

# Femtowatt Photoreceiver with InGaAs-PIN Photodiode



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

<p>Features</p>	<ul style="list-style-type: none"> <li>• <b>InGaAs-PIN photodiode, 0.5 mm active diameter</b></li> <li>• <b>Ultra low noise, NEP 7.5 fW/√Hz</b></li> <li>• <b>Amplifier transimpedance gain <math>1 \times 10^{11}</math> V/A</b></li> <li>• <b>Max. conversion gain <math>0.95 \times 10^{11}</math> V/W @ 1550 nm</b></li> <li>• <b>Spectral range 900 – 1700 nm</b></li> <li>• <b>Free-space input 1.035"-40 threaded, alternatively 25 mm diameter unthreaded</b></li> <li>• <b>Easily convertible to fiber optic input (FC and FSMA) with optionally available screw-on adapters</b></li> <li>• <b>UNC 8-32 and M4 tapped holes for mounting on standard posts with metric and imperial thread</b></li> </ul>
<p>Applications</p>	<ul style="list-style-type: none"> <li>• <b>Fluorescence measurements</b></li> <li>• <b>NIR spectroscopy</b></li> <li>• <b>Electrophoresis</b></li> <li>• <b>Replacement for (liquid nitrogen) cooled Ge photodiodes and avalanche photodiodes (APDs)</b></li> </ul>
<p>Block Diagram</p>	<p style="text-align: right; font-size: small;">BS01-FWPR_R03</p>

## Femtowatt Photoreceiver with InGaAs-PIN Photodiode

Available Versions

FWPR-20-IN-FST

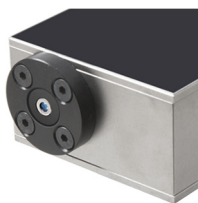


Picture shows 1.035"-40 threaded flange with internally threaded coupler ring (outer diameter 30 mm)

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.  
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.

FWPR-20-IN-FS



Picture shows unthreaded flange with 25 mm diameter

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

Related Models

FWPR-20-SI-FST

Si photodiode, 1.1 × 1.1 mm<sup>2</sup>, 320 - 1100 nm free space input, 1.035"-40 threaded flange

FWPR-20-SI-FS

Si photodiode, 1.1 × 1.1 mm<sup>2</sup>, 320 – 1100 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: ±15 VDC

## Femtowatt Photoreceiver with InGaAs-PIN 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	$1.0 \times 10^{11}\text{ V/A}$ (@ output load $\geq 100\text{ k}\Omega$ ) $\pm 1\%$ (electrical) $0.95 \times 10^{11}\text{ V/W typ.}$ (@ $1550\text{ nm}$ , 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	$7.5\text{ fW}/\sqrt{\text{Hz}}$ (@ $1550\text{ nm}$ , 1 Hz) 110 pW (for linear amplification, @ $1550\text{ nm}$ )
Detector	Detector Active area Spectral range Max. sensitivity	InGaAs-PIN photodiode $\varnothing 0.5\text{ mm}$ 900 – 1700 nm $0.95\text{ A/W typ.}$ (@ $1550\text{ nm}$ )
Output	Output voltage range Offset compensation range 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) $50\ \Omega$ (terminate with $\geq 100\text{ k}\Omega$ load) 25 mA (short-circuit proof) $3\text{ mV}_{\text{RMS}}$ ( $20\text{ mV}_{\text{PP}}$ ) 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-IN-FST incl. coupler ring 190 g (0.42 lbs) FWPR-20-IN-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	Optical input power (CW) Power supply voltage	10 mW $\pm 20\text{ V}$
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## Femtowatt Photoreceiver with InGaAs-PIN Photodiode

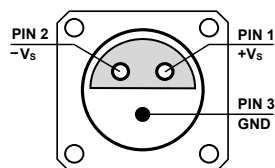
Connectors

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

FWPR-20-IN-FS 25 mm dia. unthreaded flange for free space applications

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

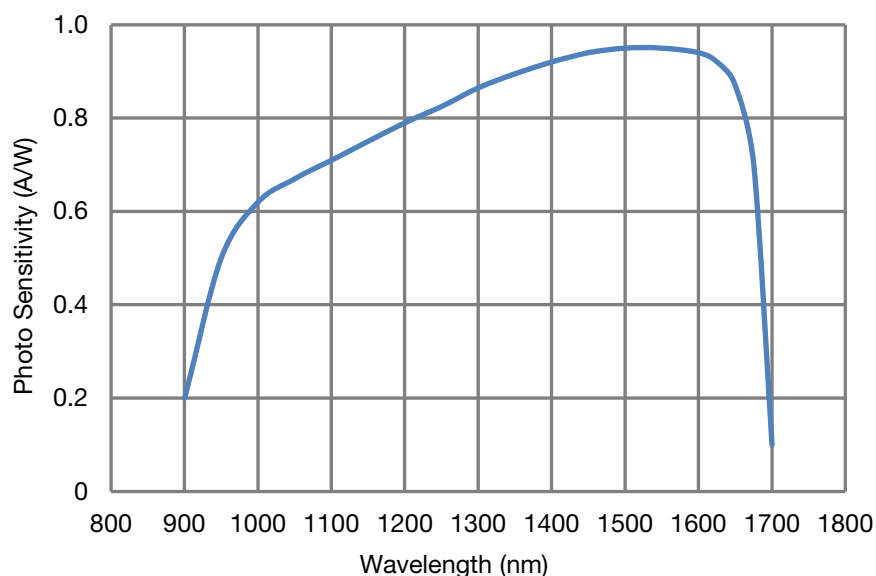
FWPR-20-IN, internally threaded coupler ring (FST version only), LEMO® 3-pin connector, datasheet, transport package

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.

FWPR-20-IN-FS 25 mm dia. unthreaded flange for free space applications.

Spectral Responsivity

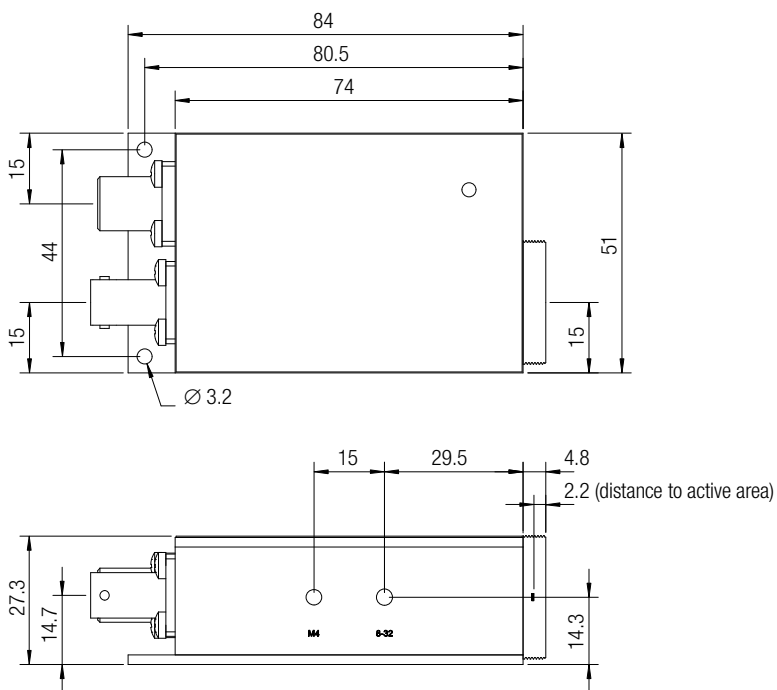


DB-Sens-FWPR-20-IN\_R01

# Femtowatt Photoreceiver with InGaAs-PIN Photodiode

Dimensions

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



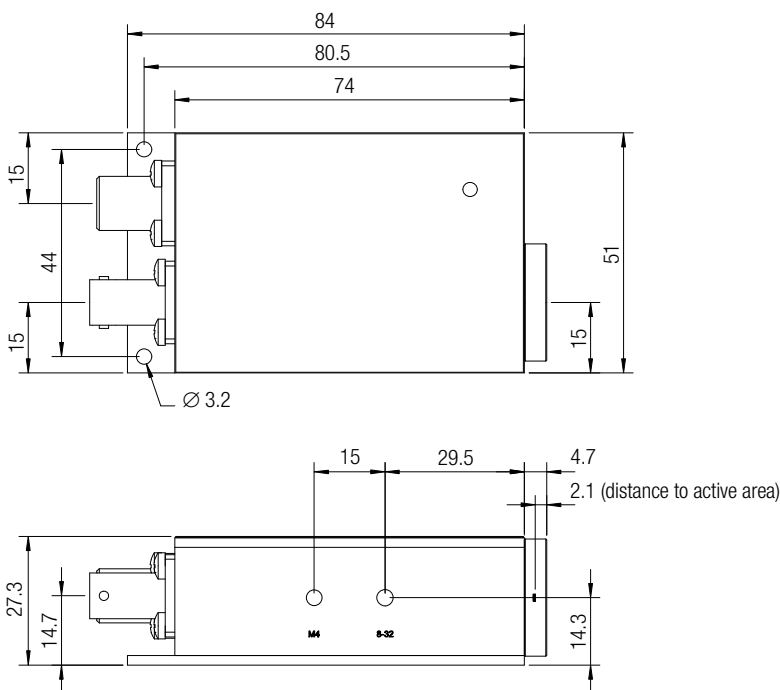
FWPR-20-IN-FST\_R1

all dimensions in mm unless otherwise noted

# Femtowatt Photoreceiver with InGaAs-PIN Photodiode

Dimensions (continued)

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



FWPR-20-IN-FS\_R1

all dimensions in mm unless otherwise noted

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