EN

wenglor
the innovative family

P1PA00x

Luminescence Sensors

Operating Instructions

Translation of the original operating instructions
Subject to change without notice
Available as PDF file only
Version 1.0.0
Status: 11/15/2021
www.wenglor.com

Table of Contents

1. General

1.1. Information Concerning these Instructions

- These instructions apply to the product with ID code P1PA001 and P1PA002
- They make it possible to use the product safely and efficiently.
- These instructions are an integral part of the product and must be kept on hand for the entire duration of its service life.
- Local accident prevention regulations and national work safety regulations must be complied with as well.
- The product is subject to further technical development, and thus the information contained in these operating instructions may also be subject to change. The current version can be found at www.wenglor.com in the product's separate download area.

NOTE!
The operating instructions must be read carefully before using the product and must be kept on hand for later reference!

1.2. Explanations of Symbols

- Safety precautions and warnings are emphasized by means of symbols and attention-getting words.
- Safe use of the product is only possible if these safety precautions and warnings are adhered to.
- The safety precautions and warnings are laid out in accordance with the following principle:

SIGNAL WORD
Type and source of danger!
Possible consequences in the event that the hazard is disregarded.
- Measures for averting the hazard.

The meanings of the signal words, as well as the scope of the associated hazards, are listed below:

DANGER!
This signal word indicates a hazard with a high degree of risk which, if not avoided, results in death or severe injury.

WARNING!
This signal word indicates a hazard with a medium degree of risk which, if not avoided, may result in death or severe injury.

CAUTION!
This signal word indicates a hazard with a low degree of risk which, if not avoided, may result in minor or moderate injury.

ATTENTION!
This word draws attention to a potentially hazardous situation which, if not avoided, may result in property damage.

NOTE!
A note draws attention to useful tips and suggestions, as well as information regarding efficient, error-free use.

1.3. Limitation of Liability

- The product has been developed in consideration of the current state-of-the-art technology, as well as applicable standards and guidelines. Subject to change without notice. A valid declaration of conformity can be found at www.wenglor.com in the product's separate download area.
- wenglor sensoric elektronische Geräte GmbH (hereinafter referred to as "wenglor") excludes all liability in the event of:
  - Non-compliance with the instructions
  - Use of the product for purposes other than those intended
  - Use by untrained personnel
  - Use of unapproved replacement parts
  - Unapproved modification of products
- These operating instructions do not include any guarantees from wenglor with regard to the described procedures or specific product characteristics.
- wenglor assumes no liability for printing errors or other inaccuracies contained in these operating instructions, unless wenglor was verifiably aware of such errors at the point in time at which the operating instructions were prepared.

1.4. Copyrights

- The contents of these instructions are protected by copyright law.
- All rights are reserved by wenglor.
- Commercial reproduction or any other commercial use of the provided content and information, in particular graphics and images, is not permitted without previous written consent from wenglor.

2. For Your Safety

2.1. Use for Intended Purpose

This wenglor product is intended for use in accordance with the following functional principle:
Luminescence sensors emit UV light with a wavelength of 375 nm. If the emitted light strikes a luminescent object, it reflects light within a visible wavelength range of 420 to 750 nm depending on the luminophor used. This fluorescent effect is exploited by the luminescence sensor in order to, for example, detect markings which are invisible to the human eye by daylight.

This product can be used in the following industry sectors:

- Special-purpose mechanical engineering
- Logistics
- Automotive industry
- Food industry
- Packaging industry
- Pharmaceuticals industry
- Plastics industry
- Woodworking industry
- Consumer goods industry
- Paper industry
- Electronics industry
- Printing industry
- Chemicals industry

2.2. Use for Other than the Intended Purpose

- No safety components in accordance with 2006/42/EC (Machinery Directive).
- The product is not suitable for use in potentially explosive atmospheres.
- The product may be used only with accessories supplied or approved by wenglor, or in combination with approved products. A list of approved accessories and combination products can be found at www.wenglor.com on the product detail page.

DANGER!
Risk of personal injury or property damage in case of use for other than the intended purpose!
Use for other than the intended purpose may lead to hazardous situations.
- Observe instructions regarding use for intended purpose.

2.3. Personnel Qualifications

- Suitable technical training is a prerequisite.
- In-house electronics training is required.
- Trained personnel must have (permanent) access to the operating instructions.

DANGER!
Risk of personal injury or property damage in case of incorrect initial start-up and maintenance!
Personal injury and damage to equipment may occur.
- Adequate training and qualification of personnel

2.4. Modification of Products

DANGER!
Risk of personal injury or property damage if the product is modified.
Personal injury and damage to equipment may occur. Non-observance may result in loss of the CE mark, and the guarantee may be rendered null and void.
- Modification of the product is not permitted.

2.5. General Safety Precautions

NOTE!
- These instructions are an integral part of the product and must be kept on hand for the entire duration of its service life.
- In the event of possible changes, the respectively current version of the operating instructions can be found at www.wenglor.com in the product's separate download area.
- Read the operating instructions carefully before using the product.
- Protect the sensor against contamination and mechanical influences.

2.6. Laser/LED Warnings

Applicable standards and safety regulations must be observed.

Attention
UV radiation from this product.

2.7. Approvals and Protection Class

3. Technical Data

3.1. Technical Data

Order no.	P1PA001	P1PA002
Optical Data		
Working range	30…90 mm	
Working distance	40 mm	
Receiving range	420…750 nm	570…750 nm
Switching hysteresis	< 10 %	
Light source	UV light	
Wavelength	375 nm	
Service life (ambient temp. = 25 °C)	100,000 h	
Max. permitted ambient light	10,000 lux	
Light spot diameter	see table 1	see table 2
Electrical Data		
Supply voltage	10…30 V DC	
Supply voltage IO-Link	18…30 V DC	
Current consumption (operating voltage = 24 V)	< 25 mA	
Switching frequency	2,500 Hz	
Response time	200 µs	
On/Off-delay	0…200 ms	
Temperature drift	< 5 %	
Temperature range	–25…60° C	
Number of switching outputs	2	
Switching output voltage drop	1.5 V	
Switching output switching current	100 mA	
Short-circuit protection	Yes	
Reverse polarity protected	Yes	
Lockable	Yes	
Interface	IO-Link	
IO-Link version	1.1	
Protection class	III	
Mechanical Data		
Setting method	Teach-in	
Housing material	Plastic	
Degree of protection	IP67	
Connection type	M12x1; 5-pin	

3.2. Spot diameter

Working distance	30 mm	50 mm	70 mm	90 mm
Spot diameter	3	4	6	7

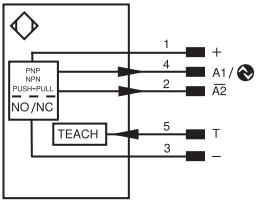
Table 1

Working distance	30 mm	50 mm	70 mm	90 mm
Spot diameter	4	5	7	9

Table 2

3.3. Wiring Diagram

249



Legend

+	Supply Voltage +	
–	Supply Voltage 0 V	
~	Supply Voltage (AC Voltage)	
A	Switching Output	(NO)
Ā	Switching Output	(NC)
V	Contamination/Error Output	(NO)
V̄	Contamination/Error Output	(NC)
E	Input (analog or digital)	
T	Teach Input	
Z	Time Delay (activation)	
S	Shielding	
RxD	Interface Receive Path	
TxD	Interface Send Path	
RDY	Ready	
GND	Ground	
CL	Clock	
E/A	Output/Input programmable	
	IO-Link	
PoE	Power over Ethernet	
IN	Safety Input	
OSSD	Safety Output	
Signal	Signal Output	
BI_D+/-	Ethernet Gigabit bidirect. data line (A-D)	
EN0 RS422	Encoder 0-pulse 0-0̄ (TTL)	

PT	Platinum measuring resistor
nc	not connected
U	Test Input
Ū	Test Input inverted
W	Trigger Input
W–	Ground for the Trigger Input
O	Analog Output
O–	Ground for the Analog Output
BZ	Block Discharge
AMV	Valve Output
a	Valve Control Output +
b	Valve Control Output 0 V
SY	Synchronization
SY–	Ground for the Synchronization
E+	Receiver-Line
S+	Emitter-Line
⏚	Grounding
SnR	Switching Distance Reduction
Rx+/–	Ethernet Receive Path
Tx+/–	Ethernet Send Path
Bus	Interfaces-Bus A(+)/B(–)
La	Emitted Light disengageable
Mag	Magnet activation
RES	Input confirmation
EDM	Contactor Monitoring

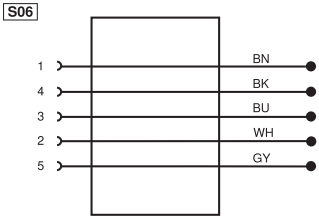
ENA RS422	Encoder A/Ā (TTL)
ENB RS422	Encoder B/B̄ (TTL)
ENA	Encoder A
ENB	Encoder B
AMIN	Digital output MIN
AMAX	Digital output MAX
AOK	Digital output OK
SY In	Synchronization In
SY OUT	Synchronization OUT
OLT	Brightness output
M	Maintenance
rsv	reserved

Wire Colors according to IEC 60757

BK	Black
BN	Brown
RD	Red
OG	Orange
YE	Yellow
GN	Green
BU	Blue
VT	Violet
GY	Grey
WH	White
PK	Pink
GNYE	Green/Yellow

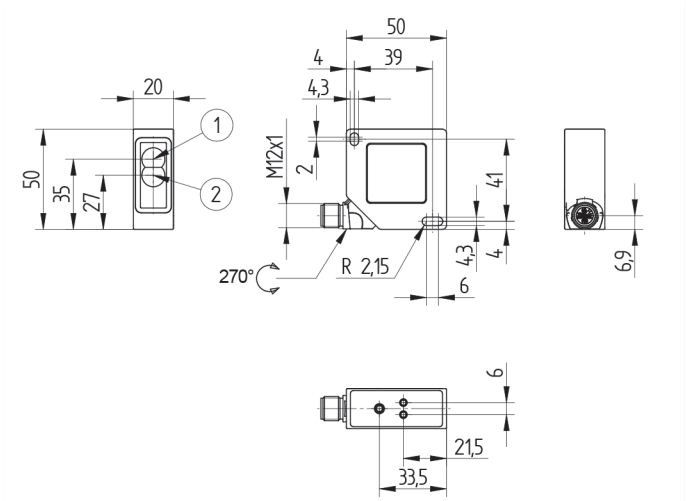
3.4. Complementary Products

Suitable mounting technology no.	380
Suitable connection equipment no.	35



IO-Link masters
PNP-NPN converter BG2V1P-N-2M
wTeach2 software DNNF005
Protective housing set ZSP-NN-02

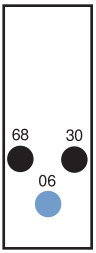
3.5. Housing Dimensions



① = Emitter diode
② = Receiver diode

3.6. Control Panel

A34



06 = Teach-in key
30 = Switching status indicator / contamination warning
68 = Supply voltage indicator

3.7. Scope of Delivery

- Product
- Quick-start guide
- Mounting set BEF-SET-02

4. Transport and Storage

4.1. Transport

Upon receipt of shipment, inspect the goods for damage in transit. In the case of damage, conditionally accept the package and notify the manufacturer of the damage. Then return the device, making reference to damage in transit.

4.2. Storage

The following points must be taken into consideration with regard to storage:

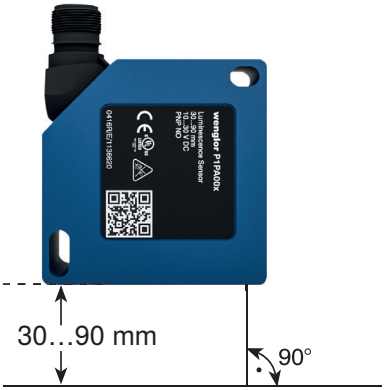
- Do not store the product outdoors.
- Store the product in a dry, dust-free place.
- Protect the product against mechanical impacts.
- Protect the product against exposure to direct sunlight.

ATTENTION!
Risk of property damage in case of improper storage!
The product may be damaged.
- Follow storage instructions.

5. Installation and Electrical Connection

5.1. Installation

P1PA001, P1PA002



- Protect the product from contamination during installation.
- Observe all applicable electrical and mechanical regulations, standards, and safety rules.

- Protect the product against mechanical influences.
- Make sure that the sensor is mounted in a mechanically secure fashion.
- If the object has smooth surfaces, the angle between the axis of the sound waves and the surface of the object should be 90° ±3°. The angle can be considerably larger in the case of rough object surfaces.
- Objects to be detected must be in the working range of the sensor.
- Specified torque values must be complied with (see “3. Technical Data” on page 9).

ATTENTION!
Risk of property damage in case of improper installation!
The product may be damaged.
- Follow installation instructions.

CAUTION!
Risk of personal injury or property damage during installation!
Personal injury and damage to the product may occur.
- Ensure a safe installation environment.

5.2. Electrical Connection

Connect the sensor to 18 to 30 V DC (see “3.3. Wiring Diagram” on page 10).

DANGER!
Risk of personal injury or property damage due to electric current.
Live parts may cause personal injury or damage to equipment.
• The electric device may be connected by suitably qualified personnel only.

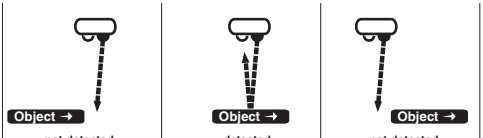
5.3. Diagnosis

LED Indicator	Possible Cause	Elimination
Warning – flashes continuously at approx. 1.5 Hz	Warning signal	Adjust the distance between the sensor and the object so that it is within the working range
	Contamination	The optic cover is contaminated. Clean it carefully with a cloth
	Undervoltage	Increase the voltage supply to at least 10 V DC
Error – flashes continuously at approx. 3 Hz	Short circuit	Check the electrical wiring and eliminate the short circuit
	Over-temperature	Disconnect the sensor from the supply voltage and allow it to cool
	Device error	Disconnect the sensor from the supply voltage and restart it or replace the sensor

Contamination Warning Flowcharts

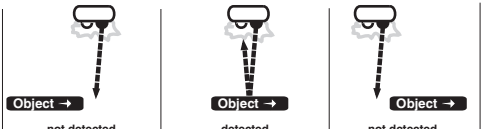
Reflex Mode

no contamination



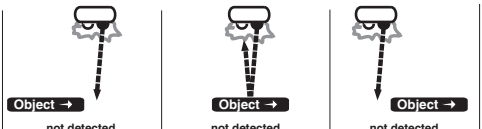
Object	not detected	detected	not detected
Switching Status Indicator	off ○	on ●	off ○

beginning contamination



Object	not detected	detected	not detected
Switching Status Indicator	off ○	blinking ◍	off ○

advanced contamination



Object	not detected	not detected	not detected
Switching Status Indicator	off ○	off ○	off ○

Required Action in Case of Fault:

NOTE!

- Shut down the machine.
- Analyze and eliminate the cause of error with the aid of the diagnostics information.
- If the error cannot be eliminated, please contact wenglor's support department.
- Do not operate in case of indeterminate malfunctioning.
- The machine must be shut down if the error cannot be definitively explained or properly eliminated.

DANGER!

Risk of personal injury or property damage in case of non-compliance!

The system's safety function is disabled. Personal injury and damage to equipment may occur.

- Required action as specified in case of fault.

6. Initial Start-Up

6.1. General Device Information

The wenglor® P1PA00x luminescence sensor is available in two different versions, which differ in their receiver filter. P1PA001 has a blue permeable receiver filter of type GG-420, while P1PA002 has a yellow/green permeable receiver filter of type OG-570. Interfering whitening agents can be suppressed with the P1PA002 sensor and the receiver filter contained therein. Both versions have a working distance of 30…90 mm.

Applications:

Sensor	Receiver filtration	Applications	Working distance
P1PA001	420 nm	Blue luminescent surfaces	30…90 mm
P1PA002	570 nm	Yellow-green luminescent surfaces	30…90 mm

Table 3

6.2. Factory Default Settings

Function	Factory default settings
On-delay	Off
Off-delay	Off
Output stage	PNP
Teach-In mode for external teach-in	Two-point
Automatic intensity read-out via IO-Link	On

Table 4

7. Setup

7.1. Setting the Switching Threshold with the Teach-In Function

With the help of integrated teach-in technology, the sensor automatically calculates future setting values based upon currently recorded values and saves them to memory after the corresponding key has been pressed, or after an external control signal has been received.

7.1.1. Two-point Teach-in

The marking to be detected is first taught into the sensor in two steps, followed by the background. The sensor then automatically determines the optimum switching threshold from both values. The brightness relationship of the two intensities is irrelevant as far as switching characteristics are concerned. Sensor output A is activated when the sensor recognizes the intensity value which was taught in first. Sensor output A is deactivated when the sensor recognizes the intensity value which was taught in second.

If the difference between the two recorded intensity values is too small, the output switching status indicator A1 flashes rapidly (8 Hz) and the switching thresholds are not updated.

- Install the sensor in accordance with the mounting instructions.
- Align the sensor with the marking to be detected.
- Press and hold the teach-in key until switching status indicator LED A1 starts flashing slowly (2 Hz) after 2 seconds.
- Release the teach-in key.
- The LED continues to flash slowly at 2 Hz.
- Align the sensor to the background.
- Press and hold the teach-in button again for 2 seconds.
- Release the teach-in key.
- The intensity value with the calculated switching threshold is taught in, and LED A1 flashes for 1 second to confirm successful teach-in.
- If the teach-in was not successful, this is signaled by LED A1 flashing rapidly (at 8 Hz). The procedure must be repeated.

7.1.2. Dynamic Teach-in

All intensity values from the background and the marking are continuously recorded with this function.
The ideal switching threshold is calculated based upon these values.
This function is intended for applications where the objects to be scanned move continuously at a constant speed, and cannot be brought to a standstill within the production process.

Example 1: **Detection of luminescent adhesive strips on unprinted packaging material, which is fed in continuously: Dynamic teach-in mode can be started regardless of the position of the light spot.**

Example 2: **Detection of luminescent markings on rapidly rotating parts: Dynamic teach-in mode can be started regardless of the position of the light spot.**

If the difference between the two recorded intensity values is too small, the output switching status indicator A1 flashes rapidly (8 Hz) and the switching thresholds are not updated.

- Install the sensor in accordance with the mounting instructions.
- Press and hold the teach-in key until switching status indicator A1 starts flashing rapidly (4 Hz) after 5 seconds.
- Release the teach-in key.
- Recording starts while the LED continues to flash rapidly at 4 Hz.
- The sensor alternately detects the marking to be detected and the background.
- Press and hold the teach-in button for 2 seconds to end recording.
- Release the teach-in key.
- The intensity value with the calculated switching threshold is taught in, and LED A1 flashes for 1 second to confirm successful teach-in.
- If the teach-in was not successful, this is signaled by LED A1 flashing rapidly (at 8 Hz). The procedure must be repeated.

7.1.3. Teach-In Input

Teach-in

The teach-in input on pin 5 can be set by following the same procedure as with the teach-in key (see sections “7.1.1. Two-point Teach-in” on page 18 and “7.1.2. Dynamic Teach-in” on page 19). An activated input corresponds to a depressed teach-in key.

8. IO-Link

Further settings can be entered into the sensor via the IO-Link interface. Process and parameters data, as well as the IODD, can be found at www.wenglor.com in the product's separate download area.

9. Maintenance Instructions

- This wenglor sensor is maintenance-free.
- We recommend cleaning the lens, and to check the plug connections at regular intervals.
- Do not clean with solvents or cleansers which could damage the device.
- The product must be protected against contamination during initial start-up.

10. Proper Disposal

wenglor sensoric GmbH does not accept the return of unusable or irreparable products. The national waste disposal regulations currently in force apply to product disposal.

11. Appendix

11.1. List of Abbreviations

Abbreviation	Meaning
Tu	Ambient temperature
Ub	Supply voltage
IODD	IO Device Description

11.2. Revision History

Version	Date	Description/Change
1.0.0	11/15/2021	Initial version of documentation

12. EU Declaration of Conformity

The EU declaration of conformity can be found at www.wenglor.com in the product's separate download area.