meM-INC

USB miniature external Measurement System

bmcm
bmc messsysteme gmbh

Features

- connection of up to 3 incremental encoders (max. 32kHz)
- counting function (max. 64kHz)
- frequency measurement (max. 64kHz)
- 32-bit counting range per incremental encoder
- external counter reset (adjustable)
- galvanic isolation
- connection via USB interface

Applications

- measuring lengths, rotation angles, positions, movements, quantities and frequencies
- perfect for mobile use

In modern PC generation less and less internal slots are available for additional cards.

Therefore the external data acquisition systems of the "USB" series of BMC Messsysteme GmbH provide an attractive alternative to substitute the measuring cards integrated in the computer before.

With the **meM-INC** bmcm introduces a data acquisition system for incremental encoders impressing by multifunctionality and an excellent price-performance ratio.

Especially to mention is the realization as a

... USB solution ...

allowing for great mobility and flexibility.

... 3 electrically isolated incremental encoder inputs ...

are provided at the 37-pole Sub-D female connector of the **meM-INC**

to connect incremental encoders with a

... pulse frequency of up to 32kHz ... .

The incremental encoder interface **meM-INC** samples values within the

… 32-bit counting range… .

An additional option is the

… external counter reset …

for the incremental encoders with the settings *active-high*, *active-low* or *disabled*.

Besides for incremental encoder measurement, additionally considering the counting direction, the device can also be used for the

… acquisition of counting pulses and frequencies …

with up to 64kHz.

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

Included as accessory is a USB driver, the hardware independent programming interface **Libad4 DLL** and a simple ActiveX control **STR-meM** for programming under Windows® 2000/XP/Vista.
In addition, the **meM-INC** can be used under Windows® 2000/XP/ Vista together with our powerful software for acquisition and processing of measuring data

... 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 **meM-INC** can be tested.

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

http://www.bmcm.de

1 Start-up procedure

Plug the red frames onto the short sides of the devices 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. The device is supplied with power via the USB-connection.

2 Connection of incremental encoders

The **meM-INC** provides for 3 electrically isolated incremental encoder channels (*low*: 0V..1V; *high*: 5V..30V). The input range can be increased to 30V with an external series resistor (max. 2.2kΩ).

The connections for the incremental encoders can be reached at the 37-pole Sub-D female connector at the back of the device. For each incremental encoder there are lines for signal A, signal B and optionally the external counter reset.

For further information about connecting your incremental encoder, please refer to the relevant documentation of your product.

The following table and figure on the right illustrate the pin assignment of the 37-pole female:

Pin (Sub-D37)	Incremental Encoder No. / Connection
9(+), 28(-)	1 / signal A
10(+), 29(-)	1 / signal B
11(+), 30(-)	1 / reset function
12(+), 31(-)	2 / signal A
13(+), 32(-)	2 / signal B
14(+), 33(-)	2 / reset function
15(+), 34(-)	3 / signal A
16(+), 35(-)	3 / signal B
17(+), 36(-)	3 / reset function
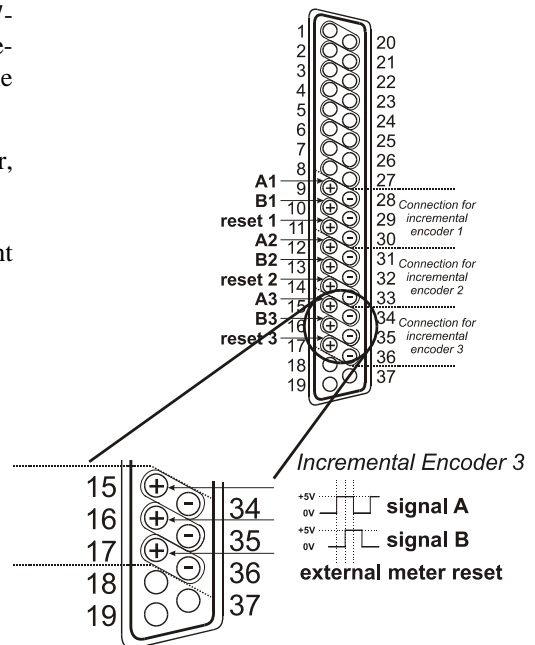
- **Exceeding the *high* level of 30V may damage the inputs of the meM-INC.**

- **To ensure that each pulse is registered, the incremental encoder should not transmit more than 32000 pulses per second.**

- **The optocoupler inputs are low-ohmic, for high input voltages the input current optionally may be limited by a serial resistor (12V: max. R=820Ω; 24V: max. R=2,2kΩ).**

3   Integrated functions

3.1 Pulse measurement

meM-INC counts the number of incoming pulses (max. 64kHz) measured at the connection of signal A. If the maximum counting range of 32 bit is reached, the counter is reset to 0. If the external counter reset is connected, the counter can be reset at any time.

Avoid toggling of the encoder outputs while the incremental encoders stand still, as it leads to measuring errors!

3.2 Incremental encoder measurement

In comparison to a counter, incremental encoders consider the counting direction by sending a second signal. The counting direction of the pulses (max. 32kHz) arriving at signal A is defined by the status of the connection for signal B (pin 10, 13, 16).

Signal B	Counting direction
low	increment
high	decrement

Open inputs are constantly *low* so that the counter increments in this case.

3.3 Frequency measurement

In frequency measurement 3 gates - the time interval in which the number of counting pulses is measured - are provided: It is advisable to choose the gate together with the suggested frequency ranges:

Frequency range	Gate
1kHz - 64kHz	0.1sec
100Hz - 1kHz	1sec
up to 100Hz	10sec

- **As a general rule: the longer the gate, the more exact the frequency value you receive.**

- **The longer the gate, the more time the calculation of the frequency values provided not before the end of the gate will take.**

4 Software installation

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

Change to the product page of the **meM-INC** by selecting the entry "Products" in the CD starter and then the device ("meM-INC") 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	SDK-LIBAD	Libad4 DLL for hardware independent programming	STR-LIBAD-IG (installation / programming manual)
	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	measuring software NextView®4 (requires license number, no freeware!)	NV4-UM (user manual) "First steps" in the NextView®4 demo project (displayed at first start of the software)
	NV4-SERV NV4-WORK	Client/Server version of NV4 consisting of NextView®4 Server and NextView®4 Workstation	

4.1 Driver installation

The **meM-INC** always requires a driver installation. 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 **meM-INC** product page of the "Software Collection"-CD.

4.1.2. Plug&Play installation

As soon as the **meM-INC** 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"

Under Windows® Vista no selections have to be made. The driver is found and installed automatically upon connection of the hardware, because the driver package has been installed on hard disc before. For the same reason 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® Vista**: Start / Control Panel/ System / "Device Manager"
- **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 **meM-INC** to open its properties. For general information, any existing device conflicts and possible sources of error see TAB "General".

4.2 Programming

Programming the **meM-INC** with C, C++™ under Windows® 2000/XP/Vista is possible with the hardware independent programming interface Libad4 SDK (SDK-LIBAD). It is available on the **meM-INC** product page of the "Software Collection"-CD. For further information, please see the relating manual STR-LIBAD4-IG.

Using the LIBAD4 requires advanced programming experience!

The easy-to-use, product specific ActiveX controls STR-meM for Visual Basic®, Delphi®, Visual C++™ are located on the on the **meM-INC** product page of the "Software Collection"-CD. Checkmark "meM-ActiveX Control module" to load the device into the programming environment.

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

4.3 Using the meM-INC 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 **meM-INC** directly.

The setup program NV4-LIVE is available in the section "NextView® 4.x". Select your measuring system (**meM-INC**) by pressing the button "Add" in the dialog "Device Setup" of the installation program.

When you open the software, you will 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 meM-INC

- 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.
- The signals of the incremental encoders are connected at the 37-pole Sub-D female – 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.
- Avoid toggling of the encoder outputs while the incremental encoders stand still, as it leads to measuring errors!
- 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.

6 Technical data meM-INC (typical at 20°C and 5V supply)

- ## Digital input channels

Digital channels:		3 electrically isolated incremental encoder inputs
Incremental encoders:		up to 3 sensors connectable
Input voltage range:		low: 0V..1V; high: 5V..15V (with external series resistor max. R=2.2kΩ: 5V..30V)
Input resistance:		$R_{in}=390\Omega$

	pulse / frequency measurement	incremental encoder
with input voltage 5V:	20kHz	10kHz
with input voltage 12V-30V:	64kHz	32kHz

Counter range per incremental encoder:	32 bit (0..4294967295), then the counter is reset to 0
Max. pulse frequency:	incremental: 32kHz; counting, frequency measurements: 64kHz
Counter reset:	adjustable for incremental encoders (*active-low*, *active-high*, *disabled*)
Frequency accuracy* (reg. real time):	max. ±100ppm
Frequency drift:	max. ±50ppm/°C

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

- ## General data

Power supply:	+4.5V..+5.5V from USB connection to the PC, max. 100mA
Digital connections:	all channels at a 37-pole Sub-D socket at the back of the device
USB interface:	USB 1.1 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. perm. potentials:	**60V DC acc. to VDE**, max. 1kV ESD on open lines
Protection type:	IP30
Size:	aluminum housing: 167 x 113 x 30 mm³
Temperature range:	-25°C..+70°C
Relative humidity:	0-90% (not condensing)
Delivery:	device with aluminum housing, 1m USB-connecting cable, "Software-Collection"-CD, description
Available accessories:	DIN rail set ZU-SCHI, USB extension cable ZUKA-USB, connecting cables ZUKA37SB, ZUKA37SS, connector boards ZU37BB/-CB/-CO, 37-pole Sub-D plug ZU37ST, waterproof housing ZU-PBOX-PG
Guarantee:	2 years from date of purchase at bmcm, damages at product resulting from improper use excluded

- ## Software support

Software on CD (included):	hardware independent programming interface Libad4 DLL and ActiveX controls STR-meM for programming under Windows® 2000/XP/Vista; measuring program NextView®4 Live! for testing and operating 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