

Electro Optical Components, Inc.

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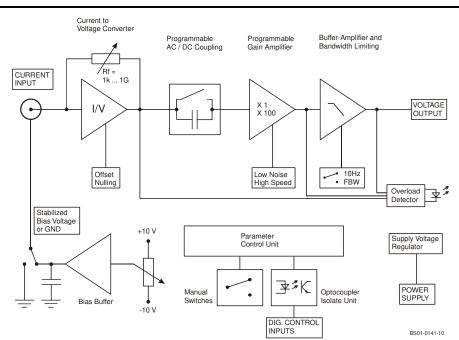
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Datasheet DLPCA-200

Variable Gain Low Noise Current Amplifier



Features	 Transimpedance (gain) switchable from 1 x 10³ to 1 x 10¹¹ V/A Bandwidth DC/1 Hz 500 kHz Bandwidth switchable to DC 10 Hz for low noise DC measurements Bandwidth independent of detector capacitance (up to 1 nF) Adjustable bias voltage Protection against ±3 kV transients Local and remote control 			
Applications	 Photodiode and photomultiplier amplifier Scanning tunneling microscopy (STM) Spectroscopy Beam monitoring for particle accelerators/synchrotrons Ionisation detectors Preamplifier for lock-ins, A/D converters, etc. 			
Block Diagram	Current to Voltage Converter Programmable Programmable Buffer-Amplifier and			



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Variable Gain Low Noise Current Amplifier

Specifications	Test conditions	$\rm V_{\rm S}=\pm15$ V, $\rm T_{\rm A}=25$ °C, load impedance = 1 $\rm M\Omega$
Gain	Transimpedance Gain accuracy Gain drift	$1 \times 10^{3} \dots 1 \times 10^{11} \text{ V/A}$ ±1 % see table below
Frequency Response	Lower cut-off frequency Upper cut-off frequency (–3 dB) Gain flatness	DC / 1 Hz up to 500 kHz (see table below), switchable to 10 Hz $\pm 0.1~\mathrm{dB}$
Input	Equ. input noise current Equ. input noise voltage Input offset current drift Input bias current Max. input current Input offset compensation	see table below 4 nV/√Hz (@ 1 kHz) see table below 1 pA typ. (max. 3 pA) see table below (value for linear amplification) adjustable by offset potentiometer and external control voltage; max. range see table below
Performance depending on Gain Setting	Gain setting (low noise) (V/A)	$10^3 10^4 10^5 10^6 10^7 10^8 10^9$
on dain obtaing	Upper cut-off frequency (–3 dB) Rise/fall time (10 % - 90 %) Input noise current density (/√Hz) measured at Integr. input noise current (rms)* Offset current drift (/°C) Gain drift (/°C) Max. input current (±) Input offset compensation (±) DC input impedance (// 5 pF)	500 kHz 500 kHz 400 kHz 200 kHz 50 kHz 7 kHz 1.1 kHz 700 ns 700 ns 900 ns 1.8 μs 7 μs 50 μs 300 μs 20 pA 2.3 pA 450 fA 130 fA 43 fA 13 fA 4.3 fA 10 kHz 10 kHz 1 kHz 1 kHz 100 Hz 100 Hz 100 Hz 21 nA 2.4 nA 500 pA 130 pA 41 pA 5.8 pA 0.8 pA 30 nA 3 nA 0.3 nA 30 pA 3 pA 0.3 pA 0.1 pA 0.008% 0.008% 0.01% 0.01% 0.01% 0.02% 10 mA 1 mA 0.1 mA 10 μA 1 μA 0.1 μA 10 nA 100 μA 10 μA 1 μA 0.1 μA 10 nA 1 nA 0.1 nA 50 Ω 50 Ω 50 Ω 60 Ω 150 Ω 1 kΩ 10 kΩ
	Gain setting (high speed) (V/A)	$10^5 10^6 10^7 10^8 10^9 10^{10} 10^{11}$
	Upper cut-off frequency (–3 dB) Rise/fall time (10 % - 90 %) Input noise current density (/√Hz) measured at Integr. input noise current (rms)* Offset current drift (/°C) Gain drift (/°C) Max. input current (±) Input offset compensation (±) DC input impedance (// 5 pF)	500 kHz 500 kHz 400 kHz 200 kHz 50 kHz 7 kHz 1.1 kHz 700 ns 700 ns 900 ns 1.8 μs 7 μs 50 μs 300 μs 13 pA 1.8 pA 440 fA 130 fA 43 fA 13 fA 4.3 fA 10 kHz 10 kHz 1 kHz 1 kHz 100 Hz 100 Hz 100 Hz 12 nA 1.8 nA 450 pA 120 pA 37 pA 5.3 pA 0.8 pA 30 nA 3 nA 0.3 nA 30 pA 3 pA 0.3 pA 0.1 pA 0.008% 0.008% 0.01% 0.01% 0.01% 0.01% 0.02% 100 μA 10 μA 1 μA 0.1 μA 10 nA 1 nA 0.1 nA 100 μA 10 μA 1 μA 0.1 μA 10 nA 1 nA 0.1 nA 50 Ω 50 Ω 50 Ω 60 Ω 150 Ω 1 kΩ 10 kΩ
		asured with an open but shielded amplifier input in the full put referred peak-peak noise can be calculated from the rms $I_{\text{pp}} = I_{\text{pms}} \ x \ 6$ $U_{\text{pp}} = I_{\text{pp}} \ x \ gain$
Output	Output voltage Output impedance Max. output current	± 10 V (@ $\geq \! 100$ k $\! \Omega$ load) 50 Ω (terminate with $\geq \! 100$ k $\! \Omega$ load for best performance) ± 30 mA
Detector Bias	Bias voltage range	± 10 V, max. 22 mA (bias voltage connected to shield of BNC input socket, adjustable by potentiometer, switchable to GND)

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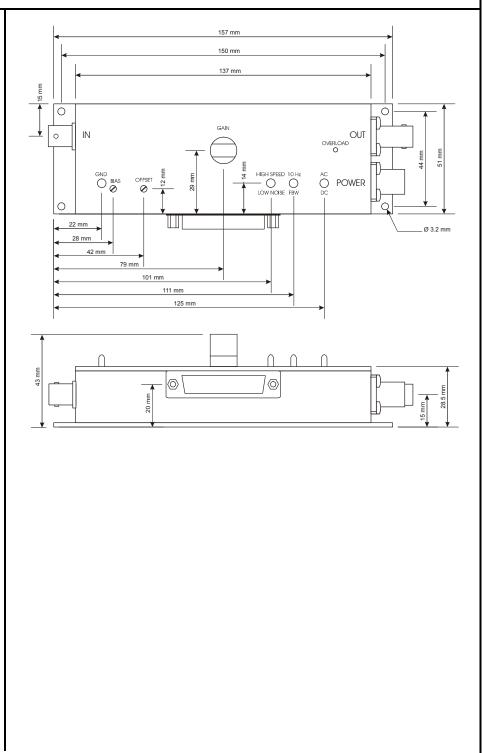
	LOW NOISE OUI					
Indicator LED	Function	overload				
Digital Control	Control input voltage range Control input current Overload output	LOW bit: $-0.8 \text{ V} \dots +1.2 \text{ V}$, HIGH bit: $2.3 \text{ V} \dots +12 \text{ V}$ 0 mA @ 0 V, 1.5 mA @ +5 V, 4.5 mA @ +12 V non active: $<0.4 \text{ V} @ 0 \dots -1$ mA active: typ. 5 5.1 V @ 0 2 mA				
Ext. Offset Control	Control voltage range Offset control input impedance	±10 V 20 kΩ				
Power Supply	Supply voltage Supply current	$\pm 15~\text{V}$ +120 / –80 mA typ. (depends on operating conditions,				
	Stabilized power supply output	recommended power supply capability min. ± 200 mA) ± 12 V, max. ± 50 mA, ± 5 V, max. ± 30 mA				
Case	Weight Material	320 g (0.74 lb.) AlMg4.5Mn, nickel-plated				
Temperature Range	Storage temperature Operating temperature	-40 °C +100 °C 0 °C +60 °C				
Absolute Maximum Ratings	Signal input voltage Signal input current (rms) Transient input voltage Control input voltage Power supply voltage	-16 V / +12 V 35 mA ±3 kV (out of 200 pF source) -5 V / +16 V ±20 V				
Connectors	Input	BNC, isolated, jack (female)				
	Output	BNC, jack (female)				
	Detector bias output	shield of input BNC				
	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 PIN 1 -Vs PIN 3 GND PIN 3 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) Pin 4: +5 V (stabilized power supply output) Pin 5: digital output: overload (referred to pin 3) Pin 6: signal output (connected to BNC) Pin 7: NC Pin 8: input offset control voltage Pin 9: DGND (ground for digital control pins 10 - 14) Pin 10: digital control input: gain, LSB Pin 11: digital control input: gain, MSB Pin 12: digital control input: gain, MSB Pin 13: digital control input: high speed / low noise Pin 15 - 25: NC				

Variable Gain Low Noise Current Amplifier

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 "Remote", "AC" and "H" (High speed) and select the wanted setting via a bit code at the corresponding digital inputs. Mixed operation, e.g. local gain setting and remote controlled AC/DC setting, is also possible.				
			Iz" and "B	ias / GND"	1
Gain setting	Low noise Pin 14=HIGH Gain (V/A)	High speed Pin 14=LOW Gain (V/A)	Pin 12 MSB	Pin 11	Pin 10 LSB
	10 ³ 10 ⁴ 10 ⁵ 10 ⁶ 10 ⁷ 10 ⁸ 10 ⁹	10 ⁵ 10 ⁶ 10 ⁷ 10 ⁸ 10 ⁹ 10 ¹⁰ 10 ¹¹	LOW LOW LOW LOW HIGH HIGH	LOW LOW HIGH HIGH LOW LOW HIGH	LOW HIGH LOW HIGH LOW HIGH LOW
Gain settling time	<150 ms				
AC/DC setting	Coupling	Pin 13			
	AC DC	LOW HIGH			
				Current to Voltage Convi	erter
		I/V		+1	0 V
	<u></u>			ng -1	O V
			Saron milli		AZ01-0140-1
	Gain settling time AC/DC setting Photo detector biasing	control set the "AC" and "H" via a bit code Mixed operatic controlled AC, Switch setting are not remot Low noise Pin 14=HIGH Gain (V/A) 10³ 10⁴ 10⁵ 10⁶ 10⁰ 10⁰ Gain settling time AC/DC setting Coupling AC DC Photo detector biasing	control set the correspondin "AC" and "H" (High speed) a via a bit code at the corresp Mixed operation, e.g. local g controlled AC/DC setting, is Switch settings "FBW / 10 H are not remote controllable. Gain setting Low noise High speed Pin 14=HIGH Pin 14=LOW Gain (V/A) Gain (V/A) 103 105 104 106 105 107 106 108 107 109 108 1010 109 1011 Gain settling time AC/DC setting Coupling Pin 13 AC LOW DC HIGH Photo detector biasing	control set the corresponding local sw "AC" and "H" (High speed) and select via a bit code at the corresponding dig Mixed operation, e.g. local gain setting Controlled AC/DC setting, is also poss Switch settings "FBW / 10 Hz" and "B are not remote controllable. Gain setting Low noise High speed Pin 14=HIGH Pin 14=LOW Pin 12 Gain (V/A) MSB 103 105 LOW 104 106 LOW 105 107 LOW 106 108 LOW 107 109 HIGH 108 1010 HIGH 109 1011 HIGH 109 1011 HIGH Gain settling time AC/DC setting Coupling Pin 13 AC LOW DC HIGH Photo detector biasing	control set the corresponding local switches to "AC" and "H" (High speed) and select the wante via a bit code at the corresponding digital inputs Mixed operation, e.g. local gain setting and remic controlled AC/DC setting, is also possible. Switch settings "FBW / 10 Hz" and "Bias / GND" are not remote controllable. Gain setting Low noise High speed Pin 14=HIGH Pin 14=LOW Pin 12 Pin 11 Gain (W/A) Gain (W/A) MSB 103 105 LOW LOW LOW 104 106 LOW LOW 105 107 LOW HIGH 106 LOW LOW 105 107 LOW HIGH 106 LOW LOW HIGH 107 109 HIGH LOW 108 109 1011 HIGH LOW 108 109 1011 HIGH LOW 109 1011 HIGH LOW 109 HIGH LOW HIGH HIGH LOW HIGH HIGH LOW HIGH HIGH LOW HIGH HIGH LOW LOW DC HIGH HIGH LOW LOW DC HIGH HIGH LOW

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Dimensions



SOPHISTICATED TOOLS FOR SIGNAL RECOVERY

F E 🍑 T O



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Datasheet LUCI-10

USB to D-Sub Control Interface for FEMTO Amplifiers



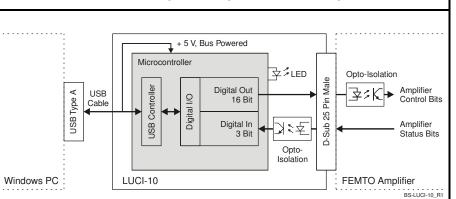
Features	•	Compact digital I/O interface for USB remote control of FEMTO amplifiers
	•	Supports onto-isolation of amplifier signal path from PC USB port

- 16 digital outputs, 3 opto-isolated digital inputs
- Bus-powered operation
- System driver, application software and VI's for use with LabVIEW[™] included

Applications

• Remote control of FEMTO® amplifiers and photoreceivers directly from a PC

Block Diagram



Hardware Specifications

Output

General Characteristics

Bus interface
Digital I/O channels

USB 2.0 (full-speed)
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

Number of channels 16 output lines, supporting opto-isolation inside FEMTO

amplifiers and photoreceivers

Output voltage range LOW bit: $0 \dots +0.5 \text{ V}$ (@ $0 \dots 2 \text{ mA}$ output current) HIGH bit: $+4 \dots +5.5 \text{ V}$ (@ $0 \dots 2 \text{ mA}$ output current)

Max. current 6 mA per channel

Writing rate max. 600 operations per second

SOPHISTICATED TOOLS FOR SIGNAL RECOVERY

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Datasheet LUCI-10

USB to D-Sub Control Interface for FEMTO Amplifiers

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Input	Number of channels Input voltage range Switching current Reading rate	3 opto-isolated input lines LOW bit: -20 +1.5 V HIGH bit: +3 +20 V 1 mA typ. @ 5 V max. 300 operations per second		
Power Supply	USB port, bus powered Active current Suspend current	+4.5 +5.5 V DC max. 200 mA / typ. 100 mA <0.5 mA (standby mode of Windows®)		
Case	D-Sub case Weight Material	metal hood (EMI/RFI shielding), with jack screws 130 g (0.3 lb.) zinc die-cast, nickel plated		
Temperature Range	Storage temperature Operating temperature	−40 +100 °C 0 +50 °C		
Absolute Maximum Ratings	Max. voltage at input Max. short-circuit output current Max. isolation voltage	±30 V ±20 mA per channel, 200 mA total ±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 Pin 18: Digital OUT Low Byte 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		

Datasheet LUCI-10

USB to D-Sub Control Interface for FEMTO Amplifiers

Software Specifications

Software (included on CD) Device driver dynamic link library (DLL) for integration in Microsoft

Windows® 32 bit & 64 bit operating system for use with C/C++, LabWindows™ /CVI™ or LabVIEW™

GUI (graphical user interface) programs for simple Application software

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 32 bit & 64 bit

development environment

Note: 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.

Microsoft Windows XP with Service Pack 3, or higher System Requirements Operating system

Processor Intel Pentium III or AMD Athlon, or better

1 GB of RAM, or more System memory

Hard disk space about 5 GB USB 1.1 or USB 2.0 Interface port

Supported FEMTO modules any standard FEMTO amplifier or photoreceiver with 25 pin

D-Sub socket, except model HLVA-100

Optional Requirements For development of own application programs an additional development environment like

LabVIEW Version 2012 (or higher) or C/C++ is required.

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respective companies used here for identification purposes only.

Datasheet LUCI-10

USB to D-Sub Control Interface for FEMTO Amplifiers

Dimensions 1.8 m cable \oplus 47 mm 25 pin D-Sub male plug USB A male plug \circ (\cdots) \circ 53 mm DZ-LUCI-10_R1

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SOPHISTICATED TOOLS FOR SIGNAL RECOVERY

