

red light LED version

product family	FHDK 04	FHCK 07	FHDK 07	FHDK 10	FHDK 10	FHDK 10	FHDK 10
							
		MINOS	MINOS				
version						point source LED	line beam
width / diameter	4 mm	8 mm	8 mm	10,4 mm	10,4 mm	10,4 mm	10,4 mm
sensing distance Tw	30 mm ±2 mm 50 mm ±3 mm	10 ... 60 mm	10 ... 60 mm	30 mm ±2 mm 50 mm ±3 mm 80 mm ±8 mm	20 ... 120 mm	25 ... 120 mm	20 ... 80 mm
response time / release time	< 0,5 ms	< 0,5 ms	< 0,5 ms	< 1 ms	< 1 ms	< 1 ms	< 1 ms
sensing distance adjustment		Teach-in	Teach-in		mechanical, 5 turn	mechanical, 5 turn	mechanical, 5 turn
push-pull	■			■			
NPN		■	■		■	■	■
PNP		■	■		■	■	■
cable	■	■	■	■	■	■	■
flylead connector	■	■	■		■		
connector				■	■	■	■
housing material	plastic	plastic	plastic	plastic	plastic	plastic	plastic
page	94	96	98	100	102	104	106

FHDK 10	FHDM 12	FHDK 14	FHDK 14	FHDH 14	FHDR 14	FHDM 16	FHDK 20
							
for glass detection							
10,4 mm	12,4 mm	14,8 mm	14,8 mm	19,6 mm	19,6 mm	15,4 mm	20 mm
10 ... 30 mm	15 ... 300 mm	20 ... 350 mm 30 ... 500 mm	40 ... 200 mm	50 ... 400 mm	50 ... 400 mm	20 ... 450 mm 20 ... 600 mm	30 ... 200 mm
< 1 ms	< 1 ms	< 1 ms < 5 ms	< 0,5 ms	< 1,8 ms	< 1,8 ms	< 1 ms < 5 ms	< 0,5 ms
mechanical, 5 turn	mechanical, 5 turn	mechanical, 10 turn	Teach-in	Teach-in /IO-Link	Teach-in /IO-Link	mechanical, 5 turn	Teach-in
				■	■		
■	■	■	■			■	■
■	■	■	■			■	■
	■	■	■	■		■	
				■			
■	■	■	■		■	■	■
plastic	metal	plastic	plastic	metal	metal	metal	plastic
				IO-Link	IO-Link		
108	114	120	122	124	126	130	136

laser version

product family	OHDK 10	OHDK 10	OHDM 12	OHDM 13	OHDK 14	OHDM 16	OHDM 16
							
version		line beam					wafer mapping sensor
width / diameter	10,4 mm	10,4 mm	12,4 mm	13,4 mm	14,8 mm	15,4 mm	15,4 mm
sensing distance Tw	22 ... 130 mm	22 ... 130 mm	17 ... 120 mm	50 ... 550 mm	20 ... 350 mm	25 ... 300 mm	123 ... 143 mm
response time / release time	< 0,25 ms	< 0,25 ms			< 0,5 ms	< 0,1 ms < 0,6 ms	< 5 ms
response time			< 1 ms	< 5 ms			
release time			< 2,7 ms	< 15 ms			
sensing distance adjustment	mechanical, 5 turn	mechanical, 5 turn	Teach-in	Teach-in	mechanical, 9 turn	mechanical, 8 turn	no
push-pull							
NPN	■	■	■	■	■	■	■
PNP	■	■	■	■	■	■	■
cable	■				■	■	■
connector	■	■	■	■	■	■	
housing material	plastic	plastic	metal	metal	plastic	metal	metal
page	110	112	116	118	128	132	134

OHDM 20	OHDK 25	OHDK 25
		
20,6 mm	23,4 mm	23,4 mm
210 ... 1500 mm	100 ... 1000 mm	100 ... 2000 mm
	< 6 ms	< 10 ms
< 6 ms		
< 18 ms		
Teach-in	Teach-in	Teach-in
	■	■
■		
■	■	■
metal	plastic	plastic
138	140	142



General information

By using the triangulation principle, diffuse sensors with background suppression not only measure the light intensity reflected by the target, but also determine the distance of the object from the sensor. In this way, objects with the minimum size of the light beam located within the adjustable sensing distance can be detected regardless of their color and surface.

The diffuse sensors with background suppression and laser light source were developed specifically for applications in which exact positioning is important. With the precisely focused beam, even very small objects such as the wires of a resistor or threads can be clearly detected or counted.

Applications

- Detection of boxes, metal and plastic parts lying on a base such as a conveyor belt, table or transport trolley from above
- Detection of bulk materials or other non-transparent materials in a container
- Counting of different-colored objects such as plastic bottles or printed packages
- Reliable presence monitoring of assembly parts, even with objects moving in the background

Characteristics and advantages

Adjustable sensing distance

The switching point can be adjusted accurately between the object and the interfering background using a set screw or Teach-in method

Largely independent of color

The sensing distance remains constant even if the color of the objects changes. Readjustment is therefore unnecessary. Objects changing in the background also have no effect.

Small spot size

Laser sensors can detect objects with a size of just 0,1 mm. Sensors with pinpoint diodes have a spot of only 2 mm diameter at the focus.

Red light emitters

Visible red light permits simple adjustment of the sensor to small objects by eye.

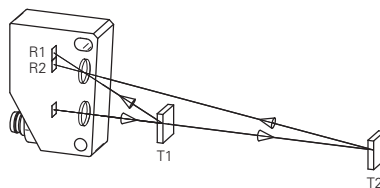
Short response time

Small, quickly moving objects are reliably detected due to the short response time.

Technology and operation

The sensors are based on the triangulation principle. Only the angle of the light reflected back from the object determines the distance at which the sensor responds. The amount of reflected light is far less important.

The schematic sketch below shows that receiver R1 receives the light reflected back from the object T1 (acute angle of incidence) and receiver R2 the light reflected back from the background (shallow angle of incidence). The transition from R1 to R2 determines the sensing distance.

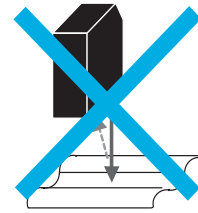
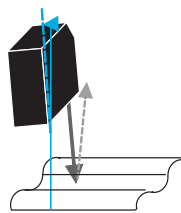
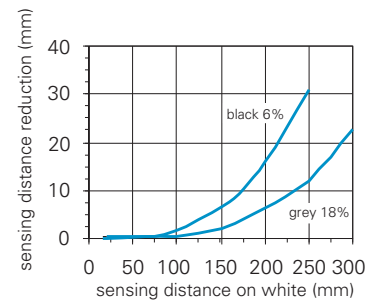




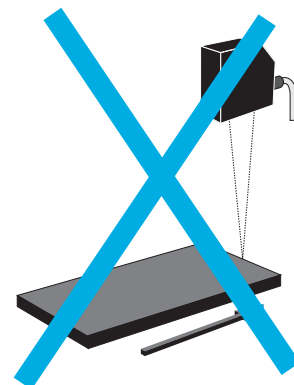
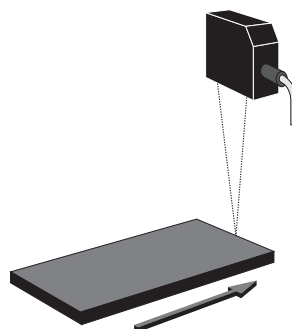
Mounting and adjustment

The diffuse sensor must be aimed at the object. The sensing distance must be set to a distance between the target and the background. The background must be located behind the adjusted sensing distance by at least the distance of the sensing distance reduction of the sensor to black.

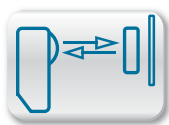
For diffuse sensors with background suppression, the sensing range diagram is specified for the optimum adjustment. This indicates the sensing range reduction as a function of the sensing range to white for different degrees of remission. This means the distance by which the sensing distance to black or gray is reduced in comparison with white. When the adjusted sensing range to white is entered on the X axis of the diagram, the reduction of the sensing distance to black or gray can be read off on the Y axis. The sensing distance reduction also indicates the minimum distance a black or gray object must be separated from a white background.



The direct reflection from glossy or reflective objects must not impinge on the receiver. This can be avoided by slightly tilting the sensor.



It should be ensured that the object to be detected approaches the active area of the sensor from the side, which avoids malfunctions caused by deflection of the light beam at edges.



Tw = 50 mm

- compact housing
- small beam diameter
- push-pull output

general data

type	background suppression
light source	pulsed point source LED
alignment / soiled lens indicator	flashing light indicator
light indicator	LED yellow
wave length	660 nm
beam diameter	2 mm
suppression of reciprocal influence	yes

electrical data

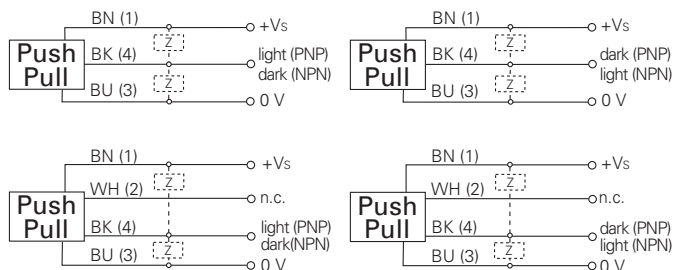
response time / release time	< 0,5 ms
voltage supply range +Vs	11 ... 30 VDC
current consumption max. (no load)	30 mA
current consumption typ.	20 mA
voltage drop Vd	< 2 VDC
output circuit	push-pull
output current	< 50 mA
short circuit protection	yes
reverse polarity protection	yes, supply only

mechanical data

width / diameter	4 mm
height / length	44,8 mm
depth	6,2 mm
type	rectangular
housing material	plastic (ASA)
front (optics)	PMMA

ambient conditions

operating temperature	-10 ... +50 °C
protection class	IP 65

**connection diagrams****connectors**

ESG 32AH0200	4 pin	2 m straight
ESW 31AH0200	4 pin	2 m angular

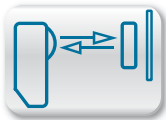
additional cable connectors and field wireable connectors, see accessories

accessories

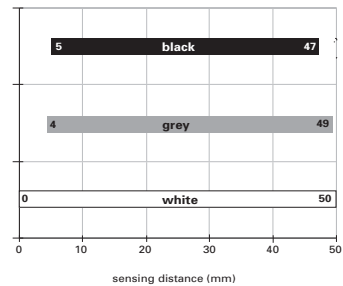
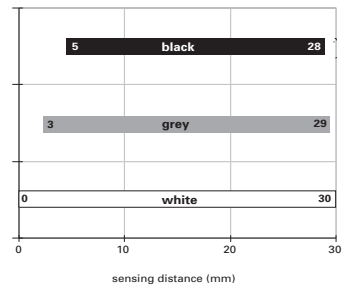
mounting brad	10163196
bracket for extrusion frames	10163299

for details, see accessories section

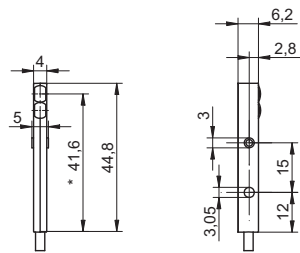
order reference	sensing distance Tw	connection types	output function
FHDK 04G6101	30 mm ±2 mm	cable 3 pin, 2 m	light operate
FHDK 04G6101/KS35A	30 mm ±2 mm	flylead connector M8 4 pin	light operate
FHDK 04G6102	50 mm ±3 mm	cable 3 pin, 2 m	light operate
FHDK 04G6102/KS35A	50 mm ±3 mm	flylead connector M8 4 pin	light operate
FHDK 04G6111	30 mm ±2 mm	cable 3 pin, 2 m	dark operate
FHDK 04G6111/KS35A	30 mm ±2 mm	flylead connector M8 4 pin	dark operate
FHDK 04G6112	50 mm ±3 mm	cable 3 pin, 2 m	dark operate
FHDK 04G6112/KS35A	50 mm ±3 mm	flylead connector M8 4 pin	dark operate



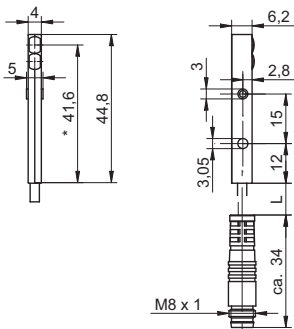
sensing distance diagrams



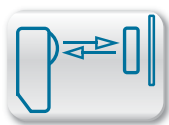
dimension drawings



* emitter axis



* emitter axis cable length L = 200 mm



Tw = 10 ... 60 mm

- ultra compact housing
- sensing distance adjustable via Teach-in
- suppression of mutual optical interference

general data

type	background suppression
light source	pulsed red LED
sensing distance Tw	10 ... 60 mm
sensing range Tb (at Tw max.)	2 ... 60 mm
sensing range Tb (at Tw min.)	5 ... 10 mm
alignment / soiled lens indicator	flashing light indicator
light indicator	LED green
output indicator	LED yellow
sensing distance adjustment	Teach-in
wave length	660 nm
suppression of reciprocal influence	yes

electrical data

response time / release time	< 0,5 ms
voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	25 mA
current consumption typ.	20 mA
voltage drop Vd	< 1,8 VDC
output function	light / dark operate
output current	< 100 mA
short circuit protection	yes
reverse polarity protection	yes

mechanical data

width / diameter	8 mm
height / length	16,2 mm
depth	10,8 mm
type	rectangular
housing material	plastic (PMMA, MABS, PA)
front (optics)	PMMA

ambient conditions

operating temperature	-20 ... +50 °C
protection class	IP 65

order reference	connection types	output circuit
FHCK 07N6901	cable rear side, 2 m	NPN
FHCK 07N6901/KS35A	flylead connector M8 4 pin	NPN
FHCK 07P6901	cable rear side, 2 m	PNP
FHCK 07P6901/KS35A	flylead connector M8 4 pin	PNP



connection diagrams



connectors

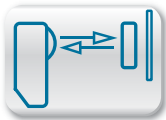
ESG 32AH0200	4 pin	2 m straight
ESW 31AH0200	4 pin	2 m angular

additional cable connectors and field wireable connectors, see accessories

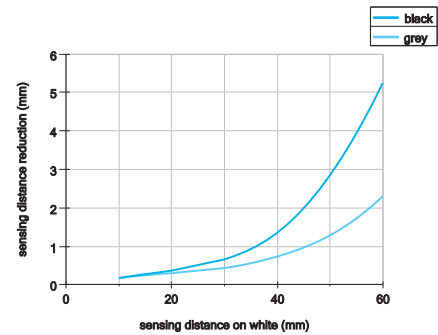
accessories

MINOFIX mounting kit	10150844
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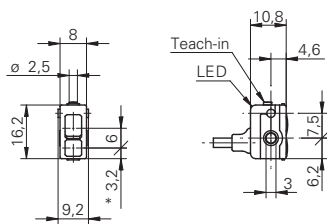
for details, see accessories section



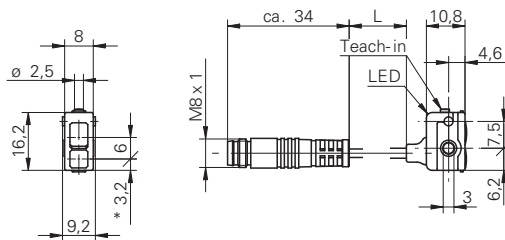
sensing distance diagram



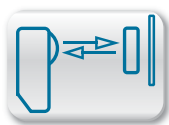
dimension drawings



* emitter axis



* emitter axis cable length L = 200 mm



Tw = 10 ... 60 mm

- ultra compact housing
- sensing distance adjustable via Teach-in
- suppression of mutual optical interference

general data

type	background suppression
light source	pulsed red LED
sensing distance Tw	10 ... 60 mm
sensing range Tb (at Tw max.)	2 ... 60 mm
sensing range Tb (at Tw min.)	5 ... 10 mm
alignment / soiled lens indicator	flashing light indicator
light indicator	LED green
output indicator	LED yellow
sensing distance adjustment	Teach-in
wave length	660 nm
suppression of reciprocal influence	yes

electrical data

response time / release time	< 0,5 ms
voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	25 mA
current consumption typ.	20 mA
voltage drop Vd	< 1,8 VDC
output function	light / dark operate
output current	< 100 mA
short circuit protection	yes
reverse polarity protection	yes

mechanical data

width / diameter	8 mm
height / length	16,2 mm
depth	10,8 mm
type	rectangular
housing material	plastic (PMMA, MABS, PA)
front (optics)	PMMA

ambient conditions

operating temperature	-20 ... +50 °C
protection class	IP 65

order reference	connection types	output circuit
FHDK 07N6901	cable bottom side, 2 m	NPN
FHDK 07N6901/KS35A	flylead connector M8 4 pin	NPN
FHDK 07P6901	cable bottom side, 2 m	PNP
FHDK 07P6901/KS35A	flylead connector M8 4 pin	PNP



connection diagrams



connectors

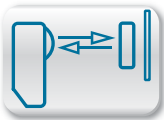
ESG 32AH0200	4 pin	2 m straight
ESW 31AH0200	4 pin	2 m angular

additional cable connectors and field wireable connectors, see accessories

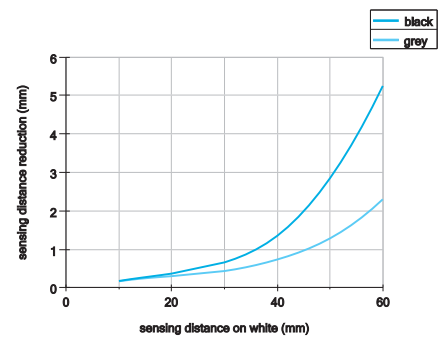
accessories

MINOFIX mounting kit	10150844
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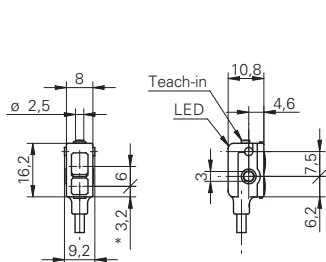
for details, see accessories section



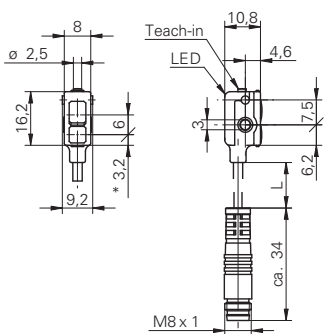
sensing distance diagram



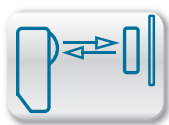
dimension drawings



* emitter axis



* emitter axis cable length L = 200 mm



Tw = 80 mm

- compact housing
- fixed sensing distance
- push-pull output

general data

type	background suppression
light source	pulsed red LED
alignment / soiled lens indicator	flashing light indicator
light indicator	LED yellow
wave length	660 nm
suppression of reciprocal influence	yes

electrical data

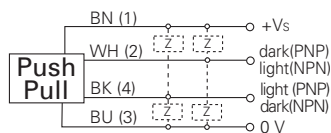
response time / release time	< 1 ms
voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	25 mA
current consumption typ.	18 mA
voltage drop Vd	< 1,8 VDC
output function	light / dark operate
output circuit	push-pull
output current	< 50 mA
short circuit protection	yes
reverse polarity protection	yes

mechanical data

width / diameter	10,4 mm
height / length	27 mm
depth	14,7 mm
type	rectangular
housing material	plastic (ASA)
front (optics)	PMMA

ambient conditions

operating temperature	-25 ... +65 °C
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**connection diagram****connectors**

ESG 32AH0200	4 pin	2 m straight
ESW 31AH0200	4 pin	2 m angular

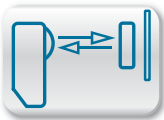
additional cable connectors and field wireable connectors, see accessories

accessories

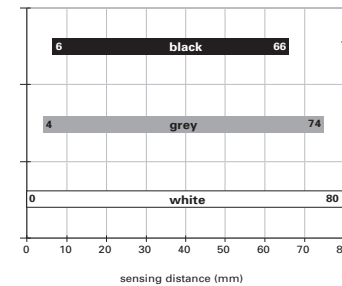
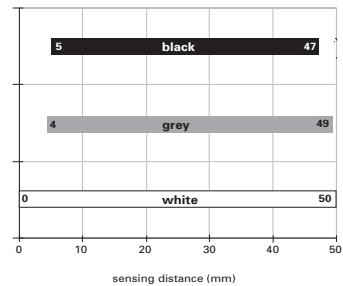
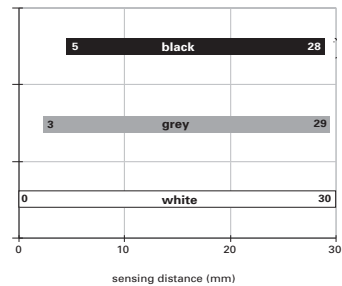
SENSOFIX mounting kit	10150326
mounting bracket (cable type)	10114501
mounting bracket (connector type)	10133792

for details, see accessories section

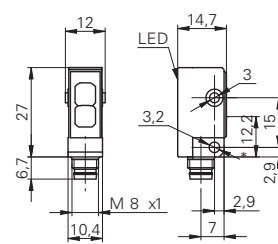
order reference	sensing distance Tw	connection types	protection class
FHDK 10G5120	30 mm ±2 mm	cable 4 pin, 2 m	IP 65
FHDK 10G5120/S35A	30 mm ±2 mm	connector M8 4 pin	IP 67
FHDK 10G5121	50 mm ±3 mm	cable 4 pin, 2 m	IP 65
FHDK 10G5121/S35A	50 mm ±3 mm	connector M8 4 pin	IP 67
FHDK 10G5122	80 mm ±8 mm	cable 4 pin, 2 m	IP 65
FHDK 10G5122/S35A	80 mm ±8 mm	connector M8 4 pin	IP 67



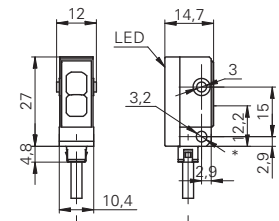
sensing distance diagrams



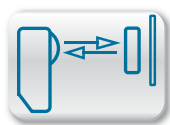
dimension drawings



* emitter axis



* emitter axis



Tw = 20 ... 120 mm

- compact housing
- large sensing range
- sensing distance adjustable via potentiometer

general data

type	background suppression
light source	pulsed red LED
sensing distance Tw	20 ... 120 mm
sensing range Tb (at Tw max.)	5 ... 120 mm
sensing range Tb (at Tw min.)	5 ... 20 mm
alignment / soiled lens indicator	flashing light indicator
light indicator	LED yellow
sensing distance adjustment	mechanical, 5 turn
wave length	660 nm
beam diameter	4 mm
suppression of reciprocal influence	yes

electrical data

response time / release time	< 1 ms
voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	30 mA
current consumption typ.	20 mA
voltage drop Vd	< 1,8 VDC
output current	< 100 mA
short circuit protection	yes
reverse polarity protection	yes

mechanical data

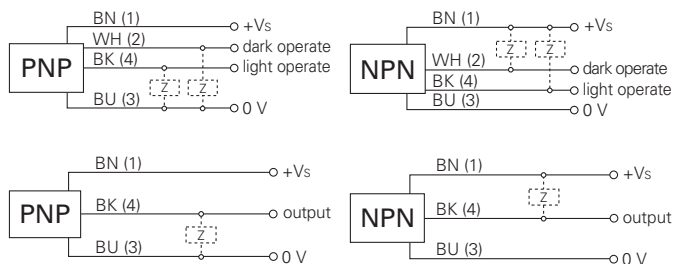
width / diameter	10,4 mm
height / length	27 mm
depth	14 mm
type	rectangular
housing material	plastic (ASA)
front (optics)	PMMA

ambient conditions

operating temperature	-25 ... +65 °C
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connection diagrams



connectors

ESG 32SH0200	3 pin	2 m straight
ESW 31SH0200	3 pin	2 m angular
ESG 32AH0200	4 pin	2 m straight
ESW 31AH0200	4 pin	2 m angular

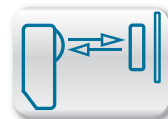
additional cable connectors and field wireable connectors, see accessories

accessories

SENSOFIX mounting kit	10150326
mounting bracket (cable type)	10114501
mounting bracket (connector type)	10133792

for details, see accessories section

order reference	connection types	output circuit	output function	protection class
FHDK 10N1101/KS35	flylead connector M8 3 pin	NPN	light operate	IP 65
FHDK 10N5101	cable 4 pin, 2 m	NPN	light / dark operate	IP 65
FHDK 10N5101/S35A	connector M8 4 pin	NPN	light / dark operate	IP 67
FHDK 10P1101/KS35	flylead connector M8 3 pin	PNP	light operate	IP 65
FHDK 10P5101	cable 4 pin, 2 m	PNP	light / dark operate	IP 65
FHDK 10P5101/S35A	connector M8 4 pin	PNP	light / dark operate	IP 67



Sensing distance on white (mm)	Sensing distance reduction (mm) - black	Sensing distance reduction (mm) - grey
0	0	0
25	1	0.5
50	4	1.5
75	12	4
100	25	10
120	38	18

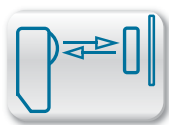
Technical drawing of the LED module showing front and side views with dimensions:

- Front View (Left):**
 - Overall width: 12
 - Overall height: 27
 - LED chip height: 4.8
 - Base width: 10.4
- Side View (Right):**
 - Overall width: 14
 - LED chip height: 3.2
 - Base width: 2.9
 - Distance between LED chips: 12.2
 - Distance from LED chip to potentiometer: 3
 - Distance from LED chip to potentiometer (center): 12.2
 - Distance from LED chip to potentiometer (bottom): 2.9
 - Distance from LED chip to potentiometer (top): 15
 - Distance from LED chip to potentiometer (bottom): 2.9
 - Distance from LED chip to potentiometer (top): 15

The technical drawing shows two views of the LED module:

- Top View (Left):** A rectangular component with overall dimensions of 12 mm width by 27 mm height. It features a central square area with a width of 10.4 mm and a depth of 4.8 mm.
- Side View (Right):** Shows the profile of the module. The total height is 15 mm. Key features include:
 - A top section labeled "LED" with a width of 14 mm.
 - A mounting hole with a diameter of 3.2 mm, located 3 mm from the left edge and 12.2 mm from the right edge.
 - A bottom section labeled "Pot" with a width of 2.9 mm.
 - A distance of 2.9 mm between the mounting hole and the bottom section.
 - A dimension "L" indicating the length of the main body.
 - A dimension "ca. 34" indicating the distance from the bottom of the module to the center of the mounting hole.
 - A screw specification of "M8 x 1" at the base.

103



Tw = 20 ... 120 mm

- compact housing
- small beam diameter
- sensing distance adjustable via potentiometer

general data

type	background suppression
version	point source LED
light source	pulsed point source LED
sensing distance Tw	25 ... 120 mm
sensing range Tb (at Tw max.)	5 ... 120 mm
sensing range Tb (at Tw min.)	5 ... 25 mm
alignment / soiled lens indicator	flashing light indicator
light indicator	LED yellow
sensing distance adjustment	mechanical, 5 turn
distance to focus	35 ... 45 mm
wave length	660 nm
beam diameter	2 mm at focus
suppression of reciprocal influence	yes

electrical data

response time / release time	< 1 ms
voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	30 mA
current consumption typ.	20 mA
voltage drop Vd	< 1,8 VDC
output function	light / dark operate
output current	< 100 mA
short circuit protection	yes
reverse polarity protection	yes

mechanical data

width / diameter	10,4 mm
height / length	27 mm
depth	14 mm
type	rectangular
housing material	plastic (ASA)
front (optics)	PMMA

ambient conditions

operating temperature	-25 ... +65 °C
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connection diagrams



connectors

ESG 32AH0200	4 pin	2 m straight
ESW 31AH0200	4 pin	2 m angular

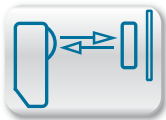
additional cable connectors and field wireable connectors, see accessories

accessories

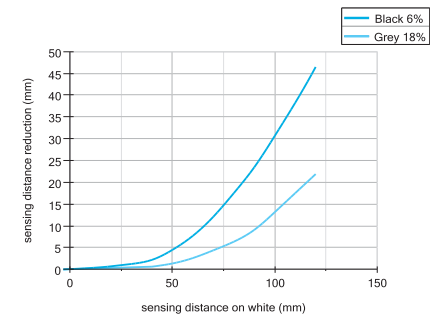
SENSOFIX mounting kit	10150326
mounting bracket (cable type)	10114501
mounting bracket (connector type)	10133792

for details, see accessories section

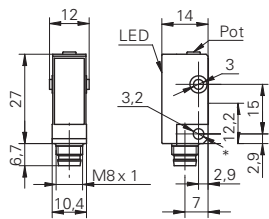
order reference	connection types	output circuit	protection class
FHDK 10N5110	cable 4 pin, 2 m	NPN	IP 65
FHDK 10N5110/S35A	connector M8 4 pin	NPN	IP 67
FHDK 10P5110	cable 4 pin, 2 m	PNP	IP 65
FHDK 10P5110/S35A	connector M8 4 pin	PNP	IP 67



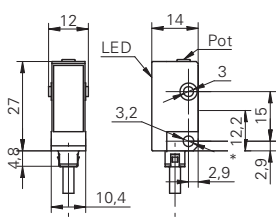
sensing distance diagram



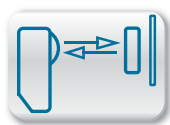
dimension drawings



* emitter axis



* emitter axis cable length L = 200 mm



Tw = 20 ... 80 mm

- compact housing
- with line beam
- sensing distance adjustable via potentiometer

general data

type	background suppression
version	line beam
light source	pulsed red LED
sensing distance Tw	20 ... 80 mm
sensing range Tb (at Tw max.)	5 ... 80 mm
sensing range Tb (at Tw min.)	5 ... 20 mm
alignment / soiled lens indicator	flashing light indicator
light indicator	LED yellow
sensing distance adjustment	mechanical, 5 turn
wave length	660 nm
suppression of reciprocal influence	yes

electrical data

response time / release time	< 1 ms
voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	30 mA
current consumption typ.	20 mA
voltage drop Vd	< 1,8 VDC
output function	light / dark operate
output current	< 100 mA
short circuit protection	yes
reverse polarity protection	yes

mechanical data

width / diameter	10,4 mm
height / length	27 mm
depth	14 mm
type	rectangular
housing material	plastic (ASA)
front (optics)	PMMA

ambient conditions

operating temperature	-25 ... +65 °C
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**connection diagrams****connectors**

ESG 32AH0200	4 pin	2 m straight
ESW 31AH0200	4 pin	2 m angular

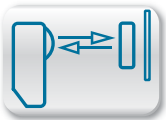
additional cable connectors and field wireable connectors, see accessories

accessories

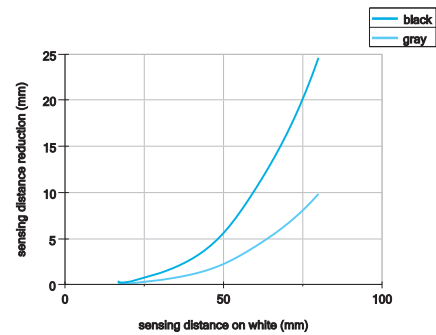
SENSOFIX mounting kit	10150326
mounting bracket (cable type)	10114501
mounting bracket (connector type)	10133792

for details, see accessories section

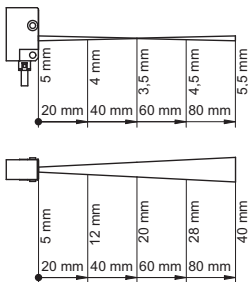
order reference	connection types	output circuit	protection class
FHDK 10N5150	cable 4 pin, 2 m	NPN	IP 65
FHDK 10N5150/S35A	connector M8 4 pin	NPN	IP 67
FHDK 10P5150	cable 4 pin, 2 m	PNP	IP 65
FHDK 10P5150/S35A	connector M8 4 pin	PNP	IP 67



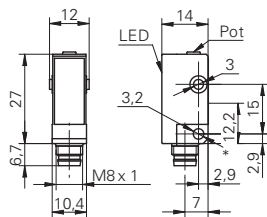
sensing distance diagram



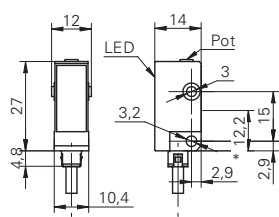
beam characteristic (typically)



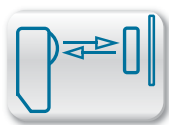
dimension drawings



* emitter axis



* emitter axis



$T_w = 10 \dots 30 \text{ mm}$

- compact housing
- optimized for glass detection
- sensing distance adjustable via potentiometer

general data

type	background suppression
version	for glass detection
light source	pulsed red LED
sensing distance T_w	10 ... 30 mm
sensing range T_b (at T_w max.)	3 ... 30 mm
alignment / soiled lens indicator	flashing light indicator
light indicator	LED yellow
sensing distance adjustment	mechanical, 5 turn
wave length	660 nm
suppression of reciprocal influence	yes

electrical data

response time / release time	< 1 ms
voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	30 mA
current consumption typ.	20 mA
voltage drop V_d	< 1,8 VDC
output function	light / dark operate
output current	< 100 mA
short circuit protection	yes
reverse polarity protection	yes

mechanical data

width / diameter	10,4 mm
height / length	27 mm
depth	14 mm
type	rectangular
housing material	plastic (ASA)
front (optics)	PMMA
connection types	connector M8 4 pin

ambient conditions

operating temperature	-25 ... +65 °C
protection class	IP 67

order reference

FHDK 10N5160/S35A

output circuit

NPN

FHDK 10P5160/S35A

PNP



connection diagrams



connectors

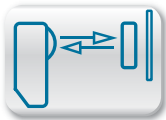
ESG 32AH0200	4 pin	2 m straight
ESW 31AH0200	4 pin	2 m angular

additional cable connectors and field wireable connectors, see accessories

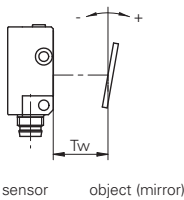
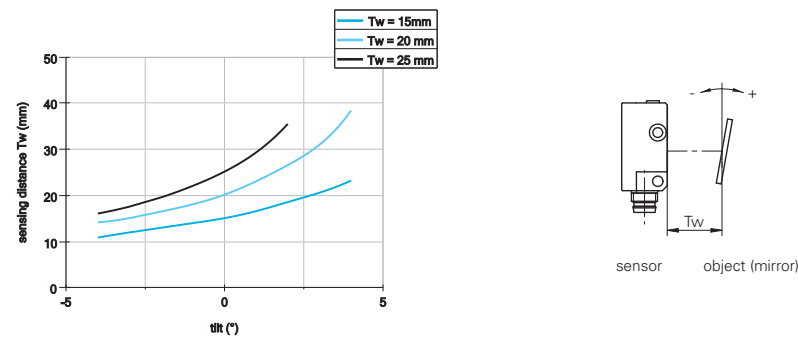
accessories

SENSOFIX mounting kit	10150326
mounting bracket	10133792

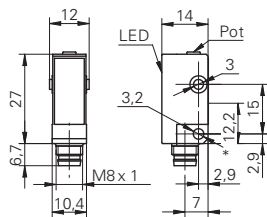
for details, see accessories section



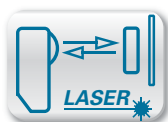
sensing distance diagrams



dimension drawing



* emitter axis



Tw = 22 ... 130 mm

- compact housing
- high repeatability
- sensing distance adjustable via potentiometer

general data

type	background suppression
light source	pulsed red laser diode
sensing distance Tw	22 ... 130 mm
sensing range Tb (at Tw max.)	3 ... 130 mm
sensing range Tb (at Tw min.)	3 ... 22 mm
repeat accuracy	< 0,2 mm at laser focus
power on indication	LED green
light indicator	LED yellow
sensing distance adjustment	mechanical, 5 turn
laser class	2
distance to focus	40 mm
wave length	650 nm
suppression of reciprocal influence	yes

electrical data

response time / release time	< 0,25 ms
voltage supply range +Vs	11 ... 30 VDC
current consumption max. (no load)	30 mA
current consumption typ.	25 mA
voltage drop Vd	< 1,8 VDC
output function	light / dark operate
short circuit protection	yes
reverse polarity protection	yes, supply only

mechanical data

width / diameter	10,4 mm
height / length	27 mm
depth	16,3 mm
type	rectangular
housing material	plastic (ASA)
front (optics)	PMMA

ambient conditions

operating temperature	-10 ... +50 °C
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**connection diagrams****connectors**

ESG 32AH0200	4 pin	2 m straight
ESW 31AH0200	4 pin	2 m angular

additional cable connectors and field wireable connectors, see accessories

accessories

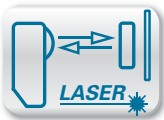
SENSOFIX mounting kit	10150326
mounting bracket (cable type)	10114501
mounting bracket (connector type)	10133792

for details, see accessories section

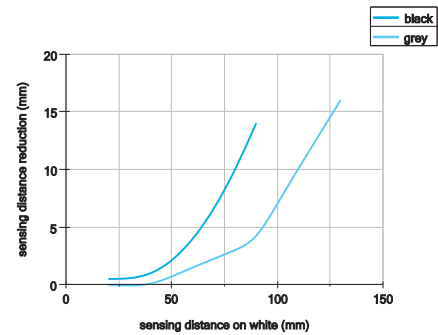
laser warning

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated June 24, 2007

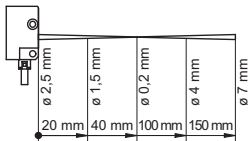
order reference	connection types	output circuit	protection class	output current
OHDK 10N5101	cable 4 pin, 2 m	NPN	IP 65	< 70 mA
OHDK 10N5101/S35A	connector M8 4 pin	NPN	IP 67	< 70 mA
OHDK 10P5101	cable 4 pin, 2 m	PNP	IP 65	< 100 mA
OHDK 10P5101/S35A	connector M8 4 pin	PNP	IP 67	< 100 mA



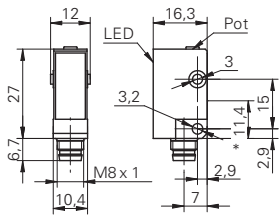
sensing distance diagram



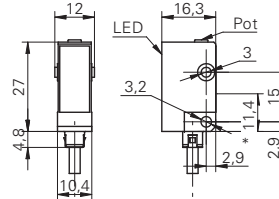
beam characteristic (typically)



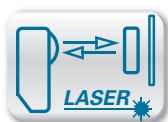
dimension drawings



* emitter axis



* emitter axis



Tw = 22 ... 130 mm

- compact housing
- line beam
- sensing distance adjustable via potentiometer

general data

type	background suppression
version	line beam
light source	pulsed red laser diode
sensing distance Tw	22 ... 130 mm
sensing range Tb (at Tw max.)	3 ... 130 mm
sensing range Tb (at Tw min.)	3 ... 22 mm
repeat accuracy	< 0,2 mm at laser focus
power on indication	LED green
light indicator	LED yellow
sensing distance adjustment	mechanical, 5 turn
laser class	1
distance to focus	40 mm
wave length	650 nm
suppression of reciprocal influence	yes

electrical data

response time / release time	< 0,25 ms
voltage supply range +Vs	11 ... 30 VDC
current consumption max. (no load)	30 mA
current consumption typ.	25 mA
voltage drop Vd	< 1,8 VDC
output function	light / dark operate
short circuit protection	yes
reverse polarity protection	yes, supply only

mechanical data

width / diameter	10,4 mm
height / length	27 mm
depth	16,3 mm
type	rectangular
housing material	plastic (ASA)
front (optics)	PMMA
connection types	connector M8 4 pin

ambient conditions

operating temperature	-10 ... +50 °C
protection class	IP 67

order reference	output circuit	output current
OHDK 10N5150/S35A	NPN	< 70 mA
OHDK 10P5150/S35A	PNP	< 100 mA

**connection diagrams****connectors**

ESG 32AH0200	4 pin	2 m straight
ESW 31AH0200	4 pin	2 m angular

additional cable connectors and field wireable connectors, see accessories

accessories

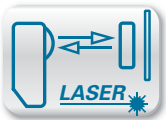
SENSOFIX mounting kit	10150326
mounting bracket (cable type)	10114501
mounting bracket (connector type)	10133792

for details, see accessories section

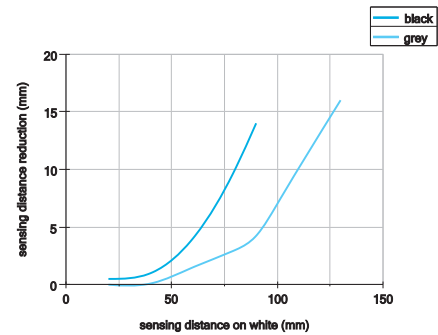
laser warning

**CLASS 1 LASER
PRODUCT**

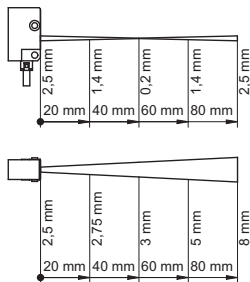
Complies with 21 CFR 1040.10 and 1040.11
except for deviations pursuant to laser
notice No. 50, dated June 24, 2007



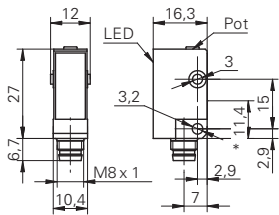
sensing distance diagram



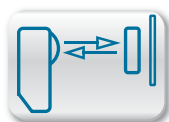
beam characteristic (typically)



dimension drawing



* emitter axis



Tw = 15 ... 300 mm

- rugged miniature metal housing
- sensing distance adjustable via potentiometer
- suppression of mutual optical interference

general data

type	background suppression
light source	pulsed red LED
sensing distance Tw	15 ... 300 mm
sensing range Tb (at Tw max.)	15 ... 300 mm
sensing range Tb (at Tw min.)	5 ... 15 mm
light indicator	LED yellow
sensing distance adjustment	mechanical, 5 turn
wave length	660 nm
suppression of reciprocal influence	yes

electrical data

response time / release time	< 1 ms
voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	35 mA
current consumption typ.	25 mA
voltage drop Vd	< 1,8 VDC
output function	light / dark operate
output current	< 100 mA
short circuit protection	yes
reverse polarity protection	yes

mechanical data

width / diameter	12,4 mm
height / length	35 mm
depth	35 mm
type	rectangular
housing material	die-cast zinc
front (optics)	PMMA

ambient conditions

operating temperature	-25 ... +65 °C
protection class	IP 67

order reference	connection types	output circuit
FHDM 12N5001	cable 4 pin, 2 m	NPN
FHDM 12N5001/S35A	connector M8 4 pin	NPN
FHDM 12P5001	cable 4 pin, 2 m	PNP
FHDM 12P5001/S35A	connector M8 4 pin	PNP

connection diagrams



connectors

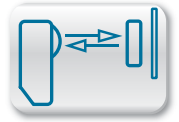
ESG 32AH0200	4 pin	2 m straight
ESW 31AH0200	4 pin	2 m angular

additional cable connectors and field wireable connectors, see accessories

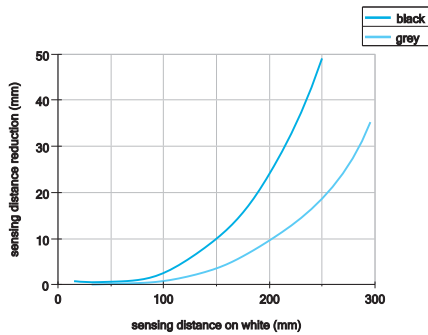
accessories

SENSOFIX mounting kit	10150328
mounting bracket	10113873

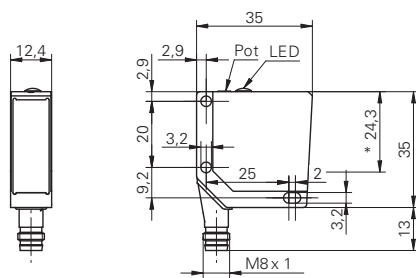
for details, see accessories section



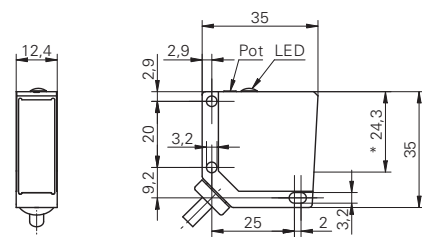
sensing distance diagram



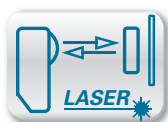
dimension drawings



* emitter axis



* emitter axis



Tw = 17 ... 120 mm

- rugged miniature metal housing
- negligible black/white difference
- teachable sensing distance

general data

type	background suppression
light source	pulsed red laser diode
sensing distance Tw	17 ... 120 mm
sensing range Tb (at Tw max.)	16 ... 120 mm
sensing range Tb (at Tw min.)	16 ... 17 mm
power on indication	LED green
light indicator	LED red
sensing distance adjustment	Teach-in
laser class	2
wave length	675 nm
beam diameter	0,9 ... 0,5 mm

electrical data

response time	< 1 ms
release time	< 2,7 ms
voltage supply range +Vs	12 ... 28 VDC
current consumption max. (no load)	80 mA
current consumption typ.	40 mA
voltage drop Vd	< 2,8 VDC
output function	light / dark operate
output current	< 100 mA
short circuit protection	yes
reverse polarity protection	yes, Vs to GND

mechanical data

width / diameter	12,4 mm
height / length	37 mm
depth	34,5 mm
type	rectangular
housing material	die-cast zinc
front (optics)	glass
connection types	connector M8 4 pin

ambient conditions

operating temperature	0 ... +50 °C
protection class	IP 67

order reference**output circuit**

OHDM 12N6901/S35A	NPN
OHDM 12P6901/S35A	PNP

**connection diagrams****connectors**

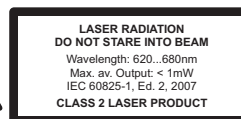
ESG 32AH0200	4 pin	2 m straight
ESW 31AH0200	4 pin	2 m angular

additional cable connectors and field wireable connectors, see accessories

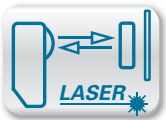
accessories

SENSOFIX mounting kit	10150328
mounting bracket	10113873

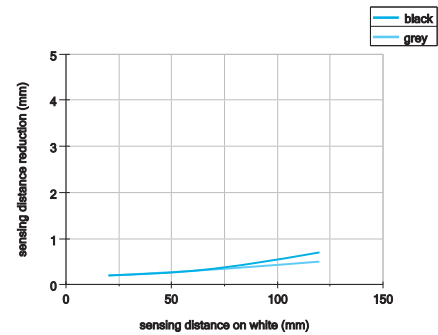
for details, see accessories section

laser warning

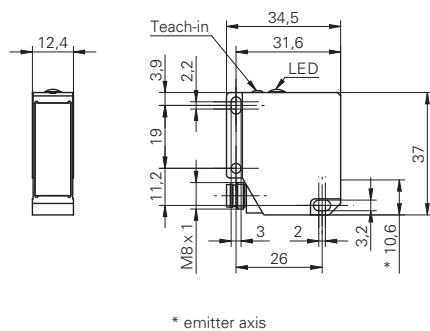
Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated June 24, 2007

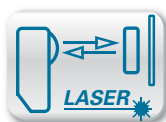


sensing distance diagram



dimension drawing





Tw = 50 ... 550 mm

- rugged metal housing
- negligible black/white difference
- teachable sensing distance

**general data**

type	background suppression
light source	pulsed red laser diode
sensing distance Tw	50 ... 550 mm
sensing range Tb (at Tw max.)	50 ... 550 mm
sensing range Tb (at Tw min.)	16 ... 17 mm
power on indication	LED green
light indicator	LED red
sensing distance adjustment	Teach-in
laser class	2

electrical data

response time	< 5 ms
release time	< 15 ms
voltage supply range +Vs	12 ... 28 VDC
current consumption max. (no load)	80 mA
current consumption typ.	40 mA
voltage drop Vd	< 2,8 VDC
output function	light / dark operate
output current	< 100 mA
short circuit protection	yes
reverse polarity protection	yes, Vs to GND

mechanical data

width / diameter	13,4 mm
height / length	48,2 mm
depth	40 mm
type	rectangular
housing material	aluminum
front (optics)	glass
connection types	connector M8 4 pin

ambient conditions

operating temperature	0 ... +50 °C
protection class	IP 67

connection diagrams**connectors**

ESG 32AH0200	4 pin	2 m straight
ESW 31AH0200	4 pin	2 m angular

additional cable connectors and field wireable connectors, see accessories

accessories

SENSOFIX mounting kit	10161829
mounting bracket	10161695

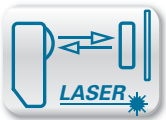
for details, see accessories section

laser warning

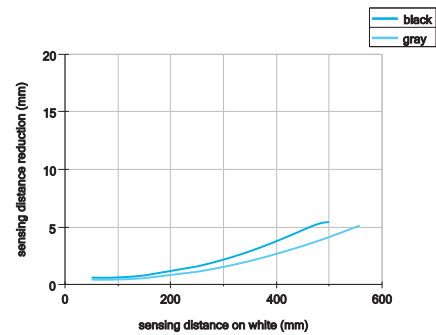
LASER RADIATION
DO NOT STARE INTO BEAM
 Wavelength: 620...680nm
 Max. av. Output: < 1mW
 IEC 60825-1, Ed. 2, 2007
CLASS 2 LASER PRODUCT

Complies with 21 CFR 1040.10 and 1040.11 except for deviations
 pursuant to laser notice No. 50, dated June 24, 2007

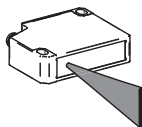
order reference	output circuit	wave length	beam type	beam width	beam height	beam diameter
OHDM 13N6901/S35A	NPN	675 nm	point	-	-	1 mm
OHDM 13N6951/S35A	NPN	650 nm	line	2 mm	4 ... 13 mm	-
OHDM 13P6901/S35A	PNP	675 nm	point	-	-	1 mm
OHDM 13P6951/S35A	PNP	650 nm	line	2 mm	4 ... 13 mm	-



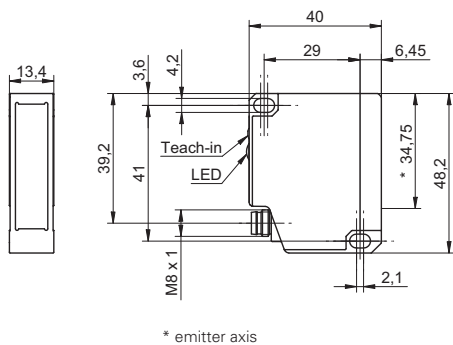
sensing distance diagram

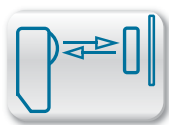


beam characteristic (typically)



dimension drawing





Tw = 20 ... 500 mm

- long range
- sensing distance adjustable via potentiometer
- suppression of mutual optical interference

general data

type	background suppression
light source	pulsed red LED
alignment / soiled lens indicator	flashing light indicator
light indicator	LED yellow
sensing distance adjustment	mechanical, 10 turn
wave length	660 nm
suppression of reciprocal influence	yes

sensing distance Tw = 20 ... 350 mm

sensing range Tb (at Tw max.)	20 ... 350 mm
sensing range Tb (at Tw min.)	5 ... 20 mm

sensing distance Tw = 30 ... 500 mm

sensing range Tb (at Tw max.)	30 ... 500 mm
sensing range Tb (at Tw min.)	5 ... 30 mm

electrical data

voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	30 mA
current consumption typ.	25 mA
voltage drop Vd	< 1,8 VDC
output function	light / dark operate
output current	< 100 mA
short circuit protection	yes
reverse polarity protection	yes

mechanical data

width / diameter	14,8 mm
height / length	43 mm
depth	31 mm
type	rectangular
housing material	plastic (ASA, MABS)
front (optics)	PMMA

ambient conditions

operating temperature	-25 ... +65 °C
protection class	IP 67



connection diagrams



connectors

ESG 32AH0200	4 pin	2 m straight
ESW 31AH0200	4 pin	2 m angular

additional cable connectors and field wireable connectors, see accessories

accessories

SENSOFIX mounting kit	10149011
mounting bracket	10134964

for details, see accessories section

order reference	sensing distance Tw	connection types	output circuit	response time / release time
FHDK 14N5101	20 ... 350 mm	cable 4 pin, 2 m	NPN	< 1 ms
FHDK 14N5101/S14	20 ... 350 mm	connector M12 4 pin	NPN	< 1 ms
FHDK 14N5101/S35A	20 ... 350 mm	connector M8 4 pin	NPN	< 1 ms
FHDK 14N5104	30 ... 500 mm	cable 4 pin, 2 m	NPN	< 5 ms
FHDK 14N5104/S14	30 ... 500 mm	connector M12 4 pin	NPN	< 5 ms
FHDK 14N5104/S35A	30 ... 500 mm	connector M8 4 pin	NPN	< 5 ms
FHDK 14P5101	20 ... 350 mm	cable 4 pin, 2 m	PNP	< 1 ms
FHDK 14P5101/S14	20 ... 350 mm	connector M12 4 pin	PNP	< 1 ms
FHDK 14P5101/S35A	20 ... 350 mm	connector M8 4 pin	PNP	< 1 ms
FHDK 14P5104	30 ... 500 mm	cable 4 pin, 2 m	PNP	< 5 ms
FHDK 14P5104/S14	30 ... 500 mm	connector M12 4 pin	PNP	< 5 ms
FHDK 14P5104/S35A	30 ... 500 mm	connector M8 4 pin	PNP	< 5 ms

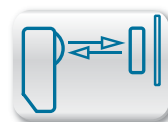
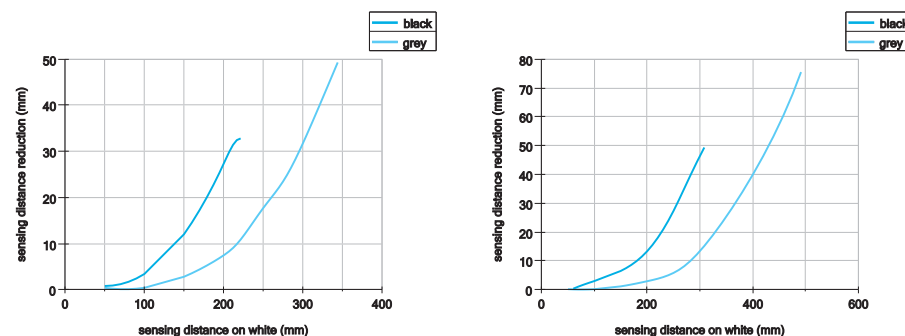
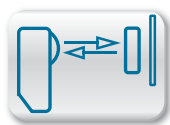


Figure 10 consists of two line graphs showing the sensing distance reduction (mm) on the y-axis versus the sensing distance on white (mm) on the x-axis. The left graph has an x-axis from 0 to 400 and a y-axis from 0 to 50. The right graph has an x-axis from 0 to 600 and a y-axis from 0 to 80. Both graphs compare 'black' (red line) and 'grey' (blue line) targets. In both cases, the black target shows a steeper increase in sensing distance reduction compared to the grey target.

Sensing distance on white (mm)	Left Graph (Reduction in mm)		Right Graph (Reduction in mm)	
	Black	Grey	Black	Grey
0	0	0	0	0
100	2	0	5	0
200	15	5	20	5
300	35	25	50	35
400	-	45	-	75





Tw = 40 ... 200 mm

- short response time
- sensing distance adjustable via Teach-in
- suppression of mutual optical interference

general data

type	background suppression
light source	pulsed red LED
sensing distance Tw	40 ... 200 mm
sensing range Tb (at Tw max.)	20 ... 200 mm
sensing range Tb (at Tw min.)	12 ... 40 mm
alignment / soiled lens indicator	flashing light indicator
light indicator	LED green
output indicator	LED yellow
sensing distance adjustment	Teach-in
wave length	660 nm
suppression of reciprocal influence	yes

electrical data

response time / release time	< 0,5 ms
voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	40 mA
current consumption typ.	35 mA
voltage drop Vd	< 1,8 VDC
output function	light / dark operate
output current	< 100 mA
short circuit protection	yes
reverse polarity protection	yes

mechanical data

width / diameter	14,8 mm
height / length	43 mm
depth	31 mm
type	rectangular
housing material	plastic (ASA, MABS)
front (optics)	PMMA

ambient conditions

operating temperature	-25 ... +65 °C
protection class	IP 67



connection diagrams



connectors

ESG 32AH0200	4 pin	2 m straight
ESW 31AH0200	4 pin	2 m angular

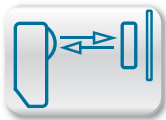
additional cable connectors and field wireable connectors, see accessories

accessories

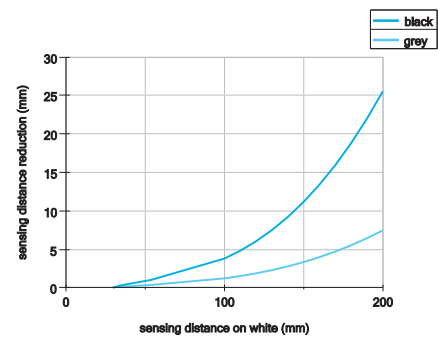
SENSOFIX mounting kit	10149011
mounting bracket	10134964

for details, see accessories section

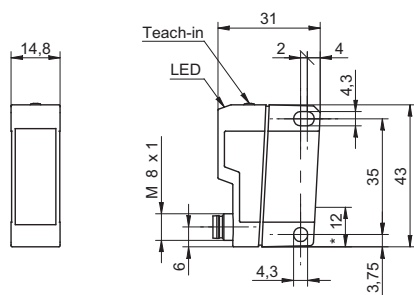
order reference	connection types	output circuit
FHDK 14N6901	cable 4 pin, 2 m	NPN
FHDK 14N6901/S14	connector M12 4 pin	NPN
FHDK 14N6901/S35A	connector M8 4 pin	NPN
FHDK 14P6901	cable 4 pin, 2 m	PNP
FHDK 14P6901/S14	connector M12 4 pin	PNP
FHDK 14P6901/S35A	connector M8 4 pin	PNP



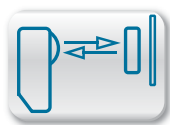
sensing distance diagram



dimension drawing



* emitter axis



Tw = 50 ... 400 mm



- hygiene design
- IO-Link
- remote Teach-in

general data

type	background suppression
special type	Hygiene design
light source	pulsed red LED
sensing distance Tw	50 ... 400 mm
sensing range Tb (at Tw max.)	20 ... 400 mm
sensing range Tb (at Tw min.)	20 ... 50 mm
power on indication	LED green
output indicator	LED red
wave length	660 nm
approvals/certificates	Ecolab EHEDG

electrical data

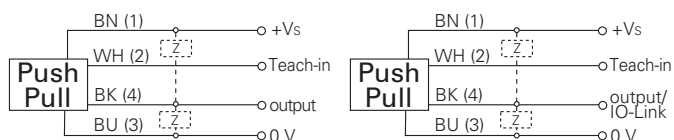
response time / release time	< 1,8 ms
voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	40 mA
current consumption typ.	35 mA
voltage drop Vd	< 2 VDC
output function	light / dark operate
output circuit	push-pull
output current	< 100 mA
short circuit protection	yes
reverse polarity protection	yes

mechanical data

width / diameter	19,6 mm
height / length	52,2 mm
depth	34,3 mm
type	rectangular
housing material	stainless steel 1.4404 (V4A); LSR
front (optics)	PMMA

ambient conditions

operating temperature	-30 ... +60 °C
protection class	IP 68/69K & proTect+
storage temperature	-30 ... +70 °C

**connection diagrams****connectors**

ESG 34AF0200	4 pin	2 m straight
ESW 33AF0200	4 pin	2 m angular

additional cable connectors and field wireable connectors, see accessories

accessories

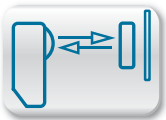
mounting	ø 17 mm	HI17-1H
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for details, see accessories section

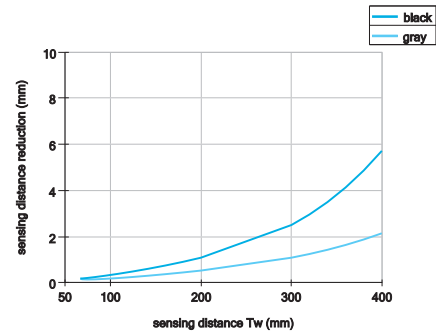
remarks

Sensor FDA compliant, EHEDG certified and Ecolab approved
 IO-Link: output signal, service status, object presence
 sensitivity adjustable: via Teach-in wire input
 LSR = Liquid Silicon Rubber

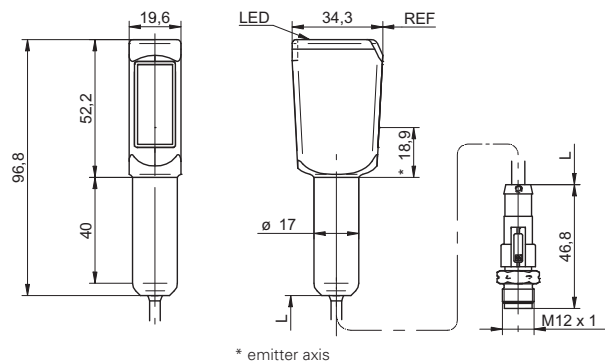
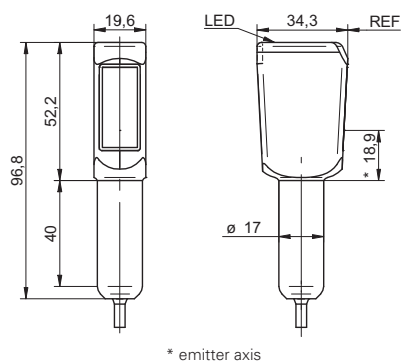
order reference	connection types	sensing distance adjustment
FHDH 14G6901	cable 4 pin, 2 m	Teach-in
FHDH 14G6901/IO	cable 4 pin, 2 m	Teach-in and IO-Link
FHDH 14G6901/KS34A	flylead connector M12, L=300 mm	Teach-in
FHDH 14G6901/KS34A/IO	flylead connector M12, L=300 mm	Teach-in and IO-Link

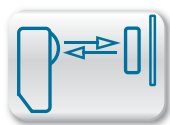


sensing distance diagram



dimension drawings





Tw = 50 ... 400 mm



- washdown design
- IO-Link
- Remote Teach-in

general data

type	background suppression
special type	Washdown design
light source	pulsed red LED
sensing distance Tw	50 ... 400 mm
sensing range Tb (at Tw max.)	20 ... 400 mm
sensing range Tb (at Tw min.)	20 ... 50 mm
power on indication	LED green
output indicator	LED red
wave length	660 nm
approvals/certificates	Ecolab

electrical data

response time / release time	< 1,8 ms
voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	40 mA
current consumption typ.	35 mA
voltage drop Vd	< 2 VDC
output function	light / dark operate
output circuit	push-pull
output current	< 100 mA
short circuit protection	yes
reverse polarity protection	yes

mechanical data

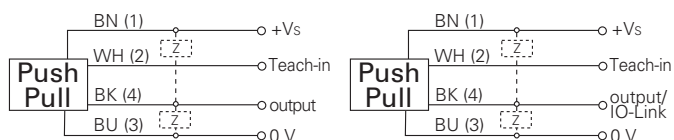
width / diameter	19,6 mm
height / length	51 mm
depth	34,3 mm
type	rectangular
housing material	stainless steel 1.4404 (V4A); LSR
front (optics)	PMMA
connection types	connector M12

ambient conditions

operating temperature	-30 ... +60 °C
protection class	IP 68/69K & proTect+
storage temperature	-30 ... +70 °C

order reference**sensing distance adjustment**

FHDR 14G6901/S14	Teach-in
FHDR 14G6901/S14/IO	Teach-in and IO-Link

**connection diagrams****connectors**

ESG 34AF0200	4 pin	2 m straight
ESW 33AF0200	4 pin	2 m angular

additional cable connectors and field wireable connectors, see accessories

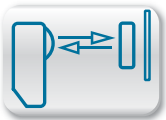
accessories

SENSOFIX mounting kit	11046279
mounting bracket	11046278

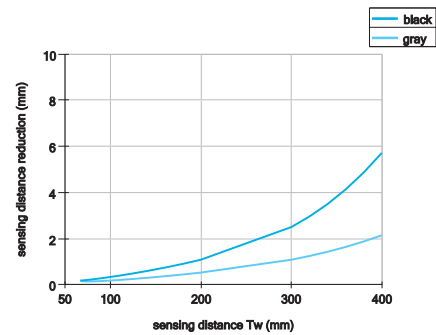
for details, see accessories section

remarks

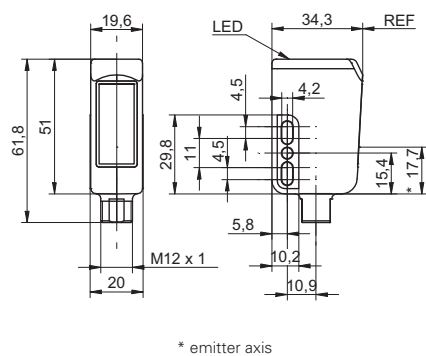
Sensor FDA compliant and Ecolab approved
 IO-Link: output signal, service status, object presence
 sensitivity adjustable: via Teach-in wire input
 LSR = Liquid Silicon Rubber

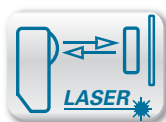


sensing distance diagram



dimension drawing





Tw = 20 ... 350 mm

- short response time
- high repeatability
- sensing distance adjustable via potentiometer

general data

type	background suppression
light source	pulsed red laser diode
sensing distance Tw	20 ... 350 mm
sensing range Tb (at Tw max.)	20 ... 350 mm
sensing range Tb (at Tw min.)	5 ... 20 mm
repeat accuracy	< 0,2 mm at laser focus
power on indication	LED green
light indicator	LED yellow
sensing distance adjustment	mechanical, 9 turn
laser class	2
distance to focus	115 mm
wave length	650 nm

electrical data

response time / release time	< 0,5 ms
voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	35 mA
current consumption typ.	25 mA
voltage drop Vd	< 2,2 VDC
output function	light / dark operate
output current	< 100 mA
short circuit protection	yes
reverse polarity protection	yes

mechanical data

width / diameter	14,8 mm
height / length	43 mm
depth	31 mm
type	rectangular
housing material	plastic (ASA, MABS)
front (optics)	PMMA

ambient conditions

operating temperature	-10 ... +50 °C
protection class	IP 67

**connection diagrams****connectors**

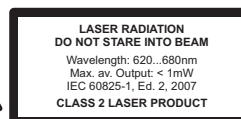
ESG 32AH0200	4 pin	2 m straight
ESW 31AH0200	4 pin	2 m angular

additional cable connectors and field wireable connectors, see accessories

accessories

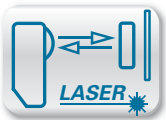
SENSOFIX mounting kit	10149011
mounting bracket	10134964

for details, see accessories section

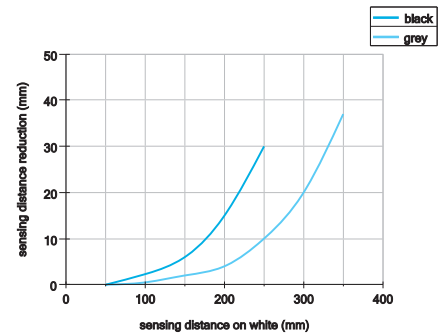
laser warning

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated June 24, 2007

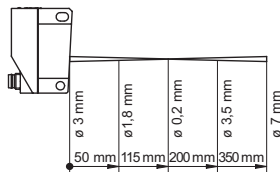
order reference	connection types	output circuit
OHDK 14N5101	cable 4 pin, 2 m	NPN
OHDK 14N5101/S14	connector M12 4 pin	NPN
OHDK 14N5101/S35A	connector M8 4 pin	NPN
OHDK 14P5101	cable 4 pin, 2 m	PNP
OHDK 14P5101/S14	connector M12 4 pin	PNP
OHDK 14P5101/S35A	connector M8 4 pin	PNP



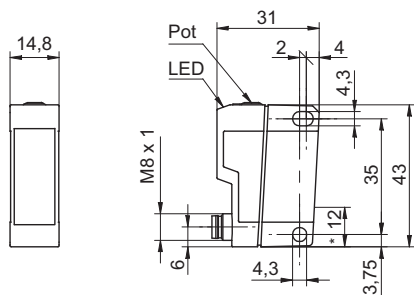
sensing distance diagram



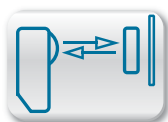
beam characteristic (typically)



dimension drawing



* emitter axis



Tw = 20 ... 600 mm

- rugged metal housing
- sensing distance adjustable via potentiometer
- suppression of mutual optical interference



general data

type	background suppression
light source	pulsed red LED
sensing range Tb (at Tw min.)	5 ... 20 mm
light indicator	LED yellow
sensing distance adjustment	mechanical, 5 turn
wave length	660 nm
suppression of reciprocal influence	yes

sensing distance Tw = 20 ... 450 mm

sensing range Tb (at Tw max.)	20 ... 450 mm
-------------------------------	---------------

sensing distance Tw = 20 ... 600 mm

sensing range Tb (at Tw max.)	20 ... 600 mm
-------------------------------	---------------

electrical data

voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	41 mA
current consumption typ.	29 mA
voltage drop Vd	< 1,8 VDC
output function	light / dark operate
output current	< 200 mA
short circuit protection	yes
reverse polarity protection	yes

mechanical data

width / diameter	15,4 mm
height / length	50 mm
depth	50 mm
type	rectangular
housing material	die-cast zinc
front (optics)	PMMA

ambient conditions

operating temperature	-25 ... +65 °C
protection class	IP 67

connection diagrams



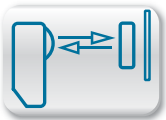
connectors

ESG 34AH0200	4 pin	2 m straight
ESW 33AH0200	4 pin	2 m angular
additional cable connectors and field wireable connectors, see accessories		

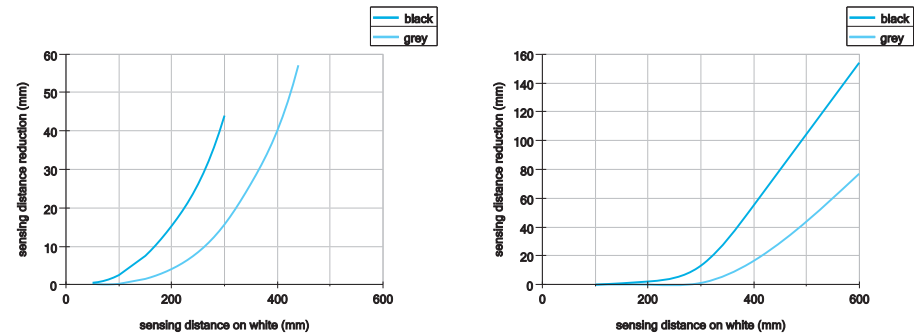
accessories

SENSOFIX mounting kit	10151721
mounting bracket	10113917
for details, see accessories section	

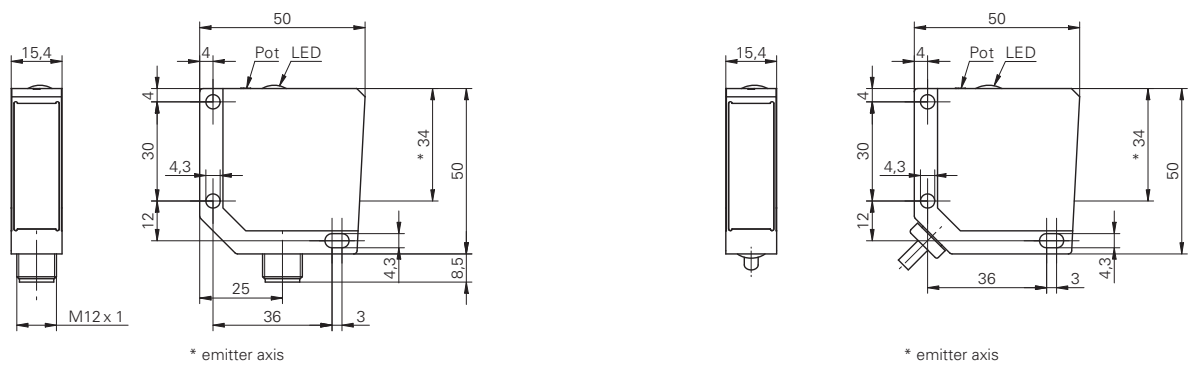
order reference	sensing distance Tw	connection types	output circuit	response time / release time
FHDM 16N5001	20 ... 450 mm	cable 4 pin, 2 m	NPN	< 1 ms
FHDM 16N5001/S14	20 ... 450 mm	connector M12 4 pin	NPN	< 1 ms
FHDM 16N5004	20 ... 600 mm	cable 4 pin, 2 m	NPN	< 5 ms
FHDM 16N5004/S14	20 ... 600 mm	connector M12 4 pin	NPN	< 5 ms
FHDM 16P5001	20 ... 450 mm	cable 4 pin, 2 m	PNP	< 1 ms
FHDM 16P5001/S14	20 ... 450 mm	connector M12 4 pin	PNP	< 1 ms
FHDM 16P5004	20 ... 600 mm	cable 4 pin, 2 m	PNP	< 5 ms
FHDM 16P5004/S14	20 ... 600 mm	connector M12 4 pin	PNP	< 5 ms

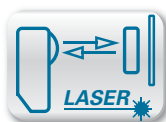


sensing distance diagrams



dimension drawings





Tw = 25 ... 300 mm

- rugged metal housing
- long range
- high repeatability

general data

type	background suppression
light source	pulsed red laser diode
sensing distance Tw	25 ... 300 mm
sensing range Tb (at Tw max.)	40 ... 300 mm
sensing range Tb (at Tw min.)	5 ... 25 mm
repeat accuracy	< 0,1 mm at laser focus
output indicator	LED yellow
sensing distance adjustment	mechanical, 8 turn
laser class	2
wave length	650 nm

electrical data

voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	35 mA
current consumption typ.	25 mA
voltage drop Vd	< 2 VDC
output function	light / dark operate
output current	< 200 mA
short circuit protection	yes
reverse polarity protection	yes

mechanical data

width / diameter	15,4 mm
height / length	50 mm
depth	50 mm
type	rectangular
housing material	die-cast zinc
front (optics)	glass

ambient conditions

operating temperature	-10 ... +50 °C
protection class	IP 67

**connection diagrams****connectors**

ESG 34AH0200	4 pin	2 m straight
ESW 33AH0200	4 pin	2 m angular

additional cable connectors and field wireable connectors, see accessories

accessories

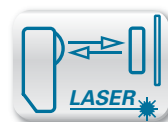
SENSOFIX mounting kit	10151721
mounting bracket	10113917
lens cleaning air nozzle bracket	10116407

for details, see accessories section

laser warning

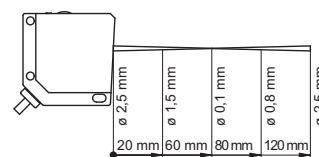
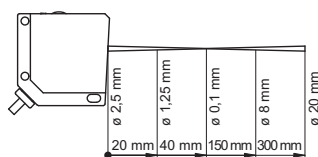
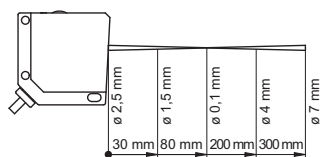
Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated June 24, 2007

order reference	connection types	output circuit	response time / release time	distance to focus	suppression of reciprocal influence
OHDM 16N5001	cable 4 pin, 2 m	NPN	< 0,6 ms	80 mm	yes
OHDM 16N5001/S14	connector M12 4 pin	NPN	< 0,6 ms	80 mm	yes
OHDM 16P5001	cable 4 pin, 2 m	PNP	< 0,6 ms	80 mm	yes
OHDM 16P5001/S14	connector M12 4 pin	PNP	< 0,6 ms	80 mm	yes
OHDM 16P5002/S14	connector M12 4 pin	PNP	< 0,6 ms	40 mm	yes
OHDM 16P5012	cable 4 pin, 2 m	PNP	< 0,1 ms	60 mm	-
OHDM 16P5012/S14	connector M12 4 pin	PNP	< 0,1 ms	60 mm	-



Sensing distance on white (mm)	Sensing distance reduction (mm) - black	Sensing distance reduction (mm) - grey
0	0	0
100	2	1
200	15	5
280	45	22

distance to laser focus = 60 mm



Technical drawing of the LED module showing front and side views with dimensions.

Front View Dimensions:

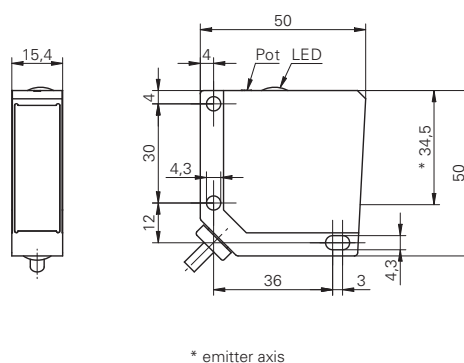
- Overall width: 50
- Overall height: 50
- Top width: 15,4
- Top thickness: 4
- Distance from top edge to first hole center: 30
- Distance between hole centers: 4,3
- Distance from bottom edge to hole center: 12
- Distance from left edge to hole center: 25
- Distance from hole center to right edge: 36
- Distance from hole center to bottom edge: 3
- Bottom thickness: 4,3
- Bottom width: 8,5
- Distance from bottom edge to LED chip: * 34,5

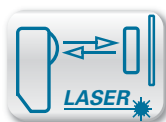
Side View Dimensions:

- Overall width: 15,4
- Overall height: 50
- Top thickness: 4
- Distance from top edge to first hole center: 30
- Distance between hole centers: 4,3
- Distance from bottom edge to hole center: 12
- Distance from left edge to hole center: 25
- Distance from hole center to right edge: 36
- Distance from hole center to bottom edge: 3
- Bottom thickness: 4,3
- Bottom width: 8,5
- Distance from bottom edge to LED chip: * 34,5

Labels:

- Pot
- LED
- M12 x 1
- * emitter axis





Tw = 133 mm

- for lateral detection of wafer edges
- very long range
- laser sensor in rugged metal housing

general data

type	background suppression
version	wafer mapping sensor
light source	pulsed red laser diode
sensing distance Tw	123 ... 143 mm
repeat accuracy	< 0,1 mm at laser focus
power on indication	LED green
output indicator	LED yellow
sensing distance adjustment	no
laser class	2
wave length	650 nm
suppression of reciprocal influence	yes

electrical data

response time / release time	< 5 ms
voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	35 mA
current consumption typ.	25 mA
voltage drop Vd	< 2 VDC
output function	light / dark operate
output current	< 200 mA
short circuit protection	yes
reverse polarity protection	yes

mechanical data

width / diameter	15,4 mm
height / length	50 mm
depth	50 mm
type	rectangular
housing material	die-cast zinc
front (optics)	glass
connection types	cable 5 pin, 2 m

ambient conditions

operating temperature	-5 ... +50 °C
protection class	IP 67

order reference**output circuit**

OHDM 16N5651	NPN
OHDM 16P5651	PNP

**connection diagrams****accessories**

SENSOFIX mounting kit	10151721
mounting bracket	10113917
lens cleaning air nozzle bracket	10116407

for details, see accessories section

remarks

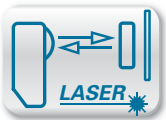
Function laser control - input:

- Laser diode on VL < 1 V

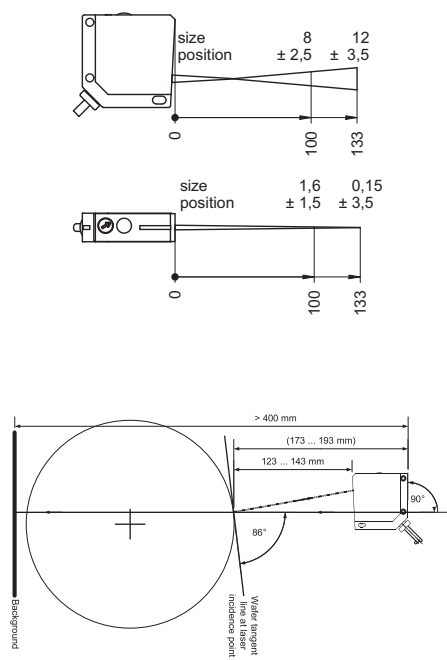
- Laser diode off VL > Vs - 4 V or open

laser warning

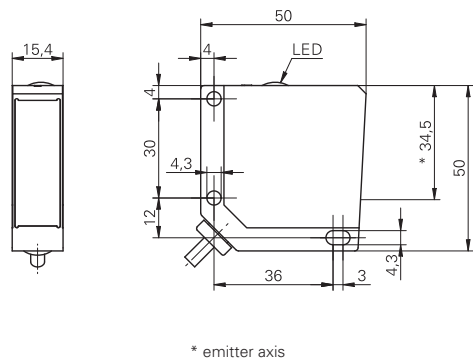
Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated June 24, 2007

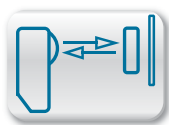


beam characteristics (typically)



dimension drawing





Tw = 30 ... 200 mm

- cross-technology housing concept
- sensing distance adjustable via Teach-in
- small mounting depth



general data

type	background suppression
light source	pulsed red LED
sensing distance Tw	30 ... 200 mm
sensing range Tb (at Tw max.)	2 ... 200 mm
sensing range Tb (at Tw min.)	12 ... 30 mm
alignment / soiled lens indicator	flashing light indicator
light indicator	LED green
output indicator	LED yellow
sensing distance adjustment	Teach-in
wave length	660 nm
suppression of reciprocal influence	yes

electrical data

response time / release time	< 0,5 ms
voltage supply range +Vs	12 ... 30 VDC
current consumption max. (no load)	48 mA
current consumption typ.	28 mA
voltage drop Vd	< 1,8 VDC
output function	light / dark operate
output current	< 100 mA
short circuit protection	yes
reverse polarity protection	yes

mechanical data

width / diameter	20 mm
height / length	42 mm
depth	15 mm
type	rectangular
housing material	plastic (PBT-ASA)
front (optics)	PMMA
connection types	connector M8 4 pin

ambient conditions

operating temperature	-25 ... +65 °C
protection class	IP 67

order reference

output circuit

FHDK 20N6901/S35A	NPN
FHDK 20P6901/S35A	PNP

connection diagrams



connectors

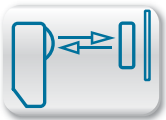
ESG 32AH0200	4 pin	2 m straight
ESW 31AH0200	4 pin	2 m angular

additional cable connectors and field wireable connectors, see accessories

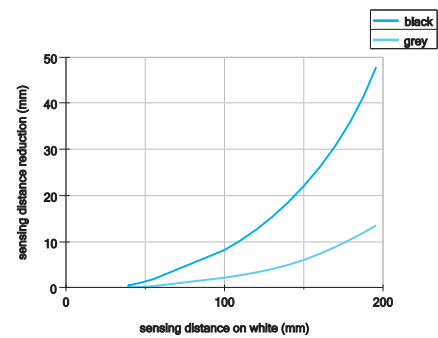
accessories

SENSOFIX mounting kit	10150326
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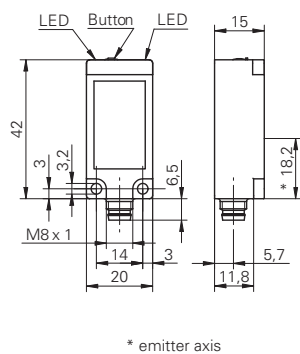
for details, see accessories section

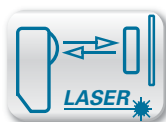


sensing distance diagram



dimension drawing





Tw = 210 ... 1500 mm

- long range
- negligible black/white difference
- two teachable sensing distances

general data

type	background suppression
light source	pulsed red laser diode
sensing distance Tw	210 ... 1500 mm
sensing range Tb (at Tw max.)	200 ... 1500 mm
sensing range Tb (at Tw min.)	200 ... 210 mm
power on indication	LED green
light indicator	LED red
sensing distance adjustment	Teach-in
laser class	2
wave length	650 nm
beam diameter	2 mm

electrical data

response time	< 6 ms
release time	< 18 ms
voltage supply range +Vs	12 ... 28 VDC
current consumption max. (no load)	100 mA
voltage drop Vd	< 5 VDC
output function	light / dark operate
output circuit	PNP
output current	< 20 mA
short circuit protection	yes
reverse polarity protection	yes, Vs to GND

mechanical data

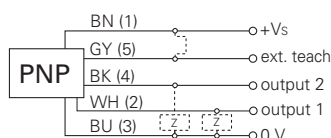
width / diameter	20,6 mm
height / length	65 mm
depth	50 mm
type	rectangular
housing material	die-cast zinc
front (optics)	glass
connection types	connector M12 5 pin

ambient conditions

operating temperature	0 ... +50 °C
protection class	IP 67

order reference

OHDM 20P6990/S14C

**connection diagram****connectors**

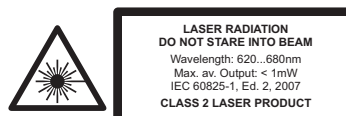
ES 34CP2	5 pin	2 m straight
ES 33CP2	5 pin	2 m angular

additional cable connectors and field wireable connectors, see accessories

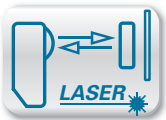
accessories

mounting bracket	10131521
protector cap	10156878

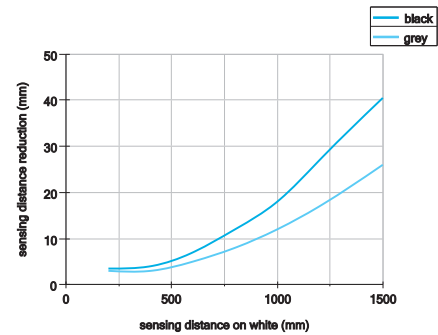
for details, see accessories section

laser warning

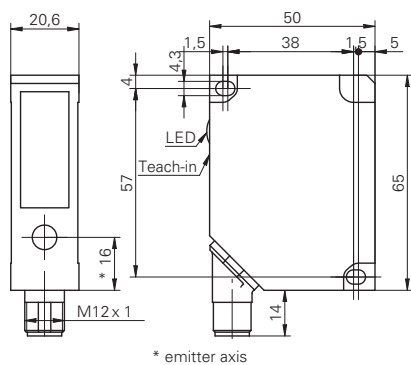
Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated June 24, 2007

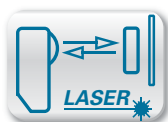


sensing distance diagram



dimension drawing





Tw = 100 ... 1000 mm

- qTeach
- no black/white difference



general data

type	background suppression
light source	pulsed red laser diode
sensing distance Tw	100 ... 1000 mm
adjusting range (object reflectivity $\geq 18\%$, grey)	100 ... 935 mm
adjusting range (object reflectivity $\leq 18\%$... 6%, black)	100 ... 450 mm
power on indication	LED green
light indicator	LED yellow
sensing distance adjustment	Teach-in
laser class	1
wave length	656 nm
beam diameter	3,7 ... 13 mm
black/white shift	0%

electrical data

response time / release time	< 6 ms
voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	80 mA
voltage drop Vd	< 3,5 VDC
output function	light / dark operate
output circuit	push-pull
output current	< 100 mA
short circuit protection	yes
reverse polarity protection	yes

mechanical data

width / diameter	23,4 mm
height / length	63 mm
depth	45 mm
type	rectangular
housing material	plastic (SAN LURAN 378P)
front (optics)	PMMA
connection types	connector M12 4 pin

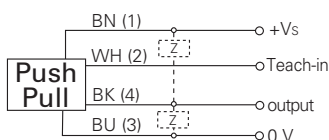
ambient conditions

operating temperature	0 ... +50 °C
protection class	IP 67
storage temperature	-10 ... +70 °C

order reference

OHDK 25G6921/S14

connection diagram



connectors

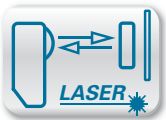
ESG 34AH0200	4 pin	2 m straight
ESW 33AH0200	4 pin	2 m angular

additional cable connectors and field wireable connectors, see accessories

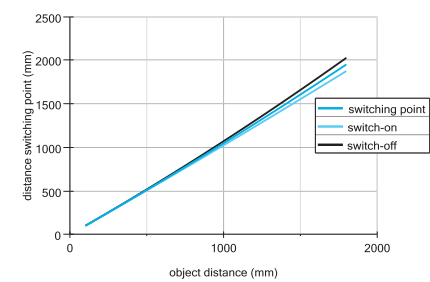
laser warning

**CLASS 1 LASER
PRODUCT**

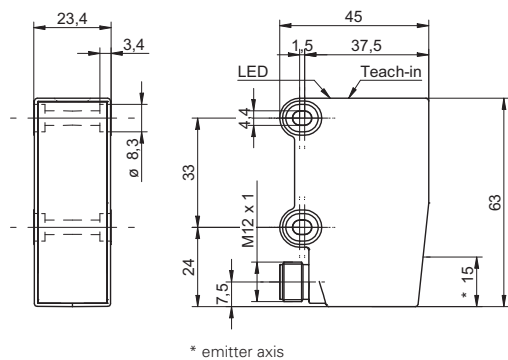
Complies with 21 CFR 1040.10 and 1040.11
except for deviations pursuant to laser
notice No. 50, dated June 24, 2007

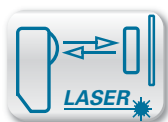


sensing distance diagram



dimension drawings





Tw = 100 ... 2000 mm

- qTeach
- no black/white difference
- 1 or 2 switching outputs

**general data**

type	background suppression
light source	pulsed red laser diode
sensing distance Tw	100 ... 2000 mm
adjusting range (object reflectivity ≥18%, grey)	100 ... 1750 mm
adjusting range (object reflectivity ≤18 ... 6%, black)	100 ... 860 mm
power on indication	LED green
light indicator	LED yellow
sensing distance adjustment	Teach-in
laser class	1
wave length	656 nm
beam diameter	3,7 ... 22 mm
black/white shift	0%

electrical data

response time / release time	< 10 ms
voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	80 mA
voltage drop Vd	< 3,5 VDC
output function	light / dark operate
output circuit	push-pull
output current	< 100 mA
short circuit protection	yes
reverse polarity protection	yes

mechanical data

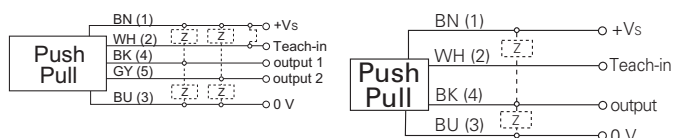
width / diameter	23,4 mm
height / length	63 mm
depth	45 mm
type	rectangular
housing material	plastic (SAN LURAN 378P)
front (optics)	PMMA
connection types	connector M12 4 pin

ambient conditions

operating temperature	0 ... +50 °C
protection class	IP 67
storage temperature	-10 ... +70 °C

order reference**number of outputs**

OHDK 25G6911/S14	1
OHDK 25G6912/S14C	2

connection diagrams**connectors**

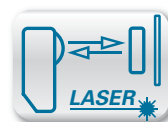
ESG 34AH0200	4 pin	2 m straight
ESW 33AH0200	4 pin	2 m angular

additional cable connectors and field wireable connectors, see accessories

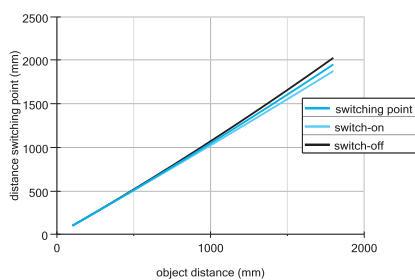
laser warning

**CLASS 1 LASER
PRODUCT**

Complies with 21 CFR 1040.10 and 1040.11
except for deviations pursuant to laser
notice No. 50, dated June 24, 2007



sensing distance diagram



dimension drawings

