

**Catalog 2009**



**Inductive Switches**



## COMPANY PORTRAIT



Inductive  
Switches

Accessories

Inductive Switch  
ABC

At **Leuze electronic**, we are "the **sensor** people": For more than 40 years we have been the specialists for innovative and practical solutions in the area of optical sensors for factory automation. Our systems are used in the automobile industry or in conveyor and storage technology as well as in printing machines and in packing material and analysis technologies.

Our dedicated employees are characterised, above all, by their customer focus. There's one thing **Leuze electronic** customers can count on – on us.

The range of products extends from simple optical electronic sensors and identification and data transmission systems to complex image processing systems and optical electronic solutions for workplace safety.

Our wide range of contactless inductive sensors takes care of the detection of metallic parts - a very hot topic at present. The sensors feature a compact and sturdy construction with large detection ranges and extremely short response times.

On the basis of extensive research and development work and the large application know-how possessed by our engineers, we are constantly further developing our systems. All with the goal of being able to offer our customers increasingly efficient and higher performance solutions at an optimal price / performance ratio.

We are the right partner for both standard applications as well as for custom, high-end solutions, and with an extensive sales and service network we can always be reached quickly.

## GERMAN SALES



With a staff of qualified field representatives and our capable **Customer Support Center**, we are able to provide you with service around the clock. Our dedication to qualified service and focus on the customer have always been among our distinguishing characteristics.

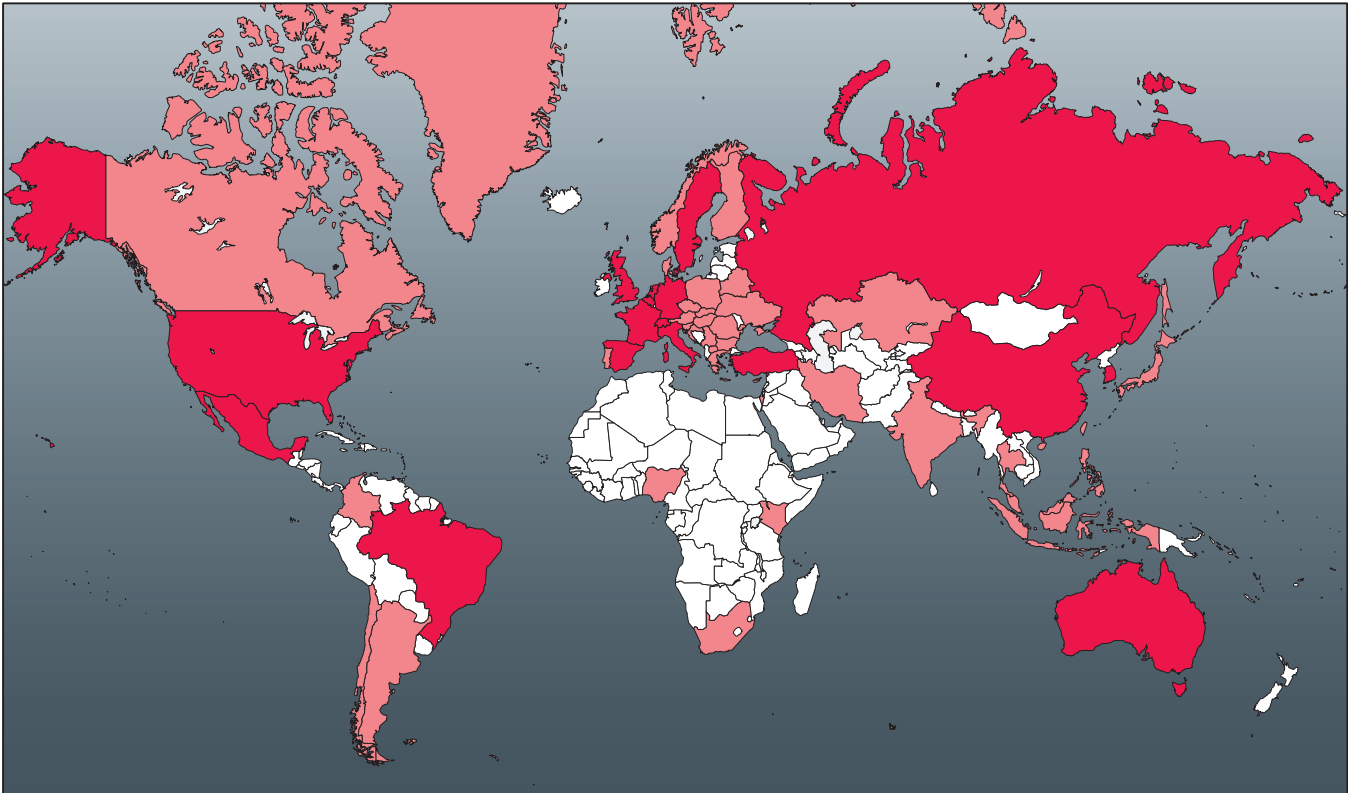
### Customer Support Center Sales / Germany

Sales Region North	Tel. +49 7021 / 573-306
Sales Region South	Tel. +49 7021 / 573-307
Sales Region East	Tel. +49 35027 / 629-106

### Technical Hotline

Optical Sensors Division	Tel. +49 7021 / 573-217
Logistics Division	Tel. +49 7021 / 573-123
Workplace Safety Division	Tel. +49 8141 / 5350-111

## GLOBAL SALES


 Inductive  
Switches

Accessories

 Inductive Switch  
ABC

Through our constantly growing number of subsidiaries and sales partners around the world, we can guarantee you a uniform level of qualified advice, fast delivery times and reliable support during mounting and commissioning of your systems at nearly every location on earth.

### Subsidiaries

AUSTRALIA	Balluff-Leuze Pty. Ltd. BAYSWATER
BELGIUM	Leuze electronic nv/sa MACHELEN
BRAZIL	Leuze electronic Ltda. SAO PAULO
CHINA	Leuze electronic Trading Co. Ltd. SHENZHEN
FRANCE	Leuze electronic sarl. MARNE LA VALLÉE
GREAT BRITAIN	Leuze Mayser electronic Ltd. ST. NEOTS, CAMBRIDGESHIRE
ITALY	Leuze electronic S.r.l. MILAN
MEXICO	Leuze lumiflex México S.A. de C.V. MONTERREY
RUSSIA	Leuze electronic OOO MOSCOW
SOUTH KOREA	Leuze electronic Co., Ltd. ANYANG-SHI, KYUNGGI-DO
SPAIN	Leuze electronic S.A. BARCELONA
SWEDEN	Leuze electronic AB KUNGENS KURVA
SWITZERLAND	Leuze electronic AG BRÜTTISELLEN
THE NETHERLANDS	Leuze electronic B.V. CM WAARDENBURG
TURKEY	Leuze electronic San.ve.Tic.Ltd.Sti. ÜMRANIYE-ISTANBUL
USA	Leuze electronic, Inc. NEW HUDSON, MI

### Sales Partners

ARGENTINA	KAZAKHSTAN
AUSTRIA	KENYA
BELORUSSIA	MACEDONIA
BULGARIA	MALAYSIA
CHILE	NIGERIA
COLUMBIA	NORWAY
CROATIA	PHILIPPINES
CZECH REPUBLIC	POLAND
DENMARK	PORTUGAL
FINLAND	ROMANIA
GREECE	SERBIA
HONG KONG	SINGAPORE
HUNGARY	SLOVAKIA
INDIA	SLOVENIA
INDONESIA	SOUTH AFRICA
IRAN	TAIWAN
ISRAEL	THAILAND
JAPAN	UKRAINE

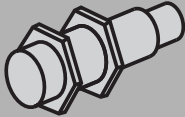






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## SERIES SELECTION TABLE

Series	Dimensions in mm (Ø x L)	Typ. scan range limit $S_n$ in mm	Installation		Switching output / function			
			Embedded	Non-embedded	PNP	NPN	NO - normally open	NC - normally closed
 <b>IS 206</b>	Ø 6.5 x 35	2.0	●		●		●	
		3.0	●		●		●	
 <b>IS 208</b>	M8 x 45	1.5	●		●	○	●	
		2.0	●		●	●	●	●
		2.5		●	●	○	●	
		4.0		●	●	○	●	○
 <b>IS 212</b>	M12 x 50	2.0	●		●	○	●	
		4.0	●		●	●	●	●
		4.0		●	●	○	●	
		6.0	●		●	○	●	
		6.0	●		●	●	●	○
		10.0		●	●	○	●	
		10.0		●	●	○	●	○
 <b>IS 218</b>	M18 x 50	5.0	●		●	○	●	
		8.0	●		●	●	●	●
		8.0		●	●	○	●	
		10.0	●		●	○	●	
		12.0	●		●	●	●	○
		20.0		●	●	○	●	
		20.0		●	●	○	●	○
 <b>IS 230</b>	M30 x 60	10.0	●		●	○	●	
		15.0		●	●	○	●	
		20.0	●		●	○	●	
		22.0	●		●	●	●	●
		40.0		●	●	○	●	
		40.0		●	●	●	●	○



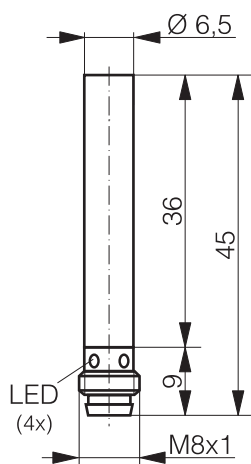
## INDUCTIVE SWITCHES

	Max. switching frequency	Operating voltage	Connection			Housing material		Protection class			Page
			M8 connector	M12 connector	Cable, 2m, PVC	Chromium-plated brass	Stainless steel AISI 316L (DIN 1.4404)	IP 67	IP 68	IP 69K	
	5000Hz	10 ... 30VDC	●		●	●		●			8
	1000Hz	10 ... 30VDC			●	●		●			
	5000Hz	10 ... 30VDC	●	●	●	●		●			12
	5000Hz	10 ... 30VDC	●		●	●		●			
	5000Hz	10 ... 30VDC	●	●	●	●		●			
	3500Hz	10 ... 30VDC	●		●	●		●			
	3000Hz	10 ... 30VDC		●	●	●		●			18
	2000Hz	10 ... 30VDC		●	●	●		●			
	2000Hz	10 ... 30VDC		●	●	●		●			
	800Hz	10 ... 30VDC		●			●	●	●		
	600Hz	10 ... 30VDC		●	●	●		●			
	400Hz	10 ... 30VDC		●			●	●	●		
	400Hz	10 ... 30VDC		●	●	●		●			
	2000Hz	10 ... 30VDC		●	●	●		●			24
	1500Hz	10 ... 30VDC		●	●	●		●			
	2000Hz	10 ... 30VDC		●	●	●		●			
	200Hz	10 ... 30VDC		●			●	●	●		
	500Hz	10 ... 30VDC		●	●	●		●			
	200Hz	10 ... 30VDC		●			●	●	●		
	200Hz	10 ... 30VDC		●	●	●		●			
	1200Hz	10 ... 30VDC		●	●	●		●			30
	700Hz	10 ... 30VDC		●	●	●		●			
	100Hz	10 ... 30VDC		●			●	●	●		
	200Hz	10 ... 30VDC		●	●	●		●			
	100Hz	10 ... 30VDC		●			●	●	●	1) Food+Beverage version	
	90Hz	10 ... 30VDC		●	●	●		●		○ = on request	

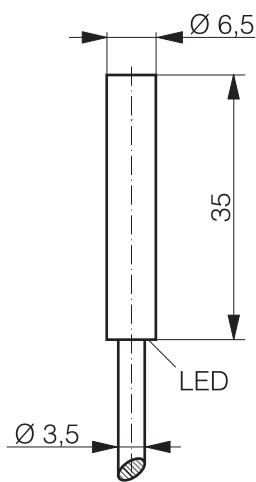
# OVERVIEW

## Dimensioned drawing

Types with M8 connector



Types with cable, 2m



Further details can be found in the respective data sheet.

We reserve the right to make changes • BR206\_Overview\_GB.fm



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## IS 206 SERIES

Installation	Typ. scan range limit $S_n$	Page
 <b>Embedded</b>	0 <input type="text" value="3"/> mm	



Inductive Switches

Accessories

Inductive Switch ABC

### Common technical data

<b>Electrical data</b>	Operating voltage $U_B$	10 ... 30VDC	
	Residual ripple $\sigma$	$\leq 20\%$ of $U_B$	
	Output current $I_L$	$\leq 200\text{mA}$	
	Residual current $I_r$	$\leq 100\mu\text{A}$	
	Voltage drop $U_d$	$\leq 2.0\text{V}$	
	Hysteresis $H$ of $S_r$	$\leq 10\%$	
	Temperature drift of $s_r$	$\leq 10\%$ (entire temp. range)	
	Repeatability	$\leq 2\%/5\%$	
<b>Indicators</b>	Yellow LED (360° visible)	switching state	
<b>Mechanical data</b>	Standard target (Fe360)	6.5 x 6.5 (9 x 9)mm <sup>2</sup>	
	Weight (plug/cable)	ca. 4g/61g	
<b>Environmental data</b>	Ambient temperature	-25°C ... +70°C	
	Protective circuit	polarity reversal protection, short circuit prot., inductive prot.	
	Standards applied	IEC 60947-5-2, UL 508	
	Electromagnetic compatibility	IEC 60255-5	1kV
		IEC 61000-4-2	Level 3
IEC 61000-4-3		Level 3	
	IEC 61000-4-4	Level 3	

### Features

- Slim and short cylindrical metal housing  $\varnothing 6.5\text{mm}$
- Chromium-plated brass or stainless steel housing
- Built-in short circuit protection, inductive protection, polarity reversal protection
- LED for switching state visible from 360°



### Inductive Switch

- Functionality P. 42
- Outputs / Switching functions P. 43
- Mounting / Installation P. 44
- Characteristic values P. 45

Mounting systems for this series can be found from page 36 onwards

## INDUCTIVE SWITCHES

Part description Part No.:	Scanning range $S_a$ [mm] <input type="checkbox"/> Typ. scan range limit $S_n$ [mm] <input type="checkbox"/>	Switching frequency	Installation	Output	Switching
<b>Inductive switches Ø 6.5, embedded installation</b>					
<b>IS 206 MP/4NO - 2E0</b> 501 11437	<input type="checkbox"/> 0 1.6 <input type="checkbox"/> 0 2	5000Hz	Embedded	1 x PNP	NO (normally open)
<b>IS 206 MP/4NO - 2E0 - S8.3</b> 501 11438	<input type="checkbox"/> 0 1.6 <input type="checkbox"/> 0 2	5000Hz	Embedded	1 x PNP	NO (normally open)
<b>IS 206 MP/4NO - 3E0</b> 501 09686	<input type="checkbox"/> 0 2.4 <input type="checkbox"/> 0 3	1000Hz	Embedded	1 x PNP	NO (normally open)

### Accessories / connection cables

More accessories can be found from **page 36** onwards

Part No.	Designation	Features
a 501 04523	K - D M8W - 3P - 5m - PVC	Connection cable 5000mm, M8 angular, 3-pin, PVC
b 501 04522	K - D M8A - 3P - 5m - PVC	Connection cable 5000mm, M8 axial, 3-pin, PVC
c 501 06692	K - D M8W - 3P - 5m - PUR	Connection cable 5000mm, M8 angular, 3-pin, PUR
d 501 06691	K - D M8A - 3P - 5m - PUR	Connection cable 5000mm, M8 axial, 3-pin, PUR
e 501 04582	D M8A - 3P - SK	Cable socket, M8 axial, 3-pin, user-configurable



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# IS 206 SERIES

Inductive switches



Connection	Material housing / active surface	Protection class	Accessories
Cable, 2m, PVC	Stainless steel / PA12	IP 67	
M8 connector	Stainless steel / PA12	IP 67	a, b, c, d, e
Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67	

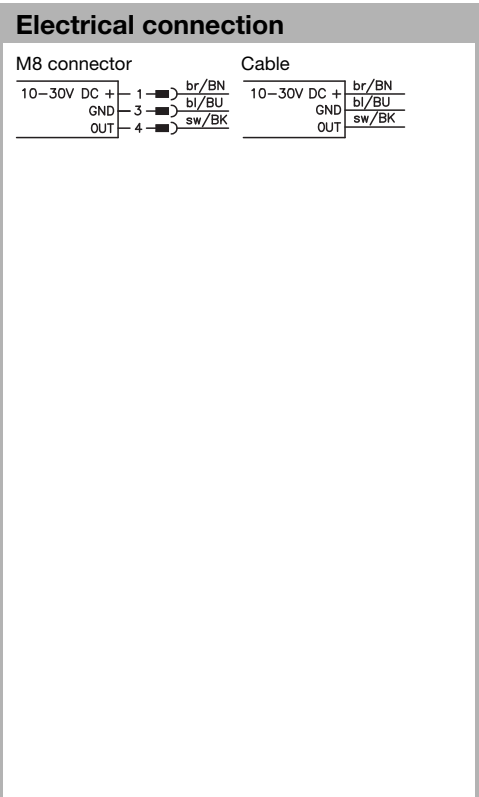


Inductive Switches

Accessories

Inductive Switch ABC

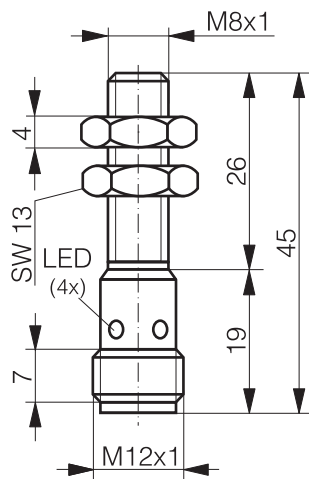
- Inductive Switch**
- Functionality P. 42
  - Outputs / Switching functions P. 43
  - Mounting / Installation P. 44
  - Characteristic values P. 45



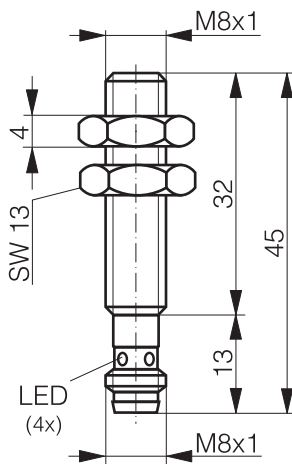
# OVERVIEW

## Dimensioned drawing

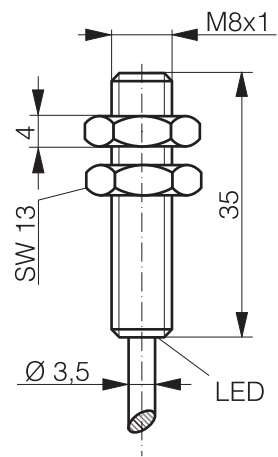
Types with M12 connector




Types with M8 connector



Types with cable, 2 m



 Further details can be found in the respective data sheet.

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


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## IS 208 SERIES

Installation	Typ. scan range limit $S_n$	Page
 <b>Embedded</b>	0   2 mm	
 <b>Non-embedded</b>	0   4 mm	



Inductive  
Switches

Accessories

Inductive Switch  
ABC

### Common technical data

<b>Electrical data</b>	Operating voltage $U_B$	10 ... 30VDC	
	Residual ripple $\sigma$	$\leq 20\%$ of $U_B$	
	Output current $I_L$	$\leq 200\text{mA}$	
	Residual current $I_r$	$\leq 100\mu\text{A}$	
	Voltage drop $U_d$	$\leq 2.0\text{V}$	
	Hysteresis H of $S_r$	5 ... 20%	
	Temperature drift of $S_r$	$\leq 10\%$ (entire temp. range)	
	Repeatability	$\leq 5\%$	
<b>Indicators</b>	Yellow LED (360° visible)	switching state	
<b>Mechanical data</b>	Standard target (Fe360)	8 x 8 (12 x 12)mm <sup>2</sup>	
	Weight (plug/cable)	ca. 12g/70g	
<b>Environmental data</b>	Ambient temperature	-25°C ... +70°C	
	Protective circuit	polarity reversal protection, short circuit prot., inductive prot.	
	Standards applied	IEC 60947-5-2, UL 508	
	Electromagnetic compatibility	IEC 60255-5	1kV
		IEC 61000-4-2	Level 3
IEC 61000-4-3		Level 3	
	IEC 61000-4-4	Level 3	

Mounting systems for this series can be found from page 36 onwards

### Features

- Slim and short cylindrical metal housing M8 x 1
- Stainless steel housing
- Built-in short circuit protection, inductive protection, polarity reversal protection
- LED for switching state visible from 360°



### Inductive Switch

- Functionality P. 42
- Outputs / Switching functions P. 43
- Mounting / Installation P. 44
- Characteristic values P. 45



# INDUCTIVE SWITCHES

Part description Part No.:	Scanning range $S_a$ [mm] <input type="checkbox"/> Typ. scan range limit $S_n$ [mm] <input type="checkbox"/>	Switching frequency	Installation	Output	Switching
<b>Inductive switches M8, embedded installation</b>					
<b>IS 208 MM/4NO - 1E5</b> 501 09639	<input type="checkbox"/> 0 1.2 <input type="checkbox"/> 0 1.5	5000Hz	Embedded	1 x PNP	NO (normally open)
<b>IS 208 MM/4NO - 1E5 - S8.3</b> 501 09640	<input type="checkbox"/> 0 1.2 <input type="checkbox"/> 0 1.5	5000Hz	Embedded	1 x PNP	NO (normally open)
<b>IS 208 MM/4NO - 1E5 - S12</b> 501 09641	<input type="checkbox"/> 0 1.2 <input type="checkbox"/> 0 1.5	5000Hz	Embedded	1 x PNP	NO (normally open)
<b>IS 208 MM/4NO - 2E0</b> 501 09652	<input type="checkbox"/> 0 1.6 <input type="checkbox"/> 0 2	5000Hz	Embedded	1 x PNP	NO (normally open)
<b>IS 208 MM/4NO - 2E0 - S8.3</b> 501 09653	<input type="checkbox"/> 0 1.6 <input type="checkbox"/> 0 2	5000Hz	Embedded	1 x PNP	NO (normally open)
<b>IS 208 MM/4NC - 2E0 - S8.3</b> 501 09654	<input type="checkbox"/> 0 1.6 <input type="checkbox"/> 0 2	5000Hz	Embedded	1 x PNP	NC (normally closed)
<b>IS 208 MM/2NO - 2E0</b> 501 09655	<input type="checkbox"/> 0 1.6 <input type="checkbox"/> 0 2	5000Hz	Embedded	1 x NPN	NO (normally open)
<b>IS 208 MM/2NO - 2E0 - S8.3</b> 501 09656	<input type="checkbox"/> 0 1.6 <input type="checkbox"/> 0 2	5000Hz	Embedded	1 x NPN	NO (normally open)

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Accessories / connection cables		More accessories can be found from <b>page 36</b> onwards
Part No.	Designation	Features
a 501 04523	K - D M8W - 3P - 5m - PVC	Connection cable 5000mm, M8 angular, 3-pin, PVC
b 501 04522	K - D M8A - 3P - 5m - PVC	Connection cable 5000mm, M8 axial, 3-pin, PVC
c 501 04541	K - D M12W - 3P - 5m - PVC	Connection cable 5000mm, M12 angular, 3-pin, PVC
d 501 04540	K - D M12A - 3P - 5m - PVC	Connection cable 5000mm, M12 axial, 3-pin, PVC
e 501 04582	D M8A - 3P - SK	Cable socket, M8 axial, 3-pin, user-configurable



**IS 208 SERIES**

Inductive switches



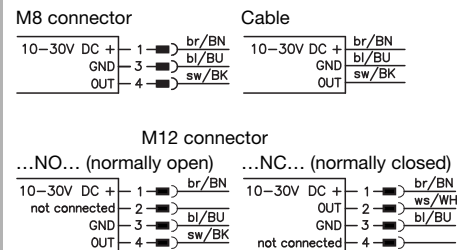
Connection	Material housing / active surface	Protection class	Accessories
Cable, 2m, PVC	Stainless steel / PA12	IP 67	
M8 connector	Stainless steel / PA12	IP 67	a, b, e
M12 connector	Stainless steel / PA12	IP 67	c, d
Cable, 2m, PVC	Stainless steel / PA12	IP 67	
M8 connector	Stainless steel / PA12	IP 67	a, b, e
M8 connector	Stainless steel / PA12	IP 67	a, b, e
Cable, 2m, PVC	Stainless steel / PA12	IP 67	
M8 connector	Stainless steel / PA12	IP 67	a, b, e



**Inductive Switch**

- Functionality P. 42
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- Mounting / Installation P. 44
- Characteristic values P. 45

**Electrical connection**



Inductive Switches

Accessories

Inductive Switch ABC

## INDUCTIVE SWITCHES

Part description Part No.:	Scanning range $S_a$ [mm] <input type="checkbox"/> Typ. scan range limit $S_n$ [mm] <input type="checkbox"/>	Switching frequency	Installation	Output	Switching
<b>Inductive switches M8, non-embedded installation</b>					
<b>IS 208 MM/4NO - 2N5</b> 501 09645	<input type="checkbox"/> 0 <input type="checkbox"/> 2 <input type="checkbox"/> 0 <input type="checkbox"/> 2.5	5000Hz	Non-embedded	1 x PNP	NO (normally open)
<b>IS 208 MM/4NO - 2N5 - S8.3</b> 501 09646	<input type="checkbox"/> 0 <input type="checkbox"/> 2 <input type="checkbox"/> 0 <input type="checkbox"/> 2.5	5000Hz	Non-embedded	1 x PNP	NO (normally open)
<b>IS 208 MM/4NO - 2N5 - S12</b> 501 09647	<input type="checkbox"/> 0 <input type="checkbox"/> 2 <input type="checkbox"/> 0 <input type="checkbox"/> 2.5	5000Hz	Non-embedded	1 x PNP	NO (normally open)
<b>IS 208 MM/4NO - 4NO</b> 501 09658	<input type="checkbox"/> 0 <input type="checkbox"/> 2 <input type="checkbox"/> 0 <input type="checkbox"/> 2.5	3500Hz	Non-embedded	1 x PNP	NO (normally open)
<b>IS 208 MM/4NO - 4NO - S8.3</b> 501 09659	<input type="checkbox"/> 0 <input type="checkbox"/> 3.2 <input type="checkbox"/> 0 <input type="checkbox"/> 4	3500Hz	Non-embedded	1 x PNP	NO (normally open)
<b>IS 208 MM/2NO - 4NO</b> 501 09661	<input type="checkbox"/> 0 <input type="checkbox"/> 3.2 <input type="checkbox"/> 0 <input type="checkbox"/> 4	3500Hz	Non-embedded	1 x NPN	NO (normally open)
<b>IS 208 MM/2NO - 4NO - S8.3</b> 501 09662	<input type="checkbox"/> 0 <input type="checkbox"/> 3.2 <input type="checkbox"/> 0 <input type="checkbox"/> 4	3500Hz	Non-embedded	1 x NPN	NO (normally open)

### Accessories / connection cables

More accessories can be found from **page 36** onwards

Part No.	Designation	Features
a 501 04523	K - D M8W - 3P - 5m - PVC	Connection cable 5000mm, M8 angular, 3-pin, PVC
b 501 04522	K - D M8A - 3P - 5m - PVC	Connection cable 5000mm, M8 axial, 3-pin, PVC
c 501 04541	K - D M12W - 3P - 5m - PVC	Connection cable 5000mm, M12 angular, 3-pin, PVC
d 501 04540	K - D M12A - 3P - 5m - PVC	Connection cable 5000mm, M12 axial, 3-pin, PVC
e 501 04582	D M8A - 3P - SK	Cable socket, M8 axial, 3-pin, user-configurable



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# IS 208 SERIES

Inductive switches



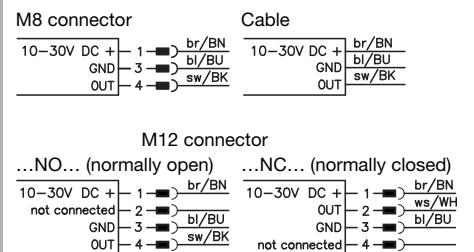
Connection	Material housing / active surface	Protection class	Accessories
Cable, 2m, PVC	Stainless steel / PBTP	IP 67	
M8 connector	Stainless steel / PBTP	IP 67	a, b, e
M12 connector	Stainless steel / PBTP	IP 67	c, d
Cable, 2m, PVC	Stainless steel / PBTP	IP 67	
M8 connector	Stainless steel / PBTP	IP 67	a, b, e
Cable, 2m, PVC	Stainless steel / PBTP	IP 67	
M8 connector	Stainless steel / PBTP	IP 67	a, b, e



### Inductive Switch

- Functionality P. 42
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### Electrical connection



Inductive Switches

Accessories

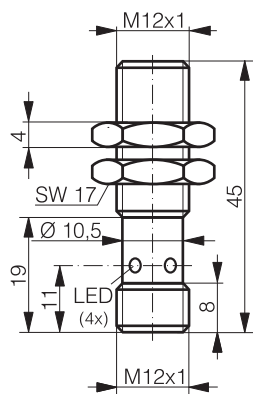
Inductive Switch ABC

# OVERVIEW

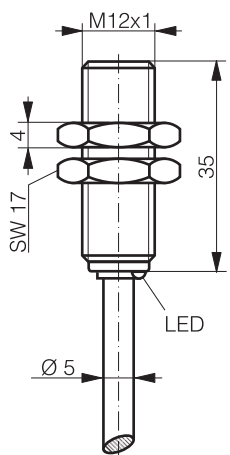
## Dimensioned drawing

### Short construction ISS 212...

Types with M12 connector

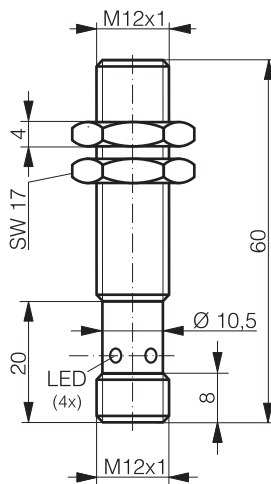


Types with cable, 2m

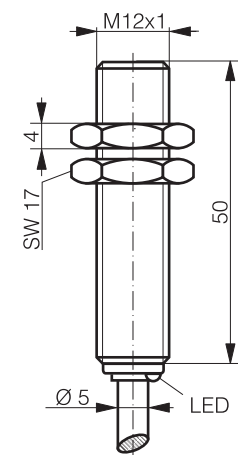



### Normal construction IS 212...

Types with M12 connector



Types with cable, 2m



 Further details can be found in the respective data sheet.

We reserve the right to make changes • BR212\_Overview\_GB.fm



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Page 8



**IS 208**  
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**IS 212**  
Page 18





**IS 218**  
Page 24



**IS 230**  
Page 30

## IS 212 SERIES

Installation	Typ. scan range limit $S_n$	Page
 <b>Embedded</b>	0 6 mm	
 <b>Non-embedded</b>	0 10 mm	



Inductive Switches

Accessories

Inductive Switch ABC

### Common technical data

<b>Electrical data</b>	Operating voltage $U_B$	10 ... 30VDC	
	Residual ripple $\sigma$	$\leq 20\%$ of $U_B$	
	Output current $I_L$	$\leq 200\text{mA}$	
	Residual current $I_r$	$\leq 100\mu\text{A}$	
	Voltage drop $U_d$	$\leq 2.0\text{V}$	
	Hysteresis H of $S_r$	0 ... 15%	
	Temperature drift of $S_r$	$\leq 10\%$ (entire temp. range)	
	Repeatability	$\leq 5\%$	
<b>Indicators</b>	Yellow LED (360° visible)	switching state	
<b>Mechanical data</b>	Standard target (Fe360)	12x12 (30x30)mm <sup>2</sup>	
	Weight (plug/cable)	ca. 30g/95g	
<b>Environmental data</b>	Ambient temperature	-25°C ... +70°C (+85°C)	
	Protective circuit	polarity reversal protection, short circuit prot., inductive prot.	
	Standards applied	IEC 60947-5-2, UL 508	
	Electromagnetic compatibility	IEC 60255-5	1kV
		IEC 61000-4-2	Level 3
IEC 61000-4-3		Level 3	
	IEC 61000-4-4	Level 3	

Mounting systems for this series can be found from page 36 onwards

### Features

- Slim and short cylindrical metal housing M12 x 1
- Chromium-plated brass housing
- Food+Beverage version in stainless steel AISI 316L (DIN 1.4404) up to +85°C
- Extra short construction available
- Built-in short circuit protection, inductive protection, polarity reversal protection
- LED for switching state visible from 360°



### Inductive Switch

- Functionality P. 42
- Outputs / Switching functions P. 43
- Mounting / Installation P. 44
- Characteristic values P. 45

# INDUCTIVE SWITCHES

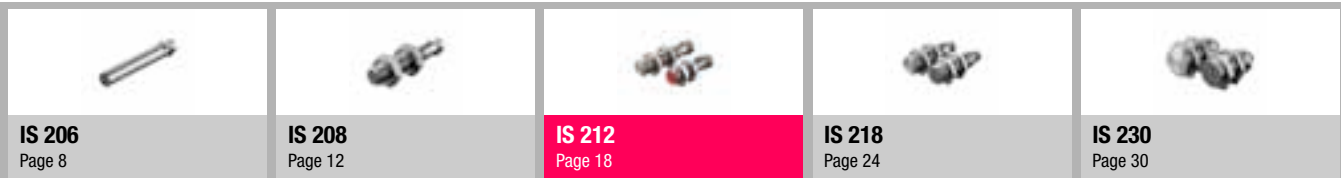
Part description Part No.:	Scanning range $S_a$ [mm] <input type="checkbox"/> Typ. scan range limit $S_n$ [mm] <input type="checkbox"/>	Switching frequency	Installation	Output	Switching
<b>Inductive switches M12, embedded installation</b>					
<b>IS 212 MM/4NO - 2EO</b> 501 09664		3000Hz	Embedded	1 x PNP	NO (normally open)
<b>IS 212 MM/4NO - 2EO - S12</b> 501 09665		3000Hz	Embedded	1 x PNP	NO (normally open)
<b>IS 212 MM/4NO - 4EO</b> 501 09672		2000Hz	Embedded	1 x PNP	NO (normally open)
<b>IS 212 MM/4NO - 4EO - S12</b> 501 09673		2000Hz	Embedded	1 x PNP	NO (normally open)
<b>ISS 212 MM/4NO - 4EO <sup>1)</sup></b> 501 09684		2000Hz	Embedded	1 x PNP	NO (normally open)
<b>ISS 212 MM/4NO - 4EO - S12 <sup>1)</sup></b> 501 09685		2000Hz	Embedded	1 x PNP	NC (normally closed)
<b>IS 212 MM/4NC - 4EO - S12</b> 501 09674		2000Hz	Embedded	1 x PNP	NC (normally closed)
<b>ISS 212 MM/4NC - 4EO - S12 <sup>1)</sup></b> 501 09676		2000Hz	Embedded	1 x PNP	NC (normally closed)
<b>IS 212 MM/2NO - 4EO</b> 501 09675		2000Hz	Embedded	1x NPN	NO (normally open)
<b>ISS 212 MM/2NO - 4EO - S12 <sup>1)</sup></b> 501 09687		2000Hz	Embedded	1x NPN	NO (normally open)

### Accessories / connection cables

More accessories can be found from **page 36** onwards

Part No.	Designation	Features
a 501 04541	K - D M12W - 3P - 5m - PVC	Connection cable 5000mm, M12 angular, 3-pin, PVC
b 501 04540	K - D M12A - 3P - 5m - PVC	Connection cable 5000mm, M12 axial, 3-pin, PVC
c 501 04545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d 501 04544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e 500 31324	KD 095 - 4	Cable socket, M12 angular, 4-pin, user-configurable
f 500 31323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable

We reserve the right to make changes • BR212\_1\_GB.fm





**IS 212 SERIES**

Inductive switches



Connection	Material housing / active surface	Protection class	Accessories
Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f
Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f
Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f
M12 connector	Brass, chromium-plated / PBTP	IP 67	c, d, e, f
M12 connector	Brass, chromium-plated / PBTP	IP 67	c, d, e, f
Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f

1) Short construction

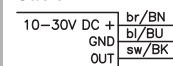


**Inductive Switch**

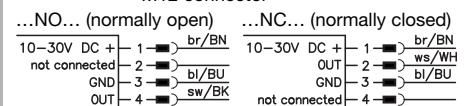
- Functionality P. 42
- Outputs / Switching functions P. 43
- Mounting / Installation P. 44
- Characteristic values P. 45

**Electrical connection**


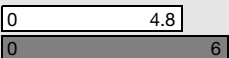
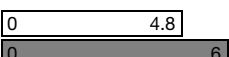

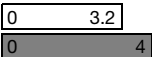
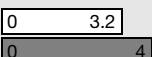
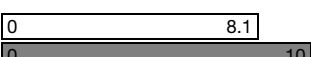
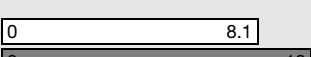
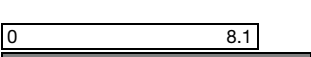
Cable



M12 connector



# INDUCTIVE SWITCHES






Part description Part No.:	Scanning range $S_a$ [mm] <input type="checkbox"/> Typ. scan range limit $S_n$ [mm] <input type="checkbox"/>	Switching frequency	Installation	Output	Switching
<b>Inductive switches M12, embedded installation</b>					
<b>IS 212 MM/4NO - 6E0</b> 501 09678		800Hz	Embedded	1 x PNP	NO (normally open)
<b>ISS 212 MM/4NO - 6E0 - S12 <sup>1)</sup></b> 501 09679		800Hz	Embedded	1 x PNP	NO (normally open)
<b>ISS 212 MM/2NO - 6E0 - S12 <sup>1)</sup></b> 501 09688		800Hz	Embedded	1 x NPN	NO (normally open)
<b>IS 212 FM/4NO.5F - 6E0 - S12 <sup>2)</sup></b> 501 09736		600Hz	Embedded	1 x PNP	NO (normally open)
<b>Inductive switches M12, non-embedded installation</b>					
<b>IS 212 MM/4NO - 4NO</b> 501 09668		2000Hz	Non-embedded	1 x PNP	NO (normally open)
<b>IS 212 MM/4NO - 4NO - S12</b> 501 09669		2000Hz	Non-embedded	1 x PNP	NO (normally open)
<b>IS 212 MM/4NO - 10N</b> 501 09689		400Hz	Non-embedded	1 x PNP	NO (normally open)
<b>ISS 212 MM/4NO - 10N - S12 <sup>1)</sup></b> 501 09680		400Hz	Non-embedded	1 x PNP	NO (normally open)
<b>IS 212 FM/4NO.5F - 10N - S12 <sup>2)</sup></b> 501 09738		400Hz	Non-embedded	1 x PNP	NO (normally open)

**Accessories / connection cables**

More accessories can be found from **page 36** onwards

Part No.	Designation	Features
a 501 04541	K - D M12W - 3P - 5m - PVC	Connection cable 5000mm, M12 angular, 3-pin, PVC
b 501 04540	K - D M12A - 3P - 5m - PVC	Connection cable 5000mm, M12 axial, 3-pin, PVC
c 501 04573	K - D M12W - 4P - 5m - FAB	Connection cable 5000mm, M12 angular, 4-pin, Food+Bev.
d 501 04572	K - D M12A - 4P - 5m - FAB	Connection cable 5000mm, M12 axial, 4-pin, Food+Bev.

We reserve the right to make changes • BR212\_2\_GB.fm

				
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**IS 212 SERIES**

Inductive switches



Connection	Material housing / active surface	Protection class	Accessories
Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b
M12 connector	Stainless steel AISI 316L (DIN 1.4404) / stainless steel AISI 316L (DIN 1.4404)	IP 67, IP 68, IP 69K	c, d
Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b
Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b
M12 connector	Stainless steel AISI 316L (DIN 1.4404) / stainless steel AISI 316L (DIN 1.4404)	IP 67, IP 68, IP 69K	c, d

1) Short construction  
2) Food + Beverage version for the food and beverage industries

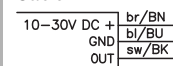


**Inductive Switch**

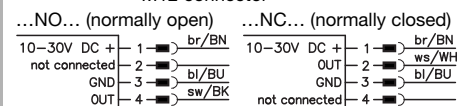
- Functionality P. 42
- Outputs / Switching functions P. 43
- Mounting / Installation P. 44
- Characteristic values P. 45

**Electrical connection**

**Cable**



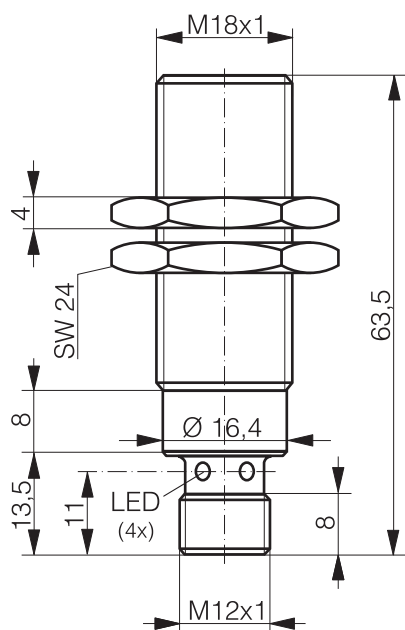
**M12 connector**



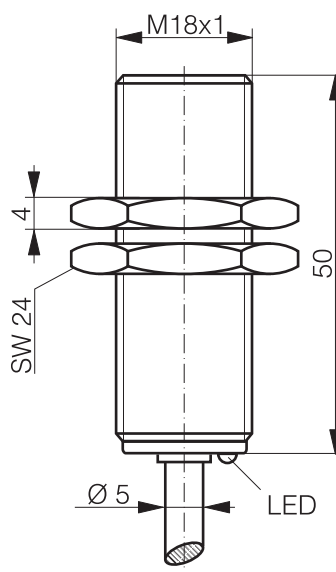
# OVERVIEW

## Dimensioned drawing

Types with M12 connector



Types with cable, 2m



**i** Further details can be found in the respective data sheet.

We reserve the right to make changes • BR218\_Overview\_GB.fm



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Page 8



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Page 12



**IS 212**  
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


**IS 218**  
Page 24



**IS 230**  
Page 30

## IS 218 SERIES

Installation	Typ. scan range limit $S_n$	Page
 <b>Embedded</b>	0 <input type="text" value="12"/> mm	
 <b>Non-embedded</b>	0 <input type="text" value="20"/> mm	



Inductive  
Switches

Accessories

Inductive Switch  
ABC

### Common technical data

<b>Electrical data</b>	Operating voltage $U_B$	10 ... 30VDC	
	Residual ripple $\sigma$	$\leq 20\%$ of $U_B$	
	Output current $I_L$	$\leq 200\text{mA}$	
	Residual current $I_r$	$\leq 100\mu\text{A}$	
	Voltage drop $U_d$	$\leq 2.0\text{V}$	
	Hysteresis H of $S_r$	0 ... 15%	
	Temperature drift of $S_r$	$\leq 10\%$ (entire temp. range)	
	Repeatability	$\leq 5\%$	
<b>Indicators</b>	Yellow LED (360°)	switching state	
<b>Mechanical data</b>	Standard target (Fe360)	18x18 (60x60)mm <sup>2</sup>	
	Weight (plug/cable)	ca. 50g/165g	
<b>Environmental data</b>	Ambient temperature	-25°C ... +70°C (+85°C)	
	Protective circuit	polarity reversal protection, short circuit prot., inductive prot.	
	Standards applied	IEC 60947-5-2, UL 508	
	Electromagnetic compatibility	IEC 60255-5	1kV
		IEC 61000-4-2	Level 3
IEC 61000-4-3		Level 3	
	IEC 61000-4-4	Level 3	

Mounting systems for this series can be found from page 36 onwards

### Features

- Slim and short cylindrical metal housing M18 x 1
- Chromium-plated brass housing
- Food+Beverage version in stainless steel AISI 316L (DIN 1.4404) up to +85°C
- Extra short construction available
- Built-in short circuit protection, inductive protection, polarity reversal protection
- LED for switching state visible from 360°



### Inductive Switch

- Functionality P. 42
- Outputs / Switching functions P. 43
- Mounting / Installation P. 44
- Characteristic values P. 45

# INDUCTIVE SWITCHES

Part description Part No.:	Scanning range $S_a$ [mm] <input type="checkbox"/> Typ. scan range limit $S_n$ [mm] <input type="checkbox"/>	Switching frequency	Installation	Output	Switching
<b>Inductive switches M18, embedded installation</b>					
<b>IS 218 MM/4NO - 5E0</b> 501 09692		2000Hz	Embedded	1 x PNP	NO (normally open)
<b>IS 218 MM/4NO - 5E0 - S12</b> 501 09693		2000Hz	Embedded	1 x PNP	NO (normally open)
<b>IS 218 MM/4NO - 8E0</b> 501 09700		1500Hz	Embedded	1 x PNP	NO (normally open)
<b>IS 218 MM/4NO - 8E0 - S12</b> 501 09701		1500Hz	Embedded	1 x PNP	NO (normally open)
<b>IS 218 MM/4NC - 8E0 - S12</b> 501 09702		1500Hz	Embedded	1 x PNP	NC (normally closed)
<b>IS 218 MM/2NO - 8E0 - S12</b> 501 09704		1500Hz	Embedded	1 x NPN	NO (normally open)
<b>ISS 218 MM/2NO - 8E0 - S12 <sup>1)</sup></b> 501 09703		1500Hz	Embedded	1 x NPN	NO (normally open)
<b>IS 218 MM/4NO - 12E</b> 501 09706		500Hz	Embedded	1 x PNP	NO (normally open)
<b>ISS 218 MM/4NO - 12E - S12 <sup>1)</sup></b> 501 09707		500Hz	Embedded	1 x PNP	NO (normally open)
<b>ISS 218 MM/2NO - 12E - S12 <sup>1)</sup></b> 501 09708		500Hz	Embedded	1 x NPN	NO (normally open)
<b>IS 218 FM/4NO.5F - 10E - S12 <sup>2)</sup></b> 501 09732		300Hz	Embedded	1 x PNP	NO (normally open)

### Accessories / connection cables

More accessories can be found from **page 36** onwards

Part No.	Designation	Features
a 501 04540	K - D M12A - 3P - 5m - PVC	Connection cable 5000mm, M12 axial, 3-pin, PVC
b 501 04544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
c 501 04573	K - D M12W - 4P - 5m - FAB	Connection cable 5000mm, M12 angular, 4-pin, Food+Bev.
d 501 04572	K - D M12A - 4P - 5m - FAB	Connection cable 5000mm, M12 axial, 4-pin, Food+Bev.

We reserve the right to make changes • BR218\_1\_GB.fm

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**IS 218 SERIES**

Inductive switches



Connection	Material housing / active surface	Protection class	Accessories
Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a
Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a
M12 connector	Brass, chromium-plated / PBTP	IP 67	b
M12 connector	Brass, chromium-plated / PBTP	IP 67	a
M12 connector	Brass, chromium-plated / PBTP	IP 67	a
Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a
M12 connector	Brass, chromium-plated / PBTP	IP 67	a
M12 connector	Stainless steel AISI 316L (DIN 1.4404) / stainless steel AISI 316L (DIN 1.4404)	IP 67, IP 68, IP 69K	c, d

1) Short construction  
2) Food + Beverage version for the food and beverage industries

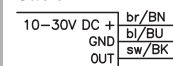


**Inductive Switch**

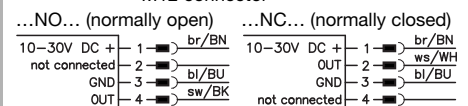
- Functionality P. 42
- Outputs / Switching functions P. 43
- Mounting / Installation P. 44
- Characteristic values P. 45

**Electrical connection**

Cable

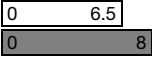
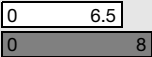


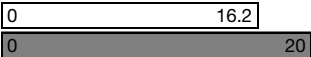


M12 connector





# INDUCTIVE SWITCHES

Part description Part No.:	Scanning range $S_a$ [mm] <input type="checkbox"/> Typ. scan range limit $S_n$ [mm] <input type="checkbox"/>	Switching frequency	Installation	Output	Switching
<b>Inductive switches M18, non-embedded installation</b>					
<b>IS 218 MM/4NO - 8NO</b> 501 09696		2000Hz	Non-embedded	1 x PNP	NO (normally open)
<b>IS 218 MM/4NO - 8NO - S12</b> 501 09697		2000Hz	Non-embedded	1 x PNP	NO (normally open)
<b>IS 218 MM/4NO - 20N</b> 501 09709		200Hz	Non-embedded	1 x PNP	NO (normally open)
<b>ISS 218 MM/4NO - 20N - S12 <sup>1)</sup></b> 501 09710		200Hz	Non-embedded	1 x PNP	NO (normally open)
<b>IS 218 FM/4NO.5F - 20N - S12 <sup>2)</sup></b> 501 09734		200Hz	Non-embedded	1 x PNP	NO (normally open)

1) Short construction  
2) Food + Beverage version for the food and beverage industries

We reserve the right to make changes • BR218\_2\_GB.fm

Accessories / connection cables		More accessories can be found from <b>page 36</b> onwards	
Part No.	Designation	Features	
a 501 04541	K - D M12W - 3P - 5m - PVC	Connection cable 5000mm, M12 angular, 3-pin, PVC	
b 501 04540	K - D M12A - 3P - 5m - PVC	Connection cable 5000mm, M12 axial, 3-pin, PVC	
c 501 04573	K - D M12W - 4P - 5m - FAB	Connection cable 5000mm, M12 angular, 4-pin, Food+Bev.	
d 501 04572	K - D M12A - 4P - 5m - FAB	Connection cable 5000mm, M12 axial, 4-pin, Food+Bev.	
e 500 31324	KD 095 - 4	Cable socket, M12 angular, 4-pin, user-configurable	
f 500 31323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable	



**IS 218 SERIES**

Inductive switches



Connection	Material housing / active surface	Protection class	Accessories
Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f
Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f
M12 connector	Stainless steel AISI 316L (DIN 1.4404) / stainless steel AISI 316L (DIN 1.4404)	IP 67, IP 68, IP 69K	c, d



Inductive Switches

Accessories

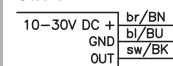
Inductive Switch ABC

**Inductive Switch**

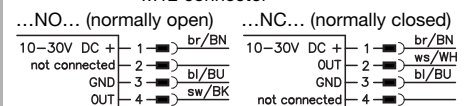
- Functionality P. 42
- Outputs / Switching functions P. 43
- Mounting / Installation P. 44
- Characteristic values P. 45

**Electrical connection**

**Cable**



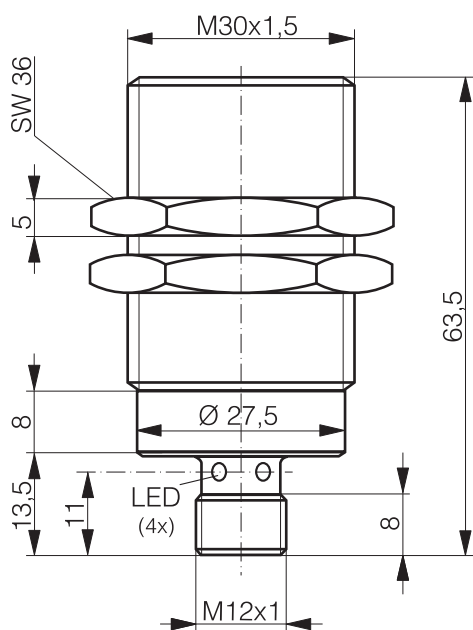
**M12 connector**



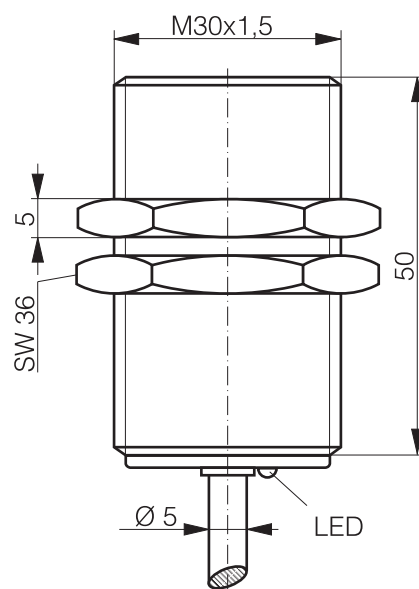
# OVERVIEW

## Dimensioned drawing

Types with M12 connector



Types with cable, 2m



Further details can be found in the respective data sheet.

We reserve the right to make changes • BR230\_Overview\_GB.fm



**IS 206**  
Page 8



**IS 208**  
Page 12



**IS 212**  
Page 18







**IS 218**  
Page 24



**IS 230**  
Page 30

## IS 230 SERIES

Installation	Typ. scan range limit $S_n$	Page
 <b>Embedded</b>	0  22 mm	
 <b>Non-embedded</b>	0  40 mm	



Inductive  
Switches

Accessories

Inductive Switch  
ABC

### Common technical data

<b>Electrical data</b>	Operating voltage $U_B$	10 ... 30VDC	
	Residual ripple $\sigma$	$\leq 20\%$ of $U_B$	
	Output current $I_L$	$\leq 200\text{mA}$	
	Residual current $I_r$	$\leq 100\mu\text{A}$	
	Voltage drop $U_d$	$\leq 2.0\text{V}$	
	Hysteresis H of $S_r$	0 ... 15%	
	Temperature drift of $S_r$	$\leq 10\%$ (entire temp. range)	
	Repeatability	$\leq 5\%$	
<b>Indicators</b>	Yellow LED (360° visible)	switching state	
<b>Mechanical data</b>	Standard target (Fe360)	30x30 (120x120)mm <sup>2</sup>	
	Weight (plug/cable)	ca. 155g/210g	
<b>Environmental data</b>	Ambient temperature	-25°C ... +70°C (+85°C)	
	Protective circuit	polarity reversal protection, short circuit prot., inductive prot.	
	Standards applied	IEC 60947-5-2, UL 508	
	Electromagnetic compatibility	IEC 60255-5	1kV
		IEC 61000-4-2	Level 3
IEC 61000-4-3		Level 3	
	IEC 61000-4-4	Level 3	

Mounting systems for this series can be found from page 36 onwards

### Features

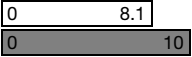
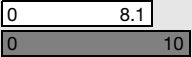





- Slim and short cylindrical metal housing M30 x 1
- Chromium-plated brass housing
- Food+Beverage version in stainless steel AISI 316L (DIN 1.4404) up to +85°C
- Built-in short circuit protection, inductive protection, polarity reversal protection
- LED for switching state visible from 360°



### Inductive Switch

- Functionality P. 42
- Outputs / Switching functions P. 43
- Mounting / Installation P. 44
- Characteristic values P. 45

# INDUCTIVE SWITCHES

Part description Part No.:	Scanning range $S_a$ [mm] <input type="checkbox"/> Typ. scan range limit $S_n$ [mm] <input type="checkbox"/>	Switching frequency	Installation	Output	Switching
<b>Inductive switches M30, embedded installation</b>					
<b>IS 230 MM/4NO - 10E</b> 501 09712		1200Hz	Embedded	1 x PNP	NO (normally open)
<b>IS 230 MM/4NO - 10E - S12</b> 501 09713		1200Hz	Embedded	1 x PNP	NO (normally open)
<b>IS 230 MM/4NO - 22E</b> 501 09720		200Hz	Embedded	1 x PNP	NO (normally open)
<b>IS 230 MM/4NO - 22E - S12</b> 501 09721		200Hz	Embedded	1 x PNP	NO (normally open)
<b>IS 230 MM/4NC - 22E - S12</b> 501 09722		200Hz	Embedded	1 x PNP	NC (normally closed)
<b>IS 230 MM/2NO - 22E</b> 501 09723		200Hz	Embedded	1 x NPN	NO (normally open)
<b>IS 230 FM/4NO.5F - 20E - S12 <sup>1)</sup></b> 501 11435		100Hz	Embedded	1 x PNP	NO (normally open)

1) Food + Beverage version for the food and beverage industries

We reserve the right to make changes • BR230\_1\_GB.fm

Accessories / connection cables		More accessories can be found from <b>page 36</b> onwards	
Part No.	Designation	Features	
a 501 04541	K - D M12W - 3P - 5m - PVC	Connection cable 5000mm, M12 angular, 3-pin, PVC	
b 501 04540	K - D M12A - 3P - 5m - PVC	Connection cable 5000mm, M12 axial, 3-pin, PVC	
c 501 04545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC	
d 501 04544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC	
e 501 04573	K - D M12W - 4P - 5m - FAB	Connection cable 5000mm, M12 angular, 4-pin, Food+Bev.	
f 501 04572	K - D M12A - 4P - 5m - FAB	Connection cable 5000mm, M12 axial, 4-pin, Food+Bev.	



**IS 230 SERIES**

Inductive switches



Connection	Material housing / active surface	Protection class	Accessories
Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b
Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b
M12 connector	Brass, chromium-plated / PBTP	IP 67	c, d
Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Stainless steel AISI 316L (DIN 1.4404) / stainless steel AISI 316L (DIN 1.4404)	IP 67, IP 68, IP 69K	e, f

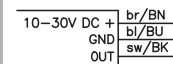


**Inductive Switch**

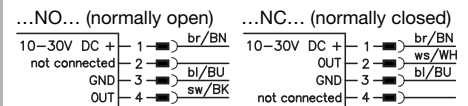
- Functionality P. 42
- Outputs / Switching functions P. 43
- Mounting / Installation P. 44
- Characteristic values P. 45

**Electrical connection**

Cable



M12 connector

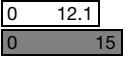
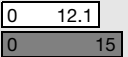


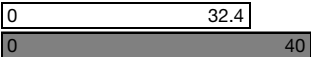



Inductive Switches

Accessories

Inductive Switch ABC

# INDUCTIVE SWITCHES

Part description Part No.:	Scanning range $S_a$ [mm] <input type="checkbox"/> Typ. scan range limit $S_n$ [mm] <input type="checkbox"/>	Switching frequency	Installation	Output	Switching
<b>Inductive switches M30, non-embedded installation</b>					
<b>IS 230 MM/4NO - 15N</b> 501 09716		700Hz	Non-embedded	1 x PNP	NO (normally open)
<b>IS 230 MM/4NO - 15N - S12</b> 501 09717		700Hz	Non-embedded	1 x PNP	NO (normally open)
<b>IS 230 MM/4NO - 40N</b> 501 09726		100Hz	Non-embedded	1 x PNP	NO (normally open)
<b>IS 230 MM/4NO - 40N - S12</b> 501 09727		100Hz	Non-embedded	1 x PNP	NO (normally open)
<b>IS 230 MM/2NO - 40N - S12</b> 501 09728		100Hz	Non-embedded	1 x NPN	NO (normally open)
<b>IS 230 FM/4NO.5F - 40N - S12 <sup>1)</sup></b> 501 11436		90Hz	Non-embedded	1 x PNP	NO (normally open)

1) Food + Beverage version for the food and beverage industries

We reserve the right to make changes • BF230\_2\_GB.fm

Accessories / connection cables		More accessories can be found from <b>page 36</b> onwards	
Part No.	Designation	Features	
a 501 04541	K - D M12W - 3P - 5m - PVC	Connection cable 5000mm, M12 angular, 3-pin, PVC	
b 501 04540	K - D M12A - 3P - 5m - PVC	Connection cable 5000mm, M12 axial, 3-pin, PVC	
c 501 04573	K - D M12W - 4P - 5m - FAB	Connection cable 5000mm, M12 angular, 4-pin, Food+Bev.	
d 501 04572	K - D M12A - 4P - 5m - FAB	Connection cable 5000mm, M12 axial, 4-pin, Food+Bev.	
e 500 31324	KD 095 - 4	Cable socket, M12 angular, 4-pin, user-configurable	
f 500 31323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable	

				
<b>IS 206</b> Page 8	<b>IS 208</b> Page 12	<b>IS 212</b> Page 18	<b>IS 218</b> Page 24	<b>IS 230</b> Page 30



**IS 230 SERIES**

Inductive switches



Connection	Material housing / active surface	Protection class	Accessories
Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f
Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f
M12 connector	Stainless steel AISI 316L (DIN 1.4404) / stainless steel AISI 316L (DIN 1.4404)	IP 67, IP 68, IP 69K	c, d

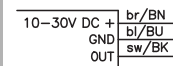


**Inductive Switch**

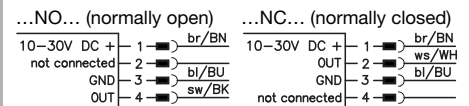
- Functionality P. 42
- Outputs / Switching functions P. 43
- Mounting / Installation P. 44
- Characteristic values P. 45

**Electrical connection**

**Cable**



**M12 connector**



Inductive Switches

Accessories

Inductive Switch ABC

# ACCESSORIES / MOUNTING SYSTEMS

Dimensioned drawing	Part description Part No.:	Feature
<b>Mounting clamps for inductive switches</b>		
	<b>MC 006K</b> 501 11496	Mounting clamp for inductive switches Ø 6.5 mm, without limit stop, ØA = 6.5 mm
	<b>MC 008K</b> 501 11497	Mounting clamp for inductive switches M8 x 1, without limit stop, ØA = 8 mm
	<b>MC 008K - LS</b> 501 11498	Mounting clamp for inductive switches M8 x 1, with limit stop, ØA = 8 mm
	<b>MC 012K</b> 501 11499	Mounting clamp for inductive switches M12 x 1, without limit stop, ØA = 12 mm, B = 9.75 mm, C = 9 mm, D = 18 mm
	<b>MC 012K - LS</b> 501 11500	Mounting clamp for inductive switches M12 x 1, with limit stop, ØA = 12 mm, B = 9.75 mm, C = 9 mm, D = 18 mm
	<b>MC 018K</b> 501 11501	Mounting clamp for inductive switches M18 x 1, without limit stop, ØA = 18 mm, B = 12.85 mm, C = 12 mm, D = 24 mm
	<b>MC 018K - LS</b> 501 11502	Mounting clamp for inductive switches M18 x 1, with limit stop, ØA = 18 mm, B = 12.85 mm, C = 12 mm, D = 24 mm

We reserve the right to make changes • Befestigungen\_IS\_GB.fm



## ACCESSORIES / MOUNTING SYSTEMS

Dimensioned drawing	Part description Part No.:	Feature
<b>Mounting clamps for inductive switches</b>		
	<p><b>MC 030K</b> 501 11503</p>	<p>Mounting clamp for inductive switches M30 x 1.5, without limit stop</p>
	<p><b>MC 030K - LS</b> 501 11504</p>	<p>Mounting clamp for inductive switches M30 x 1.5, with limit stop</p>

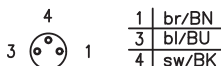
Inductive  
Switches

Accessories

Inductive Switch  
ABC

## ACCESSORIES / CONNECTION TECHNOLOGY

Contact assignment	Part description Part No.:	Feature
<b>Connection cables with M8 connector, 3-pin</b>		
	<b>K - D M8A - 3P - 2m - PVC</b> 501 04520	Connection cable 2000mm, M8 axial, 3-pin, PVC
	<b>K - D M8W - 3P - 2m - PVC</b> 501 04521	Connection cable 2000mm, M8 angular, 3-pin, PVC
	<b>K - D M8A - 3P - 5m - PVC</b> 501 04522	Connection cable 5000mm, M8 axial, 3-pin, PVC
	<b>K - D M8W - 3P - 5m - PVC</b> 501 04523	Connection cable 5000mm, M8 angular, 3-pin, PVC
	<b>K - D M8A - 3P - 10m - PVC</b> 501 10556	Connection cable 10000mm, M8 axial, 3-pin, PVC
	<b>K - D M8W - 3P - 10m - PVC</b> 501 10559	Connection cable 10000mm, M8 angular, 3-pin, PVC
	<b>K - D M8A - 3P - 2m - PUR</b> 501 10555	Connection cable 2000mm, M8 axial, 3-pin, PUR
	<b>K - D M8W - 3P - 2m - PUR</b> 501 10557	Connection cable 2000mm, M8 angular, 3-pin, PUR
	<b>K - D M8A - 3P - 5m - PUR</b> 501 06691	Connection cable 5000mm, M8 axial, 3-pin, PUR
	<b>K - D M8W - 3P - 5m - PUR</b> 501 06692	Connection cable 5000mm, M8 angular, 3-pin, PUR
	<b>K - D M8A - 3P - 10m - PUR</b> 501 06693	Connection cable 10000mm, M8 axial, 3-pin, PUR
	<b>K - D M8W - 3P - 10m - PUR</b> 501 10558	Connection cable 10000mm, M8 angular, 3-pin, PUR



**Mounting systems**

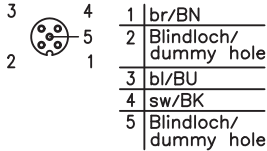
Page 36



**Connection technology**

Page 38

## ACCESSORIES / CONNECTION TECHNOLOGY

Contact assignment	Part description Part No.:	Feature
<b>Connection cables with M12 connector, 3-pin</b>		
	<b>K - D M12A - 3P - 2m - PVC</b> 501 04538	Connection cable 2000 mm, M12 axial, 3-pin, PVC
	<b>K - D M12W - 3P - 2m - PVC</b> 501 04539	Connection cable 2000 mm, M12 angular, 3-pin, PVC
	<b>K - D M12A - 3P - 5m - PVC</b> 501 04540	Connection cable 5000 mm, M12 axial, 3-pin, PVC
	<b>K - D M12W - 3P - 5m - PVC</b> 501 04541	Connection cable 5000 mm, M12 angular, 3-pin, PVC

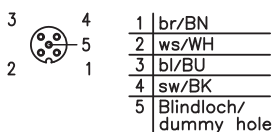
 Inductive  
Switches

Accessories

 Inductive Switch  
ABC

## ACCESSORIES / CONNECTION TECHNOLOGY

Contact assignment	Part description Part No.:	Feature
<b>Connection cables with M12 connector, 4-pin</b>		
	<b>K - D M12A - 4P - 2m - PVC</b> 501 04542	Connection cable 2000mm, M12 axial, 4-pin, PVC
	<b>K - D M12W - 4P - 2m - PVC</b> 501 04543	Connection cable 2000mm, M12 angular, 4-pin, PVC
	<b>K - D M12A - 4P - 5m - PVC</b> 501 04544	Connection cable 5000mm, M12 axial, 4-pin, PVC
	<b>K - D M12W - 4P - 5m - PVC</b> 501 04545	Connection cable 5000mm, M12 angular, 4-pin, PVC
	<b>K - D M12A - 4P - 10m - PVC</b> 501 04546	Connection cable 10000mm, M12 axial, 4-pin, PVC
	<b>K - D M12W - 4P - 10m - PVC</b> 501 04547	Connection cable 10000mm, M12 angular, 4-pin, PVC
	<b>K - D M12A - 4P - 2m - PUR</b> 501 04561	Connection cable 2000mm, M12 axial, 4-pin, PUR
	<b>K - D M12W - 4P - 2m - PUR</b> 501 04562	Connection cable 2000mm, M12 angular, 4-pin, PUR
	<b>K - D M12A - 4P - 5m - PUR</b> 501 04563	Connection cable 5000mm, M12 axial, 4-pin, PUR
	<b>K - D M12W - 4P - 5m - PUR</b> 501 04564	Connection cable 5000mm, M12 angular, 4-pin, PUR
	<b>K - D M12A - 4P - 10m - PUR</b> 501 04565	Connection cable 10000mm, M12 axial, 4-pin, PUR
	<b>K - D M12W - 4P - 10m - PUR</b> 501 04566	Connection cable 10000mm, M12 angular, 4-pin, PUR



**Mounting systems**




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**Connection technology**

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## ACCESSORIES / CONNECTION TECHNOLOGY

Contact assignment	Part description Part No.:	Feature										
<b>Connection cables with M12 connector, 4-pin, for the food and beverage industries</b>												
 <p>3 4 2 5 1</p> <table border="1"> <tr><td>1</td><td>br/BN</td></tr> <tr><td>2</td><td>ws/WH</td></tr> <tr><td>3</td><td>bl/BU</td></tr> <tr><td>4</td><td>sw/BK</td></tr> <tr><td>5</td><td>Blindloch/ dummy hole</td></tr> </table>	1	br/BN	2	ws/WH	3	bl/BU	4	sw/BK	5	Blindloch/ dummy hole	<b>K - D M12A - 4P - 2m - FAB</b> 501 04570	Connection cable 2000mm, M12 axial, 4-pin, PVC, Food & Beverage version
	1	br/BN										
	2	ws/WH										
	3	bl/BU										
	4	sw/BK										
5	Blindloch/ dummy hole											
<b>K - D M12W - 4P - 2m - FAB</b> 501 04571	Connection cable 2000mm, M12 angular, 4-pin, PVC, Food & Beverage version											
<b>K - D M12A - 4P - 5m - FAB</b> 501 04572	Connection cable 5000mm, M12 axial, 4-pin, PVC, Food & Beverage version											
<b>K - D M12W - 4P - 5m - FAB</b> 501 04573	Connection cable 5000mm, M12 angular, 4-pin, PVC, Food & Beverage version											
<b>K - D M12W - 4P - 10m - FAB</b> 501 10273	Connection cable 10000mm, M12 angular, 4-pin, PVC, Food & Beverage version											
<b>Cable connectors, user-configurable</b>												
 <p>4 3 1 2</p> <table border="1"> <tr><td>1</td><td>br/BN</td></tr> <tr><td>3</td><td>bl/BU</td></tr> <tr><td>4</td><td>sw/BK</td></tr> </table>	1	br/BN	3	bl/BU	4	sw/BK	<b>D M8A - 3P - SK</b> 501 04582	Cable socket, M8 axial, 3-pin, insulation displacement connections, user-configurable				
1	br/BN											
3	bl/BU											
4	sw/BK											
 <p>3 4 2 5 1</p> <table border="1"> <tr><td>1</td><td>br/BN</td></tr> <tr><td>2</td><td>ws/WH</td></tr> <tr><td>3</td><td>bl/BU</td></tr> <tr><td>4</td><td>sw/BK</td></tr> </table>	1	br/BN	2	ws/WH	3	bl/BU	4	sw/BK	<b>KD 095 - 4</b> 500 31324	Cable socket, M12 angular, 4-pin, user-configurable		
	1	br/BN										
2	ws/WH											
3	bl/BU											
4	sw/BK											
<b>KD 095 - 4A</b> 500 31323	Cable socket, M12 axial, 4-pin, user-configurable											

Inductive Switches

Accessories

Inductive Switch ABC

# INDUCTIVE SWITCH ABC

## Introduction

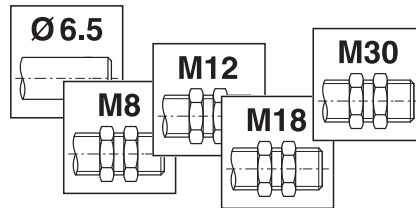
The inductive switch ABC shall assist you in selecting the right switch.



You will find here explanations on the different inductive switch types, the additional functions and a lot of information for the practitioner.

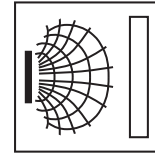
## Inductive switch types

The wide variety of constructions with their varying scanning ranges solves almost every "detection problem".



The following explanations shall assist you in making the right selection for the corresponding application.

## Functionality

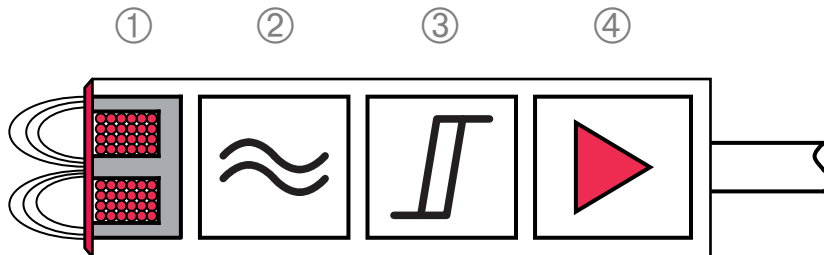


The function of inductive switches is based on the interaction of metallic conductors with the electromagnetic field of the switch.

Eddy currents are induced in the metallic damping material, and these extract energy from the sensor's alternating field. If the amplitude of the internal oscillation falls below the factory-set switching threshold, the signal at the switch output changes.

## Function groups of a switch

- ① Coil and ferrite core define the geometry and hence the operating range of the electromagnetic field.
- ② The oscillator defines the oscillating frequency and supplies the coil with energy.



- ③ The trigger circuit detects the changes in the oscillating circuit.
- ④ The driver stage amplifies the trigger signal for evaluation by a control.

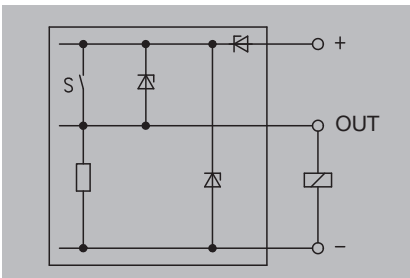
We reserve the right to make changes • Induktiv\_ABC\_GB.fm



**Outputs**

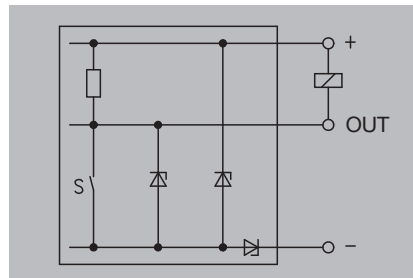
**PNP transistor outputs**

The PNP transistor output is a high-impedance switching output with open collector. It switches positive potential to the connected load.



**NPN transistor outputs**

The NPN transistor output is a high-impedance switching output with open collector. It switches GND to the connected load.



**Short-circuit protection**

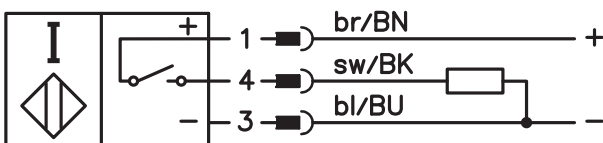
Transistor outputs are usually short-circuit proof. This is achieved by monitoring the output current and, should it exceed a certain level, cutting off the supply to the transistor.

The information on the maximum current given on the data sheet have to be observed despite the short-circuit protection.

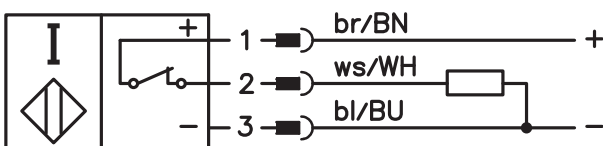
**Switching functions**

**PNP (+) switching**

**NO (Normally Open - make-contact)**

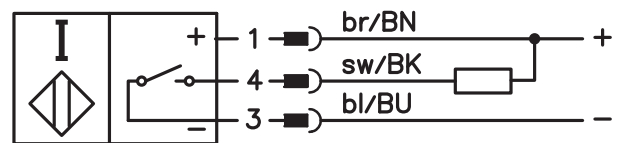


**NC (Normally Closed - break-contact)**

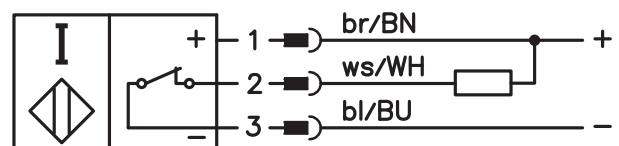


**NPN (-) switching**

**NO (Normally Open - make-contact)**



**NC (Normally Closed - break-contact)**



# MOUNTING / INSTALLATION

## Metal installation

The inductive switches can be classified as "embedded installation possible" and "embedded installation not possible".

Switches for which embedded installation is possible may be recognized from their metal sleeve, which does not fully stretch to the active surface, but falls a few millimeters short depending on the switch's diameter.

Switches that are not for embedded installation permit a larger operating distance to be achieved.

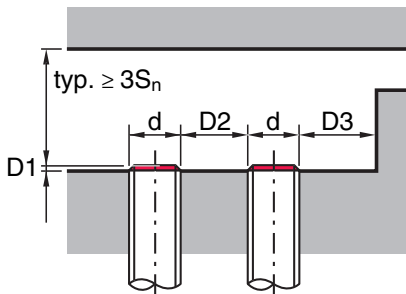


**Notice:**

The individual installation specifications may be found in the data sheet of the respective switch.

## Embedded installation in metal

For inductive switches capable of embedded installation, the active surface can be installed flush with the surrounding metal surface.



For switches with increased operating distance  $S_n$  (typically the scanning range limit), the active surface must protrude by the distance D1.

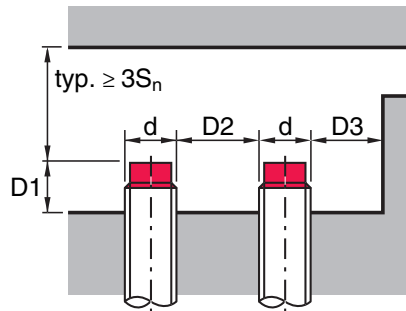
If switches for embedded installation are mounted side by side, a distance of more than D2 must be kept.

The distance to the adjacent metal walls must be at least D3.

The distance of the switch's active surface to the opposite metal surfaces must be  $3 \times S_n$ .

## Non-embedded installation in metal

Inductive switches for non-embedded installation can be recognized by the protruding caps. This area must not be installed inside metal. This lets these switches achieve a larger operating distance  $S_n$ .



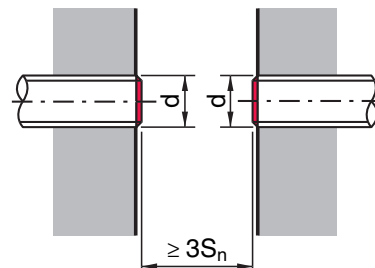
The distance from the switch's active surface to the surrounding metal surface must be D1.

If switches for non-embedded installation are mounted side by side, a distance of more than D2 must be kept. The distance to the adjacent metal walls must be at least D3.

The distance of the switch's active surface to the opposite metal surfaces must be  $3 \times S_n$ .

## Installation of 2 switches opposite to each other

If two inductive switches are mounted opposite each other, the minimum distance between the active surfaces must be  $3 \times S_n$ .



## Tightening torque

If the holding nut is tightened too much, the cylindrical switches may be mechanically damaged. In order to avoid this, the indicated maximum admissible tightening torques must not be exceeded:

Installation size	max. tightening torque
M8 x 1	4Nm
M12 x 1	10Nm
M18 x 1	30Nm
M30 x 1.5	60Nm



**Notice:**

For precise individual values please refer to the data sheet of the respective switch.

## IP protection class

In order to make the protection of housings against foreign objects and water comparable, the protection classes have been defined in EN 60529/IEC 60529.

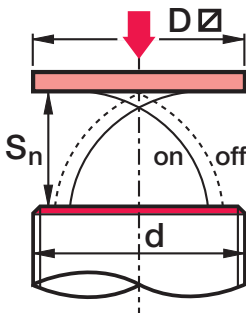
The first digit refers to the protection against foreign objects, the second to water protection.

Leuze inductive switches meet at least protection class IP 67. The models featuring stainless steel housings were specifically developed against intrusion of humidity during high-pressure cleaning and pass the tests of protection class IP 69K according to DIN 40050 Part 9.

## CHARACTERISTICS

### Typical response behaviour

The specified values for the operating distance  $S$  relate to the damping of the inductive switch using a standard measuring plate in axial direction. If the measuring plate is laterally offset or the switch is approached radially, the actual operating distance  $S_r$  shifts.



As an example, the diagram above shows the response behaviour of an inductive switch: the operating distance in relation to axial and radial offset.



**Notice:**

The type-specific response curves may be found in the data sheet of the respective switch.

### Active surface

The active surface is the area from which the electromagnetic field of the switch emanates. It is used as reference point for the specified operating distance.

The area is determined by the coil core geometry and roughly matches the surface of the core cap.

### Standard measuring plate

The standard measuring plate is used to determine the inductive characteristics such as operating distance, repeatability, or temperature drift according to IEC 60947-5-2.

The plate is a square of 1 mm thickness and made of steel (Fe360). The side length  $a$  of the square is the diameter of the inscribed circle of the active surface, or three times the rated operating distance  $S_n$  if this is the larger value.

### Operating distances

The operating distance  $S$  defines the distance from a standard measuring plate to the inductive switch at which the signal at the switch's switching output changes.

### Typical Scanning range limit (rated operating distance $S_n$ )

The rated operating distance  $S_n$  is a parameter for the specification of operating distances. It considers neither manufacturing tolerances nor changes due to external influences such as voltage and temperature.

The actual operating distance  $S_r$  of an inductive switch is measured under defined installation conditions, at rated operating voltage and an ambient temperature of  $23^\circ\text{C} \pm 5^\circ\text{C}$  ( $0.9 \times S_n \leq S_r \leq 1.1 \times S_n$ ).

The usable operating distance  $S_u$  is measured over the complete ambient temperature range (typically:  $-25^\circ\text{C} \dots 70^\circ\text{C}$ ) at a supply voltage of 85% ... 110% of the rated value ( $0.81 \times S_n \leq S_u \leq 1.21 \times S_n$ ).

### Scanning range (assured operating distance $S_a$ )

The assured operating distance  $S_a$  describes the scanning range that ensures a safe operation of the switch across the specified temperature and voltage range.

For inductive switches, the assured operating distance  $S_a$  is between 0% ... 81% of the rated operating distance  $S_n$ .

### Reduction factors

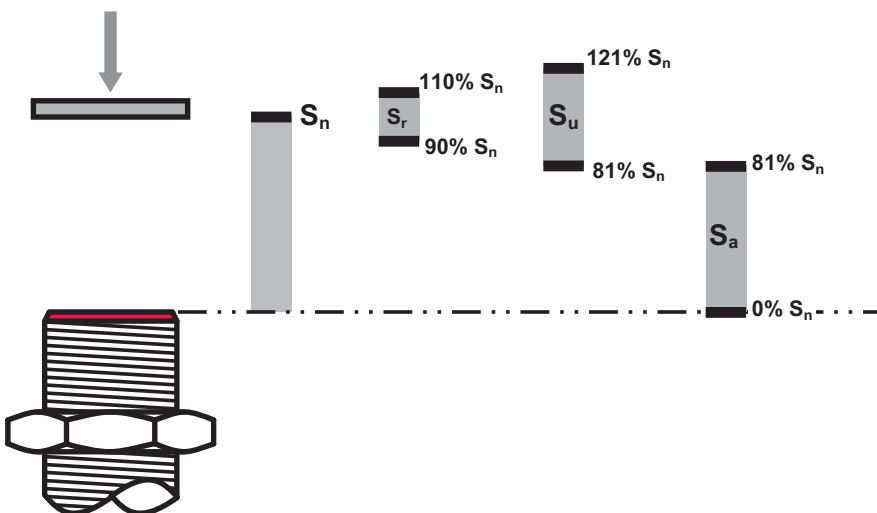
The reduction factor is a value that changes depending on the material. It describes the change of the operating distance  $S$  if the damping material differs from Fe360:  $S_r = \text{factor} \times S_n$

Material	Factor
Steel (FE360)	1.0
Copper	0.18 ... 0.50
Aluminium	0.25 ... 0.50
Brass	0.33 ... 0.60
Stainless steel	0.63 ... 0.90



**Notice:**

For precise individual values please refer to the data sheet of the respective sensor.



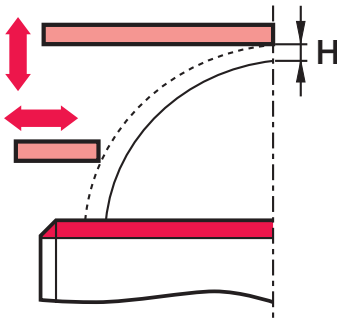
# CHARACTERISTICS

## Delay before start-up

The delay before start-up is the maximum delay between switching the operating voltage on and the switch reaching readiness for operation.

## Hysteresis H

The hysteresis H is the range between switch-on and cut-out point (switch reversal) of an inductive switch.



It is determined at the rated operating voltage and an ambient temperature of 23°C ± 5°C.

At the most, the hysteresis is 20% of the actual operating distance S<sub>r</sub>.

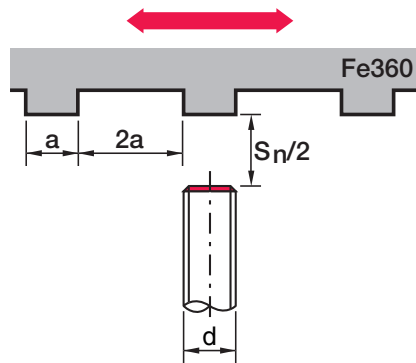
## Repeatability

The repeatability of the actual operating distance S<sub>r</sub> is measured over eight hours at an ambient temperature of 23°C ± 5°C, a relative humidity of 90%, and the rated operating voltage.

The difference between two arbitrary measurement values must not exceed 10% of the actual operating distance S<sub>r</sub>.

## Switching frequency

The switching frequency indicates the maximum possible number of switching sequences per second at a constant pulse-pause ratio (1:2) and half the rated operating distance S<sub>r</sub>.



## Ambient temperature

The ambient temperature range specified (typically -25°C ... +70°C) must not be exceeded, as the switches may be damaged in this case. The functionality outside these limits is also not defined.

## Temperature drift

The temperature drift is the deviation of the actual operating distance S<sub>r</sub> within the temperature range of -25°C ... +70°C. According to IEC 60947-5-2, the difference is at most 10% compared to the rated value.

## Voltage drop U<sub>d</sub>

In the switched-on state, a current-dependent voltage drop is present across the output transistor.

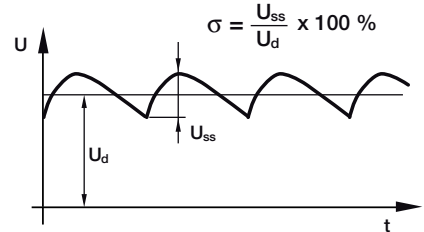
The actual output voltage is the applied operating voltage less the voltage drop.

## Operating voltage U<sub>B</sub>

The operating voltage is the voltage at which the switch operates safely. The operating voltage is 10 ... 30VDC.

## Residual ripple σ

The residual ripple is the AC voltage superimposed onto the DC voltage.



If the residual ripple is too high, the switching behavior of the switch may be undefined.

The maximum allowable operating voltage U<sub>B</sub> must not be exceeded, even during the peaks of U<sub>ss</sub>.

## Open-circuit current I<sub>0</sub>

The open-circuit current is the current consumption of the inductive sensor for operating LED, amplifier etc. in the locked state.

## Output current I<sub>L</sub>

The devices are designed for a maximum output current I<sub>L</sub>. If this current is exceeded, even for brief periods, the overload protection activates.

## Residual current I<sub>r</sub>

If the output is switched off, the residual current flows through the output transistor and therefore through the load connected.

## Electromagnetic compatibility – EMC

The EMC robustness of the products listed meets the high requirements of the IEC 60947-5-2. They are subjected to the following tests:

- IEC 60255-5      1 kV
- IEC 61000-4-2    Level 3 (ESD)
- IEC 61000-4-3    Level 3 (RFI)
- IEC 61000-4-4    Level 3 (Burst)

## STANDARDS AND CERTIFICATION

### IEC 60947-5-2



There is a harmonized product standard for inductive switches.

It provides a reference to the respective basic standards and basic engineering standards and describes, among others, the inductive switch functions, pin assignments, temperature ranges, protection classes, electromagnetic compatibility, and the stress from swinging and shock.

The applicable international standard is the IEC 60947-5-2, for Europe EN 60947-5-2 (in Germany: DIN EN 60947-5-2 or VDE 660 part 208.)

### CE labelling



An important goal of the European Union (EU) is free trade and the standardisation of applicable regulations within EU member countries. To achieve this aim, the European parliament has enacted certain guidelines.

98/37/EC Machine directive (2006/42/EC)

2004/108/EC EMC directive

2006/95/EC Low voltage directive

If a product falls under one of these directives, it must only be placed on the market if it meets the requirements of the respective directive. The product also has to be marked with the CE label. The CE certification certifies conformity with the applicable guideline(s).

All listed products are equipped with the CE certification.

### C-UL-US certification



Products with this certification meet the requirements specified by UL (Underwriters Laboratory Inc.) for both the USA as well as Canada. The adherence to the specifications is checked during periodical audits by the UL officials or their representatives. The product standard which is used is UL 508.

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