

FKL

M18 CYLINDRICAL  
PHOTOELECTRIC SENSOR

Installation manual - 806001601 Rev. B - ENG - Created: 24/02/2025

SUPPLIED MATERIAL

- 1 photoelectric sensor
- 2 M18 ring nuts
- Trimmer adjustment accessory
- ST82 for receivers

GENERAL DESCRIPTION

M18 cylindrical photoelectric sensor, RED LASER emission , M18 , DC Sensitivity adjustment for all models (by means teach-in button placed on the sensor in reflex and scanner models or by means trimmer placed on the receiver in through beam models).

CAUTIONS

Laser devices always emit an intense and very concentrated light; the intentional and prolonged observation of this light can cause problems. As a result, it is advisable, where possible, to install the laser sensors so as the beam cannot exceed the operating area. We also suggest avoiding that the laser beam direction permanently meets the operator's eyes.

CLASS 1  
LASER PRODUCT

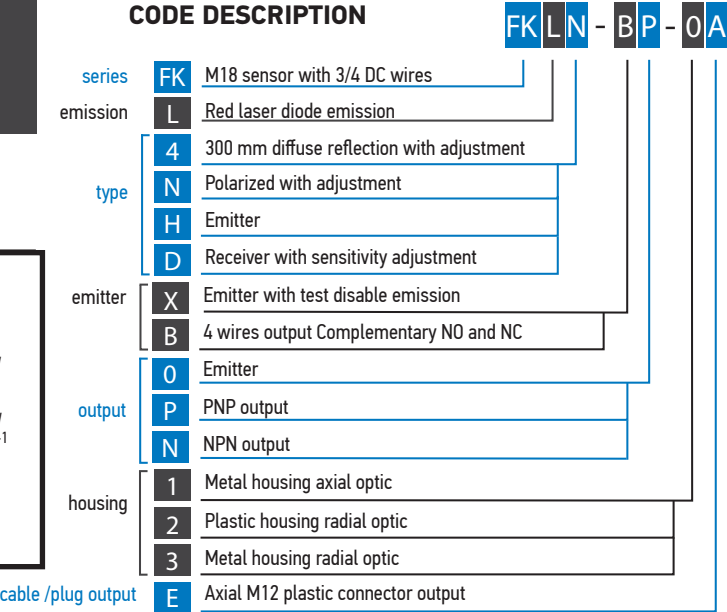
Red laser light  
wavelength = 655 nm; repetitively pulsed emission.

FKLN and FKL4: Frequency = 4840 Hz;  
pulse duration = 9,3 µs;  
maximum output power = 0,4 mW

FKLH: Frequency = 8330 Hz;  
pulse duration = 12 µs;  
maximum output power = 0,2 mW

Classified according to IEC EN standard IEC 60825-1

CODE DESCRIPTION



INSTALLATION

- Make sure that the operating voltage is correctly stabilized with a maximum ripple being within the specified figure as stated in the catalogue.
- In the event that the noise induced by the power lines is greater than that specified by the EMC directive (interference immunity), detach the sensor cables from the power and high voltage lines and insert the cable in an earthed metal conduit.
- Do not use alcohol or chemical products to clean lens.
- Do not allow a strong light such as sun light to radiate directly on the sensor.

Sensitivity Adjustment

• Diffuse reflection  
Place the target object at the sensing distance required, checking that the optical axis is perpendicular to the surface of the object. Assuming the worst possible conditions (object statistically smaller and object or part of object darker than the background), position the object at the furthest possible point from the sensor. Press the teach button or connect pin 2 (white cable) to Supply(-) for 2-5 secs. until the yellow signal LED switches back to steady on.  
The threshold is set at 50% of the detected signal, thus giving the device a standard sensitivity adjustment. Remove the object and check that the yellow LED has switched off. If the yellow LED remains switched on, fine sensitivity adjustment is required.  
To carry out the fine adjustment connect pin 2 (white cable) to Supply(-) or press the Teach-in button for t > 8 secs. until the yellow signal LED starts flashing. The threshold is set below the detected signal of the hysteresis amplitude.  
Remove the object and check that the yellow LED has switched off.

• Polarized

Install the retro-reflector so that its surface is perpendicular to the sensor's optical axis. Make sure that the distance between the sensor and the retro-reflector is not greater than that specified for the retro-reflector in use.  
Provisionally secure the sensor in a stable position and select the output state. To achieve the best alignment, use the following procedure. Press the Teach button, or connect pin 2 (white cable) to Supply(-) for t > 8 secs., until the yellow signal LED starts flashing. The threshold is set below the detected signal of the hysteresis amplitude.  
Adjust the sensor by moving it vertically and horizontally until the LED switches on constantly, or at least until the frequency of the flashes decreases. Repeat the operation until it is no longer possible to vary the frequency at which the yellow LED flashes. Secure the sensor in a stable position and check that the LED switches off when the beam is interrupted by the target object.  
In this way a correct centering on the retro-reflector in use and a fine adjustment of device sensitivity have been carried out. This adjustment is ideal for the accurate detection of semi-transparent objects.  
For applications in which the target objects are not transparent, the standard adjustment is recommended (after having carried out the operations described above). This gives the highest possible margin of immunity to the dust or dirt which can deposit on the optical elements. To carry out a standard adjustment press the Teach button or connect pin 2 (white cable) to Supply(-) for 2-5 secs. until the yellow signal LED switches back to steady on. The threshold is set at 50% of the detected signal.  
Check that the LED switches off when the beam is interrupted by the target object. If the yellow LED remains switched on, fine sensitivity adjustment is required.

• Through - beam

Using the recommended brackets, provisionally install the emitter and receiver within the sensing distance. Position the components so that they coincide with the optical axis as much as possible.  
Check that the sensitivity adjustment trimmer is turned to the furthest clockwise position.  
Adjust the emitter by moving it vertically and horizontally until the yellow LED on the receiver switches on. Adjust the receiver by moving it vertically and horizontally until the yellow LED switches on constantly. Secure the system properly and proceed with the sensitivity adjustment.  
Check that, when no object is present, the yellow LED on the receiver is steady on. Turn the sensitivity adjustment trimmer in an counterclockwise direction until the LED switches off. Turn the trimmer in a clockwise direction until the signal LED switches back to steady on. This is the position in which the system can operate in the optimum conditions for detecting both solid parts and spaces with equal precision and with a good detection margin.  
If the target object does not create problems, the trimmer can be turned clockwise to the furthest position to achieve higher working limits. Check that the yellow LED on the receiver switches off when the optical beam is interrupted.  
Check input: Some models have a test circuit in the emitter which enables a user friendly test to be conducted in order to verify that the sensor is operating correctly. Connecting the Check input (Bk/2 to supply (-)) turns off the light emission from the emitter. This condition simulates the presence of a target within the detection range and forces the receiver output to switch. If switching does not occur it indicates a fault in the system.

• Digital adjustment notes

Beyond the nominal distance of the sensor, the fine adjustment has no effect on the operating distance. If a fine adjustment is required, the sensor must be used within the nominal sensing distance. To check if the sensor is capable of adjusting the sensitivity correctly, it is always advisable to carry out a fine adjustment and to make certain that the LED is flashing at the end of the procedure. If the LED remains steady on, either the sensor operates at too high distance in relation to the target object or the sensor is not correctly aligned. If it is sufficient only to detect the presence of objects and this is not affected by backgrounds or other objects behind those to be detected, the sensor can be used until the distance indicated in the curves is reached. If necessary, repeat the setting by carrying out a brief teach.

BN = brown; BK = black;  
BU = blue; WH = white;  
PK = pink; GY= grey

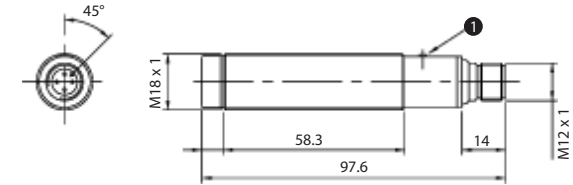
TECHNICAL SPECIFICATIONS

Model	FKL4/**-**	FKLN/**-**	FKLD/**-**	FKLH/**-**
Type	Diffuse reflection	Polarised Retro-reflective	Receiver	Emitter
Minimum sensing distance:	0 mm (White 90%) 50 mm (Grey 18%) 50 mm (Black 6%)	0,05 m	0,05 m	
Nominal Sensing Distance (Sn)	300 mm axial optic 200 mm radial optic (1) (focussed 100 mm)	20 m with RL110; 30 m with RL201; 5 m with RL100D	50m	
Emission	Laser diode (650nm)		-	Laser Diode (650nm)
Laser Class	Laser class 1 (IEC 60825-1)		-	Laser class 1 (IEC 60825-1)
Tolerance	+15/-5% the nominal sensing distance Sn			
Differential Travel	≤10% V d. c.			
Repeat Accuracy	5%		10%	-
Operating Voltage	10- 30 V d. c.			
Ripple	≤10%			
No-load Supply Current	≤35mA		≤25mA	
Load Current	100 mA			-
Leakage Current	≤ 150 µA ( at Vdc AT max)			-
Voltage Drop	2V max a 100mA			-
Output Type	NPN o PNP - NO +NC			-
Maximum Switching Frequency	1 kHz		1 kHz	-
Time Delay Before Availability	200ms			-
Supply Electrical Protections	Polarity reversal, Transient			
Output Electrical Protections	Short circuit (autoreset)			-
Temperature Range	-10 °C...+55 °C (without freeze)			
Check input	-			BK/2 connected to 0V Emission disable
Temperature Drift	10 %Sr			
Interference to External Light	> 1000 lux (incandescent lamp); > 10000 lux (fluorescent lamp)			
Protection Degree	IP67 (EN60529)			
Noise immunity	According EN60947-5-2			
Radiation	According EN60947-5-2			
LED Indicator	Yellow: fixed on (light state with ExG≥2 ) Yellow: blink (light state with 1≤ExG<2) Yellow: off (dark state) Green: power on		Yellow: light state	Green: power on Yellow: on (emission enable) Yellow: off (emission disable)
Sensitivity Adjustment	Teach-in-button		Trimmer	-
Housing Material	Nickel -plated brass/ PA12			
Lenses Material	Glass			
Tightening Torque	25 Nm (metal housing)			
Weight (approx.)	90 g.			

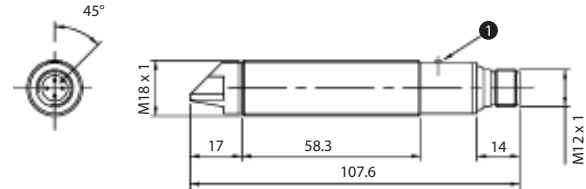
(1) White target pantone 90% rell etcion 100 x 100 mm

DIMENSIONS (mm)

axial optic and axial plug M12

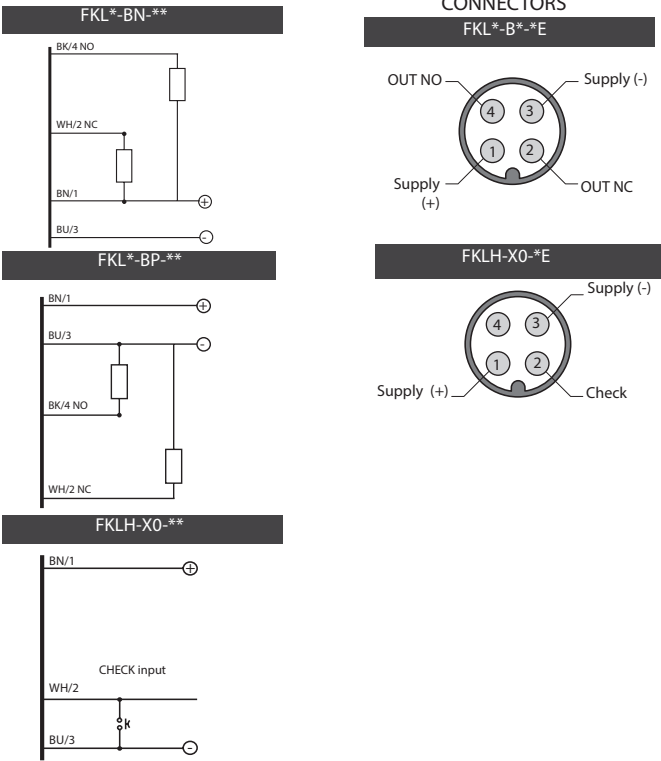


radial optic and axial plug M12

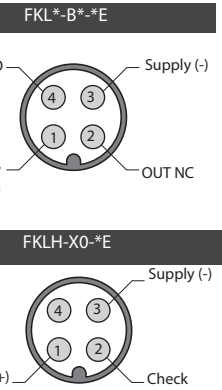


1 Button for sensitivity adjustment

ELECTRICAL DIAGRAMS OF THE CONNECTIONS



CONNECTORS



WARNING These products are NOT safety sensors and are NOT suitable for use in personnel safety application

Declaration of conformity  
Automation Direct declare under our sole responsibility  
that these products are in conformity with the EMC directive.

Automation Direct  
3505 Hutchinson Rd  
Cumming, GA 30040  
[www.automationdirect.com](http://www.automationdirect.com)

Preliminary 21/03/25

FKL BGS

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PACK CONTENT

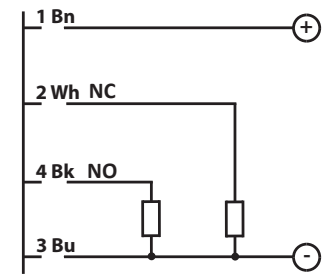
- 1 Sensor
- 2 Nickel brass nuts (metal housing)

GENERAL DESCRIPTION

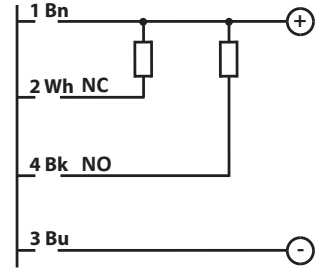
- M18 Photoelectric sensor Background Suppression with Laser emission
- Models in Class I and Class II Laser emission power
- Axial and Right angle optical head
- Sensing distance adjustment by trimmer
- Collimated Light spot
- Complete protection against electrical damages
- Nickel plated brass housing
- Laser marked

ELECTRICAL DIAGRAMS OF THE CONNECTIONS

PNP, output selectable NO+NC



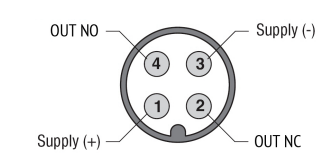
NPN output selectable NO+NC



KEY: BN = brown; BK = black; BU = blue; WH = white

PLUGS

FKL\*\_B\*.\_\*\*



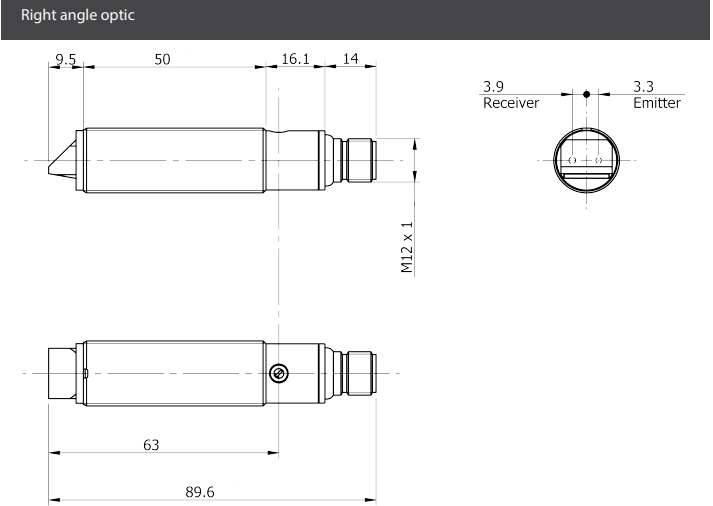
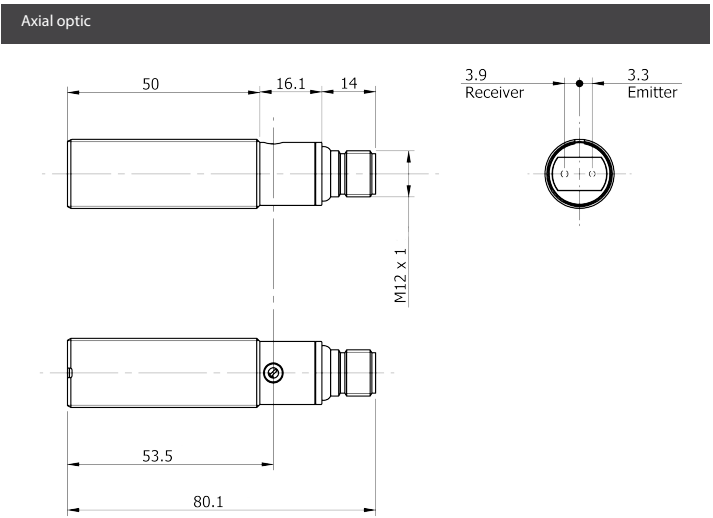
Laser protection regulations: the transmitter and the laser light barrier comply with the laser protection class II in accordance with the EN 60825-1. Therefore no additional protective measures are necessary for operation.

This sensor may not be used in applications where the safety of persons depends on functioning of the device (not safety designed per EU machine guideline). Read these operating instructions carefully before putting the device into service.

CODE DESCRIPTION

	FK	L	W	-	O	P	-	1	E
FK	M18 Cylindrical photoelectric sensor								
L	Laser emission								
S	Background Suppression (Laser Class 1)								
W	Background Suppression (Laser Class 2)								
-									
B	Complementary output (NO+NC)								
N	NPN output								
P	PNP output								
-									
1	Axial version Metallic housing								
3	Right Angle (90°) version Metallic housing								
E	Connector M12 4 pins								

DIMENSIONS

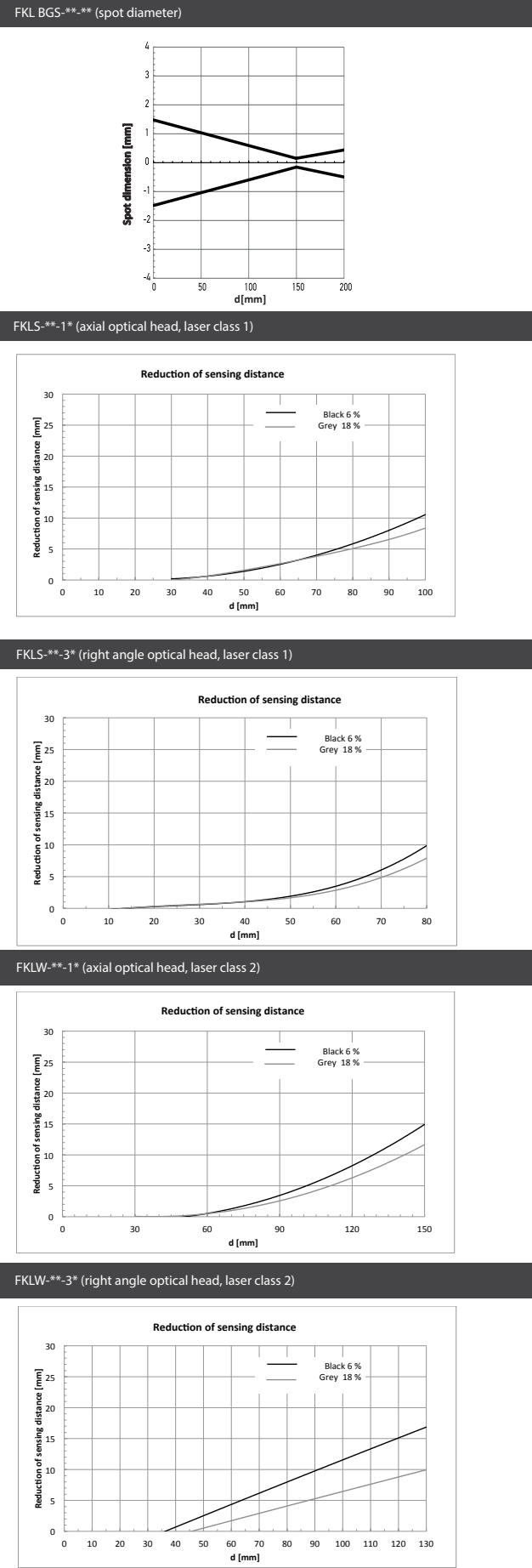


Models	FKLS-B*-*E Axial	FKLS-B*-*E Radial	FKLW-B*-*E Axial	FKLW-B*-*E Radial
Nominal sensing distance (Sn)	25mm - 100mm	25...80 mm	25mm - 150mm	25mm - 130mm
Sensing range (Sd)	30mm - 100mm	30...80 mm	30mm - 150mm	30mm - 130mm
Emission	Red laser diode (650nm)			
Laser Protection Class EN60852-1	1	1	2	2
Adjustment	By trimmer (270° Turn)			
Differential travel	10%			
Repeat accuracy	10%			
Operating voltage Ue	10...30 Vdc			
Ripple	≤ 10%			
No-Load current	≤ 40 mA			
Output current	100 mA			
Leakage current	≤10 µA (Vdc max)			
Output voltage drop	2 V max. (II=100mA)			
Output type	NPN or PNP NO +NC			
Switching frequency	1,5 kHz			
Response time	250 ms			
Supply electrical protections	Polarity reversal, transient			
Output electrical protection	Short circuit (auto reset) , over voltage pulses			
Temperature range	-10°...+50° C			
Interference to external light	15000 lux incandescent lamp			
Thermal Drift	10% Sn			
Led indicator	Yellow (output sate)			
Max. Capacitive Load	500nF			
Protection Degree	IP67 (EN60529)			
Housing material	Nickel plated brass (metallic)			
Optic material	PMMA ABS	Glass ABS	PMMA ABS	Glass ABS
Exit plug	PA12			
Weight	65 g			
Tightening torque	25 Nm			

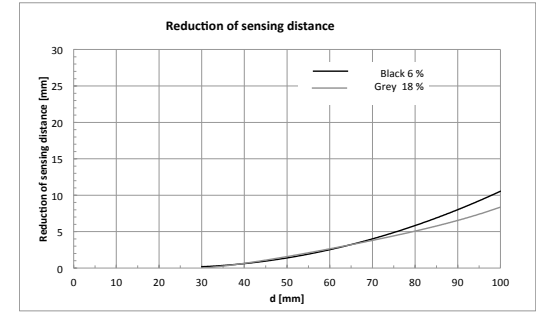
ADJUSTMENT

L: Light-switching: if light received, output (Q) switches  
D: Dark-switching: if dark received, output (Q) switches  
Direct proximity scanner with background suppression  
Mount the unit, connect and align the sensor following the connection diagrams.  
Place the object to be detected at the required reading distance, checking that the optic axis is perpendicular to the object surface. PLEASE NOTE: In case of reflecting or flat objects, it could be beneficial to adjust the beam so that it is not exactly perpendicular to the surface. Reproducing the worst possible conditions (for example object with dimensions statistically smaller than the usual ones or with parts darker than the background), place the object as far as possible from the sensor.  
Adjust light reception setting on Max. the detection distance. Position the object checking that the red beam strikes it. The reception indicator must be permanently switched on, if it switches off, it is necessary to re-adjust the sensor position. If necessary, clean the optic or check the operating conditions. Set the detection distance, remove the object; the reception indicator must switch off (position A=MAX). If not, turn the control knob to Min. until the indicator switches off (e.g. position A).  
Turn the control knob to Min.. Place the object again. Turn the control knob to Max. until the reception indicator switches on (e.g. position B). If position B < position A, select middle position C. Check overall function. If function is OK the setting procedure is over. If the setting is not OK check the operating conditions and re-adjust. If position A ≤ position B, background influence is too high.  
Maintenance  
Automation Direct photoelectric switches do not require any maintenance. We recommend that you clean the external lens surfaces and check the screw connections and plug-in connections at regular intervals.

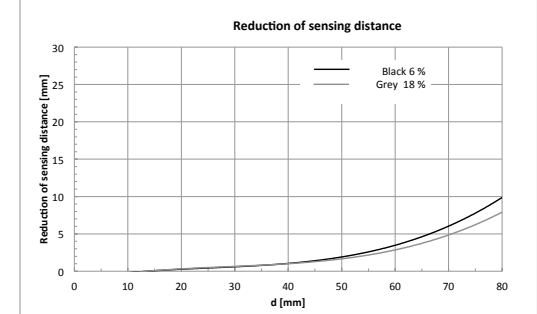
CHARACTERISTIC CURVES



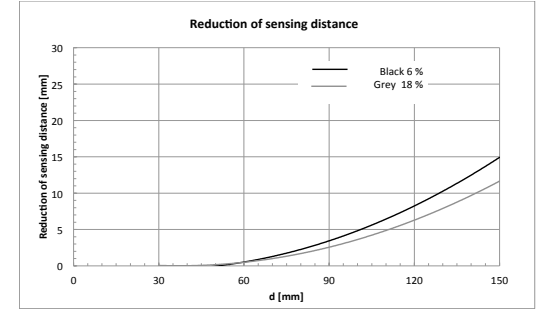
FKLS-\*\_\*-1\* (axial optical head, laser class 1)



FKLS-\*\_\*-3\* (right angle optical head, laser class 1)



FKLW-\*\_\*-1\* (axial optical head, laser class 2)



FKLW-\*\_\*-3\* (right angle optical head, laser class 2)

