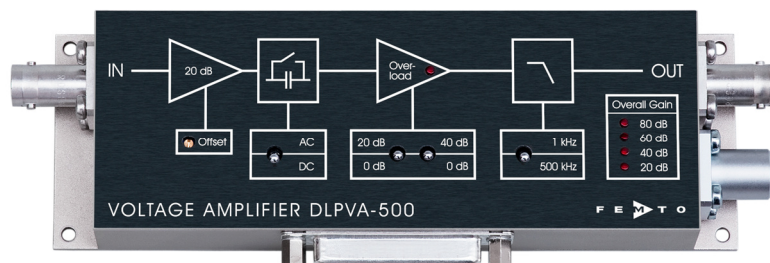


Variable Gain Low-Frequency Voltage Amplifier



The picture shows model DLPVA-500-F-S with BNC input

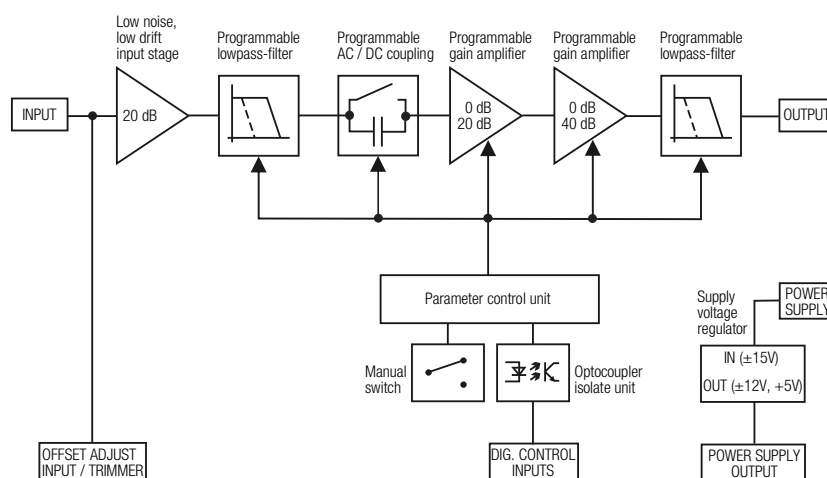
Features

- **Variable gain 20 to 80 dB, switchable in 20 dB steps**
- **FET input stage, 1 T Ω impedance**
- **Protection against ± 3 kV transients**
- **Single ended and true differential input models**
- **Bandwidth DC – 500 kHz, switchable to 1 kHz**
- **1.3 μ V/ $^{\circ}$ C DC-drift**
- **120 dB CMRR**
- **Down to 5 nV/ $\sqrt{\text{Hz}}$ input noise**
- **Switchable AC/DC-coupling**
- **Local and remote control**

Applications

- **Universal laboratory amplifier**
- **Automated measurements**
- **Industrial sensors**
- **Detector preamplifier**
- **Integrated measurement systems**

Block Diagram



BS-DLPVA-B-F_R01

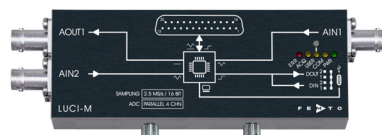
Variable Gain Low-Frequency Voltage Amplifier

Intended Use	The DLPVA-500-F voltage amplifiers are variable gain voltage amplifiers. They are 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-F amplifiers are designed for use with high resistance sources up to 100 MΩ. A higher source resistance causes significant increase of the input offset voltage and may trigger overload status. See "Overload LED" section for details. The source resistance (R), in combination with the amplifier's input capacitance (C) of 18 pF, forms a low-pass filter. Therefore, a source resistance above 20 kΩ limits the transmission bandwidth. A coax cable between source and amplifier increases the amplifier input capacitance (typical 1 pF/cm). Long input cables should therefore be avoided. The upper cut-off frequency (f_c) of the input signal can be estimated by $f_c = 1/(2\pi RC)$. When using a DLPVA-500-F-D with differential input, ensure that the common mode voltage, relative to the amplifier case, does not exceed the allowable range of ± 8 V. A floating source, such as an induction coil, without any connection to the amplifier ground will trigger the overload status as well.	
Available Versions	DLPVA-500-F-S DLPVA-500-F-D	Variable gain voltage amplifier, gain settings 20/40/60/80 dB, single ended (FET), typical source resistance <1 MΩ, input 1 TΩ (BNC), bandwidth DC/1.5 Hz – 1/500 kHz Variable gain voltage amplifier, gain settings 20/40/60/80 dB, true differential (FET), typical source resistance <1 MΩ, input 1 TΩ (LEMO®), bandwidth DC/1.5 Hz – 1/500 kHz
Related Models	DLPVA-500-BLN-S DLPVA-500-B-S DLPVA-500-B-D	Variable gain voltage amplifier, gain settings 40/60/80/100 dB, single ended (bipolar), typical source resistance <100 Ω, input 1 MΩ (BNC), bandwidth DC/1.5 Hz – 1/500 kHz Variable gain voltage amplifier, gain settings 20/40/60/80 dB, single ended (bipolar), typical source resistance <1 kΩ, input 1 MΩ (BNC), bandwidth DC/1.5 Hz – 1/500 kHz Variable gain voltage amplifier, gain settings 20/40/60/80 dB, true differential (bipolar), typical source resistance <10 kΩ, input 1 MΩ (LEMO®), bandwidth DC/1.5 Hz – 1/500 kHz
Available Accessories	PS-15-25-L  LUCI-10 	Power Supply Input: AC 100 – 240 V Output: DC ± 15 V 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

Variable Gain Low-Frequency Voltage Amplifier

Available Accessories
(continued)

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 galvanic isolation from computer

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), source impedance $50\text{ }\Omega$

Gain

Gain values
Gain accuracy

20, 40, 60, 80 dB, indicated by LEDs, (@ output load $\geq 100\text{ k}\Omega$)
 $\pm 0.05\text{ dB}$

Frequency Response

Lower cut-off frequency
Upper cut-off frequency (-3 dB)
Upper cut-off frequency roll-off

DC / 1.5 Hz, switchable
500 kHz / 1 KHz, switchable
12 dB/oct

Time Response

Rise/fall time (10 % - 90 %)

$0.7\text{ }\mu\text{s}$ (@ bandwidth 500 kHz)
 $350\text{ }\mu\text{s}$ (@ bandwidth 1 kHz)

Input

Input impedance
Input voltage drift

$1\text{ T}\Omega \parallel 18\text{ pF}$
 $1.3\text{ }\mu\text{V}/^\circ\text{C}$

Equ. input noise voltage

gain settings	DLPVA-500-F-S	DLPVA-500-F-D
20 dB	$6.5\text{ nV}/\sqrt{\text{Hz}}$	$7.5\text{ nV}/\sqrt{\text{Hz}}$
40, 60, 80 dB	$5.0\text{ nV}/\sqrt{\text{Hz}}$	$6.5\text{ nV}/\sqrt{\text{Hz}}$

Equ. input noise current

$1.6\text{ fA}/\sqrt{\text{Hz}}$

1/f-noise corner

80 Hz

Input bias current

3 pA typ.

Input bias current drift

Factor $2.3 / 10\text{ }^\circ\text{C}$

Input offset voltage

$\pm 5\text{ mV}$, adjustable by offset trimmer and external contr. voltage

True differential input, model "DLPVA-500-F-D" only:

Common mode voltage range

$\pm 8\text{ V}$

CMRR

120 dB (@ 100 Hz)
 100 dB (@ 10 kHz)
 80 dB (@ 60 kHz)

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)

Variable Gain Low-Frequency Voltage Amplifier

Specifications (continued)

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 under the following operating conditions:

- The amplifier is operated with open input or with a high source resistance, e. g. external AC coupling. Due to the near infinite input resistance a charge present at the input will persist. For proper operation please use a source resistance of less than 100 M Ω or switch to a lower gain setting.
- When using a DLPVA-500-F-D with differential input stage the Overload LED may turn on if the common mode input voltage exceeds the common mode voltage range. This is likely to happen when the source is floating with respect to the amplifier ground. For proper operation make sure that the common mode voltage stays within the allowed common mode voltage range with respect to the amplifier ground. Provide an electrical connection between the source ground and the amplifier ground to ensure the inputs cannot drift outside the tolerable common mode range.

Digital Control

Control input voltage range	Low: -0.8 ... +0.8 V High: +1.8 ... +12 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	± 10 V (+10 V corresponds to +5 mV input offset voltage)
Offset control input impedance	200 k Ω

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	± 15 V
Transient input voltage	± 3 kV (discharge from 5 nF source)

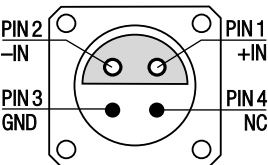
Variable Gain
Low-Frequency Voltage Amplifier

Connectors

Input

Model DLPVA-500-F-S
BNC jack (female)

Model DLPVA-500-F-D
LEMO® series 1S, 4-pin fixed socket
(mating plug type: FFA.1S.304.CLAC52)



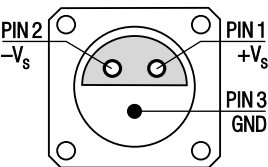
Pin 1: non inverting input
Pin 2: inverting input
Pin 3: ground (GND)
Pin 4: not connected (NC)

Output

BNC jack (female)

Power supply

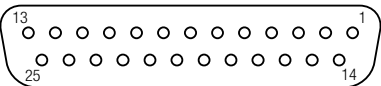
LEMO® series 1S, 3-pin fixed socket
(mating plug type: FFA.1S.303.CLAC52)



Pin 1: +15 V
Pin 2: -15 V
Pin 3: ground (GND)

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: 500 kHz / 1 kHz
- Pin 15 – 25: NC

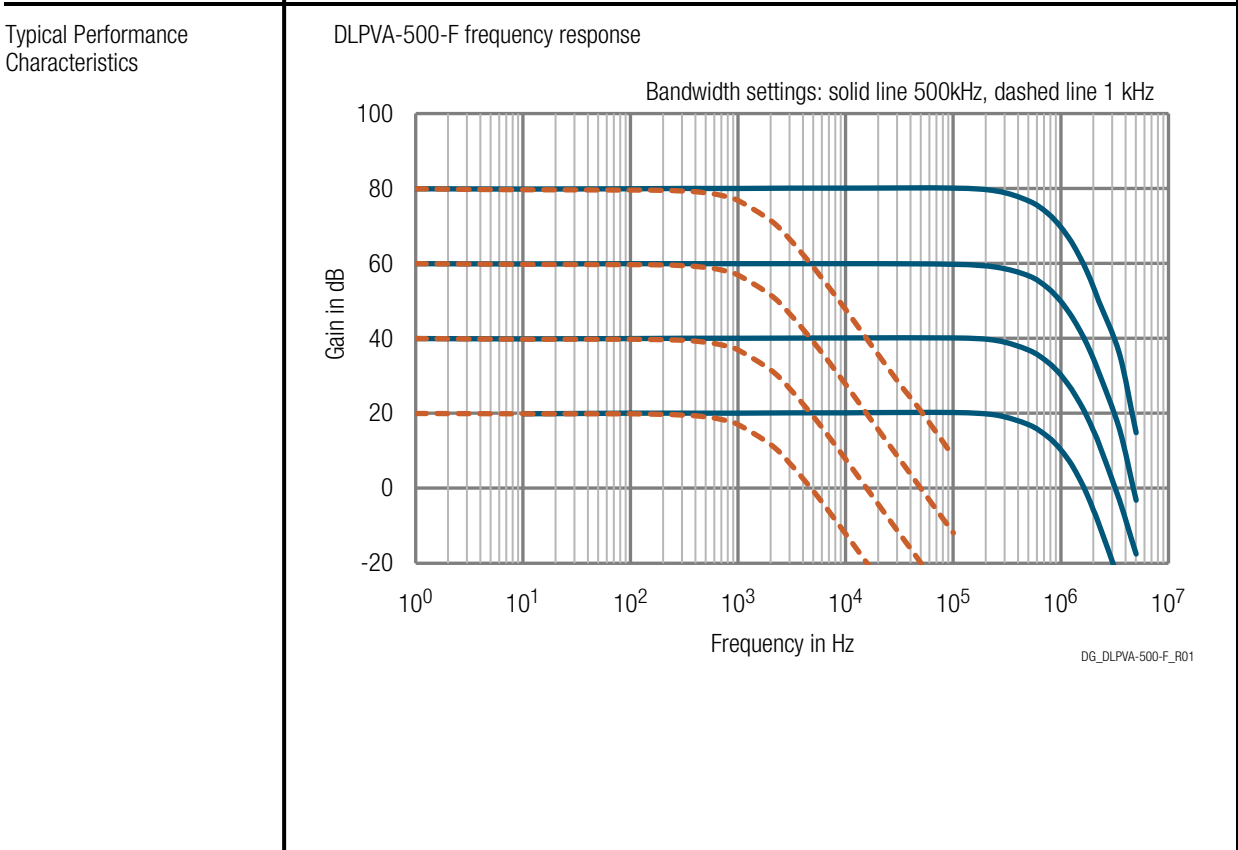
*stabilized power supply output current
±12 V: max. ±100 mA
+5V: max. 50 mA

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
		20 dB	low	low
		40 dB	high	low
		60 dB	low	high
AC/DC setting		80 dB	high	high
	AC/DC setting	Coupling	Pin 13	
		AC	low	
Bandwidth setting		DC	high	
	Bandwidth setting	Bandwidth	Pin 14	
		1 kHz	low	
		500 kHz	high	

Scope of Delivery	DLPVA-500-F, LEMO® 3-pin connector, LEMO® 4-pin connector (model DLPVA-500-F-D only), datasheet, transport package
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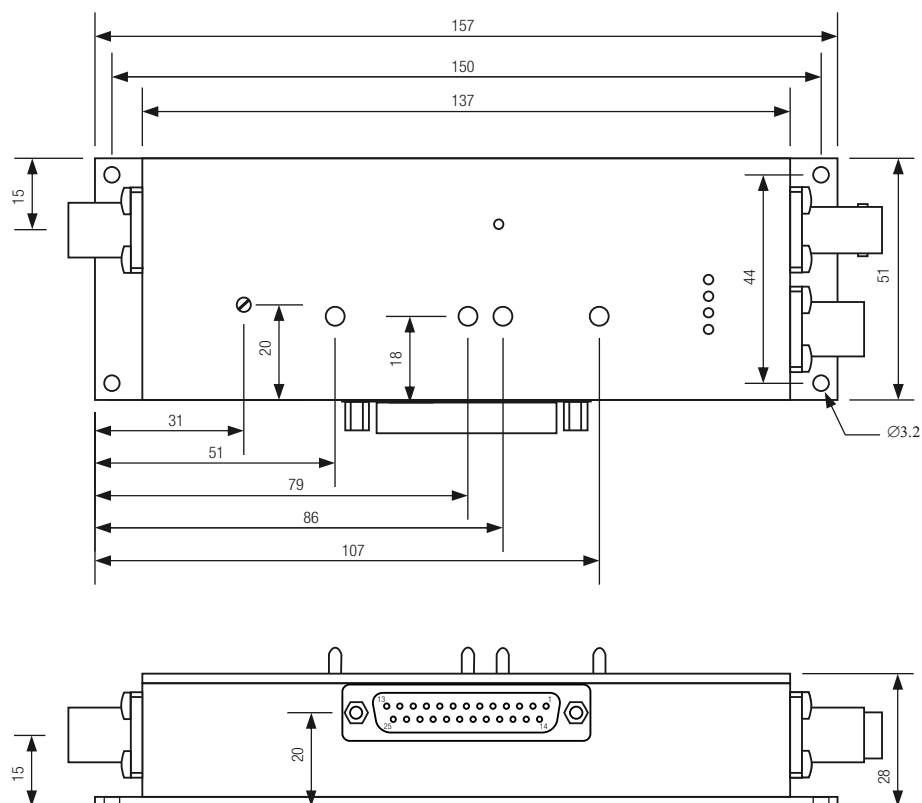
Ordering Information	DLPVA-500-F-S	Variable gain voltage amplifier, single ended (FET)
	DLPVA-500-F-D	Variable gain voltage amplifier, true differential (FET)



Variable Gain Low-Frequency Voltage Amplifier

Dimensions

DLPVA-500-F-D

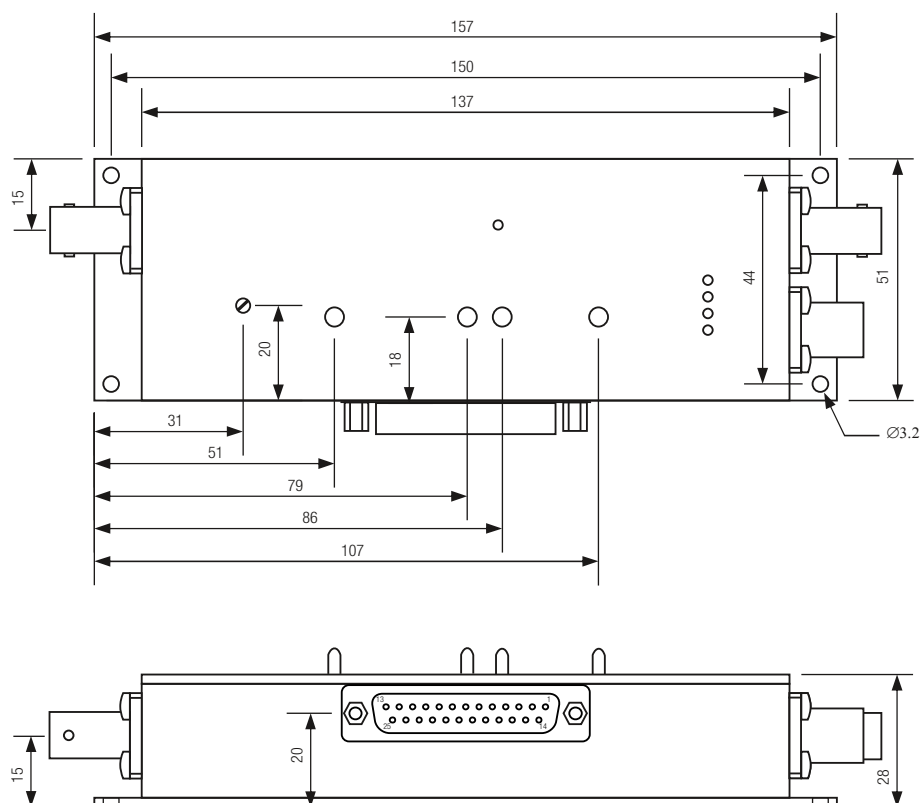


DZ-DLPVA-500-B-F-D_R01

all dimensions in mm unless otherwise noted

Dimensions continued

DLPVA-500-F-S



DZ-DLPVA-500-BLN-B-F-S R01

all dimensions in mm unless otherwise noted

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