# M18 CYLINDRICAL PHOTOELECTRIC SENSOR

nstallation 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.



	C	ODE	DESCRIPTION FK LN - BP - 0
	series	FK	M18 sensor with 3/4 DC wires
	emission	L	Red laser diode emission
		4	300 mm diffuse reflection with adjustment
	type	Ν	Polarized with adjustment
		Н	Emitter
	1	D	Receiver with sensitivity adjustment
	emitter	Х	Emitter with test disable emission
		В	4 wires output Complementary NO and NC
W		0	Emitter
w	output	Ρ	PNP output
5-1		Ν	NPN output
	L.	1	Metal housing axial optic
	nousing	2	Plastic housing radial optic
		3	Metal housing radial optic
cable /plug output		Ε	Axial M12 plastic connector output

#### **DIMENSIONS (mm)**



adial optic and axial plug M1



• Button for sensitivity adjustment

#### **ELECTRICAL DIAGRAMS OF THE CONNECTIONS**



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 amptitude.

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 LÉD 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 vellow 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 untill 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

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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



CHECK input

# **TECHNICAL SPECIFICATIONS**

	FKL4/**-**	FKLN/**-**	FKLD/**-**	FKLH/**-**				
	Diffuse reflection	Polarised Retro-reflective	Receiver	Emitter				
sensing	0 mm (White 90%) 50 mm (Grey 18%) 50 mm (Black 6%)	0,05 m		0,05 m				
ensing in)	300 mm axial optic 200 mm radial optic (1) (focussed100 mm)	20 m with RL110; 30 m with RL201; 5 m with RL100D		50m				
	Laser dioc	le (650nm)	-	Laser Diode (650nm)				
5	Laser class 1	(IEC 60825-1)	-	Laser class 1 (IEC 60825-1)				
	+15/-5% the nominal sensing distance Sn							
Travel	≤10% V d. c.							
uracy	5	-						
/oltage	10- 30 V d. c.							
	≤10%							
pply Current	≤35	≤25mA						
nt		100 mA		-				
urrent	≤ 150	0 μΑ ( at Vdc AT max)		-				
р	:	2V max a 100mA		-				
2	NP	N o PNP - NO +NC		-				
Switching	1 4	κHz	1 kHz	-				
Before		200ms		-				
trical		Polarity reversa	l, Transient					
trical	Sho	-						
re Range	-10 °C+55 °C (without freeze)							
	BK/2 co to							
ro Drift	10 %5r							
e to External	> 1000 lux (incandescent lamp); > 10000 lux (fluorescent lamp)							
Degree	IP67 (EN60529)							
unity		According EN6	0947-5-2					
	According EN60947-5-2							
or	Yellow: fixed on (ligh Yellow: blink (light s Yellow: off Green: p	nt state with ExG≥2 ) state with 1≤ExG<2) (dark state) power on	Yellow: light state	Green: power on Yellow: on (emission enable) Yellow: off (emission disable)				
Adjustment	Teach-ir	Teach-in-button Trimmer						
aterial	Nickel -plated brass/ PA12							
terial	Glass							
Torque		25 Nm (metal housing)						
prox.)	90 g.							

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

# 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





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

### **PLUGS**



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 instruction carefully before putting the device into service.

# Achieve ce

# CODE

DESC	ESCRIPTION			W	-	0	Ρ	-	1	E
FK	M18 Cylindrical photoelectric sensor									
L	Laser emission									
S	Background Suppression (Laser Class 1)									
W	Background Suppression (Laser Class 2)									
-										
В	Complementary output (NO+NC)									
Ν	NPN output									
Р	PNP output									
-										
1	Axial version Metallic housing									
3	Right Angle (90°) version Metallic housing	9								
E	Connector M12 4 pins									

# DIMENSIONS





63

89.6

Models	FKLS-B*-*E Axial	FKLS-B*-*E Radial	FKLW-B*-*E Axial	FKLW-B*-*E Radial				
Nominal sensing distance (Sn)	25mm - 100mm	2580 mm	25mm – 150mm	25mm – 130mm				
Sensing range (Sd)	30mm - 100mm	3080 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	1030 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 exter- nal 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		PA	12					
Weight								
Tightening torque	25 Nm							
	2J 1111							

# 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. PLESE NOTE: In case of reflecting or flat objects, are used to be detected at the required reading distance 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

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  $\leq$  position B, background influence is too high.

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 con-nections at regular intervals.



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

# CHARACTERISTIC CURVES





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