



meM-ADfo

Data acquisition system (USB)

Measurement & Control. Analog and digital.

Record and output signals with the meM-ADfo. The USB data acquisition system is a universal device for medium-class applications with maximum safety in the digital field. Optocouplers and relays are already integrated and protect against high potentials and interferences.

16 analog inputs. 10kHz. 12 bit. $\pm 5V$.

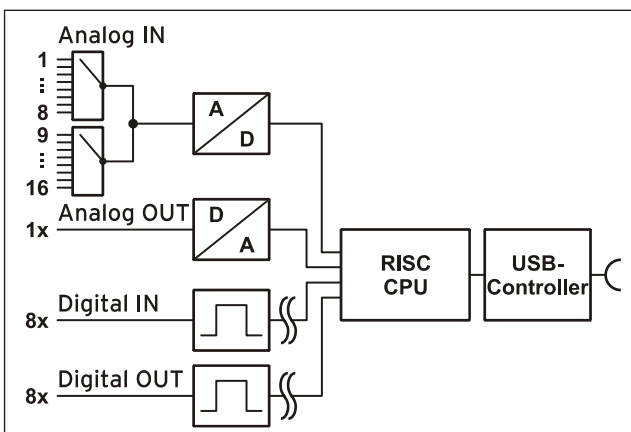
Voltage signals in the $\pm 5V$ range are connected at 16 analog inputs. The integrated micorcontroller allows sampling with 12 bit resolution and 10kHz total sampling rate.

1 analog output. 12 bit. $\pm 5V$.

The 5V output can be used for analog control with 12 bit accuracy.

8 digital inputs/outputs each. Galvanically isolated.

8 optocouplers and 8 relays provide for galvanic isolation. The digital inputs and outputs, however, are not just electrically isolated from the PC and the power supply, but also from each other for maximum interference resistance.



Function diagram

Plug & Play.

The connection to the PC is realized via USB. The meM-ADfo provides all typical USB features (e.g. Plug&Play, Hot-Plug). Up to 127 devices can be connected and installed during operation.

Powered by USB.

The device is supplied with power via the USB interface. This reduces cabling efforts to a minimum and makes mobile measurements a lot easier.

All Windows® or something.

The meM-ADfo can be used on Windows® 7/XP. The entire software for installation and programming (ActiveX Control) of the device is included for free.



NextView®4. Try for free.

The DAQ system is supported by NextView® 4, the software for data acquisition and analysis. A fully functional 30-day trial is included with delivery to directly test the functionality of the meM-ADfo.

1 Start-up procedure

Install the bmcm driver package (see chapter 5.1.1). Plug the red frames onto the short sides of the device with the feet looking downward as to be seen in the product picture. Connect one end of the USB cable to the device and the other to the USB-interface of the PC and start the Plug&Play installation (see chapter 5.1.2). The device is supplied with power via the USB-connection.

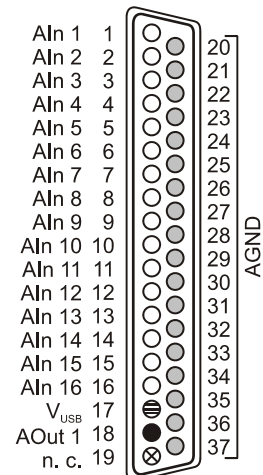
If necessary, further software components can be installed now, as described in chapter 5.

2 Analog inputs and outputs

The 37-pole Sub-D female connector at the front of the device is designed for the connection of the analog inputs and outputs. An auxiliary voltage (e.g. for sensor supply) is provided at pin 17.

The following table shows the pin assignment of the 37-pole Sub-D connector:

Pin	meM-ADfo	Pin	meM-ADfo
1	AIn 1	11	AIn 11
2	AIn 2	12	AIn 12
3	AIn 3	13	AIn 13
4	AIn 4	14	AIn 14
5	AIn 5	15	AIn 15
6	AIn 6	16	AIn 16
7	AIn 7	17	V _{USB} (4-5V; max. 20mA)
8	AIn 8	18	AOut 1
9	AIn 9	19	n. c.
10	AIn 10	20..37	AGND



- AIn = Analogeingang / analog input
- AOut = Analogausgang / analog output
- AGND = analoge Masse / analog ground
- ⊖ V_{USB} = Hilfsspannung / auxiliary voltage
- ⊗ n. c. = nicht verbunden / not connected

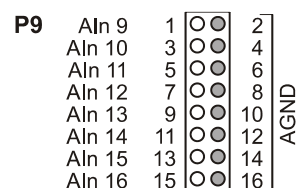
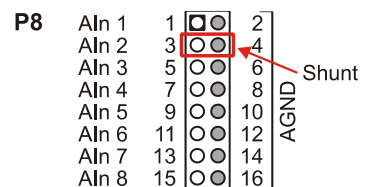
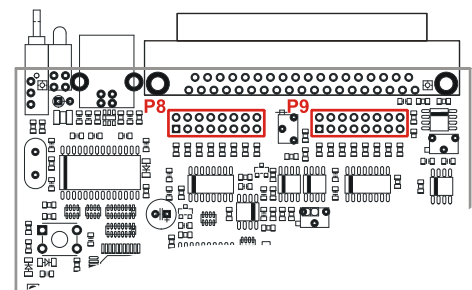


The max. potentials to ground must not exceed $\pm 7V$. Any channel overload may influence measurements of other channels and may lead to wrong values.

The internal connection of the 16 analog inputs is provided via two 16-pole pin connectors P8, P9 (see figure on the right) on the meM-ADfo board, which for example can be used for connecting current shunts (available as accessory under: ZU-CS250R).

The pin assignment of these connectors is listed in the following table:

Pin (P8)	meM-ADfo	Pin (P9)	meM-ADfo
1	AIn 1	1	AIn 9
3	AIn 2	3	AIn 10
5	AIn 3	5	AIn 11
7	AIn 4	7	AIn 12
9	AIn 5	9	AIn 13
11	AIn 6	11	AIn 14
13	AIn 7	13	AIn 15
15	AIn 8	15	AIn 16
2, 4, ..., 14, 16	AGND	2, 4, ..., 14, 16	AGND



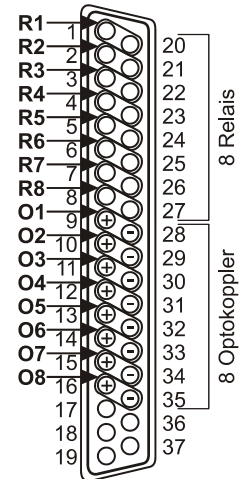
- AIn = Analogeingang / analog input
- AGND = analoge Masse / analog ground

3 Digital inputs and outputs

The meM-ADfo features 8 digital inputs and outputs each (*low*: 0V..1V; *high*: 5V..15V), which are controlled via 8 internal optocouplers and relays.

The connections for the switch contacts are accessible at the 37-pole Sub-D female connector on the back of the device. The pin combinations corresponding to the relevant optocoupler/relay are listed in the following table:

Pin combination	meM-ADfo	Pin combination	meM-ADfo
1(+), 20(-)	relay 1	9(+), 28(-)	optocoupler 1
2(+), 21(-)	relay 2	10(+), 29(-)	optocoupler 2
3(+), 22(-)	relay 3	11(+), 30(-)	optocoupler 3
4(+), 23(-)	relay 4	12(+), 31(-)	optocoupler 4
5(+), 24(-)	relay 5	13(+), 32(-)	optocoupler 5
6(+), 25(-)	relay 6	14(+), 33(-)	optocoupler 6
7(+), 26(-)	relay 7	15(+), 34(-)	optocoupler 7
8(+), 27(-)	relay 8	16(+), 35(-)	optocoupler 8



- The switch contacts of the relays can be used with maximum 1A. Exceeding the *high* level of 30V for the optocouplers may cause damage to the digital channels.
- The input voltage range can be extended to 5V..30V by connecting an external series resistor.

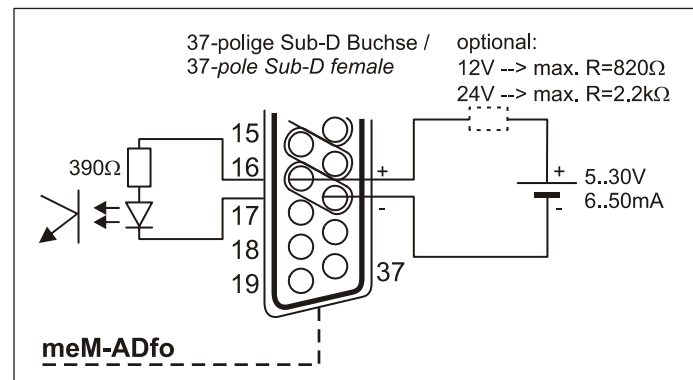
4 Interfacing examples for the digital inputs/outputs of the meM-ADfo

The pin combination at the 15-pole Sub-D female connector for the contacts of an optocoupler or relay is described in chapter 3. If connecting to an optocoupler, the pin with the lower value must be used for the positive connection.

4.1 Connecting a battery to optocoupler input 8

Optocouplers provide optimum protection at each input line. With them, it is possible to connect higher voltages and to protect the hardware from being destroyed.

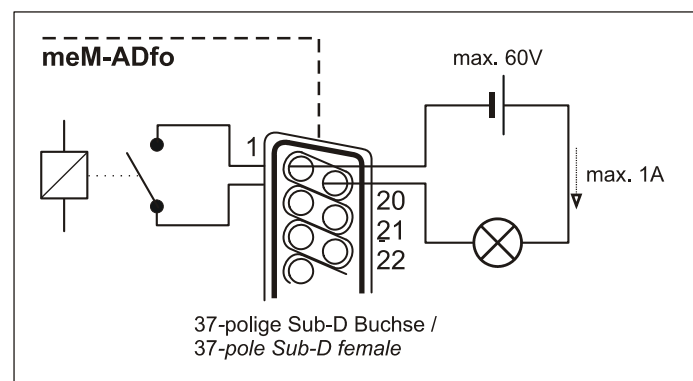
The optocoupler inputs are low-ohmic. For high input voltages the input current optionally may be limited by a serial resistor.



4.2 Connecting a relay

A connected relay is ideal to switch higher currents.

The figure on the right shows an application with a maximum current of 1A.



5 Software installation



All software and documentation available for the meM-ADfo are integrated on the "Software Collection" CD included with delivery. When inserting the CD, a CD starter opens automatically (otherwise: start **openhtml.exe**).



meM-ADfo

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



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



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

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)
Program- ming	STR-LIBADX	ActiveX control for hardware independent programming	STR-LIBADX-IG (installation / programming manual)
	STR-LIBADX-EX	example programs for LIBADX ActiveX control	-
	SDK-LIBAD	SDK with example programs for C/C++ on Windows®	SDK-LIBAD-IG (installation / programming manual)
Operating program	NV4	measuring software NextView®4 available in the Standalone versions: <ul style="list-style-type: none"> • Lite: "slim" version with basic functions • Pro: full version with complete functional range • Analysis: version for the analysis of stored measuring data <p>NextView®4 can be used for free as a fully functional 30-day trial version. After purchasing the software, all projects, measurement files, and settings can still be used.</p>	DS-NV4 (data sheet) UM-NV4 (user manual) "First steps" in the NextView®4 demo project (displayed when first starting the software)
	NV4-SRV NV4-WORK	Client/Server version of NV4 consisting of NextView®4 Server and NextView®4 Workstation	

5.1 Driver installation



Under Windows®, the driver installation is always required for the meM-ADfo. Only then additional software can be installed. To make sure the installation is done correctly, please follow the instructions in the order as described below.

5.1.1 Install driver package

The prior installation of the bmc 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 meM-ADfo product page of the "Software Collection" CD.

5.1.2 Plug&Play installation

As soon as the meM-ADfo is connected to the PC, the system announces the new hardware. Since the driver package has been copied to hard disc before, the hardware will be installed automatically under Windows® 7. Under Windows® XP, the automatic hardware detection is started by selecting the following option:



- **Windows® 7:** no specifications required
- **Windows® XP:** "Install the software automatically" (SP2: do not connect with Windows® Update!)

5.1.3 Check installation

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



- **Windows® 7:** Start / Control Panel / System and Security / System / Device Manager
- **Windows® XP:** Start / Control Panel / System / TAB "Hardware" / button "Device Manager"

Double click the meM-ADfo to show its properties. For general information, any existing device conflicts and possible sources of error, see TAB "General".

5.2 Programming

Programming the meM-ADfo with Visual Basic®, Delphi®, Visual C++™ under Windows® 7/XP is possible with the hardware independent [STR-LIBADX](#). It is available on the meM-ADfo product page 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"

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

5.3 Using meM-ADfo with NextView®4

Install the fully functional trial of the professional software NextView®4 for measurement data acquisition and processing to directly test the features and functions of the meM-ADfo.



The setup program [NV4](#) is available on the product page of the card. When first starting the software, request a license number with the option "Request 30 days free trial version" being checked and select your DAQ system (meM-ADfo) in the following dialog "Device Setup".

The data sheet and the start project of NextView®4 contain first instructions about how to install and operate the program. For detailed information, an online help is provided.



The trial is valid for 30 days after requesting the license number. If a license is not purchased within this period, the functional range of NextView®4 will considerably be cut back!

6 Important notes for using the meM-ADfo

- The device is only suitable for extra-low voltages - please observe the relevant regulations! For reasons relating to EMC, it must only be used in closed PC housings. ESD voltages at open lines may cause malfunction.
- For cleaning only use non-solvent detergents. The product is designed to be maintenance-free.
- Signal cables are connected at the two 37-pole Sub-D female connectors – preferably use shielded cables. 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 (for 12 bit) of the full range of the converter are used. As a result, the measuring ranges are slightly larger (e.g. $\pm 5.12V$) than the indicated measuring ranges so that overranges can be recognized. The AD converter of the meM-ADfo 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.

7 Technical data

(typical at 20°C, after 5min., +5V supply)

• Analog inputs

Channels // Resolution:	16 single-ended // 12 bit (2.5mV)
Sampling rate:	max. 10kHz total sampling rate*
Measuring ranges // Accuracy // Noise:	$\pm 5V$ // $\pm 5mV$ // ± 1 LSB
Surge protection:	max. $\pm 35V$ (when turned on), $\pm 20V$ (when turned off), max. $\pm 20mA$ in total of all input channels!
Input resistance // Input capacity:	1M Ω (with PC turned off: 1k Ω) // 5pF
Zero shift // Gain drop:	$\pm 50ppm/^{\circ}C$ // $\pm 50ppm/^{\circ}C$
Frequency accuracy // Frequency drift:	max. $\pm 100ppm$ // max. $\pm 50ppm/^{\circ}C$

* The total sampling rate is the sum of the sampling rates of the individual used channels (e.g. if 5 channels are scanned with 1kHz, the total sampling rate adds up to 5kHz).

• Analog outputs

Voltage range // Output current:	1 voltage output with $\pm 5V$ // 1mA max.
Resolution // Accuracy:	12 bit // typ. ± 4 LSB, max. ± 8 LSB
Zero shift // Gain drop:	$\pm 50ppm/^{\circ}C$ // $\pm 50ppm/^{\circ}C$

• Digital inputs/outputs

Channels:	8 optocoupler inputs, 8 relays outputs
Input voltage range // Input resistance:	low: 0V..1V; high: 5V..15V (with external series resistor max. $R=2.2k\Omega$: 5V..30V) // $R_{in}=390\Omega$
Contact operation speed of optocouplers:	<1ms
Relays // Live period // Max. current:	response or fall time: 10ms // 100000 cycles // relay contacts max. 1A

• General data

Power supply:	+4.5V..+5.5V from USB connection to the PC, max. 100mA
USB interface:	USB 1.1 compatible (full speed)
Connections analog:	all channels at a 37-pole Sub-D female at the device front
Connections digital:	all channels at a 37-pole Sub-D female at the device back
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 ranges // Relative humidity:	operating temp. 0..70°C, storage temp. -25..+85°C // 0-90% (not condensing)
Dimensions // Protection type:	167 x 113 x 30 mm ³ // IP30
Delivery:	device in aluminum housing, 1m USB connection cable, "Software Collection" CD, description
Available accessories (optional):	DIN rail set ZU-SCHI, current shunt ZU-CS250R, USB extension cable ZUKA-USB, connecting cables ZUKA37SB, ZUKA37SS, 37-pole Sub-D plug ZU37ST, connector boards ZU37BB/CB/CO, waterproof housing ZU-PBOX-PG
Warranty:	2 years from date of purchase at bmcm, claims for damages resulting from improper use excluded

• Software

Software on CD (included):	ActiveX Controls LIBADX (hardware independent) for programming on Windows [®] 7/XP; trial version of the measuring software NextView [®] 4 to test and operate the hardware
NextView [®] 4 (optional):	professional software (versions: Professional, Lite, Client/Server) for the acquisition and analysis of measurement data on Windows [®] 7/XP