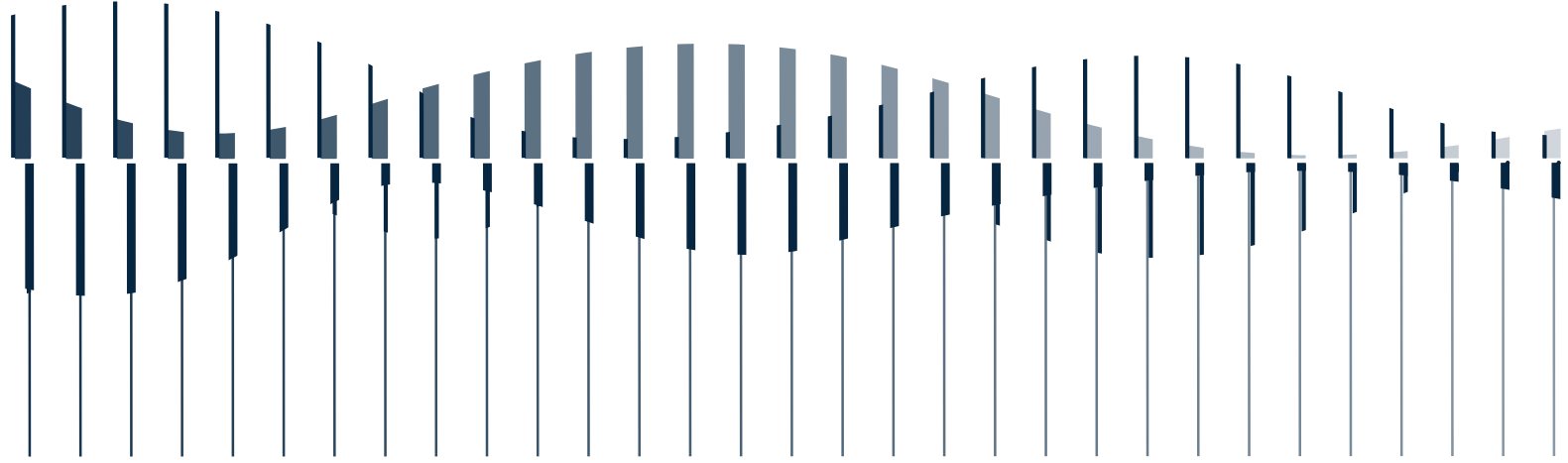




# Instruction Manual

12AK Power Module



**Power Module  
Type 12AK**

Revision 30 08 2005

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## 1. Introduction and Description

The G.R.A.S. Power Module Type 12AK (Fig. 1.1) is a single-channel power supply for preamplifiers used with condenser microphones. It is for general use in acoustic measurements as well as for intensity measurements; both in the laboratory and in the field.

It provides:

- a polarization voltage for a condenser microphone
- a voltage supply for powering a microphone preamplifier.
- a choice of signal conditioning.

A block diagram of its main components is shown in Fig. 1.2.

### 1.1 Polarization Voltage

The polarization voltage can be set to either 0V or 200V via an internal switch (see section 3.2). Use:

- 0V for prepolarized microphones, and
- 200V for externally-polarized microphones (default setting)

### 1.2 Preamplifier Voltage Supplies

The preamplifier voltage supply can be set to either 28V DC or 120V DC via an internal switch (see section 3.2). Use:

- 28V for minimum power consumption (default setting), and
- 120V for maximum dynamic range



Fig. 1.1 Power Module Type 12AK

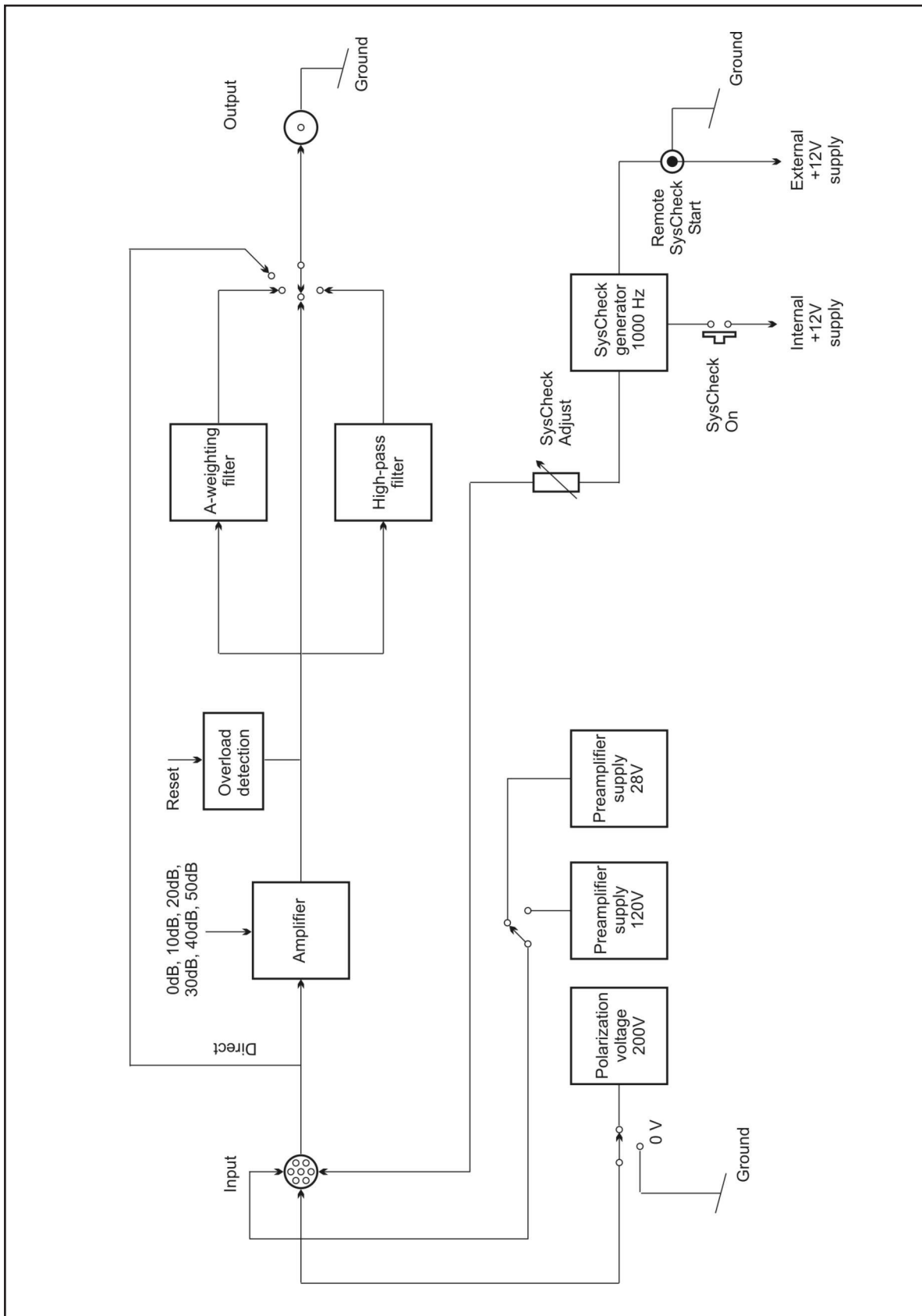


Fig. 1.2 Block diagram of the Type 12AK

## 1.3 Signal Conditioning

### 1.3.1 Frequency Response

The frequency response can be set to one of the following via a switch on the front panel (see section 2.1):

- Linear
- A-weighted  
via standard A-weighting filters fulfilling the requirements of IEC Standard 60651 "Sound Level Meters" Type 0.
- High-pass  
via a 3-pole Butterworth high-pass filter with a  $-1$  dB cut off at a frequency of 20 Hz
- Direct-mode coupling  
the microphone signal from the preamplifier is coupled directly with the BNC output socket, thus by-passing all the above settings. Use this mode if extremely good phase response is required or for maximum upper limit of dynamic range.

### 1.3.2 Gain

The gain can be set to one of the following via a switch on the front panel (see section 2.1):

- 0 dB
- +10 dB
- +20 dB
- +30 dB
- +40 dB
- +50 dB

Note: Gain is disabled if Direct mode is selected.

## 1.4 SysCheck (System Check)

The Type 12AK has a built-in 1000 Hz SysCheck generator for verifying the stability of the complete measuring system including the microphone.

The signal level from the generator can be pre-adjusted before it is applied to the measurement set-up. A system check can be activated locally via a push button on the rear panel, or remotely via a Mini Jack socket also on the rear panel.

SysCheck (or similar technique) can be used with preamplifiers supporting this feature, e.g. the G.R.A.S. preamplifiers Type 26AJ and Type 26AL.

## 1.5 Power Supplies

The Type 12AK can run on internal batteries with a battery life of approximately 10 hours using G.R.A.S. preamplifiers, or from an external power supply of 12 - 18 V DC, e.g. the mains/line adapter included with the Type 12AK.

## 1.6 Input/Output

The Type 12AK has a 7-pin LEMO input for microphone preamplifier such as the G.R.A.S. Preamplifiers Types 26AM, 26AC and 26AK. Fig. 2.2 shows the wiring diagram of this input socket which is also compatible with a range of microphone preamplifiers from other suppliers such as Norsonic, L&D and Brüel & Kjær.

The output is available via a standard BNC socket for direct use with analyzers, voltmeters, oscilloscopes etc.

## 2. External Features

### 2.1 Front Panel

The front panel has the following features (see Fig. 2.1)

- Two LEDs: green “power OK”, red “Batt. Low”.  
If the power supply is correct, the green LED lights up. If the red LED lights up, either the batteries are low and should be changed (see section 3.1) or the external DC supply voltage is too low.
- **SysCheck Adjustment** potentiometer  
Use a small screwdriver to adjust the level of the SysCheck signal applied to pin 1 of the Pre-amplifier Input socket (Fig. 2.2). Signal adjustment ranges from 0 to 5.6V RMS. (The SysCheck signal is applied when the **SysCheck Start** push-button on the rear panel is pressed - see Fig. 2.3).
- **Ovl (overload) Reset**  
Press to reset (extinguish) the latched overload LED.
- **Overload** LEDs: both red  
**Inst.** lights instantaneously and only when there is an overload.  
**Latch** lights when there is an overload and remains lit (until reset via the **Ovl Reset** button).
- **Gain** switch  
Adjust the gain to suit requirements without overload (**Overload** LEDs light up). **Gain** settings are from 0 dB to +50 dB in 10 dB steps. Disabled if Direct mode is selected (see **Filter** below).

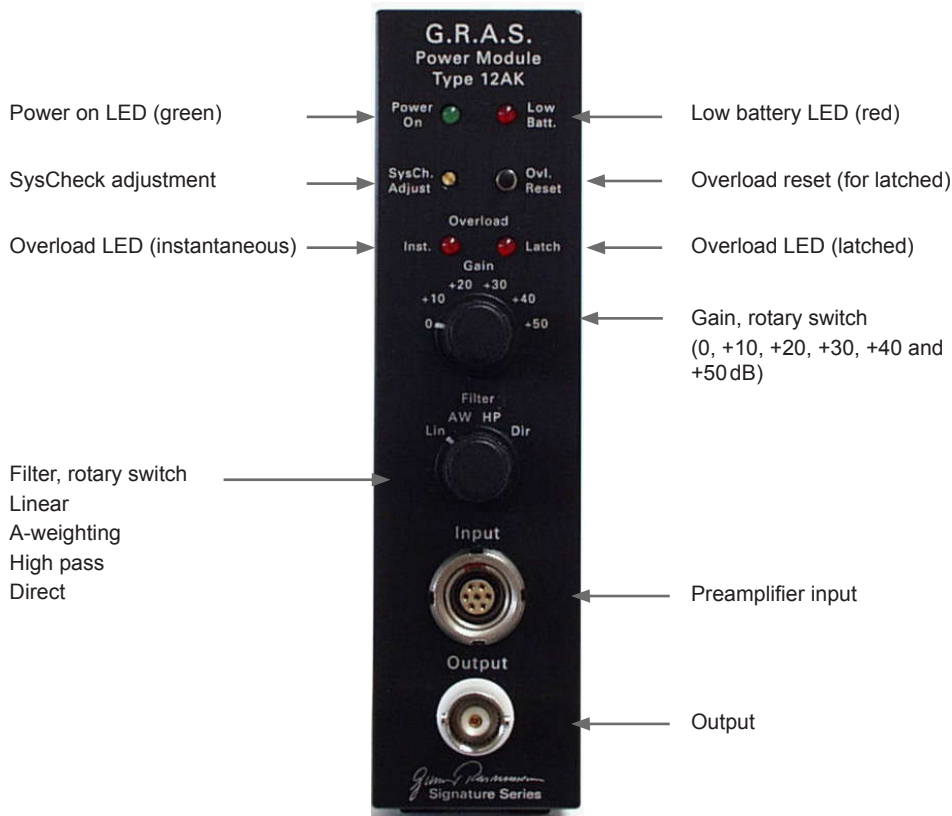


Fig. 2.1 Front panel of the Power Module Type 12AK

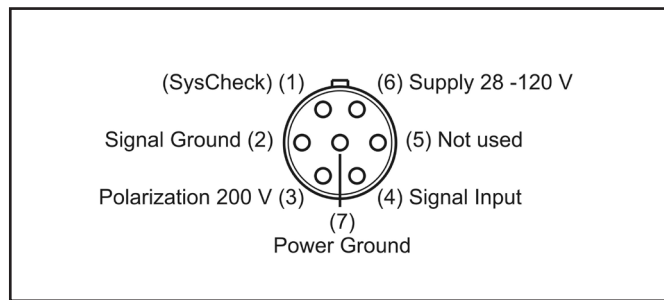


Fig. 2.2 7-pin LEMO female socket 1B (external view)

- **Filter** 4-position signal-conditioning switch;
  - **Lin.**  
routes the signal through the amplifier alone.
  - **AW**  
routes the signal through the amplifier and the A-weighting network.
  - **HP**  
routes the signal through the amplifier and the 20 Hz high-pass filter (e.g. to suppress infra-sound).
  - **Dir.**  
selects the Direct mode and by-passes all **Gain** and **Filter** selections (see also section 1.3.1).
- **Preamplifier Input**  
7-pin LEMO input connector for microphone preamplifier. Wiring diagram shown in Fig. 2.2
- **Output**  
BNC socket for the output signal either via signal conditioning or directly from the microphone preamplifier.



## 2.2 Rear Panel

The rear panel has the following features (see Fig. 2.3)

- Power switch **I/O** (On/Off)
- Twist/release holder for 250 mA, 250 V low-impedance ( $<1.5\Omega$ ) fuse.
- **Pol. Volt. 200V**  
Test points for checking the 200 V polarization at source. Red +, Black ground. Independent of the selection of polarization voltage described in section 3.2.
- **SysCheck** push-button.  
Press and hold to activate the 1000 Hz SysCheck generator. The signal from the generator will be applied to pin 1 (see Fig. 2.2) of the Pre-amplifier Input socket.
- **Remote SysCheck Start.**  
Mini Jack input for remote SysCheck start. Apply a +DC voltage of 12V to activate the SysCheck generator; centre pin +terminal.
- Input socket for an external power supply of **12 - 18V DC**; centre pin +terminal. The use of an external power supply automatically disables power from the batteries.
- Locking screw  
Unscrew to remove baseplate and gain access to internal setting switches.



Fig. 2.3 Rear panel of the Power Module Type 12AK

### 3. Internal Features

Note: switch the Type 12AK off and disconnect it from any external power supply before removing the baseplate for any reason. Afterwards replace the baseplate.

The battery pack and user-servicable switches are contained within the cabinet of the Type 12AK. To gain access to these, first remove the knurled locking screw (see Fig. 2.3) and slide the baseplate off.



Fig. 3.1 Showing the battery pack of the Power Module Type 12AK

#### 3.1 Battery Pack

Take out the battery tray (Fig. 3.1) and replace all the batteries (10 x LR6 (AA) standard alkaline cells), making sure that the polarity is as indicated on the battery tray.

#### 3.2 User-servicable Switches

The (internal) user-servicable slide switches are shown in Fig. 3.2.

- **Preamplifier supply select** pair of switches:
  - **Polarization voltage** 2-position switch selects:
    - 0V** for prepolarized (electret) microphones
    - or **200V** for externally-polarized microphones
  - **Supply voltage** 2-position switch selects:
    - 120V** for maximum dynamic range
    - or **28V** for minimum power consumption

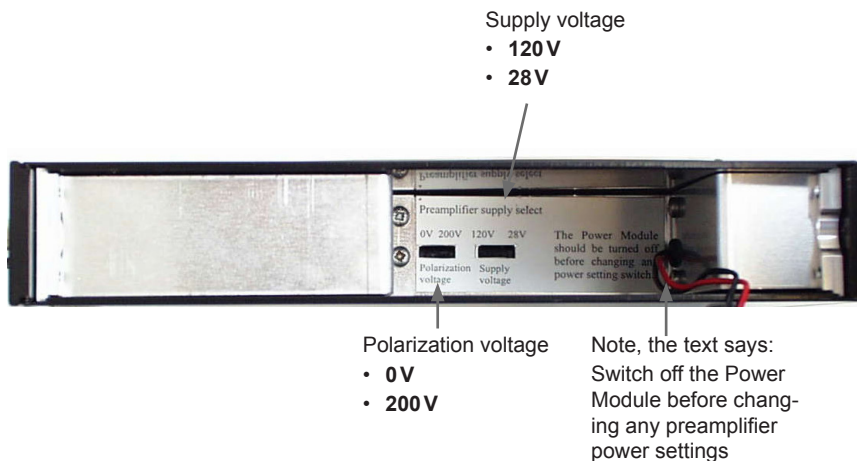


Fig. 3.2 Showing the internal switches of the Power Module Type 12AK

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## 4. Operation

### 4.1 Batteries and External Power

The Type 12AK can be powered either by internal batteries (Fig. 3.1) or from an external power supply via the DC input on the rear panel (Fig. 2.3). If an external power supply is used, the batteries within the unit will be automatically disconnected. External power should be 12 - 18V DC, typically from the mains/line adaptor included with the Type 12AK.

Whenever the Type 12AK is switched on, the green **Power On** LED on the front panel (Fig. 2.1) should always be lit to ensure correct operation. If red **Low Batt.** LED lights up, either the batteries are low and should be changed (see section 3.1) or the external DC supply voltage is too low.

### 4.2 Polarization Voltage and Preamplifier Supply Voltage

Polarization voltage can be switched from 200V to 0V (see section 3.2). Use 200V for standard externally-polarized condenser microphones, and 0V for prepolarized (electret) microphones.

Preamplifier supply voltage can be switched from 28V or 120V. Use 28V for minimising power consumption, it is also sufficient for most applications but limits the dynamic range of the microphone preamplifiers used with the Type 12AK. Use 120V to utilise the full dynamic range of the microphone preamplifier. In this case the dynamic range will be determined by the Type 12AK which should be switched to its Direct mode (section 3.2) or its Gain switched to 0dB to avoid overload. Note: if a non G.R.A.S. preamplifier is used, check its supply-voltage specifications.

### 4.3 Filter and Gain Settings, and Direct Mode

The **Gain** switch can be used in conjunction with the first three positions of the **Filter** switch, viz. (a) **Lin.** (linear), (b) **AW** (A-weighting) or (c) **HP** (high-pass) filtering. The **Gain** switch is disabled if the **Filter** switch is set to **Dir** (direct mode).

In Direct mode, all amplification and filtering circuits are by-passed; the signal goes directly from LEMO input to BNC output.

Direct mode is preferable when very good phase response is required, e.g. when using the Type 12AK in intensity measurements, or for maximum upper limit of dynamic range. In this mode, the **Gain** switch on the front panel has no effect and the overload LEDs register nothing.

In all other modes the input signals can be amplified internally and passed through a selected filter. Use **Lin.** if no filtering is required. Use **AW** if A weighting is required by the measurement standard. Use **HP** if low frequencies (below 20Hz) are to be suppressed, e.g. wind-induced noise.

### 4.4 SysCheck (System Check)

SysCheck (or similar technique) can be used with preamplifiers supporting this feature, e.g. the G.R.A.S. preamplifiers Type 26AJ and Type 26AL.

Use SysCheck to verify the stability of a complete measurement set-up. If the signal registered by the measuring equipment as a result of activating a SysCheck remains unchanged, then system stability (including the microphone) can be assumed.

## **5. Service and Repair**

Repairs should be carried out only by qualified personal. The Power Module Type 12AK should not be dismantled with power on because of high-voltage circuits.

## 6. Specifications

### Input/Output sockets:

Input: 7-pin LEMO 1B female  
Output: BNC coaxial

### Gain:

0 to +50 dB in 10 dB steps, and direct-mode coupling

### Output-voltages:

Preamplifier supply: 28 V or 120 V  
Polarization voltage: 0 V or 200 V

### Gain error:

<0.2 dB

### Frequency response (Lin setting):

20 Hz - 20 kHz:  $\pm 0.2$  dB  
2 Hz - 200 kHz (gain  $\leq +40$  dB):  $\pm 1.0$  dB  
2 Hz - 100 kHz (gain = +50 dB):  $\pm 1.0$  dB

### Inherent noise:

(20 Hz - 20 kHz with input grounded)  
A-weighted: <2.8  $\mu$ V  
Lin: <4  $\mu$ V  
(20 Hz - 20 kHz with G.R.A.S. preamplifier and 20 pF dummy microphone)  
A-weighted: <4  $\mu$ V  
Lin: <5.6  $\mu$ V

### A-weighting filters:

Compliant with IEC 60651 Type 0 (see Fig. 6.1)

### High-pass filter:

3-pole Butterworth, -1 dB at 20 Hz

### Output impedance:

30  $\Omega$

### Power supply:

10 x LR6 (AA) standard alkaline cells, or  
DC mains/line adapter supply: 12 V - 18 V

### Power consumption:

With a G.R.A.S preamplifier using:-  
120 V: 210 mA  
28 V: 180 mA

### Fuse:

250 mA (low impedance <1.5  $\Omega$ ), 250 V

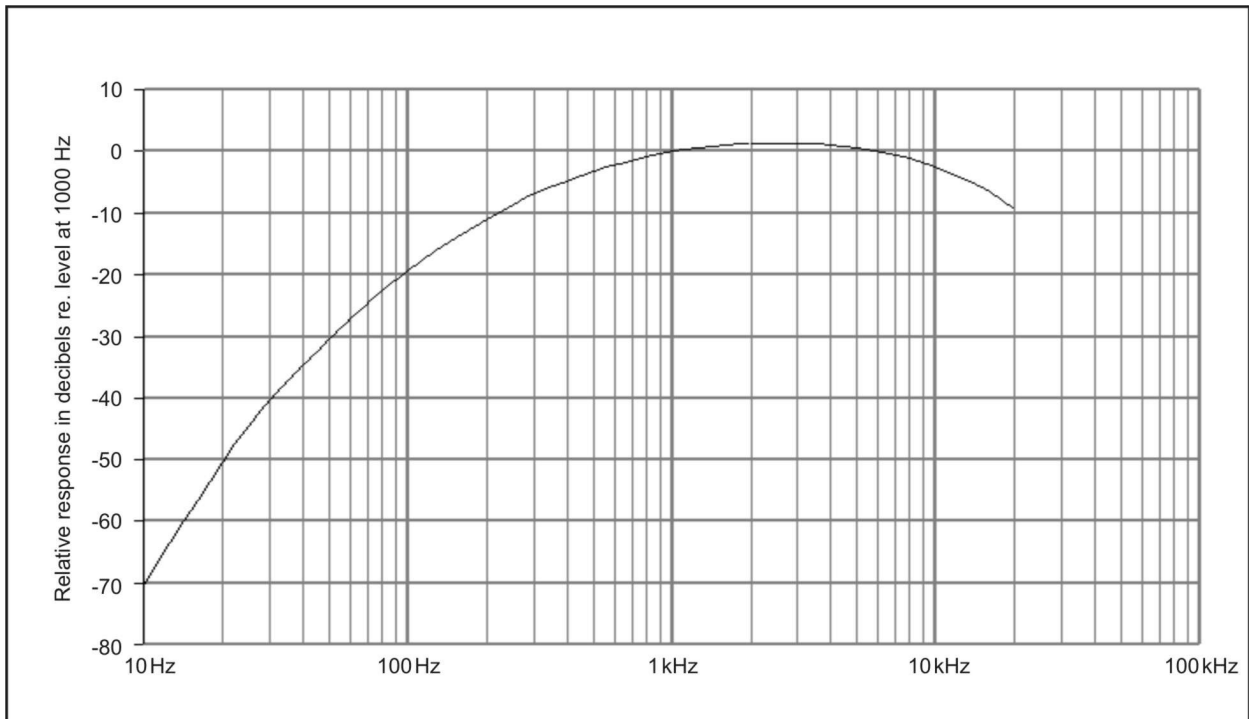


Fig. 6.1 Frequency response of A-weighting filter shown graphically

**Battery life (valid for 23°C and alkaline cells) for:-**

120 V supply:	≈9 hours
28 V supply:	≈11 hours

**Operating temperature range:**

-10 °C to +50 °C

**Dimensions:**

(1/12 of a standard 19-inch rack)  
 Height: 132.6 mm (5¼ in)  
 Width: 34.6 mm (1.3 in)  
 Depth: 196.0 mm (7.7 in)

**Weight:**

770 g (1.69 lbs)

**Accessories included:**

Mains/line adapter:

Europe:	AB0002
Or	
USA:	AB0003

**Accessories available:**

AK0040	19-inch Rack-mounting System
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Manufactured to conform with:

CE marking directive:  
93/68/EEC



WEEE directive:  
2002/96/EC



RoHS directive:  
2002/95/EC

