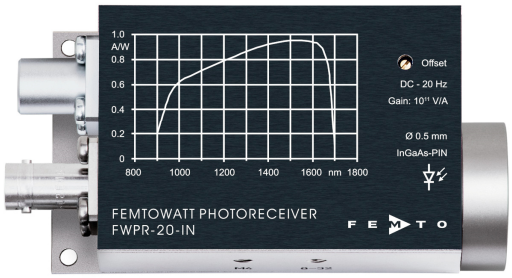
Femtowatt Photoreceiver with InGaAs-PIN Photodiode



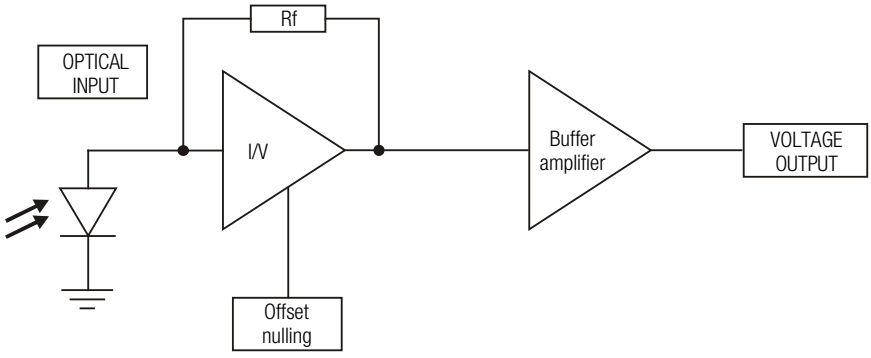
Features

- **InGaAs-PIN photodiode, 0.5 mm active diameter**
- **Ultra low noise, NEP 7.5 fW/√Hz**
- **Amplifier transimpedance gain 1 × 10^{11} V/A**
- **Max. conversion gain 0.95 × 10^{11} V/W @ 1550 nm**
- **Spectral range 900 – 1700 nm**
- **Free-space input 1.035"-40 threaded, Easily convertible to fiber optic input (FC and FSMA) with optionally available screw-on adapters**
- **UNC 8-32 and M4 tapped holes for mounting on standard posts with metric and imperial thread**

Applications

- **Fluorescence measurements**
- **NIR spectroscopy**
- **Electrophoresis**
- **Replacement for (liquid nitrogen) cooled Ge photodiodes and avalanche photodiodes (APDs)**

Block Diagram



BS01-FWPR_R03

Intended Use

The FWPR-20-IN photoreceiver consists of an InGaAs photodiode and a subsequent low-noise fixed gain transimpedance amplifier. It is designed for conversion of optical signals in the range from fW to pW into equivalent output voltages. Operation is mostly 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.

Femtowatt Photoreceiver with InGaAs-PIN Photodiode

Available Version	FWPR-20-IN-FST	1.035"-40 threaded flange for free space applications, compatible with many optical standard accessories and for use with various types of fiber connector adapters. Optionally available: Fiber adapters PRA-FC, PRA-FCA and PRA-FSMA. The coupling efficiency will depend on fiber type. With the relative large 0.5 mm dia. photodiode installed in the FWPR-20-IN input coupling is not critical. However, standard SM 9/125 fibers (PC or APC) with low numerical aperture (NA) are recommended for ensuring near 100% coupling efficiency.
	 Picture shows 1.035"-40 threaded flange with internally threaded coupler ring (outer diameter 30 mm)	
Related Model	FWPR-20-SI-FST	Si photodiode, 1.1 × 1.1 mm², 320 - 1100 nm free space input, 1.035"-40 threaded flange
Available Accessories	PRA-FC PRA-FCA PRA-FSMA	Fiber-adapter with external 1.035"-40 thread
		
	PRA-PAP	Alternative mounting option: Post adapter plate, easy to mount on FEMTO photoreceiver series OE, FWPR, PWPR, HCA-S and LCA-S
		
	PS-15-25-L	Power Supply Input: 100 – 240 VAC Output: ±15 VDC
		
Specifications	Test conditions	V_S = ±15 V, T_A = 25 °C, output load impedance 1 MΩ, warm-up 20 minutes (min. 10 minutes recommended)
Gain	Transimpedance gain	1.0×10^{11} V/A (@ output load ≥ 100 kΩ)
	Gain accuracy	±1 % (electrical)
	Conversion gain	0.95×10^{11} V/W typ. (@ 1550 nm, output load ≥ 100 kΩ)
Frequency Response	Lower cut-off frequency	DC
	Upper cut-off frequency (–3 dB)	20 Hz (±20 %)
Time Response	Rise/fall time (10 % – 90 %)	18 ms (±20 %)
Input	Noise equivalent power (NEP)	7.5 fW/√Hz (@ 1550 nm, 1 Hz)
	Optical saturation power	110 pW (for linear amplification, @ 1550 nm)
Detector	Detector	InGaAs-PIN photodiode
	Active area	∅ 0.5 mm
	Spectral range	900 – 1700 nm
	Max. sensitivity	0.95 A/W typ. (@ 1550 nm)

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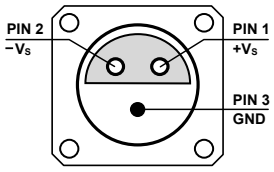
Specifications (continued)		
Output	Output voltage range	–1.6 V ... +10 V (@ ≥ 100 kΩ output load)
	Offset compensation range	±1.6 V typ. (adjustable by offset potentiometer)
	Output impedance	50 Ω (terminate with ≥ 100 kΩ load)
	Max. output current	25 mA (short-circuit proof)
	Output noise	3 mV RMS (20 mV peak-peak) typ. (@ ≥ 100 kΩ load, no signal on detector, measurement bandwidth 8 kHz)
Optical Input Connector	Material FST flange	1.4305 stainless steel, nickel-plated
	Material FST coupler ring	1.4305 stainless steel, glass bead blasted
Power Supply	Supply voltage	±15 V (±14.5 V ... ±16.5 V)
	Supply current	±15 mA (depends on operating conditions, recommended power supply capability min. ±50 mA)
Case	Weight	203 g (0.45 lbs) incl. coupler ring
	Material	AlMg3/4.5Mn, nickel-plated
Temperature Range	Storage temperature	–30 °C ... +85 °C
	Operating temperature	0 °C ... +60 °C
Absolute Maximum Ratings	Optical input power (CW)	10 mW
	Power supply voltage	±20 V
Connectors	Input	1.035"-40 threaded flange for free space applications and for use with various types of optical standard accessories
	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: GND

Scope of Delivery	FWPR-20-IN-FST, internally threaded coupler ring, LEMO® 3-pin connector, datasheet, transport package

Ordering Information	FWPR-20-IN-FST	1.035"-40 threaded flange for free space applications and for use with various types of optical standard accessories.

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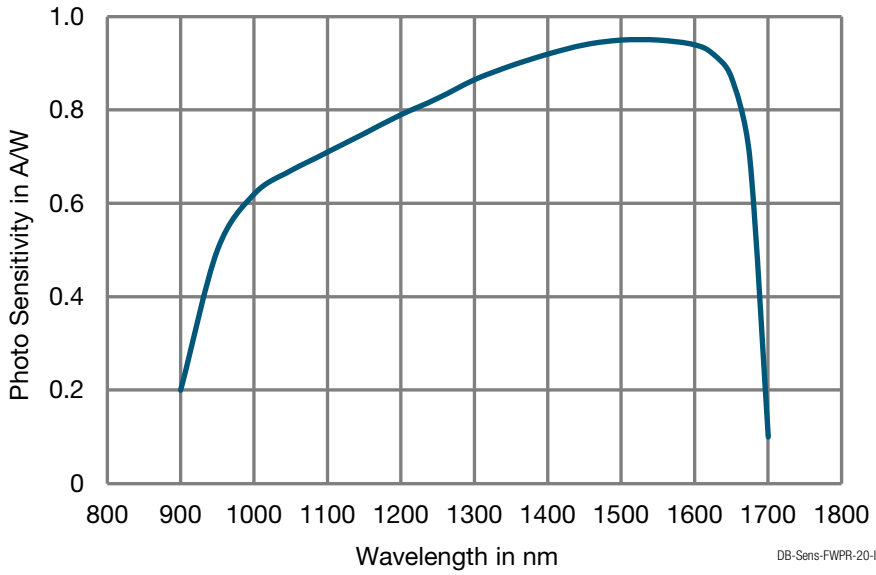
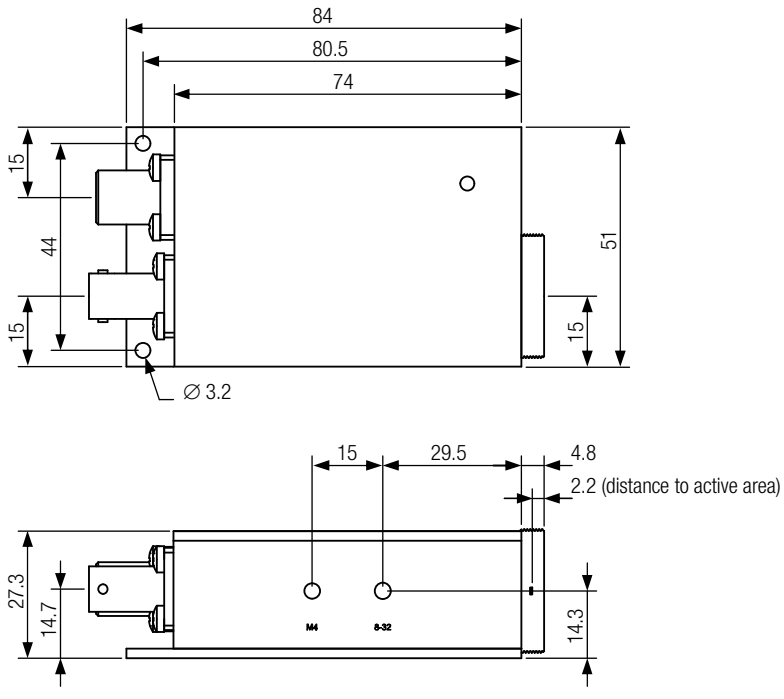
Spectral Response



DB-Sens-FWPR-20-IN_R01

Dimensions

FWPR-20-IN-FST (1.035"-40 threaded free space input)



FWPR-20-IN-FST_R2

all dimensions in mm unless otherwise noted

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