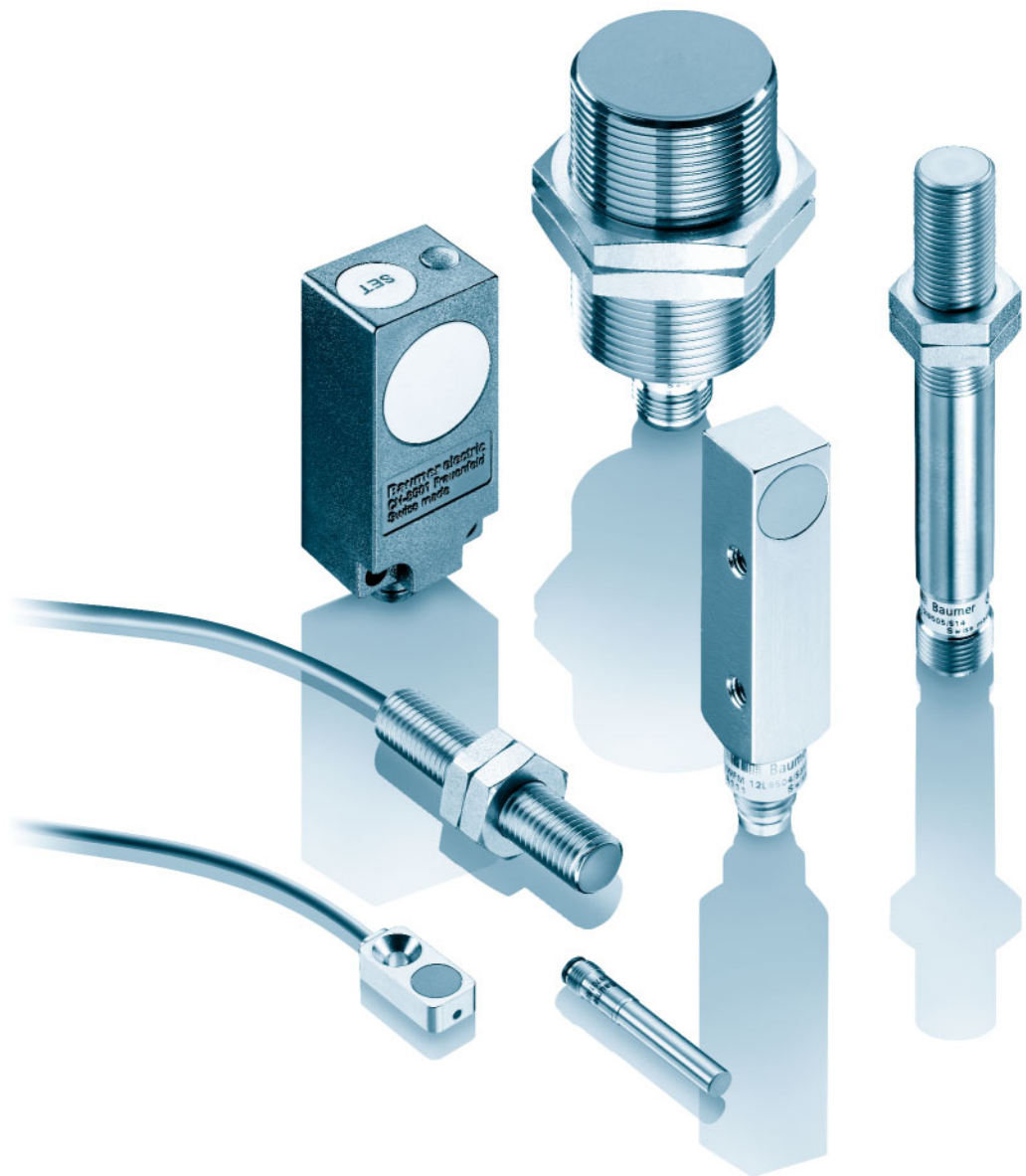




# Inductive distance measuring sensors

## *AlphaProx*



Overview

Function and applications

Dynamic and static resolution

Linearization of the output curve

Teach-in functions

Cylindrical designs

Rectangular designs

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## Cylindrical designs








product family	IWRM 04	IWRM 06	IWRM 08	IWRM 12	IPRM 12	IWRM 12	IWRM 12Z
							
	<i>AlphaProx</i>	<i>AlphaProx</i>	<i>AlphaProx</i>	<i>AlphaProx</i>	<i>AlphaProx</i>	<i>AlphaProx</i>	<i>AlphaProx</i>
mounting type	quasi-flush	quasi-flush	quasi-flush	flush	quasi-flush	quasi-flush	quasi-flush
measuring distance Sd	0 ... 1 mm	0 ... 2 mm	0 ... 2 mm	1 ... 1,5 mm 1 ... 2 mm	0,5 ... 1,5 mm 0 ... 2 mm 0 ... 3 mm	0 ... 4 mm	0 ... 4 mm
dimension	4 mm	6,5 mm	8 mm	12 mm	12 mm	12 mm	12 mm
housing length	30 mm	40 mm 46 mm	40 mm 46 mm	50 mm	90 mm	50 mm	60 mm
voltage output	■	■	■	■		■	
voltage output / PNP							■
current output		■	■		■	■	
cable, 2 m		■	■	■			
connector M5	■						
connector M8		■	■				
connector M12					■	■	■
stainless steel	■	■	■				
brass nickel plated				■		■	■
steel (9 SMn (Pb) 28/36)					■		
page	36	37	38	42	41	39	43

## ATEX/Outdoor

product family	IWRM 12 ATEX	IWRM 18	IWRR 18
			
	<i>AlphaProx</i>	<i>AlphaProx</i>	<i>AlphaProx</i>
Outdoor design		■	■
ATEX 2D	■		
Ecolab			■
mounting type	quasi-flush	quasi-flush	quasi-flush
measuring distance Sd	0 ... 4 mm	0 ... 8 mm	0 ... 7 mm
dimension	12 mm	18 mm	18 mm
housing length	50 mm	60 mm	60 mm
current output	■	■	■
connector M12	■	■	■
brass nickel plated	■	■	
stainless steel 1.4404 (V4A)			■
page	40	47	48

IWRM 18	IWRM 18	IWRM 18Z	IWRM 30	IWRM 30	IWRM 30Z
					
<i>AlphaProx</i> quasi-flush	<i>AlphaProx</i> flush	<i>AlphaProx</i> quasi-flush	<i>AlphaProx</i> flush	<i>AlphaProx</i> quasi-flush	<i>AlphaProx</i> quasi-flush
0 ... 8 mm	2 ... 4 mm 2 ... 5 mm	0 ... 8 mm	5 ... 9 mm 5 ... 10 mm	0 ... 16 mm	0 ... 16 mm
18 mm	18 mm	18 mm	30 mm	30 mm	30 mm
60 mm	31,5 mm 65 mm	60 mm	60 mm	63 mm	62 mm
■	■		■	■	
		■			■
■	■		■	■	
	■		■		
■		■		■	■
■	■	■	■	■	■
44	45	46	49	50	51

## Rectangular designs

product family	IWFM 05	IWFM 08	IWFM 12	IWFM 12	IWFM 18	IWFM 20	IWFM 20
							
	<i>AlphaProx</i>	<i>AlphaProx</i>	<i>AlphaProx</i>	<i>AlphaProx</i>	<i>AlphaProx</i>	<i>AlphaProx</i>	<i>AlphaProx</i>
mounting type	quasi-flush	quasi-flush	flush	flush	flush	flush	flush
measuring distance Sd	0 ... 1 mm	0 ... 2 mm	0 ... 4 mm	1 ... 2 mm	0 ... 4 mm	2 ... 3 mm 2 ... 5 mm	0 ... 2 mm
dimension	5 mm	8 mm	12 mm	12 mm	18 mm	20 mm	20 mm
housing length	32 mm	16 mm	60 mm	55 mm	30 mm	35 mm	30 mm
voltage - / current output			■		■		
voltage output	■	■		■	■	■	■
voltage output / PNP							
current output						■	
cable, 2 m		■		■			
flylead connector M8		■					■
connector M5	■						
connector M8			■		■	■	
stainless steel	■						
brass nickel plated			■	■	■	■	■
polyester							
die-cast zinc nickel plated		■					
<b>page</b>	<b>52</b>	<b>53</b>	<b>54</b>	<b>55</b>	<b>56</b>	<b>57</b>	<b>58</b>

IWFK 20



*AlphaProx*

quasi-flush

0 ... 10 mm

20 mm

42 mm



59

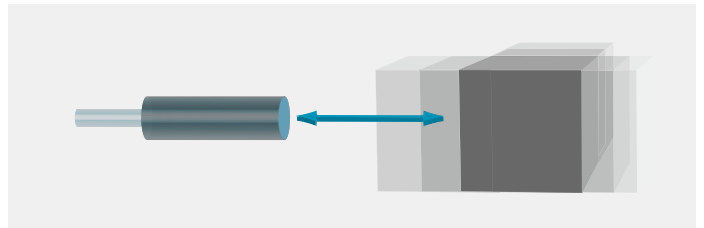


Function

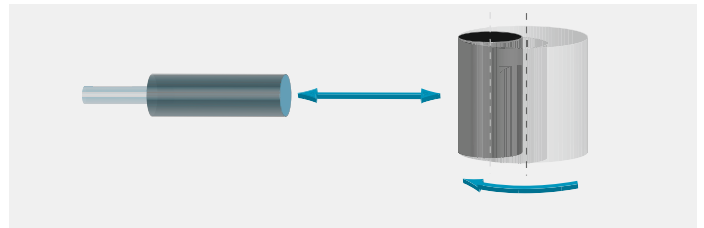
Inductive sensors with analog output signals are characterized by their short response times, high resolution and linearity as well as their outstanding repeat accuracy. The output current and voltage values are proportional to the distance between the sensor and the object being detected. In other words, they represent absolute measured values corresponding to the distance between the active surface and the object. These properties make inductively measuring linear sensors extremely interesting for numerous applications in the area of measurement and control engineering.

Typical applications

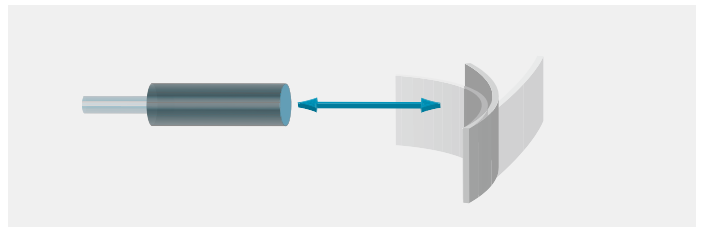
Travel / position / displacement



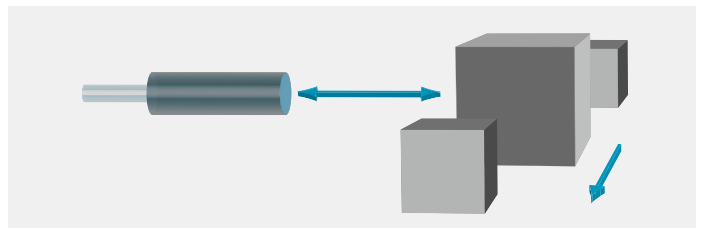
Diameter / eccentricity



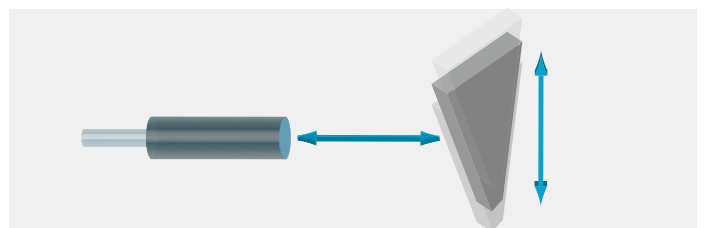
Deflection / deformation



Size comparison / measurement tolerance

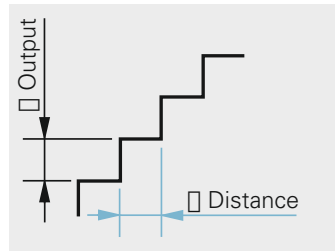


Taper / ramp



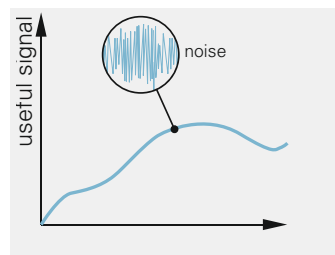


Resolution in general



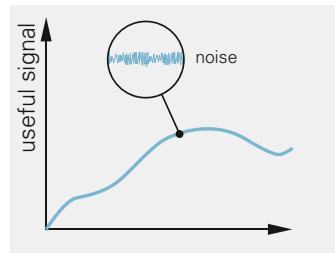
Resolution represents the smallest possible change in distance which will produce a measurable signal change at the sensor's output. Resolution can be impaired by high-frequency electrical interference (noise) or by the resolution of digital/analog converters.

Dynamic resolution



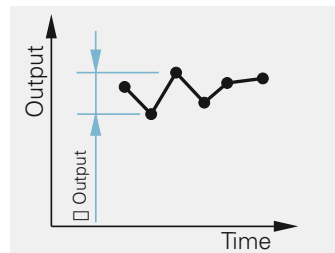
Signal noise exerts full effect on signal processing during very rapid measurements (high scan rates). Filtration without influencing the useful signal is only possible to a limited extent, if at all.

Static resolution



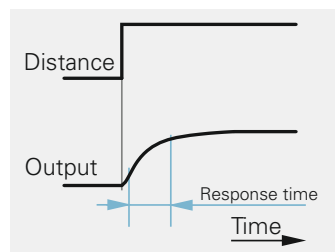
Very slow object movements (low scan rates) such as the temperature expansion of shafts allow the high-frequency interference to be filtered. The carrier signal is not influenced by this filtration. Using this technique significantly increases the resolution when compared to dynamic measurements.

Repeat accuracy



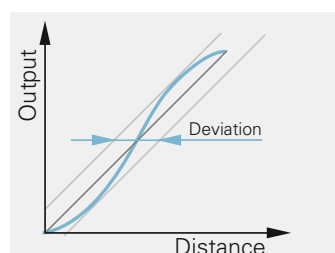
Repeat accuracy means the difference between the measured values of successive measurements within a period of 8 hours at an ambient temperature of  $23\text{ °C} \pm 5\text{ °C}$ .

Response time



The time which the signal output of a sensor requires to rise from 10 % to 90 % of the maximum signal level is called the response time.

FS Linearity



Linearity defines the deviation between the output signal and a straight line. It is given as a percentage of the measuring range end value (FS or Full Scale). The following alternatives are available for applications where the indicated linearity is insufficient:

- Sensors with linearized output curves
- Polynomials for the mathematical linearization of the sensor curve's in the controller

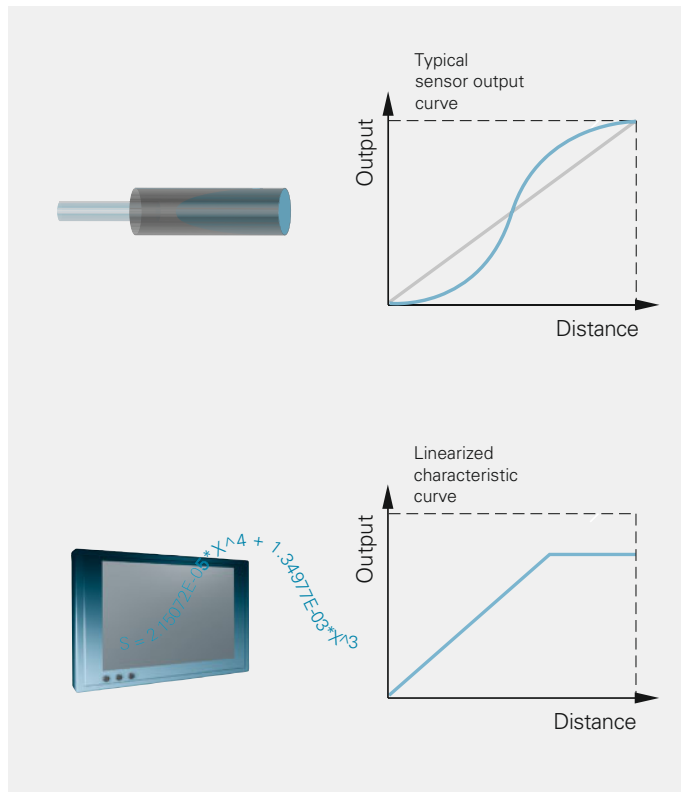


Signal linearization with polynomials

Polynomials represent a mathematical function which converts a typical inductive analog sensor output curve into a linear signal. For example, it is integrated in the software of a programmable logic control to change the s-shaped sensor signal into a straight line.

Polynomials are used when ...

- a linear signal progression is required across the entire signal range
  - no sensors with linear output curves are available for the intended measuring range
  - rapid measurements are to be performed
  - an economical solution is desired
- A variety of sensors with linear output curves are also available as alternatives.







**Functions**

The following parameters can be altered using the Teach-in function:

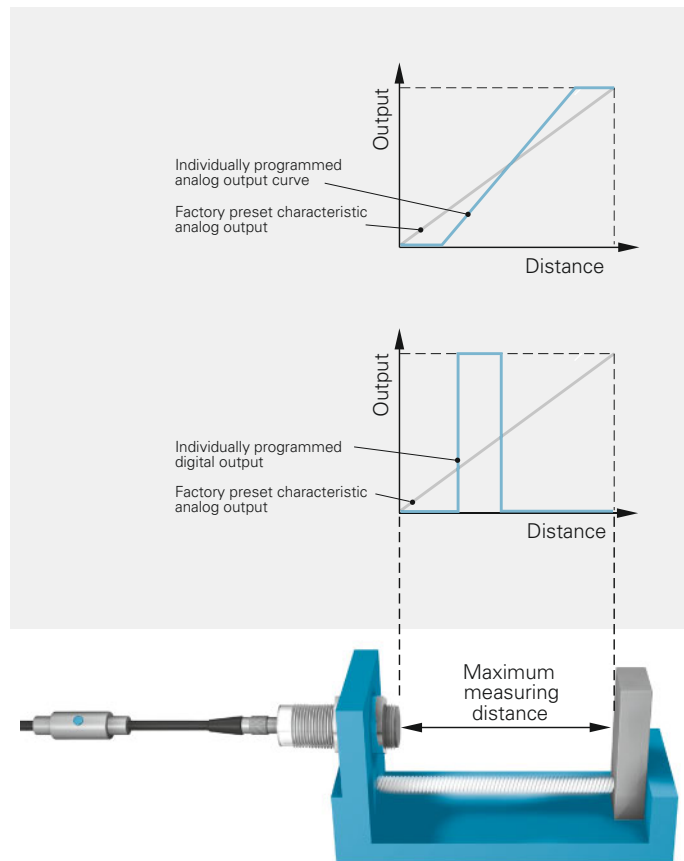
- Analog output (measuring range)
- Digital output (switching window)

**Procedure**

The same Teach-in function menu structure is used for all sensors from Baumer, with the primary emphasis being on the simplest operation possible. This function allows the measuring range to be freely programmed within predefined limits. If, for example, a small measuring range with a large signal amplitude is desired, the range can be limited to merely a few millimeters. If necessary, the direction of the analog output's flow can be inverted, too.

In addition, the points at which one of the digital outputs switches on and off can be specified. These can lie either within or outside the individually programmed measuring range.

**Programmable output curve**



**Accessories**

Diverse accessories, including an external teach-in adapter as well as a 3-point converter which enables conversion of an analog signal into several digital signals, are available for analog sensors.


**Sd = 0 ... 1 mm**

- compact housing design
- very high resolution
- short response time


**general data**

mounting type	quasi-flush
measuring distance Sd	0 ... 1 mm
resolution	< 0,001 mm (stat.) < 0,005 mm (dynam.)
repeat accuracy	< 0,005 mm
linearity error	± 100 µm
temperature drift	± 5 % (Full Scale)

**electrical data**

response time (factory characteristic)	< 0,5 ms
voltage supply range +Vs	15 ... 30 VDC
current consumption max. (no load)	15 mA
output circuit	voltage output
output signal	0 ... 10 VDC
load resistance	> 1000 Ohm
short circuit protection	yes
reverse polarity protection	yes

**mechanical data**

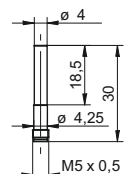
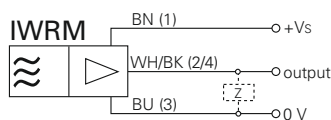
type	cylindrical smooth
housing material	stainless steel
dimension	4 mm
housing length	30 mm
connection types	connector M5

**ambient conditions**

operating temperature	10 ... +60 °C
protection class	IP 67

**connectors and mating connectors**

ESG 05SP0200	Connector M5, 3 pin, straight, 2 m
ESW 05SP0200	Connector M5, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	

**order reference**
**IWRM 04U9701/S05**
**dimension drawing**

**connection diagram**



**Sd = 0 ... 2 mm**

- very high resolution
- short response time


**general data**

mounting type	quasi-flush
measuring distance Sd	0 ... 2 mm
resolution	< 0,001 mm (stat.) < 0,005 mm (dynam.)
repeat accuracy	< 0,02 mm
linearity error	± 100 µm
temperature drift	± 5 % (Full Scale)

**electrical data**

response time (factory characteristic)	< 0,7 ms
voltage supply range +Vs	15 ... 30 VDC
short circuit protection	yes
reverse polarity protection	yes

**voltage output**

current consumption max. (no load)	25 mA
output signal	0 ... 10 VDC
load resistance	> 1000 Ohm

**current output**

current consumption max. (no load)	35 mA
output signal	0 ... 10 mA
load resistance +Vs min.	< 910 Ohm
load resistance +Vs max.	< 2400 Ohm

**mechanical data**

type	cylindrical smooth
housing material	stainless steel
dimension	6,5 mm

**ambient conditions**

operating temperature	10 ... +60 °C
protection class	IP 67

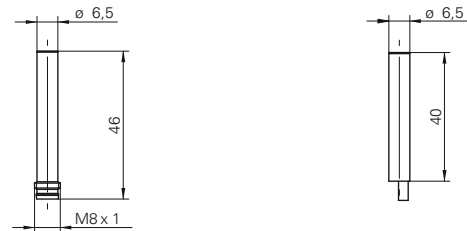
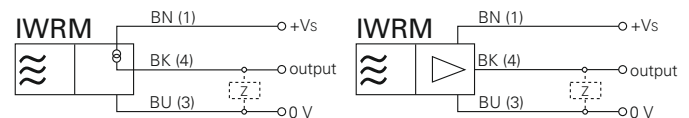
**connectors and mating connectors**

ESG 32SH0200	Connector M8, 3 pin, straight, 2 m
ESW 31SH0200	Connector M8, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	

**accessories**

10109474	Mounting bracket for sensors Ø 6,5 mm
10117742	Clamping nut for sensors Ø 6,5 mm

for details: see accessories section

**dimension drawings**

**connection diagrams**


order reference	output circuit	housing length	connection types
<b>IWRM 06I9501</b>	current output	40 mm	cable, 2 m
<b>IWRM 06I9501/S35</b>	current output	46 mm	connector M8
<b>IWRM 06U9501</b>	voltage output	40 mm	cable, 2 m
<b>IWRM 06U9501/S35</b>	voltage output	46 mm	connector M8



**Sd = 0 ... 2 mm**

- very high resolution
- short response time

**general data**

mounting type	quasi-flush
measuring distance Sd	0 ... 2 mm
resolution	< 0,001 mm (stat.) < 0,005 mm (dynam.)
repeat accuracy	< 0,02 mm
linearity error	± 100 µm
temperature drift	± 5 % (Full Scale)

**electrical data**

response time (factory characteristic)	< 0,5 ms
voltage supply range +Vs	15 ... 30 VDC
short circuit protection	yes
reverse polarity protection	yes

**voltage output**

current consumption max. (no load)	25 mA
output signal	0 ... 10 VDC
load resistance	> 1000 Ohm

**current output**

current consumption max. (no load)	35 mA
output signal	0 ... 10 mA
load resistance +Vs min.	< 910 Ohm
load resistance +Vs max.	< 2400 Ohm

**mechanical data**

type	cylindrical threaded
housing material	stainless steel
dimension	8 mm

**ambient conditions**

operating temperature	10 ... +60 °C
protection class	IP 67

**connectors and mating connectors**

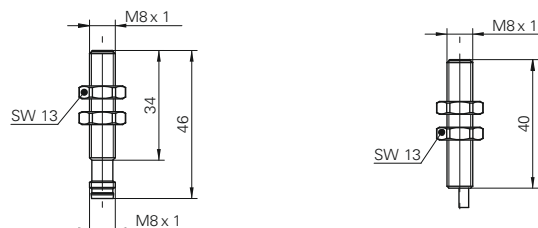
ESG 32SH0200	Connector M8, 3 pin, straight, 2 m
ESW 31SH0200	Connector M8, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	

**accessories**

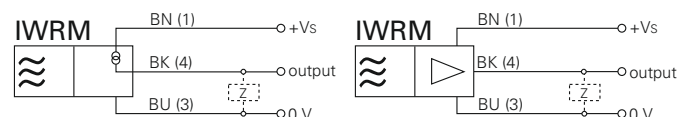
10151719	Sensofix series 08
for details: see accessories section	



**dimension drawings**



**connection diagrams**



order reference	output circuit	housing length	connection types
IWRM 08I9501	current output	40 mm	cable, 2 m
IWRM 08I9501/S35	current output	46 mm	connector M8
IWRM 08U9501	voltage output	40 mm	cable, 2 m
IWRM 08U9501/S35	voltage output	46 mm	connector M8

IWRM 08 Sd = 0 ... 2 mm

Inductive distance measuring sensors AlphaProx


**Sd = 0 ... 4 mm**

- large measuring distance
- very high resolution
- short response time


**general data**

mounting type	quasi-flush
measuring distance Sd	0 ... 4 mm
linearity error	± 160 µm
temperature drift	± 4 % (Full Scale)

**electrical data**

voltage supply range +Vs	15 ... 30 VDC
short circuit protection	yes
reverse polarity protection	yes

**voltage output**

current consumption max. (no load)	20 mA
output signal	0 ... 10 VDC
load resistance	> 1000 Ohm

**current output**

output signal	4 ... 20 mA
load resistance +Vs min.	< 330 Ohm
load resistance +Vs max.	< 1000 Ohm

**mechanical data**

type	cylindrical threaded
housing material	brass nickel plated
dimension	12 mm
housing length	50 mm
connection types	connector M12

**ambient conditions**

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

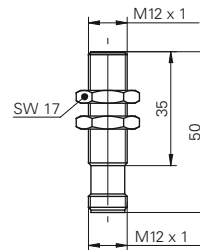
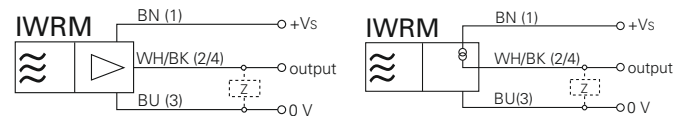
**connectors and mating connectors**

ESG 34SH0200	Connector M12, 3 pin, straight, 2 m
ESW 33SH0200	Connector M12, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	

**accessories**

10151720	Sensofix series 12 round
10163979	Converter 3-point (M12)

for details: see accessories section

**dimension drawing**

**connection diagrams**


order reference	resolution	repeat accuracy	output circuit	response time (factory characteristic)
<b>IWRM 12I9704/S14</b>	< 0,001 mm (stat.) < 0,005 mm (dynam.)	< 0,01 mm	current output	< 2 ms
<b>IWRM 12I9705/S14</b>	< 0,0005 mm (stat.) < 0,001 mm (dynam.)	< 0,005 mm	current output	< 30 ms
<b>IWRM 12U9704/S14</b>	< 0,001 mm (stat.) < 0,005 mm (dynam.)	< 0,01 mm	voltage output	< 2 ms
<b>IWRM 12U9705/S14</b>	< 0,0005 mm (stat.) < 0,001 mm (dynam.)	< 0,005 mm	voltage output	< 30 ms


**Sd = 0 ... 4 mm**

- ATEX certification
- very high resolution


**general data**

mounting type	quasi-flush
measuring distance Sd	0 ... 4 mm
resolution	< 0,001 mm (stat.) < 0,005 mm (dynam.)
repeat accuracy	< 0,01 mm
linearity error	± 160 µm
temperature drift	± 4 % (Full Scale)
approvals/certificates	ATEX 2D

**electrical data**

response time (factory characteristic)	< 2 ms
voltage supply range +Vs	15 ... 27 VDC
current consumption max. (no load)	20 mA
output circuit	current output
output signal	4 ... 20 mA
load resistance +Vs min.	< 330 Ohm
load resistance +Vs max.	< 1000 Ohm
Maximal zulässige Verlustleistung	< 1,35 W
short circuit protection	yes
reverse polarity protection	yes

**mechanical data**

type	cylindrical threaded
housing material	brass nickel plated
dimension	12 mm
housing length	50 mm
connection types	connector M12
tightening torque	15 Nm

**ambient conditions**

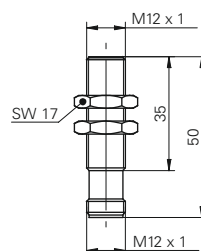
protection class	IP 67
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**safe maximum values**

marking	II 2D Ex tb IIIC T100°C Db IP6X
operating temperature Ta	-10 ... +50 °C

**accessories**

10151720	Sensofix series 12 round
for details: see accessories section	

**order reference**
**IWRM 12I9704/S14X**
**dimension drawing**

**connection diagrams**




**Sd = 0 ... 3 mm**

- very high resolution
- high repeat accuracy
- minimized temperature drift



**general data**

mounting type	quasi-flush
measuring speed	< 1 mm / ms
repeat accuracy (Sd)	< 1 µm

**electrical data**

voltage supply range +Vs	15 ... 30 VDC
current consumption max. (no load)	50 mA
output circuit	current output
output signal	0 ... 20 mA
load resistance +Vs min.	< 100 Ohm
load resistance +Vs max.	< 400 Ohm
voltage drop Vd	< 7 VDC
short circuit protection	yes
reverse polarity protection	yes

**mechanical data**

type	cylindrical threaded
dimension	12 mm
housing length	90 mm
housing material	steel (9 SMn (Pb) 28/36)
material (sensing face)	ceramic
connection types	connector M12

**ambient conditions**

operating temperature	0 ... +60 °C
protection class	IP 67

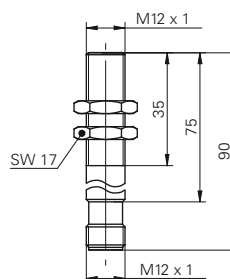
**connectors and mating connectors**

ESG 34SH0200	Connector M12, 3 pin, straight, 2 m
ESW 33SH0200	Connector M12, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	

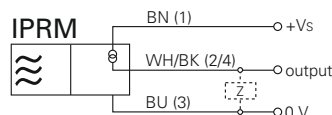
**accessories**

10151720	Sensofix series 12 round
for details: see accessories section	

**dimension drawing**



**connection diagram**



order reference	measuring distance Sd	linearity error	temperature drift	resolution (RMS)
<b>IPRM 12I9504/S14</b>	0,5 ... 1,5 mm	± 50 µm	± 10 µm	< 0,01 µm (stat. 10 Hz) < 0,06 µm (dynam. 520 Hz) < 0,004 µm (range center)
<b>IPRM 12I9505/S14</b>	0 ... 2 mm	± 60 µm	± 10 µm	< 0,012 µm (stat. 10 Hz) < 0,065 µm (dynam. 520 Hz) < 0,006 µm (range center)
<b>IPRM 12I9506/S14</b>	0 ... 3 mm	± 150 µm	± 25 µm	< 0,08 µm (stat. 10 Hz) < 0,17 µm (dynam. 520 Hz) < 0,013 µm (range center)


**Sd = 1 ... 2 mm**

**general data**

mounting type	flush
measuring speed	< 0,5 mm / ms
repeat accuracy	< 0,02 mm
temperature coefficient	1 μm / (K mm)

**electrical data**

voltage supply range +Vs	14 ... 30 VDC
current consumption max. (no load)	20 mA
output circuit	voltage output
output signal	1 ... 9 VDC
load resistance	> 1000 Ohm
residual output ripple	< 0,5 % Vs
short circuit protection	yes
reverse polarity protection	yes

**mechanical data**

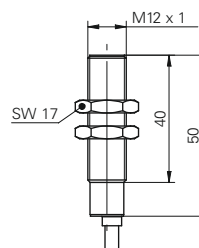
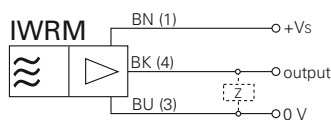
type	cylindrical threaded
housing material	brass nickel plated
dimension	12 mm
housing length	50 mm
connection types	cable, 2 m

**ambient conditions**

operating temperature	0 ... +60 °C
protection class	IP 67

**accessories**

10151720	Sensofix series 12 round
for details: see accessories section	

**dimension drawing**

**connection diagram**


order reference	measuring distance Sd	reference distance	linearity error
IWRM 12U9501	1 ... 2 mm	1,35 ... 1,65 mm	± 80 μm
IWRM 12U9502	1 ... 1,5 mm	1,15 ... 1,35 mm	± 60 μm




**Sd = 0 ... 4 mm**

- external Teach-in
- integrated Analog- and switching output
- linear analog output


**general data**

mounting type	quasi-flush
special type	2 adjust. switching points
measuring distance Sd	0 ... 4 mm
resolution	< 0,005 mm (stat.) < 0,005 mm (dynam.)
repeat accuracy	< 0,01 mm
adjustment	external Teach-in
linearity error	± 16 µm
temperature drift	± 5 % (Full Scale)

**electrical data**

response time (factory characteristic)	< 2,5 ms
response time (teach in characteristic)	< 3,1 ms
voltage supply range +Vs	15 ... 30 VDC
current consumption max. (no load)	20 mA
output circuit	voltage output / PNP
output signal	0 ... 10 VDC
load resistance	> 1000 Ohm
output current	< 10 mA (PNP)
voltage drop Vd	< 5 VDC (PNP)
short circuit protection	yes
reverse polarity protection	yes

**mechanical data**

type	cylindrical threaded
housing material	brass nickel plated
dimension	12 mm
housing length	60 mm
connection types	connector M12

**ambient conditions**

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

**connectors and mating connectors**

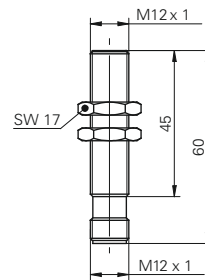
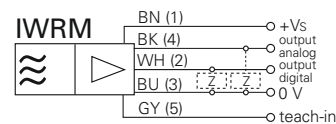
ESG 34CH0200	Connector M12, 5 pin, straight, 2 m
ESW 33CH0200	Connector M12, 5 pin, angular, 2 m
ESW 33CH0500	Connector M12, 5 pin, angular, 5 m

additional cable connectors and field wireable connectors: see accessories

**accessories**

10151720	Sensofix series 12 round
10141584	Teach-in Adapter M12
10163979	Converter 3-point (M12)

for details: see accessories section

**order reference**
**IWRM 12Z8704/S14C**
**dimension drawing**

**connection diagram**



**Sd = 0 ... 8 mm**

- large measuring distance
- short response time
- extended immunity against electrical interference


**general data**

mounting type	quasi-flush
measuring distance Sd	0 ... 8 mm
resolution	< 0,005 mm (stat.) < 0,01 mm (dynam.)
repeat accuracy	< 0,015 mm
linearity error	± 400 µm
temperature drift	± 5 % (Full Scale)

**electrical data**

response time (factory characteristic)	< 2 ms
voltage supply range +Vs	15 ... 30 VDC
current consumption max. (no load)	20 mA
short circuit protection	yes
reverse polarity protection	yes

**voltage output**

output signal	0 ... 10 VDC
load resistance	> 1000 Ohm

**current output**

output signal	4 ... 20 mA
load resistance +Vs min.	< 330 Ohm
load resistance +Vs max.	< 1000 Ohm

**mechanical data**

type	cylindrical threaded
housing material	brass nickel plated
dimension	18 mm
housing length	60 mm
connection types	connector M12

**ambient conditions**

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

**connectors and mating connectors**

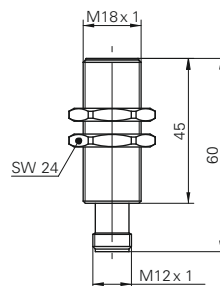
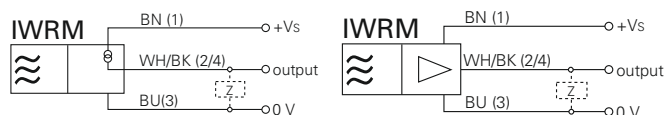
ESG 34SH0200	Connector M12, 3 pin, straight, 2 m
ESW 33SH0200	Connector M12, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	

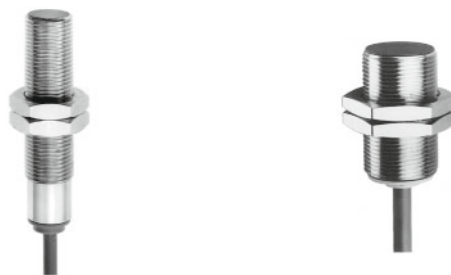
**accessories**

10151658	Sensofix series 18
10163979	Converter 3-point (M12)
for details: see accessories section	

**order reference**
**output circuit**

<b>IWRM 18I9704/S14</b>	current output
<b>IWRM 18U9704/S14</b>	voltage output

**dimension drawing**

**connection diagrams**



**Sd = 2...5 mm**

**general data**

mounting type	flush
measuring speed	< 1 mm / ms
repeat accuracy	< 0,02 mm
temperature coefficient	1 µm / (K mm)

**electrical data**

voltage supply range +Vs	15 ... 30 VDC
residual output ripple	< 0,5 % Vs
short circuit protection	yes
reverse polarity protection	yes

**voltage output**

current consumption max. (no load)	20 mA
output signal	1 ... 9 VDC
load resistance	> 1000 Ohm

**current output**

current consumption max. (no load)	35 mA
output signal	4 ... 20 mA
load resistance +Vs min.	< 500 Ohm
load resistance +Vs max.	< 1000 Ohm

**mechanical data**

type	cylindrical threaded
housing material	brass nickel plated
dimension	18 mm
connection types	cable, 2 m

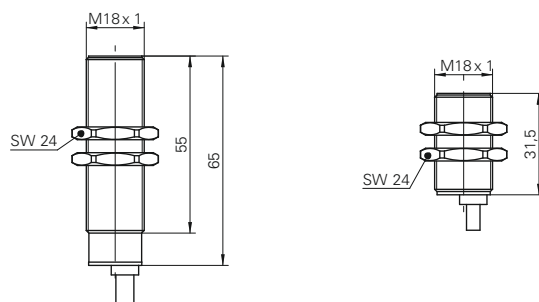
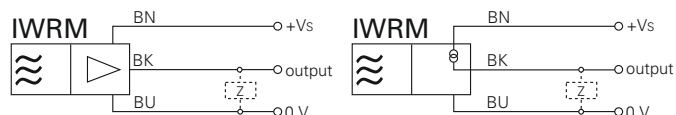
**ambient conditions**

operating temperature	0 ... +60 °C
protection class	IP 67

**accessories**

10151658      Sensofix series 18

for details: see accessories section

**dimension drawings**

**connection diagrams**


order reference	measuring distance Sd	reference distance	output circuit	housing length	linearity error
IWRM 18I9501	2 ... 5 mm	3,25 ... 3,75 mm	current output	65 mm	± 100 µm
IWRM 18I9502	2 ... 4 mm	2,8 ... 3,2 mm	current output	65 mm	± 80 µm
IWRM 18I9511	2 ... 5 mm	3,25 ... 3,75 mm	current output	31,5 mm	± 100 µm
IWRM 18U9501	2 ... 5 mm	3,25 ... 3,75 mm	voltage output	65 mm	± 100 µm
IWRM 18U9502	2 ... 4 mm	2,8 ... 3,2 mm	voltage output	65 mm	± 80 µm
IWRM 18U9511	2 ... 5 mm	3,25 ... 3,75 mm	voltage output	31,5 mm	± 100 µm
IWRM 18U9512	2 ... 4 mm	2,8 ... 3,2 mm	voltage output	31,5 mm	± 80 µm


**Sd = 0 ... 8 mm**

- external Teach-in
- integrated Analog- and switching output
- linear analog output


**general data**

mounting type	quasi-flush
special type	2 adjust. switching points
measuring distance Sd	0 ... 8 mm
resolution	< 0,01 mm (stat.) < 0,01 mm (dynam.)
repeat accuracy	< 0,015 mm
adjustment	external Teach-in
linearity error	± 32 µm
temperature drift	± 5 % (Full Scale)

**electrical data**

response time (factory characteristic)	< 2 ms
response time (teach in characteristic)	< 3,1 ms
voltage supply range +Vs	15 ... 30 VDC
current consumption max. (no load)	20 mA
output circuit	voltage output / PNP
output signal	0 ... 10 VDC
load resistance	> 1000 Ohm
output current	< 10 mA (PNP)
voltage drop Vd	< 5 VDC (PNP)
short circuit protection	yes
reverse polarity protection	yes

**mechanical data**

type	cylindrical threaded
housing material	brass nickel plated
dimension	18 mm
housing length	60 mm
connection types	connector M12

**ambient conditions**

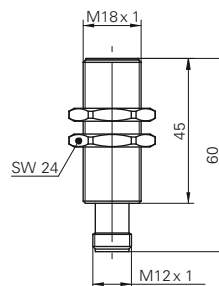
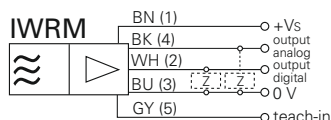
operating temperature	-10 ... +70 °C
protection class	IP 67

**connectors and mating connectors**

ESG 34CH0200	Connector M12, 5 pin, straight, 2 m
ESW 33CH0200	Connector M12, 5 pin, angular, 2 m
ESW 33CH0500	Connector M12, 5 pin, angular, 5 m
additional cable connectors and field wireable connectors: see accessories	

**accessories**

10151658	Sensofix series 18
10141584	Teach-in Adapter M12
10163979	Converter 3-point (M12)
for details: see accessories section	

**order reference**
**IWRM 18Z8704/S14C**
**dimension drawing**

**connection diagram**




**Sd = 0 ... 8 mm**

- large measuring distance
- operating temperature -40 ... +70°C



**general data**

mounting type	quasi-flush
special type	Outdoor design
measuring distance Sd	0 ... 8 mm
resolution	< 0,005 mm (stat.) < 0,01 mm (dynam.)
repeat accuracy	< 0,015 mm
linearity error	± 400 µm
temperature drift	± 10 % (Full Scale)

**electrical data**

response time (factory characteristic)	< 2 ms
voltage supply range +Vs	15 ... 30 VDC
current consumption max. (no load)	40 mA
output circuit	current output
output signal	4 ... 20 mA
load resistance +Vs min.	< 330 Ohm
load resistance +Vs max.	< 1000 Ohm
short circuit protection	yes
reverse polarity protection	yes

**mechanical data**

type	cylindrical threaded
material (sensing face)	PBT
housing material	brass nickel plated
dimension	18 mm
housing length	60 mm
connection types	connector M12

**ambient conditions**

operating temperature	-40 ... +70 °C
protection class	IP 67

**connectors and mating connectors**

ESG 34SH0200	Connector M12, 3 pin, straight, 2 m
ESW 33SH0200	Connector M12, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	

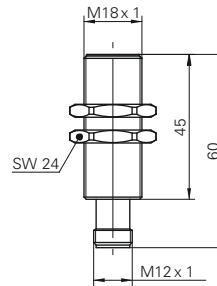
**accessories**

10151658	Sensofix series 18
for details: see accessories section	

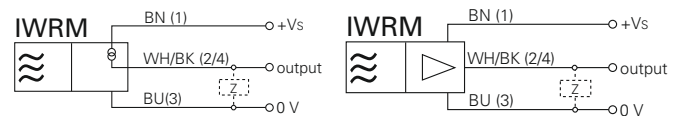
**order reference**

**IWRM 18I97T4/S14**

**dimension drawing**



**connection diagrams**




**Sd = 0 ... 7 mm**

- robust steel housing
- protection class IP 69K & proTect+
- operating temperature -40 ... +70°C


**general data**

mounting type	quasi-flush
special type	Outdoor design Washdown design
measuring distance Sd	0 ... 7 mm
resolution	< 0,005 mm (stat.) < 0,01 mm (dynam.)
repeat accuracy	< 0,015 mm
linearity error	± 350 µm
temperature drift	± 10 % (Full Scale)
approvals/certificates	Ecolab

**electrical data**

response time (factory characteristic)	< 2 ms
voltage supply range +Vs	15 ... 30 VDC
current consumption max. (no load)	40 mA
output circuit	current output
output signal	4 ... 20 mA
load resistance +Vs min.	< 330 Ohm
load resistance +Vs max.	< 1000 Ohm
short circuit protection	yes
reverse polarity protection	yes

**mechanical data**

type	cylindrical threaded
material (sensing face)	LCP
housing material	stainless steel 1.4404 (V4A)
dimension	18 mm
housing length	60 mm
connection types	connector M12

**ambient conditions**

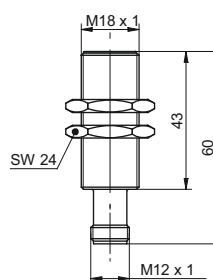
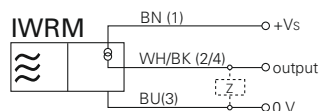
operating temperature	-40 ... +70 °C
cleaning temperature	70 ... +85 °C (30 min/day)
protection class	IP 68/69K & proTect+

**connectors and mating connectors**

ESG 34SH0200	Connector M12, 3 pin, straight, 2 m
ESW 33SH0200	Connector M12, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	

**accessories**

10151658	Sensofix series 18
for details: see accessories section	

**order reference**
**IWRR 18I97T4/S14**
**dimension drawing**

**connection diagram**




Sd = 5 ... 10 mm



**general data**

mounting type	flush
measuring speed	< 1,5 mm / ms
repeat accuracy	< 0,02 mm
temperature coefficient	1 µm / (K mm)

**electrical data**

voltage supply range +Vs	15 ... 30 VDC
residual output ripple	< 0,5 % Vs
short circuit protection	yes
reverse polarity protection	yes

**voltage output**

current consumption max. (no load)	20 mA
output signal	1 ... 9 VDC
load resistance	> 1000 Ohm

**current output**

current consumption max. (no load)	35 mA
output signal	4 ... 20 mA
load resistance +Vs min.	< 500 Ohm
load resistance +Vs max.	< 1000 Ohm

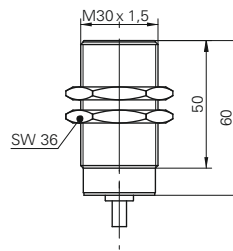
**mechanical data**

type	cylindrical threaded
housing material	brass nickel plated
dimension	30 mm
housing length	60 mm
connection types	cable, 2 m

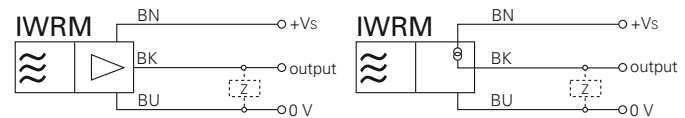
**ambient conditions**

operating temperature	0 ... +60 °C
protection class	IP 67

**dimension drawing**



**connection diagrams**



order reference	measuring distance Sd	reference distance	output circuit	linearity error
IWRM 30I9501	5 ... 10 mm	7,1 ... 7,9 mm	current output	± 200 µm
IWRM 30U9501	5 ... 10 mm	7,1 ... 7,9 mm	voltage output	± 200 µm
IWRM 30U9502	5 ... 9 mm	6,7 ... 7,3 mm	voltage output	± 150 µm

IWRM 30 Sd = 5 ... 10 mm Inductive distance measuring sensors AlphaProx



**Sd = 0 ... 16 mm**

- large measuring distance
- short response time
- extended immunity against electrical interference



**general data**

mounting type	quasi-flush
measuring distance Sd	0 ... 16 mm
resolution	< 0,005 mm (stat.) < 0,01 mm (dynam.)
repeat accuracy	< 0,015 mm
linearity error	± 1600 µm
temperature drift	± 5 % (Full Scale)

**electrical data**

response time (factory characteristic)	< 2 ms
voltage supply range +Vs	15 ... 30 VDC
current consumption max. (no load)	20 mA
short circuit protection	yes
reverse polarity protection	yes

**voltage output**

output signal	0 ... 10 VDC
load resistance	> 1000 Ohm

**current output**

output signal	4 ... 20 mA
load resistance +Vs min.	< 330 Ohm
load resistance +Vs max.	< 1000 Ohm

**mechanical data**

type	cylindrical threaded
housing material	brass nickel plated
dimension	30 mm
housing length	63 mm
connection types	connector M12

**ambient conditions**

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

**connectors and mating connectors**

ESG 34SH0200	Connector M12, 3 pin, straight, 2 m
ESW 33SH0200	Connector M12, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	

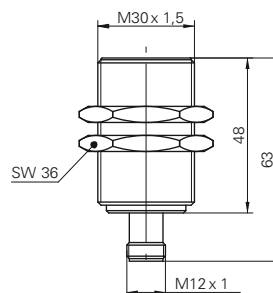
**accessories**

10163979	Converter 3-point (M12)
for details: see accessories section	

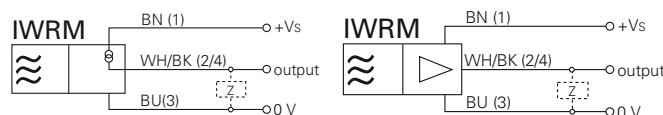
**order reference**                      **output circuit**

<b>IWRM 30I9704/S14</b>	current output
<b>IWRM 30U9704/S14</b>	voltage output

**dimension drawing**



**connection diagrams**



IWRM 30 Sd = 0 ... 16 mm

Inductive distance measuring sensors *AlphaProx*




**Sd = 0 ... 16 mm**

- external Teach-in
- integrated analog and switching output
- linear analog output


**general data**

mounting type	quasi-flush
special type	2 adjust. switching points
measuring distance Sd	0 ... 16 mm
resolution	< 0,01 mm (stat.) < 0,01 mm (dynam.)
repeat accuracy	< 0,015 mm
adjustment	external Teach-in
linearity error	± 160 µm
temperature drift	± 5 % (Full Scale)

**electrical data**

response time (factory characteristic)	< 2,5 ms
response time (teach in characteristic)	< 3,1 ms
voltage supply range +Vs	15 ... 30 VDC
current consumption max. (no load)	20 mA
output circuit	voltage output / PNP
output signal	0 ... 10 VDC
load resistance	> 1000 Ohm
output current	< 10 mA (PNP)
voltage drop Vd	< 5 VDC (PNP)
short circuit protection	yes
reverse polarity protection	yes

**mechanical data**

type	cylindrical threaded
housing material	brass nickel plated
dimension	30 mm
housing length	62 mm
connection types	connector M12

**ambient conditions**

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

**connectors and mating connectors**

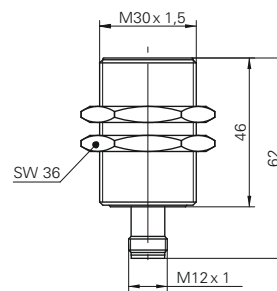
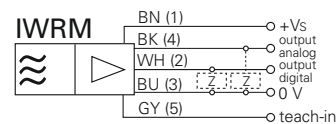
ESG 34CH0200	Connector M12, 5 pin, straight, 2 m
ESW 33CH0200	Connector M12, 5 pin, angular, 2 m
ESW 33CH0500	Connector M12, 5 pin, angular, 5 m

additional cable connectors and field wireable connectors: see accessories

**accessories**

10152386	Sensofix series 30
10141584	Teach-in Adapter M12
10163979	Converter 3-point (M12)

for details: see accessories section

**order reference**
**IWRM 30Z8704/S14C**
**dimension drawing**

**connection diagram**



**Sd = 0 ... 1 mm**

- very high resolution
- short response time


**general data**

mounting type	quasi-flush
measuring distance Sd	0 ... 1 mm
resolution	< 0,001 mm (stat.) < 0,005 mm (dynam.)
repeat accuracy	< 0,01 mm
linearity error	± 70 µm
temperature drift	± 5 % (Full Scale)

**electrical data**

response time (factory characteristic)	< 0,5 ms
voltage supply range +Vs	15 ... 30 VDC
current consumption max. (no load)	15 mA
output circuit	voltage output
output signal	0 ... 10 VDC
load resistance	> 1000 Ohm
short circuit protection	yes
reverse polarity protection	yes

**mechanical data**

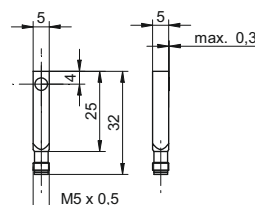
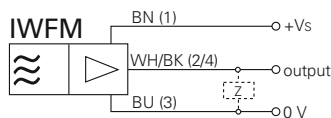
type	rectangular
housing material	stainless steel
dimension	5 mm
housing length	32 mm
connection types	connector M5

**ambient conditions**

operating temperature	10 ... +60 °C
protection class	IP 67

**connectors and mating connectors**

ESG 05SP0200	Connector M5, 3 pin, straight, 2 m
ESW 05SP0200	Connector M5, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	

**order reference**
**IWFM 05U9701/S05**
**dimension drawing**

**connection diagram**




**Sd = 0 ... 2 mm**



- very high resolution
- short response time

**general data**

mounting type	quasi-flush
measuring distance Sd	0 ... 2 mm
resolution	< 0,001 mm (stat.) < 0,005 mm (dynam.)
repeat accuracy	< 0,02 mm
linearity error	± 100 µm
temperature drift	± 5 % (Full Scale)

**electrical data**

response time (factory characteristic)	< 1 ms
current consumption max. (no load)	10 mA
output circuit	voltage output
load resistance	> 3000 Ohm
short circuit protection	yes
reverse polarity protection	yes

**mechanical data**

type	rectangular
housing material	die-cast zinc nickel plated
dimension	8 mm
housing length	16 mm

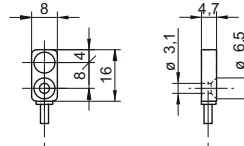
**ambient conditions**

operating temperature	10 ... +60 °C
protection class	IP 67

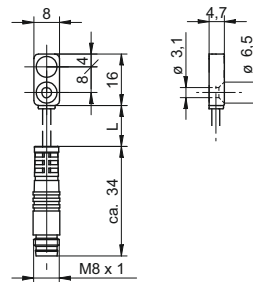
**connectors and mating connectors**

ESG 32SH0200	Connector M8, 3 pin, straight, 2 m
ESW 31SH0200	Connector M8, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	

**dimension drawing**

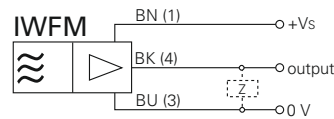


**flylead connector version**



standard cable length 200 mm (L)

**connection diagram**



order reference	output signal	voltage supply range +Vs	connection types
IWFM 08U6501	0 ... 5 VDC	10,8 ... 14,4 VDC	cable, 2 m
IWFM 08U6501/KS35	0 ... 5 VDC	10,8 ... 14,4 VDC	flylead connector M8
IWFM 08U9501	0 ... 10 VDC	15 ... 30 VDC	cable, 2 m
IWFM 08U9501/KS35	0 ... 10 VDC	15 ... 30 VDC	flylead connector M8


**Sd = 0 ... 4 mm**

- very high resolution
- short response time
- integrated current- and voltage output


**general data**

mounting type	flush
measuring distance Sd	0 ... 4 mm
linearity error	± 4 % (S = 0,5 ... 4 mm Full Scale)
temperature drift	± 4 % (Full Scale)

**electrical data**

voltage supply range +Vs	15 ... 30 VDC
current consumption max. (no load)	40 mA
output circuit	voltage - / current output
output signal	0 ... 10 V / 4 ... 20 mA
load resistance	> 1000 Ohm (Uout) / 330 ... 1000 Ohm (Iout)
voltage drop Vd	< 7,2 VDC (Iout)
short circuit protection	yes
reverse polarity protection	yes

**mechanical data**

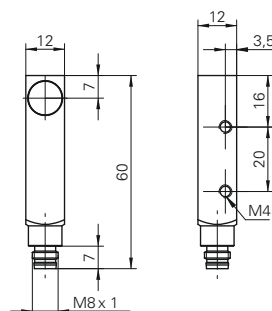
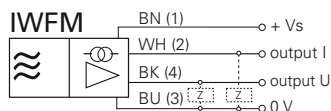
type	rectangular
housing material	brass nickel plated
dimension	12 mm
housing length	60 mm
connection types	connector M8

**ambient conditions**

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

**connectors and mating connectors**

ESG 32AH0200	Connector M8, 4 pin, straight, 2 m
ESW 31AH0200	Connector M8, 4 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	

**dimension drawing**

**connection diagram**


order reference	resolution	repeat accuracy	response time (factory characteristic)
IWFM 12L9504/S35A	< 0,005 mm	< 0,01 mm	< 2 ms
IWFM 12L9505/S35A	< 0,001 mm	< 0,005 mm	< 30 ms


**Sd = 1 ... 2 mm**

**general data**

mounting type	flush
measuring distance Sd	1 ... 2 mm
reference distance	1,35 ... 1,65 mm
measuring speed	< 0,5 mm / ms
repeat accuracy	< 0,02 mm
linearity error	± 80 µm
temperature coefficient	1 µm / (K mm)

**electrical data**

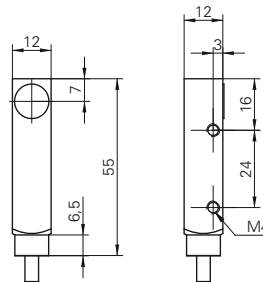
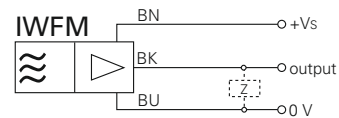
voltage supply range +Vs	15 ... 30 VDC
current consumption max. (no load)	20 mA
output circuit	voltage output
output signal	1 ... 9 VDC
load resistance	> 1000 Ohm
residual output ripple	< 0,5 % Vs
short circuit protection	yes
reverse polarity protection	yes

**mechanical data**

type	rectangular
housing material	brass nickel plated
dimension	12 mm
housing length	55 mm
connection types	cable, 2 m

**ambient conditions**

operating temperature	0 ... +60 °C
protection class	IP 67

**order reference**
**IWFM 12U9501/O1**
**dimension drawing**

**connection diagram**



**Sd = 0 ... 4 mm**

- very high resolution
- short response time
- linear analog output


**general data**

mounting type	flush
measuring distance Sd	0 ... 4 mm
temperature drift	± 5 % (Full Scale)

**voltage - / current output**

linearity error	± 4 % (S = 0,5 ... 4 mm Full Scale)
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**voltage output**

linearity error	± 0,4 %
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**electrical data**

voltage supply range +Vs	15 ... 30 VDC
short circuit protection	yes
reverse polarity protection	yes

**voltage - / current output**

current consumption max. (no load)	40 mA
output signal	0 ... 10 V / 4 ... 20 mA
load resistance	> 1000 Ohm (Uout) / 330 ... 1000 Ohm (Iout)
voltage drop Vd	< 7,2 VDC (Iout)

**voltage output**

current consumption max. (no load)	20 mA
output signal	0 ... 10 VDC

**mechanical data**

type	rectangular
housing material	brass nickel plated
dimension	18 mm
housing length	30 mm
connection types	connector M8

**ambient conditions**

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

**connectors and mating connectors**

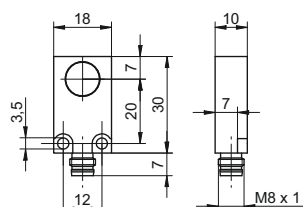
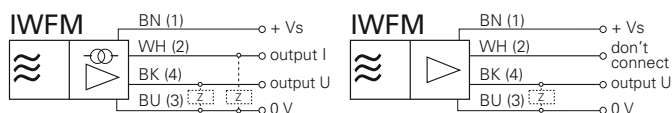
ESG 32AH0200	Connector M8, 4 pin, straight, 2 m
ESW 31AH0200	Connector M8, 4 pin, angular, 2 m

additional cable connectors and field wireable connectors: see accessories

**accessories**

10152385	Sensofix series 18/20 inductive rectangular
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for details: see accessories section

**dimension drawing**

**connection diagrams**


order reference	resolution	repeat accuracy	output circuit	response time (factory characteristic)	linearity error
IWFM 18L9504/S35A	< 0,005 mm	< 0,01 mm	voltage - / current output	< 2 ms	± 4 % (S = 0,5 ... 4 mm Full Scale)
IWFM 18L9505/S35A	< 0,001 mm	< 0,05 mm	voltage - / current output	< 30 ms	± 4 % (S = 0,5 ... 4 mm Full Scale)
IWFM 18U7504/S35A	< 0,005 mm	< 0,01 mm	voltage output	< 2,5 ms	± 0,4 %


**Sd = 2 ... 5 mm**

**general data**

mounting type	flush
measuring speed	< 1 mm / ms
repeat accuracy	< 0,01 mm
temperature coefficient	1 µm / (K mm)

**electrical data**

voltage supply range +Vs	15 ... 30 VDC
residual output ripple	< 0,5 % Vs
short circuit protection	yes
reverse polarity protection	yes

**voltage output**

current consumption max. (no load)	20 mA
output signal	1 ... 9 VDC
load resistance	> 1000 Ohm

**current output**

current consumption max. (no load)	35 mA
output signal	4 ... 20 mA
load resistance +Vs min.	< 500 Ohm
load resistance +Vs max.	< 1000 Ohm

**mechanical data**

type	rectangular
housing material	brass nickel plated
dimension	20 mm
housing length	35 mm
connection types	connector M8

**ambient conditions**

operating temperature	0 ... +60 °C
protection class	IP 67

**connectors and mating connectors**

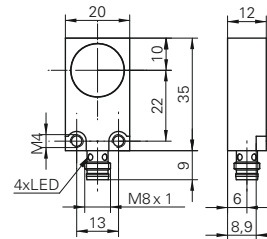
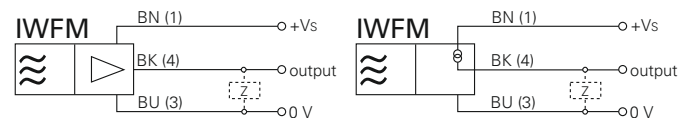
ESG 32SH0200	Connector M8, 3 pin, straight, 2 m
ESW 31SH0200	Connector M8, 3 pin, angular, 2 m

additional cable connectors and field wireable connectors: see accessories

**accessories**

10152385	Sensofix series 18/20 inductive rectangular
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for details: see accessories section

**dimension drawing**

**connection diagrams**


order reference	measuring distance Sd	reference distance	output circuit	linearity error
IWFM 20I9501/S35	2 ... 5 mm	3,25 ... 3,75 mm	current output	± 100 µm
IWFM 20I9503/S35	2 ... 3 mm	2,35 ... 2,65 mm	current output	± 60 µm
IWFM 20U9501/S35	2 ... 5 mm	3,25 ... 3,75 mm	voltage output	± 100 µm
IWFM 20U9503/S35	2 ... 3 mm	2,35 ... 2,65 mm	voltage output	± 60 µm


**Sd = 0 ... 2 mm**

- small linearity error
- very short response time


**general data**

mounting type	flush
measuring distance Sd	0 ... 2 mm
resolution	< 0,001 mm (stat.) < 0,005 mm (dynam.)
repeat accuracy	< 0,01 mm
linearity error	± 40 µm
temperature drift	± 2 % (Full Scale)

**electrical data**

response time (factory characteristic)	< 0,5 ms
voltage supply range +Vs	15 ... 30 VDC
current consumption max. (no load)	20 mA
output circuit	voltage output
output signal	0 ... 10 VDC
load resistance	> 1000 Ohm
short circuit protection	yes
reverse polarity protection	yes

**mechanical data**

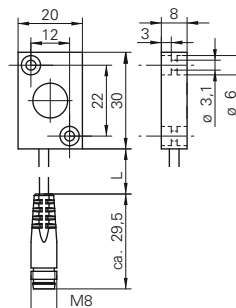
type	rectangular
housing material	brass nickel plated
dimension	20 mm
housing length	30 mm
connection types	flylead connector M8

**ambient conditions**

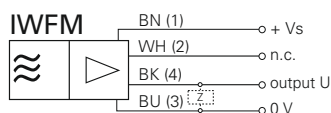
operating temperature	-10 ... +70 °C
protection class	IP 67

**connectors and mating connectors**

ESG 32AH0200	Connector M8, 4 pin, straight, 2 m
ESW 31AH0200	Connector M8, 4 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	

**order reference**
**IWFM 20U9509/KS35AP**
**dimension drawing**


standard cable length 200 mm (L)

**connection diagram**





**Sd = 0 ... 10 mm**

- internal Teach-in
- integrated Analog- and switching output
- linear analog output


**general data**

mounting type	quasi-flush
measuring distance Sd	0 ... 10 mm
resolution	< 0,01 mm (stat.) < 0,01 mm (dynam.)
repeat accuracy	< 0,015 mm
adjustment	Teach-in
linearity error	± 50 µm
temperature drift	± 5 % (Full Scale)

**electrical data**

response time (factory characteristic)	< 2,5 ms
response time (teach in characteristic)	< 3,1 ms
voltage supply range +Vs	15 ... 30 VDC
current consumption max. (no load)	20 mA
output circuit	voltage output / PNP
output signal	0 ... 10 VDC
load resistance	> 1000 Ohm
output current	< 10 mA (PNP)
voltage drop Vd	< 5 VDC (PNP)
short circuit protection	yes
reverse polarity protection	yes

**mechanical data**

type	rectangular
housing material	polyester
dimension	20 mm
housing length	42 mm
connection types	connector M8

**ambient conditions**

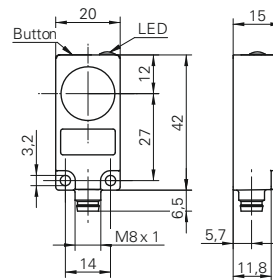
operating temperature	-10 ... +70 °C
protection class	IP 67

**connectors and mating connectors**

ESG 32AH0200	Connector M8, 4 pin, straight, 2 m
ESW 31AH0200	Connector M8, 4 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	

**accessories**

10152385	Sensofix series 18/20 inductive rectangular
for details: see accessories section	

**order reference**
**IWFK 20Z8704/S35A**
**dimension drawing**

**connection diagram**
