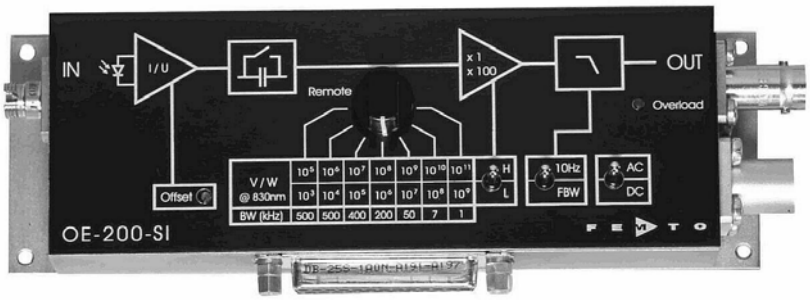
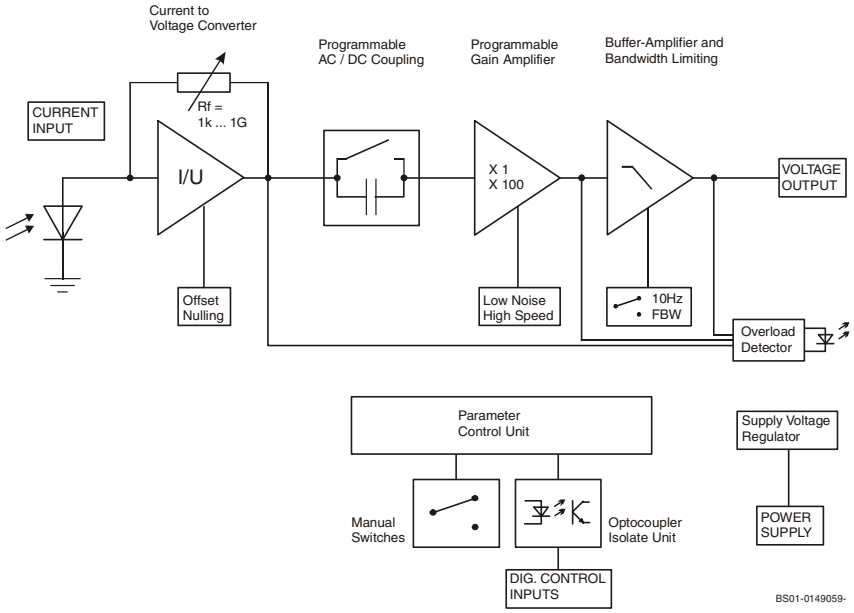
Variable-Gain Photoreceiver - Fast Optical Power Meter



Features	• **Si PIN Detector, ∅ 1.2 mm Active Diameter, FC, ST or SMA Fiber Receptacle** • **Spectral Range 320 - 1060 nm** • **Conversion Gain Switchable from 1 x 10^3 to 1 x 10^{11} V/W** • **Calibrated at 830 nm, Traceable to NIST Standards** • **Bandwidth up to 500 kHz** • **Local and Remote Control**
Applications	• **Fast Optical Power Meter** • **Spectroscopy** • **General-Purpose Opto-Electronical Measurements** • **Optical Receiver for Use with Lock-In Amplifiers**
Block Diagram	

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Specifications	*Test Conditions*	*Vs = ± 15 V, Ta = 25°C*
Gain	Conversion Gain	1 x 10^3 ... 1 x 10^{11} V/W (@ 830 nm)
	Gain Accuracy	± 5 % electro-optical (Popt ≤ 1 mW), traceable to NIST
	Gain Drift	see table below
Frequency Response	Lower Cut-Off Frequency	DC / 1 Hz, switchable
	Upper Cut-Off Frequency	up to 500 kHz (see table), switchable to 10 Hz
	Gain Flatness	± 0.1 dB
	Gain Accuracy	± 1 % electrical, between settings
Input	NEP	see table
	Max. cw-Saturation Power	see table
	Dark Current Compensation	± 1 nW, adjustable by offset trimpot and external control voltage
Detector	Detector	Si PIN photodiode in FC, ST or SMA fiber receptacle
	Active Area	∅ 1.2 mm
	Spectral Response	320 – 1060 nm
	Sensitivity	0.6 A/W (@ 830 nm)
	Dark Current	2 pA typ.

Performance Depending on Gain Setting

Gain Setting (Low Noise) (V/W)	10^3	10^4	10^5	10^6	10^7	10^8	10^9
Upper Cut-Off Frequency (- 3 dB)	500 kHz	500 kHz	400 kHz	200 kHz	45 kHz	7 kHz	1.2 kHz
Rise / Fall Time (10% - 90%)	700 ns	700 ns	900 ns	1.8 µs	8 µs	50 µs	300 µs
NEP (/√Hz, @100 Hz)	37 pW	4.3 pW	850 fW	240 fW	80 fW	26 fW	10 fW
Offset Current Drift (/°C)	60 nW	6 nW	0.6 nW	51 pW	5.1 pW	0.8 pW	0.6 pW
Gain Drift (/°C)	0.008%	0.008%	0.008%	0.01%	0.01%	0.01%	0.02%
cw-Saturation Power	2 mW	1 mW	0.1 mW	10 µW	1 µW	0.1 µW	10 nW

Gain Setting (High Speed) (V/W)	10^5	10^6	10^7	10^8	10^9	10^{10}	10^{11}
Upper Cut-Off Frequency (- 3 dB)	500 kHz	500 kHz	400 kHz	200 kHz	45 kHz	7 kHz	1.2 kHz
Rise / Fall Time (10% - 90%)	700 ns	700 ns	900 ns	1.8 µs	8 µs	50 µs	300 µs
Min. NEP (/√Hz, @100 Hz))	24 pW	3.3 pW	830 fW	240 fW	80 fW	26 fW	10 fW
Offset Current Drift (/°C)	60 nW	6 nW	0.6 nW	51 pW	5.1 pW	0.8 pW	0.6 pW
Gain Drift (/°C)	0.008%	0.008%	0.008%	0.01%	0.01%	0.01%	0.02%
cw-Saturation Power	0.1 mW	10 µW	1 µW	0.1 µW	10 nW	1 nW	0.1 nW

Output	Output Voltage	± 10 V (@ 10 kΩ load)
	Output Impedance	50 Ω (terminate with > 10 kΩ load for best performance)
	Max. Output Current	± 30 mA
Indicator LED	Function	Overload
Digital Control	Control Input Voltage Range	Low: - 0.8 ...+ 1.2 V, High: 2.3 ... + 12 V
	Control Input Current	0 mA @ 0V, 1.5 mA @ + 5 V, 4.5 mA @ + 12V
	Overload Output	non active: 0 V , max. -1 mA, active: 5.1 V, max. 7 mA
Ext. Offset Control	Control Voltage Range	± 10 V
	Offset Control Input Impedance	20 kΩ

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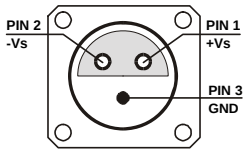
Specifications (continued)		
Power Supply	Supply Voltage	± 15 V
	Supply Current	+ 150 / -100 mA (depends on operating conditions, recommended power supply capability minimum 250 mA)
	Stabilized Power Supply Output	± 12 V, max. 150 mA, + 5V, max. 50 mA
Case	Weight	320 g (0.74 lbs)
	Material	AlMg4.5Mn, nickel-plated
Temperature Range	Storage Temperature	-40 ... +80 °C
	Operating Temperature	0 ... +60 °C
Absolute Maximum Ratings	Max. cw-Power (averaged)	20 mW
	Control Input Voltage	- 5 V / + 16 V
	Power Supply Voltage	± 22 V
Connectors	Input	optical, FC, ST or SMA fiber receptacle
	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: +12V (stabilized power supply output) Pin 2: -12V (stabilized power supply output) Pin 3: AGND (analog ground) Pin 4: +5V (stabilized power supply output) Pin 5: digital output: High = overload 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 Pin 12: digital control input: gain, MSB Pin 13: digital control input: AC/DC Pin 14: digital control input: high speed / low noise Pin 15 - 25: NC
Available Models	OE-200-SI-FC	FC receptacle, calibrated at 830 nm
	OE-200-SI-ST	ST receptacle, calibrated at 830 nm
	OE-200-SI-SMA	SMA receptacle, calibrated at 830 nm



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Remote Control Operation

General

Remote control input bits are opto-isolated and connected by a logical OR function to the local switch settings. For remote control set the corresponding local switches to “Remote”, "AC" and "H” and select the desired setting via a bit-code at the corresponding digital inputs.
Mixed operation, e.g. local AC/DC setting and remote controlled gain setting, is also possible.

The switch setting “FBW / 10 Hz” of the lowpass signal filter is not remote controllable.

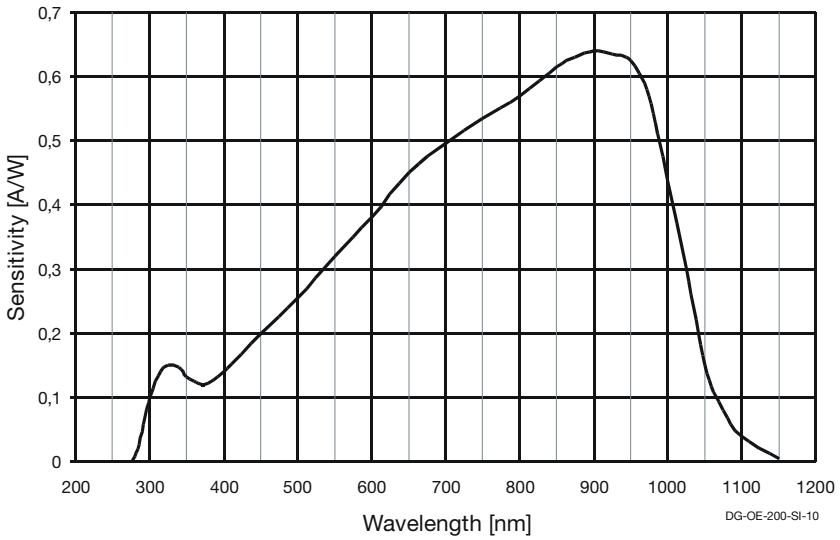
Gain Setting

Low Noise Gain (V/W) Pin 14=High	High Speed Gain (V/W) Pin 14=Low	Pin 10 LSB	Pin 11	Pin 12 MSB
10^3	10^5	Low	Low	Low
10^4	10^6	High	Low	Low
10^5	10^7	Low	High	Low
10^6	10^8	High	High	Low
10^7	10^9	Low	Low	High
10^8	10^{10}	High	Low	High
10^9	10^{11}	Low	High	High

AC/DC Setting

Coupling	Pin 13
AC	Low
DC	High

Spectral Response



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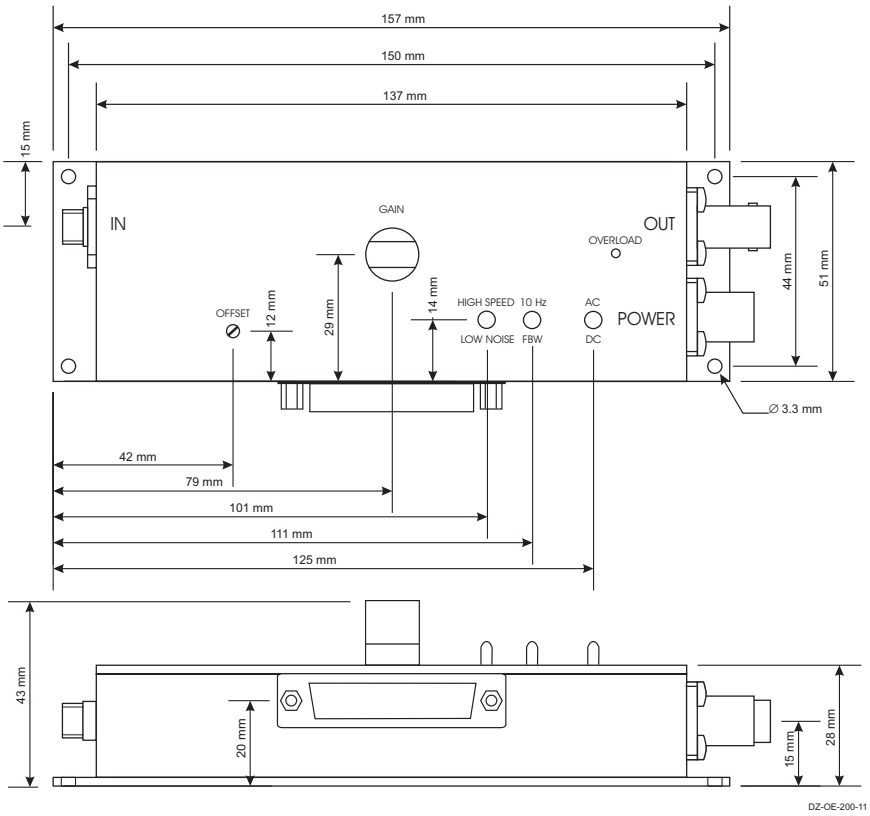
Dimensions



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