


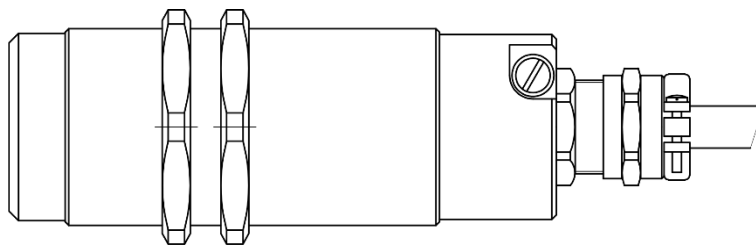


# Operating Instructions

## PP2031... Ex Transmitter-Receiver Light Barrier for Hazardous Areas

,4139M01GE'

Features	Applications
<ul style="list-style-type: none"> <li>✓ Very large working ranges – typically up to 200 m in environments subject to high levels of dust</li> <li>✓ Cascaded operation is possible – up to 8 pairs of light barriers can be arranged closely beside each other</li> <li>✓ Explosions-proof transmitter and receiver units</li> <li>✓  II 2G Ex db IIC T6 Gb</li> <li>✓  II 2D Ex tb IIIC T80°C Db</li> </ul>	<ul style="list-style-type: none"> <li>○ Detection of materials/objects in areas in Zones 1 or 21</li> </ul> <div style="text-align: center; margin-top: 20px;">  <p>PP2031... Ex Transmitter/Receiver</p> </div>



Sketch of PP2031... Ex

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## 1 Identification

<b>1.1 Product Brand</b>	“PP2031... Ex” transmitter-receiver light barrier for hazardous (potentially explosive) areas		
<b>1.2 Product Versions / Marking</b>	Transmitter:	PP2031S Ex	PP2031*01nS Ex
	Receiver:	PP2031E Ex	PP2031*01nE Ex
<b>1.3 Name and Address of the Manufacturer</b>	<b>Fotoelektrik Pauly GmbH</b> <b>Wahrbrink 6, 59368 Werne, Germany</b>		
<b>1.4 Declaration of Conformity</b>	The above products were developed and manufactured in conformance to the following standards or normative documents!		

- Low-voltage directive 2014/35/EU
- EMC directive 2014/30/EU
- ATEX directive 2014/34/EU

EC-Type Examination Certificate of Equipment and Components for Use in Hazardous Areas (Directive 94/9/EC):

Certificate No.: **BVS 08 ATEX E 122 X**

Marking:  II 2G Ex db IIC T6 Gb  
II 2D Ex tb IIIC T80°C Db

IECEX Certificate of Conformity, IEC Certification Scheme for Explosive Atmospheres:

Certificate No.: **IECEX BVS 12.0029X**

Marking: Ex db IIC T6 Gb  
Ex tb IIIC T80°C Db

### Applied Standards and Technical Specifications:

IEC 60079-0:2017	General Requirements
IEC 60079-1:2014	Equipment protection flameproof enclosure “d”
IEC 60079-31:2013	Equipment dust ignition protection by enclosure “t”

### 2 Product Description

#### 2.1 General Functions and Range of Applications, Use in Accordance with the Intended Purpose

The “PP2031... Ex” transmitter-receiver light barrier has been developed for use in hazardous areas in Zones 1 and 21.

The “PP2031... Ex” transmitter-receiver light barrier consists of a “PP2031...S Ex” transmitter and a “PP2031...E Ex” receiver. Together the transmitter and receiver form a high-performance transmitter-receiver light barrier.

The application of 24 VDC supply voltage to the transmitter generates in the transmitter a modulated light signal in the invisible infrared range. The light signal has a defined clock ratio. The receiver is supplied with voltage by means of a connecting cable between the transmitter and the receiver and synchronised with the transmitter light clock timing.

A P-N-P transistor in the receiver indicates the occupancy state of the light barrier. The transistor is connected when the light path between the transmitter and receiver is unobstructed. The switching output then supplies a voltage potential of 24 VDC. The transistor is blocked if the light path between the transmitter and receiver is interrupted. The switching state of the transmitter-receiver light barrier is typically evaluated with a PLC or a monitoring device.

The transmitter and receiver in a high-performance transmitter-receiver light barrier can be adjusted with various optical attachments to suit a variety of working ranges.

Even in very dusty environments, such as e.g. coking plants, working ranges of 200 m are by all means possible. In the open air, working ranges of 300 m are possible. The high-performance transmitter-receiver light barrier can be used for monitoring places or switching positions. Place occupation or switch position signals are required in the many different automated industrial applications. These include e.g. tracking the flow of materials or recognising switching lever positions or marking flags. The recognition of switching lever positions is used in particular to monitor flap valves in coke oven batteries in coking plants.

If it is necessary to have several light barriers close to each other, cascaded operation in accordance with the master/slave principle is used, whereby the master light barrier is the PP2031 Ex type and the slave light barrier is the PP2031\*01n Ex type.

### 2.2 Safety Information, Summary (Use for Purposes Other Than That Intended)



The owner / managing operator / installer must acquire information about the Ex regulations that apply to his area of application and conform to these regulations. The same applies when cables and conductors are being installed and wired. In applications in Zone 21 it must be ensured when installing the connection cable that electrostatic charging cannot lead to ignitable discharges.



The light barriers may be installed only by an authorised and qualified person with the required specialist knowledge on how electrical equipment should be installed in hazardous areas.



The requirements of EN 60079-14 must be observed.



Transmitters and receivers may not be disassembled.

If the connection is established in the hazardous area:



the connection cable of the transmitter and of the receiver must be connected in an enclosure. The enclosure used must meet the requirements of a recognised type of protection (complying with EN60079-0, Section 1).



If the enclosure or cable entry is damaged or no longer leak-tight, the device must be put out of operation immediately.



External sources of heat or cold in the form of sources of radiation with the capability of impermissibly heating or cooling the device's surfaces are inadmissible and special care must be taken to prevent them arising.

**3 Definitions – Technical Data**

<b>Transmitter</b>	<b>PP2031S Ex</b>	<b>PP2031*01nS Ex</b>
Enclosure material:	Stainless steel	
Dimensions:	M42x1.5 x 147 mm	
Weight	approx. 1450 g (incl. 5 m cable)	
Protection mode	IP66 (Protection against Dust and Powerful Water Jets)	
Voltage supply	24 VDC	
Power consumption	~40 mA / <1 W without load (for transmitter and receiver)	
Connection	No. cable 4x0.75 mm <sup>2</sup> shielded (typical length 5 m)	No. cable 5x0.75 mm <sup>2</sup> shielded (typical length 5 m)
Emitted light	LED 850...880 nm, invisible	
Working indicator	red LED	
Ambient temperature (T <sub>amb.</sub> )	-20 to +60 °C	
Storage temperature	-20 to +70 °C	
Interference suppression	Forced synchronisation	
Light beam diameter	approx. 1700 mm / 5 m (without optical attachments)	

<b>Receiver</b>	<b>PP2031E Ex</b>	<b>PP2031*01nE Ex</b>
Enclosure material:	Stainless steel	
Dimensions:	M42x1.5 x 147 mm	
Weight	approx. 1450 g (incl. 5 m cable)	
Protection mode	IP66 (Protection against Dust and Powerful Water Jets)	
Voltage supply	24 VDC (from transmitter)	
Connection	No. cable 4x0.75 mm <sup>2</sup> shielded (typical length 5 m)	
Switching output	PNP transistor, short-circuit proof 50 mA	
Signal mode	Bright-switching (Optional: dark-switching)	
Switch indicator	green LED	
Ambient temperature (T <sub>amb.</sub> )	-20 to +60 °C	
Storage temperature	-20 to +70 °C	
Steady light resistance	> 80 kLux	
Access time	< 12 ms/switch transition	
Interference suppression	Forced synchronisation	
Light beam diameter	approx. 1700 mm / 5m (without optical attachments)	

All specification: see data sheet

### 4 Preparing the Products for Use

Transmitters and receivers must be mounted opposite each other.

The objects to be monitored must be able to fully occupy the light channel, formed from the light exit and entry areas of transmitters or receivers.

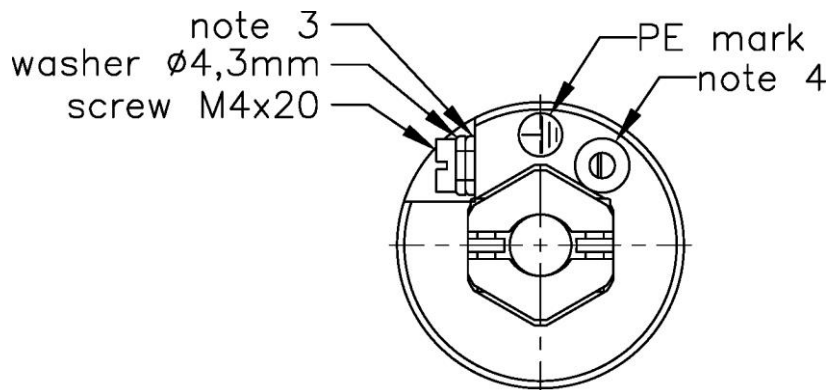
When mounting, the operating instructions and the data sheets must be observed.

### 5 Connection

#### 5.1 Wiring the Light Barriers

The PP2031... Ex light barrier must be wired in accordance with the data sheet. On request we will provide a wiring diagram for cascaded operation in the master/slave system.

#### 5.2 PE Connection



Note 3: Connection for cable socket with ring eyelet, internal diameter 4.3 mm, external diameter maximum 9.5 mm.

Note 4: Connection of rigid conductors: 4 mm<sup>2</sup> to 6 mm<sup>2</sup>.  
Connection of flexible conductors with ferrule: 4 mm<sup>2</sup>.



In each case only one of the two connection possibilities may be used, either in accordance with note 3 or note 4!

#### 5.3 Technical Recommendation about Connection Lines for Installation

Please pay attention that high quality power supply/connection lines will be used with appropriate low transmission-line constant like low inductance and capacitance as well as a low line-resistance and a good and EMC/HF proofed shield. The capacitance per unit length should be less than 200 nF/km ('Wire/Wire') and 300 nF/km ('Wire/Shield'). For long connection lines the cross-sectional area of one conductor should be 1.5 mm<sup>2</sup> or more. The total length of any connection line including terminal boxes should be limited by max. 300 m. Otherwise unwanted envelop delay distortion on the line may cause detection problems of the electrical signals.

## 6 Marking the Light Barriers

Transmitter:  
PP2031S Ex

	<b>CE 0158</b> Type: PP2031S Ex Ⓜ II 2G Ex db IIC T6 Gb Ⓜ II 2D Ex tb IIIC T80°C Db IP66 ATEX certno.: BVS 08 ATEX E 122 X IECEx CoC: IECEx BVS 12.0029X Temp.: -20 °C ≤ Ta ≤ +60 °C Art.no.: 4138Sx01 Ser.no.: C2A.8888	光控传感器 德国制造 Ex ID A21 IP66 T80°C Certificate No.: 22-AV480-0096X to 22-AV480-0101X Date of issue: 2022-03-24 Made in Germany Fotoelektrik Pauly   59368 Werne www.fotoelektrik-pauly.de	
	+24VDC 1 0V 2 0V shield to Receiver Clock outp. 3 to Transmitter n+1 PE GN/YE		

Receiver:  
PP2031E Ex

	<b>CE 0158</b> Type: PP2031E Ex Ⓜ II 2G Ex db IIC T6 Gb Ⓜ II 2D Ex tb IIIC T80°C Db IP66 ATEX certno.: BVS 08 ATEX E 122 X IECEx CoC: IECEx BVS 12.0029X Temp.: -20 °C ≤ Ta ≤ +60 °C Art.no.: 4138Ex01 Ser.no.: C2A.8888	光控传感器 德国制造 Ex ID A21 IP66 T80°C Certificate No.: 22-AV480-0096X to 22-AV480-0101X Date of issue: 2022-03-24 Made in Germany Fotoelektrik Pauly   59368 Werne www.fotoelektrik-pauly.de	
	Clock 1 0V 2 0V shield from Transmitter Out 3 PE GN/YE		

Transmitter:  
PP2031\*01nS Ex

	<b>CE 0158</b> Type: PP2031*01nS Ex Ⓜ II 2G Ex db IIC T6 Gb Ⓜ II 2D Ex tb IIIC T80°C Db IP66 ATEX certno.: BVS 08 ATEX E 122 X IECEx CoC: IECEx BVS 12.0029X Temp.: -20 °C ≤ Ta ≤ +60 °C Art.no.: 4139SM01x01 Ser.no.: C2A.8888	光控传感器 德国制造 Ex ID A21 IP66 T80°C Certificate No.: 22-AV480-0096X to 22-AV480-0101X Date of issue: 2022-03-24 Made in Germany Fotoelektrik Pauly   59368 Werne www.fotoelektrik-pauly.de	
	+24VDC 1 0V 2 0V shield to Receiver Clock outp. 4 to Transmitter n+1 Clock inp. 3 from Transm. n-1 PE GN/YE		

Receiver:  
PP2031\*01nE Ex

	<b>CE 0158</b> Type: PP2031*01nE Ex Ⓜ II 2G Ex db IIC T6 Gb Ⓜ II 2D Ex tb IIIC T80°C Db IP66 ATEX certno.: BVS 08 ATEX E 122 X IECEx CoC: IECEx BVS 12.0029X Temp.: -20 °C ≤ Ta ≤ +60 °C Art.no.: 4139EM01x01 Ser.no.: C2A.8888	光控传感器 德国制造 Ex ID A21 IP66 T80°C Certificate No.: 22-AV480-0096X to 22-AV480-0101X Date of issue: 2022-03-24 Made in Germany Fotoelektrik Pauly   59368 Werne www.fotoelektrik-pauly.de	
	Clock 1 0V 2 0V shield from Transmitter Out 3 PE GN/YE		

## 7 Maintenance and Cleaning

- ❖ Maintenance and cleaning work may only be done by qualified personnel who are familiar with the location and have received the relevant instructions.
- ❖ Only a damp cloth may be used to clean the viewing glass. Do not use any caustic detergents!
- ❖ If the enclosure or cable entry is damaged or no longer leak-tight, the device must be put out of operation immediately.
- ❖ Repairs to the device itself may only be done by the manufacturing company itself.



### 8 List of Spare Parts

Designation	Type	Version	Order Code
Transmitter	PP2031S Ex	/e2/5mK4/ir/24VDC	4138Sx...
Cascadable Transmitter	PP2031*01nS Ex	/e2/5mK5/ir/24VDC	4139SM01x...
Receiver	PP2031E Ex	/e2/5mK4/24VDC	4138Ex...
Cascadable Receiver	PP2031*01nE Ex	/e2/5mK4/24VDC	4139EM01x...

The type, version and order code must be specified when making order enquiries.

### 9 Decommissioning the Product

- ❖ The product may be decommissioned only by qualified personnel who are familiar with the location and have received the relevant instructions.

### 10 Annex – Supplementary Documents

Data sheet	PP2031 Ex Transmitter-Receiver Light Barrier	E_41381	2023-08-17
Data sheet	PP2031*01n Ex Cascadable Transmitter-Receiver Light Barrier	E_413911	2023-08-17

D-59368 Werne, 2023-10-23

\* 4139M01 GE \*

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