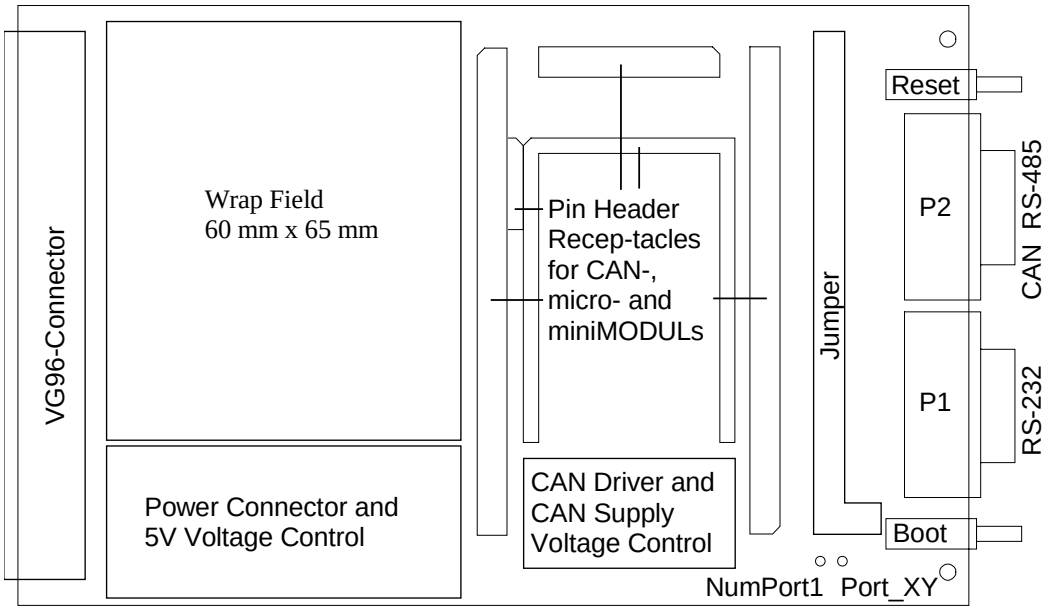


Figure 2: Overview of the Different Functions

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:

- X1 – receptacle to install PHYTECs miniMODULs,
- X2 – receptacle to install PHYTECs microMODULs,
- VG1 - VG96-connector to attach the power source and for custom specific connections,
- P3 – low-voltage power source connector,
- P1, P1x, P2, P2x, P3x - various interfaces (RS-232, RS-485, CAN etc.),
- NUMPORT1 and PORT_XY – two soldering holes to connect the silicon serial number and the LED D3.

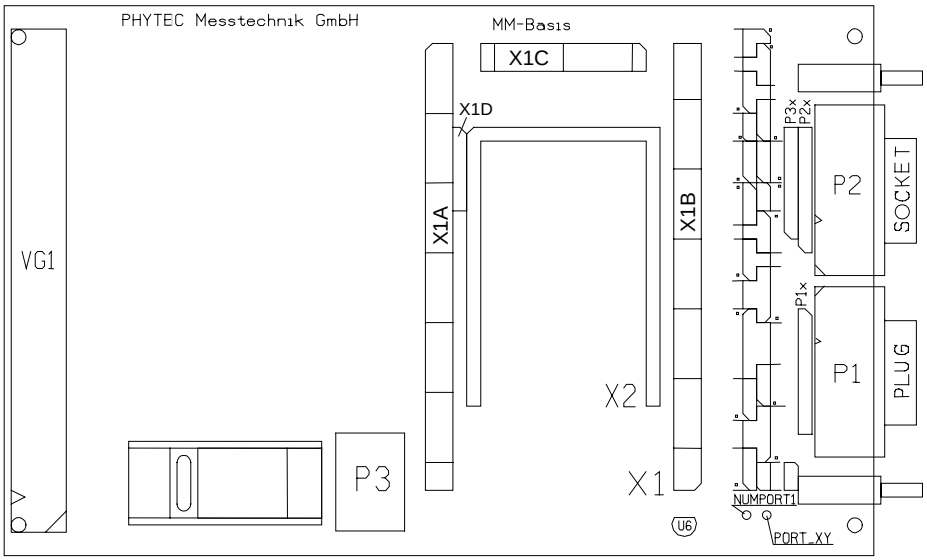


Figure 3: Location of the Connectors

2.1 Power Connectors VG1, P3

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

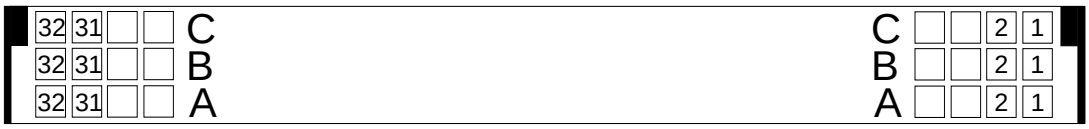
- connection via the VG96 connector at VG1
- connection via the low voltage socket at P3

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 should 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 + 5V at the following pins:

Pin 1abc + 5 V regulated



Pin 32abc GND

Figure 4: 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.

2.1.2 Connection via the Low Voltage Socket P3

An unregulated power supply in the range of +8 V=...13 V= 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). A power supply connected to P3 must support a current draw of 5 V/150 mA and 3.3 V/400 mA If a power supply is connected at P3, the regulated + 5V is not available at the VG96 connector.

Ensure the right polarity of the power supply as depicted in the figure below.

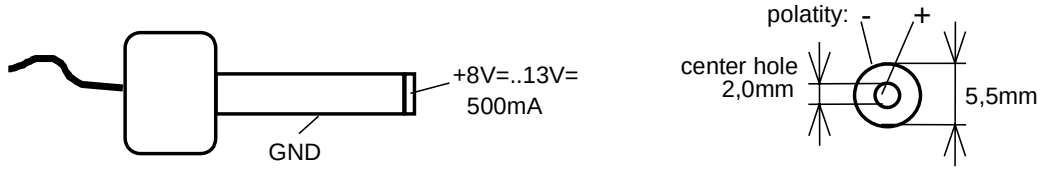
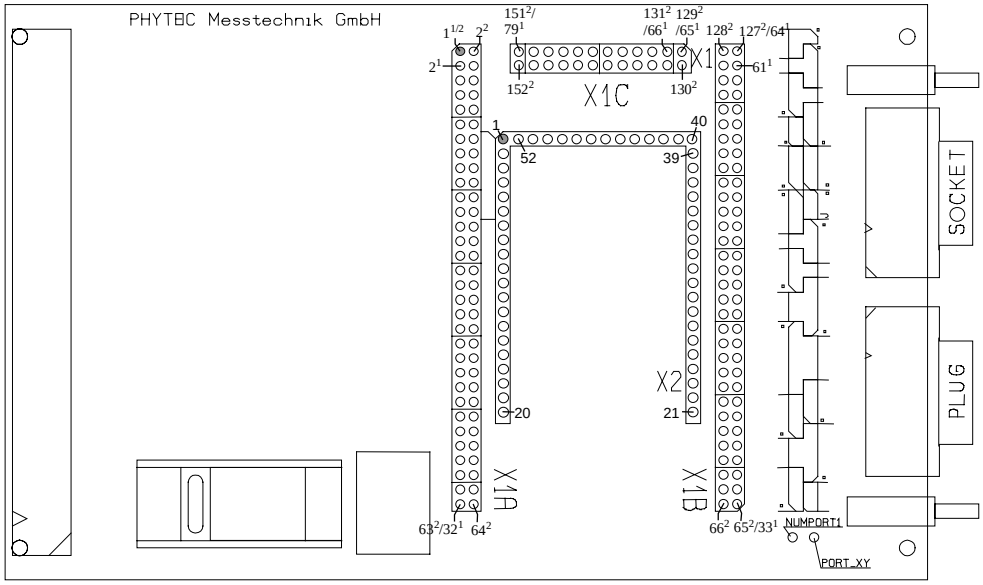


Figure 5: Polarity of the Power Supply

2.2 Receptacles X1, X2

The pin header receptacles X1 and X2 enable easy mounting of micro-/miniMODULs on the Development Board.



1: miniMODULE with single row pin header receptacle (i.e. miniMODUL-535)

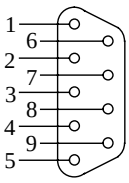
2: miniMODULE with double row pin header receptacle (i.e. miniMODUL-537/509)

Figure 6: Numbering of the Pin Header Receptacles X1and X2

2.3 DB9-Socket P1 and Wire Wrap Row P1x

The DB-9 socket at P1 and the wire wrap row P1x can be used as RS-232 interfaces. The pinout is shown in the figure below:

DB9-socket P1 Wire Wrap Row P1x



Pin 2:	TXD0 (RS-232)	Pin 3
Pin 3:	RXD0 (RS-232)	Pin 5
Pin 5:	GND	Pin 9

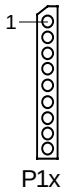


Figure 7: Pinout of the DB-9 Socket at P1 (Front View) and of the Wire Wrap Row P1x

2.4 DB9-Plug P2 and Wire Wrap Row P2x

The DB-9 socket at P2 and the wire wrap row P2x can be configured to serve as an RS-485 or a CAN interface, dependent upon the module installed on the Development Board. The pinout for the various modes is shown in the figures below:

RS-485 Mode

DB9-socket P2 Wire Wrap Row P2x

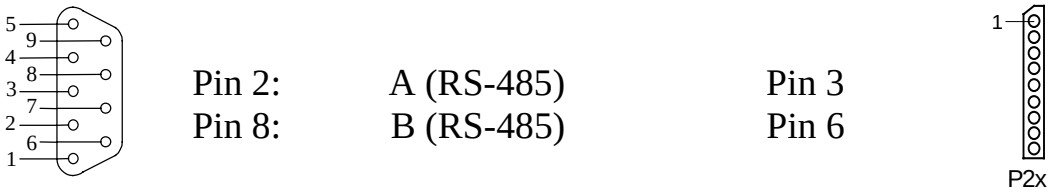


Figure 8: Pinout of the DB-9 Plug at P2 (Front View) and of the Wire Wrap Row P2x (RS-485 Mode)

CAN Mode

DB9-socket P2 Wire Wrap Row P2x

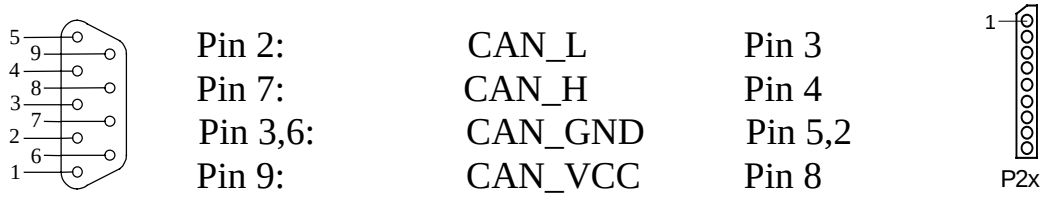


Figure 9: Pinout of the DB-9Pplug at P2 (Front View) and of the Wire Wrap Row P2x (CAN Mode)

The DB-9 plug P2 can be alternately configured to transmit signals of your choice instead of RS-485 or CAN signals. To do so Jumpers JP5, JP6 and JP13-16 must be opened. The desired signals can then be routed via P2x to DB-9 plug P2.

2.5 The DSP-C5x Bootport -Connector[1]

Via Bootport connector P3x the DSP-C5x Bootport of a miniMODUL-DSP50x can be connected to a DB-25 PC printer port. This connection is used for starting the miniMODUL-DSPC5x without a System-Monitor.

After the Development Board is connected to a host-PC, the program ***C5XBOOT.EXE*** must be started using the following syntax:

C5xboot bin-file LPT-Port[2] Bootmode[3]

Together with the DSP-Bootloader, which is resident in the on-chip ROM of the DSP controller, the PC Bootloader ***C5XBOOT.EXE*** directly loads user code into the DSP-memory. After transfer, user code is automatically executed. Further information on this process can be found in the miniMODUL-DSP5Cx Hardware Manual and the accompanying diskette/CD.

The following table shows the connections between P3x and the printer port of the host-PC:

PC-printer port DB25		**Bootport-connection P3x**	
pin	signal name	pin	signal name
1	STRB	1,2	MODE 16x, DSP-FSR
2	D0	3	DSP-DR
3	D1	4	DSP-CLKR
11	PE	6	DSP-XF
16	PI	5	/RES-16x
18	GND	7,8	GND

Table 1: The Connection between P3x and LPT-Port

1: only for miniMODUL-DSP-C5x
2: address of the LPT-Ports (Hexadezimal)
3: only Bootmode 1 is currently available

2.6 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 U6, as indicated in *Figure 3*.

This chip must then be connected to a port-pin of the mini- or microMODUL 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 NUM-PORT. The soldering hole is located next to the LED D3 (refer to *Figure 3*).

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).

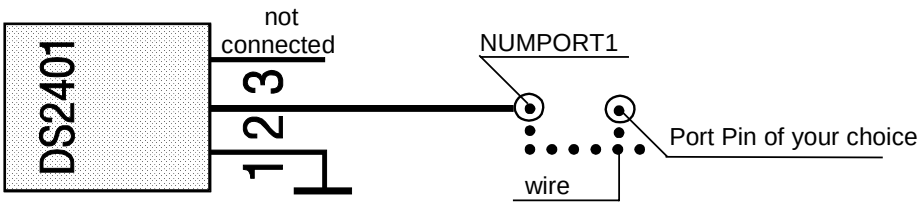


Figure 10: Connecting the Silicon Serial Number to the mini-/microMODUL

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.

Example:

In this example the number chip shall be connected to port pin 4.0. Connect the soldering hole labeled NUM-PORT (pin 2 of the number chip) port-pin 4.0 (*refer to Figure 10*). The utilized port and pin-number must be entered into the configuration file ***cancfg.a51***.

DS2401Port	**EQU**	**0C0h**	**indicate port address; (P4 = 0C0h)**
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 A51 assembler.

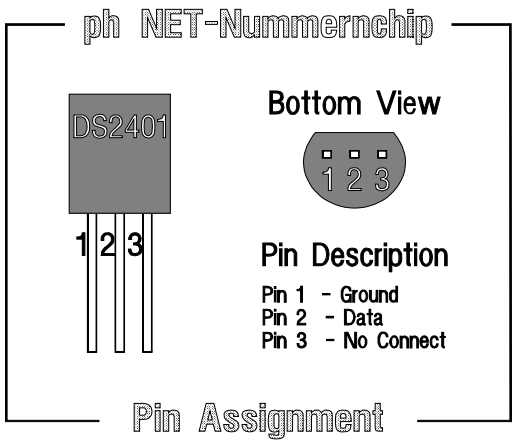


Figure 11: Pinout of the Silicon Serial Number

3 Jumper Layout

The jumpers located between the module receptacles and DB9 connectors configure the applicable signals required for operation of the different PHYTEC micro- and miniMODUL Single Board Computers mounted on the Development Board.

Without proper Jumper configuration, signals from the micro- and miniMODULs mounted on the Development Board do not properly extend to the Development Board's DB-9 connectors and the RESET- and Boot-switches. *Figure 12* shows the numbering of the Jumper-pads, while *Figure 13* illustrates the location of the Jumpers on the board.

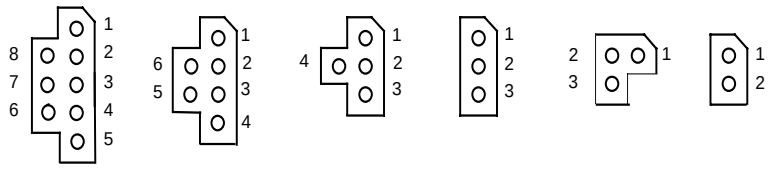


Figure 12: *Numbering of the Jumper-Pads*

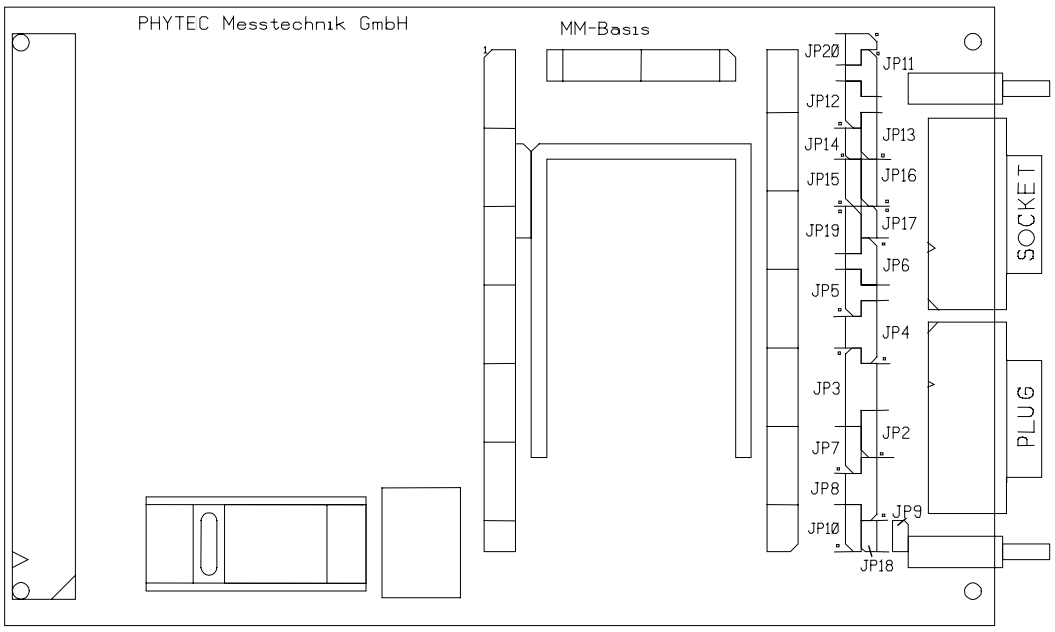


Figure 13: *Location of the Jumpers (Top Side)*

3.1 Power Supply Connector: 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 Reset: JP2

This Jumper connects the RESET-input of the module mounted on the Development Board with the Development Board's RESET-switch at S1.

Module Pin	**JP2**
X1A = pin 61 (dual row connector) X1A = pin 31 (single row connector)	2 + 3
X1B = pin21 (dual row connector)	1 + 2

3.3 RS-232 Driver: JP3 and JP4

These Jumpers connect the RS-232 driver (RxD, TxD, GND) on the module mounted on the Development Board with the Development Board's DB9-socket at P1.

Module Pin RxD	**JP3**
X1A = pin 26 (single row connector)	1 + 2
X1A = pin 45 (dual row connector)	8 + 2
X1B = pin 68 (dual row connector)	7 + 3
X1A = pin 35 (single row connector)	6 + 4
X2 = pin 36 (microMODULs)	5 + 4

Module Pin TxD	**JP4**
X1A = pin 27 (single row connector)	1 + 2
X1A = pin 47 (dual row connector)	6 + 2
X1B = pin 67 (dual row connector)	5 + 3
X2 = pin 35 (microMODULes)	3 + 4

3.4 RS-485 Driver: JP5 and JP6

These Jumpers connect the RS-485 driver (RxD, TxD, GND) of the module mounted on the Development Board to the Development Board's DB-9 socket at P2.

Module Pin RS485_A	**JP5**
X1B = pin 96 (dual row connector)	1 + 2
X2 = pin 36 (microMODULs) **JP3 open !!**	2 + 4
X1B = pin 97 (dual row connector) **JP19 open !!**	2 + 3

Module Pin RS485_B	**JP6**
X1B = pin 94 (dual row connector)	1 + 2
X2 = pin 35 (microMODULs) **JP4 open !!**	2 + 4
X1B = pin 31 (dual row connector)	2 + 3

3.5 LED D3: JP7

This Jumper connects a controller port of the module mounted on the Development Board to the LED at position D3 on the Development Board.

Module Type	**Port Pin**	**JP7**
microMODUL-8051 (formerly µM-1/2/6/7)	P1.0	2 + 3
microMODUL-166 (formerly µM-4)	P2.0	2 + 3
microMODUL-165 (formerly µM-5)	P3.0	2 + 3
miniMODUL-500, -535, -552, -592 slioMODUL-592	P1.0	2 + 3
miniMODUL-196	P6.7	2 + 3
miniMODUL-537	P4.0	1 + 2
miniMODUL-166 and -167	P2.8	1 + 2

3.6 NMI/Boot Function: JP8, JP9, JP10 and JP20

Jumpers JP8 and JP10 activate the NMI/Boot function on the various modules which can be mounted on the Development Board. JP8 connects of the Boot-switch with the appropriate module pin. Jumper JP10 renders the module mounted on the Development Board into Bootstrap mode or execution mode. Jumper JP9 allows short-circuit of the Boot-switch. JP 20 connects the Boot-switch either to VCC or GND.

Module Pin BOOT/NMI/ALE	**JP8**	**JP9**	**JP10**	**JP20**
X1B = pin 23 (dual row connector) NMI-16x connected with GND	1 + 2	open	1 + 2	open
X1B = pin 23/13 (dual row connector) NMI-16x connected with ALE-16x	1 + 2	open	2 + 3	1 + 2
X2 = pin 6 (microMODUL) X1A = pin 37 (dual row connector) D4 connected with pull-down resistor	6 + 2	open or closed	1 + 2	open
X2 = pin 2 (microMODUL) X1A = pin 63 (single row connector) D0 connected with pull-up resistor	3 + 5	open	open	1 + 2
X2 = pin 2 (microMODUL) X1A = pin 63 (single row connector) D0 connected with pull-down resistor	3 + 5	open	open	2 + 3
X1B = pin 10 (dual row connector) D0 connected with pull-up resistor	3 + 4	open	open	1 + 2

3.7 CAN Signals: JP11 and JP12

These Jumpers connect the CAN signals (CTX/RTX) from the module mounted on the Development Board with the external opto-entcoupled CAN-driver. The external CAN-driver can be activated only with Jumpers JP13 - JP16.

Module Pin CANT	**JP11**
X1A+167 = pin 4 (miniMODUL-167) X2 = pin7 (microMODULs)	1 + 2
X1A/B = pin 24 (single row connector)	2 + 4
X1A/B = pin 56 (single row connector)	2 + 3

Module Pin CANR	**JP12**
X1A+167 = pin 5 (miniMODUL-167) X2 = pin 8 (microMODULs)	1 + 2
X1A/B = pin 48 (single row connector)	2 + 4
X1A/B = pin 53 (single row connector)	2 + 3

3.8 CAN Driver Supply Source: JP13 and JP14

These jumpers enable connection of the opto-entcoupled CAN-driver with an external voltage supply (in the range +9 – 12 VDC) via the DB9 socket at P2. The CAN-driver can also be connected to the module's internal power supply.

Power Supply Source	**JP13**	**JP14**
internal voltage supply	1 + 2	closed
external voltage supply	2 + 3	open

3.9 CAN Driver: JP15 and JP16

Closing these jumpers connects an external CAN-driver, or an on-board CAN-driver located on a module mounted on a Development Board, with the DB9 socket at P2 on the Development Board.

Module Pin CANH	**JP15**
X1A/B = pin 48 (single row connector)	1 + 2
external CAN-driver	2 + 3

module pin CANL	**JP16**
X1A/B = pin 49 (single row connector)	2 + 3
external CAN-driver	1 + 2

3.10 MODE/BOOT Function: JP17, JP18 and JP19

Jumper JP17, JP18 and JP19 activate the MODE/BOOT function of the different module mounted on the Development Board. Closing Jumpers JP17 and JP18 renders GND polarization of the module pins. Opening these Jumpers connects the module pins to Vcc via the module-internal the pull-up resistors.

Module Pin Mode 16X	**JP17**
X1B = pin 38 (dual row connector)	closed MODE 16X = 0
X1B = pin 38 (dual row connector)	open (module internal pull-up = 1)

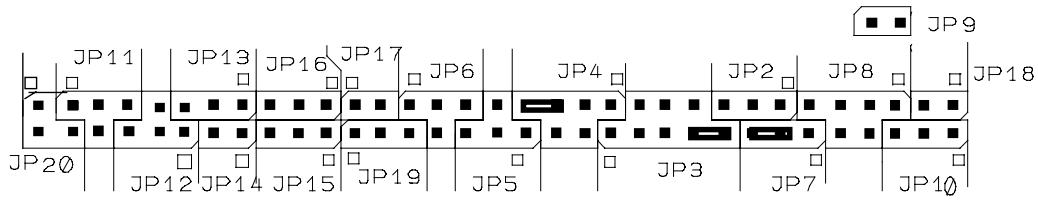
module pin /BOOT 166	**JP18**
X1B = pin 35 (dual row connector)	closed /BOOT 166 = 0
X1B = pin 35 (dual row connector)	open (module internal pull up = 1)

module pin MODE	**JP19**
X1A/X1B = pin 49 (single row connector)	1 + 2 = 0 2 + 3 = 1
CAN-MODULs	**open !!**

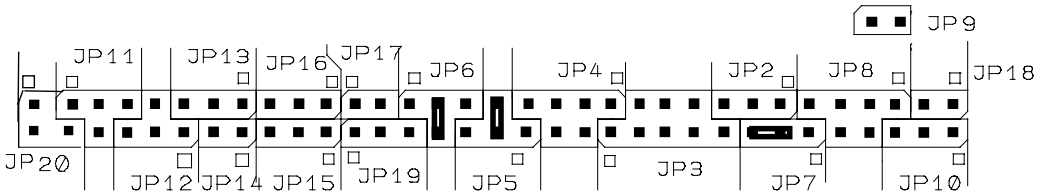
4 Jumper Settings for the Modules

The Jumpers on the Development Board must be specially configured depending on which micro- or miniMODUL is mounted on the Development Board. Proper configuration routes the proper signals from the module to the connectors on the Development Board, as described in Sections 3 and 4 of this manual.

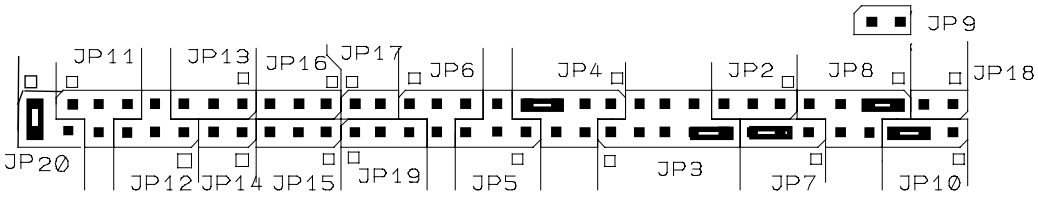
microMODUL-8051 with active RS-232 Interface
(formerly microMODUL-1 and 2)



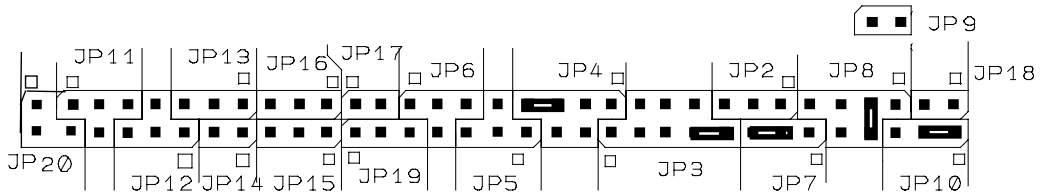
microMODUL-8051 with active RS-485 Interface
(formerly microMODUL-1 and 2)



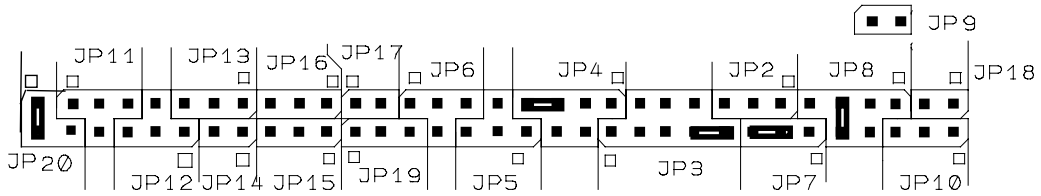
microMODUL-166
(formerly microMODUL-4)



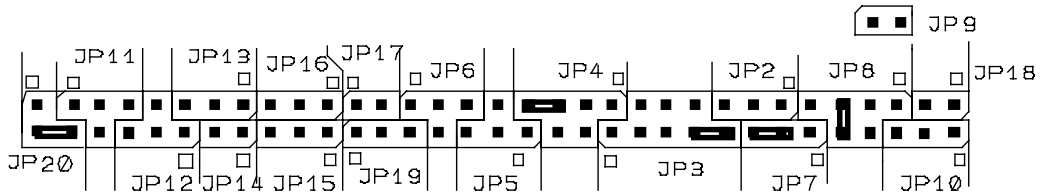
microMODUL-165
(formerly microMODUL-5)



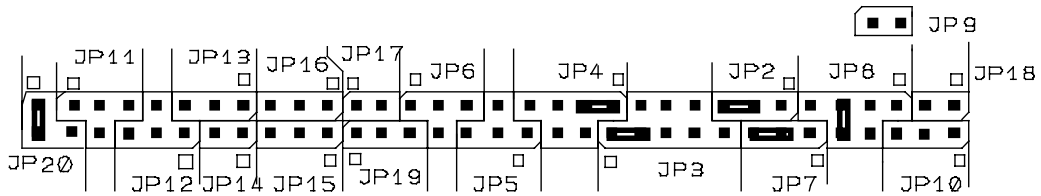
microMODUL-8051
(formerly microMODUL-6 and 7)



microMODUL-251
(formerly microMODUL-8)

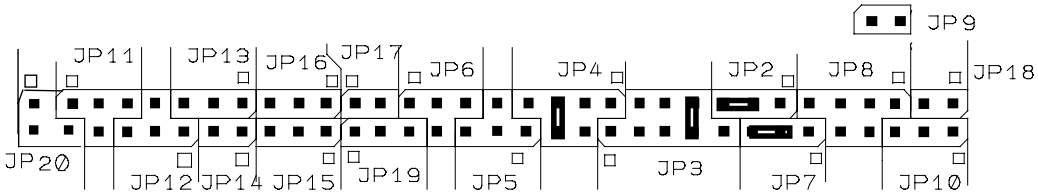


miniMODUL-500/535[1]/552/535/552
(with Flash)

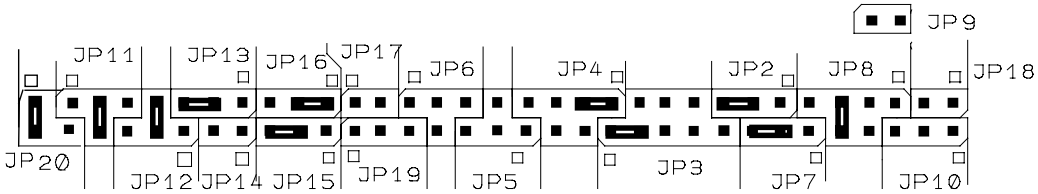


[1]: refer to section *MODE/BOOT Function: JP17, JP18 and JP19* for details about MODE configuration

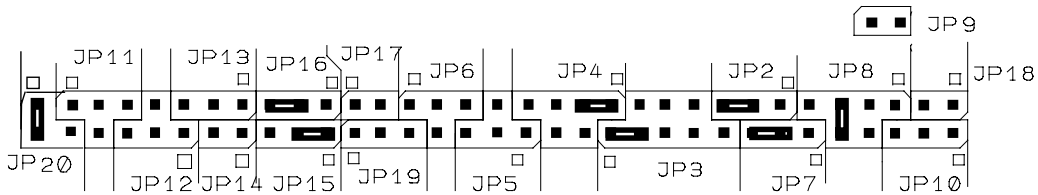
miniMODUL-196



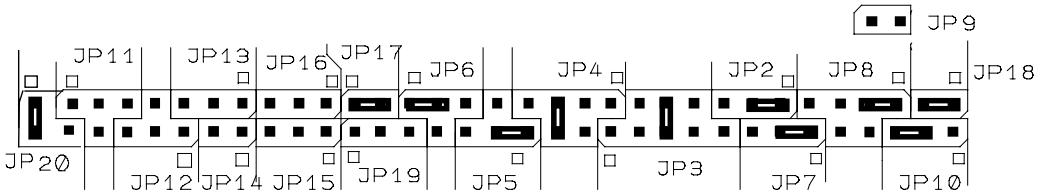
miniMODUL-592
(with Flash and external, optically-isolated CAN-driver)



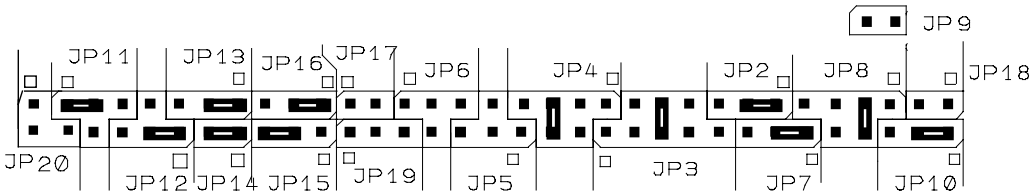
miniMODUL-592
(with Flash and on-board CAN-driver)



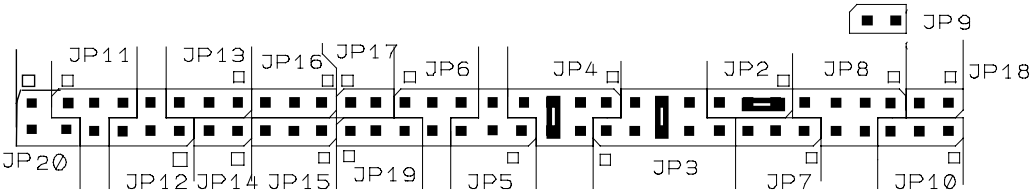
miniMODUL-166
(MODE/JP17 = 0, /Boot/JP18 = 0, for use of Monitor)
(refer to MODE/BOOT Function: JP17, JP18 and JP19 in section 3.10.)



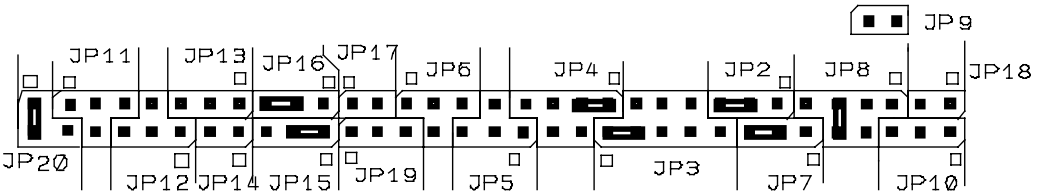
miniMODUL-167
(with external optically-isolated CAN-driver)



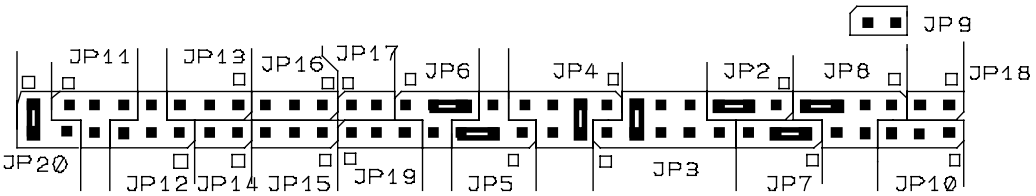
miniMODUL-DSP-C5x



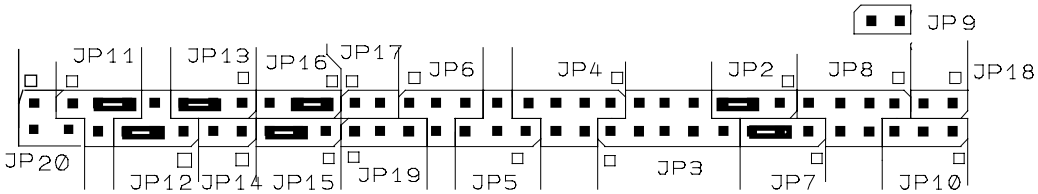
miniMODUL-515C
(with CAN-driver of miniMODUL-515C, no optical isolation)



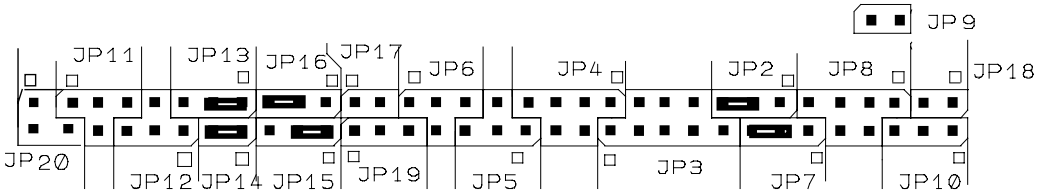
miniMODUL-537/F
(with Flash)



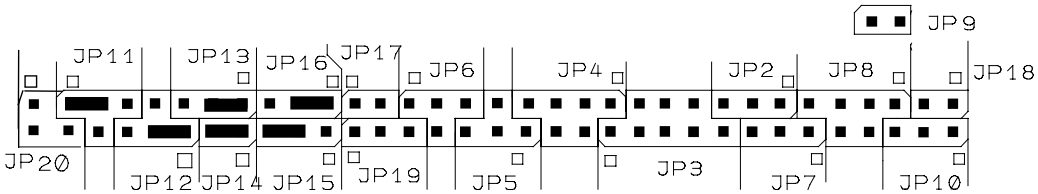
slioMODUL-592
(with external optically-isolated CAN-driver)



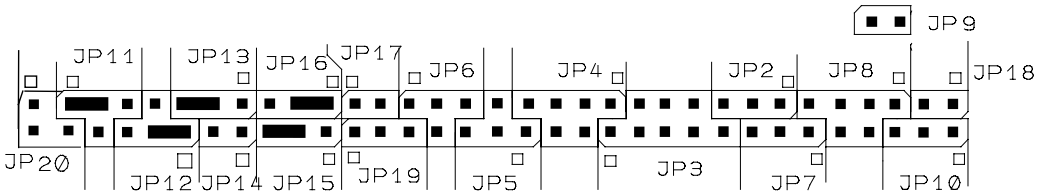
slioMODUL-592
(with CAN-driver of the slioMODUL-592, no optical isolation)



slioMODUL-150
(with external CAN-driver, supply of the CAN-devices from Development Board)



slioMODUL-150
(with external, optically-isolated CAN-driver, supply of the CAN-devices via CAN-bus)



5 Technical Specifications

The physical dimensions of the Development Board are shown in *Figure 14*.

The height of the Development Board, when mounted with a micro- or miniMODUL, is approximately 16 mm. The Development Board itself is 1.5 mm. thick. It is possible to house the Development Board in a 19" casing.

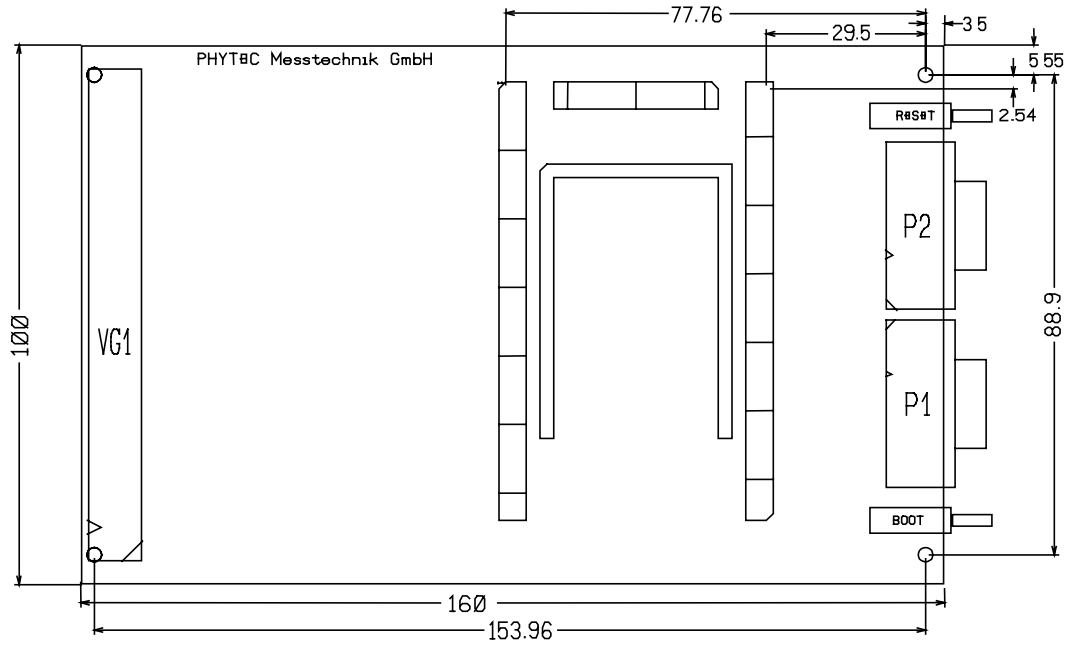


Figure 14: *Physical Dimensions*

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Document: **Development Board for CAN- micro- miniMODUL**
Document number: **L-084e_10, December 2002**

How would you improve this manual?

Did you find any mistakes in this manual? page

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PHYTEC Technologie Holding AG
Postfach 100403
D-55135 Mainz, Germany
Fax : +49 (6131) 9221-33

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