Fork sensors and optical windows

Experts in small part detection and counting tasks

FGL-RK – LED red light fork sensors
from Page 548

- Precise small part detection from 0.2 mm
- Indicator LEDs with all-round visibility over entire fork edge
- Simple sensor mounting via dovetail guides
- Sensitivity adjustment via teach-in button or control line

FGL-IK – infrared fork sensors
from Page 550

- Precise small part detection from 0.2 mm
- Indicator LEDs with all-round visibility over entire fork edge
- Simple sensor mounting via dovetail guides
- Sensitivity adjustment via teach-in button or control line

FGL 5-IK – LED fork sensors for the detection of labels and multilayers
from Page 552

- Specially designed for label dispensers
- High speed of 12 kHz for very accurate positioning
- Robust metal housing
- Easy teach-in during operation

FGL – LED red light fork sensors with metal housings
from Page 554

- Resistant zinc die-cast housings
- High switching frequency up to 3 kHz
- Sensitivity adjustment via potentiometer

Fork sensors and optical windows display characteristic properties as a result of their special housing design: thanks to their precise beam guidance they are particularly suitable for small part detection. The sensors are also easy to mount because no time-consuming adjustment is required.

The fork sensors of the FGL-IK and FGL-RK series detect parts from a diameter of 0.2 mm. They are used, for example, for small part detection on conveyor sections and chutes or for counting bulk goods on vibration conveyors. Rotational speed measurement is another typical application. The optical windows of the FG series are employed, for example, for detecting thread breaks in the textile industry, for part detection in transparent tubes in pneumatic conveyors, or for ejection detection. Fork sensors and optical windows are frequently the first choice for use in plants subject to strong vibrations, in particular, thanks to their robust housings and the design-related fixed light beam.

Precise detection and user-friendly details: plastic fork sensors
Fork sensors with plastic housings (FGL-RK and –IK series) are, in all respects, perfectly thought-through products. On the one hand, they are particularly shatterproof thanks to the elastic housing material, on the other hand, their numerous user-friendly detail solutions are highly impressive. Thus, in addition to the usual mounting holes, threaded sleeves and dovetail designs are also integrated. In combination with the MBD-S94 bracket, the latter permits flexible mounting in almost any desired position in the process. Operation by means of dynamic teach-in also very easy: the measurement sensitivity can be directly adjusted on moving objects. In addition, the switching distance can be checked anytime thanks to the all-round visibility of the Indicator LEDs. Even a product that, at first glance, appears simple can be quite refined!

FGL with mounted MBD-S94 bracket and easily visible Indicator LEDs on the fork edge.

FG – Infrared optical windows
from Page 558

- *Robust metal housings*
- *Sensitivity adjustment per potentiometer*
- *Adjustable output signal duration of 10 … 300 ms*
- *Dynamic signal evaluation*

made in Germany

TYPICAL SENSOPART

- Simple and robust housing
- Metal or plastic housing options (FGL) or robust metal housings (FG)
- High resolution for precise small part detection (fork sensors from 0.2 mm, optical windows from 0.8 mm)
- Various fork and window widths available
- Easy, rapid mounting without complicated adjustment

- Red light or infrared LED options
- High switching frequency of up to 3 kHz
- Dynamic signal evaluation (FG)
- 3- or 4-pin connector depending on variant
- Reliable function even in harsh conditions
- Indicator LEDs easy to see from all sides

Fork Sensors and Optical Windows – Product Overview					
	Type of light	Adjustment	Fork width / window size	Special features	Page
Fork sensors					
FGL-RK	Red light	Teach-in	30 / 50 / 80 / 120 mm	Teach-in, dovetail mounting	548
FGL-IK	Infrared	Teach-in	30 / 50 / 80 / 120 mm	Teach-in, dovetail mounting	550
FGL 5-IK	Infrared	Teach-in	5 mm	Teach-in, dovetail mounting	552
FGL	Red light	Potentiometer	5 / 10 / 20 / 30 mm	Metal housings	554
FGL	Red light	Potentiometer	50 / 80 / 120 / 180 / 220 mm	Metal housings	556
Optical windows					
FG	Infrared	Potentiometer	40 × 80 mm² / 80 × 80 mm² / 120 × 80 mm²	Metal housings	558

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 … 220 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)
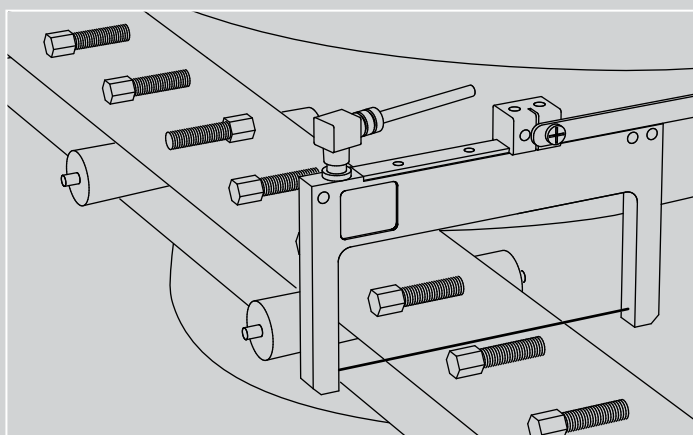
Counting parts on a vibration conveyor
An **FGL fork sensor** checks whether the feed section is completely occupied with work-pieces and, if necessary, stops the conveyor.

Optical windows

System description

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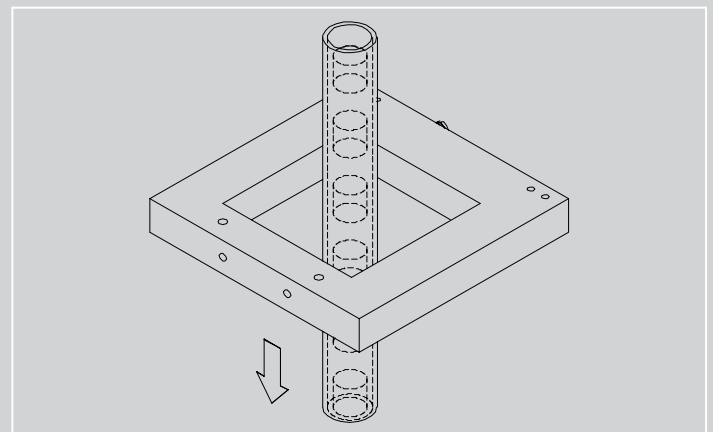
FG detection of objects through a tube
Optical windows also detect objects transported through a partially transparent tube thanks to dynamic evaluation.

FGL… -RK

Fork sensors

CE

IP 67

c(UL)us LISTED

PRODUCT HIGHLIGHTS

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

Optical data			
Fork width	30 … 120 mm (see Selection Table)		
Type of light	LED, red, 640 nm		
Smallest detectable part	(See table)		

Functions			
Indicator LED, green	Operating voltage indicator		
Indicator LED, yellow	Switching output indicator		
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			
Operating voltage, $+U_B$	10 … 30 V DC[1]		
No-load current, I_0	≤ 30 mA		
Output current, Ie	≤ 100 mA		
Voltage drop, U_D	≤ 2.4 V		
Protective circuits	Reverse polarity protection, U_B / Short-circuit protection (Q)		
Protection Class	2		
Switching output, Q	PNP / NPN (see Selection Table)		
Output function	N.O. / N.C.		
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		

Mechanical data			
Dimensions	(See plug connection)		
Enclosure rating	IP 67[3]		
Material, housing	Polycarbonate		
Type of connection	See Selection Table		
Ambient temperature: operation	-20 … +60 °C		
Ambient temperature: storage	-20 … +80 °C		
Weight	See Selection Table		
Vibration and impact resistance	EN 60947-5-2		

[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	Plug, M8×1, 3-pin	20 g	FGL 30-RK-30-PS-M3	832-11000
30 mm	NPN	Plug, M8×1, 3-pin	20 g	FGL 30-RK-30-NS-M3	832-11001
30 mm	PNP	Plug, M8×1, 4-pin	20 g	FGL 30-RK-30-PS-M4	832-11002
30 mm	NPN	Plug, M8×1, 4-pin	20 g	FGL 30-RK-30-NS-M4	832-11003
50 mm	PNP	Plug, M8×1, 3-pin	30 g	FGL 50-RK-50-PS-M3	832-11004
50 mm	NPN	Plug, M8×1, 3-pin	30 g	FGL 50-RK-50-NS-M3	832-11005
50 mm	PNP	Plug, M8×1, 4-pin	30 g	FGL 50-RK-50-PS-M4	832-11006
50 mm	NPN	Plug, M8×1, 4-pin	30 g	FGL 50-RK-50-NS-M4	832-11007

Version: 02/2015. Subject to changes; diagrams similar

Fork width	Switching output	Type of connection	Weight	Part number	Article number
80 mm	PNP	Plug, M8×1, 3-pin	35 g	FGL 80-RK-50-PS-M3	832-11008
80 mm	NPN	Plug, M8×1, 3-pin	35 g	FGL 80-RK-50-NS-M3	832-11009
80 mm	PNP	Plug, M8×1, 4-pin	35 g	FGL 80-RK-50-PS-M4	832-11010
80 mm	NPN	Plug, M8×1, 4-pin	35 g	FGL 80-RK-50-NS-M4	832-11011
120 mm	PNP	Plug, M8×1, 3-pin	40 g	FGL 120-RK-50-PS-M3	832-11012
120 mm	NPN	Plug, M8×1, 3-pin	40 g	FGL 120-RK-50-NS-M3	832-11013
120 mm	PNP	Plug, M8×1, 4-pin	40 g	FGL 120-RK-50-PS-M4	832-11014
120 mm	NPN	Plug, M8×1, 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
② Gewindeeinsatz M4, Einschraubtiefe max. 6 mm
Threaded insert M4, max. screw-in depth 6 mm
Insert filetage M4, profondeur vis max 6 mm

153-00543

Connection, 4-pin	Connection, 3-pin

154-00148

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	From Page A-34
Brackets	From Page A-4

FGL… -IK

Infrared fork sensors

CE
IP 67
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PRODUCT HIGHLIGHTS

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

Optical data	
Fork width	30 … 120 mm (see Selection Table)
Type of light	Infrared, 880 nm
Smallest detectable part	(See table)

Functions	
Indicator LED, green	Operating voltage indicator
Indicator LED, yellow	Switching output indicator
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	
Operating voltage, $+U_B$	10 … 30 V DC[1]
No-load current, I_0	≤ 32 mA
Output current, Ie	100 mA
Voltage drop, U_D	≤ 2.4 V
Protective circuits	Reverse polarity protection, U_B / Short-circuit protection (Q)
Protection Class	2
Switching output, Q	PNP / NPN (see Selection Table)
Output function	N.O. / N.C.
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

Mechanical data	
Dimensions	(See plug connection)
Enclosure rating	IP 67[3]
Material, housing	Polycarbonate
Type of connection	See Selection Table
Ambient temperature: operation	-20 … +60 °C
Ambient temperature: storage	-20 … +80 °C
Weight	See Selection Table
Vibration and impact resistance	EN 60947-5-2

[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	Plug, M8×1, 3-pin	20 g	FGL 30-IK-30-PS-M3	832-11016
30 mm	NPN	Plug, M8×1, 3-pin	20 g	FGL 30-IK-30-NS-M3	832-11017
30 mm	PNP	Plug, M8×1, 4-pin	20 g	FGL 30-IK-30-PS-M4	832-11018
30 mm	NPN	Plug, M8×1, 4-pin	20 g	FGL 30-IK-30-NS-M4	832-11019
50 mm	PNP	Plug, M8×1, 3-pin	30 g	FGL 50-IK-50-PS-M3	832-11020
50 mm	NPN	Plug, M8×1, 3-pin	30 g	FGL 50-IK-50-NS-M3	832-11021
50 mm	PNP	Plug, M8×1, 4-pin	30 g	FGL 50-IK-50-PS-M4	832-11022
50 mm	NPN	Plug, M8×1, 4-pin	30 g	FGL 50-IK-50-NS-M4	832-11023

Version: 02/2015. Subject to changes; diagrams similar

Fork width	Switching output	Type of connection	Weight	Part number	Article number
80 mm	PNP	Plug, M8×1, 3-pin	35 g	FGL 80-IK-50-PS-M3	832-11024
80 mm	NPN	Plug, M8×1, 3-pin	35 g	FGL 80-IK-50-NS-M3	832-11025
80 mm	PNP	Plug, M8×1, 4-pin	35 g	FGL 80-IK-50-PS-M4	832-11026
80 mm	NPN	Plug, M8×1, 4-pin	35 g	FGL 80-IK-50-NS-M4	832-11027
120 mm	PNP	Plug, M8×1, 3-pin	40 g	FGL 120-IK-50-PS-M3	832-11028
120 mm	NPN	Plug, M8×1, 3-pin	40 g	FGL 120-IK-50-NS-M3	832-11029
120 mm	PNP	Plug, M8×1, 4-pin	40 g	FGL 120-IK-50-PS-M4	832-11030
120 mm	NPN	Plug, M8×1, 4-pin	40 g	FGL 120-IK-50-NS-M4	832-11031

Plug connection

153-00697

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

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	From Page A-34
Brackets	From Page A-4

FGL 5-IK

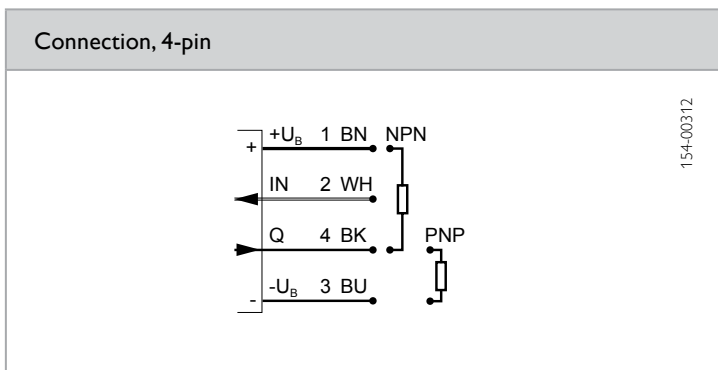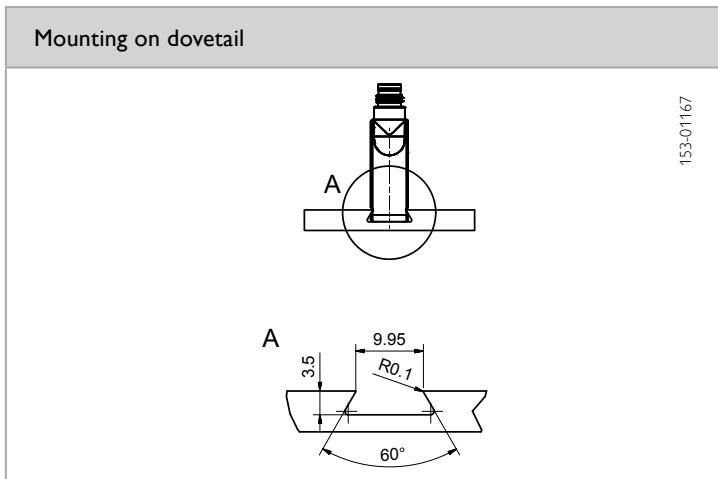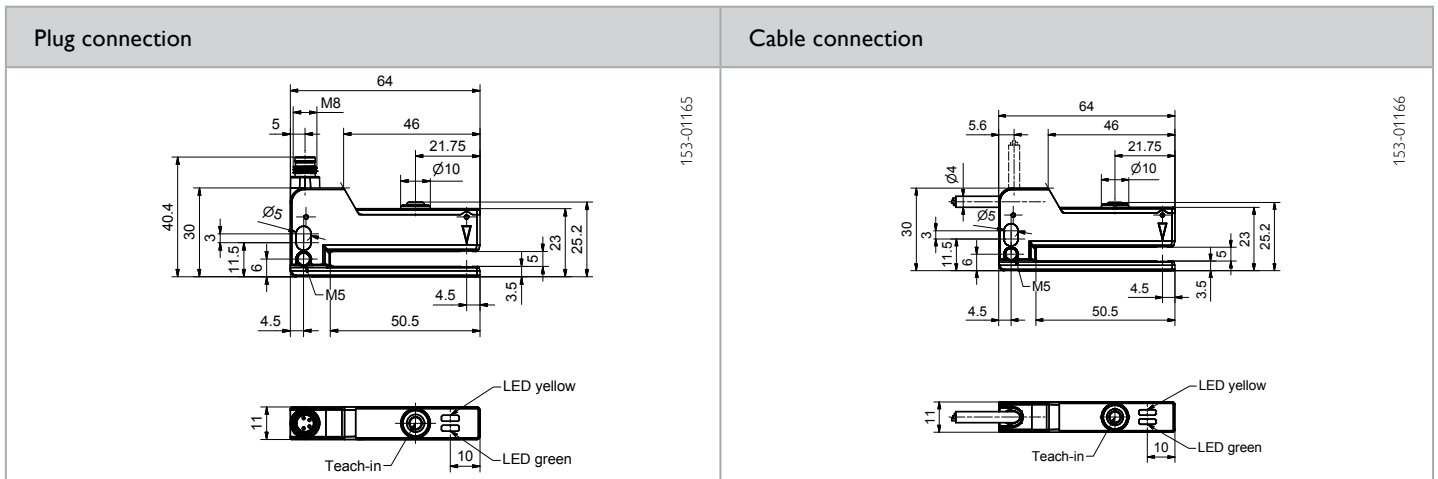Fork sensors for the detection of labels and multilayers

PRODUCT HIGHLIGHTS

- Detects even semi-transparent labels on carrier material
- Non-distorting and robust metal housing with cable or 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 Mode 2: process at standstill
Minimum distance between labels	0.5 ... 2 mm[1]	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	Active on carrier material - reset via control line or teach-in button

Electrical data		Mechanical data	
Operating voltage, $+U_B$	10 ... 30 V DC[2]	Dimensions	64 × 40,4 × 11 mm[3]
No-load current, I_0	≤ 30 mA	Enclosure rating	IP 65[4]
Output current, Ie	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 / NPN[3] (see Selection Table)	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 schocks per every axis EN 60068-2-27
Control input, ET[2]	$+U_B$ = Teach-in, $-U_B$ = normal operation Open = normal operation		

[1] Max. 10 % ripple, within U_B [2] Voltage peak max. 2 Vpp   [3] pull up/down resistance 33 kOhm   [4] With connected IP 67 plug

Fork width	Switching output	Type of connection	Weight	Part number	Article number
5 mm	PNP	Metal plug, M8×1, 4-pin	46 g	FGL 5-IK-50-PS-M4	830-11011
5 mm	NPN	Metal plug, M8×1, 4-pin	46 g	FGL 5-IK-50-NS-M4	830-11013
5 mm	PNP	Cable, 2 m, 4-wire	85 g	FGL 5-IK-50-PS-K4	830-11010
5 mm	NPN	Cable, 2 m, 4-wire	85 g	FGL 5-IK-50-NS-K4	830-11012

Version: 02/2015. Subject to changes; diagrams similar

Plug connection

153-01165

LED yellow

LED green

Teach-in

M8

64

5

46

21.75

Ø10

40.4

30

3

Ø5

11.5

6

M5

4.5

50.5

4.5

3.5

5

23

25.2

11

10

Cable connection

153-01166

LED yellow

LED green

Teach-in

64

5.6

46

21.75

Ø10

Ø4

Ø5

30

3

11.5

6

M5

4.5

50.5

4.5

3.5

5

23

25.2

11

10

Mounting on dovetail

153-01167

A

A

3.5

9.95

R0.1

60°

Connection, 4-pin

154-00312

+U$_B$ 1 BN   NPN

+

IN   2 WH

Q   4 BK   PNP

-U$_B$ 3 BU

-

Accessories

Connection cables	From Page A-34
Brackets	From Page A-4

FGL

Fork sensors with metal housings

CE

IP 67

PRODUCT HIGHLIGHTS

- Robust metal housings
- Small part detection from 0.3 mm
- High switching frequency up to 3000 Hz
- Precise sensitivity adjustment via potentiometer
- N.O. N.C. switchable

Optical data			Functions	
Fork width	5 … 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	(See table)		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[4]
Output current, Ie	≤ 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
			Ambient temperature: operation	-10 … +60 °C
Protection Class	2		Ambient temperature: storage	-20 … +80 °C
Switching output, Q	PNP		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)	3000 Hz[2] / 1500 Hz[3]			

[1] Max. 10 % ripple, within U_B [2] FGL 5 / FGL 10   [3] FGL 20 / FGL 30   [4] With connected IP 67 plug

Fork width	Type of connection	Weight	Part number	Article number
5 mm	Metal plug, M8×1, 3-pin	32 g	FGL 5-R-PSM3	830-11000
10 mm	Metal plug, M8×1, 3-pin	36 g	FGL 10-R-PSM3	830-11001
20 mm	Metal plug, M8×1, 3-pin	50 g	FGL 20-R-PSM3	830-11002
30 mm	Metal plug, M8×1, 3-pin	66 g	FGL 30-R-PSM3	830-11003

     Version: 02/2015. Subject to changes; diagrams similar

Plug connection (5 mm fork width)

153-00262

Poti

25
5
4
17
45
4.3
4.5
4.5
8
t=10
6

Plug connection (10 mm fork width)

153-00263

Poti

30
10
4
17
45
4.3
4.5
4.5
8
t=10
6

Plug connection (20 mm fork width)

153-00264

Poti

40
20
4
24
49
4.3
4.5
4.5
8
t=10
6

Plug connection (30 mm fork width)

153-00265

50
30
4
34
59
4.3
4.5
4.5
Poti
4.5
8
12
t=10

10

Operating / display elements

155-00237

Plug / LED   N.O./N.C. switching via potentiometer

Sensitivity adjustment via potentiometer

Connection, 3-pin

154-00456

1 BN $+U_B$
4 BK
[PNP]
3 BU $-U_B$

4: ⌐‾
4: ⌐_

Smallest detectable part

Type	FGL 5	FGL 10	FGL 20	FGL 30
Part size	0.3 mm	0.3 mm	0.3 mm	0.3 mm

Accessories

Connection cables	From Page A-34

FGL

Fork sensors with metal housings

CE

IP 67

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	
Fork width	50 … 220 mm (see Selection Table)
Type of light	LED, red, 640 nm
Smallest detectable part	(See table)
Repeatability	0.04 mm[1] / 0.06 mm[2] / 0.08 mm[3]

Functions			
Indicator LED, yellow		Switching output indicator	
Sensitivity adjustment		Via potentiometer	
Adjustment possibilities		N.O. / N.C. via potentiometer	

Electrical data	
Operating voltage, $+U_B$	10 … 30 V DC[4]
No-load current, I_0	≤ 35 mA
Output current, Ie	≤ 200 mA
Voltage drop, U_D	< 3 V
Protective circuits	Reverse polarity protection, U_B / Short-circuit protection (Q)
Protection Class	2
Switching output, Q	PNP
Output function	N.O. / N.C.
Switching frequency, f (ti/tp 1:1)	1500 Hz

Mechanical data	
Dimensions	(See plug connection)
Enclosure rating	IP 67[5]
Material, housing	Die-cast zinc (GD Zn)
Material, active areas	Glass
Type of connection	See Selection Table
Ambient temperature: operation	-10 … +60 °C
Ambient temperature: storage	-20 … +80 °C
Weight	See Selection Table
Vibration and impact resistance	EN 60947-5-2

[1] FGL 50   [2] FGL 80   [3] FGL 120 / FGL 180 / FGL 220   [4] Max. 10 % ripple, within U_B [5] With connected IP 67 plug

Fork width	Type of connection	Weight	Part number	Article number
50 mm	Metal plug, M8×1, 3-pin	110 g	FGL 50-R-PSM3	830-11004
80 mm	Metal plug, M8×1, 3-pin	135 g	FGL 80-R-PSM3	830-11005
120 mm	Metal plug, M8×1, 3-pin	210 g	FGL 120-R-PSM3	830-11006
180 mm	Metal plug, M8×1, 3-pin	315 g	FGL 180-R-PSM3	830-11007
220 mm	Metal plug, M8×1, 3-pin	365 g	FGL 220-R-PSM3	830-11008

Plug connection (50 mm fork width)

153-00266

70
50
4
79
54
4.3
4.5
Poti
4.5
4.5
8
12
t=10

Plug connection (80 mm fork width)

153-00267

100
80
4
79
54
4.3
4.5
Poti
4.5
4.5
8
12
t=10

Plug connection (120 mm fork width)

153-00268

140
120
4
84
54
4.3
20
5
Poti
37
t=10
100
22

Plug connection (180 mm fork width)

153-00299

200
180
4
144
114
4.3
20
5
Poti
37
t=10
160
22

Plug connection (220 mm fork width)

153-00300

240
220
4
144
114
4.3
20
5
Poti
37
t=10
200
22

Operating / display elements

155-00237

Plug / LED
N.O./N.C. switching via potentiometer

Sensitivity adjustment via potentiometer

Connection, 3-pin

154-00456

1   BN   +U$_B$
4   BK
[PNP]
3   BU   -U$_B$
4:
4:

Smallest detectable part

Type	FGL 50	FGL 80	FGL 120	FGL 180	FGL 220
Part size	0.4 mm	0.4 mm	0.8 mm	0.8 mm	0.8 mm

Accessories

Connection cables	From Page A-34

FG 40 / 80 / 120

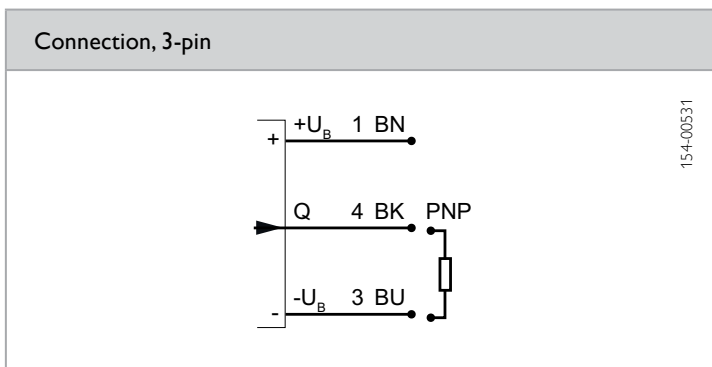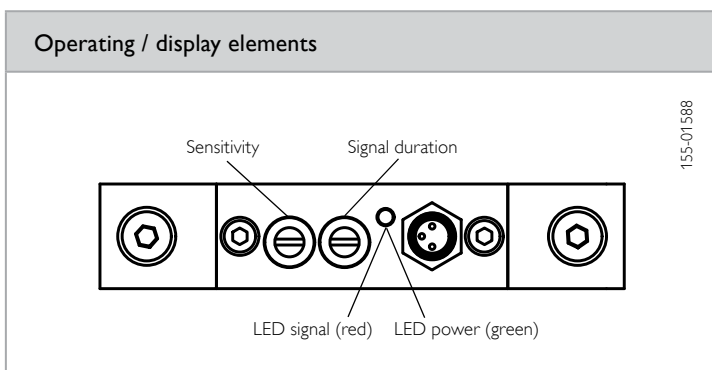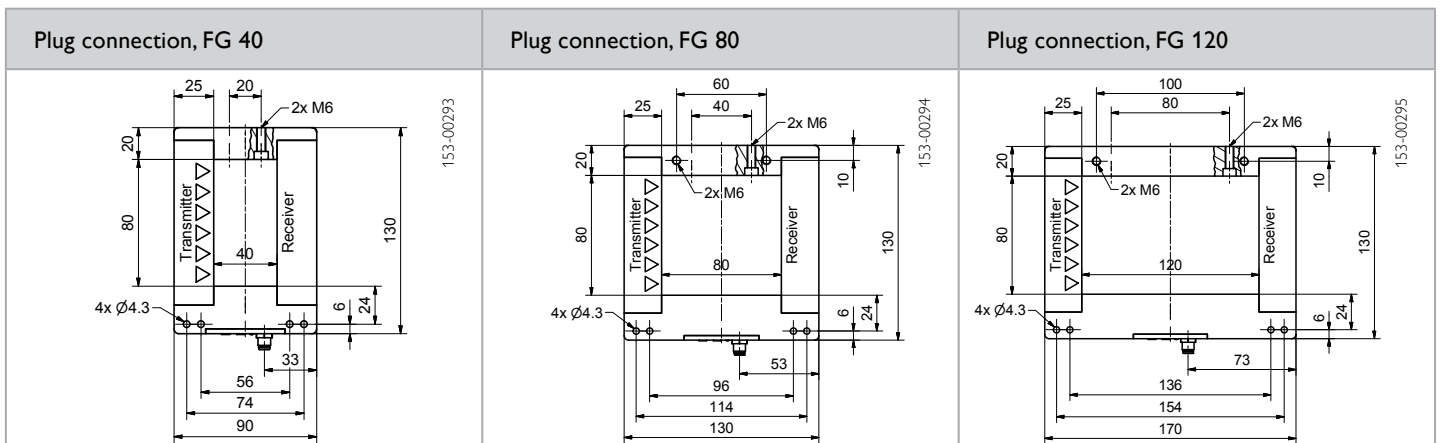## Optical windows

CE

IP 65
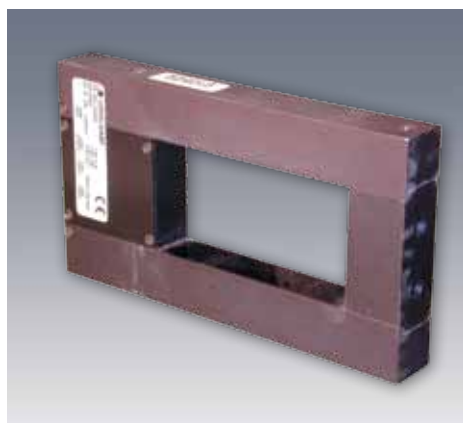
PRODUCT HIGHLIGHTS

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

Optical data

Window size	40×80 mm^2 / 80×80 mm^2 / 120×80 mm^2 (see Selection Table)
Type of light	Infrared, 880 nm
Resolution	1.0 mm$^{1, 2}$ / 1.2 mm^3

Functions

Display LED, green	Operating voltage indicator
Display LED, yellow	Switching output indicator
Sensitivity adjustment	Via potentiometer
Adjustment possibilities	Output signal duration via potentiometer

Electrical data

Operating voltage, $+U_B$	10 … 30 V DC
No-load current, I_0	≤ 40 mA^1 / ≤ 45 mA^2 / ≤ 60 mA^3
Output current, Ie	≤ 200 mA
Voltage drop,	≤ 3.5 V
Protective circuits	Reverse polarity protection, U_B / Short-circuit protection (Q)
Protection Class	2
Power On Delay	< 100 ms
Switching output, Q	PNP
Output function	N.O.
Switching frequency, f (ti/tp 1:1)	3 … 100 Hz

Mechanical data

Dimensions	(See plug connection)
Enclosure rating	IP 67^4
Material, housing	Aluminium, anodised
Material, active areas	PMMA
Type of connection	See Selection Table
Ambient temperature: operation	-10 … +55 °C
Weight	See Selection Table

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

Window size	Switching output	Type of connection	Weight	Part number	Article number
40×80 mm^2	PNP	Plug, M8×1, 3-pin	280 g	FG 40 I-PSM3	831-81000
80×80 mm^2	PNP	Plug, M8×1, 3-pin	400 g	FG 80 I-PSM3	831-81001
120×80 mm^2	PNP	Plug, M8×1, 3-pin	480 g	FG 120 I-PSM3	831-81002

Plug connection, FG 40

153-00293

25 · 20 · 2x M6
20
80
Transmitter · Receiver
40
130
4x Ø4.3
6
24
33
56
74
90

Plug connection, FG 80

153-00294

25 · 60 · 40 · 2x M6
20
80
Transmitter · Receiver
2x M6
80
10
130
4x Ø4.3
6
24
53
96
114
130

Plug connection, FG 120

153-00295

25 · 100 · 80 · 2x M6
20
80
Transmitter · Receiver
2x M6
120
10
130
4x Ø4.3
6
24
73
136
154
170

Operating / display elements

155-01588

Sensitivity   Signal duration

LED signal (red)   LED power (green)

Connection, 3-pin

154-00531

+U$_B$ 1 BN

Q 4 BK PNP

-U$_B$ 3 BU

10

Accessories

Connection cables	From Page A-34