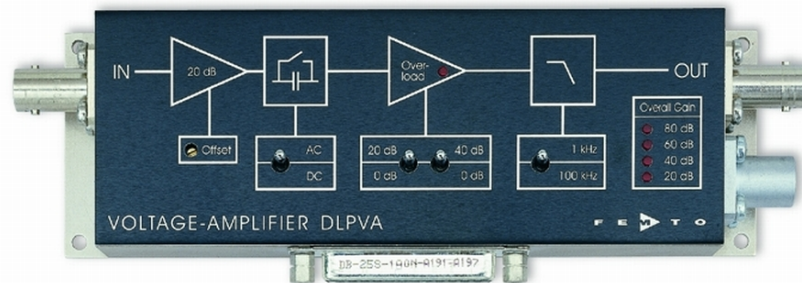




# Datasheet

# DLPVA-100-F Series

## Variable Gain Low Frequency Voltage Amplifier

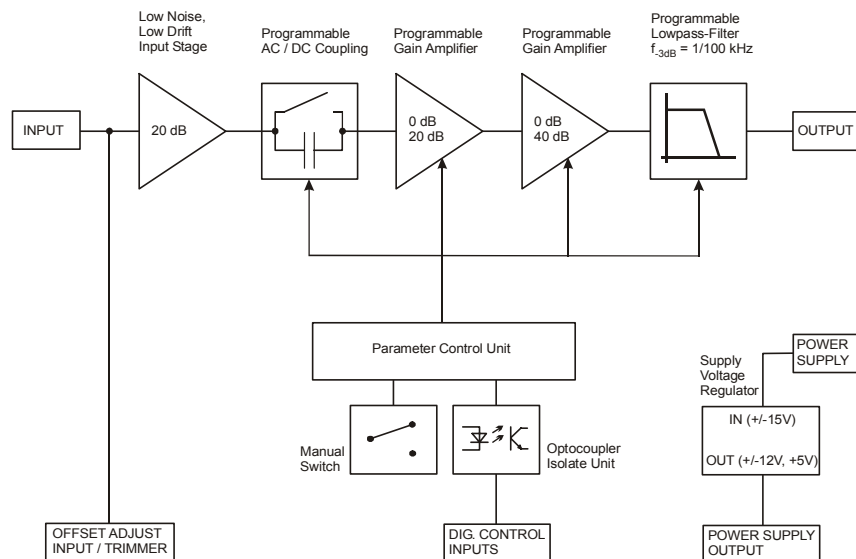


### Features

- **Variable Gain 20 to 80 dB, Switchable in 20 dB Steps**
- **FET Input Stage, 1  $\Omega$  Impedance**
- **Protection against  $\pm 3$  kV Transients**
- **Single Ended and True Differential Input Models**
- **Bandwidth DC - 100 kHz, Switchable to 1 kHz**
- **1.3  $\mu$ V/ $^{\circ}$ C DC-Drift**
- **120 dB CMRR**
- **5.5 nV/ $\sqrt$ Hz Input Noise**
- **Switchable AC/DC-Coupling**
- **Local and Remote Control**

### Applications

- **Universal Laboratory Amplifier**
- **Automated Measurements**
- **Industrial Sensors**
- **Detector Preamplifier**
- **Integrated Measurement Systems**



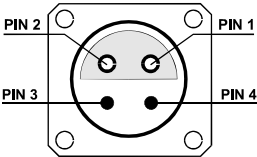
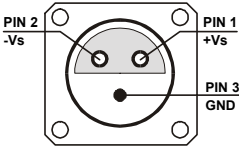
## Variable Gain Low Frequency Voltage Amplifier

Specifications	<i>Test Conditions</i>	<i>V<sub>s</sub> = ± 15 V, T<sub>a</sub> = 25°C</i>		
Gain	Gain Values	20, 40, 60, 80 dB indicated by four LEDs		
	Gain Accuracy	± 0.1 %	(between settings)	
		± 1 %	(overall)	
Frequency Response	Gain Flatness	± 0.1 dB		
	Lower Cut-Off Frequency	DC, switchable to 1.5 Hz		
	Upper Cut-Off Frequency	100 kHz, switchable to 1 kHz		
Time Response	Upper Cut-Off Frequency Roll-off	12 dB/Oct.		
	Rise / Fall Time (10% - 90%)	3.5 μs (@ BW = 100 kHz) 350 μs (@ BW = 1 kHz)		
Input	Input Impedance	1 TΩ		
	Input Voltage Drift	1.3 μV/K		
	Equivalent Input Voltage Noise	Gain Setting	DLPVA-100-F-S	DLPVA-100-F-D
		60, 80 dB	5.5 nV/√Hz	6.9 nV/√Hz
		40 dB	8 nV/√Hz	10 nV/√Hz
		20 dB	60 nV/√Hz	60 nV/√Hz
	Equivalent Input Current Noise	1.6 fA/√Hz		
	1/f-Noise Corner	80 Hz		
	Input Bias Current	1 pA		
	Input Bias Current Drift	Factor 2.3 / 10 °C		
	Input Offset Voltage	± 5 mV, adjustable by offset trimmer and external control voltage		
<i>Single Ended Input, Model "DLPVA-100-F-S" only:</i>				
	Input Voltage Range for linear Amplification:	± 0.6 V		
<i>True Differential Input, Model "DLPVA-100-F-D" only:</i>				
	Common Mode Voltage Range	± 5 V		
Output	CMRR	120 dB	(@ 100 Hz)	
		100 dB	(@ 10 kHz)	
		80 dB	(@ 60 kHz)	
Output	Output Impedance	50 Ω (terminate with > 10 kΩ load for best performance)		
	Output Voltage Range	± 10 V (@ > 10 kΩ load)		
	Output Current (max.)	± 20 mA		
	Output Overload Recovery Time	0.5 ms (after 20x overload)		

## Variable Gain Low Frequency Voltage Amplifier

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 under the following operating conditions:</p> <ul style="list-style-type: none"> <li>- The amplifier is operated with open input or with a high source impedance. For proper operation please use a source impedance of less than 100 MΩ or switch to a lower gain setting.</li> <li>- When using a DLPVA-F-D with differential input stage the Overload LED may turn on if the common mode input voltage exceeds ± 5 V or if the source is totally floating with respect to the amplifier ground. For proper operation make sure that the common mode voltage stays within ± 5 V with respect to the amplifier ground and make a valid connection between the source ground and the amplifier ground to ensure that the inputs cannot drift outside the tolerable common mode range.</li> </ul>	
Remote Offset Control	Offset Control Voltage Range	± 10 V, corresponds to ± 5 mV input offset
	Offset Control Input Impedance	200 kΩ
Remote 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
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 150 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	± 15 Vp
	Transient Input Voltage	± 3 kV (discharge from 5 nF source)

## Variable Gain Low Frequency Voltage Amplifier

Connectors	<p><b>Input</b></p> <p><i>Single Ended Input, Model "DLPVA-100-F-S":</i> BNC</p> <p><i>True Differential Input, Model "DLPVA-100-F-D":</i> LEMO series 1S, 4-pin fixed socket Pin 1: non inverting input Pin 2: inverting input Pin 3: GND Pin 4: N.C.</p> <div style="text-align: center;">  </div> <p><b>Output</b></p> <p>BNC</p> <p><b>Power Supply</b></p> <p>LEMO series 1S, 3-pin fixed socket Pin 1: + 15V Pin 2: - 15V Pin 3: GND</p> <div style="text-align: center;">  </div> <p><b>Control Port</b></p> <p>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</p>
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## Variable Gain Low Frequency Voltage Amplifier

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
20 dB	low	low
40 dB	high	low
60 dB	low	high
80 dB	high	high

AC/DC Setting

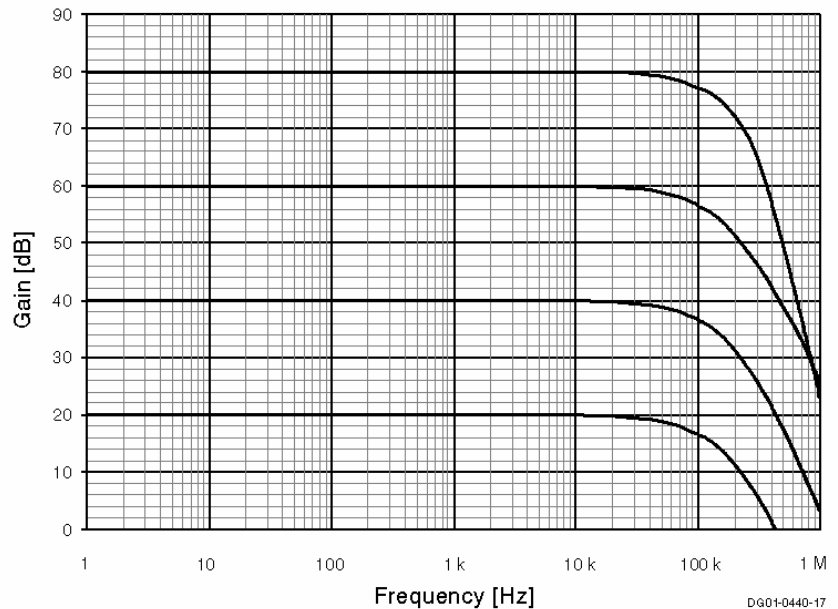
Coupling	Pin 13
AC	low
DC	high

Bandwidth Setting

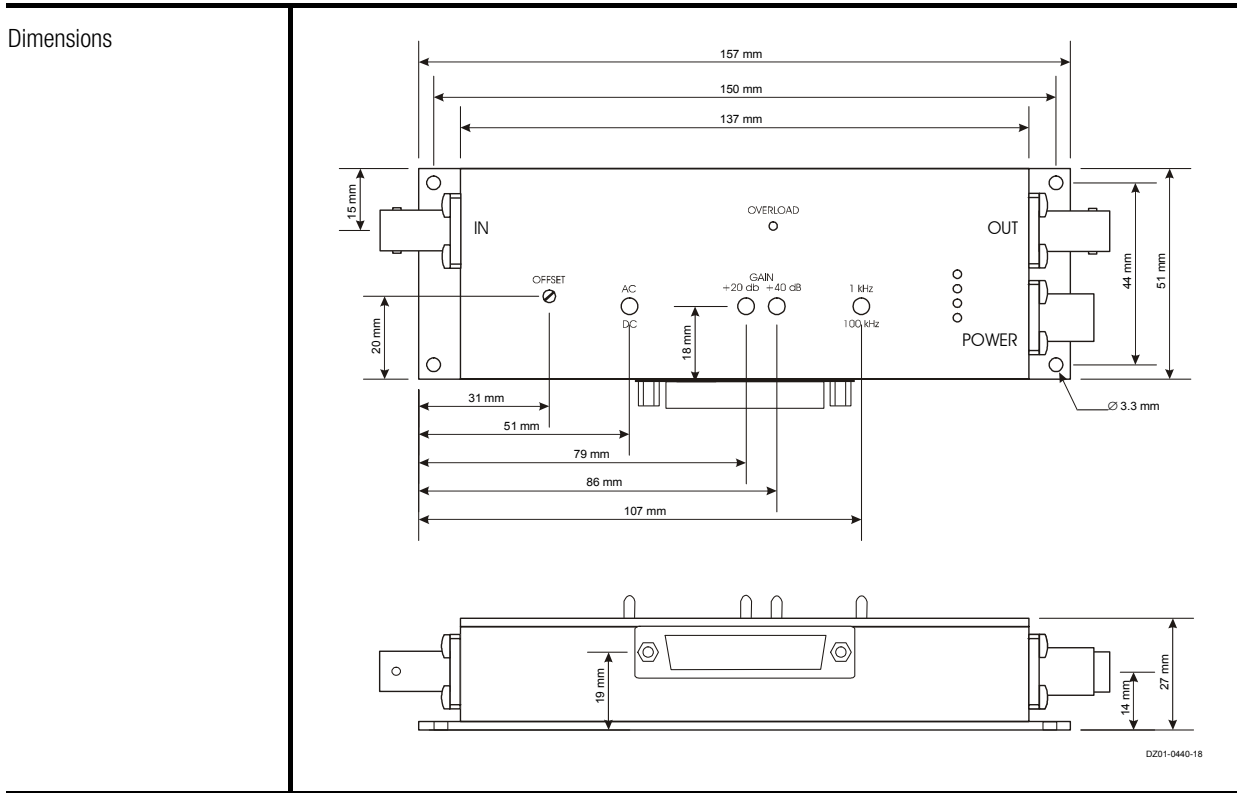
Bandwidth	Pin 14
1 kHz	low
100 kHz	high

Typical Performance Characteristics

Frequency Response (Logarithmic)



## Variable Gain Low Frequency Voltage Amplifier



<p>Ordering Information</p>	<p>Available Models</p> <p>Model No.: DLPVA-100-F-S - FET, single-ended input (BNC-connector input)</p> <p>Model No.: DLPVA-100-F-D - FET, true differential input (LEMO-connector input)</p>
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## Datasheet

## LUCI-10

### USB to D-Sub Control Interface for FEMTO Amplifiers



Features	<ul style="list-style-type: none"> <li>• <b>Compact Digital I/O Interface for USB Remote Control of FEMTO Amplifiers</b></li> <li>• <b>Supports Opto-Isolation of Amplifier Signal Path from PC USB Port</b></li> <li>• <b>16 Digital Outputs, 3 Opto-Isolated Digital Inputs</b></li> <li>• <b>Bus-Powered Operation</b></li> <li>• <b>System Driver, Application Software and VI's for use with LabVIEW™ Included</b></li> </ul>																											
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## USB to D-Sub Control Interface for FEMTO Amplifiers

Input	Number of Channels      3 opto-isolated input lines Input Voltage Range      LOW bit: - 20 ... + 1.5 V HIGH bit: + 3 ... + 20 V Switching Current        1 mA typ. @ 5 V Reading Rate                max. 400 operations per second
Power Supply	USB Port, Bus Powered    + 4.5 ... + 5.5 V DC Active Current              max. 200 mA / typ. 100 mA Suspend Current            < 0.5 mA (standby mode of Windows®)
Case	D-Sub Case                    metal hood (EMI/RFI shielding), with jack screws Weight                        130 g (0.3 lb.) Material                        zinc die-cast, nickel plated
Temperature Range	Storage Temperature        - 40 ... + 100 °C Operating Temperature      0 ... + 50 °C
Absolute Maximum Ratings	Max. Voltage at Input        +/- 30 V Max. Short Circuit Output Current +/- 20 mA per channel, 200 mA total Max. Isolation Voltage       +/- 60 V (Input Ground to Output Ground)
Connectors	Device Port                    D-Sub, 25 pin, male Pin 1:    NC Pin 2:    NC Pin 3:    GND (IN) Pin 4:    NC Pin 5:    Digital IN Pin 6:    Digital IN Pin 7:    Digital IN Pin 8:    NC Pin 9:    GND (OUT) Pin 10:   Digital OUT Low Byte, LSB Pin 11:   Digital OUT Low Byte Pin 12:   Digital OUT Low Byte Pin 13:   Digital OUT Low Byte Pin 14:   Digital OUT Low Byte Pin 15:   Digital OUT Low Byte Pin 16:   Digital OUT Low Byte Pin 17:   Digital OUT Low Byte, MSB Pin 18:   Digital OUT High Byte, LSB Pin 19:   Digital OUT High Byte Pin 20:   Digital OUT High Byte Pin 21:   Digital OUT High Byte Pin 22:   Digital OUT High Byte Pin 23:   Digital OUT High Byte Pin 24:   Digital OUT High Byte Pin 25:   Digital OUT High Byte, MSB  PC Port                        USB type A

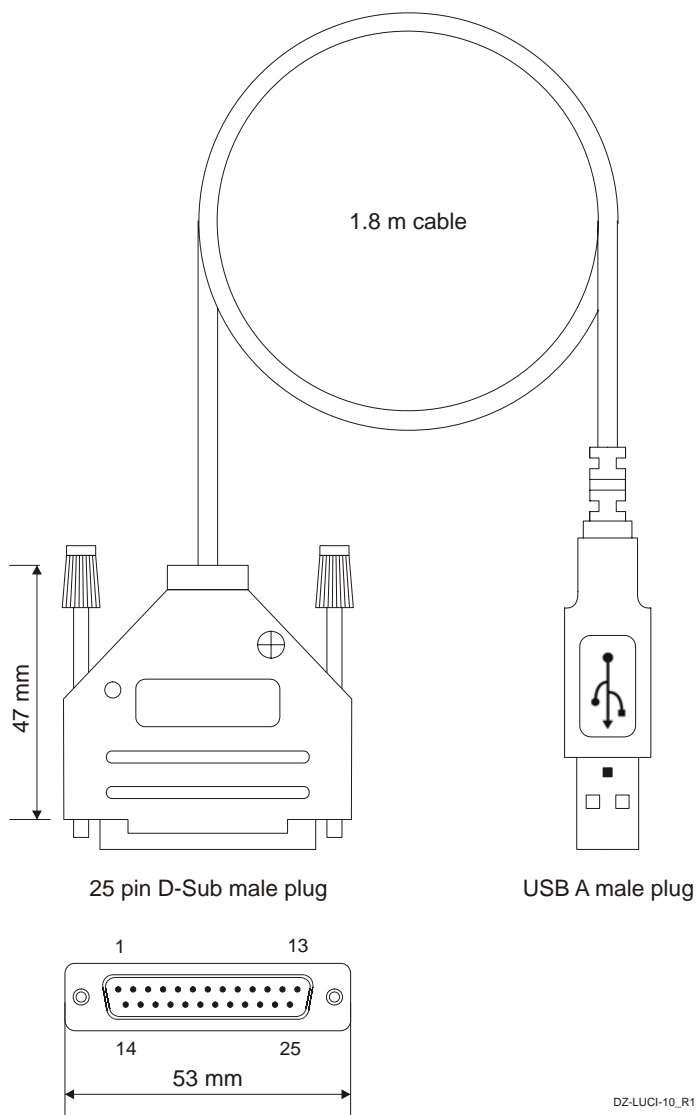


## USB to D-Sub Control Interface for FEMTO Amplifiers

Software Specifications	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 5px;">Software (included on CD)</td> <td style="padding: 5px;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 5px;">Device Driver</td> <td style="padding: 5px;">dynamic link library (DLL) for integration in Microsoft Windows® operating system for use with C/C++, LabWindows™ /CVI™ or LabVIEW™</td> </tr> <tr> <td style="padding: 5px;">Application Software</td> <td style="padding: 5px;">GUI (graphical user interface) programs for simple remote control of FEMTO amplifiers and photoreceivers provided as executable programs and LabVIEW projects</td> </tr> <tr> <td style="padding: 5px;">LabVIEW Programs</td> <td style="padding: 5px;">sample programs to control and test the LUCI-10 hardware (including front panel and block diagram)</td> </tr> <tr> <td style="padding: 5px;">LabVIEW Library</td> <td style="padding: 5px;">special VI toolkit for integration in LabVIEW development environment</td> </tr> </table> </td> </tr> </table> <p style="margin-top: 10px;"><b>Note:</b> A National Instruments LabVIEW™ license is not included in this software package. For use of the GUI application programs the LabVIEW Run-Time Engine is required. If not detected on the host PC during the installation process the LabVIEW Run-Time Engine will be installed automatically from the CD.</p>	Software (included on CD)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 5px;">Device Driver</td> <td style="padding: 5px;">dynamic link library (DLL) for integration in Microsoft Windows® operating system for use with C/C++, LabWindows™ /CVI™ or LabVIEW™</td> </tr> <tr> <td style="padding: 5px;">Application Software</td> <td style="padding: 5px;">GUI (graphical user interface) programs for simple remote control of FEMTO amplifiers and photoreceivers provided as executable programs and LabVIEW projects</td> </tr> <tr> <td style="padding: 5px;">LabVIEW Programs</td> <td style="padding: 5px;">sample programs to control and test the LUCI-10 hardware (including front panel and block diagram)</td> </tr> <tr> <td style="padding: 5px;">LabVIEW Library</td> <td style="padding: 5px;">special VI toolkit for integration in LabVIEW development environment</td> </tr> </table>	Device Driver	dynamic link library (DLL) for integration in Microsoft Windows® operating system for use with C/C++, LabWindows™ /CVI™ or LabVIEW™	Application Software	GUI (graphical user interface) programs for simple remote control of FEMTO amplifiers and photoreceivers provided as executable programs and LabVIEW projects	LabVIEW Programs	sample programs to control and test the LUCI-10 hardware (including front panel and block diagram)	LabVIEW Library	special VI toolkit for integration in LabVIEW development environment		
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Optional Requirements	<p>For development of own application programs an additional development environment like LabVIEW Version 8 (or higher) or C/C++ is required.</p>												
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## USB to D-Sub Control Interface for FEMTO Amplifiers

Dimensions



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# Datasheet

# LUCI-10

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	Digital I/O Channels	16 output lines 3 opto-isolated input lines																										
	Supply	PC USB port, + 5 V, typ. 100 mA, bus-powered (no auxiliary power supply required)																										
	Connectors	USB type A D-Sub, 25 pin, male																										
	Cable	AWG 28, length 1.8 m																										
Output	Number of Channels	16 output lines, supporting opto-isolation inside FEMTO amplifiers and photoreceivers																										
	Output Voltage Range	LOW bit: 0 ... + 0.5 V (@ 0 ... 2 mA output current) HIGH bit: + 4 ... + 5.5 V (@ 0 ... 2 mA output current)																										
	Max. Current	6 mA per channel																										
	Writing Rate	max. 800 operations per second																										

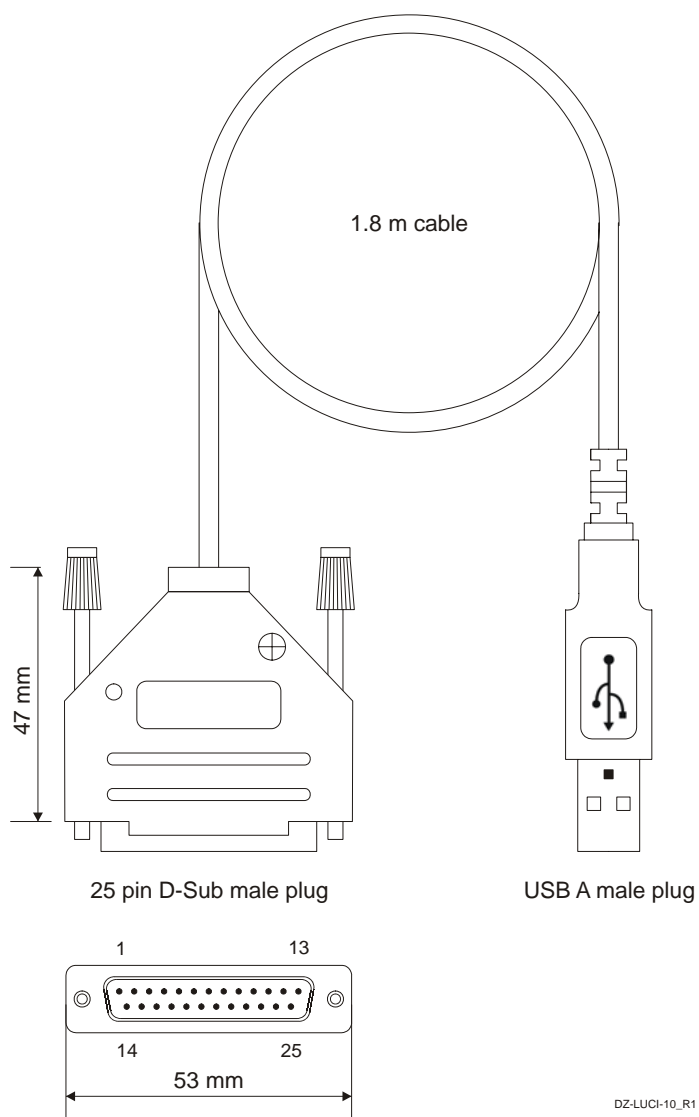


## USB to D-Sub Control Interface for FEMTO Amplifiers

Software Specifications	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 5px;">Software (included on CD)</td> <td style="padding: 5px;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 5px;">Device Driver</td> <td style="padding: 5px;">dynamic link library (DLL) for integration in Microsoft Windows<sup>®</sup> operating system for use with C/C++, LabWindows<sup>™</sup> /CVI<sup>™</sup> or LabVIEW<sup>™</sup></td> </tr> <tr> <td style="padding: 5px;">Application Software</td> <td style="padding: 5px;">GUI (graphical user interface) programs for simple remote control of FEMTO amplifiers and photoreceivers provided as executable programs and LabVIEW projects</td> </tr> <tr> <td style="padding: 5px;">LabVIEW Programs</td> <td style="padding: 5px;">sample programs to control and test the LUCI-10 hardware (including front panel and block diagram)</td> </tr> <tr> <td style="padding: 5px;">LabVIEW Library</td> <td style="padding: 5px;">special VI toolkit for integration in LabVIEW development environment</td> </tr> </table> </td> </tr> </table> <p style="margin-top: 10px;"><b>Note:</b> A National Instruments LabVIEW<sup>™</sup> license is not included in this software package. For use of the GUI application programs the LabVIEW Run-Time Engine is required. If not detected on the host PC during the installation process the LabVIEW Run-Time Engine will be installed automatically from the CD.</p>	Software (included on CD)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 5px;">Device Driver</td> <td style="padding: 5px;">dynamic link library (DLL) for integration in Microsoft Windows<sup>®</sup> operating system for use with C/C++, LabWindows<sup>™</sup> /CVI<sup>™</sup> or LabVIEW<sup>™</sup></td> </tr> <tr> <td style="padding: 5px;">Application Software</td> <td style="padding: 5px;">GUI (graphical user interface) programs for simple remote control of FEMTO amplifiers and photoreceivers provided as executable programs and LabVIEW projects</td> </tr> <tr> <td style="padding: 5px;">LabVIEW Programs</td> <td style="padding: 5px;">sample programs to control and test the LUCI-10 hardware (including front panel and block diagram)</td> </tr> <tr> <td style="padding: 5px;">LabVIEW Library</td> <td style="padding: 5px;">special VI toolkit for integration in LabVIEW development environment</td> </tr> </table>	Device Driver	dynamic link library (DLL) for integration in Microsoft Windows <sup>®</sup> operating system for use with C/C++, LabWindows <sup>™</sup> /CVI <sup>™</sup> or LabVIEW <sup>™</sup>	Application Software	GUI (graphical user interface) programs for simple remote control of FEMTO amplifiers and photoreceivers provided as executable programs and LabVIEW projects	LabVIEW Programs	sample programs to control and test the LUCI-10 hardware (including front panel and block diagram)	LabVIEW Library	special VI toolkit for integration in LabVIEW development environment		
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Optional Requirements	<p>For development of own application programs an additional development environment like LabVIEW Version 8 (or higher) or C/C++ is required.</p>												
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## USB to D-Sub Control Interface for FEMTO Amplifiers

Dimensions



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