Power Modules

Measurement microphones and preamplifiers require special voltages for supply and polarization. There are two different supply principles. One is for the traditional voltage-driven preamplifiers, and one is for CCP (Constant Current Power) preamplifiers. Acoustic measurements also often require special signal conditioning such as A-weighting or high-pass filtering. Amplification or attenuation of the signal may also be necessary.

Standard externally polarized condenser microphones require a stable polarization voltage of 200 V DC for proper operation. This polarization voltage may be turned off in the power modules for use with pre-polarized microphones too.

A-weighting is the most commonly used form of frequency weighting in acoustic measurements. It approximates the sensitivity of the human ear, which results in a more subjective measurement of noise.

Low-frequency acoustic signals generated, for example by wind flow, may overload the input section of the analyzer and subsequent measurement chain. This can be avoided by removing frequencies below 20 Hz with the high-pass filter of a power module.

The wide range of GRAS power modules can fulfil these requirements. Some are simple supplies that give only the special voltages required, whereas others also include signal conditioning.

CCP stands for “Constant Current Power” and describes GRAS power modules that maintain a constant level of current for driving CCP transducers such as GRAS CCP Preamplifiers, standard CCP microphone sets and special CCP microphones. Since the current is constant, the only thing that can vary with a CCP transducer under excitation is the supply voltage, which is analogous to its output signal.

Furthermore, since power is supplied via the same line as that used by the signal, only a coaxial cable is needed for connecting the transducer to the power module and subsequent analyzer.

There are also dedicated power modules for use only with GRAS low-noise measurements systems. They provide polarization and supply voltages for powering the special low-noise microphones and preamplifiers. The power modules are provided with a switch for selecting a response setting of either pressure or free-field.

Large systems for multi-channel acoustic measurements involving eight channels or more are most economically realized by using multi-channel power modules. Most GRAS power modules will fit into the optional GRAS 19” standard rack kit.

A combined power module and power amplifier is also available for electro-acoustic tests of smaller devices like receivers and mini speakers.

GRAS 12AD

1-Channel Power Module

12AD is a 1-channel, battery-operated, microphone power module. It has a 7-pin LEMO 1B input connector for a microphone preamplifier and one BNC output socket. It can provide a polarization of 200 V for externally polarized or 0 V for prepolarized microphone cartridges.

A battery indicator is included to monitor battery condition as well as an input socket for an external power supply.

Specifications	12AD
Input Channels	7-pin LEMO 1B connectors
Output Channels	BNC socket
Preamplifier Supply	± 15 V
Output Impedance	Depends on preamplifier
Polarization Voltage	0 V or 200 V
Frequency Response	0.05 Hz - 200 kHz
Power Supply	4 x AA alkaline batteries (included) or 4.5 - 24 V DC mains adapter 115/230VAC) (not included)

GRAS 12AR

2-Channel Power Module

12AR is a 2-channel, battery-operated, microphone power module. It has two 7-pin LEMO 1B input connectors for microphone preamplifiers and two BNC output sockets. It can provide a polarization of 200 V for externally polarized or 0 V for prepolarized microphone cartridges.

A battery indicator is included to monitor battery condition as well as an input socket for an external power supply.

Specifications	12AR
Input Channels	2 x 7-pin LEMO 1B connectors
Output Channels	2 x BNC sockets
Preamplifier Supply	± 15 V
Output Impedance	Depends on preamplifier
Polarization Voltage	0 V or 200 V
Frequency Response	0.05 Hz - 200 kHz
Power Supply	4 x AA alkaline batteries (included) or 4.5 - 24 V DC mains adapter 115/230 VAC) (not included)

GRAS 12AK

1-Channel Power Module with Gain, Filters and SysCheck Generator

12AK is a 1-channel, battery-operated, microphone power module, amplifier and filter unit. It has a 7-pin LEMO 1B input connector for a microphone preamplifier and a BNC output socket. It has both instantaneous and latched overload indicators and a gain that can be set to 0dB, +10dB, +20dB, +30dB, +40dB or +50dB.

The A-weighting network fulfills the requirements of IEC 60651 for Type 0 and IEC 61672 Class 1 Sound Level Meters. The high pass filter is a 3-pole Butterworth filter with a cut-off frequency at 20 Hz.

A battery indicator is included to monitor battery condition as well as an input socket for an external power supply. It also has a built-in 1 kHz precision calibration generator with adjustable level for activating the SysCheck function in the 26AJ and 26AL preamplifiers. The generator can be activated either via a front-panel button or remotely via an input on the back of the module.

12 of these Power Modules can be mounted in the AK0040 Standard 19" Rack Kit.

Specifications	12AK
Input Channel	7-pin LEMO 1B connectors
Output Channel	BNC socket
Gain Settings	0 dB, +10 dB, +20 dB, +30 dB, +40 dB, +50 dB
Preamplifier Supply	28 V or 120 V
Output Impedance	30 Ω
Polarization Voltage	0 V or 200 V
Frequency Response	3.5 Hz - 200 kHz
A-weighting Network	IEC 60651 Type 0 and IEC 61672 Class 1
Power Supply	10 x AA alkaline batteries (included) or 12 - 18 V DC mains/line adapter for 115/230 VAC (included)

GRAS 12AA

2-Channel Power Module with Gain, Filters and SysCheck Generator

12AA is a 2-channel, battery-operated, microphone power module, amplifier and filter unit. It has two 7-pin LEMO 1B input connectors for microphone preamplifiers as well as two BNC output sockets. Both channels have an overload indicator and a gain that can be set to -20dB, 0dB, +20dB or +40dB.

The A-weighting network fulfills the requirements of IEC 60651 for Type 0 and IEC 61672 Class 1 Sound Level Meters. The high-pass filters are 3-pole Butterworth filters with a cut-off frequency at 20 Hz.

A battery indicator is included to monitor battery condition as well as an input socket for an external power supply. It also has a built-in 1 kHz precision calibration generator with adjustable levels for both channels for activating the SysCheck function in the 26AJ and 26AL preamplifiers. The generator can be activated either via a front-panel button or remotely via an input on the back of the module.

12 of these Power Modules can be mounted in the AK0040 Standard 19" Rack Kit.

Specifications	12AA
Input Channel	2 x 7-pin LEMO 1B connectors
Output Channel	2 x BNC socket
Gain Settings	-20 dB, 0 dB, +20 dB, +40 dB
Preamplifier Supply	28 V or 120 V
Output Impedance	30 Ω
Polarization Voltage	200 V or 0 V
Frequency Response	3.5 Hz - 200 kHz
A-weighting Network	IEC 60651 Type 0 and IEC 61672 Class 1
Power Supply	10 x AA alkaline batteries (included) or 12 - 18 V DC mains/line adapter for 115/230 VAC (included)

GRAS 12AG

8-Channel Power Module with gain, filters and SysCheck generator

12AG is an 8-channel mains/line operated power module, but can also be powered by an external DC supply. It is built for multi-channel acoustic measurements, using pre-amplifiers and condenser microphones.

Each channel offers a choice of linear response, A-weighting and high pass filters, and has a built-in 1000 Hz oscillator, which enables a complete channel check when used in conjunction with preamplifiers having SysCheck or similar facility. The polarization voltage can be set to either 200 V or 0 V allowing the use of either externally polarized and prepolarized microphone cartridges. The preamplifier supply voltage can be selected internally to either 28 V or 120 V.

Each channel has a 7-pin LEMO 1B input connector for a microphone preamplifier, as well as indicators for instantaneous and latched overloads.

The gain in each channel can be selected individually in steps of 10 dB from 0 dB up to +50 dB. The high-pass filters are 3-pole Butterworth filters with a -1dB cut-off frequency at 20 Hz to remove unwanted low frequency signals, for example caused by wind-induced noise around the microphones. Two of these Power Modules can be mounted in the AK0040 Standard 19" Rack Kit.

Specifications	12AG
Input Channels	8 x 7-pin LEMO 1B connectors
Output Channels	8 x BNC sockets
Gain Settings	0 dB, +10 dB, +20 dB, +30 dB, +40 dB, +50 dB
Preamplifier Supply	28 V or 120 V
Polarization Voltage	0 V or 200 V
Frequency Response	3.5 Hz - 200 kHz
A-weighting network	IEC 60651 Type 0 and IEC 61672 Class 1
Output Impedance	30 Ω
Power Supply	12 - 18 V DC mains/line adapter for 115/230 VAC (included)

GRAS 12AB

2-Channel Power Module for GRAS Intensity Probes

12AB is a 2-channel, battery-operated, microphone power module for use with the GRAS 50AI-B/-C/-D Sound Intensity Probe.

It has a 12-pin LEMO 1B input connector for direct connection with the intensity probe and two BNC output sockets for the microphone signals. It also has a 9-pin D-sub socket for connecting to the RS-232 port of a computer for software control of the remote control facilities of the GRAS 50AI Sound Intensity Probe.

A battery indicator is included to monitor battery condition as well as an input socket for an external power supply.

12 of these Power Modules can be mounted in the AK0040 Standard 19" Rack Kit.

Specifications	12AB
Input Channels	2 via 12-pin LEMO 1B connectors
Output Channels	2 x BNC sockets and 9-pin D-sub socket
Preamplifier Supply	28 V or 120 V
Polarization Voltage	0 V or 200 V
Frequency Response	0.05 Hz - 200 kHz
Power Supply	10 x AA alkaline batteries (included) or 12 - 18 V DC mains/line adapter for 115/230 VAC (included)

GRAS 12AQ

2-Channel Universal Power Module with signal conditioning and PC interface

12AQ is a 2-channel power module for powering microphone preamplifiers requiring a constant-current or constant voltage power supply. 12AQ is for general use in acoustic measurements as well as for intensity measurements, both in the laboratory and in the field. It has facilities for both manual control and remote control. Manual control is via front-panel switches and push buttons. Remote control is via RS-232 interface.

If a special filter function such as a HP-filter, LP-filter or BP-filter is required, it can easily be implemented in the module, as 12AQ is prepared with slots for extra filters.

Specifications	12AQ
Traditional preamp. input:	
Connector	7-pin LEMO
Power Supply	± 15V or ± 60 V
Polarization	0 V or 200 V
CCP Preamplifier Input:	
Connector	BNC coaxial
Power Supply	4 mA sourced at 28 V DC
Signal Output	BNC coaxial connector
Gain	Adjusted, steps of 10 dB from -20 dB to +70 dB
Frequency Range	2 Hz to 200 kHz ± 0.2 dB
Filters	HP filter 20 Hz. A-weighting IEC 61672 Class 1
Control Interface to host	Smart RS-232, MSG line
Power Supply	6 x LR14 alkaline batteries (included) or 8 - 18 V DC mains adapter for 115/230 VAC (included)

GRAS 12AL

1-Channel CCP Power Module with A-weighting filter

12AL is a 1-channel CCP Power Module for powering microphone preamplifiers requiring a constant-current power supply, e.g. 26CB and 26CA. It can also power the 40SC Probe Microphone as well as the 40PH and 40PL Array Microphones.

12AL covers the frequency range from 1 Hz to 200 kHz and has a switchable A-weighting network and overload indicator. It is powered either by two internal batteries (LR6-AA) or by an external 3 - 6 V DC supply.

Specifications	12AL
Input Channel	BNC socket
Output Channel	BNC socket
Transducer Supply Current	4 mA sourced from 28 V
Frequency Response	1 Hz - 200 kHz
A-Weighted Network	IEC 60651 Type 0 and IEC 61672 Class 1
Power Supply	2 x AA alkaline batteries (included) or 3 - 6 V DC mains adapter for 115/230 VAC (not included)

GRAS 12AN

4-Channel Power Module

12AN is a 4-channel power module for general use. It is a cost-effective solution with direct coupling (no filters), and is therefore ideally suited for infra-sound measurements. It can be used with all standard LEMO microphone sets and standard front-ends or acquisition units.

GRAS 12AX

4-Channel CCP Power Module

12AX is a 4-channel power module for production line testing. It has three gain settings for optimization of the signal-to-noise performance. It can be used with all standard CCP microphone sets and standard front-ends or acquisition units.

Specifications	12AN	12AX
Input Channels	4 x 7-pin LEMO 1B connector	4 x BNC sockets
Output Channels	4 x BNC sockets	4 x BNC sockets
Gain	-	0 dB, +20 dB, +40 dB
Preamplifier Supply	+/- 15 V	5 mA @ 28 V
Polarization	0 V or 200 V	0 V
Frequency Response	0.05 Hz - 200 kHz +/- 0.2 dB	1 to 300 kHz (+1/-3 dB @ Gain = 0 dB)
Power Supply (included)	4 x AA batteries or 6 - 20 V DC mains adapter for 115/230 VAC	6 - 20 V DC mains/line adapter for 115/230 VAC

GRAS 12AU

1-Channel Universal Power Module with Signal Conditioning and Power Amplifier

12AU is a combined power module and power amplifier, optimized for production line testing of micro-speakers and receivers.

It will supply a CCP or a LEMO microphone set and condition the measured signal. In addition, it will drive a loudspeaker and continuously monitor the current and voltage for easy derivation of typical loudspeaker test parameters.

It is remotely controlled via its USB interface and, for this purpose, is delivered with a control program for Microsoft Windows®. It can be mounted in a 19" rack.

Specifications	12AU	
Traditional input	Connector Power Supply	7-pin LEMO 1B series ± 15 V
CCP Input	Connector Power Supply	BNC 2-20 mA
Polarization	0 V / 200 V (remote controlled)	
Output	BNC floating (2 kΩ/100 nF to power ground)	
Gain	0 - 50 dB in 10 dB steps (± 0.2 dB) (remote controlled)	
Bandwith (-3dB)	1 Hz to 100 kHz	
Noise (relative to input) Input shorted (≥ 20 dB gain) Input loaded with 20pF dummy mic.	< 1.5 µVrms (20 Hz - 20 kHz) <5 µVrms (20 Hz - 20 kHz)	
High Pass Filter (remote controlled)	1 Hz (1. order) or 20 Hz (3. order Butterworth)	
Max Output Current	+/- 1.4 A	
Overload Detection (voltage & current)	LED indicators (remote controlled reading and reset)	
Current Output (voltage/current ratio)	1 V DC/1 A or 10 V DC/1 A	
Power Supplies (included)	6 x LR14 alkaline batteries or 8 - 18 V DC mains adapter (115/230 VAC)	

GRAS 12HF

1-Channel Power Module for Low-noise Systems

12HF is a power module for single-channel, low-noise measurements using the matched, low-noise preamplifiers and high sensitive microphones of 40HF, 40HH and 40HT Low-noise Microphone Systems.

12HF provides:

- Polarization voltage (200 V) for the condenser microphone
- Voltage supplies (±15 V) for powering the microphone preamplifier
- A response setting of pressure or free-field

When fitted with the above matched preamplifiers and microphones, the 12HF supports the specifications of GRAS Low-noise Microphone Systems.

GRAS 12HM

10-Channel Power Module for Low-noise Systems

12HM is a 10-channel power supply for multi-channel low-noise measurements with GRAS 40HF, 40HH and 40HT Low-noise Microphone Systems. With these, the 12HM can be used in sound-power measurements of low-noise products, such as disk drives, under anechoic and/or semi-anechoic conditions.

12HM provides:

- Polarization voltages (200 V) for up to 10 condenser microphones
- Voltage supplies (±15 V) for powering up to 10 microphone preamplifiers
- Individual response setting, pressure or free-field, for each channel
- Individual gain adjustment of ±3 dB for each channel.

When connected to the above matched preamplifiers and microphones, each channel supports the specifications of GRAS Low-noise Microphone Systems.

Specifications	12HF	12HM
Input Channel	7-pin LEMO EGA 1B	10 x 7-pin LEMO EGA 1B
Output Channel	BNC coaxial	10 x BNC coaxial
Output Impedance	30 Ω	30 Ω
Polarization Voltage	200 V	200 V
Gain Adjustment/Channel	-	± 3 dB
Channel Separation	-	> 90 dB
Power Supply	4 x LR14 (C) batteries or (included) 6 - 20 V DC mains adapter for 115/230 VAC (included)	Mains adapter for 115 or 230 VAC - max. 35 VA (included)
Dimensions	Height: 132.6 mm (5 1/4") Width: 34.6 mm (1.3") Depth: 196 mm (7.7")	Height: 132.6 mm (5 1/4") Width: 420 mm (16 1/2") Depth: 196 mm (7.7")
Weight	620 g (1.3 lbs)	5.5 KG (12 lbs)