

# meM-PIO

USB miniature external Measurement System

## Features

- 24 digital channels with TTL level
- connection via USB-interface
- Windows® 98/2000 compatible
- Hot pluggable and Plug & Play

## Applications

- digital controls
- signal acquisition
- ideal for mobile use



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

The external **meM-PIO** provides an alternative to replace the PIO cards by BMC Messsysteme GmbH which used to be integrated in the computer. This USB-solution features

... 24 digital channels ...

for the acquisition and control of TTL-signals.

The USB-device provides for

... three 8 Bit ports ...

with programmable direction. The port lines are brought out via a 25pole Sub-D socket.

The device is connected to the PC and supplied with power by means of a

## ... USB-connection ...

Included with the device is a USB-driver, ActiveX Controls **STR-meM** for Windows® 98/Me/2000/XP, as well as the easy-to-use operating program **ST-meM-PIO** for displaying and controlling digital signals.

The **meM-PIO** can be used together with our powerful software for the acquisition and processing of measuring data

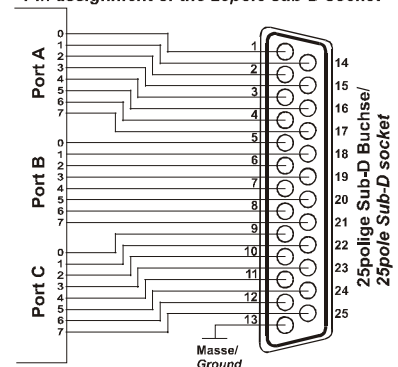
## ... NextView®/NT...

version 3.2 and higher. It is available in the versions *Light*, *Professional* and *Client/Server* for Windows® 98/Me/2000/XP. A demo version is included with the delivery.

Please visit our homepage for additional information and software updates:

<http://www.bmcm.de>

Portbaustein 1 (Leitung 1..24)  
Pinbelegung der 25poligen Sub-D Buchse  
Port module 1 (line 1..24)  
Pin assignment of the 25pole sub-D socket



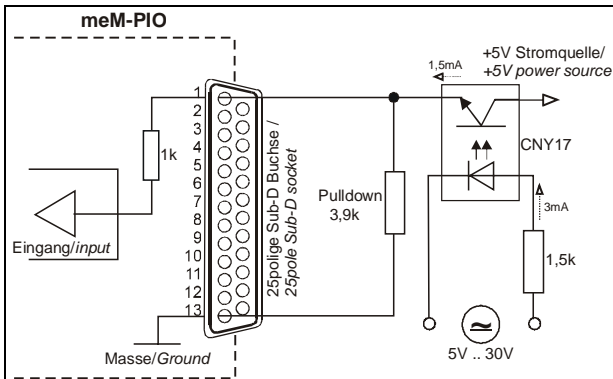
Do not apply voltage to the ports without the relevant protective circuit. Two outputs connected with each other may get damaged by the high flow of current. The high-resistance CMOS-inputs can continuously switch between 0 and 1 without appropriate protective circuit (e.g. 10kΩ-Pulldown-resistor). The in-/ outputs of the meM-PIO are lead out with 1kΩ resistors.

## Start-Up Procedure

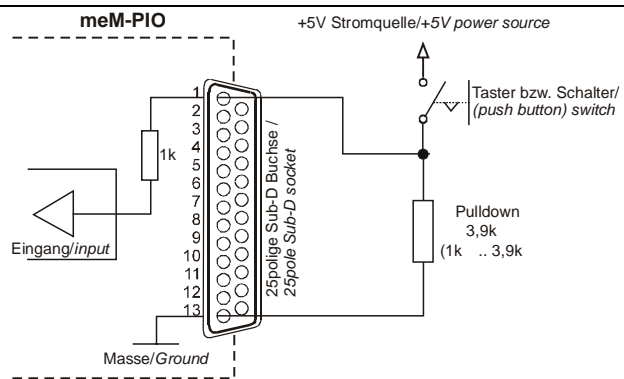
Plug the red frames onto the short sides of the devices with the feet looking downward, as can be seen in the above diagram. Connect one end of the USB-cable to the device and the other to the USB-interface of the PC. The device is supplied with power via the USB-connection.

## Interfacing examples for the In- and Outputs of the meM-PIO

**Inputs:** The pull-down resistor of  $3.9k\Omega$  will set the input to *low*, if no voltage is applied there.



Anschluss eines Optokopplers an einen Eingang der meM-PIO/  
connecting an optocoupler with an input line of meM-PIO



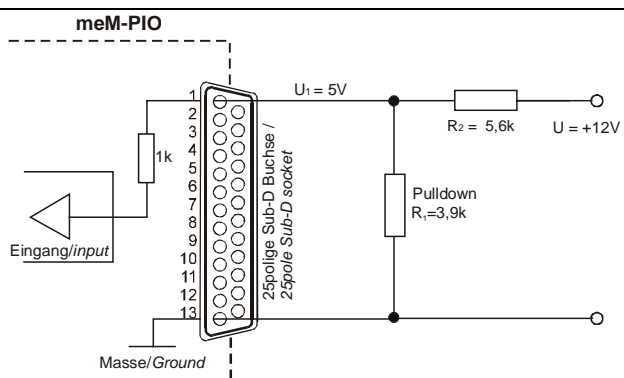
Anschluss eines Tasters/Schalters an einen Eingang der meM-PIO/  
connecting a (push button) switch with an input line of meM-PIO

If a direct voltage greater 5V is applied, a **potential divider** must be used to ensure that 5V max. are applied at the input of the meM-PIO. Exceeding 5V input voltage may damage the device.

The following formula applies for calculating the value of the resistor to be used:

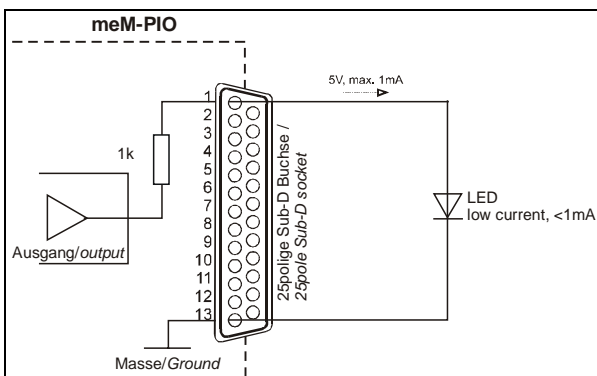
$$U/U_1 = (R_1 + R_2)/R_1$$

The CMOS-technology in this device also allows for the use of lower input voltage (*high*  $\geq 3V$ ).

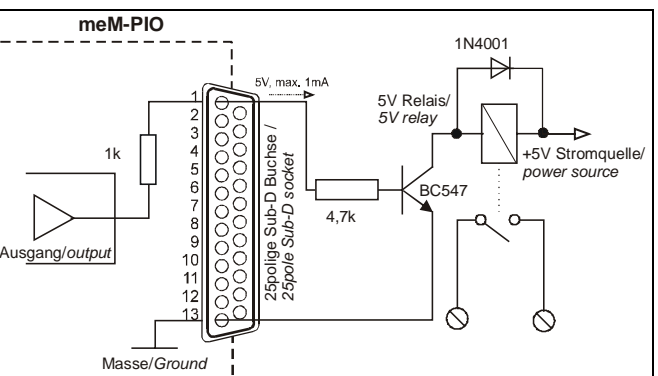


Anschluss eines Spannungsteilers an einen Eingang der meM-PIO/  
connecting a potential divider with an input line of meM-PIO

**Outputs:** The following diagrams show the connection of an output to an LED and a relay.



Anschluss einer Leuchtdiode an einen Ausgang der meM-PIO/  
connecting an LED with an output line of meM-PIO



Anschluss eines Relais an einen Ausgang der meM-PIO/  
connecting a relay with an output line of meM-PIO

## Software Installation

Before using the device, the **hardware drivers** must be **installed**. The device can be programmed under Windows 98/2000/XP by means of programming languages (Visual Basic, Delphi, Visual C++ etc), which are able to link the ActiveX Controls, using the programming interface **STR-meM**. The operating program **ST-meM-PIO** allows you to utilize the hardware's capacity to its full extent. The device driver, the ActiveX Control **STR-meM** and the operating

program **ST-meM-PIO** is included on the "Software Collection"-CD by BMC Messsysteme GmbH which comes with the delivery.

## 1. Installation of Drivers

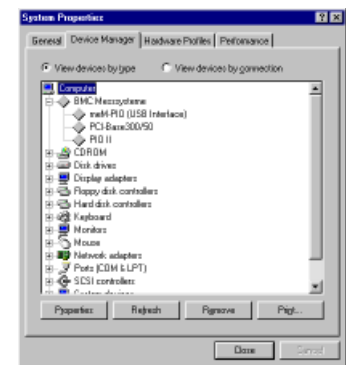
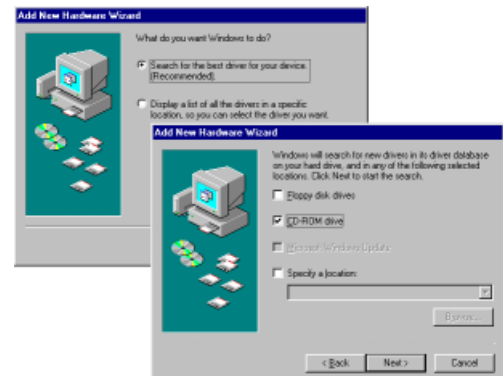
As soon as the **meM-PIO** is connected to the computer, the hardware detection is started automatically by the system. The device will be found and displayed and the search for available drivers is started.

Select the option "search for the best driver for your device" (recommended).

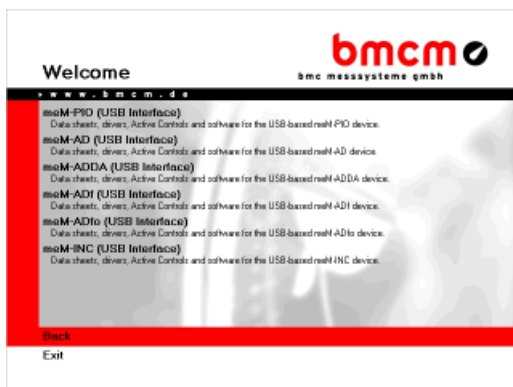
Select "CD-ROM drive" to search for the driver if you have the software on CD. Select "floppy disk drives" to search for the driver, if your software is on a floppy disk. If you have downloaded the driver from our homepage, select the option at the bottom and enter the directory path where the driver is stored. You will be prompted on the driver which has been found and asked if you want to install the driver. The installation will be complete after the required files have been copied to the hard disk. You may be requested to restart your computer afterwards.

**We strongly recommend you to check the system's device manager if the installation has been successful.** (Windows 98: *My Computer / Control Panel / System / TAB Device Manager*; Windows 2000/XP: *My Computer / Control Panel / System / TAB Hardware / button Device Manager*).

It should have a new entry called: "BMC Messsysteme". When you open it by clicking on the "plus" sign on the left, all the installed devices are listed, including the USB device **meM-PIO**. A doubleclick on the device will show the configuration properties. Selecting TAB *General*, gives you general information and on conflicting devices and possible sources of error. The TAB *Driver* allows you to install new driver versions.



## 2. Installation of the ActiveX Controls STR-meM



To install or upgrade the ActiveX Control put the "Software Collection"-CD which is included with the delivery in your CD-ROM drive. The installation window with a list of choices will be displayed. Select "Products", then the product group of your device and finally the product type of your meM-device. The following window shows all software and documentation of your product which you can choose to install. Now please select the entry "meM-PIO ActiveX Control Setup".

If not using the auto run function of the "Software Collection"-CD for installation, you can install by opening the file `mem-actx-us.exe` (english setup) in the directory `products / mem / pio`.

After a short introduction the driver information will be displayed. Then the required files will be copied to your hard disk and you will be prompted if the installation has been successful. Restart your computer, if necessary.

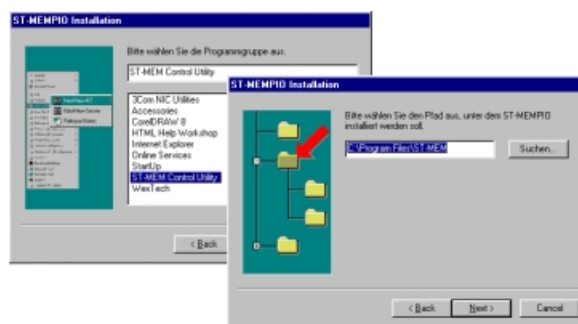
## 3. Installation of the Operating Program ST-meM-PIO



**The USB driver and the ActiveX Control STR-meM must be installed before installing this program!**

The program is installed in the same way as the ActiveX Controls, except that you now select "ST-meM-PIO Control Utility" instead of **STR-meM**. If you don't start the installation from the CD, open the setup program `st-mempio-install.exe` in the directory `products / mem / pio`.

After a short introduction you will be asked to confirm the suggested installation path and group name or enter your changes. Then the required files will be copied to your hard disk and a prompt will show whether the installation has been successful. Restart your computer if necessary.



## Programming

The CD contains programming examples in the same directory as the ActiveX Controls **STR-meM**. Choose the entry "meM-PIO Programming Examples". For further information about the programming of the meM-devices please read the respective PDF file, which will be installed together with the programming examples. If you don't start the installation from the CD, open the setup program `mem-examples.exe` in the directory `products / mem / PIO`.

## Important Notes for Using the meM-PIO

- 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.
- Only use a metalically isolated power supply unit.
- For cleaning use water and mild detergent only. The device is designed to be maintenance-free.
- At the 25pole Sub-D socket signal cables are connected – 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.
- As sampling depends on the software, the device is not suitable for long-term measurements on Windows® 98/Me.
- 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 completely 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.

## Technical Data meM-PIO (typical at 20°C and 5V supply)

### • Digital Inputs and Outputs

Port inputs // overload protection:	0..5V (CMOS) // max. +5.5V, protected with 1kΩ, max. 20mA in total of all input channels
Current pick-up per output pin:	1mA (with app. 4V-level), max. 20mA in total of all output channels
Max. sampling rate:	10Hz for all channels with NextView®/NT
USB interface:	USB 1.1 compatible (full speed)

### • General Data

Supply:	+4.5V..+5.5V from USB connection of the PC, max. 100mA
Digital connections:	all channels at a 25-pole Sub-D socket
CE standards:	EN50081T1, EN50082T1, EN61010-1; for decl. of conformity (PDF) visit <a href="http://www.bmc.de">www.bmc.de</a>
Max. permissible potentials:	<b>60V DC acc. to VDE</b> , max. 1kV ESD on open lines
Temperature range // relative humidity:	-25°C..+70°C // 0-90% (not condensing)
Housing // protection type:	aluminum housing, size: 167 x 113 x 30 mm <sup>3</sup> // IP50
Delivery:	device with aluminum housing, 1m USB connecting cable, "Software Collection"-CD incl. drivers and documentation, description
Available accessories:	hatrail set ZU-SCHI, USB cable ZUKA-USB, connecting cable ZUKA25, Sub-D plug ZUST37
Guarantee:	2 years with effect from sales date, damages at product resulting from improper use excluded

### • Software Support

Software on CD (incl.):	ActiveX Controls STR-meM for programming under Windows® 98/Me/2000/XP; operating program ST-meM-PIO for displaying and controlling of digital signals
NextView®/NT (optional):	version 3.2 and higher for Windows® 98/Me/2000/XP