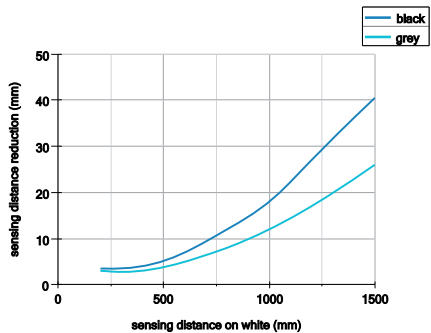
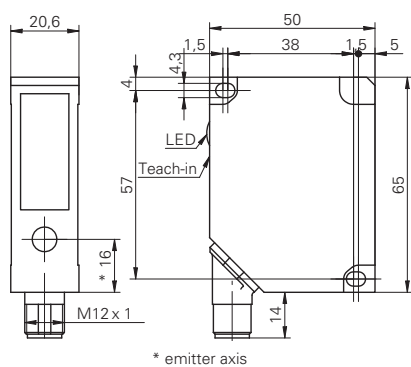
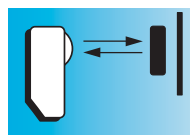


sensing distance diagram



dimension drawing





$T_w = 120 \dots 400 \text{ mm}$

- sensing distance adjustable via potentiometer
- small blind range

general data

type	background suppression
light source	pulsed infrared diode
sensing distance T_w	120 ... 400 mm
sensing range T_b (at T_w max.)	10 ... 400 mm
sensing range T_b (at T_w min.)	8 ... 120 mm
light indicator	LED yellow
sensing distance adjustment	mechanical, 9 turn
wave length	880 nm

electrical data

response time / release time	< 1 ms
voltage supply range +Vs	10 ... 30 VDC
current consumption max.	45 mA
current consumption typ.	35 mA
voltage drop V_d	< 1,8 VDC
output function	light / dark operate
output current	< 200 mA
short circuit protection	yes
reverse polarity protection	yes

mechanical data

width / diameter	25 mm
height / length	80 mm
depth	58 mm
type	rectangular
housing material	plastic (ASA)
front (optics)	PMMA

ambient conditions

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

order reference	connection types	output circuit
FHDK 26N5001/S14	connector M12, 4 pin	NPN
FHDK 26P5001	cable 4 pin, 2 m	PNP
FHDK 26P5001/S14	connector M12, 4 pin	PNP



connection diagrams



connectors

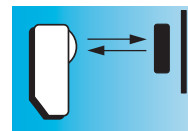
ESG 34AH0200	4 pin	2 m straight
ESW 33AH0200	4 pin	2 m angular

additional cable connectors and field wireable connectors, see accessories

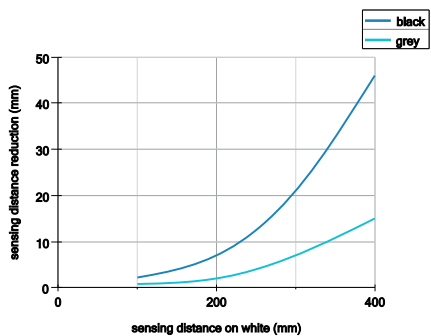
accessories

mounting bracket	10112477
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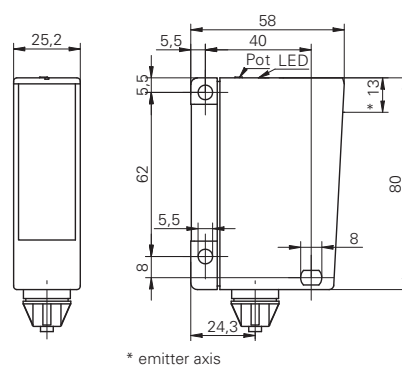
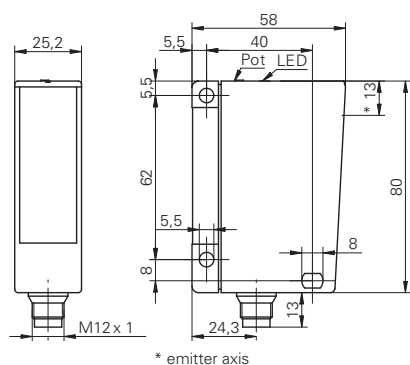
for details, see accessories section



sensing distance diagram




dimension drawings



red light LED version

product family	FNCK 07	FNDK 07	FNDM 12	FNDK 14
				
	<i>MINOS</i>	<i>MINOS</i>		
width / diameter	8 mm	8 mm	12,4 mm	14,8 mm
sensing distance Tw	10 ... 45 mm	10 ... 45 mm	20 ... 80 mm	55 ... 200 mm
response time / release time	< 0,5 ms	< 0,5 ms	< 1 ms	< 0,5 ms
sensing distance adjustment	Teach-in	Teach-in	mechanical, 5 turn	Teach-in
NPN	■	■	■	■
PNP	■	■	■	■
cable	■	■	■	
connector	■	■	■	■
housing material	plastic	plastic	metal	plastic
Page	306	308	310	312

laser version

product family	ONDM 16
	
width / diameter	15,4 mm
sensing distance Tw	25 ... 200 mm
response time / release time	< 0,6 ms
sensing distance adjustment	mechanical, 8 turn
PNP	■
cable	■
connector	■
housing material	metal
Page	314

Diffuse sensors with foreground suppression

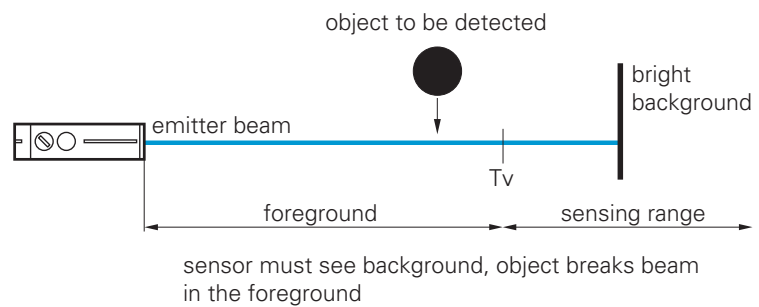


General information

Diffuse sensors with foreground suppression using the triangulation principle 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. Objects moving through the light beam in the adjustable foreground are suppressed.

Applications

- Detection of thin, poorly-reflecting objects on a reflective conveyor belt (if black/white offset of the diffuse sensor with background suppression becomes a problem)
- Detection of objects without a blind region. The sensor must be adjusted to a defined background, which then operates as a «reflector» (see sketch).





Characteristics and advantages

Adjustable foreground distance

The foreground distance or, expressed otherwise, the beginning of the sensing distance, can be precisely adjusted by a set screw or Teach-in.

Insensitive to color

The beginning of the sensing distance remains largely constant even if the color of the objects changes. Readjustment is therefore unnecessary.

Small spot size

Laser sensors can detect objects with a size of just 0,1 mm.

Short response time

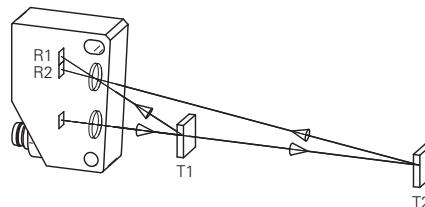
Small, quickly moving objects are reliably detected due to the short response time.

Technology and operation

The sensors are based on the triangulation principle. The beginning of the sensing distance is only determined by the angle of the light reflected back from the object. 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 (foreground) and receiver R2 the light reflected back from object T2. The transition from R1 to R2 determines the sensing distance.

Inside the sensing distance, the sensor operates as a normal diffuse sensor, i.e. the max. range depends on the reflectivity of the object.



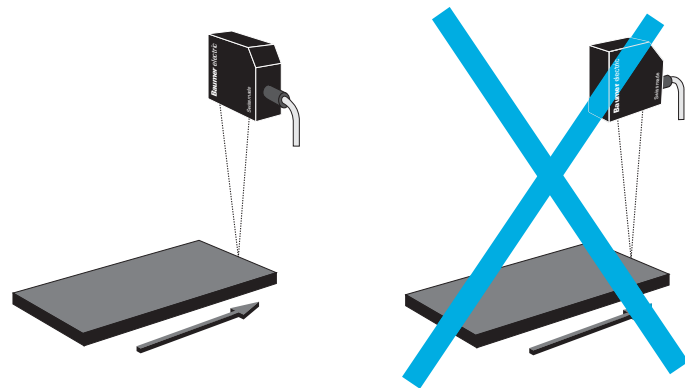
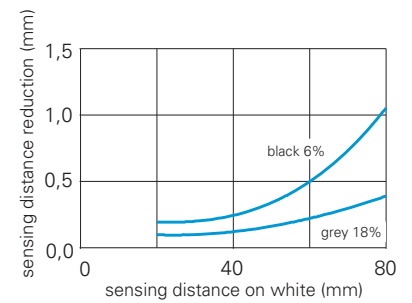


Mounting and adjustment

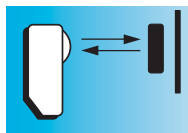
The diffuse sensor must be aimed at the object. The beginning of the sensing distance must be set to a distance between the target and the object in the foreground.

For diffuse sensors with foreground suppression, the sensing distance diagram is specified. This indicates the sensing distance expansion as a function of the beginning of the sensing distance to white for different degrees of remission. This means the distance by which the beginning of the sensing distance to black or gray is increased in comparison with white. When the adjusted beginning of the sensing distance to white is entered on the X axis of the diagram, the increase of the sensing distance to black or gray can be read off on the Y axis.

The sensing distance increase also indicates how far a black or gray object may be located behind the adjusted sensing distance for the object to be correctly detected.



It should be ensured that the object to be detected approaches the active area of the sensor from the side, which avoids malfunctions.



$T_w = 10 \dots 45 \text{ mm}$

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

general data

type	foreground suppression
light source	pulsed red LED
sensing distance T_w	10 ... 45 mm
sensing range T_b (at T_w max.)	45 ... 150 mm
sensing range T_b (at T_w min.)	10 ... 150 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.	25 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

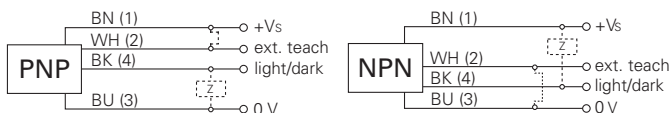
mechanical data

width / diameter	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

connection diagrams



connectors

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

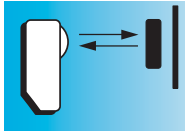
additional cable connectors and field wireable connectors, see accessories

accessories

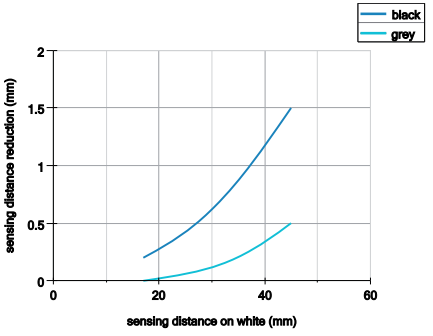
MINOFIX mounting kit	10150844
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for details, see accessories section

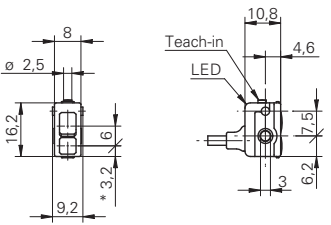
order reference	connection types	output circuit
FNCK 07N6901	cable rear side, 2 m	NPN
FNCK 07N6901/KS35A	flylead connector M8, 4 pin	NPN
FNCK 07P6901	cable rear side, 2 m	PNP
FNCK 07P6901/KS35A	flylead connector M8, 4 pin	PNP



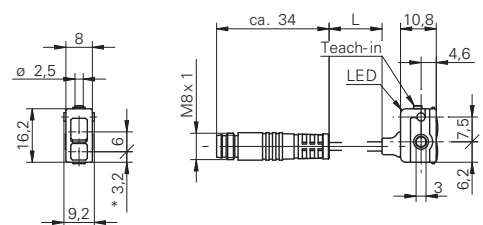
sensing distance diagram



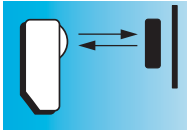
dimension drawings



* emitter axis



* emitter axis cable length L = 200 mm



$T_w = 10 \dots 45 \text{ mm}$

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

general data

type	foreground suppression
light source	pulsed red LED
sensing distance T_w	10 ... 45 mm
sensing range T_b (at T_w max.)	45 ... 150 mm
sensing range T_b (at T_w min.)	10 ... 150 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.	25 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	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



connection diagrams



connectors

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

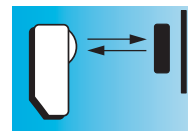
additional cable connectors and field wireable connectors, see accessories

accessories

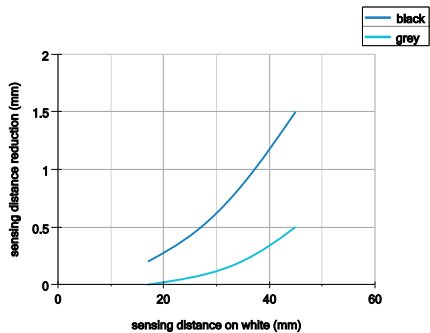
MINOFIX mounting kit	10150844
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for details, see accessories section

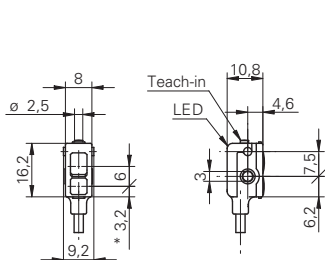
order reference	connection types	output circuit
FNDK 07N6901	cable bottom side, 2 m	NPN
FNDK 07N6901/KS35A	flylead connector M8, 4 pin	NPN
FNDK 07P6901	cable bottom side, 2 m	PNP
FNDK 07P6901/KS35A	flylead connector M8, 4 pin	PNP



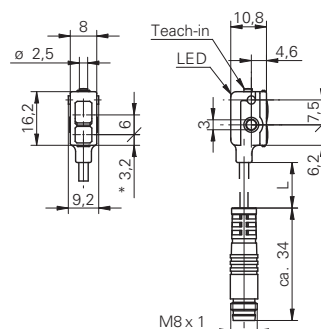
sensing distance diagram



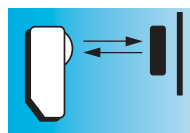
dimension drawings



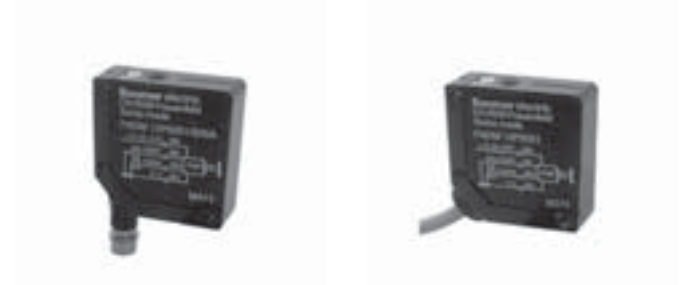
* emitter axis



* emitter axis cable length L = 200 mm


 $T_w = 20 \dots 80 \text{ mm}$

- rugged miniature metal housing
- sensing distance adjustable via potentiometer



general data

type	foreground suppression
light source	pulsed red LED
sensing distance T_w	20 ... 80 mm
sensing range T_b (at T_w max.)	80 ... 160 mm
sensing range T_b (at T_w min.)	20 ... 30 mm
light indicator	LED yellow
sensing distance adjustment	mechanical, 5 turn
wave length	660 nm

electrical data

response time / release time	< 1 ms
voltage supply range +Vs	10 ... 30 VDC
current consumption max.	35 mA
current consumption typ.	25 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	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

connection diagrams



connectors

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

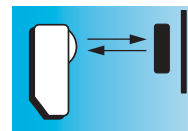
additional cable connectors and field wireable connectors, see accessories

accessories

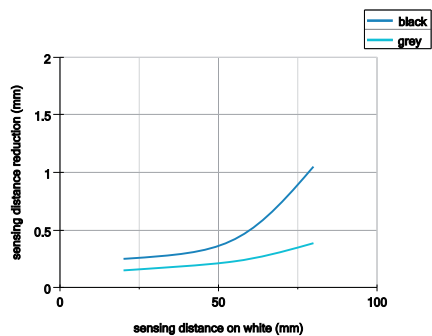
SENSOFIX mounting kit	10150328
mounting bracket	10113873

for details, see accessories section

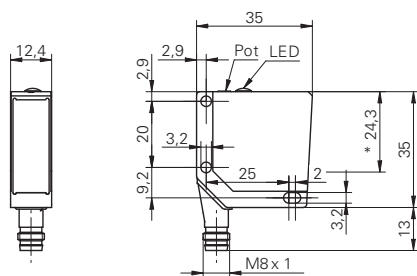
order reference	connection types	output circuit
FNDM 12N5001	cable 4 pin, 2 m	NPN
FNDM 12N5001/S35A	connector M8, 4 pin	NPN
FNDM 12P5001	cable 4 pin, 2 m	PNP
FNDM 12P5001/S35A	connector M8, 4 pin	PNP



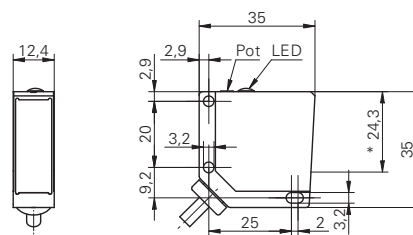
sensing distance diagram



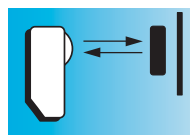
dimension drawings



* emitter axis



* emitter axis



$T_w = 55 \dots 200 \text{ mm}$

- short response time
- sensing distance adjustable via Teach-in



general data

type	foreground suppression
light source	pulsed red LED
sensing distance T_w	55 ... 200 mm
sensing range T_b (at T_w max.)	200 ... 350 mm
sensing range T_b (at T_w min.)	55 ... 350 mm
alignment / soiled lens indicator	flashing light indicator
light indicator	LED yellow
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.	40 mA
current consumption typ.	35 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	14,8 mm
height / length	43 mm
depth	31 mm
type	rectangular
housing material	plastic (PA12)
front (optics)	PA
connection types	connector M8, 4 pin

ambient conditions

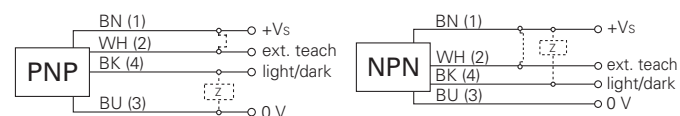
operating temperature	-25 ... +65 °C
protection class	IP 67

order reference

FNDK 14N6901/S35A	NPN
FNDK 14P6901/S35A	PNP

output circuit

connection diagrams



connectors

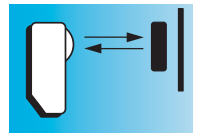
ESG 32AH0200	4 pin	2 m straight
ESW 31AH0200	4 pin	2 m angular

additional cable connectors and field wireable connectors, see accessories

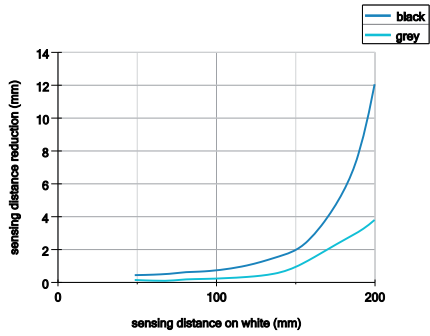
accessories

SENSOFIX mounting kit	10149011
mounting bracket	10134964

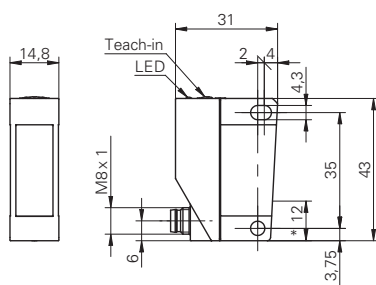
for details, see accessories section



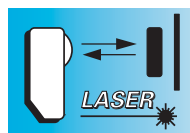
sensing distance diagram



dimension drawing



* emitter axis



Tw = 25 ... 200 mm

- rugged metal housing
- high repeatability

general data

type	foreground suppression
light source	pulsed red laser diode
sensing distance Tw	25 ... 200 mm
sensing range Tb (at Tw max.)	200 ... 500 mm
sensing range Tb (at Tw min.)	25 ... 45 mm
repeatability	< 0,1 mm at laser focus
light indicator	LED yellow
sensing distance adjustment	mechanical, 8 turn
laser class	2
distance to laser focus	80 mm
wave length	650 nm
suppression of reciprocal influence	yes

electrical data

response time / release time	< 0,6 ms
voltage supply range +Vs	10 ... 30 VDC
current consumption max.	35 mA
current consumption typ.	25 mA
voltage drop Vd	< 1,8 VDC
output function	light / dark operate
output circuit	PNP
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

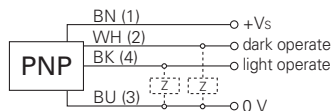
operating temperature	-10 ... +50 °C
protection class	IP 67

order reference connection types

ONDM 16P5101	cable 4 pin, 2 m
ONDM 16P5101/S14	connector M12, 4 pin



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

accessories

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

for details, see accessories section

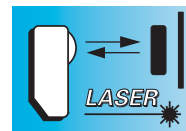
laser warning



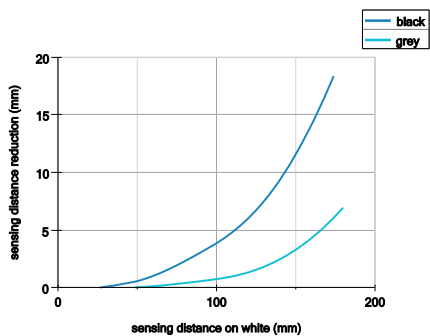
Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated July 26, 2001

ONDM 16 Tw = 25 ... 200 mm

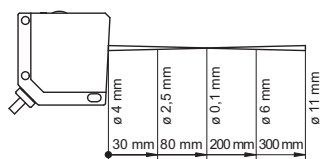
Diffuse sensors with foreground suppression



sensing distance diagram



beam characteristic



dimension drawings

