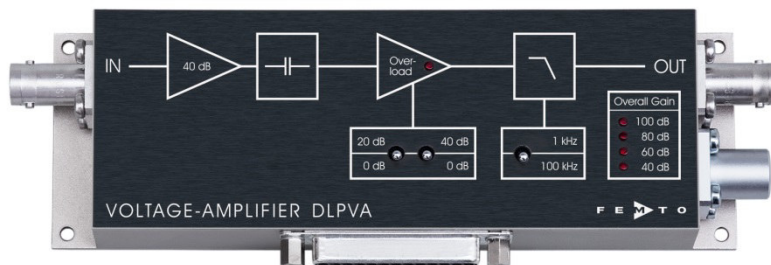


Ultra-Low-Noise Variable Gain Low-Frequency Voltage Amplifier



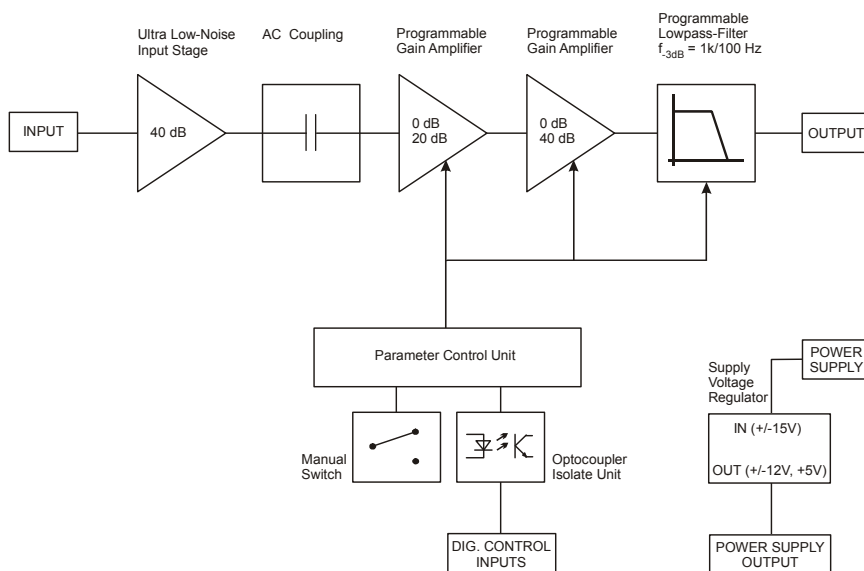
Features

- Variable gain 40 to 100 dB, switchable in 20 dB steps
- Bipolar input stage, recommended for low impedance sources smaller than 50 Ω
- Ultra low input voltage noise: 400 pV/√Hz
- AC coupled, single ended
- Bandwidth 1.5 Hz - 100 kHz, switchable to 1 kHz
- Local and remote control

Applications

- Ultra low-noise laboratory amplifier
- Pulsed thermal EMF analysis
- Chopped thermopiles / bolometers
- Industrial sensors
- Detector preamplifier
- Integrated measurement systems

Block Diagram

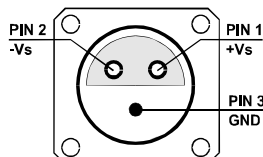


BS01-0445-20_R2

Ultra-Low-Noise Variable Gain Low-Frequency Voltage Amplifier

Specifications	<p>Test conditions $V_s = \pm 15\text{ V}$, $T_A = 25\text{ }^\circ\text{C}$, load impedance = $1\text{ M}\Omega$</p>										
Gain	<p>Gain values 40, 60, 80, 100 dB indicated by four LEDs</p> <p>Gain accuracy $\pm 1\%$</p>										
Frequency Response	<p>Lower cut-off frequency 1.5 Hz</p> <p>Upper cut-off frequency 100 kHz, 12 dB/Oct switchable to 1 kHz, 6 dB/Oct.</p>										
Time Response	<p>Rise/fall time (10% - 90%) 3.5 μs (@ BW = 100 kHz) 350 μs (@ BW = 1 kHz)</p>										
Input	<p>Input impedance 1 kΩ typ.</p> <p>Equivalent input voltage noise</p> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Gain setting</th> <th>Noise</th> </tr> </thead> <tbody> <tr> <td>100 dB</td> <td>400 pV/$\sqrt{\text{Hz}}$</td> </tr> <tr> <td>80 dB</td> <td>420 pV/$\sqrt{\text{Hz}}$</td> </tr> <tr> <td>60 dB</td> <td>800 pV/$\sqrt{\text{Hz}}$</td> </tr> <tr> <td>40 dB</td> <td>6 nV/$\sqrt{\text{Hz}}$</td> </tr> </tbody> </table> <p>Equivalent input current noise 5,5 pA/$\sqrt{\text{Hz}}$</p> <p>1/f-noise corner 100 Hz</p> <p>Input bias current 30 μA</p> <p>Maximum input DC-offset voltage for linear amplification $\pm 90\text{ mV}$</p> <p>Important notice: The input must see a source impedance below 200 Ω.</p>	Gain setting	Noise	100 dB	400 pV/ $\sqrt{\text{Hz}}$	80 dB	420 pV/ $\sqrt{\text{Hz}}$	60 dB	800 pV/ $\sqrt{\text{Hz}}$	40 dB	6 nV/ $\sqrt{\text{Hz}}$
Gain setting	Noise										
100 dB	400 pV/ $\sqrt{\text{Hz}}$										
80 dB	420 pV/ $\sqrt{\text{Hz}}$										
60 dB	800 pV/ $\sqrt{\text{Hz}}$										
40 dB	6 nV/ $\sqrt{\text{Hz}}$										
Output	<p>Output impedance <100 Ω (terminate with > 100 kΩ load for best performance)</p> <p>Output voltage range for linear amplification $\pm 10\text{ V}$ (@ > 100 kΩ load)</p> <p>Output current (max.) $\pm 20\text{ mA}$</p> <p>Output overload recovery time 0.5 ms (after 20x overload)</p>										
Overload LED	<p>The amplifier features a LED to signalize an overload condition. The Overload LED will turn on if the signal level within the signal path exceeds the linear operating range. In order to ensure the correct operation of the amplifier without signal distortions reduce the gain setting until the Overload LED turns off.</p> <p>The Overload LED may also turn on when the amplifier is operated with open input or with a high source impedance, e. g. external AC coupling. In this case the bias current may cause a considerable input voltage. For proper operation please use a source impedance of less than 100 Ω or switch to a lower gain setting.</p>										
Remote Digital Control	<p>Control input voltage range Low: $-0.8 \dots +0.8\text{ V}$ High: $+1.8 \dots +12\text{ V}$, TTL / CMOS compatible</p> <p>Control input current 0 mA @ 0 V, 1.5 mA @ +5 V, 4.5 mA @ +12 V</p> <p>Overload output Non active: +5 V, max. 1 mA, active: 0.8 V, max. -10 mA</p>										
Power Supply	<p>Supply voltage $\pm 15\text{ V}$ ($\pm 14.5\text{ V}$ to $\pm 16\text{ V}$)</p> <p>Supply current $\pm 55\text{ mA}$ typ. (depends on operating conditions, recommended power supply capability min. $\pm 150\text{ mA}$)</p>										

Ultra-Low-Noise Variable Gain Low-Frequency Voltage Amplifier

Specifications (continued)									
Case	Weight 0.32 kg (0.7 lbs) Material AlMg4.5Mn, nickel-plated								
Temperature Range	Storage temperature -40 °C to +70 °C Operating temperature 0 °C to +55 °C								
Absolute Maximum Ratings	Power supply voltage ±21 V Control input voltage +16 V / -5 V Signal input voltage ±4 V Overvoltage at the signal input can severely degrade the noise performance or destroy the amplifier!								
Connectors	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; vertical-align: top;">Input</td> <td>BNC jack (female)</td> </tr> <tr> <td style="vertical-align: top;">Output</td> <td>BNC jack (female)</td> </tr> <tr> <td style="vertical-align: top;">Power supply</td> <td> Lemo® series 1S, 3-pin fixed socket (mating plug type: FFA.1S.303.CLAC52) Pin 1: +15V Pin 2: -15V Pin 3: GND </td> </tr> <tr> <td style="vertical-align: top;">Control port</td> <td> Sub-D 25-pin, female Pin 1: +12 V (stabilized power supply output, max. 60 mA*) Pin 2: -12 V (stabilized power supply output, max. 60 mA*) Pin 3: AGND (analog ground) Pin 4: +5 V (stabilized power supply output, max. 15 mA*) Pin 5: digital output: overload Pin 6: NC Pin 7: NC Pin 8: NC Pin 9: DGND (ground f. digital control Pin 10 - 25) Pin 10: NC Pin 11: digital control input: gain, LSB Pin 12: digital control input: gain, MSB Pin 13: NC Pin 14: digital control input: 100 kHz / 1 kHz Pin 15 - 25: NC </td> </tr> </table> <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: right; margin-top: 20px;">*check power supply for maximum deliverable current</p>	Input	BNC jack (female)	Output	BNC jack (female)	Power supply	Lemo® series 1S, 3-pin fixed socket (mating plug type: FFA.1S.303.CLAC52) Pin 1: +15V Pin 2: -15V Pin 3: GND	Control port	Sub-D 25-pin, female Pin 1: +12 V (stabilized power supply output, max. 60 mA*) Pin 2: -12 V (stabilized power supply output, max. 60 mA*) Pin 3: AGND (analog ground) Pin 4: +5 V (stabilized power supply output, max. 15 mA*) Pin 5: digital output: overload Pin 6: NC Pin 7: NC Pin 8: NC Pin 9: DGND (ground f. digital control Pin 10 - 25) Pin 10: NC Pin 11: digital control input: gain, LSB Pin 12: digital control input: gain, MSB Pin 13: NC Pin 14: digital control input: 100 kHz / 1 kHz Pin 15 - 25: NC
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Remote Control Operation

General

Remote control input bits are opto-isolated and connected by logical OR to local switch setting. For remote control set the corresponding local switch to "0 dB" and "1 kHz" and select the wanted setting via a bit-code at the corresponding digital inputs.
Mixed operation, e.g. local gain setting and remote controlled bandwidth setting, is also possible.

Gain setting

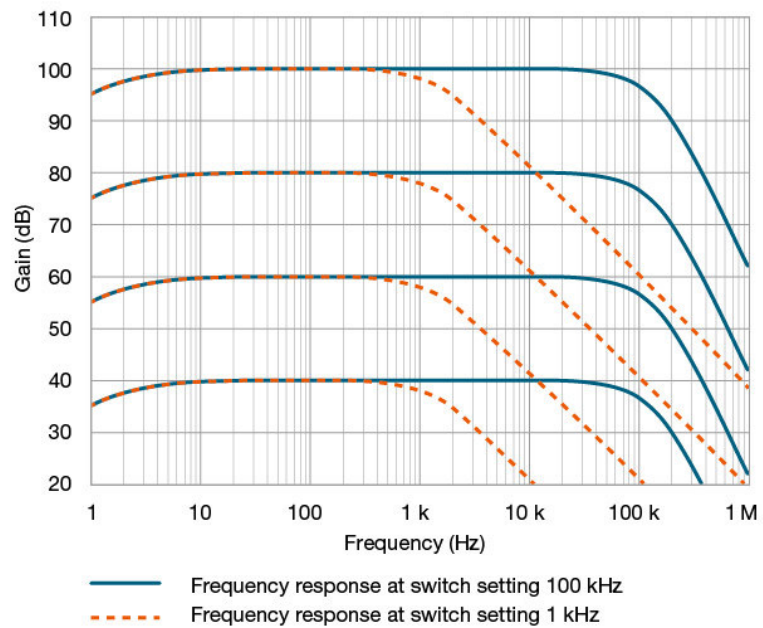
Gain	Pin 11	Pin 12
40 dB	low	low
60 dB	high	low
80 dB	low	high
100 dB	high	high

Bandwidth setting

Bandwidth	Pin 14
1 kHz	low
100 kHz	high

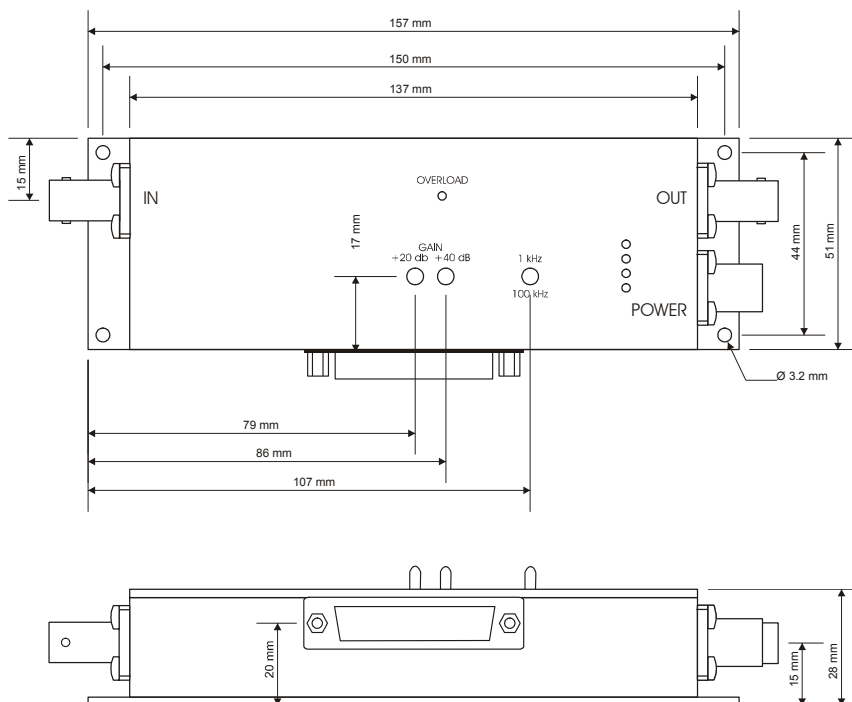
Typical Performance
Characteristics

Frequency response



Ultra-Low-Noise Variable Gain Low-Frequency Voltage Amplifier

Dimensions



DZ-DLPVA-BUN-S_R1

FEMTO Messtechnik GmbH
 Klosterstr. 64
 10179 Berlin · Germany
 Phone: +49 30 280 4711-0
 Fax: +49 30 280 4711-11
 Email: info@femto.de
 www.femto.de

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