

Fork sensors

System description

Method of function

Fork sensors function according to the through-beam principle. The transmitter is located in one arm of the fork and transmits its light to the receiver directly opposite in the other fork arm. Thus a great advantage of fork sensors is that the transmitter and the receiver no longer need to be aligned. Reduced cabling work and flexible mounting possibilities further accelerate commissioning of the sensors. The shared housing design is available in differing fork widths (5 ... 120 mm) and fork depths. The particular advantage of fork sensors lies in their simple commissioning.

An important feature of SensoPart fork sensors is their particularly reliable function with maximum precision. The smallest objects, with a diameter of 0.2 mm, are reliably detected. High switching frequencies also allow detection with rapid conveyor processes. Sensitivity adjustment of the sensors takes place via a teach-in button and can be carried out during running processes (dynamic teach-in). Fork sensors are available with metal or plastic housings, red light or invisible infrared light.

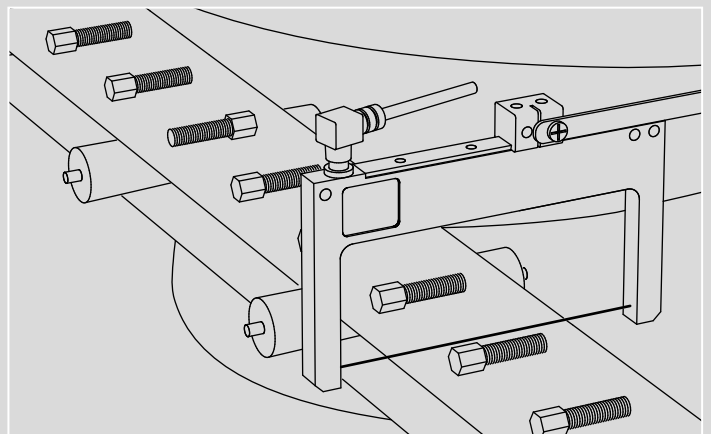
Precise small part detection on feed belts, rotational speed measurement or the precise positioning of objects are typical applications for fork sensors.

Metal version

- Simple and robust design
- N.O./N.C. function switchable
- 3-pin connection plug

Plastic version

- NPN or PNP output options
- 3- or 4-pin connection plug
- Dynamic teach-in
- Adjustment also possible on moving objects
- Switching state LEDs visible all-round
- Numerous mounting possibilities (including dovetail)



Counting parts on a vibration conveyor

An **FGL fork sensor** checks whether the feed section is completely occupied with work-pieces and, if necessary, stops the conveyor.

Method of function

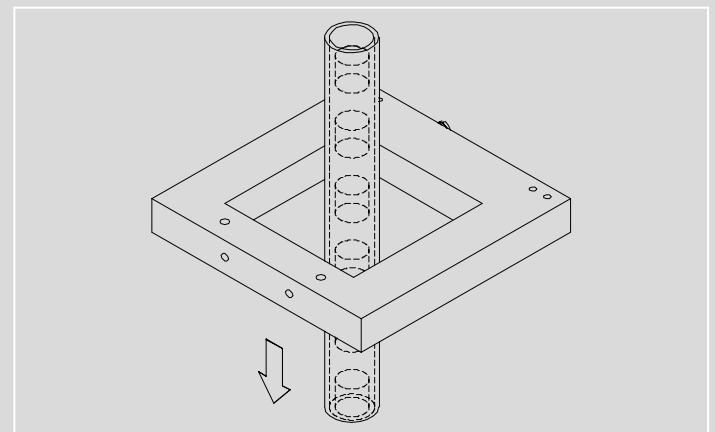
Strictly speaking, optical windows are through-beam light grids. In effect, several through-beam photoelectric switches are mounted and aligned on two opposite sides. Modulation of the transmitted light and the special geometrical arrangement ensure that the differing “through-beam photoelectric switches” do not interfere with one another. The number of “photoelectric switches” in the housing is an indication of the optical window’s resolution and thus determines the minimum object size of the detection quality. The shared housings are available in differing frame widths (40, 80, 120 mm).

The simple cabling due to a single shared plug, the pre-aligned transmitter and receiver – and thus simplified commissioning – are particular advantages of the optical windows. Simply connect and align. Finished.

Checking the ejection of small parts, e.g. on presses and stamping machines, is a typical application for optical windows. Whereby the resolution of the light grid and its response time is decisive for the reliable detection of small objects. The resolution of SensoPart optical windows ensures the reliable detection of small parts from as little as 0.8 mm. It is even possible, thanks to dynamic signal evaluation, to detect objects through transparent tubes. The adjustable output signal duration (signal length: 10 ... 300 ms) ensures maximum compatibility with the PLC.

Features

- High resolution
- Dynamic signal evaluation
- Infrared light
- Robust metal housings
- Simple sensitivity adjustment via potentiometer



FG detection of objects through a tube

Optical windows also detect objects transported through a partially transparent tube thanks to dynamic evaluation.

FGL... -RK

Fork sensors



PRODUCT HIGHLIGHTS

- Fork widths: 30 ... 120 mm
- Small part detection from 0.2 mm
- Robust metal plug connection
- Sensor adjustment via teach-in and control input
- Versatile mounting possibilities
- N.O./N.C. switchable

Optical data		Functions	
Fork width	30 ... 120 mm (see selection table)	Indicator LED, green	Operating voltage indicator
Type of light	LED, red, 640 nm	Indicator LED, yellow	Switching output indicator
Smallest detectable part	See table	Sensitivity adjustment	Via Teach-in button and control input
		Teach-in modes	Mode 1: during running process Mode 2: process at standstill
		Adjustment possibilities	N.O./N.C. via Teach-in button and control input Button lock via control input Default: via Teach-in button and control input
		Default setting	Maximum stability (max. immunity to contamination)
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ¹	Dimensions	(See plug connection)
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 67 ³
Output current, I _e	≤ 100 mA	Material, housing	Polycarbonate
Voltage drop, U _D	≤ 2.4 V	Type of connection	See selection table
Protective circuits	Reverse polarity protection, U _B / Short-circuit protection (Q)	Ambient temperature: operation	-20 ... +60 °C
Protection Class	2	Ambient temperature: storage	-20 ... +80 °C
Switching output, Q	PNP / NPN (see selection table)	Weight	See selection table
Output function	N.O. / N.C.	Vibration and impact resistance	EN 60947-5-2
Switching frequency, f (ti/tp 1:1)	≤ 2000 Hz		
Response time	250 μs		
Control input, ET ²	+U _B = Teach-in, -U _B = button locked Open = normal operation		

¹ Max. 10 % ripple, within U_B ² Only 4-pin design ³ With connected IP 67 plug

Fork width	Switching output	Type of connection	Weight	Part number	Article number
30 mm	PNP	Metal plug, M8x1, 3-pin	20 g	FGL 30-RK-30-PS-M3	832-11000
30 mm	NPN	Metal plug, M8x1, 3-pin	20 g	FGL 30-RK-30-NS-M3	832-11001
30 mm	PNP	Metal plug, M8x1, 4-pin	20 g	FGL 30-RK-30-PS-M4	832-11002
30 mm	NPN	Metal plug, M8x1, 4-pin	20 g	FGL 30-RK-30-NS-M4	832-11003
50 mm	PNP	Metal plug, M8x1, 3-pin	30 g	FGL 50-RK-50-PS-M3	832-11004
50 mm	NPN	Metal plug, M8x1, 3-pin	30 g	FGL 50-RK-50-NS-M3	832-11005
50 mm	PNP	Metal plug, M8x1, 4-pin	30 g	FGL 50-RK-50-PS-M4	832-11006
50 mm	NPN	Metal plug, M8x1, 4-pin	30 g	FGL 50-RK-50-NS-M4	832-11007

Fork width	Switching output	Type of connection	Weight	Part number	Article number
80 mm	PNP	Metal plug, M8x1, 3-pin	35 g	FGL 80-RK-50-PS-M3	832-11008
80 mm	NPN	Metal plug, M8x1, 3-pin	35 g	FGL 80-RK-50-NS-M3	832-11009
80 mm	PNP	Metal plug, M8x1, 4-pin	35 g	FGL 80-RK-50-PS-M4	832-11010
80 mm	NPN	Metal plug, M8x1, 4-pin	35 g	FGL 80-RK-50-NS-M4	832-11011
120 mm	PNP	Metal plug, M8x1, 3-pin	40 g	FGL 120-RK-50-PS-M3	832-11012
120 mm	NPN	Metal plug, M8x1, 3-pin	40 g	FGL 120-RK-50-NS-M3	832-11013
120 mm	PNP	Metal plug, M8x1, 4-pin	40 g	FGL 120-RK-50-PS-M4	832-11014
120 mm	NPN	Metal plug, M8x1, 4-pin	40 g	FGL 120-RK-50-NS-M4	832-11015

Plug connection

Typ / Type	A	B	C	D	E	F	G	H	I	②
FGL 30-RK-30-xx-xx	30	50	30	34	59,5	20	-	62,2	71,7	1x
FGL 50-RK-50-xx-xx	50	70	50	54	79,5	20	28	82,2	91,7	2x
FGL 80-RK-50-xx-xx	80	100	80	54	79,5	20	2x28	112,2	91,7	3x
FGL 120-RK-50-xx-xx	120	140	120	54	79,5	20	3x28	152,2	91,7	4x

Angaben in mm / Specifications are in mm / Données en mm

① Schwalbenschwanz / Dovetail / Pince à queue d'aronde
 Gewindeeinsatz M4, Einschraubtiefe max. 6 mm
 Threaded insert M4, max. screw-in depth 6 mm
 Insert filetage M4, profondeur vis max 6 mm

153-00543

9

Connection, 4-pin

154-00148

Connection, 3-pin

154-00163

Smallest detectable part				
Type	FGL 30	FGL 50	FGL 80	FGL 120
Part size	0.2 mm	0.2 mm	0.2 mm	0.4 mm

Accessories	
Connection cables	www.sensopart.com/en/accessories
Brackets	

FGL... -IK

Infrared fork sensors



PRODUCT HIGHLIGHTS

- Fork widths 30 ... 120 mm
- Small part detection from 0.2 mm
- Robust metal plug connection
- Sensor adjustment via teach-in and control input
- Versatile mounting possibilities
- N.O./N.C. switchable

Optical data		Functions	
Fork width	30 ... 120 mm (see selection table)	Indicator LED, green	Operating voltage indicator
Type of light	Infrared, 880 nm	Indicator LED, yellow	Switching output indicator
Smallest detectable part	See table	Sensitivity adjustment	Via Teach-in button and control input
		Teach-in modes	Mode 1: during running process Mode 2: process at standstill
		Adjustment possibilities	N.O. / N.C. via Teach-in button and control input Button lock via control input Default: via Teach-in button and control input
		Default setting	Maximum stability (max. immunity to contamination)
Electrical data		Mechanical data	
Operating voltage, $+U_B$	10 ... 30V DC ¹	Dimensions	(See plug connection)
No-load current, I_0	≤ 32 mA	Enclosure rating	IP 67 ³
Output current, I_e	100 mA	Material, housing	Polycarbonate
Voltage drop, U_D	≤ 2.4 V	Type of connection	See selection table
Protective circuits	Reverse polarity protection, U_B / Short-circuit protection (Q)	Ambient temperature: operation	-20 ... +60 °C
Protection Class	2	Ambient temperature: storage	-20 ... +80 °C
Switching output, Q	PNP / NPN (see selection table)	Weight	See selection table
Output function	N.O. / N.C.	Vibration and impact resistance	EN 60947-5-2
Switching frequency, f (ti/tp 1:1)	2000 Hz		
Response time	250 μ s		
Control input, ET ²	$+U_B$ = Teach-in, $-U_B$ = button locked Open = normal operation		

¹ Max. 10 % ripple, within U_B ² Only 4-pin design ³ With connected IP 67 plug

Fork width	Switching output	Type of connection	Weight	Part number	Article number
30 mm	PNP	Metal plug, M8x1, 3-pin	20 g	FGL 30-IK-30-PS-M3	832-11016
30 mm	NPN	Metal plug, M8x1, 3-pin	20 g	FGL 30-IK-30-NS-M3	832-11017
30 mm	PNP	Metal plug, M8x1, 4-pin	20 g	FGL 30-IK-30-PS-M4	832-11018
30 mm	NPN	Metal plug, M8x1, 4-pin	20 g	FGL 30-IK-30-NS-M4	832-11019
50 mm	PNP	Metal plug, M8x1, 3-pin	30 g	FGL 50-IK-50-PS-M3	832-11020
50 mm	NPN	Metal plug, M8x1, 3-pin	30 g	FGL 50-IK-50-NS-M3	832-11021
50 mm	PNP	Metal plug, M8x1, 4-pin	30 g	FGL 50-IK-50-PS-M4	832-11022
50 mm	NPN	Metal plug, M8x1, 4-pin	30 g	FGL 50-IK-50-NS-M4	832-11023

Fork width	Switching output	Type of connection	Weight	Part number	Article number
80 mm	PNP	Metal plug, M8x1, 3-pin	35 g	FGL 80-IK-50-PS-M3	832-11024
80 mm	NPN	Metal plug, M8x1, 3-pin	35 g	FGL 80-IK-50-NS-M3	832-11025
80 mm	PNP	Metal plug, M8x1, 4-pin	35 g	FGL 80-IK-50-PS-M4	832-11026
80 mm	NPN	Metal plug, M8x1, 4-pin	35 g	FGL 80-IK-50-NS-M4	832-11027
120 mm	PNP	Metal plug, M8x1, 3-pin	40 g	FGL 120-IK-50-PS-M3	832-11028
120 mm	NPN	Metal plug, M8x1, 3-pin	40 g	FGL 120-IK-50-NS-M3	832-11029
120 mm	PNP	Metal plug, M8x1, 4-pin	40 g	FGL 120-IK-50-PS-M4	832-11030
120 mm	NPN	Metal plug, M8x1, 4-pin	40 g	FGL 120-IK-50-NS-M4	832-11031

Plug connection

The diagram illustrates the plug connection between a Transmitter and a Receiver. The Transmitter is on the left, and the Receiver is on the right. The Receiver has a Teach-In button. The assembly is shown with dimensions A through I. The Transmitter has a dovetail (Schwalbenschwanz) and a threaded insert (Gewindeeinsatz M4). The Receiver has a threaded insert (Gewindeeinsatz M4) and a Teach-In button. The dimensions are as follows:

- A: Total length of the receiver housing
- B: Length of the receiver housing excluding the teach-in button
- C: Length of the receiver housing excluding the teach-in button and the threaded insert
- D: Height of the receiver housing
- E: Height of the receiver housing excluding the teach-in button
- F: Height of the receiver housing excluding the teach-in button and the threaded insert
- G: Height of the receiver housing excluding the teach-in button and the threaded insert (for the 3x28 and 4x28 versions)
- H: Total length of the transmitter housing
- I: Length of the transmitter housing excluding the dovetail

The Transmitter has a dovetail (Schwalbenschwanz) and a threaded insert (Gewindeeinsatz M4). The Receiver has a threaded insert (Gewindeeinsatz M4) and a Teach-In button. The dimensions are as follows:

- A: Total length of the receiver housing
- B: Length of the receiver housing excluding the teach-in button
- C: Length of the receiver housing excluding the teach-in button and the threaded insert
- D: Height of the receiver housing
- E: Height of the receiver housing excluding the teach-in button
- F: Height of the receiver housing excluding the teach-in button and the threaded insert
- G: Height of the receiver housing excluding the teach-in button and the threaded insert (for the 3x28 and 4x28 versions)
- H: Total length of the transmitter housing
- I: Length of the transmitter housing excluding the dovetail

Typ / Type	A	B	C	D	E	F	G	H	I	②
FGL 30-IK-30-xx-xx	30	50	30	34	59,5	20	-	62,2	71,7	1x
FGL 50-IK-50-xx-xx	50	70	50	54	79,5	20	28	82,2	91,7	2x
FGL 80-IK-50-xx-xx	80	100	80	54	79,5	20	2x28	112,2	91,7	3x
FGL 120-IK-50-xx-xx	120	140	120	54	79,5	20	3x28	152,2	91,7	4x

Angaben in mm / Specifications are in mm / Données en mm

- ① Schwalbenschwanz / Dovetail / Pince à queue d'aronde
- ② Gewindeeinsatz M4, Einschraubtiefe max. 6 mm
Threaded insert M4, max. screw-in depth 6 mm
Insert filetage M4, profondeur vis max 6 mm

153-00697

Connection, 4-pin	Connection, 3-pin

Smallest detectable part				
Type	FGL 30	FGL 50	FGL 80	FGL 120
Part size	0.2 mm	0.2 mm	0.2 mm	0.4 mm

Accessories	
Connection cables	www.sensopart.com/en/accessories
Brackets	

FGL 5-IK

Fork sensors for the detection of labels and multilayers



PRODUCT HIGHLIGHTS

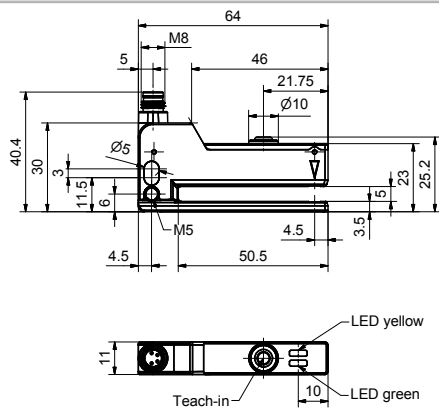
- Detects even semi-transparent labels on carrier material
- Non-distorting and robust metal housing with M8 plug
- Design with small arm adapted to label dispenser
- Easy adjustment via teach-in button or control line
- Versatile mounting possibilities
- N.O./N.C. switchable
- High positioning accuracy thanks to 12 kHz switching frequency

Optical data		Functions	
Fork width	5 mm	Indicator LED, green	Operating voltage indicator
Fork depth	50 mm	Indicator LED, yellow	Switching output indicator
Type of light	Infrared, 850 nm	Sensitivity adjustment	Via Teach-in button and control input
Minimum label width	0.5 ... 2 mm ¹	Teach-in modes	Mode 1: during running process
Minimum distance between labels	0.5 ... 2 mm ¹	Adjustment possibilities	Mode 2: process at standstill
			N.O. / N.C. via Teach-in button and control input
			Button lock via control input
			Default: via Teach-in button and control input
		Default setting	Active on carrier material - reset via control line or teach-in button
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ²	Dimensions	64 x 40.4 x 11 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 65 ³
Output current, I _e	100 mA	Material, housing	Aluminium, Zinc alloy and PBT (cover)
Protective circuits	Reverse polarity protection, U _B / Short-circuit protection (Q)	Material, lens	PC
Protection Class	2	Type of connection	See selection table
Switching output, Q	PNP	Ambient temperature: operation	-20 ... +55 °C
Output function	N.O. / N.C.	Ambient temperature: storage	-20 ... +70 °C
Switching frequency, f (ti/tp 1:1)	12000 Hz	Weight	See selection table
Response time	Max. 40 µs	Vibration and impact resistance	11ms (30 G) 6 shocks per every axis
Control input, ET ²	+U _B = Teach-in, -U _B = normal operation Open = normal operation		EN 60068-2-27

¹ Depending on light transmittance of the objects ² Voltage peak max. 2 Vpp ³ With connected IP 67 plug

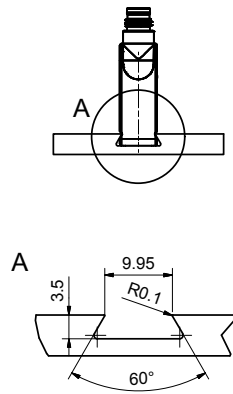
Fork width	Switching output	Type of connection	Weight	Part number	Article number
5 mm	PNP	Metal plug, M8x1, 4-pin	46 g	FGL 5-IK-50-PS-M4	830-11011

Plug connection



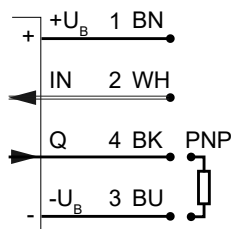
153-01165

Mounting on dovetail



153-01167

Connection, 4-pin



154-00595

Accessories

Connection cables
Brackets

www.sensopart.com/en/accessories

FGL

Fork sensors with metal housings



PRODUCT HIGHLIGHTS

- Robust metal housings
- Small part detection from 0.3 mm
- High switching frequency of 1500 Hz
- Precise sensitivity adjustment via potentiometer
- N.O. N.C. switchable

Optical data		Functions	
Fork width	20 ... 30 mm (see selection table)	Indicator LED, yellow	Switching output indicator
Type of light	LED, red, 640 nm	Sensitivity adjustment	Via potentiometer
Smallest detectable part	0.3 mm	Adjustment possibilities	N.O. / N.C. via potentiometer
Repeatability	0.02 mm		
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30 V DC ¹	Dimensions	(See plug connection)
No-load current, I ₀	≤ 35 mA	Enclosure rating	IP 67 ²
Output current, I _e	≤ 200 mA	Material, housing	Die-cast zinc (GD Zn)
Voltage drop, U _D	< 3 V	Material, active areas	Glass
Protective circuits	Reverse polarity protection, U _B / Short-circuit protection (Q)	Type of connection	See selection table
Protection Class	2	Ambient temperature: operation	-10 ... +60 °C
Switching output, Q	PNP	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O. / N.C.	Weight	See selection table
Switching frequency, f (ti/tp 1:1)	1500 Hz	Vibration and impact resistance	EN 60947-5-2

¹ Max. 10 % ripple, within U_B ² With connected IP 67 plug

Fork width	Type of connection	Weight	Part number	Article number
20 mm	Metal plug, M8x1, 3-pin	50 g	FGL 20-R-PSM3	830-11002
30 mm	Metal plug, M8x1, 3-pin	66 g	FGL 30-R-PSM3	830-11003

Plug connection (20 mm fork width)	Plug connection (30 mm fork width)

Operating / display elements	Connection, 3-pin
Plug / LED N.O./N.C. switching via potentiometer Sensitivity adjustment via potentiometer	+U_B 1 BN Q 4 BK -U_B 3 BU PNP

Accessories	
Connection cables	www.sensopart.com/en/accessories



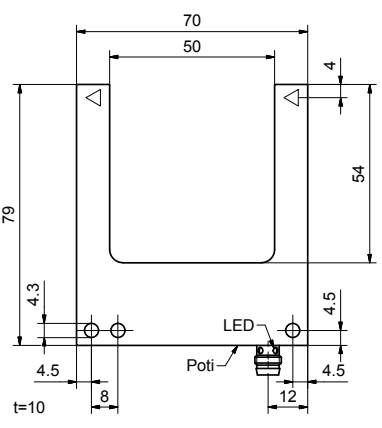
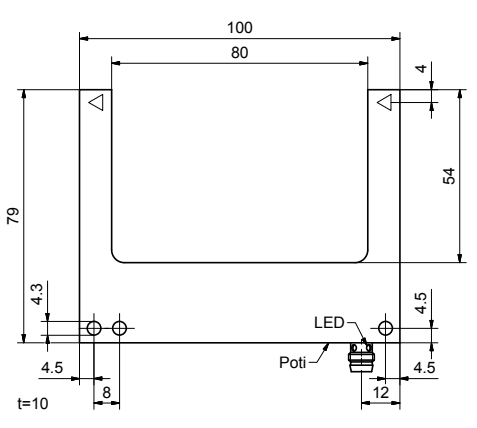
PRODUCT HIGHLIGHTS

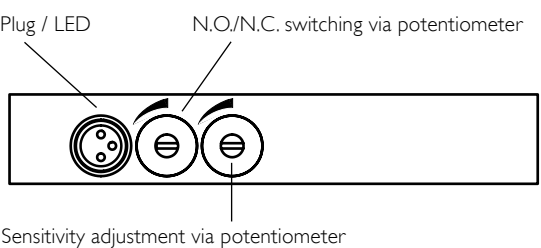
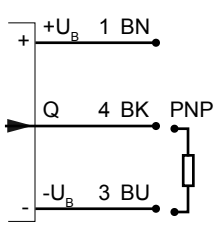
- Robust metal housings
- Small part detection from 0.4 mm
- High switching frequency of 1500 Hz
- Precise sensitivity adjustment via potentiometer
- N.O./N.C. switchable

Optical data		Functions	
Fork width	50 ... 80 mm (see selection table)	Indicator LED, yellow	Switching output indicator
Type of light	LED, red, 640 nm	Sensitivity adjustment	Via potentiometer
Smallest detectable part	0.4 mm	Adjustment possibilities	N.O. / N.C. via potentiometer
Repeatability	0.04 mm ¹ / 0.06 mm ²		
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30 V DC ³	Dimensions	(See plug connection)
No-load current, I ₀	≤ 35 mA	Enclosure rating	IP 67 ⁴
Output current, I _e	≤ 200 mA	Material, housing	Die-cast zinc (GD Zn)
Voltage drop, U _D	< 3 V	Material, active areas	Glass
Protective circuits	Reverse polarity protection, U _B / Short-circuit protection (Q)	Type of connection	See selection table
Protection Class	2	Ambient temperature: operation	-10 ... +60 °C
Switching output, Q	PNP	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O. / N.C.	Weight	See selection table
Switching frequency, f (ti/tp 1:1)	1500 Hz	Vibration and impact resistance	EN 60947-5-2

¹ FGL 50 ² FGL 80 ³ Max. 10 % ripple, within U_B ⁴ With connected IP 67 plug

Fork width	Type of connection	Weight	Part number	Article number
50 mm	Metal plug, M8x1, 3-pin	110 g	FGL 50-R-PSM3	830-11004
80 mm	Metal plug, M8x1, 3-pin	135 g	FGL 80-R-PSM3	830-11005

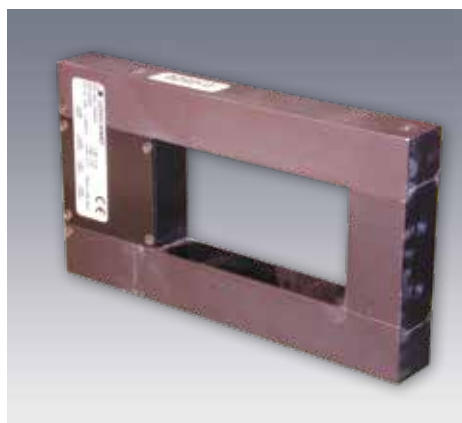
Plug connection (50 mm fork width)	Plug connection (80 mm fork width)
 153-00266	 153-00267

Operating / display elements	Connection, 3-pin
 155-00237	 154-00531

Accessories	
Connection cables	www.sensopart.com/en/accessories

FG 40 / 80 / 120

Optical windows



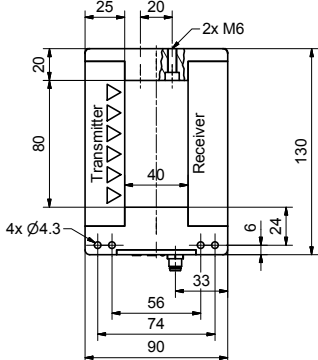
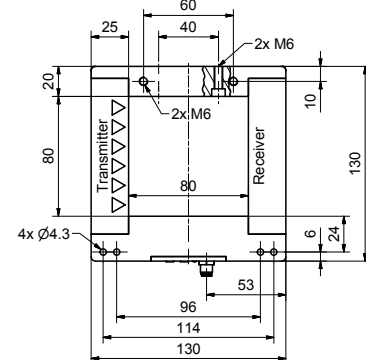
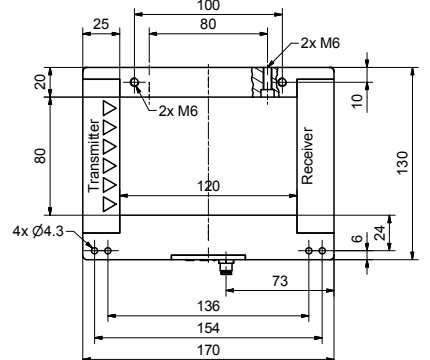
PRODUCT HIGHLIGHTS

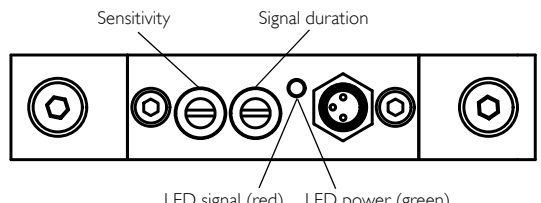
- Ideally suited for monitoring ejection
- Active zone 40, 80 or 120 mm
- Dynamic evaluation
- Adjustable output signal duration 10 ... 300 ms

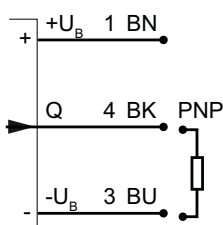
Optical data		Functions	
Window size	40 x 80 mm ² / 80 x 80 mm ² / 120 x 80 mm ² (see selection table)	Display LED, green	Operating voltage indicator
Type of light	Infrared, 880 nm	Display LED, yellow	Switching output indicator
Resolution	1.0 mm ^{1, 2} / 1.2 mm ³	Sensitivity adjustment	Via potentiometer
		Adjustment possibilities	Output signal duration via potentiometer
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC	Dimensions	(See plug connection)
No-load current, I ₀	≤ 40 mA ¹ / ≤ 45 mA ² / ≤ 60 mA ³	Enclosure rating	IP 67 ⁴
Output current, I _e	≤ 200 mA	Material, housing	Aluminium, anodised
Voltage drop,	≤ 3.5 V	Material, active areas	PMMA
Protective circuits	Reverse polarity protection, U _B / Short-circuit protection (Q)	Type of connection	See selection table
Protection Class	2	Ambient temperature: operation	-10 ... +55 °C
Power On Delay	< 100 ms	Weight	See selection table
Switching output, Q	PNP		
Output function	N.O.		
Switching frequency, f (ti/tp 1:1)	3 ... 100 Hz		

¹ FG 40 ² FG 80 ³ FG 120 ⁴With connected IP 67 plug

Window size	Switching output	Type of connection	Weight	Part number	Article number
40 x 80 mm ²	PNP	Plug, M8x1, 3-pin	280 g	FG 40 I-PSM3	831-81000
80 x 80 mm ²	PNP	Plug, M8x1, 3-pin	400 g	FG 80 I-PSM3	831-81001
120 x 80 mm ²	PNP	Plug, M8x1, 3-pin	480 g	FG 120 I-PSM3	831-81002

Plug connection, FG 40	Plug connection, FG 80	Plug connection, FG 120
 153-00293	 153-00294	 153-00295

Operating / display elements
 155-01588

Connection, 3-pin
 154-00531

Accessories	
Connection cables	www.sensopart.com/en/accessories