BP16 / BP16-PC

Carrier board (with housing) for measuring amplifiers of the MAL series

bmc messsysteme gmbh

Features

- 16 DIL sockets for MAL amplifiers
- 37-pole Sub-D input socket
- 37-pole Sub-D output socket
- **BP16**: in external metal housing
- **BP16-PC**: for installation in the PC

Applications

- controlling of processes
- development
- signal conditioning
- sensor adjustment

The **BP16**/**BP16-PC** (**B**ack**P**lane) features slots for

... 16 measuring amplifiers ...

of the *MAL* series and of other manufacturers.
The **BP16** is a backplane for amplifiers with housing used as an external device, whereas the **BP16-PC** can be integrated in a PC and connected internally to a PC measuring card.

The **BP16** / **BP16-PC** provides all included amplifiers with

... electrically isolated supply ... .

For sensor supply additionally

... 5V, 120mA ...

with electrical isolation are provided.

The measuring amplifier modules needed for signal conditioning are

... very reasonable ...

standard amplifiers.

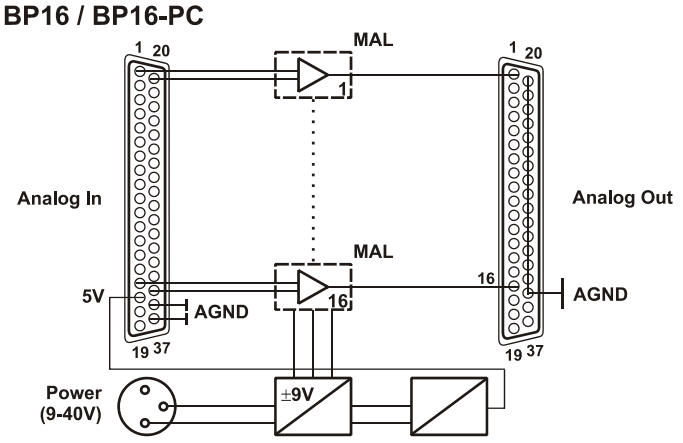
To achieve optimum measuring results, please see for a good shared potential of the signals to be measured, as there is no electrical isolation of the measuring amplifiers.

The input signals are connected at a 37-pole Sub-D socket. The output signals of the individual measuring amplifiers can also be reached at an additional 37-pole Sub-D socket.

The measuring cards of BMC Messsysteme GmbH have an internal connection for analog input channels, so that measuring signals with short lines can be lead directly from the **BP16-PC** to the measuring system.
As the BP16-PC does not need much space the complete electronic equipment for measuring data acquisition can easily be installed in portable PCs.

If using the appropriate amplifiers also multi-conductor technique can be realized.

1 Block diagram



2 Assembly

The external version **BP16** is installed as an independent measuring amplifier system before a measurement system. If using a USB measuring system of the meM series for example, the housings of both devices can comfortably be fixed together at the red frames of the device, so that you get a stable unit.

Afterwards connect the output of the **BP16** with the inputs of the measuring system using the short ribbon cable included with delivery.

fig. 1

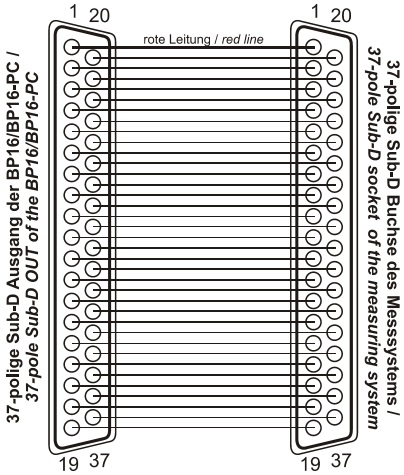


fig. 2

The device is supplied via the power supply connector (9-40V DC) and a power supply unit (e.g. *ZU-PW10W*) or alternatively by the connected measuring system, if providing an auxiliary voltage (see chapter 3.1).

The carrier board **BP16-PC** is installed in a PC next to a measuring card. Keep in mind to supply the carrier board with the appropriate measuring amplifiers at the respective channels first before connecting the analog output channels of the **BP16-PC** to the internal analog input channels of the bmcm measuring card using the enclosed cable (for assignment see fig. 4).

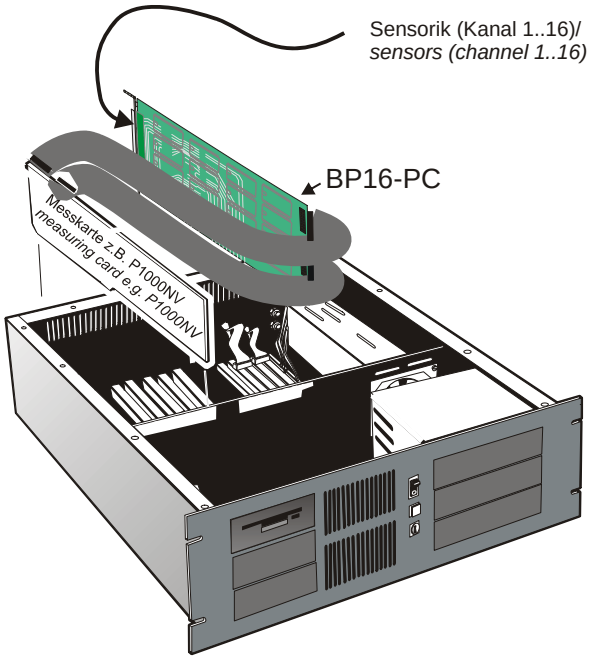


fig. 3

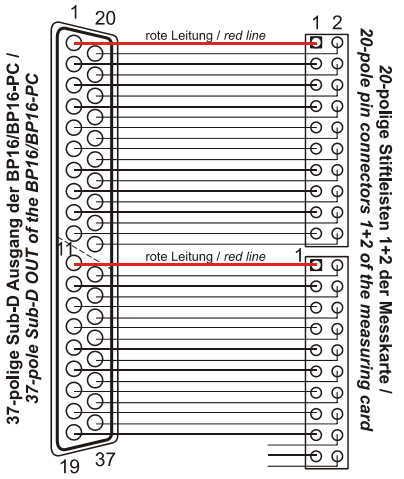


fig. 4

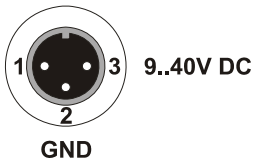
Now connect the power supply cable with the 2-pole plug which is next to the analog input plug and at the other side to the power supply of the PC. Finally mount the card into the PC (see fig. 3).

3 Connections

All connections of the device are available at the front and the back of the **BP16** / **BP16-PC**.

3.1 Power supply

The assignment of the 3-pole DIN plug is shown in the figure on the right. It is located at the device front of the **BP16**. There a power supply unit (e.g. *ZU-PW10W*) can be attached. The **BP16-PC** is supplied by the PC power supply via a connecting cable.

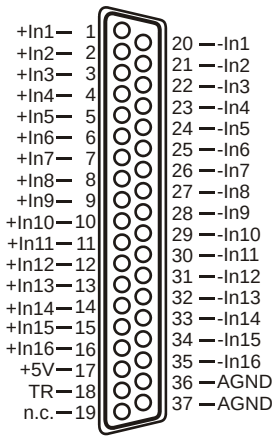


The following table displays the different possibilities for power supply. Please see for the correct configuration of jumpers J17-J2. All required jumpers are located above DIL socket 2 (see fig. 5).

Power source	Supply with	Meas. system	Jumper configuration	Notes
3-pole DIN plug	9-40V_{DC}	BP16	J17, J18, J20: open J19: closed (default configuration)	electrically isolated, sensor current max. 120mA
PC power supply	12V_{DC}	BP16-PC	J17, J18, J20: open J19: closed (default configuration)	connecting cable included with delivery, sensor current max. 120mA
external	5V	BP16, BP16-PC	J17, J19, J20: open J18: closed	supply must be stabilized, sensor supply reduced to 50mA
by connected measurement system	usually app. 5V, 100mA	BP16, BP16-PC	J19: open J17, J20: closed	no electrical isolation, sensor supply reduced to 50mA

3.2 Analog input channels

The 16 analog input channels are connected at the 37-pole Sub-D IN socket of the **BP16** / **BP16-PC** (**BP16**: front of device). For each channel separately the carrier boards **BP16** / **BP16-PC** can be equipped with measuring amplifiers of the *MAL* series, so that all inputs are connectable to the most different sensors or signals.

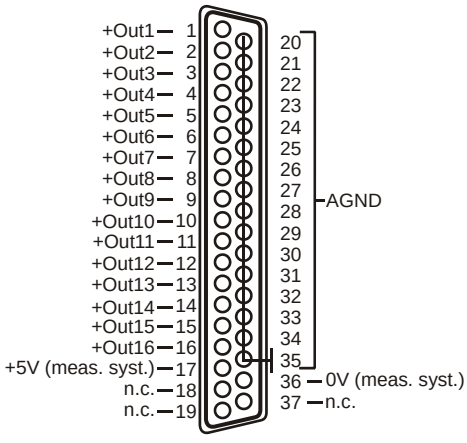


The following table and figure show the pin assignment of the 37-pole Sub-D IN socket:

Pin	Sub-D 37 IN socket
1(+), 20(-)	Analog In 1
...	...
16(+), 35(-)	Analog In 16
17	+5V (current output for sensor supply)
18	Temperature reference input (*MAL* only)
19	-
36, 37	GND for +5V sensor supply

3.3 Analog output channels

The 16 analog output channels are lead out at the 37-pole Sub-D OUT socket (**BP16**: back of device). Those are the outputs of the respective *MAL* amplifiers or of the bypassed DIL socket.



The following table and figure show the pin assignment of the 37-pole Sub-D OUT socket:

Pin	Sub-D 37 OUT socket
1 .. 16	Analog Out 1 .. 16
17	alt. 5V supply by measuring system
20 .. 35	analog ground (AGND)
36	alt. 0V supply by measuring system
18, 19, 37	-

4 Layout diagram of the BP16 / BP16-PC

The measuring amplifier sockets on the **BP16 / BP16-PC** are numbered from channel 1 = 1 to channel 16 = 16 .

When mounting the measuring amplifiers on the carrier board please observe their correct alignment!

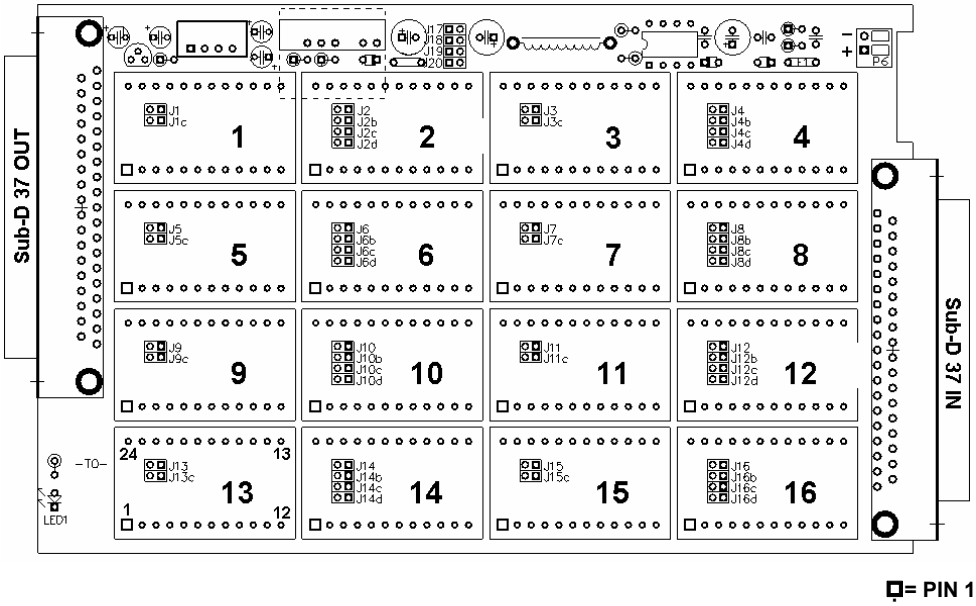
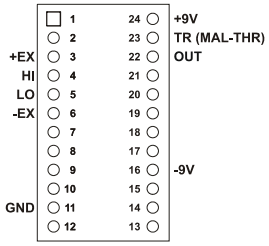


fig. 5

4.1 Pin assignment of the DIL sockets when using MAL measuring amplifiers

The pin assignment of the measuring amplifier sockets is illustrated by the figure on the right and the following table.



For using the appropriate measuring amplifier please refer to the documentation of the *MAL*.

It is also possible to combine standard measuring amplifiers of other manufacturers with the **BP16 / BP16-PC**, as soldering bridges for the module configuration are included and accessible from the underside of the board. Here you can make all settings regarding additional functions (A1+2, V1-3) of the standard measuring amplifiers. For further information about their pin assignment please see the documentation of your measuring amplifier.

Pin	Name	Function
1	n.c.	-
2	n.c.	-
3	+EX	+ sensor supply
4	+IN	HI signal input
5	-IN	LO signal input
6	-EX	- sensor supply
7	n.c.	-
8	n.c.	-

Pin	Name	Function
9	n.c.	-
10	n.c.	-
11	GND	ground
12	n.c.	-
13	n.c.	-
14	n.c.	-
15	n.c.	-
16	-UB	neg. supply (-9V)

Pin	Name	Function
17	n.c.	-
18	n.c.	-
19	n.c.	-
20	n.c.	-
21	n.c.	-
22	OUT	amplifier output (±5V)
23	TR	temp. reference (*MAL-THR* only)
24	+UB	pos. supply (+9V)

4.2 Using the jumpers

Each DIL socket is provided with two or four plug-in jumpers. Those are numbered according to the number of their **BP16 / BP16-PC** DIL socket. The jumpers of one socket have different functions and are distinguished from each other by an additional letter.

Jumper	Function	Default factory setting
Jx	bypass +IN of socket x	closed
Jxb	lead out +EX of socket x-1 to 37-pole Sub-D socket	open
Jxc	bypass -IN of socket x	closed
Jxd	lead out -EX of socket x-1 to 37-pole Sub-D socket	open

If socket x is not supplied with a measuring amplifier, as only voltages are to be measured, this socket has to be bypassed by closing jumpers **Jx** and **Jxc**. Please note that this input then can not be operated differentially. Ex works all sockets are bypassed.

- **Do not use any measuring amplifier on a socket where a jumper is set.**
- **The pin connectors are very damageable, in case of contact problems replace if necessary.**
- **Always only close <u>either</u> jumpers Jx, Jxc <u>or</u> Jxb, Jxd. Never close all 4 jumpers at the same time!**

If using long cables, 4-wire technique or for precise measurements we recommend to lead out the excitation connections of the measuring amplifiers to the 37-pole Sub-D socket, in order to avoid interferences. This is achieved by closing jumpers **Jxb** and **Jxd**, which are located at the **BP16 / BP16-PC** DIL sockets with even numbering. So the excitation connections of channel x-1 are lead out at the 37-pole Sub-D socket replacing the original connections of the following even analog inputs (e.g. +EX1 to pin 2, before: +IN2; -EX1 to pin 21, before: –IN2). In this case the number of available channels is reduced to 50% at the maximum.

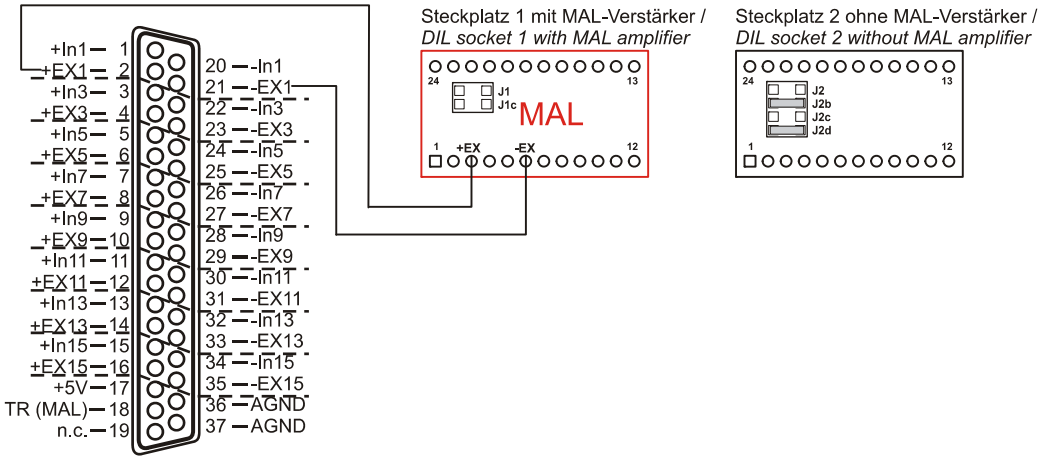


fig.6

The following table shows the pin assignment of the two Sub-D37 sockets, if all excitation connections are used:

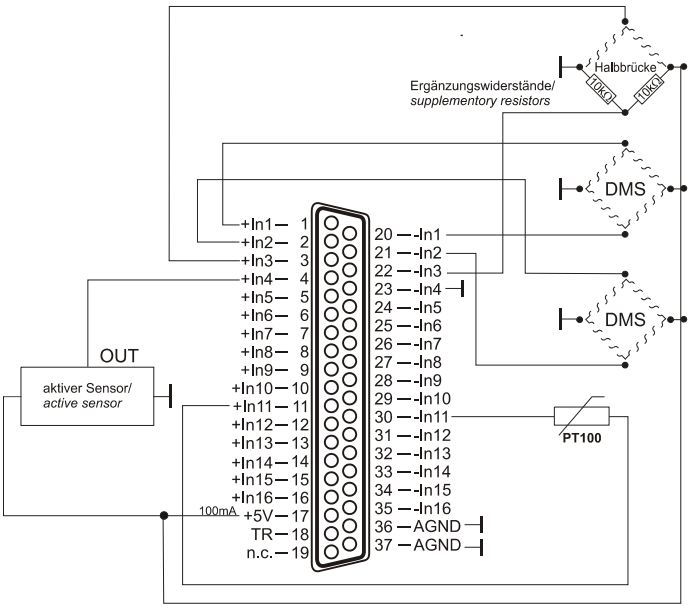
Pin	Sub-D 37 IN socket
1(+), 20(-)	Analog In 1
2(+), 21(-)	excitation voltage for Analog In 1
3(+), 22(-)	Analog In 3
4(+), 23(-)	excitation voltage for Analog In 3
...	...
15(+), 34(-)	Analog In 15
16(+), 35(-)	excitation voltage for Analog In 15
17	+5V (current output for sensor supply)
18	temperature reference input
19	n. c.
36, 37	analog ground for +5V output
	Analog In 2, 4, ..., 14, 16 not available!

5 Connecting examples for using the BP16 / BP16-PC

5.1 2-wire technique with joint supply

The sensor supplies of the measuring amplifiers are not lead out to the 37-pole Sub-D socket of the **BP16**/ **BP16-PC** (exception: resistance measurement as 2-wire measurement).

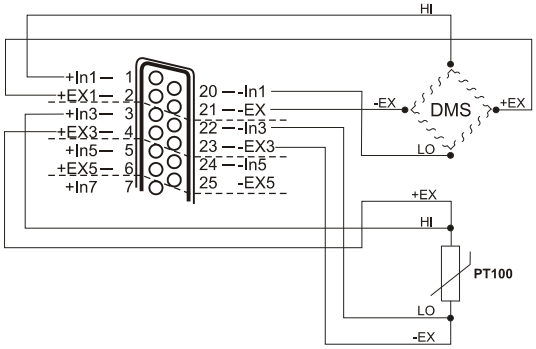
The sensor supply is provided electrically isolated separately from the measuring amplifiers on the **BP16** / **BP16-PC**.



5.2 4-wire technique

For 4-wire technique the sensor supplies are used by the relevant measuring amplifier. The advantage is that voltage drops caused by long cables have no influence on the neighbored channels. However, in this case only 8 channels can be used. The sensor supply is taken from the amplifier supply. Please note, that the total of all sensor currents does not exceed 100mA.

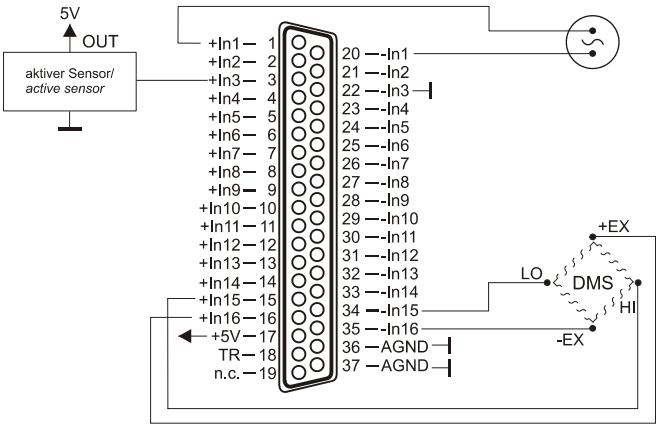
Cable shields can be connected at AGND (analog ground) at one end only.



5.3 Combined 2- and 4-wire technique

It is also possible to connect the channels mixed: in 2-wire as well as in 4-wire technique. Use the 4-wire technique (here at channel 15) only where you need a higher accuracy.

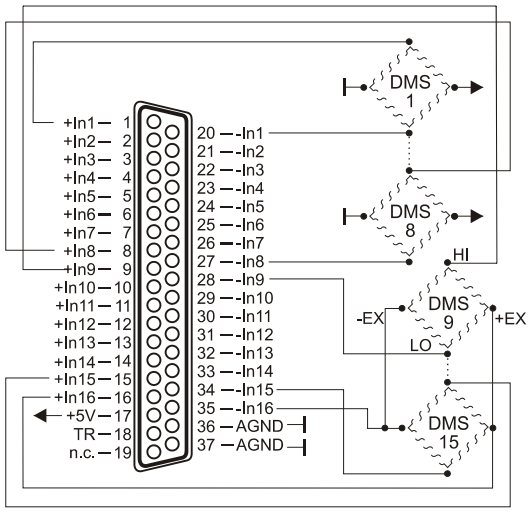
Depending on the respective application you will profit from the optimum use of the **BP16** / **BP16-PC**.



5.4 Supply of 15 strain gage 350Ohm sensors

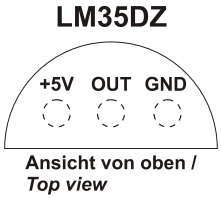
For more than eight strain gage 350Ω sensors the power of the 5V excitation (pin 17) is not sufficient. In this case we suggest the following way of connection, as show in the figure to the right.

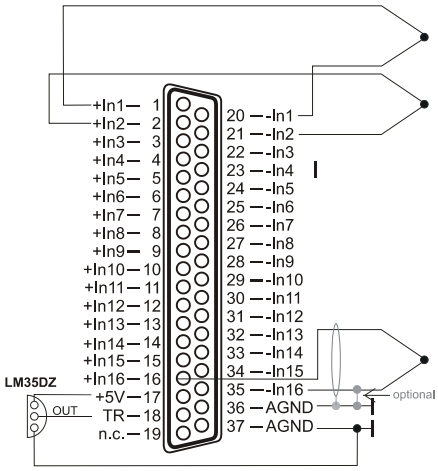
Eight channels with 350Ω strain gage bridges can be supplied via pin 17 (5V). One channel (e.g. channel 15) is connected in 4-wire technique (channel 16 is not connected). With its sensor supply this channel as well as additional 6 strain gage measuring bridges can be supplied.



5.5 Thermocouple measurement with type K

The MAL-THR module is prepared for thermocouple measurement with compensation. Therefore a sensor for temperature reference must be installed at the cold junction. A semi-conductor sensor LM35DZ is used with an absolute accuracy of ±1C°. The sensor is supplied by the **BP16 / BP16-PC** with 5V and produces a reference voltage for all measuring channels proportional to the cold-junction.





The thermocouples can be extended using a copper wire. Yet in this case the temperature reference ZU-TR must be moved to the cold junction, too.

6 Important notes for using the BP16 / BP16-PC

- The **BP16 / BP16-PC** is only suitable for extra-low voltages, please observe the relevant regulations!
- Only use an electrical isolated power supply unit (with CE).
- All accessible pins are electrostatic devices. Workplace must be conductive during installation.
- The jumpers of the **BP16 / BP16-PC** are very damageable and not too suitable for use in motion, in case of contact problems and in steady applications we recommend to solder the jumpers if necessary.
- The **BP16 / BP16-PC** must only be used in closed housings (for reasons relating to EMC).
- For reasons relating to CE use shielded cables. Connect the shield to ground at one end only. Close open inputs if possible. ESD voltages on lines may cause malfunction during operation.
- For cleaning use water and mild detergent only. The device is designed to be maintenance-free.
- 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!
- The device must not be used for safety-relevant jobs. 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 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 BP16 / BP16-PC (typical at 20°C)

- **Sensor supply**

Sensor supply at PIN17 of Sub-D37:	+5V DC, accuracy ±0.25%, TK 100ppm, electrically isolated
Current:	max. 100mA (if supplied with 9..40V_{DC})
Amplifier supply:	app. ±9V max. 100mA, electrically isolated

- **General data**

Power supply:	+9..40V_{DC} or 5V, min. 0.3W, max. 4W
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 lines
Analog connections:	37-pole Sub-D socket for input and output each
Connection for power supply:	BP16: 3-pole DIN plug at the device, BP16-PC: 2-pole pin plug on the board
Temperature range:	-25°C..+70°C
Relative humidity:	0-90% (not condensing)
Protection type BP16:	IP30
Protection type BP16-PC:	IP00
Dimensions BP16:	167 x 113 x 30 mm^3
Dimensions BP16-PC:	167 x 100 x 25 mm^3
Delivery BP16:	BP16 device in aluminum housing, 3-pole coupling for power supply, 37-pole analog out cable
Delivery BP16-PC:	BP16-PC board, PC bracket, cable for power supply, analog out cable for internal PC connection
Guarantee:	2 years with effect from sales date, damages at product caused by improper use excluded

- **Accessories**

Measuring amplifiers:	miniature measuring amplifiers and converters of the MAL / MAL-ISO series
Plugs // cables:	ZU3DIN, ZU37ST // ZUKA37SB, ZUKA37SS
Connector panels:	ZU37BB, ZU37CB, ZU37CO
DIN rail sets:	ZU-SCHI
Temperature reference:	ZU-TR (LM35DZ) with 37-pole Sub-D plug
Power supply:	ZU-PW10W (12V, 1A)
Other:	gender changer ZU37SS; wasserdichte Gehäuse ZU-PBOX-PG, ZU-PBOX-LAN

Manufacturer: BMC Messsysteme GmbH. Subject to change due to technical improvements. Errors and printing errors excepted. Rev. 4.1 08/18/2010