

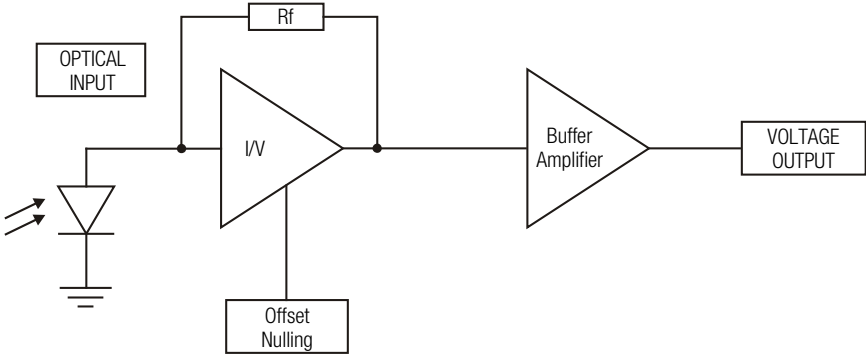
Datasheet

FWPR-20-SI

Femtowatt Photoreceiver
with Si Photodiode



The picture shows model FWPR-20-SI-FS.
The photoreceiver will be delivered without post holder and post.

Features	<ul style="list-style-type: none">• Si photodiode, 1.1 × 1.1 mm² active area• Ultra low noise, NEP 0.7 fW/√Hz• Amplifier transimpedance gain 1 × 10¹² V/A• Max. conversion gain 0.6 × 10¹² V/W @ 960 nm• Wavelength range 320 – 1100 nm• Free-space input 1.035"-40 threaded, alternatively 25 mm diameter unthreaded• 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	<ul style="list-style-type: none">• Fluorescence measurements• Spectroscopy• Electrophoresis• Replacement for photomultiplier tubes (PMTs) and avalanche photodiodes (APDs)
Block Diagram	<div></div> <div>BS01-FWPR_R03</div>

Femtowatt Photoreceiver with Si Photodiode

Available Versions

FWPR-20-SI-FST



Picture shows 1.035"-40 threaded flange with internally threaded coupler ring (outer diameter 30 mm)

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.

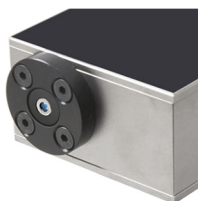
Optionally available:

Fiber adapters PRA-FC, PRA-FCA and PRA-FSMA.

Coupling efficiency will depend on fiber type.

With the relative large $1.1 \times 1.1 \text{ mm}^2$ photodiode installed in the FWPR-20-SI 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.

FWPR-20-SI-FS



Picture shows round flange with 25 mm diameter

25 mm dia. unthreaded flange for free space applications. Compatible with many optical standard accessories.

Related Models

FWPR-20-IN-FST

InGaAs-PIN, $\varnothing 500 \mu\text{m}$, 900 - 1700 nm free space input, 1.035"-40 threaded flange

FWPR-20-IN-FS

InGaAs-PIN, $\varnothing 500 \mu\text{m}$, 900 - 1700 nm free space input, 25 mm dia. unthreaded flange

Available Accessories

PRA-FC
PRA-FCA
PRA-FSMA



Fiber-adapter with external 1.035"-40 thread (suitable for FST models only).

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

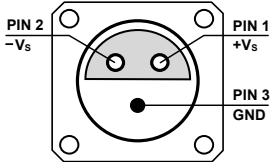
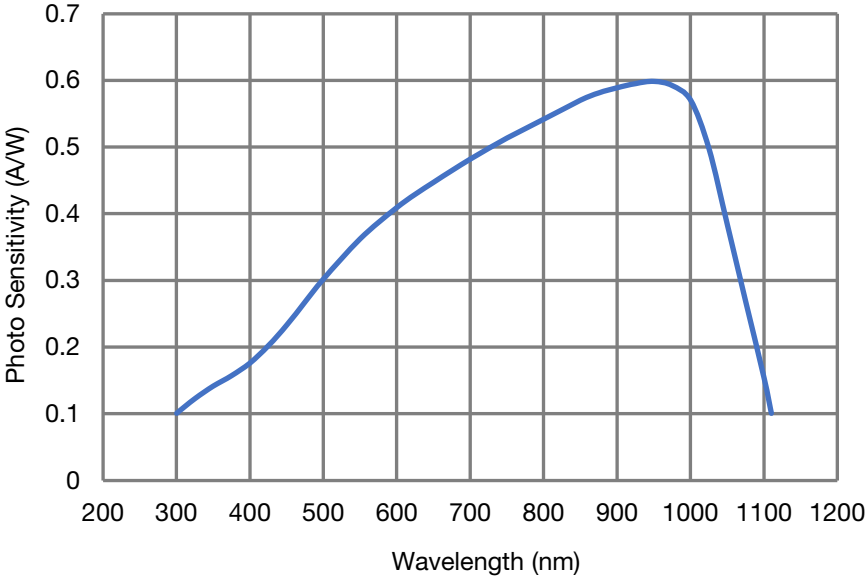


Power supply,
Input: 100 – 240 VAC,
Output: $\pm 15 \text{ VDC}$

Femtowatt Photoreceiver with Si Photodiode

Specifications	Test conditions	$V_S = \pm 15\text{ V}$, $T_A = 25\text{ }^\circ\text{C}$, output load impedance $1\text{ M}\Omega$, warm-up 20 minutes (min. 10 minutes recommended)
Gain	Transimpedance gain Gain accuracy Conversion gain	$1.0 \times 10^{12}\text{ V/A}$ (@ output load $\geq 100\text{ k}\Omega$) $\pm 1\%$ (electrical) $0.6 \times 10^{12}\text{ V/W typ.}$ (@ 960 nm , output load $\geq 100\text{ k}\Omega$)
Frequency Response	Lower cut-off frequency Upper cut-off frequency (-3 dB)	DC 20 Hz ($\pm 20\%$)
Time Response	Rise/fall time ($10\% - 90\%$)	18 ms ($\pm 20\%$)
Input	Noise equivalent power (NEP) Optical saturation power	$0.7\text{ fW}/\sqrt{\text{Hz}}$ (@ 960 nm , 1 Hz) 18 pW (for linear amplification, @ 960 nm)
Detector	Detector Active area Spectral range Sensitivity	Si photodiode $1.1 \times 1.1\text{ mm}^2$ $320 - 1100\text{ nm}$ 0.6 A/W typ. (@ 960 nm)
Output	Output voltage range Offset voltage compensation Output impedance Max. output current Output noise	$-1.6\text{ V} \dots +10\text{ V}$ (@ $\geq 100\text{ k}\Omega$ output load) $\pm 1.6\text{ V typ.}$ (adjustable by offset potentiometer) $50\text{ }\Omega$ (terminate with $\geq 100\text{ k}\Omega$ load) 25 mA (short-circuit proof) 6 mV_{RMS} (40 mV_{PP}) typ. (@ $\geq 100\text{ k}\Omega$ load, no signal on detector, measurement bandwidth 8 kHz)
Input Flange	Material	1.4305 stainless steel, nickel-plated (FST flange) AlMg4.5Mn, nickel-plated (FS flange)
Coupler Ring (FST version only)	Material	1.4305 stainless steel, glass bead blasted
Power Supply	Supply voltage Supply current	$\pm 15\text{ V}$ ($\pm 14.5\text{ V} \dots \pm 16.5\text{ V}$) $\pm 15\text{ mA}$ (depends on operating conditions, recommended power supply capability min. $\pm 50\text{ mA}$)
Case	Weight Material	203 g (0.45 lbs) FWPR-20-SI-FST incl. coupler ring 190 g (0.42 lbs) FWPR-20-SI-FS AlMg3/4.5Mn, nickel-plated
Temperature Range	Storage temperature Operating temperature	$-30\text{ }^\circ\text{C} \dots +85\text{ }^\circ\text{C}$ $0\text{ }^\circ\text{C} \dots +60\text{ }^\circ\text{C}$
Absolute Maximum Ratings	Max. CW power (averaged) Power supply voltage	10 mW $\pm 20\text{ V}$

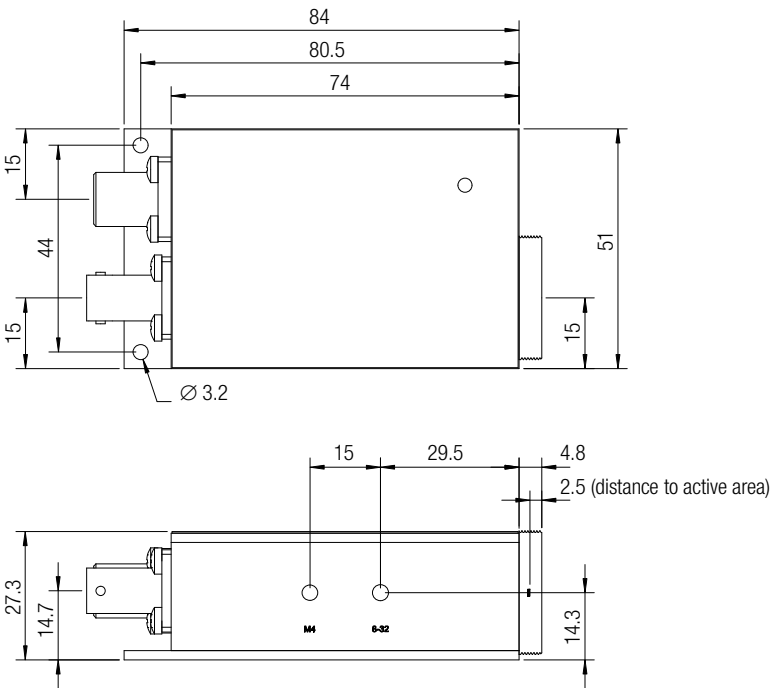
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Connectors	<div>InputFWPR-20-SI-FST1.035"-40 threaded flange for free space applications and for use with various types of optical standard accessories</div> <div>FWPR-20-SI-FS25 mm dia. unthreaded flange for free space applications</div> <div>OutputBNC jack (female)</div> <div>Power supplyLEMO® series 1S, 3-pin fixed socket (mating plug type: FFA.1S.303.CLAC52)</div> <div><div><div><div>PIN 2 -Vs</div><div></div><div>PIN 1 +Vs</div><div>PIN 3 GND</div></div><div>Pin 1: +15 V Pin 2: -15 V Pin 3: GND</div></div></div>																						
Scope of Delivery	FWPR-20-SI, internally threaded coupler ring (FST version only), LEMO® 3-pin connector, datasheet, transport package																						
Ordering Information	<div>FWPR-20-SI-FST1.035"-40 threaded flange for free space applications and for use with various types of optical standard accessories.</div> <div>FWPR-20-SI-FS25 mm dia. unthreaded flange for free space applications.</div>																						
Spectral Responsivity	<div><table border="1"><caption>Photo Sensitivity vs Wavelength</caption><thead><tr><th>Wavelength (nm)</th><th>Photo Sensitivity (A/W)</th></tr></thead><tbody><tr><td>300</td><td>0.1</td></tr><tr><td>400</td><td>0.18</td></tr><tr><td>500</td><td>0.3</td></tr><tr><td>600</td><td>0.4</td></tr><tr><td>700</td><td>0.48</td></tr><tr><td>800</td><td>0.55</td></tr><tr><td>900</td><td>0.58</td></tr><tr><td>950</td><td>0.6</td></tr><tr><td>1000</td><td>0.58</td></tr><tr><td>1100</td><td>0.1</td></tr></tbody></table></div> <div>DB-Sens-FWPR-20-SI_R01</div>	Wavelength (nm)	Photo Sensitivity (A/W)	300	0.1	400	0.18	500	0.3	600	0.4	700	0.48	800	0.55	900	0.58	950	0.6	1000	0.58	1100	0.1
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Dimensions

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



FWPR-20-SI-FST_R1

all dimensions in mm unless otherwise noted

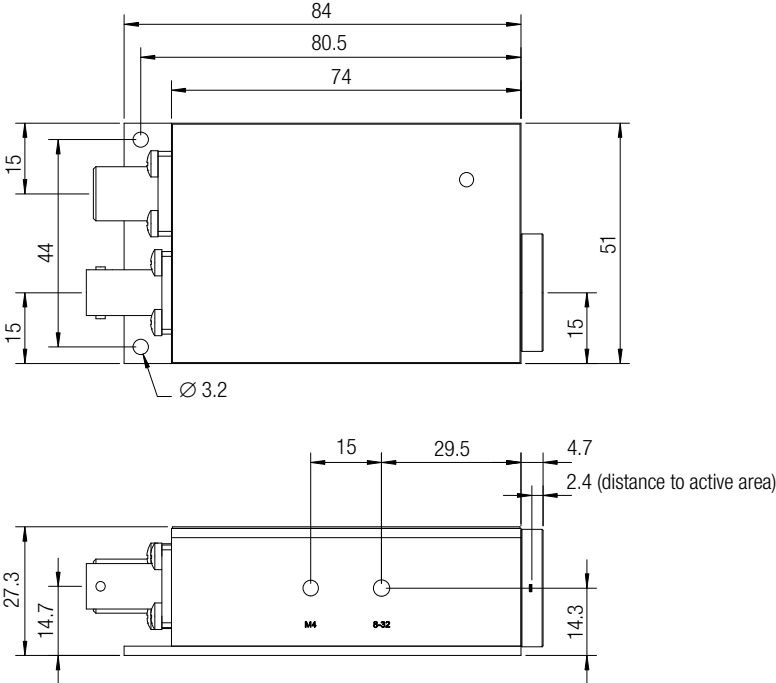
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Dimensions (continued)

FWPR-20-SI-FS (25 mm dia. unthreaded free space input)



FWPR-20-SI-FS_R1

all dimensions in mm unless otherwise noted

FEMTO Messtechnik GmbH
Klosterstr. 64
10179 Berlin · Germany
Phone: +49 30 280 4711-0
Fax: +49 30 280 4711-11
Email: info@femto.de
www.femto.de

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