

AKS 171.2

Ejection monitoring

en 01-2018/11 50140931



300 ... 1700 mm



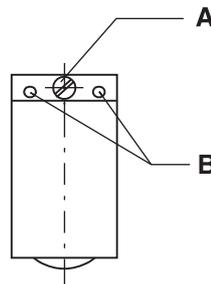
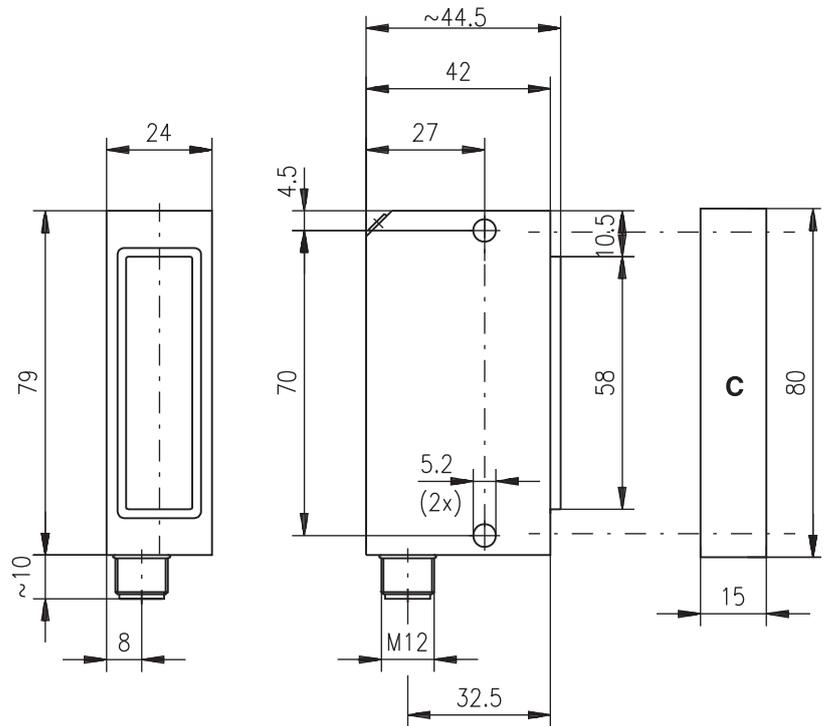
- Gapless detection of the smallest parts through automatic adjustment in the range of ≥ 60 mm (in front of transmitter)
- 4-step switch for adaptation to the size of the ejected goods (receiver)
- Optimum adaptation of the transmitting power by means of an infinitely adjustable potentiometer (transmitter)
- Exact, time-saving alignment through indicator LEDs – bar graph – and variation of the transmitting power
- Static and dynamic monitoring in the range between 300 ... 1700 mm
- Static detection of parts that were left behind
- Warning output if reception signal is too low
- Compact design in metal construction.

Accessories:

(available separately)

- Cables with M12 connector (KD ...)

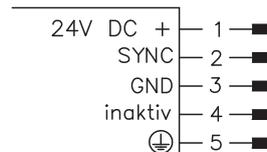
Dimensioned drawing



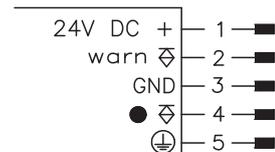
- A** Receiver: 4-step switch (adaptation to the thickness of the parts)
- B** LEDs
- C** Protection cap for receiver, screw type

Electrical connection

Transmitter



Receiver



We reserve the right to make changes *PAL_AKS171_2_en_50140931.fm

Technical data

Optical data

Operating ranges ¹⁾ 300 ... 1700mm (distance transmitter-receiver)
 Detection range Distance x 54 mm (height)
 Smallest detectable part Ø 10 x 0.5 mm, dynamic
 Ø 15 x 0.5 mm, static

Object detection

Distance transmitter/receiver Maximum 1700 mm in the range 300 ... 1700 mm
 Minimum 300 mm, dependent on the object size

Transmitter

Adaptation of the transmitting power as a function of the transmitter/receiver distance With infinitely adjustable potentiometer (under screw cap)
 Light beam propagation Divergent band
 Light-band width Approx. 20 mm at 1 m
 Transmitting components 5 LEDs
 Pulse frequency 10 kHz
 Wavelength 880 nm
 Optics Cylindrical lens 60 x 15 mm

Receiver

Optics Cylindrical lens 60 x 15 mm
 Wavelength 880 nm
 Receiving components 22 pin photodiodes
 Switch, red Presetting of the object size
 Position 1: 2 - 3 mm
 Position 2: 1.5 - 2 mm
 Position 3: 1 - 1.5 mm
 Position 4: 0.5 - 1 mm
 Ø 10 x 0.5 mm

Smallest detectable part

Time behavior

Detection speed 0 (static) to 3 m/s (dynamic)
 Pulse stretching on ejection (output Q) Approx. 150 ms (see diagram)
 Response delay for parts that were left behind (output Q) Approx. 50 ms (see diagram)
 Readiness delay 100 ms
 Switching frequency ≤ 5 Hz
 Response delay Warning output: ≤ 500 ms
 Dark pulse: ≤ 5 ms

Electrical data

Operating voltage U_B 24 V DC ± 15%
 Residual ripple ≤ 15% of U_B
 Current consumption, max. Transmitter: 60 mA Receiver: 60 mA
 Outputs Warning output Q_W : PNP
 Switching output Q: PNP, dark switching
 Max. 100 mA per output

Output current

Indicators

Transmitter

Green LED Ready
 Yellow LED Transmitter activated

Receiver

Yellow LED Output Q
 Red LED Output Q_W continuous light with reserve, flashing without reserve

Mechanical data

Housing Aluminum, black anodized
 Optics Glass
 Weight 400 g
 Connection type M12 connector

Environmental data

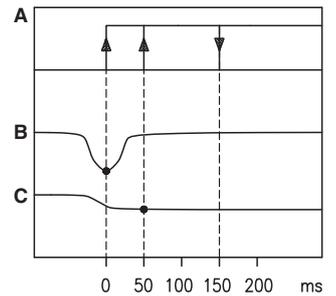
Ambient temp. (operation/storage) -20°C ... +40°C / -30°C ... +70°C
 Protective circuit ²⁾ 1, 2, 3
 VDE protection class III
 Degree of protection IP 54
 Light source Exempt group (in acc. with EN 62471)
 Standards applied IEC 60947-5-2

Additional function

Activation input **inactive**
 Transmitter inactive/active ≥ 8 V / ≤ 2 V or not connected
 Activation/disable delay ≤ 0.5 ms
 SYNC Not connected

1) Operating range: recommended range with function reserve
 2) 1=transient protection, 2=polarity reversal protection, 3=short circuit protection for all outputs

Diagrams



A Output Q
 B Ejection part, dynamic
 C Static part left behind

Notes

Observe intended use!

- ⚠ This product is not a safety sensor and is not intended as personnel protection.
- ⚠ The product may only be put into operation by competent persons.
- ⚠ Only use the product in accordance with its intended use.

- The preferred direction for the gapless detection of parts that have been left behind is perpendicular to the lens-edge shift angle ≤ 30°

Order guide

Transmitter unit
 Receiver unit (with protection cap, 15 mm deep)
 Set consisting of transmitter (50138388) and receiver (50138389)

| Designation | Part no. |
|-------------------------|----------|
| AKS 171.2/4.5.1SE-S12 | 50138388 |
| AKS 171.2/4.5.1E-S12 | 50138389 |
| SET AKS 171.2/4.5.1-S12 | 50140950 |

Alignment - Setting

Device overview

The **AKS 171.2** sensor system is a fast, high-resolution light curtain consisting of transmitter and receiver:



AKS 171.2 transmitter



**AKS 171.2 receiver
 (with mounted protection cap, 15 mm deep)**



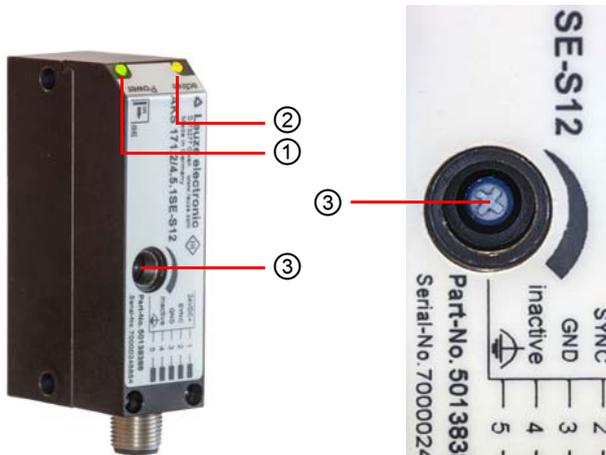
Note!

Prerequisite for optimum function of the system is the proper alignment and adjustment of transmitter and receiver as described in the following. A poorly adjusted system functions poorly!

Indicators and operational controls

The following display and operating elements are relevant for the alignment and adjustment procedure:

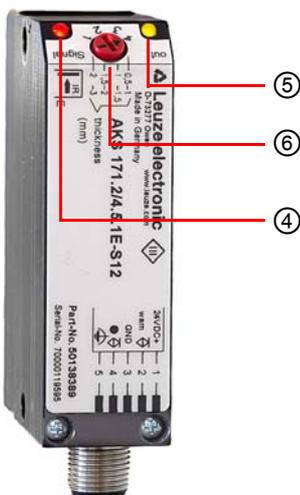
AKS 171.2 transmitter



| | |
|---|--|
| ① | Green LED - ready |
| ② | Yellow LED - transmitter active |
| ③ | Adjustment potentiometer (potentiometer cover removed) |

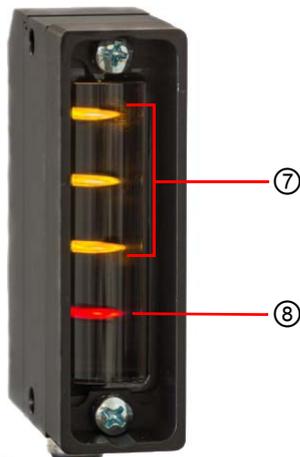
AKS 171.2 receiver

Rear side



| | |
|---|--|
| ④ | Red LED - Reception signal 3 states: - Off: no reception signal - Flashing: weak reception signal - On: good reception signal |
| ⑤ | Yellow LED – switching output state 2 states: - On: active - Off: inactive |
| ⑥ | Rotary switch - Object size 4 positions: - 4: object size 0.5 ... 1.0mm - 3: object size 1.0 ... 1.5mm - 2: object size 1.5 ... 2.0mm - 1: object size 2.0 ... 3.0mm |

Optics side



| | |
|---|---|
| ⑦ | 3 yellow LEDs - Alignment display 4 states: - 3 LEDs on good reception signal - 2 LEDs on moderate reception signal - 1 LED on weak reception signal - 0 LEDs on very weak or no reception signal |
| ⑧ | Red LED - Illumination indicator 2 states: - On: uneven illumination - Off: even illumination (rest state) |

Mounting / exchange

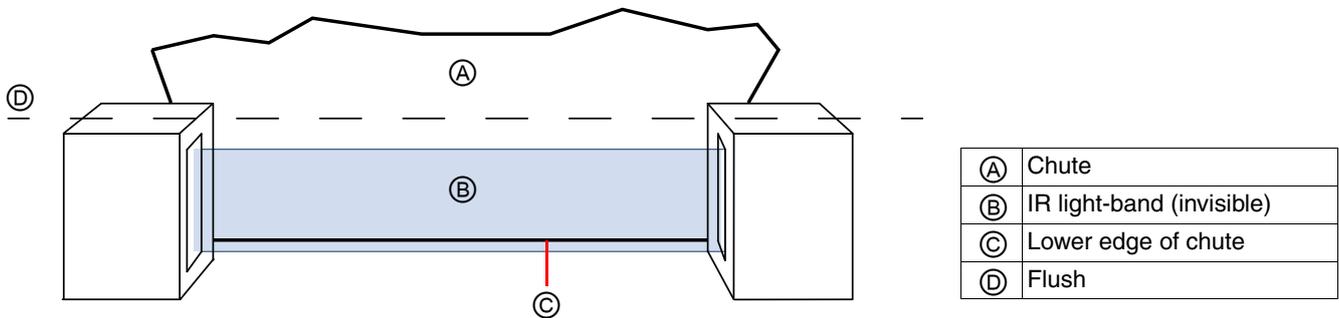
Removal / exchange

When replacing defective devices, the photoelectric sensors should be replaced in **pairs** (transmitter + receiver) for optimum function. Any previously present AKS171 or AKS171.1 systems can be converted to the AKS171.2 without problem.

1. Remove cable plug on transmitter and receiver.
2. Mechanically dismount transmitter + receiver, noting on which side the transmitter and receiver are mounted while doing so.

Mounting

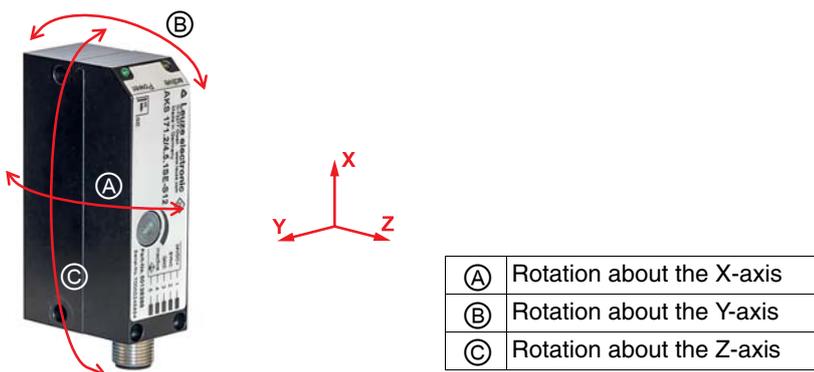
1. Screw sensors to the machine with the same orientation (e.g., each connector plug facing downward and at the same height (flush)).
2. The distance between chute edge and the middle of the light-band (lens middle) should be approx. 20 mm (reference value, dependent on external conditions such as glossy objects, etc.) ¹⁾.
3. The holder or frame that holds the holder must be sufficiently sturdy ²⁾.
4. Reflective surfaces that are parallel to the light-band should be avoided.
5. The upper edge of the chute must be located within the detection range of the sensor (light-band) (lower edges of the lens below the upper edge of the chute). ³⁾



6. Electrically connect transmitter and receiver. Mount cable plugs and tighten coupling rings.
Note the different wiring of transmitter and receiver.

Preparations

First, transmitter and receiver must be roughly aligned by sight, with the optics facing one another. The rotary axes mentioned in the following description are defined as follows (using the example of the transmitter, receiver accordingly):



1) An insufficient distance to the chute or other objects may, due to reflections, make it impossible for the the sensor to be correctly aligned in the next step or for small parts to be reliably detected later on. A distance that is too large increases the probability that slowly incoming parts will fall between the ramp edge and the sensor detection range.

2) Prerequisite for proper function is that the transmitter and receiver cannot move relative to one another, even in the event of strong physical shocks.

3) If a sensor is mounted too high, the objects that are to be detected may fall below the detection range; if a sensor is mounted too low, parts could jump out of the detection range.

Connect the supply voltage to the transmitter and receiver. After the readiness delay, the devices should be in the following states.

Transmitter

Green LED ① illuminates: ready.
 Yellow LED ② illuminates: transmitter activated.

If the yellow LED does not illuminate, check the electrical connection (black wire / pin 4). To activate the transmitter, pin 4 must be connected to ground potential (e.g., connected with the blue wire / pin 3) or not connected.



Note!

Input pin 4 can be used during operation to perform a simple system test. If pin 4 of the transmitter is connected to the supply voltage potential (deactivation), this results in a signal change corresponding to an interrupted light path (from inactive to active – dark switching) at pin 4 of the receiver (switching output) if the light path is free.

Receiver

There are various display constellations depending on the alignment state. At least one of the two LEDs on the rear side of the housing must illuminate, however:

Red LED ④ illuminates or flashes: transmitter signal detected
 Yellow LED ⑤ illuminates: output active

Alignment

Basic alignment of transmitter

1. Remove potentiometer cover on transmitter
2. Turn potentiometer ③ on the sensor using a suitable screwdriver (2.5mm blade) clockwise at least 4 full turns for maximum transmitting power (potentiometer has no limit stop).
3. Align transmitter in Y- and Z-axis by sight and affix in place. Turn along the X-axis (left or right) until at least one yellow LED of the alignment indicator ⑦ on the receiver illuminates.
4. Lightly secure transmitter (screw in place).

Fine alignment

1. Beginning with the receiver, optimize the alignment of transmitter and receiver, alternately adjusting the X-axis of each until all 3 yellow LEDs of the alignment indicator ⑦ on the receiver illuminate. Lightly secure the devices after each step.
2. Reduce the transmitting power of the transmitter by turning the potentiometer ③ counterclockwise until only 2 yellow LEDs on the alignment indicator ⑦ illuminate.
3. With the potentiometer adjustment from step 2., further optimize transmitter and receiver along the X-axis and try to again illuminate all 3 yellow LEDs of the alignment indicator ⑦.
4. Repeat steps 2. and 3. until the third LED can no longer be illuminated by turning the sensor along the X-axis. The optimum alignment has then been found.
5. Now tighten the X-axis of the receiver so that it is immovable, whereby the found alignment position must not be changed from this point on.
6. Slowly turn the potentiometer ③ on the transmitter clockwise until the third yellow LED of the alignment indicator ⑦ again just illuminates (all 3 yellow LEDs of the alignment display illuminate now, the red LED ⑧ must not illuminate if the light path is free).
7. Again loosen the transmitter in the X-axis and alternately turn to the left and right to determine the position at which the third LED in the alignment display ⑦ on the receiver switches off and only 2 yellow LEDs illuminate. The optimum alignment along the X-axis for the transmitter is located in the middle between these two ascertained positions.
8. Now also tighten the X-axis of the transmitter so that it is immovable, whereby the ascertained alignment position must not be changed from this point on.



Note!

The accuracy of the alignment is essential for the detection of small parts and for the insensitivity of the system with respect to physical shocks.

Setting

Before adjusting, the transmitter and receiver must be aligned as described in sections "Preparations" and "Alignment."

Objectives:

- Adjust the transmitter and receiver so that the required sensitivity is achieved.
- Reliable, fault-free detection of small objects.

1. Set switch ⑥ on the receiver to the minimum object size (position '4').
2. Turn the potentiometer ③ on the transmitter clockwise at least 4 full rotations (maximum position).
3. With the light axis free, slowly turn potentiometer ③ counterclockwise until the red illumination LED ⑧ just switches off (at maximum distance between transmitter and receiver (1700 mm), this is, under certain circumstances, the case even without turning back the potentiometer).
4. Interrupt and again clear the light axis several times to check whether the red illumination LED ⑧ reliably switches off each time.
5. If not, turn potentiometer ③ on the transmitter counterclockwise approx. ¼ turn and repeat the previous step.
6. The system is correctly adjusted if:
 - all 3 yellow LEDs of the alignment indicator ⑦ illuminate
 - the red LED ⑧ does not illuminate with free light paths (it may, however, illuminate if objects are in the light path).
7. Transmitter: remount potentiometer cover on the potentiometer ③ .
Receiver: use switch ⑥ to set object size.

Function test

1. Transmitter:

green LED ① and yellow LED ② must illuminate.

2. Receiver

If light path is free:

- Red LED ④ (signal) must illuminate constantly (not flash).
- All 3 yellow LEDs in the alignment indicator ⑦ illuminate.
- Red LED ⑧ (illumination indicator) must not illuminate.

If there are objects in the light path:

- Yellow LED ⑤ (state output on receiver) illuminates -> object detected.
- Red LED ④ (receiver signal strength) on the rear side of the receiver switches off while large objects¹⁾ are located in the light path. For smaller objects, it illuminates constantly or flashes.
- Red LED ⑧ (illumination indicator) illuminates upon detection; is dark, however, if the light path is free.

Trouble shooting

| Fault image | Error | Possible remedy |
|--|--|---|
| Sensor: both LEDs ① , ② off | Supply voltage missing or polarity reversed or transmitter defective | Check power supply unit / wiring, exchange device if necessary and send to manufacturer for repair. |
| Transmitter: green LED ① illuminates, yellow LED ② off | Transmitter deactivated | Connect pin 4 (black wire) to pin 3 (blue wire) or isolate pin 4 (black wire). |
| Receiver: both LEDs ④ , ⑤ dark | Supply voltage missing or receiver defective | Check power supply unit / wiring; replace receiver if necessary. |
| Red LED ④ (signal indicator) off, yellow LED ⑤ illuminates continuously, switching output active | No or very weak signal received from transmitter (light path interrupted, large object, massive soiling, potentiometer ③ on transmitter misadjusted) or transmitter without supply or transmitter defective or transmitter/receiver alignment very bad | Check whether light path is free, check whether transmitter is active (both LEDs ① , ② on). Check transmitter adjustment (potentiometer ③) and alignment. |
| Red LED ④ (signal indicator) flashes, yellow LED ⑤ off | Object in the light path, weak reception signal, sensor is at the function limit but still just managing to function | Check whether light path is free. Clean optics with lint-free cloth and alcohol, check alignment, check potentiometer adjustment ③ on transmitter. |

1) Large object = light path is fully or largely darkened.

| | | |
|--|---|---|
| Red LED ④ (signal indicator) flashes, yellow LED ⑤ illuminates | Object in the light path, weak reception signal, sensor is just below the function limit, just barely no longer functions | Check whether light path is free. Clean optics with lint-free cloth and alcohol, check alignment, check potentiometer adjustment ③ on transmitter. |
| Alignment indicator ⑦ in optics: fewer than 3 yellow LEDs illuminate | Reception signal too weak | Check whether light path is free, clean optics, turn potentiometer ③ clockwise until 3 LEDs ⑦ just illuminate, check and, if necessary, correct alignment at the same time. |
| Red illumination indicator ⑧ in the optics illuminates continuously | Uneven illumination of the receiver or device defective | <p>Check whether light axis is free.</p> <p>Check lenses for soiling and clean with lint-free cloth and alcohol if necessary.</p> <p>Turn potentiometer ③ back approx. ¼ turn. Check alignment.</p> <p>During the initial alignment, check whether the problem can be rectified by changing the position of the Y-axis (particularly at the transmitter).</p> <p>Check whether the problem is caused by reflections on adjacent parts (cover adjacent parts with dark matt paper or similar for test purposes).</p> <p>Exchange devices if necessary and send to manufacturer for repair.</p> |
| Small parts are not reliably detected | Incorrect adjustment and/or alignment | <p>Check switch position for object size ⑥ on receiver, turn potentiometer ③ on transmitter counterclockwise until only 2 LEDs illuminate on the alignment indicator ⑦; then carefully turn back clockwise until the third yellow LED of the alignment indicator ⑦ just switches on again with free light path.</p> <p>Check whether slow, small objects could fall through the detection area (incorrect mounting position).</p> <p>Check whether small objects could jump over the the detection area and take measures to prevent this from happening, e.g., with baffles.</p> |
| Sensor switches without object in the event of physical shocks | Bad/incorrect alignment of transmitter and/or receiver or unsuitable mounting bracket/support (too instable) | <p>Realign sensor (transmitter and receiver) according to instructions (see sections "Preparations" and "Alignment").</p> <p>Use stable mounting bracket (transmitter and receiver must not be able to move relative to one another).</p> |
| Illumination indicator ⑧ illuminates if receiver optics are fully shaded or if transmitter is inactive | Receiver defective | Exchange device if necessary and send to manufacturer for repair. |