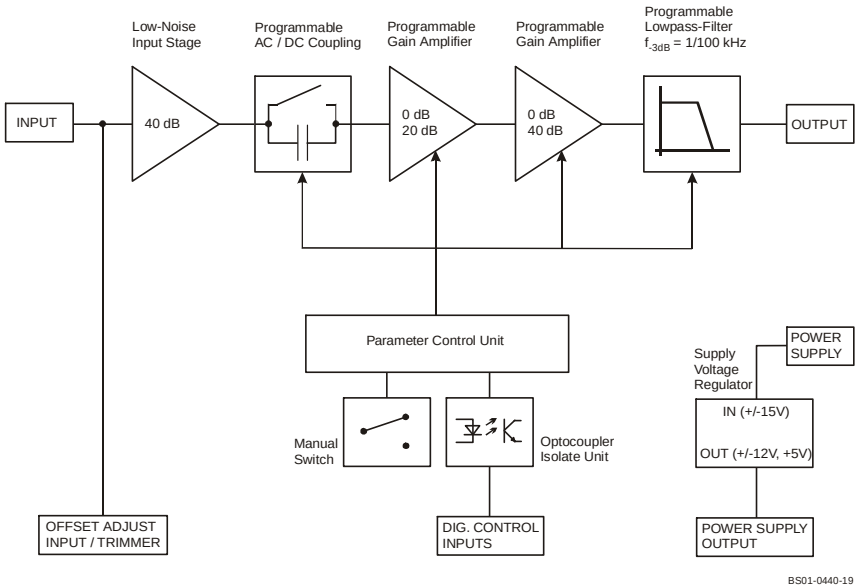
Low Noise Variable Gain Low Frequency Voltage Amplifier

Features	• **Variable Gain 40 to 100 dB, Switchable in 20 dB Steps** • **Bipolar Input Stage, Recommended for Low Impedance Sources Smaller than 100 Ω** • **Very Low Input Voltage Noise: 700 pV/√Hz** • **DC-Coupled, Single Ended** • **DC-Drift 0.5 µV/°C** • **Bandwidth DC - 100 kHz, Switchable to 1 kHz** • **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	

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Specifications	*Test Conditions*	*Vs = ± 15 V, Ta = 25°C*
Gain	Gain Values	40, 60, 80, 100 dB indicated by four LEDs
	Gain Accuracy	± 0.1 % (between settings)
		± 1 % (overall)
	Gain Flatness	± 0.1 dB
Frequency Response	Lower Cut-Off Frequency	DC, switchable to 1.5 Hz
	Upper Cut-Off Frequency	100 kHz, switchable to 1 kHz
	Upper Cut-Off Frequency Rolloff	12 dB/Oct.
Time Response	Rise / Fall Time (10% - 90%)	3.5 µs (@ BW = 100 kHz)
		350 µs (@ BW = 1 kHz)
Input	Input Impedance	1 MΩ
	Input Voltage Drift	0.5 µV/°C
	Equivalent Input Voltage Noise (100 Hz … 100 kHz)	Gain Setting / Noise
		100 dB: 700 pV/√Hz
		80 dB: 730 pV/√Hz
		60 dB: 860 pV/√Hz
		40 dB: 6 nV/√Hz
	Equivalent Input Current Noise	3 pA/√Hz
	1/f-Noise Corner	80 Hz
	Input Bias Current	1 µA
	Input Bias Current Drift	8 nA/°C
	Input Offset Voltage	± 500 µV, adjustable by offset trimmer and external control voltage
Output	Output Impedance	50 Ω (terminate with > 10 kΩ for best performance)
	Output Voltage Range	
	For Linear Amplification	± 10 V (@ > 10 kΩ load)
	Output Current (max.)	± 20 mA
	Output Overload Recovery Time	0.5 ms (after 20x overload)
Overload LED	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.	
	The Overload LED may also turn on when the amplifier is operated with open input or with a high source impedance. For proper operation please use a source impedance of less than 1 kΩ or switch to a lower gain setting.	
Remote Offset Control	Offset Control Voltage Range	± 10 V, corresponds to ± 500 µV input offset
	Offset Control Input Impedance	200 kΩ
Remote Digital Control	Control Input Voltage Range	Low: - 0.8 ...+ 0.8 V
		High: + 1.8 ... + 15 V, TTL / CMOS compatible
	Control Input Current	0 mA @ 0 V, 1.5 mA @ + 5 V, 4.0 mA @ + 12 V
	Overload Output	Non active: + 5 V, max. 1 mA, active: 0.8 V, max. -10 mA; (refered to signal ground)

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Power Supply	Supply Voltage	± 15 V (± 14.5 V to ± 16 V)
	Supply Current	± 75 mA typ. (depends on operating conditions, recommended power supply capability minimum 200 mA)
Case	Weight	0.32 kg (0.7 lbs)
	Material	AlMg4.5Mn, nickel-plated
Temperature Range	Storage Temperature	- 40 °C to + 100 °C
	Operating Temperature	0 °C to + 60 °C

Absolute Maximum Ratings

Power Supply Voltage	± 21 V
Control Input Voltage	+ 16 V / - 5 V
Signal Input Voltage	± 0.7 V
Input Current	± 25 mA

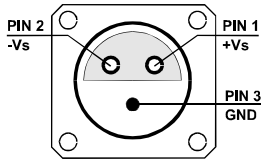
Overvoltage at the signal input can severely degrade the noise performance or destroy the amplifier!

Connectors

Input	BNC
Output	BNC

Power Supply: LEMO series 1S, 3-pin fixed socket

Pin 1:	+ 15V
Pin 2:	- 15V
Pin 3:	GND



Control Port: Sub-D 25-pin, female, qual. class 2

Pin 1:	+12 V (stabilized power supply output, max. 100 mA)
Pin 2:	-12 V (stabilized power supply output, max. 100 mA)
Pin 3:	AGND (analog ground)
Pin 4:	+5 V (stabilized power supply output, max. 50 mA)
Pin 5:	digital output: overload
Pin 6:	NC
Pin 7:	NC
Pin 8:	offset control voltage input
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:	digital control input: AC/DC
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 a switch setting, set the corresponding local switch 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	Pin 12
40 dB	low	low
60 dB	high	low
80 dB	low	high
100 dB	high	high

AC/DC Setting

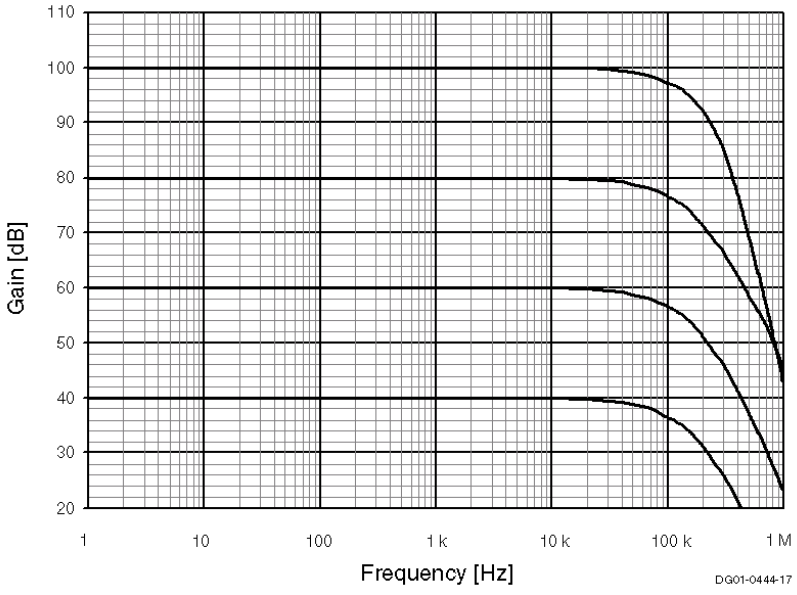
Coupling	Pin 13
AC	low
DC	high

Bandwidth Setting

Bandwidth	Pin 14
1 kHz	low
100 kHz	high

Typical Performance Characteristics

Frequency Response (Logarithmic)



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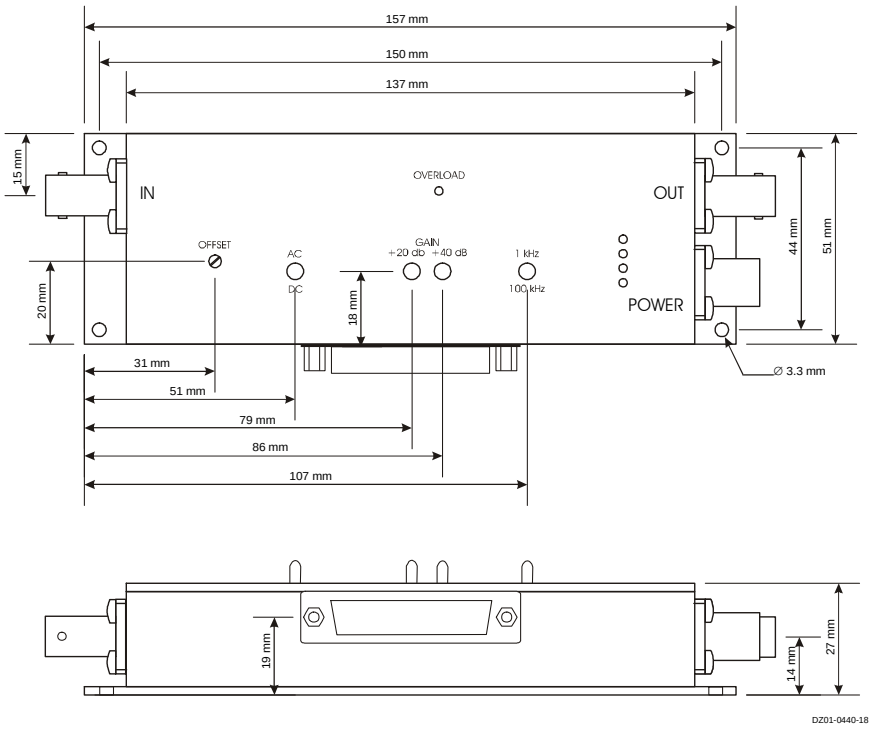
Dimensions



Environmental Protection

FEMTO offers all end users in the EC the possibility to return “end of life” units without incurring disposal charges. If you wish to return a unit for waste recovery, please contact FEMTO for further information. Do not dispose of the unit in a litter bin or at a public waste disposal site.

Safety and EMI Requirements

The manufacturer declares that this product meets the requirements and the intents of the following standards, normative documents and directives. The unit bears the CE mark.
A complete declaration of CE-conformity is available upon request.

DIN EN 61326-2:2006
EN55011Class B, EMC Directive 2004/108/EC
REACH Directive (EC)/Nr. 1907/2006
RoHS Directive 2011/65/EC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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