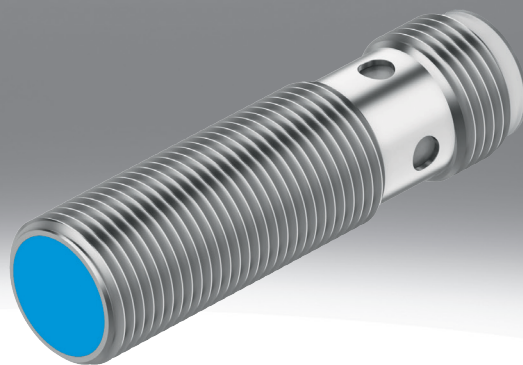


## Distance sensor SOIA

**FESTO**



## Characteristics

### At a glance



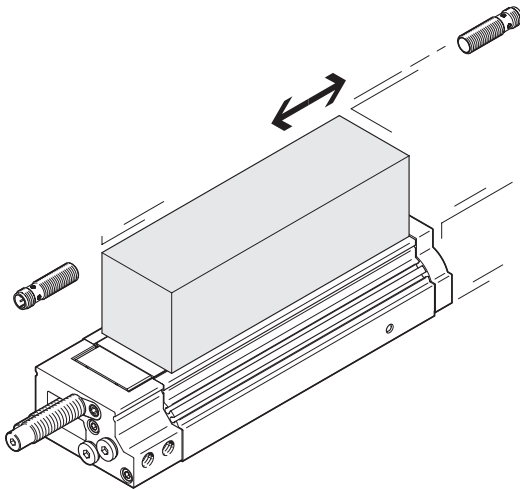
Product characteristics:

- Distance, speed and acceleration sensor
- IO-Link® 1.1 Smart sensor profile
- Sizes: M8, M12, M18, M30, Q40
- Flush and non-flush types
- Plug and cable types
- Distance measuring range up to 30 mm
- Velocity measuring range 0.001 ... 3.00 m/s
- Acceleration measuring range 0.1 ... 3250 m/s<sup>2</sup>

Advantages:

- Unique sensor for monitoring pneumatic, hydraulic and elastic cushioning (impact energy)
- Replacement for standard inductive proximity switches in SIO mode
- Enables predictive maintenance
- Preventing expensive production downtime
- Savings thanks to avoiding oversized actuators
- Cost effective

### Application example



## Type code

001	Series
SOIA	Distance sensor

002	Design
M8P	Round, M8x1
M12P	Round, M12x1
M18P	Round, M18x1
M30P	Round, M30x1.5
Q40	Cube 40 mm

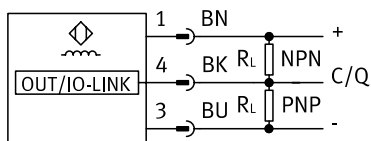
003	Mounting type
B	Flush
NB	Not flush

004	Switching input/output
PNLK	PNP or NPN or IO-Link®

005	Electrical connection
LE	Open end
M8	Plug M8, A-coded
M12	Plug M12, A-coded

# Datasheet

## General technical data



Size	M8	M12	M18	M30	Q40
Measuring principle	Inductive				
Measurement method	Distance sensor				
Measured variable	Position, Path/displacement				
UKCA marking (see declaration of conformity)	To UK instructions for EMC, To UK RoHS instructions				
Conforms to standard	EN 60947-5-2				
Approval	c UL us listed (OL)				
CE mark (see declaration of conformity) <sup>1)</sup>	To EU EMC Directive, In accordance with EU RoHS Directive				
LABS (PWIS) conformity	VDMA24364-B2-L				
Note on materials	RoHS-compliant				

1) For information about the area of use, see the declaration of conformity at: [www.festo.com/catalogue/soia](http://www.festo.com/catalogue/soia) → Support/Downloads.

If the devices are subject to usage restrictions in residential, commercial or industrial environments as well as small businesses, further measures for reducing the emitted interference may be necessary.

## Input signal, measuring element

Size	M8		M12	
Mounting type	Flush	Not flush	Flush	Not flush
Reference material	8 mm x 8 mm x 1 mm Structural steel, 1.0037, S235JR	12 mm x 12 mm x 1 mm Structural steel, 1.0037, S235JR	24 mm x 24 mm x 1 mm Structural steel, 1.0037, S235JR	24 mm x 24 mm x 1 mm Structural steel, 1.0037, S235JR
Displacement measuring range	0 ... 2 mm	0 ... 4 mm	0 ... 7 mm	0 ... 7 mm
Measurement range speed	1 ... 800 mm/s	1 ... 1,100 mm/s	1 ... 1,400 mm/s	1 ... 2,100 mm/s
Displacement resolution	0.01 mm			
Repetition accuracy	±0.02 mm	±0.04 mm	±0.07 mm	±0.07 mm
Linearity error in ± %FS	3%			
Temperature drift	±10%			
Repetition accuracy speed	+/- 5% FS			
Accuracy speed	+/- 20% FS			
Acceleration value range	-3,270 ... 3,270 m/s <sup>2</sup>			

## Input signal, measuring element, basic type

Size	M18		M30	
Mounting type	Flush	Not flush	Flush	Not flush
Reference material	24 mm x 24 mm x 1 mm Structural steel, 1.0037, S235JR	36 mm x 36 mm x 1 mm Structural steel, 1.0037, S235JR	30 mm x 30 mm x 1 mm Structural steel, 1.0037, S235JR	60 mm x 60 mm x 1 mm Structural steel, 1.0037, S235JR
Displacement measuring range	0 ... 8 mm	0 ... 12 mm	0 ... 10 mm	0 ... 20 mm
Measurement range speed	1 ... 2,700 mm/s	1 ... 3,000 mm/s	1 ... 2,400 mm/s	1 ... 3,000 mm/s
Displacement resolution	0.01 mm			
Repetition accuracy	±0.08 mm	±0.12 mm	±0.1 mm	±0.2 mm
Linearity error in ± %FS	3%			
Temperature drift	±10%			
Repetition accuracy speed	+/- 5% FS			
Accuracy speed	+/- 20% FS			
Acceleration value range	-3,270 ... 3,270 m/s <sup>2</sup>			

## Datasheet

Input signal, measuring element, basic type	
Size	Q40
Mounting type	Not flush
Reference material	90 mm x 90 mm x 1 mm Structural steel, 1.0037, S235JR
Displacement measuring range	0 ... 30 mm
Measurement range speed	1 ... 3,000 mm/s
Displacement resolution	0.01 mm
Repetition accuracy	±0.3 mm
Linearity error in ± %FS	3%
Temperature drift	±10%
Repetition accuracy speed	+/- 5% FS
Accuracy speed	+/- 20% FS
Acceleration value range	-3,270 ... 3,270 m/s <sup>2</sup>

Switching output, M8, M12				
Size	M8		M12	
Mounting type	Flush	Not flush	Flush	Not flush
Switching output	PNP/NPN, switchable, Push-pull			
Switching element function	Switchable			
Rated operating distance	0 ... 2 mm	0 ... 4 mm	0 ... 7 mm	
Note on rated operating distance	SSC1.SP1: 1.7 mm SSC2.SP1: 1.0 mm Factory setting	SSC1.SP1: 3.4 mm SSC2.SP1: 2.0 mm Factory setting	SSC1.SP1: 5.95 mm SSC2.SP1: 3.5 mm Factory setting	
Hysteresis	1 ... 20 %FS			
Note on hysteresis	Factory setting: 5% FS			
Max. switching frequency	750 Hz	1,400 Hz	1,200 Hz	1,400 Hz

Switching output, M18, M30, Q40				
Size	M18		M30	
Mounting type	Flush	Not flush	Flush	Not flush
Switching output	PNP/NPN, switchable, Push-pull			
Switching element function	Switchable			
Rated operating distance	0 ... 8 mm	0 ... 12 mm	0 ... 10 mm	0 ... 20 mm
Note on rated operating distance	SSC1.SP1: 6.8 mm SSC2.SP1: 4.0 mm Factory setting	SSC1.SP1: 10.2 mm SSC2.SP1: 6.0 mm Factory setting	SSC1.SP1: 8.5 mm SSC2.SP1: 5.0 mm Factory setting	SSC1.SP1: 17.0 mm SSC2.SP1: 10.0 mm Factory setting
Hysteresis	1 ... 20 %FS			
Note on hysteresis	Factory setting: 5% FS			
Max. switching frequency	1,200 Hz	1,100 Hz	1,300 Hz	400 Hz

Switching output, basic type	
Size	Q40
Mounting type	Not flush
Switching output	PNP/NPN, switchable, Push-pull
Switching element function	Switchable
Rated operating distance	0 ... 30 mm
Note on rated operating distance	SSC1.SP1: 20.5 mm SSC2.SP1: 15.0 mm Factory setting
Hysteresis	1 ... 20 %FS
Note on hysteresis	Factory setting: 5% FS
Max. switching frequency	250 Hz

## Datasheet

Electronics					
Size	M8	M12	M18	M30	Q40
Operational voltage range DC	10 ... 30 V				
Note on operational voltage range DC	18 - 30 V in IO-Link mode				
Residual ripple	20%				
Max. output current	100 mA				
Min. load current	0 mA				
No-load supply current	17 mA				22 mA
Off-state current	0.03 mA				
Reverse polarity protection	yes				
Short circuit current rating	Pulsed				
Overload protection	Available				
Inductive protective circuit	Integrated				
Voltage drop	≤1 V				
Immunity to surge	0.5 kV				
Insulation voltage	30 V				
Switching status indication	Yellow LED				
Ready status indication	–				Green LED

IO-Link®	
Protocol	IO-Link®
IO-Link, revision ID	V1.1
IO-Link, device profile	Function Object detection Function Product URI Function Teach two values Identification and diagnostics Smart sensor - SSP 4.1.1
IO-Link, transmission rate	COM2
IO-Link, SIO-Mode support	Yes
IO-Link, port type	Class A
IO-Link, process data length input	32 bit
IO-Link, Process data content IN	Distance measurement 16 bit MDC Distance monitoring 2 bit SSC Maintenance warning 1 bit DSC Motion diagnostic 2 bit DSC
Reverse polarity protection	yes
IO-Link, minimum cycle time	3.2 ms
IO-Link, Data storage required	308 Byte

Electromechanics with plug					
Size	M8	M12	M18	M30	Q40
Electrical connection 1, connection type	Plugs				
Electrical connection 1, connector system	M8x1, A-coded, to EN 61076-2-104	M12x1, A-coded to EN 61076-2-101			
Electrical connection 1, number of connections/cores	3				4
Electrical connection 1, type of mounting	Snap-locking, Screw-type lock, Not rotatable	Screw-type lock, Not rotatable			

## Datasheet

## Electromechanics, cable open end

Size	M8	M12	M18	M30
Electrical connection 1, connection type	Cable			
Electrical connection 1, number of connections/cores	3			
Cable length	2.5 m			
Material cable sheath	PUR			
Cable sheath colour	Grey			
Cable diameter	2.9 mm	3.8 mm		
Nominal cross section conductor	0.14 mm <sup>2</sup>	0.25 mm <sup>2</sup>		

## Mechanics, M8, M12

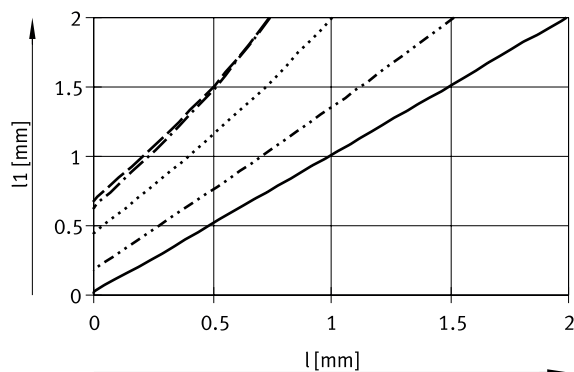
Size	M8	M12	M18	M30	Q40
Tightening torque	0 ... 3 Nm	0 ... 10 Nm	0 ... 30 Nm		
Material housing	Brass PBT				PA
Housing colour	Blue, grey				Blue, Black
Material locknut	Brass				–

## Immission, emission, basic type

Size	M8	M12	M18	M30	Q40
Ambient temperature	-25 ... 70°C				
Storage temperature	-40 ... 85°C				
Degree of protection	IP65, IP67				
Housing pressure resistance	1 bar				–
Immunity to magnetic fields	< 50 µT				
Corrosion resistance class CRC <sup>1)</sup>	3 - high corrosion stress				1 - Low corrosion stress

1) More information: [www.festo.com/x/topic/crc](http://www.festo.com/x/topic/crc)

## SOIA-M8PB-PNLK



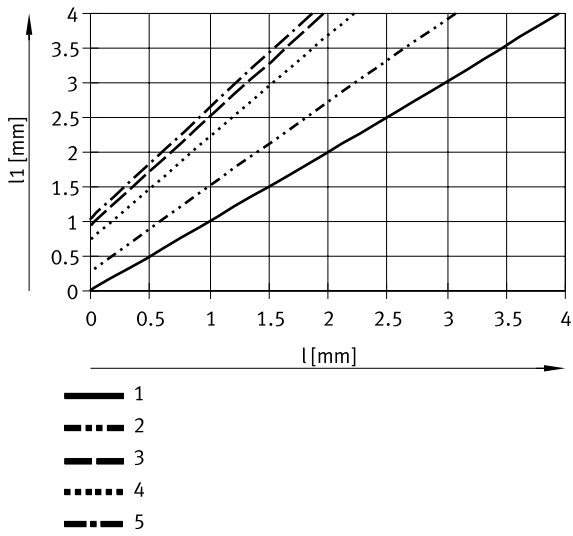
- 1
- - - 2
- · - 3
- · · · 4
- - - - 5

- 1 Steel
- 2 Stainless steel
- 3 Aluminium
- 4 Brass
- 5 Copper

l = Distance  
l1 = Measured value

Datasheet

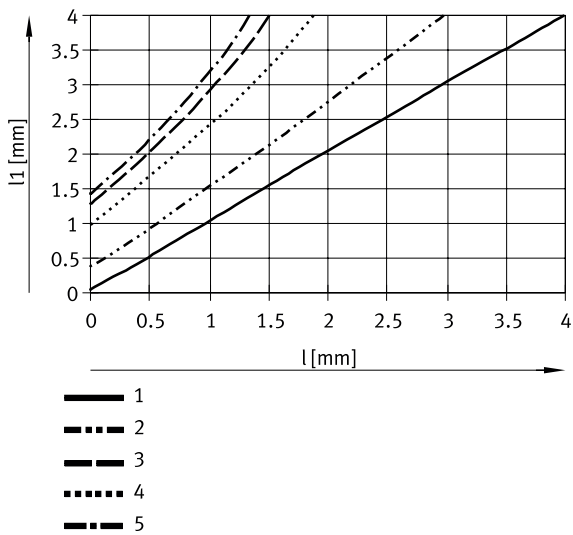
SOIA-M8PNB-PNLK



- 1 Steel
- 2 Stainless steel
- 3 Aluminium
- 4 Brass
- 5 Copper

$l$  = Distance  
 $l_1$  = Measured value

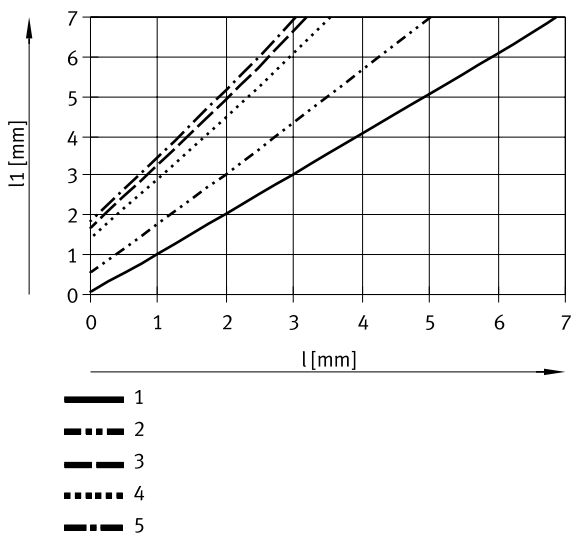
SOIA-M12PB-PNLK



- 1 Steel
- 2 Stainless steel
- 3 Aluminium
- 4 Brass
- 5 Copper

$l$  = Distance  
 $l_1$  = Measured value

SOIA-M12PNB-PNLK

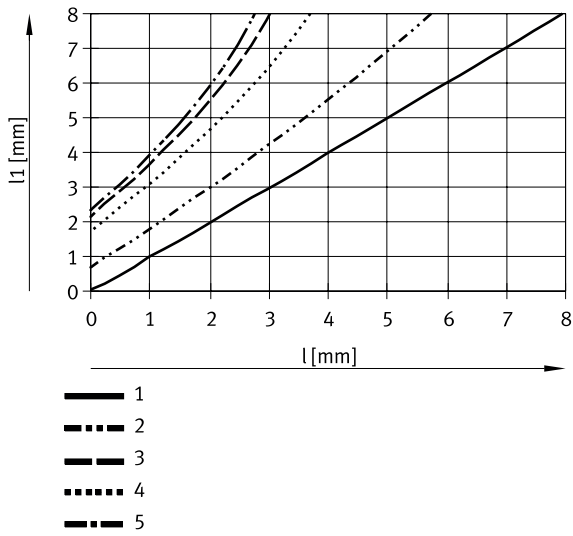


- 1 Steel
- 2 Stainless steel
- 3 Aluminium
- 4 Brass
- 5 Copper

$l$  = Distance  
 $l_1$  = Measured value

Datasheet

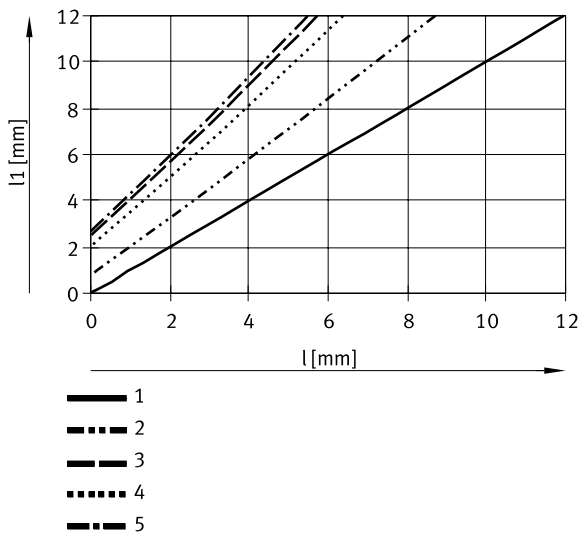
SOIA-M18PB-PNLK



- 1 Steel
- 2 Stainless steel
- 3 Aluminium
- 4 Brass
- 5 Copper

l = Distance  
l1 = Measured value

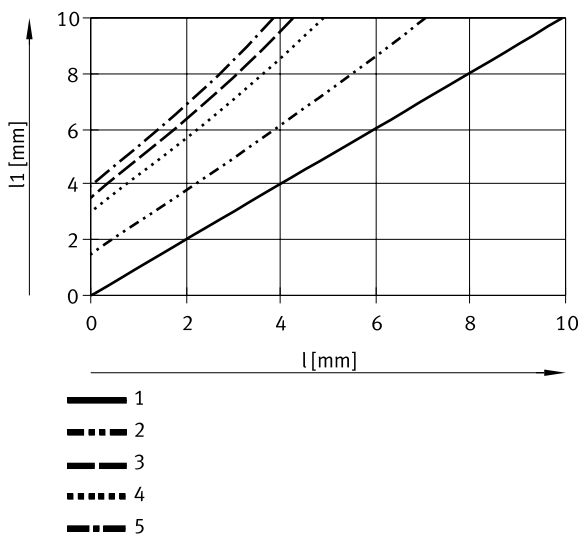
SOIA-M18PNB-PNLK



- 1 Steel
- 2 Stainless steel
- 3 Aluminium
- 4 Brass
- 5 Copper

l = Distance  
l1 = Measured value

SOIA-M30PB-PNLK

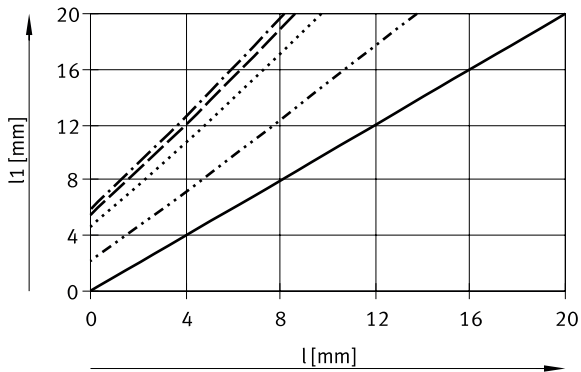


- 1 Steel
- 2 Stainless steel
- 3 Aluminium
- 4 Brass
- 5 Copper

l = Distance  
l1 = Measured value

Datasheet

SOIA-M30PNB-PNLK

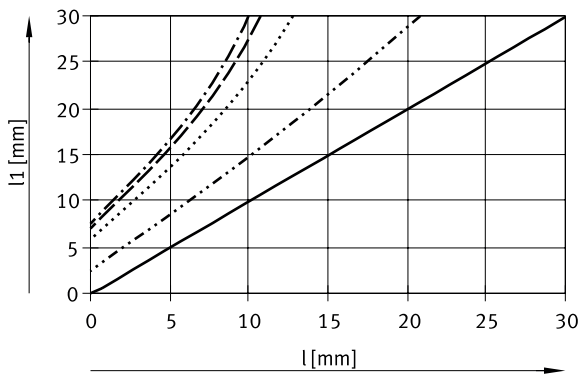


- 1 ——— 1
- 2 - - - - 2
- 3 - · - · 3
- 4 · · · · 4
- 5 - - - - 5

- 1 Steel
- 2 Stainless steel
- 3 Aluminium
- 4 Brass
- 5 Copper

l = Distance  
l1 = Measured value

SOIA-Q40NB-PNLK



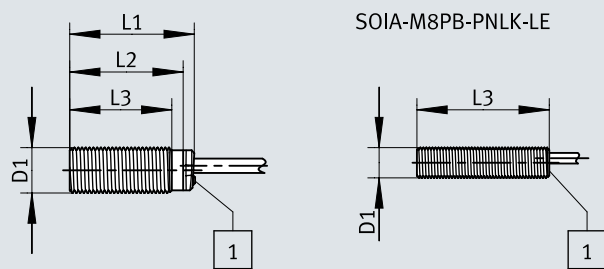
- 1 ——— 1
- 2 - - - - 2
- 3 - · - · 3
- 4 · · · · 4
- 5 - - - - 5

- 1 Steel
- 2 Stainless steel
- 3 Aluminium
- 4 Brass
- 5 Copper

l = Distance  
l1 = Measured value

## Dimensions

Dimensions – SOIA-M...PB-PNLK-LE

Download CAD data [www.festo.com](http://www.festo.com)

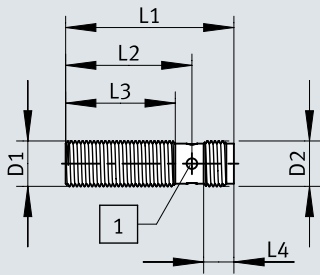
[1] LED

	D1	L1	L2	L3
SOIA-M8PB-PNLK-LE	M8x1	–	–	35
SOIA-M12PB-PNLK-LE	M12x1	33,2	30	27
SOIA-M18PB-PNLK-LE	M18x1	35,9	30	27
SOIA-M30PB-PNLK-LE	M30x1,5	40,3	31,2	28,2

## Dimensions

Dimensions – SOIA-M...PB-PNLK-M...

Download CAD data [www.festo.com](http://www.festo.com)

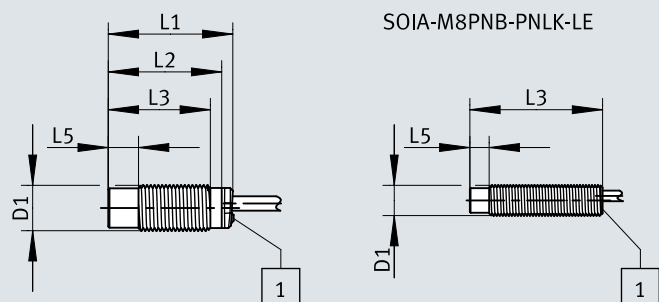


[1] LED

	D1	D2	L1	L2	L3	L4
SOIA-M8PB-PNLK-M8	M8x1	M8x1	45	35,7	30	6
SOIA-M12PB-PNLK-M12	M12x1	M12x1	44,5	33	28,5	8
SOIA-M18PB-PNLK-M12	M18x1	M12x1	46	35,5	27	8
SOIA-M30PB-PNLK-M12	M30x1,5	M12x1	47,2	36,7	28,2	8

## Dimensions

## Dimensions – SOIA-M...PNB-PNLK-LE

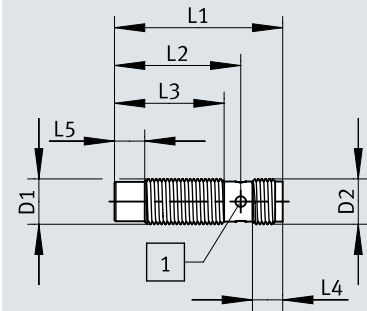
Download CAD data [www.festo.com](http://www.festo.com)

[1] LED

	D1	L1	L2	L3	L5
SOIA-M8PNB-PNLK-LE	M8x1	–	–	35	5
SOIA-M12PNB-PNLK-LE	M12x1	33,2	30	27	8
SOIA-M18PNB-PNLK-LE	M18x1	35,9	30	27	10
SOIA-M30PNB-PNLK-LE	M30x1,5	44,1	35	32	18

## Dimensions

Dimensions – SOIA-M...PNB-PNLK-M...

Download CAD data [www.festo.com](http://www.festo.com)

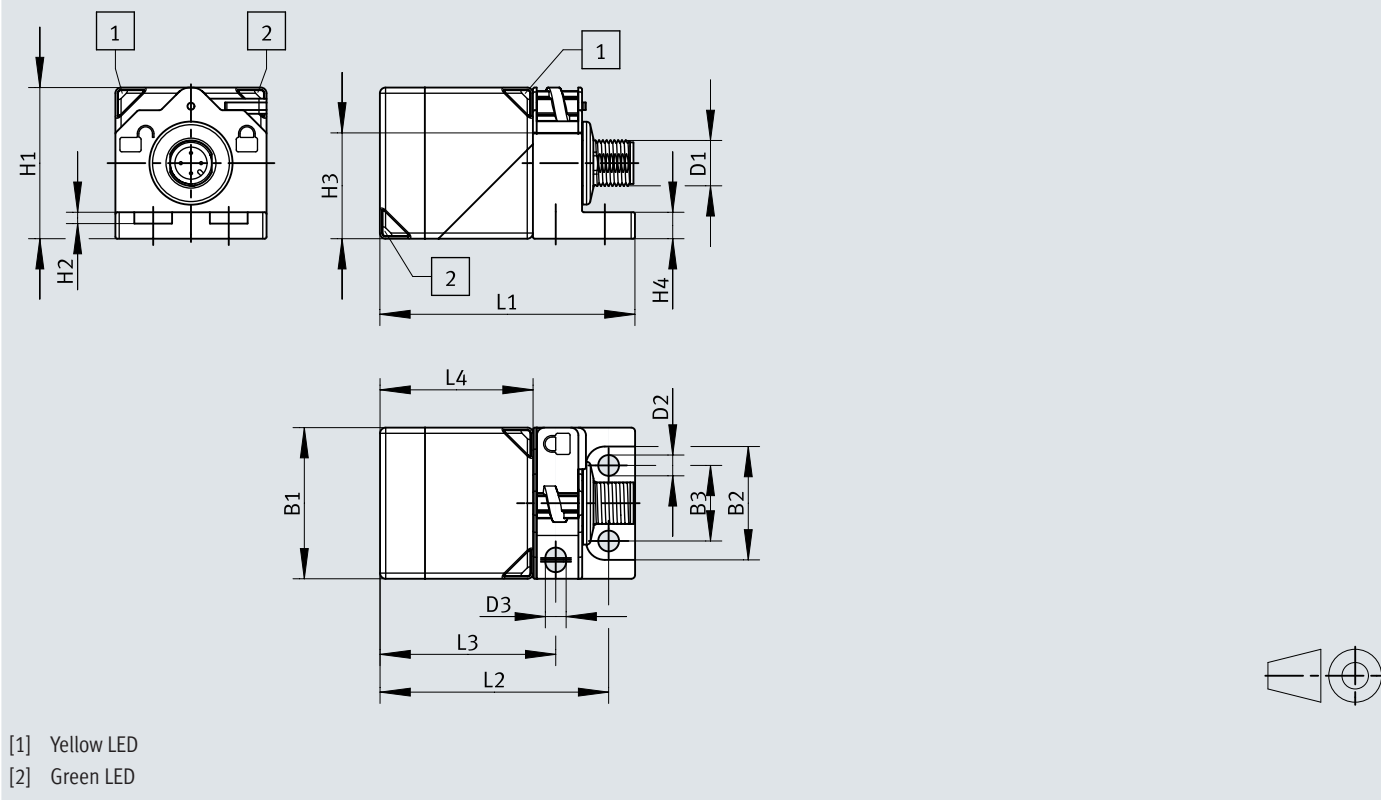
[1] LED

	D1	D2	L1	L2	L3	L4	L5
SOIA-M8PNB-PNLK-M8	M8x1	M8x1	45	35,8	30	6	5
SOIA-M12PNB-PNLK-M12	M12x1	M12x1	44,5	33	28,5	8	8
SOIA-M18PNB-PNLK-M12	M18x1	M12x1	46	35,5	27	8	10
SOIA-M30PNB-PNLK-M12	M30x1,5	M12x1	51	40,5	32	8	18

## Dimensions


Dimensions – SOIA-Q40NB-PNLK-M12

Download CAD data [www.festo.com](http://www.festo.com)




	B1	B2	B3	D1	D2 ∅	D3	H1	H2	H3	H4	L1	L2	L3	L4
SOIA-Q40NB-PNLK-M12	40	30	20	M12x1	5,5	5,5	40	4	28	7	67	60	46	40


## Ordering data

Ordering data M8						
	Rated operating distance	Mounting type <sup>1)</sup>	Electrical connection 1, connection type	Product weight	Part no.	Type
	0 ... 2 mm	Flush	Cable	39 g	<b>8161194</b>	SOIA-M8PB-PNLK-LE
			Plugs	13 g	<b>8161195</b>	SOIA-M8PB-PNLK-M8
	0 ... 4 mm	Not flush	Cable	38 g	<b>8161196</b>	SOIA-M8PNB-PNLK-LE
			Plugs	13 g	<b>8161197</b>	SOIA-M8PNB-PNLK-M8


1) (Sample picture)

Ordering data M12						
	Rated operating distance	Mounting type <sup>1)</sup>	Electrical connection 1, connection type	Product weight	Part no.	Type
	0 ... 4 mm	Flush	Cable	67 g	<b>8161198</b>	SOIA-M12PB-PNLK-LE
			Plugs	21 g	<b>8161199</b>	SOIA-M12PB-PNLK-M12
	0 ... 7 mm	Not flush	Cable	66 g	<b>8161200</b>	SOIA-M12PNB-PNLK-LE
			Plugs	20 g	<b>8161201</b>	SOIA-M12PNB-PNLK-M12


1) (Sample picture)

Ordering data M18						
	Rated operating distance	Mounting type <sup>1)</sup>	Electrical connection 1, connection type	Product weight	Part no.	Type
	0 ... 8 mm	Flush	Cable	87 g	<b>8161202</b>	SOIA-M18PB-PNLK-LE
			Plugs	45 g	<b>8161203</b>	SOIA-M18PB-PNLK-M12
	0 ... 12 mm	Not flush	Cable	83 g	<b>8161204</b>	SOIA-M18PNB-PNLK-LE
			Plugs	42 g	<b>8161205</b>	SOIA-M18PNB-PNLK-M12

1) (Sample picture)

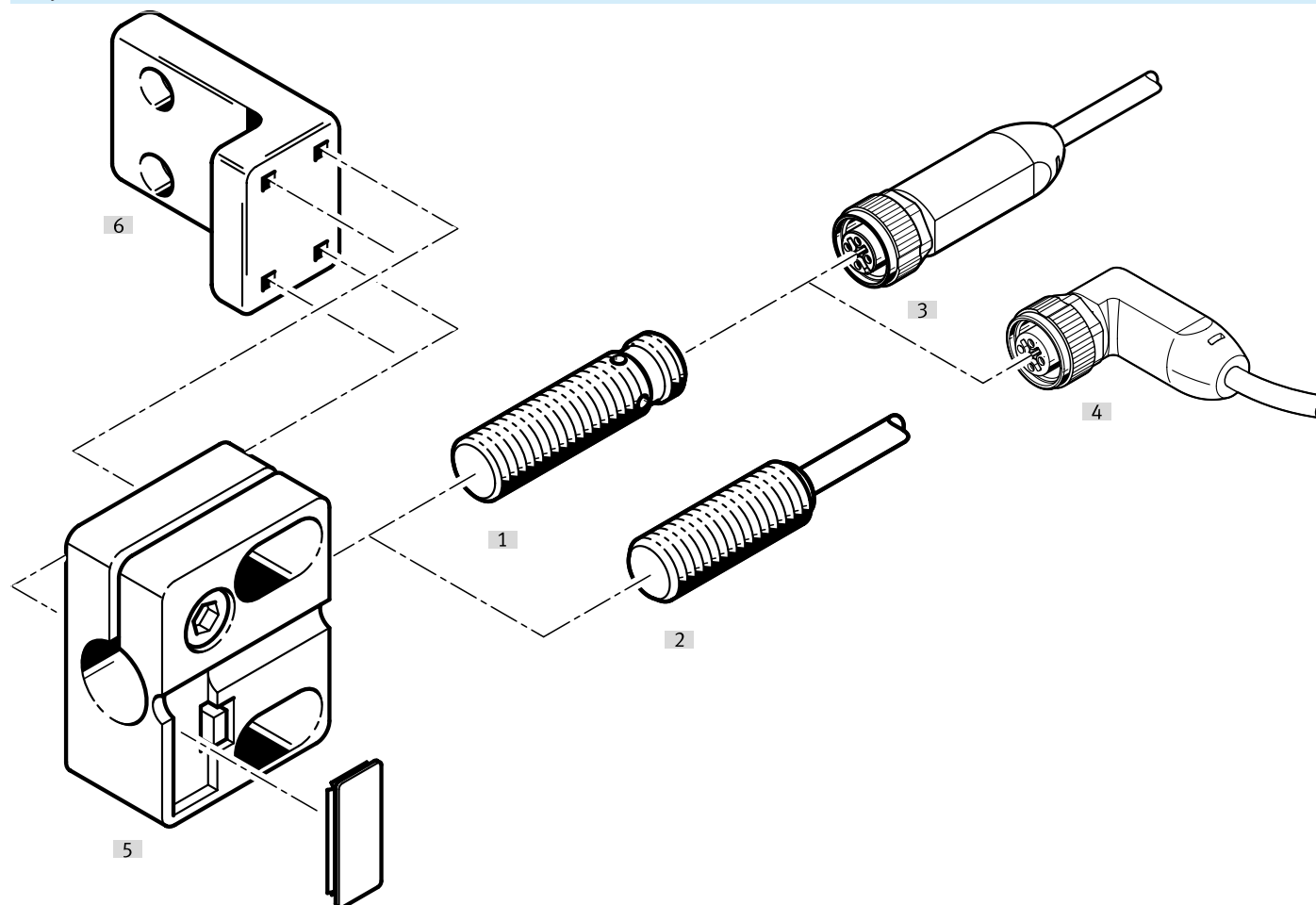
Ordering data M30						
	Rated operating distance	Mounting type <sup>1)</sup>	Electrical connection 1, connection type	Product weight	Part no.	Type
	0 ... 10 mm	Flush	Cable	145 g	<b>8161206</b>	SOIA-M30PB-PNLK-LE
			Plugs	116 g	<b>8161207</b>	SOIA-M30PB-PNLK-M12
	0 ... 20 mm	Not flush	Cable	134 g	<b>8161208</b>	SOIA-M30PNB-PNLK-LE
			Plugs	104 g	<b>8161209</b>	SOIA-M30PNB-PNLK-M12

1) (Sample picture)

Ordering data Q40						
	Rated operating distance	Mounting type	Electrical connection 1, connection type	Product weight	Part no.	Type
	0 ... 30 mm	Not flush	Plugs	145 g	<b>8161210</b>	SOIA-Q40NB-PNLK-M12

## Peripherals

## Peripherals overview



Accessories			→ Link
Type/order code	Description		
[1] Distance sensor SOIA-M12PB-...	Distance sensor, inductive, with plug		<a href="#">soia</a>
[2] Distance sensor SOIA-M12PB-...	Distance sensor, inductive, with cable		<a href="#">soia</a>
[3] Connecting cables NEBA-M12G5-...	Straight socket		<a href="#">18</a>
[4] Connecting cables NEBA-M12W5-...	Angled socket		<a href="#">18</a>
[5] Sensor bracket SIEZ-B-12	For flush mounting		<a href="#">18</a>
[6] Sensor bracket SIEZ-UH	Without stop		<a href="#">19</a>

## Accessories

## Connecting cables, M8 socket, 3-pin, without switching status indication

Electrical connection 1, cable outlet	Electrical connection 2, connector system	Electrical connection 2, cable outlet	Cable length	Product weight	Part no.	Type
Straight	M12x1, A-coded to EN 61076-2-101	Straight	0.5 m	23 g	8078278	NEBA-M8G3-U-0.5-N-M12G3
			1 m	33 g	8078279	NEBA-M8G3-U-1-N-M12G3
			2.5 m	60 g	8078280	NEBA-M8G3-U-2.5-N-M12G3
			5 m	107 g	8078281	NEBA-M8G3-U-5-N-M12G3
	M8x1, A-coded to EN 61076-2-104	Straight	0.5 m	17 g	8078282	NEBA-M8G3-U-0.5-N-M8G3
			1 m	26 g	8078283	NEBA-M8G3-U-1-N-M8G3
			1.5 m	35 g	8078284	NEBA-M8G3-U-1.5-N-M8G3
			2 m	44 g	8078285	NEBA-M8G3-U-2-N-M8G3
			2.5 m	54 g	8078286	NEBA-M8G3-U-2.5-N-M8G3
			5 m	100 g	8078287	NEBA-M8G3-U-5-N-M8G3
			10 m	192 g	8078288	NEBA-M8G3-U-10-N-M8G3
			Open end	Straight	1 m	22 g
	2.5 m	50 g			8078223	NEBA-M8G3-U-2.5-N-LE3
	5 m	96 g			8078224	NEBA-M8G3-U-5-N-LE3
	10 m	188 g			8078225	NEBA-M8G3-U-10-N-LE3
	20 m	373 g			8078226	NEBA-M8G3-U-20-N-LE3
	Angled	Open end	Straight	2.5 m	50 g	8078230
5 m				96 g	8078231	NEBA-M8W3-U-5-N-LE3
10 m				189 g	8078232	NEBA-M8W3-U-10-N-LE3

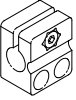
## Connecting cables, M8 socket, 3-pin, with snap-locking

Electrical connection 1, cable outlet	Electrical connection 2, connector system	Cable length	Product weight	Part no.	Type
Straight	Open end	2.5 m	49 g	8078264	NEBA-M8CG3-U-2.5-N-LE3
		5 m	95 g	8078265	NEBA-M8CG3-U-5-N-LE3
Angled	Open end	2.5 m	49 g	8078266	NEBA-M8CW3-U-2.5-N-LE3
		5 m	95 g	8078267	NEBA-M8CW3-U-5-N-LE3

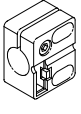
## Connecting cables, M12 socket, 5-pin, without switching status indicator


Electrical connection 1, cable outlet	Electrical connection 2, connector system	Electrical connection 2, number of connections/cores	Cable length	Product weight	Part no.	Type
Straight	M12x1, A-coded to EN 61076-2-101	5	0.5 m	34 g	8078274	NEBA-M12G5-U-0.5-N-M12G5
			1 m	47 g	8078275	NEBA-M12G5-U-1-N-M12G5
			2.5 m	87 g	8078276	NEBA-M12G5-U-2.5-N-M12G5
			5 m	153 g	8078277	NEBA-M12G5-U-5-N-M12G5
	Open end	3	2.5 m	55 g	8078236	NEBA-M12G5-U-2.5-N-LE3
			5 m	102 g	8078237	NEBA-M12G5-U-5-N-LE3
			10 m	194 g	8078238	NEBA-M12G5-U-10-N-LE3
			2.5 m	56 g	8078245	NEBA-M12W5-U-2.5-N-LE3
Angled	Open end	3	5 m	103 g	8078246	NEBA-M12W5-U-5-N-LE3
			10 m	195 g	8078247	NEBA-M12W5-U-10-N-LE3


## Sensor bracket with stop, for flush sensors

	Size	Type of mounting	Product weight	Part no.	Type
	M8	With through-hole	3.5 g	538346	SIEZ-B-8
	M12		20 g	538348	SIEZ-B-12
	M18		21 g	538350	SIEZ-B-18
	M30		36 g	538352	SIEZ-B-30

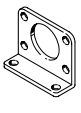
## Accessories

Sensor bracket without stop, for non-flush sensors					
	Size	Type of mounting	Product weight	Part no.	Type
	M8	With through-hole	3.5 g	538345	SIEZ-NB-8
	M12		20 g	538347	SIEZ-NB-12
	M18		21 g	538349	SIEZ-NB-18
	M30		36 g	538351	SIEZ-NB-30

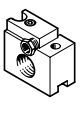
Sensor bracket without stop				
	Type of mounting	Product weight	Part no.	Type
	With through-hole	25 g	538354	SIEZ-UH

Foot mounting				
	Size <sup>1)</sup>	Product weight	Part no.	Type
	8/10	22 g	5123	HBN-8/10X1


1) Suitable for SIEN-M12.

Flange mounting				
	Size <sup>1)</sup>	Product weight	Part no.	Type
	32	103 g	195855	FBN-32

1) Suitable for SIEN-M30.

Mounting flange YSRF-S-...-C					
	Size <sup>1)</sup>	Material housing	Product weight	Part no.	Type
	8	Steel, Galvanised	12 g	34579	YSRF-S-8-C
	12		130 g	34580	YSRF-S-12-C
	16		180 g	34581	YSRF-S-16-C
	20		250 g	34582	YSRF-S-20-C

1) For mounting SOIA sensors, size M8/M12 in combination with shock absorbers

Stop			
	Size	Part no.	Type
	M8	11542	SDA-8X1-B
	M12	11541	SDA-12X1-B