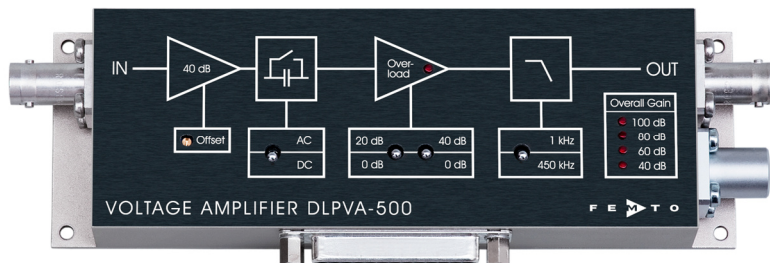


Variable Gain Low-Frequency Voltage Amplifier



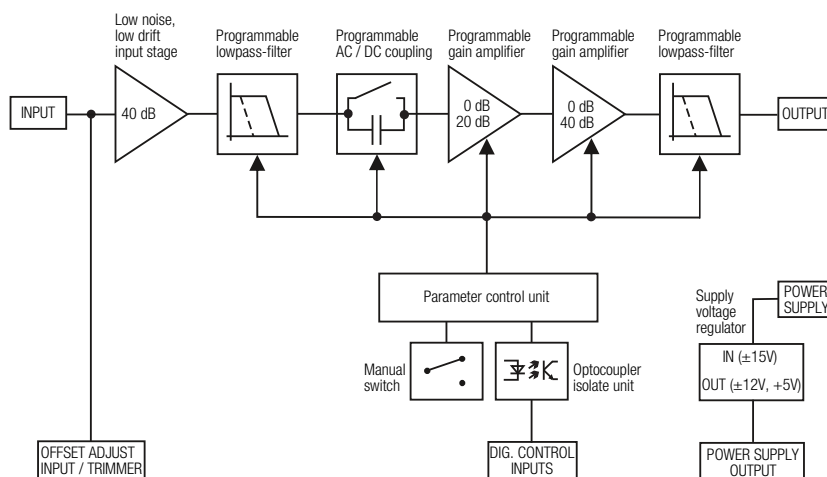
Features

- Variable gain 40 to 100 dB, switchable in 20 dB steps
- Bipolar input stage, recommended for low impedance sources less than 100 Ω
- DC-coupled, single ended
- Very low input voltage noise down to 700 pV/ $\sqrt{\text{Hz}}$
- Bandwidth DC – 450 kHz, switchable to 1 kHz
- 0.5 $\mu\text{V}/^\circ\text{C}$ DC-drift
- Switchable AC/DC-coupling
- Local and remote control

Applications

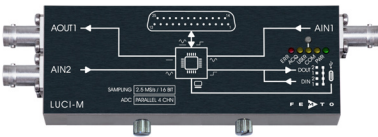
- Low-noise laboratory amplifier
- Pulsed thermal EMF analysis
- Industrial sensors
- Detector preamplifier
- Integrated measurement systems

Block Diagram



BS-DLPVA-BLN-S_R01

Variable Gain Low-Frequency Voltage Amplifier

Intended Use	The DLPVA-500-BLN-S voltage amplifier is a variable gain voltage amplifier. It is designed for fast amplification of small voltage signals. Operation is largely self-explanatory. If in doubt, consult this document or contact support@femto.de. For safe operation, please refer to the damage thresholds specified in the "Absolute Maximum Ratings", "Temperature Range" and "Power Supply" sections of this document. The operating environment must be free of smoke, dust, grease, oil, condensing moisture, and other contaminants that could affect the operation or performance.	
Application Notes	The DLPVA-500-BLN-S amplifier is designed for use with low resistance sources up to 100 Ω. A high source resistance causes significant increase of the input offset voltage and may trigger overload status. See "Overload LED" section for details.	
Available Version	DLPVA-500-BLN-S	Variable gain voltage amplifier, gain settings 40/60/80/100 dB, single ended (bipolar), typical source resistance <100 Ω , input 1 M Ω (BNC), bandwidth DC/1.5 Hz – 1/450 kHz
Related Models	DLPVA-500-B-S	Variable gain voltage amplifier, gain settings 20/40/60/80 dB, single ended (bipolar), typical source resistance <1 k Ω , input 1 M Ω (BNC), bandwidth DC/1.5 Hz – 1/500 kHz
	DLPVA-500-B-D	Variable gain voltage amplifier, gain settings 20/40/60/80 dB, true differential (bipolar), typical source resistance <10 k Ω , input 1 M Ω (LEMO [®]), bandwidth DC/1.5 Hz – 1/500 kHz
	DLPVA-500-F-S	Variable gain voltage amplifier, gain settings 20/40/60/80 dB, single ended (FET), typical source resistance <1 M Ω , input 1 T Ω (BNC), bandwidth DC/1.5 Hz – 1/500 kHz
	DLPVA-500-F-D	Variable gain voltage amplifier, gain settings 20/40/60/80 dB, true differential (FET), typical source resistance <1 M Ω , input 1 T Ω (LEMO [®]), bandwidth DC/1.5 Hz – 1/500 kHz
Available Accessories	PS-15-25-L	 Power Supply Input: AC 100 – 240 V Output: DC $\pm$15 V
	LUCI-10	 Compact digital I/O interface for USB remote control, supports opto-isolation of amplifier signal path from PC USB port, 16 digital outputs, 3 opto-isolated digital inputs, bus-powered operation
	LUCI-M	 Compact, universal USB system for data acquisition (DAQ) and control, up to 4 parallel 16 bit ADC channels with 2.5 MS/s, 3 12 bit DAC channels, 24 digital I/O s

Variable Gain Low-Frequency Voltage Amplifier

Available Accessories
(continued)

CAB-HF1



Double shielded high performance cables, minimizes ground related noise, designed for precise measurement of small signals

Specifications

Test conditions

$V_S = \pm 15\text{ V}$, $T_A = 25\text{ }^\circ\text{C}$, output load impedance $1\text{ M}\Omega$, warm-up 20 minutes (min. 10 minutes recommended)

Gain

Gain values

40, 60, 80, 100 dB
indicated by LEDs, (@ output load $\geq 100\text{ k}\Omega$)

Gain accuracy

$\pm 0.05\text{ dB}$

Frequency Response

Lower cut-off frequency

DC / 1.5 Hz, switchable

Upper cut-off frequency (-3 dB)

450 kHz / 1 KHz, switchable

Upper cut-off frequency roll-off

12 dB/oct.

Time Response

Rise/fall time (10 % - 90 %)

0.78 μs (@ bandwidth 450 kHz)
350 μs (@ bandwidth 1 kHz)

Input

Input impedance

$1\text{ M}\Omega \parallel 13\text{ pF}$

Input voltage drift

0.5 $\mu\text{V}/^\circ\text{C}$

Equ. input noise voltage

gain settings	noise
40 dB	0.8 nV/ $\sqrt{\text{Hz}}$
60, 80, 100 dB	0.7 nV/ $\sqrt{\text{Hz}}$

Equ. input noise current

3 pA/ $\sqrt{\text{Hz}}$

1/f-noise corner

100 Hz

Input bias current

1 μA

Input bias current drift

8 nA/ $^\circ\text{C}$

Input offset voltage

$\pm 0.5\text{ mV}$, adjustable by offset trimmer and external control voltage

Output

Output voltage range

$\pm 10\text{ V}$ (@ $\geq 100\text{ k}\Omega$ output load)

Output impedance

$50\text{ }\Omega$ (terminate with $\geq 100\text{ k}\Omega$ load for best performance)

Max. output current

$\pm 20\text{ mA}$ (short-circuit proof)

Output overload recovery time

0.5 ms (after 20 x overload)

Overload LED

The amplifier features a LED to indicate 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.

The Overload LED may also turn on when the amplifier is operated with open input or with a high source resistance, e. g. external AC coupling. In this case the bias current may cause a considerable input voltage. For proper operation please use a source resistance of less than $100\text{ }\Omega$ or switch to a lower gain setting.

Digital Control

Control input voltage range

Low: $-0.8 \dots +0.8\text{ V}$
High: $+1.8 \dots +12\text{ V}$, TTL / CMOS compatible
Control input current
0 mA @ 0 V, 1.5 mA @ +5 V, 4.5 mA @ +12 V
Overload output
Non active: +5 V, max. 1 mA, active: 0.8 V, max. -10 mA

Ext. Offset Control

Offset control voltage range

$\pm 10\text{ V}$ (+10 V corresponds to +0.5 mV input offset voltage)

Offset control input impedance

$200\text{ k}\Omega$

Variable Gain Low-Frequency Voltage Amplifier

Specifications (continued)

Power Supply

Supply voltage DC ± 15 V (± 14.5 V to ± 16 V)
Supply current ± 75 mA typ. (depends on operating conditions, recommended power supply capability min. ± 150 mA)

Case

Weight 320 g (0.7 lbs)
Material AlMg4.5Mn, nickel-plated

Temperature Range

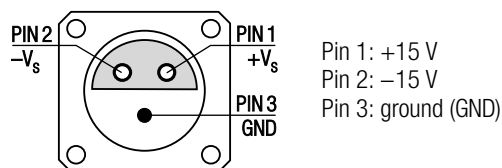
Storage temperature -40 °C ... $+80$ °C
Operating temperature 0 °C ... $+60$ °C

Absolute Maximum Ratings

Digital control input voltage -5 V/ $+16$ V relative to digital ground DGND (pin 9)
Analog control input voltage ± 15 V relative to analog ground AGND (pin 3)
Power supply voltage ± 20 V
Signal Input voltage ± 0.7 V
Overvoltage at the signal input can severely degrade the noise performance or destroy the amplifier!

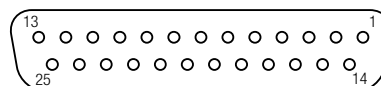
Connectors

Input BNC jack (female)
Output BNC jack (female)
Power supply LEMO® series 1S, 3-pin fixed socket (mating plug type: FFA.1S.303.CLAC52)



Control port

Sub-D 25-pin, female, qual. class 2



Pin 1: $+12$ V (stabilized power supply output*)
Pin 2: -12 V (stabilized power supply output*)
Pin 3: AGND (analog ground for pins 1 – 8)
Pin 4: $+5$ V (stabilized power supply output*)
Pin 5: digital output: overload (referred to pin 3)
Pin 6: NC
Pin 7: NC
Pin 8: input offset control voltage
Pin 9: DGND (ground for digital control pins 10 – 14)
Pin 10: NC
Pin 11: digital control input: gain, LSB
Pin 12: digital control input: gain, MSB
Pin 13: digital control input: AC/DC
Pin 14: digital control input: 450 kHz / 1 kHz
Pin 15 – 25: NC

*stabilized power supply output current
 ± 12 V: max. ± 100 mA
 $+5$ V: max. 50 mA

Variable Gain
Low-Frequency Voltage Amplifier

Remote Control Operation

General	Remote control input bits are opto-isolated and connected by logical OR function to local switch settings. For remote control set the corresponding local switches to "0 dB", "AC" 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 LSB	Pin 12 MSB
	40 dB	low	low
	60 dB	high	low
	80 dB	low	high
	100 dB	high	high
AC/DC setting	Coupling	Pin 13	
	AC	low	
	DC	high	
Bandwidth setting	Bandwidth	Pin 14	
	1 kHz	low	
	450 kHz	high	

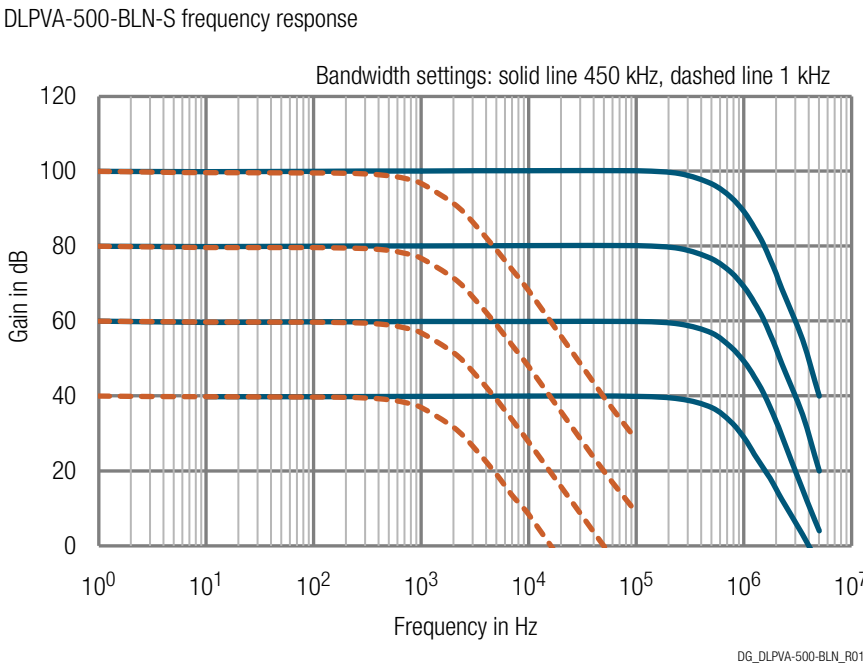
Scope of Delivery

DLPVA-500-BLN-S, LEMO® 3-pin connector, datasheet, transport package

Ordering Information

DLPVA-500-BLN-S Variable gain voltage amplifier, single ended (bipolar)

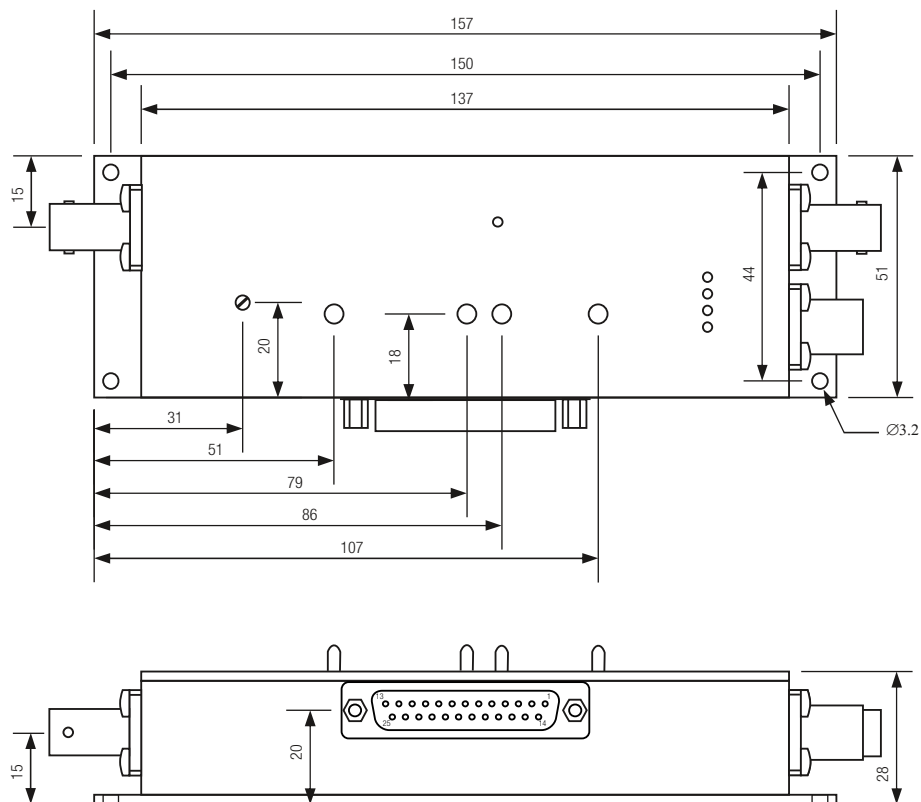
Typical Performance
Characteristics



Variable Gain Low-Frequency Voltage Amplifier

Dimensions

DLPVA-500-BLN-S



DZ-DLPVA-500-BLNS-B-F-S_R01

all dimensions in mm unless otherwise noted

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