PCI-BASE1000

PCI-Multifunction Measuring Card for MAD/MCAN/MDA Modules

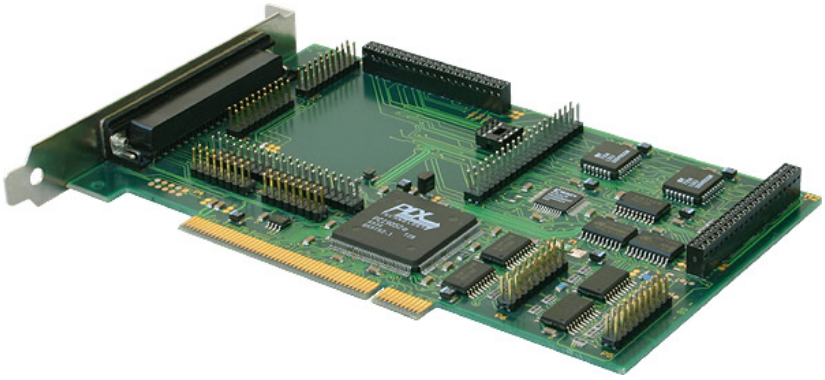
bmc messsysteme gmbh

Features

- 2 slots for Mxx modules
  => up to 32 analog channels
- FIFO for fast data acquisition
- PCI bus compatible (short PCI!)
- 32 digital channels

Applications

- acquisition of analog signals
- analog controls
- recording of digital events
- digital controls



It is available as "Professional", "Lite" or "Client/Server" version.
The free version **NextView® 4 Live!** is included with delivery.

With **NextView® 4 Live!** the entire functional range of the **PCI-BASE1000** can be tested.

BMC Messsysteme GmbH proudly presents the

... PCI multi-function measuring card ...

with a highly integrated and modular concept at an unbeatable price which allows the user to tackle any measuring task by assembling his individual measuring card.

The MAD modules provide overall sampling rates of up to

... 1 MHz ... .

In combination with a CAN interface module analog measurements and via the CAN interface are possible and synchronous in time.

The measured data can simultaneously be displayed and stored on the hard disk.

The switch-over from one measuring range to another can be defined for each channel separately and does not influence the sampling rate.

...16 digital in- and outputs each...

are available on the PCI-BASE plate. This means that the base plate, without any analog modules is a digital I/O card itself.

The

... modular concept ...

easily allows for

... 32 analog inputs ...

in addition with resolutions of 12 or 16 Bit. In order to access the analog inputs 17..32, BMC Messsysteme GmbH offers a PC card bracket with a 37-pole Sub-D socket plus connecting cable (ZUKA16).

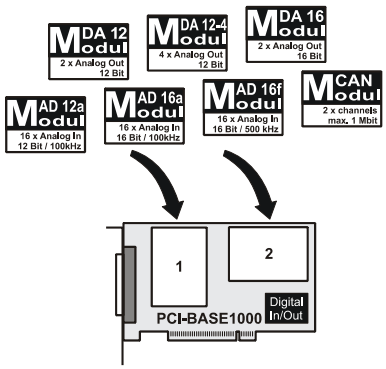
Included as accessory is the hardware independent ActiveX control **LibadX** for programming under Windows® 2000/XP/Vista.

In addition the **PCI-BASE1000** can be used under Windows® 2000/XP/Vista together with our powerful software for acquisition and processing of measuring data

... NextView® 4 ... .

The following modules are presently available:

- **Analog input modules:**
  MAD12a: 100kHz, 12 Bit
  MAD16a: 100kHz, 16 Bit
  MAD16f: 500kHz, 16 Bit
- **Analog output modules:**
  MDA12: 12 Bit, 2 outputs
  MDA12-4: 12 Bit, 4 outputs
  MDA16: 16 Bit, 2 outputs
- **CAN interface module:**
  MCAN: 2 channels, max. 1MBit



1 Installation: Module slots M1 and M2

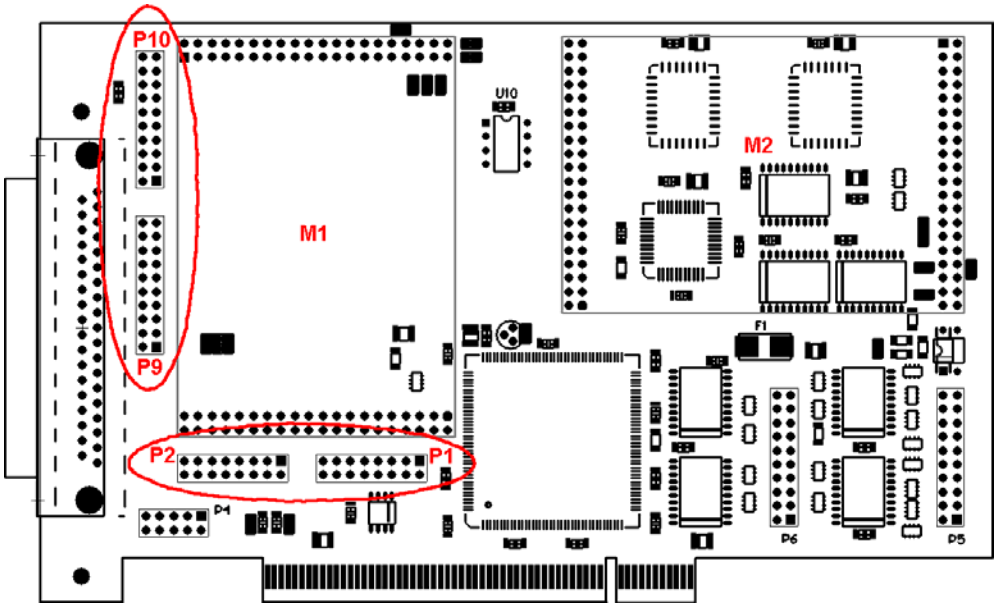
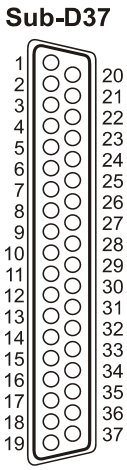
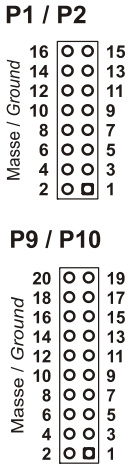


fig. 1

1.1 Module slot - M1

The 37-pole Sub-D socket at the **PCI-BASE1000** allows for the connection of the analog in- and outputs of the modules. The pin connectors P1 and P2 (see fig. 1) can be used for internally connecting an *AAB-II* amplifier box or current shunts *ZU-CS250R*.

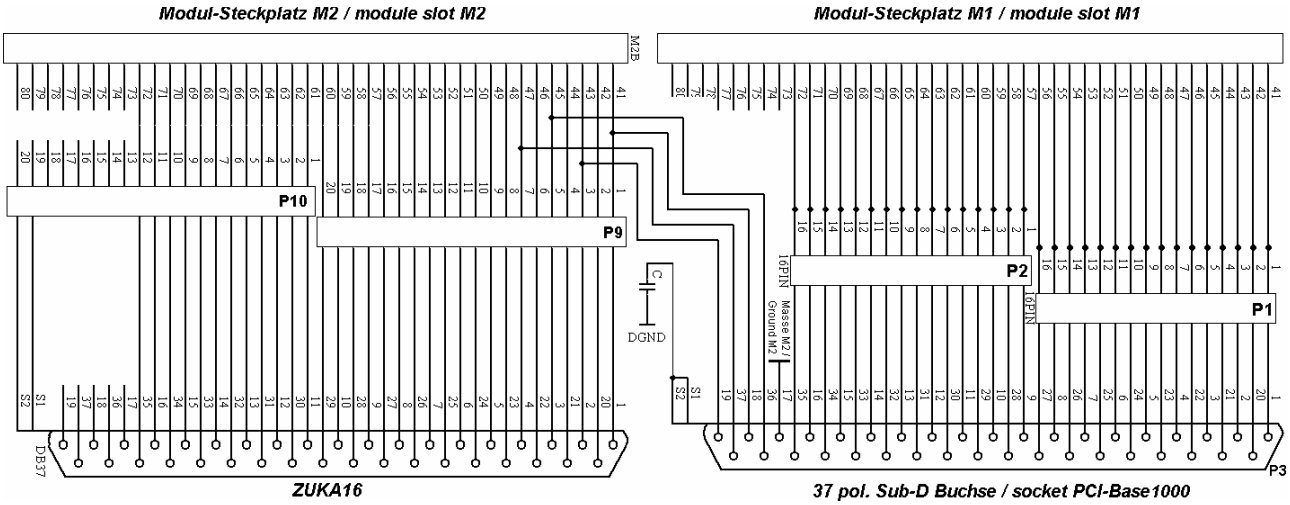




1.2 Module slot - M2

All connections of the second module slot M2 are accessible via the pin connectors P9 and P10 (see fig. 1). Channels 1 and 2 of this module slot can also be accessed by means of the 37-pole Sub-D socket at PIN 18 and 19. In this way, two D/A channels for example can be lead out. If using the *ZUKA16* the channels of the slot M2 are lead out via a 37-pole Sub-D socket (connect line 1 of ZUKA16 with pin 1 of the pin connector P9, see "2.2.1 Connection cable ZUKA16").

The figure below shows the pin assignment of the module slots M1 and M2 of the **PCI-BASE1000** (also see "1.3 Pin assignments"):



1.3 Pin assignments

1.3.1. Module slot M1 --> Sub-D 37, P1, P2

Sub-D37	MAD (s.-e.)	MAD (diff.)	MDA 12/16	MDA 12-4	MCAN	Pin connector (P1/P2) / Pin
1	IN1	+ IN1	AOut1	AOut1	n. c.	P1/1
2	IN2	+ IN2	AOut2	AOut2	CAN1 L	P1/3
3	IN3	+ IN3	-	AOut3	CAN1 GND	P1/5
4	IN4	+ IN4	-	AOut4	n. c.	P1/7
5	IN5	+ IN5	-	-	n. c.	P1/9
6	IN6	+ IN6	-	-	n. c.	P1/11
7	IN7	+ IN7	-	-	CAN2 H	P1/13
8	IN8	+ IN8	-	-	n. c.	P1/15
9	IN9	- IN1	-	-	CAN2 5V	P2/1
10..16	IN10..16	- IN2..8	-	-	-	P2/3, P2/5, ... , P2/13, P2/15
17	-	-	(GND)	(GND)	-	-
18	-	-	(AOut1)	(AOut1)	-	-
19	-	-	(AOut2)	(AOut2)	-	-
20	GND	-	GND	GND	-	P1/2
21	GND	-	GND	GND	CAN1 H	P1/4
22	GND	-	-	GND	-	P1/6
23	GND	-	-	GND	CAN1 5V	P1/8
24	GND	-	-	-	-	P1/10
25	GND	-	-	-	CAN2 L	P1/12
26	GND	-	-	-	CAN2 GND	P1/14
27..35	GND	-	-	-	-	P1/16, P2/2, P2/4, ... , P2/14, P2/16
36	-	-	-	(AOut3)	-	-
37	-	-	-	(AOut4)	-	-

The channels displayed in brackets represent the channels of the second module slot, if an MDA module is plugged.

1.3.2. Module slot M2 --> ZUKA16, P9, P10

ZUKA16	MAD (s.-e.)	MAD (diff.)	MDA 12/16	MDA 12-4	MCAN	Pin connector (P9/P10) / Pin
1	IN1	+ IN1	AOut1	AOut1	n. c.	P9/1
2	IN2	+ IN2	AOut2	AOut2	CAN1 L	P9/3
3	IN3	+ IN3	-	AOut3	CAN1 GND	P9/5
4	IN4	+ IN4	-	AOut4	n. c.	P9/7
5	IN5	+ IN5	-	-	n. c.	P9/9
6	IN6	+ IN6	-	-	n. c.	P9/11
7	IN7	+ IN7	-	-	CAN2 H	P9/13
8	IN8	+ IN8	-	-	n. c.	P9/15
9	IN9	- IN1	-	-	CAN2 5V	P9/17
10..16	IN10..16	- IN2..8	-	-	-	P9/19, P10/1, P10/3, ... , P10/9, P10/11
17..19	-	-	-	-	-	-
20	GND	-	GND	GND	-	P9 / 4
21	GND	-	GND	GND	CAN1 H	P9 / 4
22	GND	-	-	GND	-	P9 / 6
23	GND	-	-	GND	CAN1 5V	P9 / 8
24	GND	-	-	-	-	P9 / 10
25	GND	-	-	-	CAN2 L	P9 / 12
26	GND	-	-	-	CAN2 GND	P9 / 14
27..35	GND	-	-	-	-	P9/16, P9/18, P9/20, P10/2, P10/4, ... , P10/10, P10/12
36, 37	-	-	-	-	-	-

2 Digital inputs and outputs

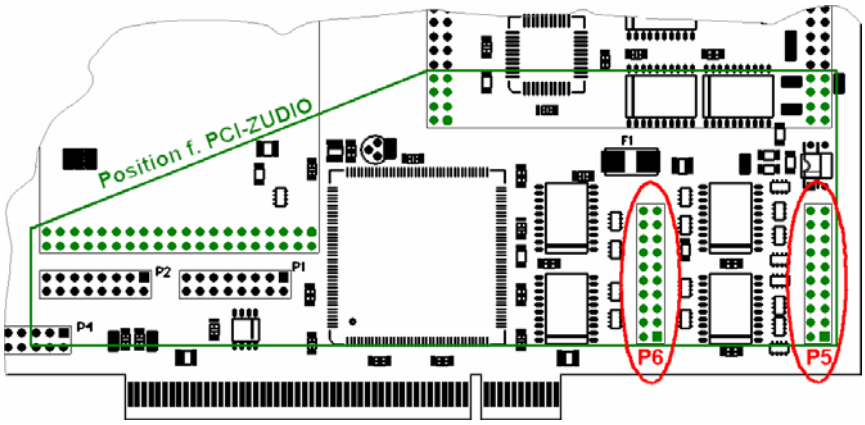


fig. 2

The **PCI-BASE1000** provides for two digital channels with 16 input and 16 output lines. The direction of the digital interface is fixed.

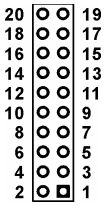
- Pin connector P5 => Input channels 1..16
- Pin connector P6 => Output channels 1..16

The digital in-/ outputs are protected by serial resistors!

2.1 Pin assignment of the pin connectors P5 and P6

The digital in-/outputs are accessible on the board at the 20-pole pin connectors (see fig. 2). The following table shows the pin assignment of the pin connectors P5 and P6:

Pin connector / Pin	Function
P5/1..P5/16	Digital IN D1..D16
P5/17	GND
P5/18	Synchronization line
P5/19, P5/20	-
P6/1..P6/16	Digital OUT D1..D16
P6/17, P6/18	V_{cc} (+5V, 100mA) from PC
P6/19, P6/20	GND



PIN 17 and 18 provide 5V DC. This output is protected by a fuse (F1, see figure above). As it is a multi-fuse it is sufficient to interrupt the power supply in case of overload, e.g. to turn off the PC or to disconnect the consumer. After app. 1 min. the multifuse has regenerated.

2.2 Additional options for the digital channels of the PCI-BASE1000

Two additional options make the digital channels externally available: the connection cable ZUKA16 and the digital I/O adapter PCI-ZUDIO. For detailed informationen see the corresponding data sheet or visit www.bmcm.de.

2.2.1. Connection cable ZUKA16

Via a ribbon cable ZUKA16 leads out the digital channels provided at the two 20-pole pin connectors P5, P6 of the **PCI-BASE1000** (see fig. 2) to the 37-pole Sub-D socket with bracket. This can be mounted at a free PC slot.

The pin connector of the ribbon cable which is connected to PIN 1 of the Sub-D

37 (line marked in red) must be plugged on P6 (square pad) PIN 1). The second connector must be plugged on P5 in parallel.

2.2.2. Digital I/O adapter PCI-ZUDIO

With the PCI-ZUDIO you can lead out the digital channels provided at the pin connectors P5, P6 to the 37-pole Sub-D socket of the **PCI-BASE1000** if using the **PCI-BASE1000** as a digital PCI interface card (PCI-PIO).

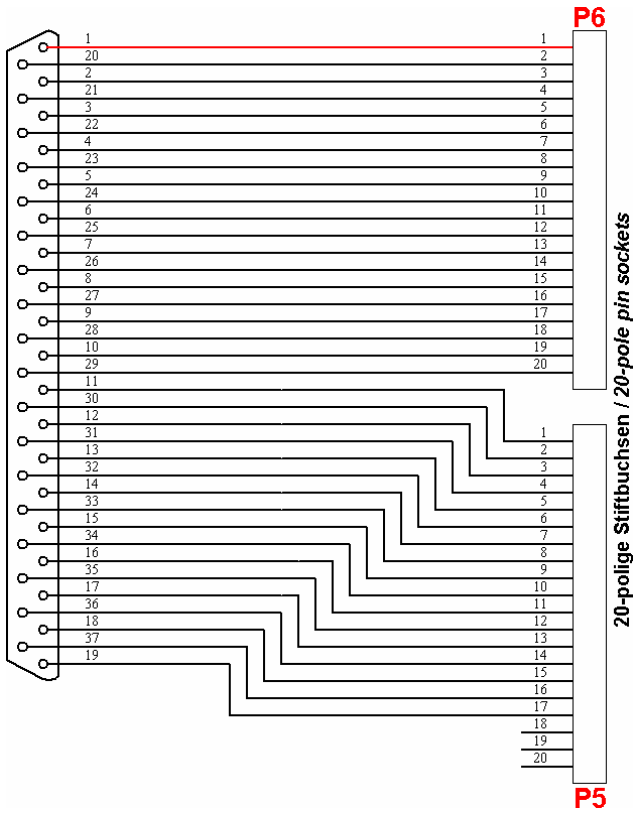
Therefore plug the pin connectors of the PCI-ZUDIO onto the connectors of the **PCI-BASE1000** as shown fig. 2 (pins marked in green).

If using the PCI-ZUDIO the module slots M1 and M2 are not provided!

2.2.3. Pin assignment when using ZUKA16 or PCI-ZUDIO

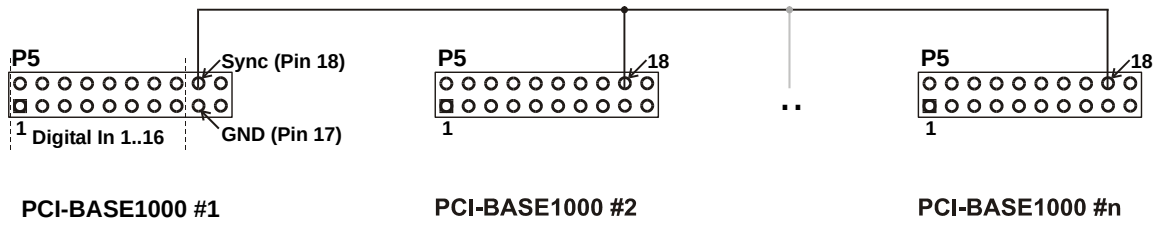
The following table shows the pin assignment of the 37-pole Sub-D socket, where the digital lines are accessible if using ZUKA16 or PCI-ZUDIO:

Sub-D 37	Pin (P6)	Function
1	P6/1	D-OUT 1
20	P6/2	D-OUT 2
2	P6/3	D-OUT 3
21	P6/4	D-OUT 4
3	P6/5	D-OUT 5
22	P6/6	D-OUT 6
4	P6/7	D-OUT 7
23	P6/8	D-OUT 8
5	P6/9	D-OUT 9
24	P6/10	D-OUT 10
6	P6/11	D-OUT 11
25	P6/12	D-OUT 12
7	P6/13	D-OUT 13
26	P6/14	D-OUT 14
8	P6/15	D-OUT 15
27	P6/16	D-OUT 16
9, 28	P6/17, P6/18	+5V
10, 19, 29	P6/19, P5/17, P6/20	Masse (GND)
11	P5/1	D-IN 1
30	P5/2	D-IN 2
12	P5/3	D-IN 3
31	P5/4	D-IN 4
13	P5/5	D-IN 5
32	P5/6	D-IN 6
14	P5/7	D-IN 7
33	P5/8	D-IN 8
15	P5/9	D-IN 9
34	P5/10	D-IN 10
16	P5/11	D-IN 11
35	P5/12	D-IN 12
17	P5/13	D-IN 13
36	P5/14	D-IN 14
18	P5/15	D-IN 15
37	P5/16	D-IN 16



3 Synchronization

When using several **PCI-BASE1000** they can be synchronized with each other, so that measurements on channels of different cards match together in time. The connection for the synchronization line is located at pin 18 of the 20-pole pin connector P5 (see fig. 2) and is done as illustrated in the following figure.



Synchronization of the previous versions PCI-BASE50/300 and MAD12/MAD12f/MAD16 is not possible!

4 Software installation

All the software for Windows® 2000/XP/Vista and documentation available for the **PCI-BASE1000** is integrated on the "Software Collection"-CD included with delivery. When inserting the CD a CD starter opens automatically (otherwise: start `setup.exe`).

PCI-BASE1000

Change to the product page of the **PCI-BASE1000** by selecting the entry "Products" in the CD starter and then the hardware ("PCI-BASE1000") listed under the interface "PCI".

For detailed information about installing or operating the software please see the corresponding manuals. To open the documentation in PDF format the Adobe Acrobat Reader is required.

You can run any installation directly from CD. If your browser prevents this first save the setup program to hard disc before running it separately afterwards.

Software	Software product	Notes	Documentation
Device driver	BMCM-DR (driver package)	1. install driver package to hard disc 2. Windows® Plug&Play installation	BMCM-DR-IG (driver installation manual)
Programming	STR-LIBADX	ActiveX control for hardware independent programming	STR-LIBADX-IG (installation / programming manual)
	STR-LIBADX-EX	example programs for LIBADX ActiveX control	-
	STR-PCI	easy-to-use ActiveX control for programming with Visual Basic®, Delphi®, Visual C++™	STR-PCI-Base-IG (installation / programming manual)
	STR-PCI-EX	example programs for STR-PCI ActiveX control	-
Operating program	NV4-LIVE	free online version of NextView®4 for testing the functional range of the hardware	NV4-IG (installation Stand-alone version) IG-NV4-CS (inst. Client/Server version) NV4-UM (user manual) "First steps" in the NextView®4 demo project (displayed at first start of the software)
	NV4	measuring software NextView®4 (requires license number, no freeware!)	
	NV4-SERV NV4-WORK	Client/Server version of NV4 consisting of NextView®4 Server and NextView®4 Workstation	

4.1 Driver installation

For the **PCI-BASE1000** a driver installation is always required. Only then additional software can be installed. To make sure that the installation is done correctly, please follow the instructions in the order as described below.

4.1.1. Install driver package

The prior installation of the bmcm driver package BMCM-DR to the hard disc of your PC makes the driver search for Windows® much easier. Especially in case of driver updates only the new driver package has to be installed, the hardware automatically uses the new version. The link to install the driver package is located on the **PCI-BASE1000** product page of the "Software Collection"-CD.

4.1.2. Plug&Play installation

Mount the **PCI-BASE1000** into a free PCI card slot of the off-state PC. At the next start of the PCs the system announces the new hardware. Start the automatic hardware detection by selecting the following option:

- **Windows® XP**: "Install the software automatically" (SP2: do not connect with Windows® Update!)
- **Windows® 2000**: "Search for a suitable driver for my device"

As the driver package has been installed on hard disc before no additional location needs to be entered for the driver search under Windows® 2000.

4.1.3. Check installation

In the Windows® Device Manager the entry "Data Acquisition (BMC Messsysteme GmbH)" is included after successful installation displaying the installed bmcm hardware. To open the Device Manager proceed as follows:

- **Windows® XP**: Start / Control Panel / System / TAB "Hardware" / button "Device Manager"
- **Windows® 2000**: Start / Settings / Control Panel / System / TAB "Hardware" / button "Device Manager"

Double click the **PCI-BASE1000** to open its properties. For general information, any existing device conflicts and possible sources of error see TAB "General".

4.2 Programming

Programming the **PCI-BASE1000** with Visual Basic®, Delphi®, Visual C++™ is possible with the hardware independent LibadX ActiveX control. It is available in the section "Programming" of the "Software Collection"-CD. After installation the ActiveX control must be loaded into the respective programming environment.

- **Visual Basic®**: menu "Project / Components", entry "LIBADX Object Library 4.0"
- **Delphi®**: menu "Components / Import ActiveX", entry "LIBADX Object Library 4.0"

The easy-to-use, product specific ActiveX controls STR-PCI are located on the on the **PCI-BASE1000** product page of the "Software Collection"-CD. Checkmark "PCI-Base ActiveX Controls 1.2" to load the card into the programming environment.

If you select the entry STR-LIBADX-EX or STR-PCI-EX, listed directly under the installation program of the corresponding ActiveX control, you can install example programs (incl. source code) demonstrating how to apply the ActiveX control.

4.3 Using the PCI-BASE1000 with NextView®4

Install the "Live!" version of the professional software NextView®4 for measurement data acquisition and processing to test the features and functions of the **PCI-BASE1000** directly. The setup program NV4-LIVE is available in the section "NextView® 4.2". Select your measuring system (**PCI-BASE1000**) by pressing the button "Add" in the dialog "Device Setup" of the installation program.

When you open the software you get first instructions about how to operate the program. For detailed information an online help is provided.

With NextView®4 Live! signals cannot be stored. The full version NextView®4 is no freeware and requires a license number!

5 Important notes for using the PCI-BASE1000

- The **PCI-BASE1000** is only suitable for extra-low voltages - please observe the relevant regulations!
- The **PCI-BASE1000** must only be used in closed PC housings (for reasons relating to EMC).
- All accessible pins are electrostatic sensitive devices. Provide for a conductive work place connected to ground.
- For CE reasons use well shielded cables, connect shield at one end only. Close open inputs, if possible. Close open inputs if necessary. ESD voltages at open lines may cause malfunction.
- The **PCI-BASE1000** ground is electrically connected to the chassis of the PC, which is usually also connected to ground. Be sure to avoid ground loops since they will cause measuring errors!
- For cleaning use water and mild detergent only. The modules are designed to be maintenance-free.
- The device must not be used for safety-relevant tasks. With the use of the product the customer becomes manufacturer by law and is therefore fully responsible for the proper installation and use of the product. In the case of improper use and/or unauthorized interference our warranty ceases and any warranty claim is excluded.
- Improper installation of the modules on the **PCI-BASE1000** may damage the modules and/or the **PCI-BASE1000**. When removing the modules use only blunt tools! Exposing the card to strong vibrations requires additional protection of the modules.
- When connecting internal ribbon cables to the **PCI-BASE1000**, please observe that the modules are well ventilated to prevent excess heating. Also observe the temperature ranges of the PC.
- In case of overload interrupt the power supply (turn off PC), so that the multifuse on the board regenerates. After app. 1 min. the fuse is ready for use.

Do not dispose of the product in the domestic waste or at any waste collection places. It has to be either duly disposed according to the WEEE directive or can be returned to bmcm at your own expense.

6 Technical Data PCI-BASE1000 (typical at 20°C and 5V supply)

- **Sampling parameters (in connection with measuring and analysis software NextView®4)**

Max. overall sampling rate*:	dep. on the modules used, max. 1 MHz with 2x MAD16f
FIFO:	4kByte
Memory depth:	depending on the RAM or HD space available (up to 4GByte)

*** The overall sampling rate is the sum of the sampling rates of the individual used channels (e.g. from 5 channels scanned with 10kHz results an overall sampling rate of 50kHz).**

- **Digital in-/ outputs**

Digital input channels:	16x TTL
Digital output channels:	16x TTL
Level:	CMOS/TTL-level (0 = 0.0V..0.5V; 1 > 2.6V..5.0V)
Digital IN R_i:	1MΩ
Digital IN surge resistant to:	60V DC, max. ±20mA in total of all input channels!
Digital OUT R_i // Output current:	1kΩ // 1mA

- **Signal connection**

Analog in-/ outputs (of MAD/MDA modules):	All channels are accessible at a 37-pole Sub-D socket at the PC-card bracket or via pin connectors.
Digital channels:	2x20-pole pin connectors on the board; the ZUKA16 (optional) leads out the digital to a 37-pole Sub-D socket, the PCI-ZUDIO (optional) to the 37-pole Sub-D socket of the PCI-BASE1000

- **General data**

Power supply:	+4.5V..+5.5V from PCI-Bus, max. 200mA + power of the modules
Bus connection:	PCI-Bus
CE standards:	EN61000-6-1, EN61000-6-3, EN61010-1; for decl. of conformity (PDF) visit www.bmcm.de
ElektroG // ear registration:	RoHS and WEEE compliant // WEEE Reg.-No. DE75472248
Max. permissible potentials:	**60V DC acc. to VDE**, max. 2kV ESD on the lines
Temperature ranges:	operating temp. –25°C..+50°C, storage temp. –25°C..+70°C
Relative humidity:	0–90% (not condensing)
Size:	178 x 103 x 13,5 mm^3
Delivery:	product, PC bracket, "Software Collection" CD with drivers and documentation, description
Available accessories:	cable with PC-bracket for internal connection ZUKA16, digital I/O adapter PCI-ZUDIO, 37-pole Sub-D plug ZUST37, connecting cables ZUKA37SB, ZUKA37SS, optocoupler board OI16-PC, connector panels ZU37BB/-CB/-CO, current shunt ZU-CS250R, modules of the series MAD/MCAN/MDA
Guarantee:	2 years with effect from sales date, damages at product resulting from improper use excluded

- **Software**

Software on CD (included):	ActiveX Controls LibadX (hardware independent) and STR-PCI for programming under Windows® 2000/XP/Vista; measuring program NextView®4 Live! to test and operate the hardware
NextView®4 (optional):	professional software (versions: Professional, Lite, Client/Server) for the acquisition and analysis of measurement data under Windows® 2000/XP/Vista

Manufacturer: BMC Messsysteme GmbH. Subject to change due to technical improvements. Errors and printing errors excepted. Rev. 6.2 02/27/2008