Operating Manual

Amplifier System

MGA II

with Digital Display

DA12

B0599-3.7 en

HBM

Contents

Safety instructions

Use in accordance with the regulations

The amplifier system is to be used exclusively for measurement tasks and directly related control tasks. Use for any purpose other than the above shall be deemed to be not in accordance with the regulations.

To ensure safe operation, the device may only be operated in accordance with the information given in the User Manual. It is also essential to comply with the legal and safety requirements for the application concerned during use. The same applies to the use of accessories.

General dangers of failing to follow the safety instructions

The amplifier system is a state–of–the–art device and is safe to operate. The device may give rise to further dangers if it is inappropriately installed and operated by untrained personnel.

Any person instructed to carry out installation, commissioning, maintenance or repair of the device must have read and understood the User Manual and in particular the technical safety instructions.

Residual dangers

The scope of supply and list of components provided with the amplifier system cover only part of the scope of measurement technology. In addition, equipment planners, installers and operators should plan, implement and respond to the safety engineering considerations of measurement technology in such a way as to minimise residual dangers. Prevailing regulations must be complied with at all times. There must be reference to the residual dangers connected with measurement technology.

After setting up and password protected activities, care must be taken to ensure that any control units that may be connected remain in a safe and secure state until the switching behaviour of the amplifier system has been checked.

Warnzeichen und Gefahrensymbole

Wichtige Hinweise für Ihre Sicherheit sind besonders gekennzeichnet. Beachten Sie diese Hinweise unbedingt, um Unfälle und Sachschäden zu vermeiden.

Sicherheitshinweise sind wie folgt aufgebaut:

⚠ SIGNALWORT

Art der Gefahr

Folgen bei Nichtbeachtung

Gefahrenabwehr

Warnzeichen:	macht auf die Gefahr aufmerksam
Signalwort:	gibt die Schwere der Gefahr an (siehe folgende Tabelle)
Art der Gefahr:	benennt die Art oder Quelle der Gefahr
Folgen:	beschreibt die Folgen bei Nichtbeachtung
Abwehr:	gibt an, wie man die Gefahr vermeidet/umgeht

Gefahrenklassen nach ANSI

Warnzeichen, Signalwort	Bedeutung
⚠ WARNUNG	kennzeichnet eine gefährliche Situation, in der Tod oder schwere Körperverletzung eintreten können, wenn sie nicht vermieden wird
⚠ VORSICHT	kennzeichnet eine gefährliche Situation, in der leichte bis mittelschwere Körperverletzungen eintreten können, wenn sie nicht vermieden wird.
HINWEIS	Sachschäden: Das Produkt oder die Umgebung können beschädigt werden.

Auf dem Modul

Bedeutung: **Angaben in der Bedienungsanleitung berücksichtigen**

Information about CE labelling

The devices in the MGA II range carry the CE label and satisfy the requirements of EU guideline 2004/108/EG “Elektromagnetic compatibility” and of the Low Voltage Directive 2006/95/EC admits listed harmonised European standards (EN).

The EU declarations of conformity according to the above mentioned EU guideline , Article 10, for the relevant authorities are available from:

HOTTINGER BALDWIN MESSTECHNIK GMBH
Im Tiefen See 45
D–64239 Darmstadt

The MGA II system devices are designed for industrial and domestic applications (domestic area, business and trade, small scale enterprises) and fulfil the requirements for interference immunity and for emisssion according to EN61326–1: 2006.

In addition to the details given in the operating instructions, the following information should be taken into account when operating the device:

The connecting cable must be screened and the screen must be connected flat on the connector housing.

If system components (e.g. plug-in cards) are supplied separately, then the operator must ensure that they are used in a HBM system housing or in an equivalent housing.

Working safely

Error messages should only be acknowledged if the cause of the error is removed and no further danger exists.

The instrument complies with the safety requirements of DIN EN 61010, Part 1 (VDE 0411, Part 1); Protection Class I.

To ensure adequate immunity from interference, use only *Greenline* shielded ducting (see HBM offprint "*Greenline* shielding design, EMC-compliant measuring cable; downloadable from the Internet at http://www.hbm.com/Greenline).

Conversions and modifications

The measuring amplifier system must not be modified from the design or safety engineering point of view except with our express agreement. Any modification shall exclude all liability on our part for any damage resulting therefrom.

In particular, any repair or soldering work on motherboards is prohibited. When exchanging any modules, only original HBM parts must be used.

Qualified personnel

means persons entrusted with the installation, assembly, commissioning and operation of the product who possess the appropriate qualifications for their function.

This instrument is only to be installed and used by qualified personnel strictly in accordance with the technical data and with the safety rules and regulations which follow.

It is also essential to comply with the appropriate legal and safety regulations for the application concerned during use. The same applies to the use of accessories.

Maintenance and repair work on an open device with the power on must only be carried out by trained personnel who are aware of the dangers involved.

Safety requirements

Before commissioning, find out whether the mains voltage and current type specified on the identification plate match the mains voltage and current type at the place of use, and whether the circuit being used is adequately protected.

Insert the mains plug only into a socket with a protection switch (Protection Class I). When connecting electrical devices to low voltage: connect to extra−low safety voltage only (safety transformer in accordance with DINVDE 0551/EN60742).

Before you open the device, make sure it is switched off; remove the mains plug from the socket.

Never pull the mains plug from the socket by the mains cable.

Automation equipment and devices must be covered over in such a way that adequate protection or locking against unintentional actuation is provided (such as access checks, password protection, etc.). The MGAII must be positioned such that the mains connection can be accessed and the device disconnected from the mains at any time.

Do not operate the device, if the mains cable is damaged.

If an amplifier channel is to be withdrawn, close off the plug−in unit with a blanking plate.

Built−in devices must only ever be operated whilst they are within the housing provided for them.

The device complies with the safety requirements of DIN EN 61010-Part 1
(VDE 0411-Part 1); Protection Class I.

A Introduction

1 Notes on documentation

This Manual contains all the information you need to operate the MGA II.

There are several **guidelines** available to you:

- Each Section starts with a list of its contents.
- The *header* tells you which Section or sub–section you are currently reading.

  Example:

  Connections ➞ Transducer B-15

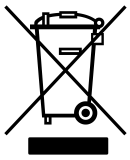
- The *page numbering* is linked to capital letters which correspond to the Section headings.

Symbols used in this manual:

Symbol: CE

Meaning: CE mark

The CE mark enables the manufacturer to guarantee that the product complies with the requirements of the relevant EC guidelines (the Declaration of Conformity can be found at http://www.hbm.com/HBMdoc).

Symbol: 

Meaning: **Statutory marking requirements for waste disposal**

National and local regulations regarding the protection of the environment and recycling of raw materials require old equipment to be separated from regular domestic waste for disposal.

For more detailed information on disposal, please contact the local authorities or the dealer from whom you purchased the product.

IMPORTANT

Important information
Indicates important information about the product or about handling the product.

TIP

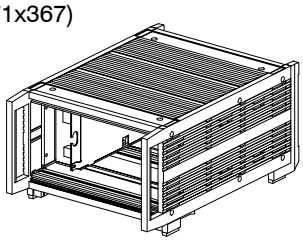
Information / Instructions for use

Instructions for use or other valuable information for the user.

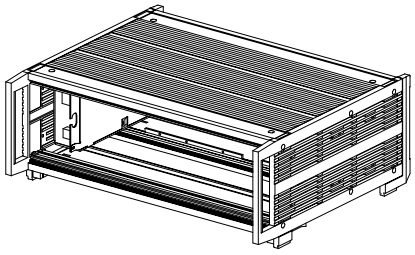
2 MGA II housings

The MGA II System is supplied in various housings:

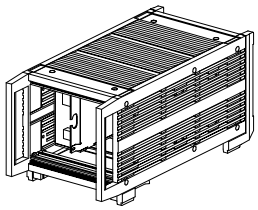
Desktop housing TG005 (255x171x367)



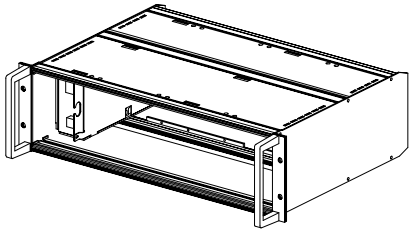
Desktop housing TG007 (458x171x367)



Desktop housing TG011 (173x171x367)



19" module frame ER007 (483x132.5x367)



(W x H x D in mm)

Desktop housing	Module frame	Maximum number of channels	Supply voltage
TG005	–	6	230 V (115 V) ~
TG007	–	12	230 V (115 V) ~
TG011	–	2	230 V (115 V) ~
–	ER007	12	230 V (115 V) ~

All basic versions of the device consist of the following components:

- Housing
- DA12 digital indicators (indication limit 19.999)
- Amplifier plug–in units (ME10 ....)
- Connection boards (AP01, AP03 ...)
- Power pack

Accessories

- Kab133A adapter cable; 0.3 m, (D-connector to MS coupler socket)
- Kab251-05 synchronisation cable; 0.5 m, (2x 5–pin cable plugs)
- DB–25P connecting plug (25–pin cable plug with housing and fixing accessories for output and control signals)
- DB–15P connecting plug (15–pin cable plug with housing and fixing accessories for transducer port)
- D25-BNC/2 connecting plug; with BNC jack
- EM001 end–phase module, switchable to impressed voltage or impressed current; can be plugged on to connection boards

Protection class

The degree of protection given in the technical data indicates the suitability of the housings for various ambient conditions and also the protection of persons against potential risks when used. The letters **IP** (International Protection), which are always present in the designation, are followed by two digits. These indicate which degree of protection a housing offers against contact or foreign bodies (first digit) and moisture (second digit).

The MGA II System is available in housings with degree of protection IP20 (as per DIN EN 60529).

Code index	Degree of protection against contact and foreign bodies	Code index	Degree of protection against water
2	Protection against contact with fingers, protection against foreign bodies with ∅ > 12 mm	0	No water protection
6	Complete protection against contact, protection against penetration of dust	5	Protection against water jet(nozzle) from any angle

3 Structure of the MGA II device

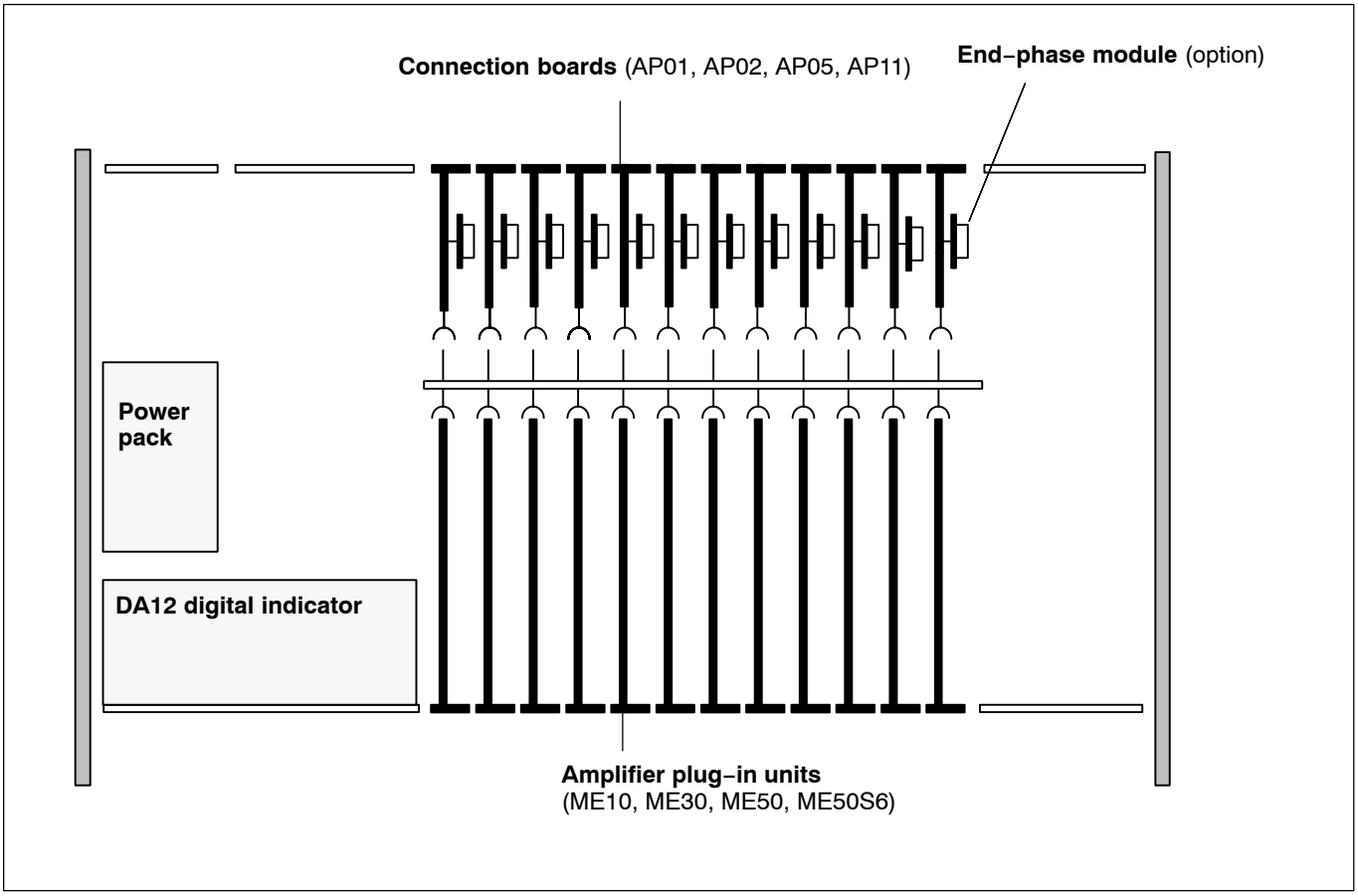


Fig. 3.1: Overall structure of the MGA II device

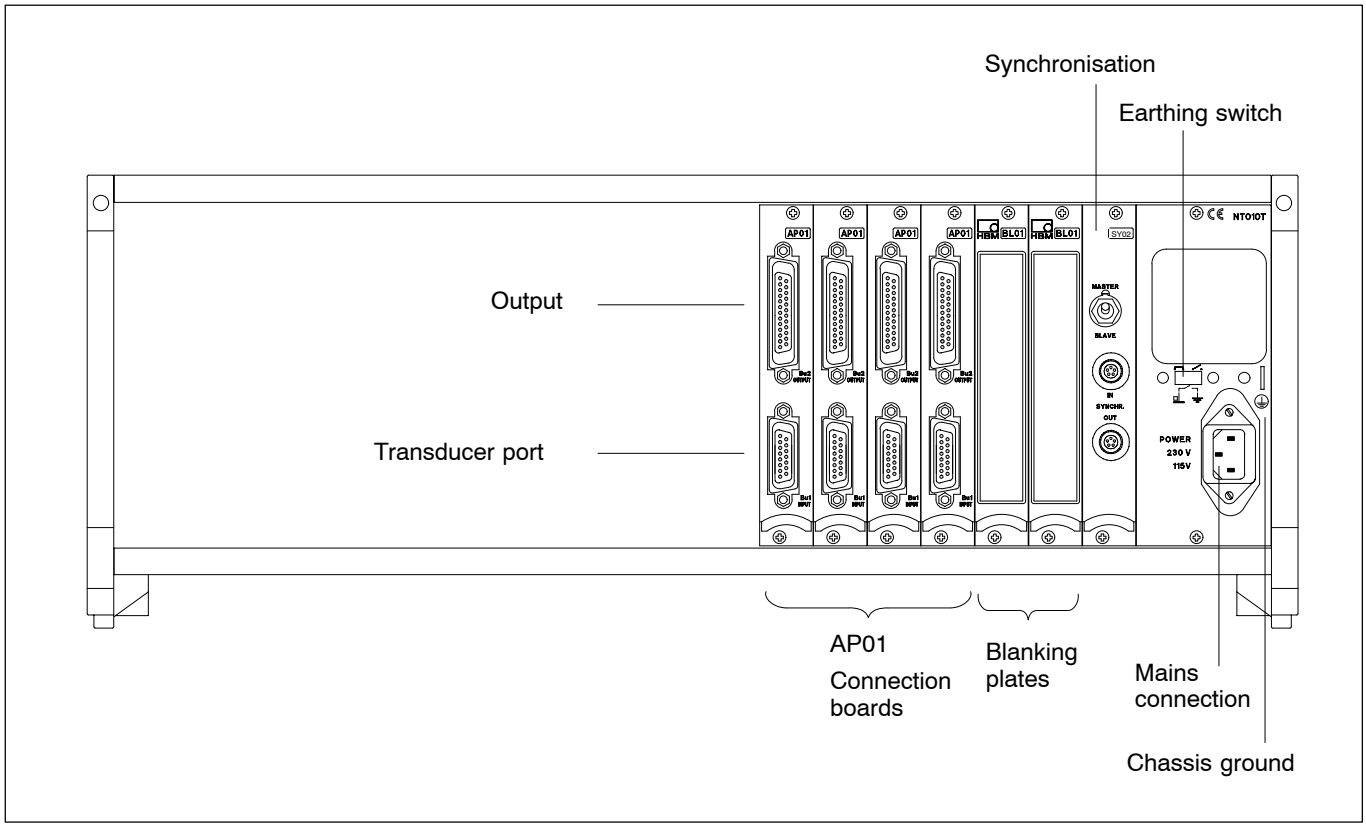


Fig. 3.2: Rear of device (section)

3.1 Control elements for the digital indicator

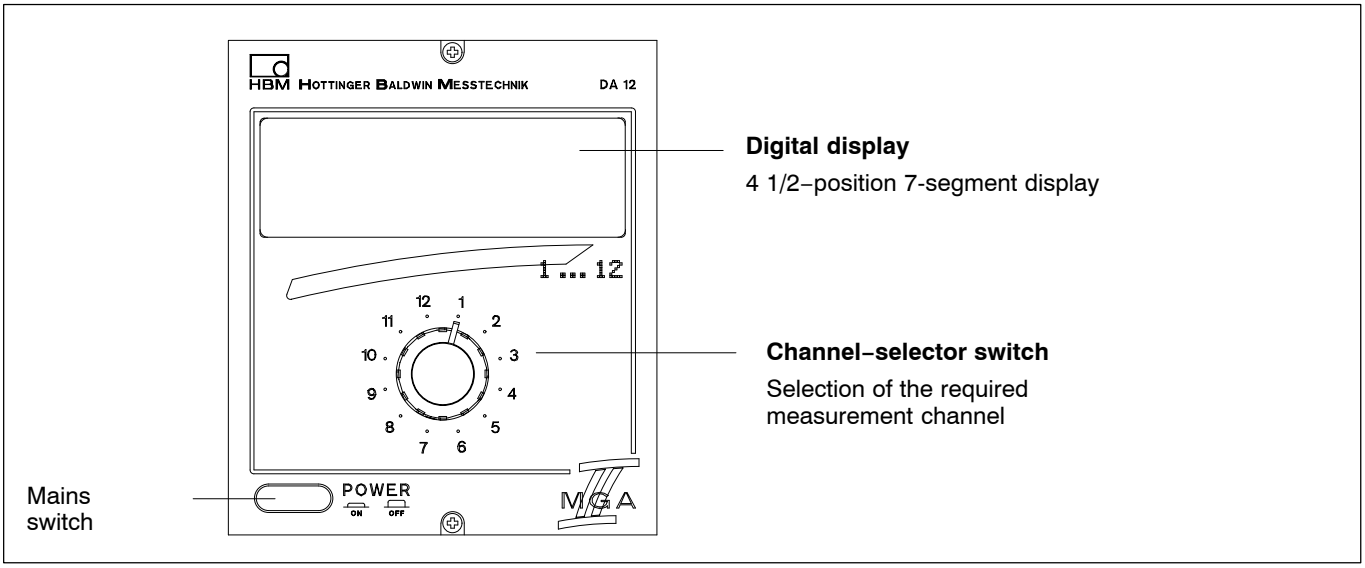


Fig. 3.3: DA12 digital indicator

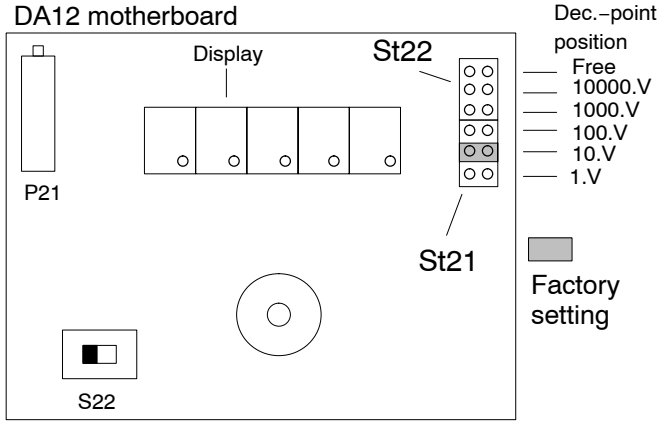
The four–and–a–half–position digital indicator displays the nominal value at 10 V. This corresponds to the HBM amplifiers' output area.
The decimal point is selectable/disconnectable via plug–in jumpers St21/St22 on the DA12 motherboard.

Select decimal point:

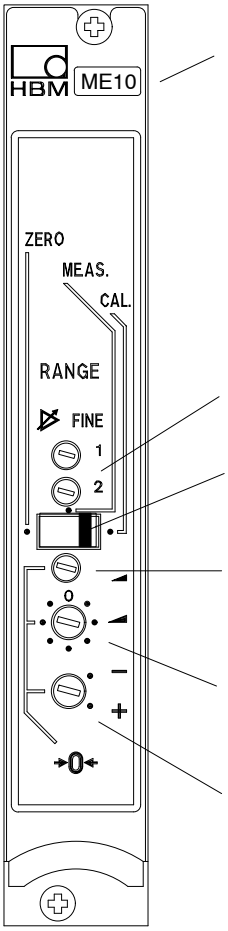
- Unscrew DA12 front panel
- Lift cap off the rotary switch and unscrew rotary switch with socket spanner
- Unscrew motherboards; access to ST21/22 free

Remove jumper: **no** decimal point

Plug jumper in: Decimal point can be moved to any position



3.2 Control elements for the amplifier plug–in units



Amplifier type

ME10: DC amplifier for strain–gauge transducers (measurement–frequency range 0...10 kHz)

ME30: 600 Hz carrier–frequency amplifier for strain gauge transducers

ME50: 4.8 kHz carrier–frequency amplifier for inductive transducers

ME50S6: 4.8 kHz carrier–frequency amplifier for strain–gauge transducers

Range fine

Fine balancing of the ranges

Operating mode

Selection of Zero/Measure/Calibrate operating modes

Zero balancing fine

Fine balancing of the zero point

Zero balancing coarse

Coarse balancing of the zero point

Polarity

Setting the polarity of the balance voltage

Fig. 3.4: Front panel, amplifier plug–in unit

3.3 Component location diagrams, connection boards

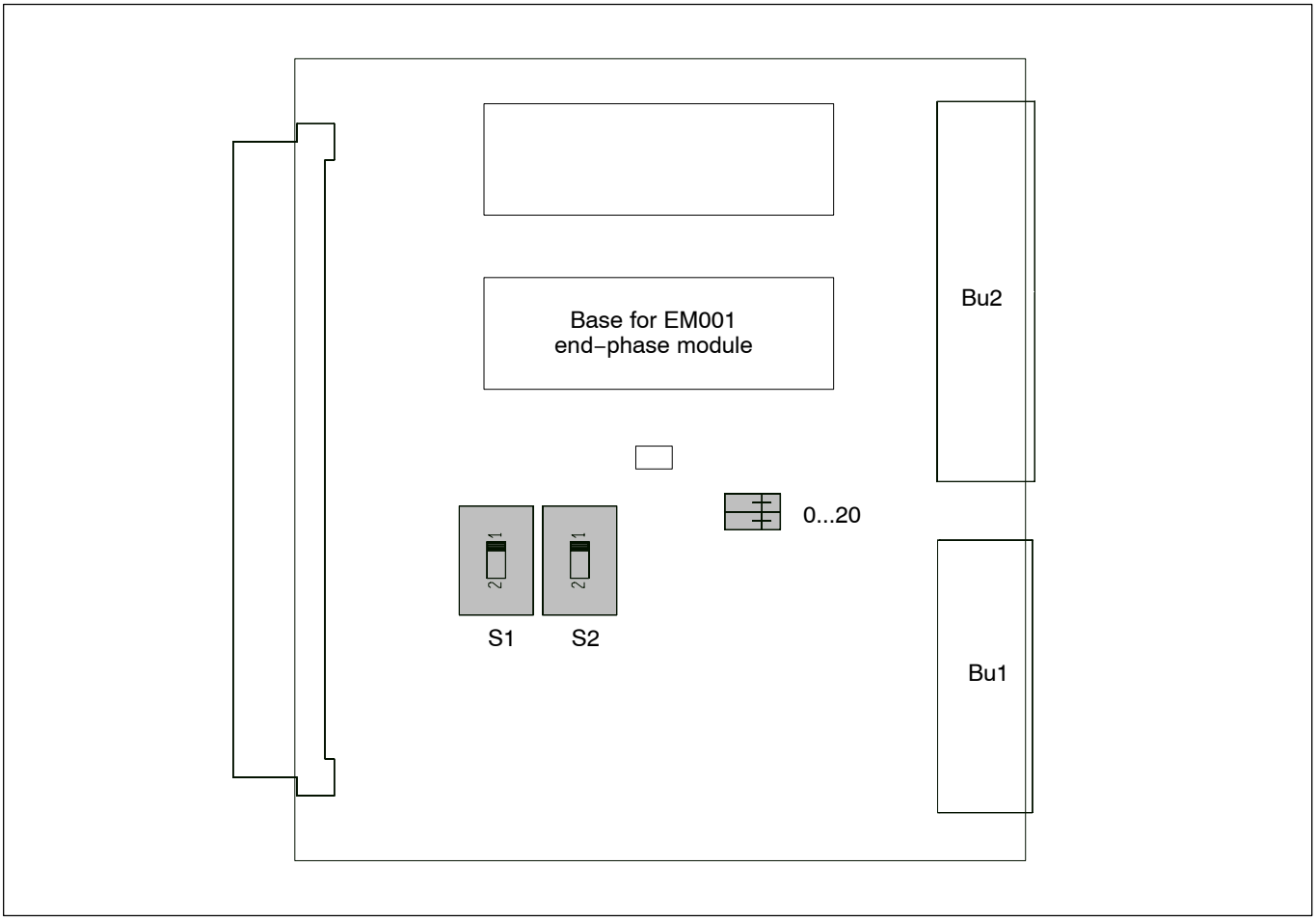


Fig. 3.5: Connection board AP01

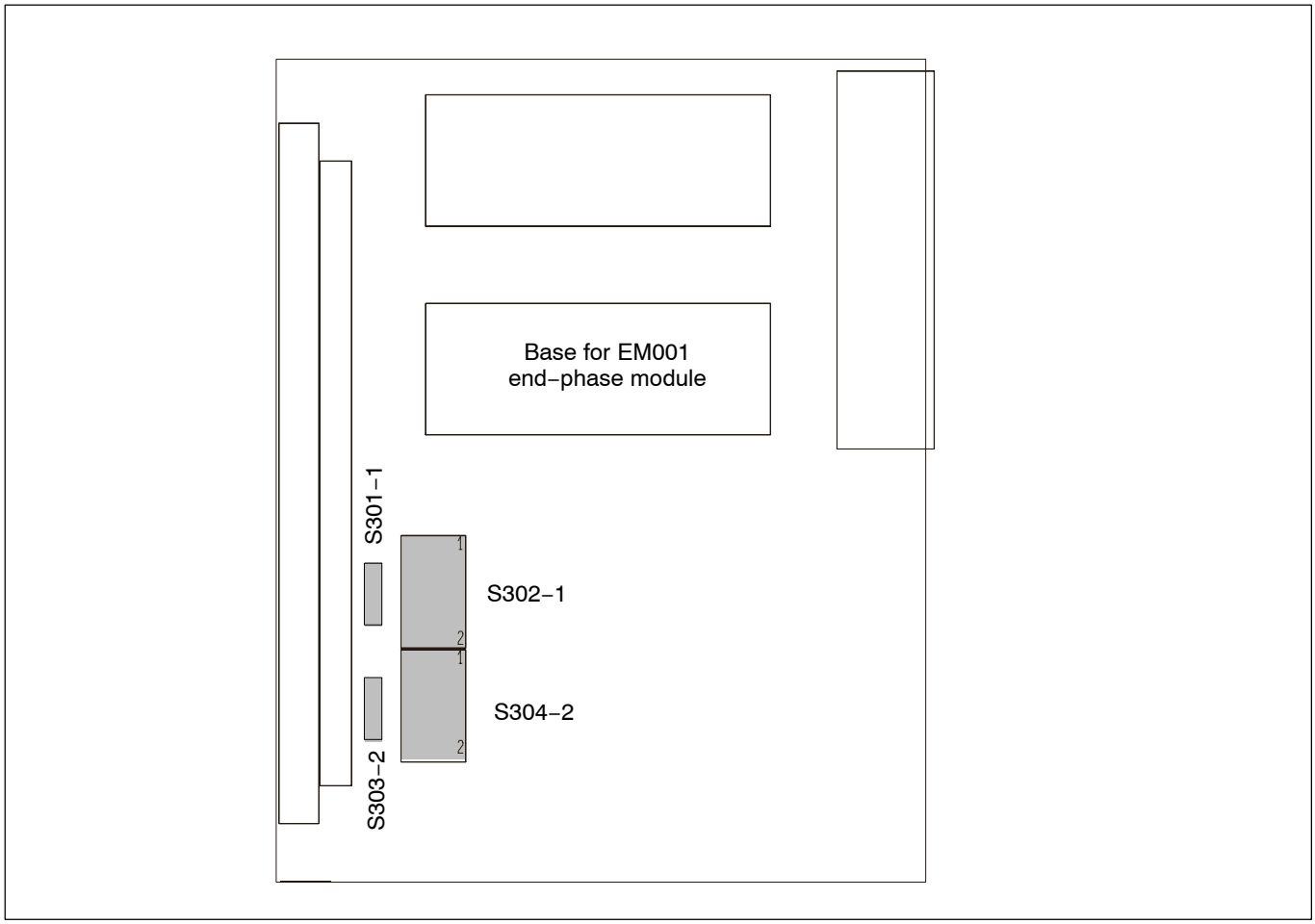


Fig. 3.6: Connection board AP05

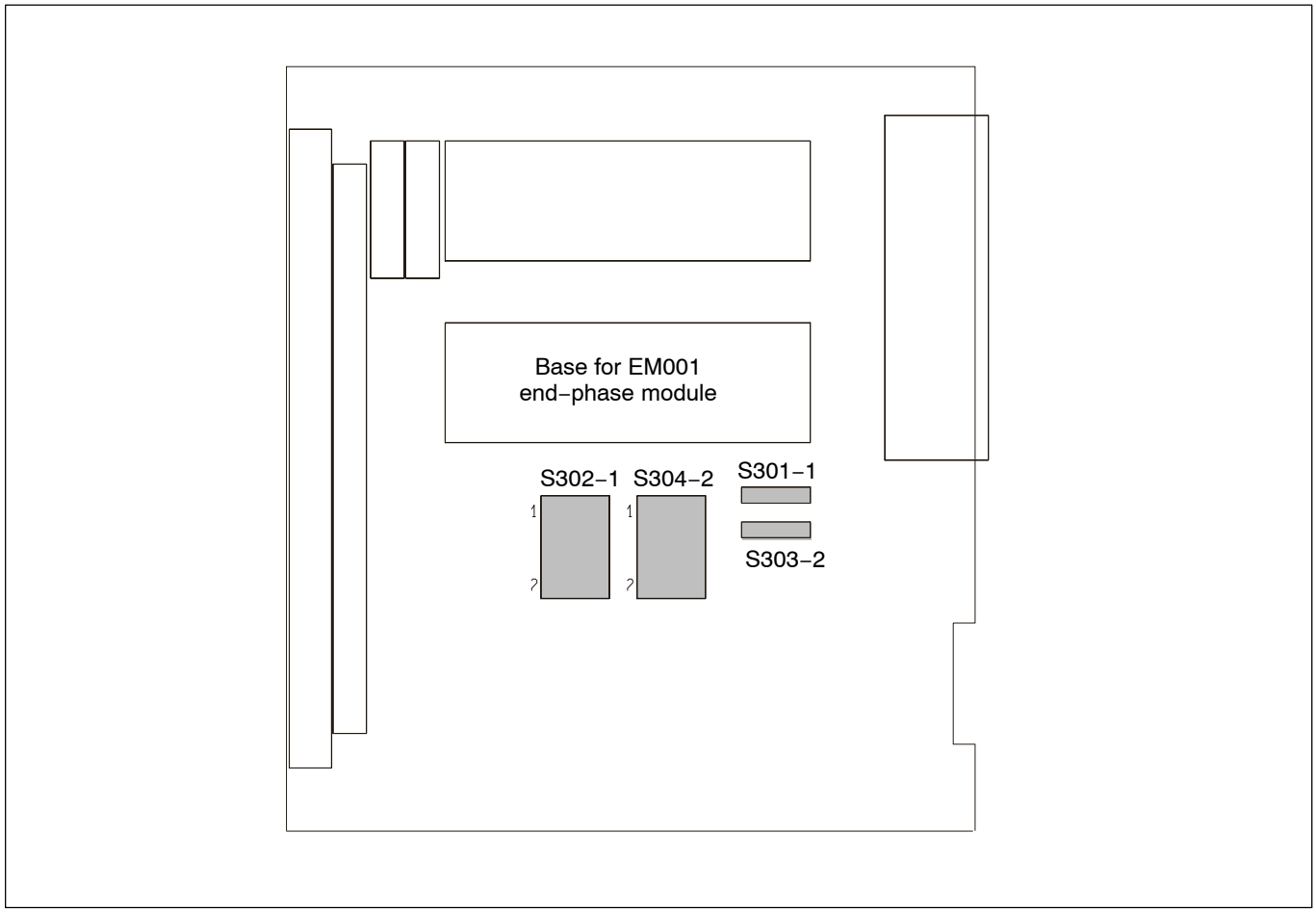


Fig. 3.7: Connection board AP11

3.4 Component location diagrams ME10, ME30, ME50, ME50S6

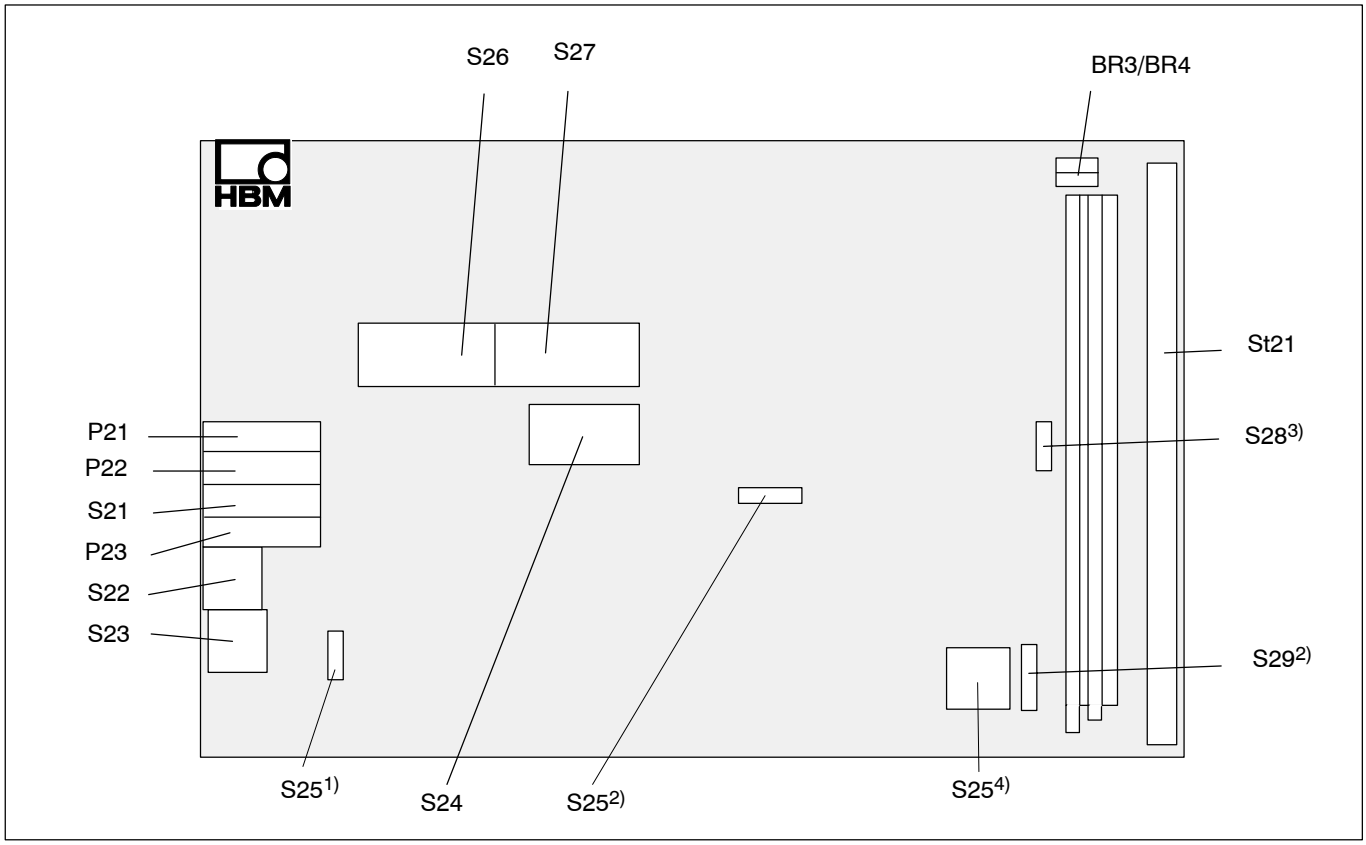


Fig. 3.8: Component location diagram ME10, ME30, ME50, ME50S6

1) with ME30
2) on ME50 and ME50S6
3) not on ME10
4) on ME10

4 Conditions on site

CAUTION

- Protect desktop devices from moisture or atmospheric influences such as rain, snow, etc.
- Ensure that the ventilation openings on the sides, the openings for the electric fan on the back of the device and the openings on the underside of the device are not covered up.
- Protect the device from direct sunlight.
- Comply with the maximum permitted ambient temperatures specified for the system devices in the Technical Data.
- For installation in 19” fitted cupboards, because of the poorer heat dissipation suitable steps must be taken to ensure that the maximum permissible ambient temperature is not exceeded. In all cases we recommend forced exhaust ventilation and, in particularly critical cases, clearances above and below the module frame.
- Permissible relative humidity at 31 °C is 80 % (non–condensing), reducing linearly to 50 % at 40 °C.
- The devices are classed as overvoltage category II, pollution grade 2 equipment.

5 Maintenance and cleaning

MGA II system devices are maintenance–free. Please note the following points when cleaning the housing:

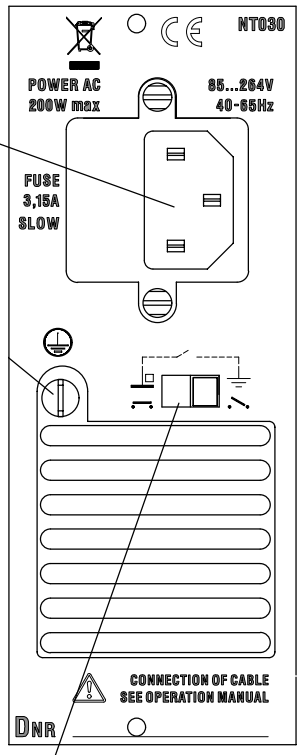
CAUTION

Withdraw the mains plug from the socket before carrying out any cleaning.

- Clean the housing with a soft, slightly damp (not wet!) cloth. You should **on no account** use solvent, since it may damage the labelling on the front panel and the indicator box.
- When cleaning, ensure that no liquid gets into the device or connections.

B Connections

1 Mains connection



Connecting to the mains

Housing earthing system

Earthing switch

The NT030 power pack is designed for connection to 230 V (115 V) and for the maximum configuration of 16 channels. It adapts automatically to the 115 V/230 V mains supply voltage. The fan on the power pack is temperature–controlled and automatically cuts out if necessary. The power pack is protected with an internal 3.15 A/T micro–fuse.

CAUTION

The power pack fuse may be changed only by the manufacturer's service personnel.

Earthing switch

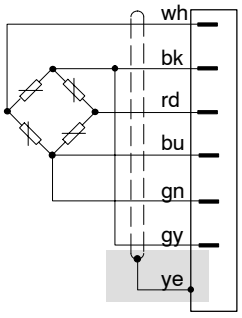
The earthing switch, in the factory setting ($\overline{\bullet\ \bullet}$), links zero operating voltage to the protection circuit. If external devices (e.g. transducers, computers) already make this link, and this causes earth–circuits to occur (hum–pickup), the earthing switch must be opened ($\bullet\ \bullet$).

Mains connection

Automation equipment and devices must be covered over in such a way that adequate protection or locking against unintentional actuation is provided (such as access checks, password protection, etc.).
The MGAII must be positioned such that the mains connection can be accessed and the device disconnected from the mains at any time.

1.1 Shielding design

GREENLINE



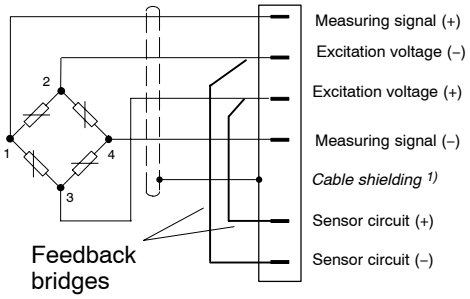
Greenline shielding design:

HBM has developed the *Greenline* shielding design as an effective means of improved protection against electromagnetic interference. The cable shielding is formed in such a way that the whole of the measuring system is completely enclosed in a Faraday cage.

NOTE

In the case of connection boards fitted with a terminal block (AP05) please connect the cable shielding to the eyelet on the connection board.

2 Connecting transducers



1) see page B–3

When using double–width connection boards (AP03, 05) only slots 1, 3, 5, 7, 9 and 11 can be occupied by an amplifier.

IMPORTANT: Transducers with four–wire connection

If you are connecting a transducer with 4–wire cable, you must connect the sensor circuit to the appropriate bridge excitation circuit **in the transducer connector** (sensor circuit (–) to excitation voltage (–) and sensor circuit (+) to excitation voltage (+)*).

AP01 connection board: connect 5 with 12 and bridge 6 with 13.
AP03 connection board: connect B with G and bridge C with F.

Any cable extension must only ever be carried out in six–wire connection. Avoid rearranging the transducers with the device switched on. Should this however occur, correct functioning is obtained by briefly switching the device ON and OFF.

*) For cable lengths >50 m, one resistor with half the bridge resistance value (BR/2) must be solder into the transducer in place of each feedback bridge. If the transducers are calibrated in six–wire connection, the resistors must be solder directly into the sensor circuit.

Which transducer to connect to which amplifier?

ME10: DC amplifier for strain–gage transducers (measuring frequency 0...10 kHz)

ME30: 600 Hz CF–amplifier for strain–gage transducers

ME50: 4.8 kHz CF amplifier for inductive transducers

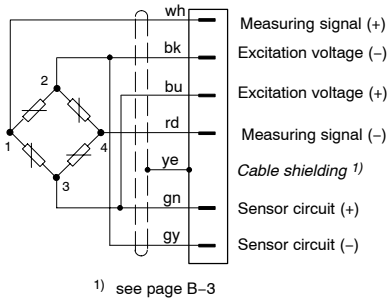
ME50S6: 4.8 kHz CF amplifier for strain–gage transducers

NOTE

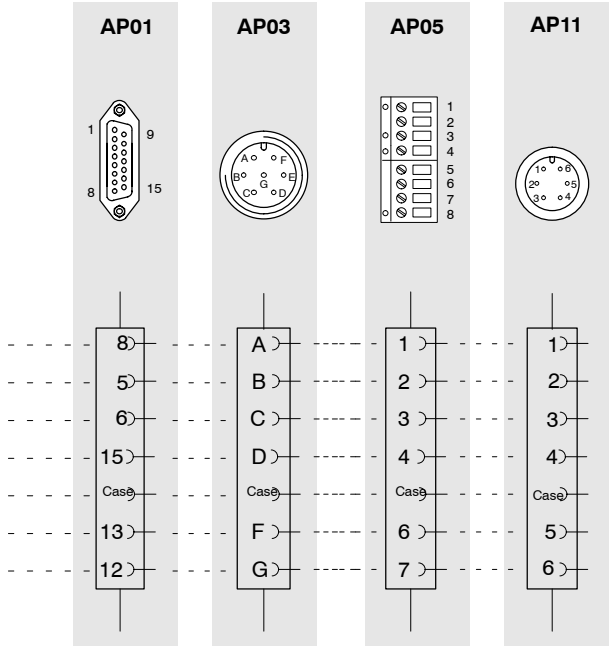
The accuracy of a measurement channel can be affected by adjacent channels, if no transducers have been connected to them. In this case, we recommend closing the bridges for the sensor circuits of the excitation voltage for all channels that have not been connected (clip on dummy plug with appropriate bridges).

2.1 Connect strain–gage full bridge

Amplifier: ME10, ME30, ME50S6



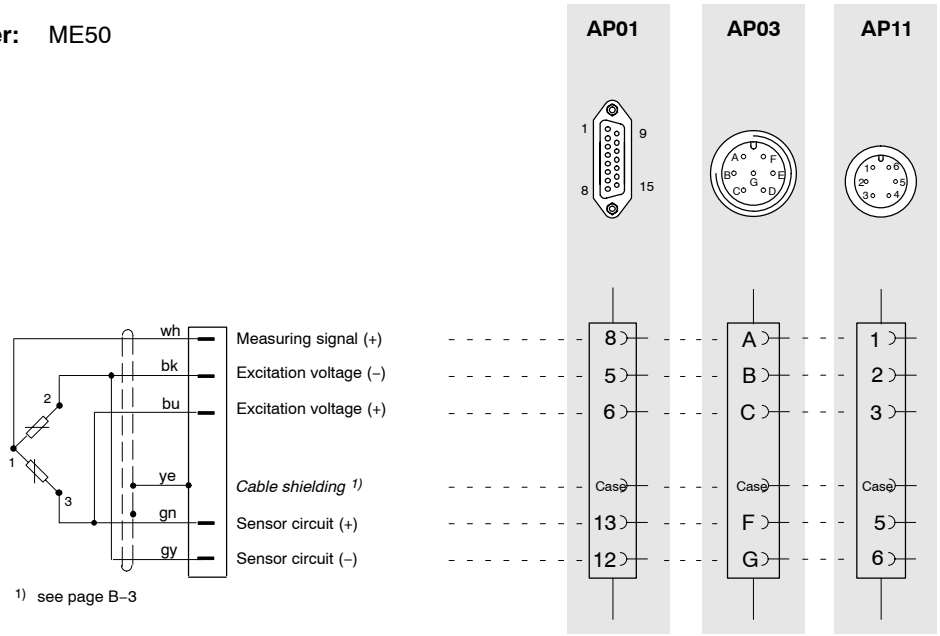
1) see page B–3



Wire colours: wh= white; bk= black; bu= blue; rd= red; ye= yellow; gn= green; gy= grey

2.2 Connect inductive half bridge

Amplifier: ME50



1) see page B–3

Wire colours: wh= white; bk= black; bu= blue; rd= red; ye= yellow; gn= green; gy= grey

2.3 Intrinsically safe transducer port

The AP05 connection board is used for connecting strain–gage transducers which are used through an **intrinsically safe EEx(ib)** circuit in areas subject to explosion hazard.
Three safety barriers (double safety barriers for 6 lines) separate the intrinsically–safe from the non–intrinsically–safe circuit.
Strain–gage full bridges can be connected to the AP05 connection board.
The following values apply to the intrinsically safe circuit:

Strain–gage full bridge:
- Voltage: ≤ 22 V
- Current: ≤ 193 mA
- Power: ≤ 1.06 W

Attachable transducer resistors in the intrinsically safe circuit		
ME30	U_B=5 V	300...4000 Ω
	U_B= 2.5 V	100... 4000 Ω
ME10	U_B=10 V	600...4000 Ω
	U_B= 5 V	175... 4000 Ω
	U_B= 2.5 V	60... 4000 Ω

2.3.1 Electrical connection to AP05

In the case of strain–gage full bridges a six–wire connection must be used to attach the transducer. A 6–core cable with light–blue oversheath to identify the intrinsically safe circuit is used to connect the transducer.
The transducer's Inspection Certificate should be consulted to determine whether it is suitable for the intrinsically–safe circuit present with the values specified in the Technical Data.

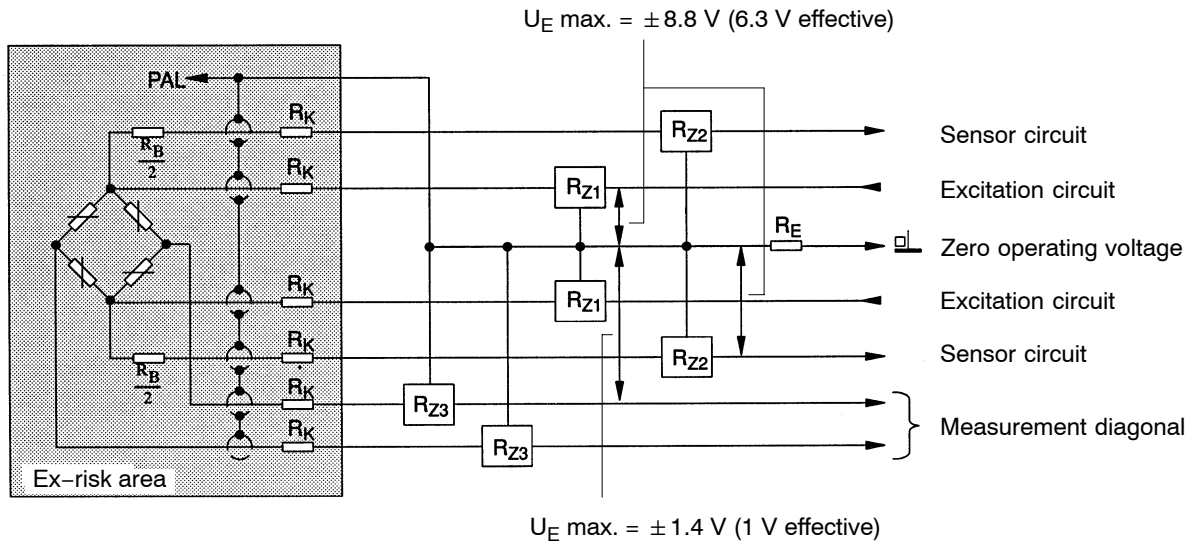
The PEL (potential equalisation line) terminals of the Zener barriers must be connected by the shortest path to the potential equalisation (cable shielding) in the area subject to explosion hazard. The cross–section of this link must at least match the conductivity of 1.5 mm^2 copper.
If the voltage between the PEL earthing point and the operating–voltage zero point of the amplifier exceeds 1..2 V, additional connection of protective conductor and operating zero may result in malfunctions in the amplifier. This voltage should therefore be kept as low as possible by appropriate choice of protective conductor.

NOTE

Further guidance on transducer connection in areas subject to explosion hazard will be found in HBM publications.

"SD01A safety barriers" for strain–gage full bridges

Intrinsically safe transducer port, strain–gage full bridge



R_K = Cable resistance

R_B = Bridge resistance

R_E = Earth resistance 15 kΩ

R_{Z1} = 158.5 kΩ (Barrier resistance)

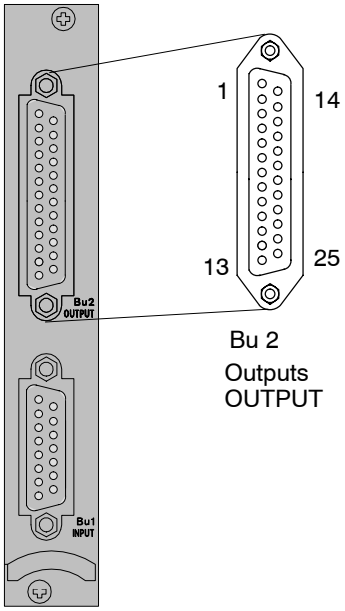
R_{Z2} = 1.5 kΩ (Barrier resistance)

R_{Z3} = 155 kΩ (Barrier resistance)

In normal operation no current flows through the Zener diodes in the Zener barriers or – if cable and transducer are of symmetrical construction – through R_E. The potential equalisation line (PEL) is thus kept to the operating–zero potential. If malfunctions occur, connect the zero operating voltage to the PEL earthing point through a separate line.

3 Outputs and remotes

3.1 Connection boards AP01, AP03, AP05, AP11



Connection boards for the amplifier channels are plugged in at the back of the desktop housing. The jacks on these connection boards provide you not only with connection facilities for the transducer, but also with several output and control signals, depending on the chosen option. The connection boards contain a 25–pin jack designated Bu2. The pin assignment of the jack for connection boards AP01, 05, 11, is shown in the following diagram.

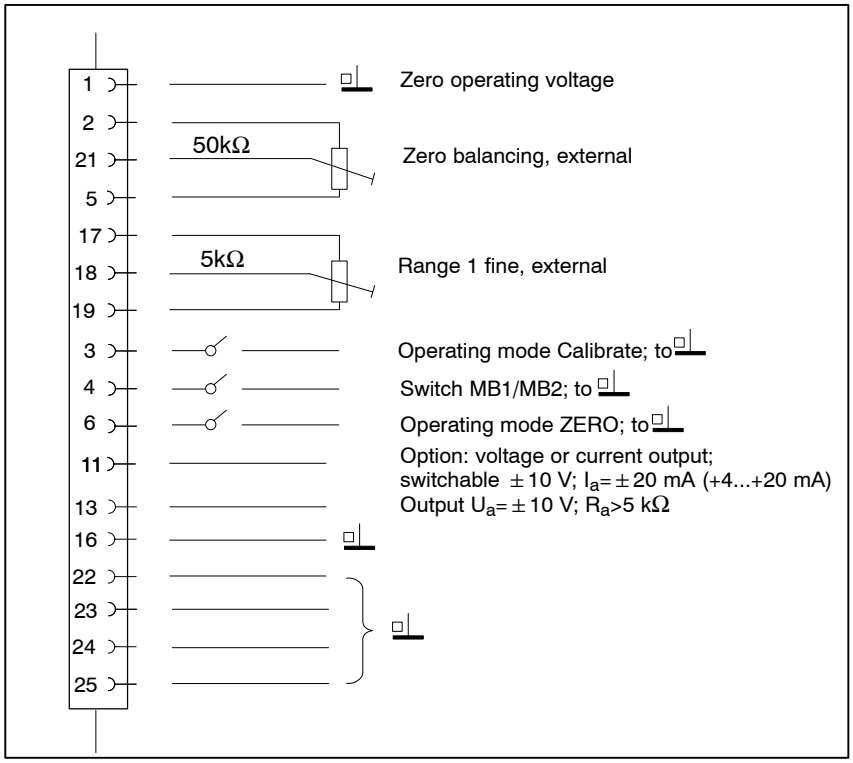
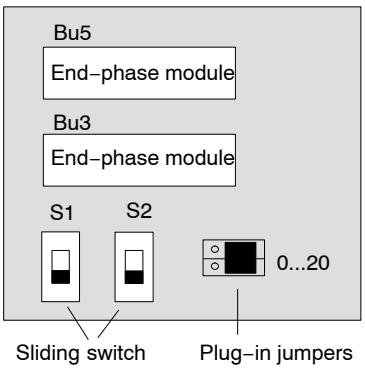


Fig. B 1: Bu2 pin assignment

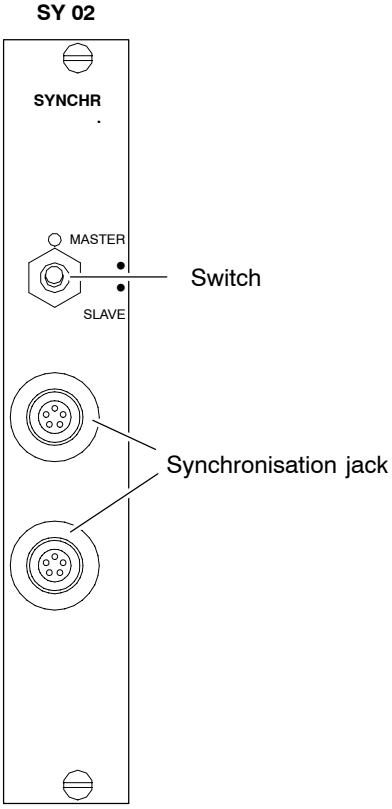
AP01/ AP03



The chart above left shows the arrangement of switches on the AP01/AP03 motherboard. Each end–phase module is assigned a sliding switch (e.g. S302-1) and a plug–in jumper. The maximum possible number of EM001 end–phase modules is two.
The switch position necessary for the required output signal is shown in the table underneath.

required output	**Switch position**			
±10 V	S1 S2		ST ST	Any
±20 mA	S1 S2		ST ST	
+4... +20 mA	S1 S2		ST ST	

4 Synchronisation (ME30 and ME50 only)



Synchronisation is advisable when

- the transducer cables of several devices have been laid side by side
- the sensors are unshielded and bunched close together

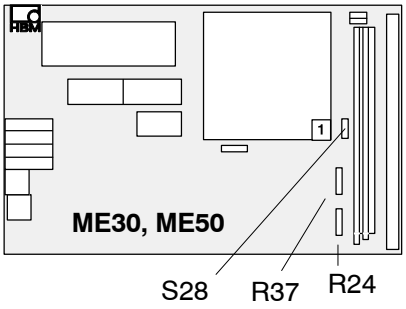
Synchronisation prevents beat interference due to carrier–frequency differences. All amplifiers within a device are basically synchronized with a built–in master oscillator.

Synchronising 2 devices

- Connect two devices through one of the SYNCHR. jacks (1–Kab 251) on the SY02 plug–in unit.
- Set the Master/Slave switch on the plug–in unit SY02 to MASTER for one device and to SLAVE for the other.

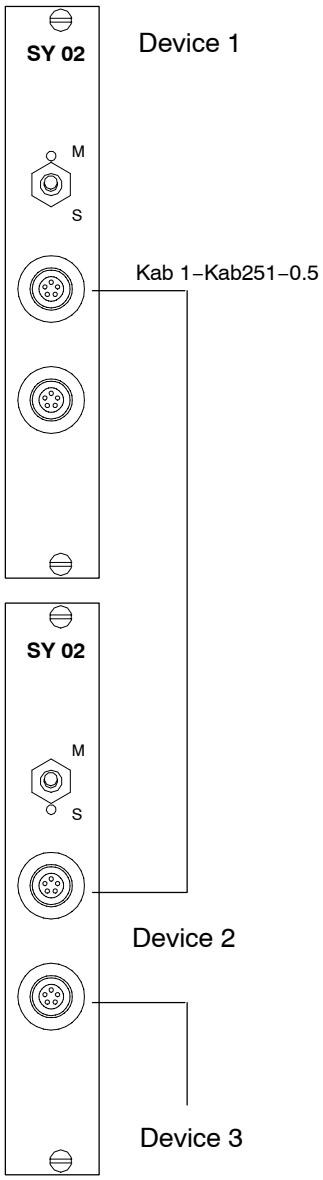
In addition the switch S28 on the amplifier PCB must be set (1st channel) accordingly:

Setting	S28
Slave	
Master	



If in the the case of the MASTER amplifier no transducer is connected by six–core circuit, the bridge supply–voltage leads must be connected to the sensor conductor by jumpers at the connecting plug or by internal 100 kOhm resistors on the amplifier circuit–board.

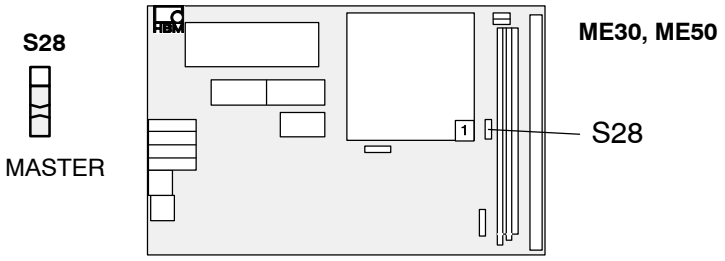
- In the case of ME30 and ME50: solder bridge between R24 and R37



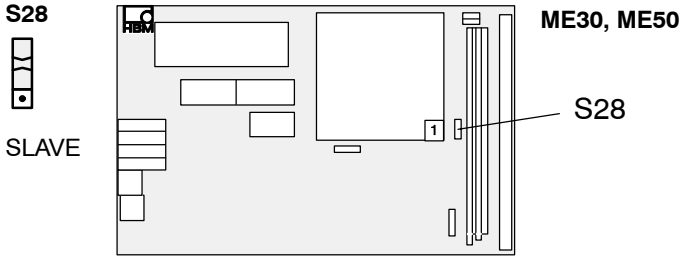
Synchronising more than 2 devices (with ME30 and ME50)

You can synchronise any number of devices via the SYNCHR. jacks.

- Set the switch SY02 on the first device to MASTER, likewise S28 on the amplifier motherboard (Channel 1).



- On all succeeding amplifier plug–in units set the switch S28 to SLAVE, likewise switch SY02 on the succeeding devices.



- Connect all devices together via the synchronisation jacks.

If the device is not to be synchronised:

- on the first device set the SY02 switch to MASTER
- switch S28 (Channel 1) to MASTER

Use the synchronisation cable Kab251–0.5 (Accessories).
In the case of the ME10 amplifier synchronisation is not possible (no CF amplifier).

C Commissioning

1 Commissioning

This chapter shows you the necessary steps to take in order to make your measuring system (amplifier system and transducer) ready for use.
You will then be in a position to carry out a function test of all components. The various steps are deliberately explained in very general terms, without going into detail about specific transducers or amplifier plug–in units. However, it is very easy to apply the description to your own measuring system. In some instances – especially to do with connecting transducers – reference will be made to later chapters. We also warn about certain errors which can typically occur during commissioning.
After initially commissioning and adapting the amplifier plug–in unit to your transducer you are in a position to get to know the other functions and facilities of the MGA II Amplifier System.

1.1 Devices in the desktop housing and module frame

- If you have not yet received your complete amplifier system, you should take note of the following points when putting the system together:

– The amplifier plug–in units are inserted from the front, the associated connection boards from the back.

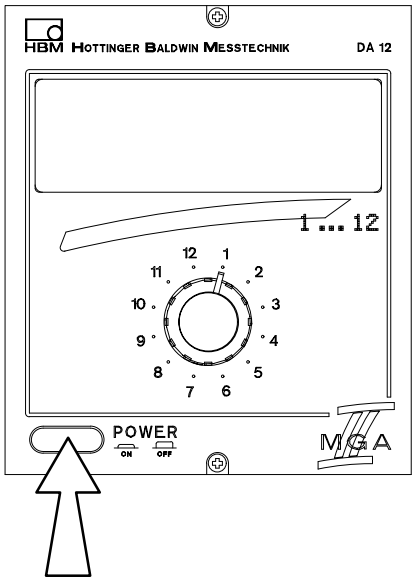
It is important to ensure correct allocation during this step:

– If using wide connection boards (8 divisions), you must plug these into slots 1, 3, 5 etc. Slots 2, 4, 6 etc. on the front panel must be fitted with blanking plates.

- On safety grounds all unused slots (amplifiers or connection boards) must be covered over with blanking plates.
- Check that all amplifiers and connection boards are firmly plugged in.
- Connect the device to the mains supply with the mains cable provided.
- Connect your transducer to the jack provided on the connection board (reference BU01). If you use a cable you have made up yourself, please adhere to the pin assignment for your transducer as shown in Section *B Connections*.

Also observe the safety instructions.

1.2 Switching on



Switching on

- Switch the device on with the POWER button on its front panel.

  When the DA12 is initialized (at which time all LEDs light up for a moment) it notes the components present. If no transducer is connected, an overflow is displayed.

D Balancing/Range

1 Balancing

Before measurement takes place the amplifier must be matched to the transducer and balanced.

1.1 Excitation voltage

Factory settings:

ME10	ME30	ME50	ME50S6
5 V	5 V	2.5 V	2.5 V

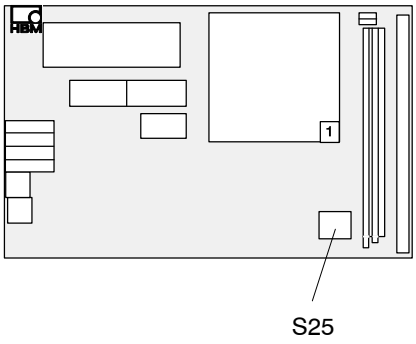
U_B = 5 V: Default setting for strain gage transducers

U_B = 2.5 V: Rated excitation voltage for HBM inductive transducers

U_B = 1 V: For inductive transducers with high output signals or when using the ME50 with safety barriers or with very small sensors.

You can alter the bridge supply voltage using the S25 switch on the amplifier motherboard:

ME10



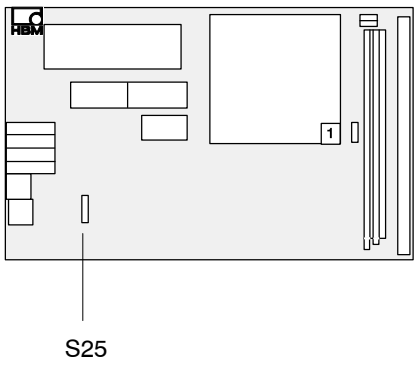
ME10

U_B	Bridge resistance	S25 1 2 3
2.5 V	R_B≥60...4000 Ω	
5 V	R_B≥110...4000 Ω	
10 V	R_B≥220...4000 Ω	

OPEN

CLOSED

ME30



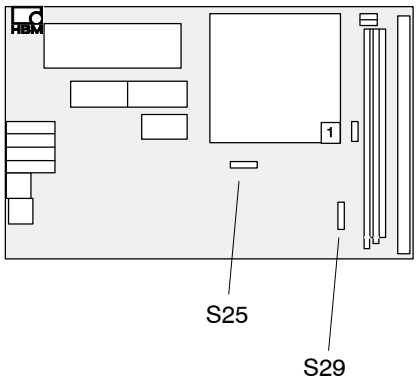
ME30

U_B	Bridge resistance	Switch S25
2.5 V	R_B ≥60...4000 Ω	
5 V	R_B ≥110...4000 Ω	

ME50

U_B	Bridge resistance	Switch S25	Switch S29
1 V[1)]	R_B ≥2.5...20 mH		
2.5 V	R_B ≥6...19 mH		

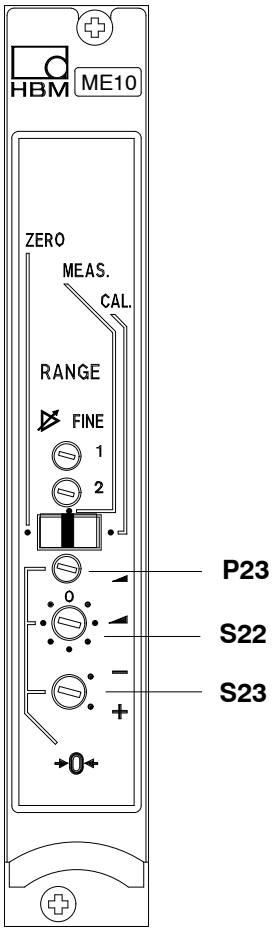
ME50



NOTE

If the ME50 is used with SI01 safety barriers, ensure that the bridge supply voltage is 1 V and that switch S29 is in the '"Full bridge" **position.**

1.2 Zero balancing



Perform zero balancing before the first measurement and after each alteration to the measurement set–up

1. Leave sliding switches in the MEAS. position during balancing.

2. Set the polarity with switch S23. Set to minus for positive and plus for negative indication.

3. Coarse balancing
   With switch S22 set the smallest possible display value.

   The balance range for ME10 and ME30 is approx. ±2 mV/V, for ME50 ±80 mV/V.

4. Fine balancing
   With P23 set the display precisely to zero.

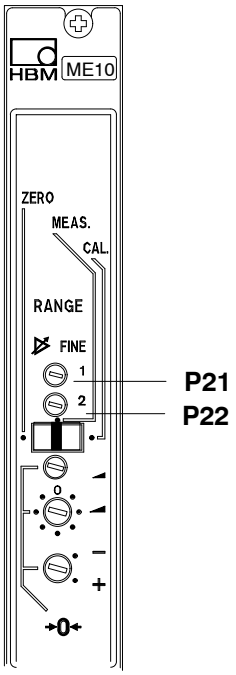
Example:

Display on DA12: –1.437

S23 to +
S22 as close as possible to zero, e.g.: 0.123

With P23 set to 0.000.

2 Setting a range



Using the adjustment controls on the operating panel RANGE (P21, P22), match the sensitivity of the amplifier to the transducer signal. Try to set the measuring range so as to utilise the amplifier's dynamic range (± 10 V) as fully as possible.

Range coarse

Using internal DIP switches the two ranges can be set independently to the transducer's nominal sensitivity.

Factory settings:

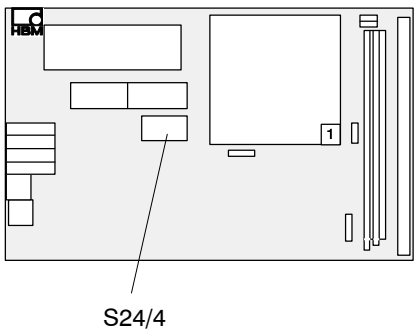
ME10 and **ME30**: MB1→ ± 2 mV/V
MB2→ ± 0.2 mV/V

Range	Switch S24/4	External
MB1 = ± 2 mV/V	OPEN	–
MB2 = ± 0.2 mV/V	CLOSED	Connect contacts 4 and 22 from Bu2 (see page B–10)

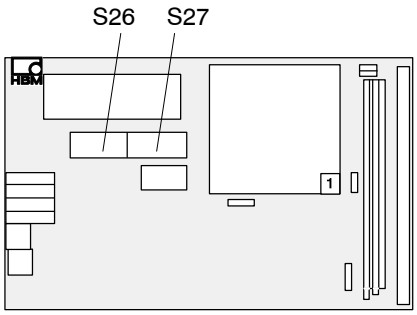
ME50: MB1→ ± 80 mV/V
MB2→ ± 8 mV/V

Range	Switch S24/4	External
MB1 = ± 80 mV/V	OPEN	–
MB2 = ± 8 mV/V	CLOSED	Connect contacts 4 and 22 from Bu2 (see page B–10)

ME30, ME50



ME10, ME30



OPEN

CLOSED

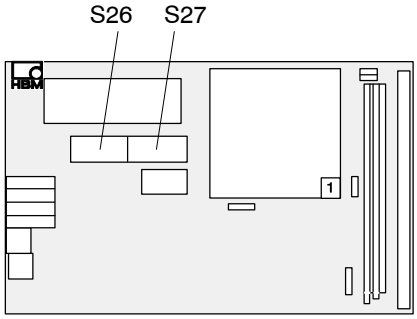
Pre–setting of the ranges in the range 0.2 mV/V ...4 mV/V for U_B=5 V (ME10, ME30) / 0.4 mV/V...8 mV/V for U_B= 2.5 V (ME50) is possible with switches S26 and S27 as shown in the following tables:

U_B = 2,5 V	U_B = 5 V	U_B = 10 V	**MB1: S26/ MB2: S27**							
mV/V	mV/V	mV/V	1	2	3	4	5	6	7	8
0.34–0.48	0.17–0.24	0.09–0.12	▪	■	■	■	■	■	▪	■
0.44–0.64	0.22–0.32	0.11–0.16	▪	■	■	■	■	■	■	▪
0.60–0.84	0.30–0.42	0.15–0.21	■	▪	■	■	■	■	▪	■
0.78–1.1	0.39–0.55	0.20–0.28	■	▪	■	■	■	■	■	▪
1.04–1.46	0.52–0.73	0.26–0.37	■	■	▪	■	■	■	▪	■
1.36–1.94	0.68–0.97	0.34–0.49	■	■	▪	■	■	■	■	▪
1.80–2.56	0.90–1.28	0.45–0.64	■	■	■	▪	■	■	▪	■
2.36–3.38	1.18–1.69	0.59–0.85	■	■	■	▪	■	■	■	▪
3.12–4.46	1.56–2.23	0.78–1.12	■	■	■	■	▪	■	▪	■
4.14–5.88	2.07–2.94	1.04–1.47	■	■	■	■	▪	■	■	▪
5.46–7.76	2.73–3.88	1.37–1.94	■	■	■	■	■	▪	▪	■
7.22–10.26	3.61–5.13	1.81–2.57	■	■	■	■	■	▪	■	▪

The range should be set so that the nominal value of the transducer (see identification plate) is within one range, in order thereby to obtain the greatest possible output signal.

Example: Force transducer 100 N at 2 mV/V
Range setting: 1.56...2.23 mV/V

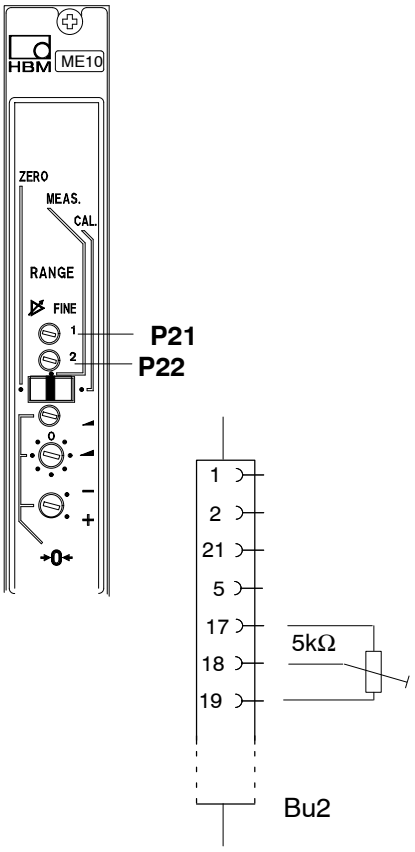
ME50



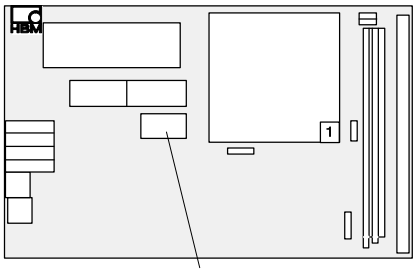
OPEN

CLOSED

U_B = 1 V	U_B = 2,5 V	**MB1: S26/ MB2: S27**							
mV/V	mV/V	1	2	3	4	5	6	7	8
17.0–24.0	6.8–9.6	CLOSED	OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN
22.0–32.0	8.8–12.8	CLOSED	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED
30.0–42.0	12.0–16.8	OPEN	CLOSED	OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN
39.0–55.0	15.6–22.0	OPEN	CLOSED	OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED
52.0–73.0	20.8–29.2	OPEN	OPEN	CLOSED	OPEN	OPEN	OPEN	CLOSED	OPEN
68.0–97.0	27.2–38.8	OPEN	OPEN	CLOSED	OPEN	OPEN	OPEN	OPEN	CLOSED
90.0–128.0	36.0–51.2	OPEN	OPEN	OPEN	CLOSED	OPEN	OPEN	CLOSED	OPEN
118.0–169.0	47.2–67.6	OPEN	OPEN	OPEN	CLOSED	OPEN	OPEN	OPEN	CLOSED
156.0–223.0	62.4–89.2	OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	CLOSED	OPEN
207.0–292.5	82.8–117.0	OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	OPEN	CLOSED
272.0–387.5	109.0–155.0	OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	CLOSED	OPEN
360.0–512.5	144.0–205.0	OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	CLOSED



ME30, ME50



MGA II S24/1+2

Range fine

Both ranges can be separately fine–tuned with P21 (MB1) or P22 (MB2). In this case corrections up to 35 % relative to the set range are possible.

NOTE

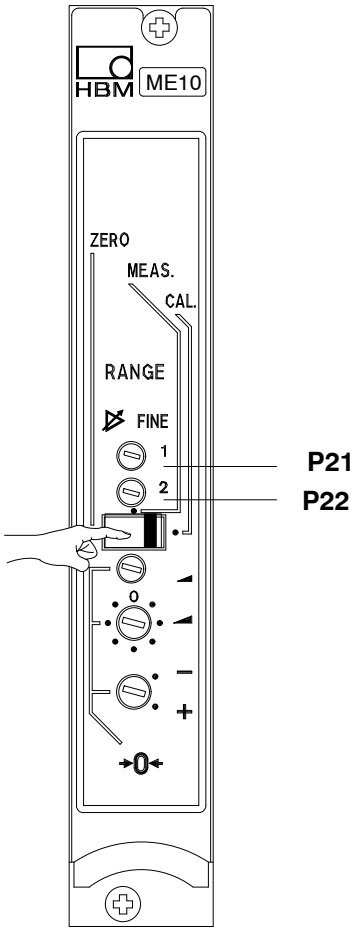
If the factory calibration of MB2 (+0.2 mV/V or +8 mV/V) is to be retained, P22 must not be altered.

For MB1 it is also possible to perform fine–setting by means of an external potentiometer (approx. 35 % of the set range).

To do this, reset switches S24 / 1 + 2 as per the following table and connect the potentiometer to contacts 17–19 of jack Bu2 (rear of housing) (see also page B–10).

Range 1 fine	Switches S24/ 1+2	External
MB1 internal (factory setting)	1 CLOSED, 2 OPEN	–
MB1 external	1 OPEN, 2 CLOSED	Potentiometer to contacts 17–19

3 Calibrating the measuring chain



Calibrating a measuring chain serves to maintain a clear–cut relationship between measured and displayed value. Here we explain two standard calibration procedures suitable for the MGA II System.

Method A: Internal calibration signal

The amplifier has an internal calibration signal of +1 mV/V ±0.1 % (+8 mV/V ±1 % for ME50) with which for the measuring range >1 mV/V (ME50: >8 mV/V) the amplifier's sensitivity can be adjusted.

1. Set sliding switch to position CAL during the calibration task.

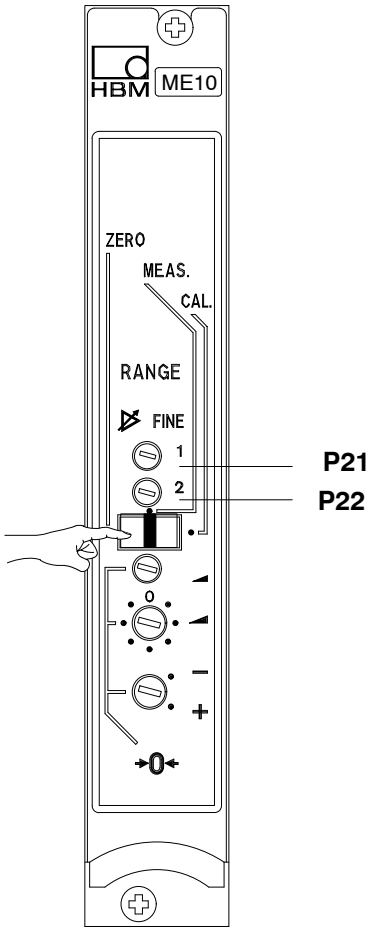
2. Using potentiometer P21 for MB1, set the range so that the desired output signal appears.
   Example:
   2 mV/V = 10000
   Internal calibration signal 1 mV/V = 5000
   Set output signal to 5000

   MB2 has been calibrated at the factory to ±0.2 mV/V (ME50: ±8 mV/V).

NOTE

If the setting of MB2 is altered, this value can no longer be set later using the internal calibration signal by balancing potentiometer P22.

On calling the calibration signal you always receive a fixed value for checking, irrespective of the transducer load.



Method B: Direct loading of the transducer

A defined load is applied to the attached transducer. The accuracy of this calibration depends on the calibration weighting (end measure in the case of displacement transducers).

1. Set sliding switch to position MEAS during the calibration task.

2. Select a range such that the amplifier is driven to the maximum possible extent by the calibration load.

3. Apply a defined load to the transducer.

4. With potentiometer P21, set the display so as to bring about a reference to the load–quantity. You can display a mechanical load at the correct digital and numerical value. The same procedure can be followed with P22 (MB2); the factory calibration ±0.2 mV/V (ME50: ±8 mV/V) will be lost.

   Mechanical calibration can be simulated electrically using a calibrator.

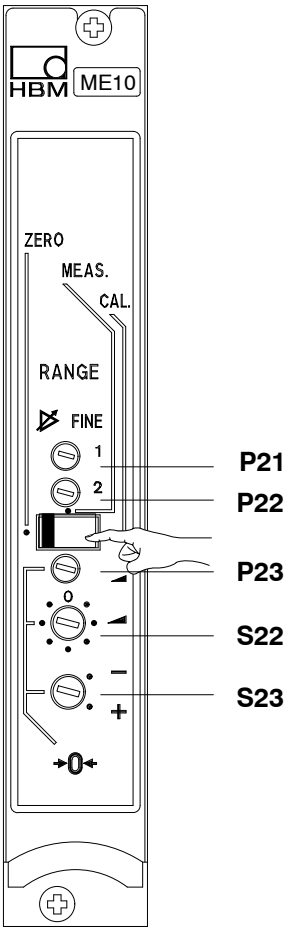
Example:

Transducer: Load–cell with nominal load 10kg
Nominal characteristic: 2 mV/V
Calibration load: 5 kg

For Range 1: With P21 set display to 5000 d; 1 d = 1 g

For Range 2 proceed similarly using P22.

4 Zero operating mode



The amplifiers in the MGA II System are easily replaced.

1. When internal calibration is finished, move sliding switch to position ZERO (check amplifier zero–point).
2. The zero value set is displayed and corresponds to the suppressed previous load (tare value).

   Example:
   Tare value: 0.1 mV/V
   2 mV/V = 2000 kg
   0.1 mV/V = 100 kg

   Zero: –100 kg is displayed (negative tare load)

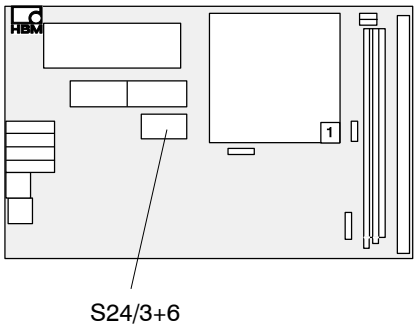
3. Note this value.

4. Switch amplifiers.
5. Move sliding switch to position ZERO.
6. Set polarity with switch S23. For positive indication to minus, for negative indication to plus.
7. With switch S22 set the value noted previously as precisely as possible.
8. With P23 set the display precisely to the noted value (–100).
9. The amplifier has now been matched to the transducer's zero point.

The amplifier can now be calibrated with the internal calibration signal (see page D–9).

5 Measurement frequency range /Cut–off frequency

ME30, ME50



The amplifier's Butterworth low–pass is factory–set:

ME10	ME30	ME50	ME50S6
0...500 Hz	0...60 Hz	0...500 Hz	0...250 Hz

You can change the measuring–frequency range by repositioning DIP-switches S24/3 and S24/6:

ME10

Measurement frequency range	S24/3	S24/6
0...2 Hz (–1 dB) f_g = 2.5 Hz (–3 dB)	OPEN	OPEN
0...500 Hz (–1 dB) f_g = 675 Hz (–3 dB)	CLOSED	OPEN
0...10 kHz (–1 dB) f_g = 20 kHz (–3 dB)	without effect	CLOSED

ME30

Measurement frequency range	S24/3
0...60 Hz (–1 dB) f_g = 80 Hz (–3 dB)	CLOSED
0...2 Hz (–1 dB) f_g = 2.5 Hz (–3 dB)	OPEN

ME50

Measurement frequency range	S24/3
0...500 Hz (–1 dB) f_g = 675 Hz (–3 dB)	 CLOSED
0...2 Hz (–1 dB) f_g = 2.5 Hz (–3 dB)	 OPEN

E Index

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