USB-AD

USB miniature external Measurement System

bmc messsysteme gmbh

Features

- 16 analog input channels, ±5V
- connection via USB-interface
- USB 2.0 compatible
- 12 Bit resolution
- 1 analog 12 Bit output channel
- 4 digital in-/ output channels each

Applications

- measuring analog signals
- analog controls
- measuring digital signals
- digital controls
- perfect for mobile use

... NextView® 4 ... .

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 **USB-AD** can be tested.

With the creation of the modern generation of PCs less and less internal slots are available for additional cards.

The external device **USB-AD** in compact plug design provides an attractive alternative to substitute the measuring cards integrated in the computer.

This USB-solution features

... 16 analog inputs ...

and an accuracy of 12 Bit in the

... ±5V measuring range ... .

In addition

... one analog output and
4 digital inputs / outputs each ...

are available for the **USB-AD**.

Of course, the device also shows all the typical USB features, such as *hot-pluggable* (devices can be plugged in during operation), up to 127 devices can be used, *Plug&Play*, and power supply via USB interface.

As universal measuring system **USB-AD** impresses by its remarkably compact size making it

... perfect for mobile use ... .

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

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

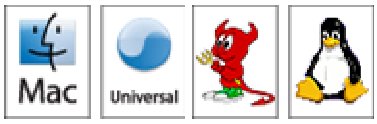
Furthermore the **USB-AD** is directly supported by the operating systems

… MAC OS X,
FreeBSD and Linux … .

A driver installation is not neccessary.

For further information and software updates please visit our homepage at:

http://www.bmcm.de .



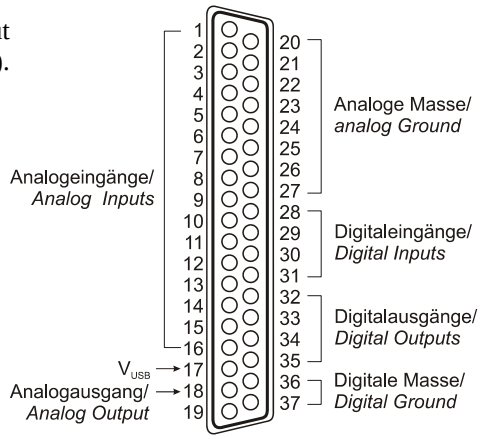
1 Start-up procedure

Connect the USB-cable of the **USB-AD** to the USB-interface of the PC. The device is supplied with power via the USB-connection.

2 Pin assignment

The USB measuring system provides for 16 analog inputs, 1 analog output and each 4 digital in- and outputs (CMOS level: *low*=0V-1V; *high*=3V-5V). The channels are connected via the 37-pole Sub-D socket of the **USB-AD**.

Pin	USB-AD
1..16	analog inputs 1..16
17	V_{USB} (4-5V; max. 20mA)
18	analog output 1
19	n. c.
20..27	analog ground (AGND)
28..31	digital inputs 1..4
32..35	digital outputs 1..4
36..37	digital ground (DGND)



- **As the digital channels are lead out to the Sub-D37 socket the pin assignment is not bmcm standard. Therefore in combination with some bmcm connection systems (e.g. AAR, ZU37BB/-CB/-CO) the analog ground (AGND) for Analog In 9..16 is not available directly!**
- **The max. potentials to ground must not exceed ±7V. Any channel overload may influence measurements of other channels and may lead to wrong values.**
- **The digital in-and outputs are protected by 1kΩ resistors. If the input voltage is not within the admitted voltage range of 0V..5V the device may be damaged.**

3 Software installation

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

USB-AD

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

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-meM	easy-to-use ActiveX controls for programming with Visual Basic®, Delphi®, Visual C++™	STR-meM-IG (installation / programming manual)
	STR-meM-EX	example programs for STR-meM ActiveX controls	-
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	

3.1 Driver installation

For **USB-AD** 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.

3.1.1 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 **USB-AD** product page of the "Software Collection"-CD.

3.1.2 Plug&Play installation

As soon as the **USB-AD** is connected to the PC, 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.

3.1.3 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 **USB-AD** to open its properties. For general information, any existing device conflicts and possible sources of error see TAB "General".

3.2 Programming

Programming the **USB-AD** 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-meM are located on the on the **USB-AD** product page of the "Software Collection"-CD. In this case the **USB-AD** is addressed as its previous model meM-ADDA and linked in the programming environment via the entry "meM-ActiveX Control module".

If you select the entry STR-LIBADX-EX or STR-meM-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.

3.3 Using the USB-AD 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 **USB-AD** directly. The setup program NV4-LIVE is available in the section "NextView® 4.2". Select your measuring system (**USB-AD**) 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!

4 Important notes for using the USB-AD

- The device is only suitable for extra-low voltages – please observe the relevant regulations! For reasons relating to EMC, the device must only be operated with housing closed. ESD voltages at open lines may cause malfunction during operation.
- For cleaning use water and mild detergent only. The device is designed to be maintenance-free.
- Signal cables are connected at the 37-pole Sub-D socket – use shielded cables only. For best possible interference suppression connect shield at one end only. Close open inputs if necessary.
- The device ground and the chassis are 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!
- PCs (notebooks), which are not grounded often produce high potentials to earth at the USB socket, so that safe operation cannot be guaranteed. In this case connect the measuring system to earth.
- The Gain is adjusted to even values. Therefore only 4000 values of the full range of the converter are used. As a result, the measuring ranges are slightly larger (±5.12V) than the indicated measuring ranges, providing the advantage that overranges can be recognized.
- The AD converter of the **USB-AD** has a code noise of up to ±1 LSB.
- 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.

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.

5 Technical data USB-AD (typical at 20°C, 5V and after 5min.)

- **Analog inputs**

Channels:	16 single-ended			
Surge protection:	max. ±12V (when turned on), ±7V (when turned off), max. ±20mA in total of all input channels!			
Input resistance // input capacity:	1MΩ (with PC turned off: 1kΩ) // 5pF			
Zero shift // gain drop:	±50ppm/°C // ±50ppm/°C			
Sampling rate:	up to 500 values/second can be sampled (depending on software and PC)			
	measuring range	**resolution**	**abs. accuracy**	**noise**
USB-AD:	±5V	12 Bit (2.5mV)	±5mV	±1 LSB

The values for accuracy always relate to the respective measuring range. Errors might add at worst.

- **Analog output**

Voltage range // resolution:	1 voltage output with ±5V // 12 Bit
Output current // accuracy:	max. 1mA // typ. ±4 LSB, max. ±20 LSB
Zero shift // gain drop:	±50ppm/°C // ±50ppm/°C

- **Digital in-/ outputs**

Channels // level:	4 input and 4 output channels // CMOS-level (low: 0V..1V; high: 3V..5V)
Input resistance:	min. 1MΩ (with PC turned off: 1kΩ)
Current pick-up per output pin:	1mA (with app. 4V level), max. 2.5mA (with app. 3V level)
Surge protection:	max. ±5.5V, protected with 1kΩ, max. max. ±20mA in total of all channels!

- **General data**

Power supply:	+4.5V..+5.5V from USB connection to the PC, max. 100mA
Connections (analog + digital):	all channels at a 37-pole Sub-D socket
USB interface:	USB 2.0 compatible (full speed)
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. 1kV ESD on open lines
Temperature range:	-25°C..+70°C
Relative humidity:	0-90% (not condensing)
Housing:	plastic housing 71 x 45 x 16 mm^3, USB cable app. 1.1m
Protection type:	IP50
Delivery:	device in plastic housing with USB cable, "Software Collection"-CD with drivers and documentation, description
Available accessories (optional):	USB extension cable ZUKA-USB, connecting cables ZUKA37SB, ZUKA37SS, connector boards ZU37BB/-CB/-CO, 37-pole Sub-D plugs ZU37ST
Guarantee:	2 years with effect from sales date, damages at product resulting from improper use excluded

- **Software support**

Software on CD (included):	hardware independent ActiveX control LibadX for programming under Windows® 2000/XP; easy-to-use, product-specific ActiveX Controls STR-meM;measuring program NextView®4 Live! for testing and operating the hardware; directly supported by MAC OS X, Universal, FreeBSD and Linux
NextView®4 (optional):	professional software (versions: Professional, Lite, Client/Server) for the acquisition and analysis of measurement data under Windows® 2000/XP

Manufacturer: BMC Messsysteme GmbH. Subject to change due to technical improvements. Errors and printing errors excepted. Rev. 2.1 11/04/2006