

SERIES SELECTION TABLE

 Series	Dimensions in mm (HxWxL)	Typ. scan range limit S_n in mm	Installation		Switching output / function			
			Embedded	Non-embedded	PNP	NPN	NO - normally open	NC - normally closed
 IS 255	5 x 5 x 25	1.5	●		●	●	●	○
		2.0	●		●	○	●	●
		3.0	●		●	○	●	○
 IS 288	8 x 8 x 50	4.0	●		●	●	●	●
		8.0		●	●	●	●	●
		20.0	●		●	●	●	●
 IS 240	40 x 12 x 26	40.0		●	●	●	●	●
		20.0	●		●	●	●	●
		40.0		●	●	●	●	●
 IS 244	40 x 40 x 67 40 x 40 x 120	20.0	●		●	●	●	●
		40.0		●	●	●	●	●
		40.0		●	●	●	●	●

INDUCTIVE SWITCHES, CUBIC

	Max. switching frequency	Operating voltage	Connection			Housing material		Protection class		
			M8 connector	M12 connector	Cable, 2 m, PVC	Chromium-plated brass	Plastic (PA)	IP 67	IP 69K	Page
	3000Hz	10 ... 30VDC	○		●	●		●		370
	5000Hz	10 ... 30VDC	●		●	●		●		374
	3000Hz	10 ... 30VDC	●		●	●		●		
	1000Hz	10 ... 30VDC	●		●	●		●		
	1400Hz	10 ... 30VDC	●		●		●	●		362
	1400Hz	10 ... 30VDC	●		●		●	●		
	150Hz	10 ... 30VDC		●	●		●	●		366
	150Hz	10 ... 30VDC		●	●		●	●		
○ = on request										

Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
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Measuring
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Sensors

Inductive
Switches

Forked
Sensors

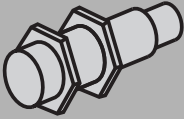
Special
Sensors

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Sensors

Light
Curtains

Protective
Sensors

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	
	IS 204	Ø 4 x 25	1.5						
	IS 205	M5 x 38	1.5						
	IS 206	Ø 6.5 x 35	2.0						
			3.0						
	IS 208	M8 x 45	1.5						
			2.0						
			2.5						
			4.0						
	IS 212	M12 x 50	2.0						
			4.0						
			4.0						
			6.0 ¹⁾						
			6.0						
			8.0						
			10.0 ¹⁾						
			10.0						
	IS 218	M18 x 50	5.0						
			8.0						
			8.0						
			10.0 ¹⁾						
			12.0						
			20.0 ¹⁾						
			20.0						
	IS 230	M30 x 60	10.0						
			15.0						
			20.0 ¹⁾						
			22.0						
			40.0 ¹⁾						
			40.0						

INDUCTIVE SWITCHES, CYLINDRICAL

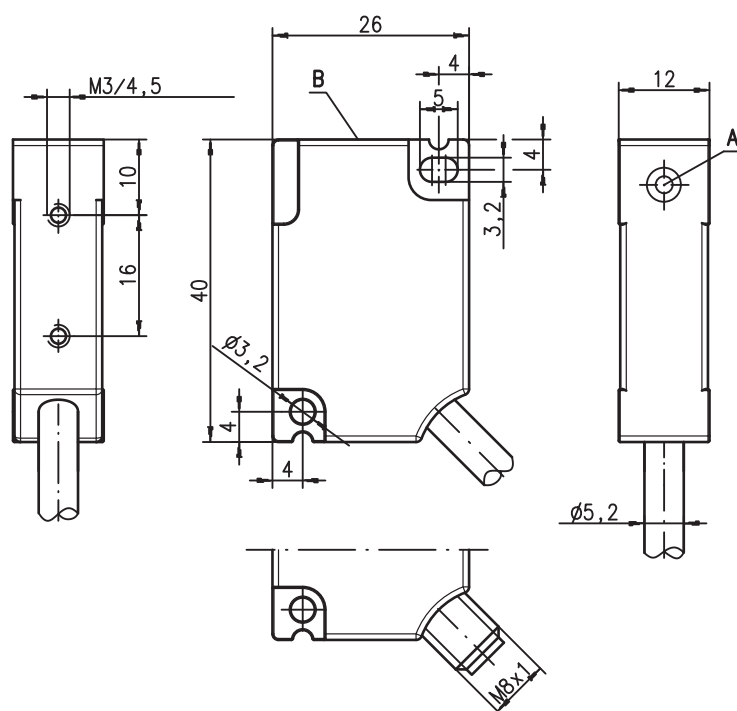
	Max. switching frequency	Operating voltage	Connection			Housing material		Protection class		Page
			M8 connector	M12 connector	Cable, 2 m, PVC	Chromium-plated brass	Stainless steel	IP 67	IP 69K	
	3000Hz	10 ... 30VDC	○		●		●	●		378
	3000Hz	10 ... 30VDC	●		●		●	●		382
	5000Hz	10 ... 30VDC	●		●		●	●		386
	1000Hz	10 ... 30VDC			●		●	●		
	5000Hz	10 ... 30VDC	●	●	●		●	●		390
	5000Hz	10 ... 30VDC	●		●		●	●		
	5000Hz	10 ... 30VDC	●	●	●		●	●		
	3500Hz	10 ... 30VDC	●		●		●	●		
	3000Hz	10 ... 30VDC		●	●	●		●		400
	2000Hz	10 ... 30VDC		●	●	●		●		
	2000Hz	10 ... 30VDC		●	●	●		●		
	800Hz	10 ... 30VDC		●			●	●	●	
	600Hz	10 ... 30VDC		●	●	●		●		
	1500Hz	10 ... 30VDC		●	●	●		●		
	400Hz	10 ... 30VDC		●			●	●	●	
	400Hz	10 ... 30VDC		●	●	●		●		
	2000Hz	10 ... 30VDC		●	●	●		●		410
	1500Hz	10 ... 30VDC		●	●	●		●		
	2000Hz	10 ... 30VDC		●	●	●		●		
	200Hz	10 ... 30VDC		●			●	●	●	
	500Hz	10 ... 30VDC		●	●	●		●		
	200Hz	10 ... 30VDC		●			●	●	●	
	200Hz	10 ... 30VDC		●	●	●		●		
	1200Hz	10 ... 30VDC		●	●	●		●		420
	700Hz	10 ... 30VDC		●	●	●		●		
	100Hz	10 ... 30VDC		●			●	●	●	
	200Hz	10 ... 30VDC		●	●	●		●		
	100Hz	10 ... 30VDC		●			●	●	●	
	90Hz	10 ... 30VDC		●	●	●		●		

1) Food+Beverage version

○ = on request

OVERVIEW

Dimensioned drawing



A Active surface
B Yellow indicator diode



Further details can be found in the respective data sheet.

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IS 240 SERIES

Installation	Typ. scan range limit S_n	Page
 Embedded	0 4 mm	364
 Non-embedded	0 8 mm	364



Common technical data

Electrical data	Operating voltage U_B	10 ... 30VDC
	Residual ripple σ	$\leq 20\%$ of U_B
	Output current I_L	≤ 250 mA
	Residual current I_r	≤ 10 μ A
	Voltage drop U_d	≤ 2.5 V
	Hysteresis H of S_r	$\leq 5\%$
	Repeatability	$\leq 10\%$
Indicators	Yellow LED	Switching state
Mechanical data	Standard target (Fe360)	12 x 12 mm ² (24 x 24 mm ²)
	Weight (connector/cable)	Approx. 18g/108g
Environmental data	Ambient temperature	-25°C ... +70°C
	Protective circuit	Polarity reversal protection, short circuit protection
	Standards applied	IEC 60947-5-2, UL 508
	Electromagnetic compatibility	IEC 61000-4-2 air 8kV
		IEC 61000-4-3 10V/m
		IEC 61000-4-4 2kV

Features

- Slim construction 40 x 12mm
- Plastic housing
- Integrated short circuit and polarity reversal protection
- LED for switching state



Inductive Switch

- | | |
|---------------------------------|--------|
| ● Functionality | P. 700 |
| ● Outputs / Switching functions | P. 701 |
| ● Mounting / Installation | P. 702 |
| ● Characteristic values | P. 703 |

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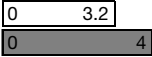
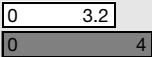
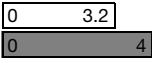
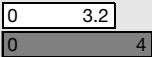
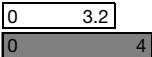
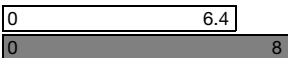
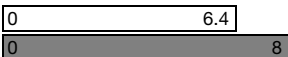
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INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches 40 x 12, embedded installation					
IS 240 PP/44 - 4E0 50114207		1400Hz	Embedded	2 x PNP	NO / NC complementary (make-contact/ break-contact)
IS 240 PP/44 - 4E0 - S8.4 50114208		1400Hz	Embedded	2 x PNP	NO / NC complementary (make-contact/ break-contact)
IS 240 PP/4NO - 4E0 - S8.3 50117797		1400Hz	Embedded	1 x PNP	NO (normally open)
IS 240 PP/22 - 4E0 50114203		1400Hz	Embedded	2 x NPN	NO / NC complementary (make-contact/ break-contact)
IS 240 PP/22 - 4E0 - S8.4 50114204		1400Hz	Embedded	2 x NPN	NO / NC complementary (make-contact/ break-contact)
Inductive switches 40 x 12, non-embedded installation					
IS 240 PP/44 - 8NO 50114209		1400Hz	Non- embedded	2 x PNP	NO / NC complementary (make-contact/ break-contact)
IS 240 PP/44 - 8NO - S8.4 50114210		1400Hz	Non- embedded	2 x PNP	NO / NC complementary (make-contact/ break-contact)
IS 240 PP/22 - 8NO 50114205		1400Hz	Non- embedded	2 x NPN	NO / NC complementary (make-contact/ break-contact)
IS 240 PP/22 - 8NO - S8.4 50114206		1400Hz	Non- embedded	2 x NPN	NO / NC complementary (make-contact/ break-contact)

Accessories / connection cables

More accessories can be found from **page 643** onwards

Part no.	Designation	Features
a 50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000mm, M8 angular, 3-pin, PVC
b 50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000mm, M8 axial, 3-pin, PVC
c 50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000mm, M8 angular, 4-pin, PVC
d 50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000mm, M8 axial, 4-pin, PVC
e 50104583	D M8A - 4P - SK	Cable socket, M8 axial, 4-pin, user-configurable



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IS 240 SERIES

Inductive Switches



Photoel. sensors/
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cubic housing

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cylindrical housing

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



Inductive Switch

- Functionality P. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Electrical connection

M8 connector, 4-pin

10-30V DC +	1	br/BN
NC OUT	2	ws/WH
GND	3	bl/BU
NO OUT	4	sw/BK

Cable

10-30V DC +	br/BN
NC OUT	ws/WH
GND	bl/BU
NO OUT	sw/BK

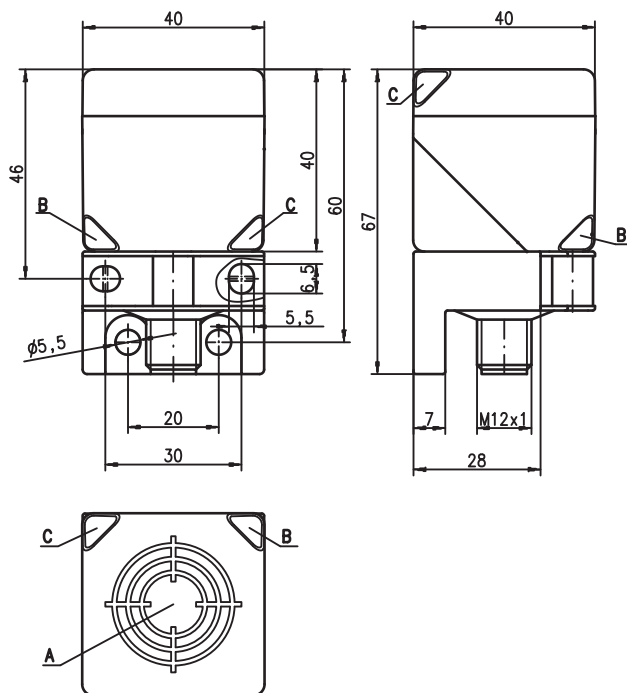
M8 connector, 3-pin

10-30V DC +	1	br/BN
GND	3	bl/BU
NO OUT	4	sw/BK

OVERVIEW

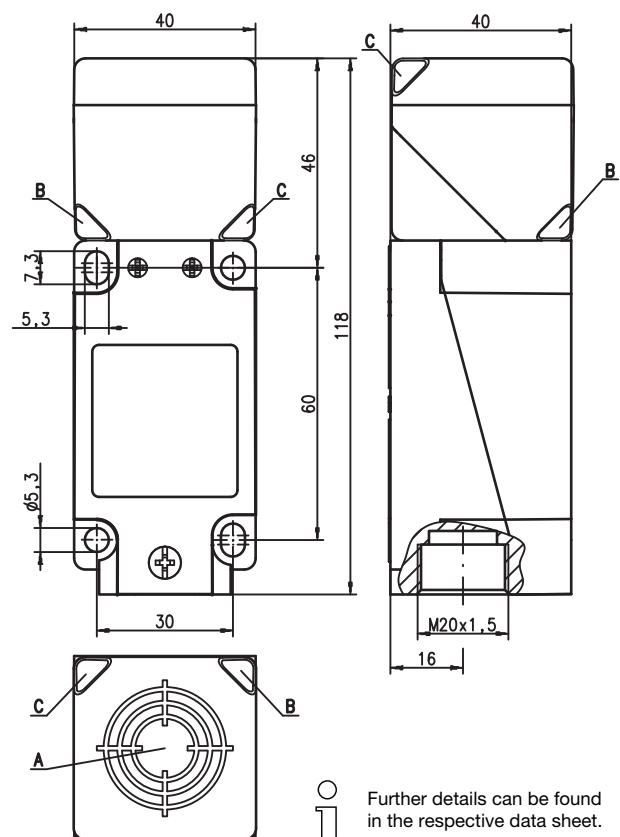
Dimensioned drawing

Types with M12 connector



- A** Active surface
- B** Yellow indicator diode
- C** Green indicator diode

Types with terminals



 Further details can be found in the respective data sheet.



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IS 244 SERIES

Installation	Typ. scan range limit S_n	Page
 Embedded	0  20 mm	368
 Non-embedded	0  40 mm	368



Common technical data

Electrical data	Operating voltage U_B	10 ... 30VDC
	Residual ripple σ	$\leq 20\%$ of U_B
	Output current I_L	$\leq 200\text{mA}$
	Residual current I_r	$\leq 500\mu\text{A}$
	Voltage drop U_d	$\leq 2.0\text{V}$
	Hysteresis H of S_r	$\leq 5\%$
	Repeatability	$\leq 10\%$
Indicators	2x green LED	Ready to operate
	2x yellow LED	Switching state
Mechanical data	Standard target (Fe360)	60 x 60mm ² (120 x 120mm ²)
	Weight (connector/cable)	Approx. 130g/225g
Environmental data	Ambient temperature	-25°C ... +85°C
	Protective circuit	Polarity reversal protection, short circuit protection
	Standards applied	IEC 60947-5-2, UL 508
	Electromagnetic compatibility	IEC 61000-4-2 air 8kV IEC 61000-4-3 10V/m IEC 61000-4-4 2kV

Features

- Classic construction 40 x 40mm
- Plastic housing
- Connection via M12 connector or terminals
- Integrated short circuit and polarity reversal protection
- LED for switching state



Inductive Switch

- Functionality P. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

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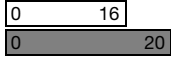
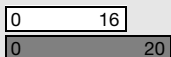
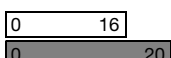
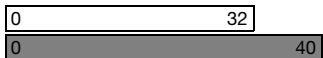
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INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches 40 x 40, embedded installation					
IS 244 PP/44 - 20E - TB.4 50114213		150Hz	Embedded	2x PNP	NO / NC complementary (make-contact/ break-contact)
ISS 244 PP/44 - 20E - S12 50114217		150Hz	Embedded	2x PNP	NO / NC complementary (make-contact/ break-contact)
IS 244 PP/22 - 20E - TB.4 50114211		150Hz	Embedded	2xNPN	NO / NC complementary (make-contact/ break-contact)
ISS 244 PP/22 - 20E - S12 50114215		150Hz	Embedded	2xNPN	NO / NC complementary (make-contact/ break-contact)
Inductive switches 40 x 40, non-embedded installation					
IS 244 PP/44 - 40N - TB.4 50114214		150Hz	Non- embedded	2x PNP	NO / NC complementary (make-contact/ break-contact)
ISS 244 PP/44 - 40N - S12 50114218		150Hz	Non- embedded	2x PNP	NO / NC complementary (make-contact/ break-contact)
IS 244 PP/22 - 40N - TB.4 50114212		150Hz	Non- embedded	2xNPN	NO / NC complementary (make-contact/ break-contact)
ISS 244 PP/22 - 40N - S12 50114216		150Hz	Non- embedded	2xNPN	NO / NC complementary (make-contact/ break-contact)

Accessories / connection cables

More accessories can be found from **page 643** onwards

Part no.	Designation	Features
a 50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000mm, M12 angular, 4-pin, PVC
b 50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000mm, M12 axial, 4-pin, PVC
c 50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d 50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e 50031323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable



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IS 244 SERIES

Inductive Switches



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	Connection	Material housing / active surface	Protection class	Accessories	
	Terminals	PA / PA	IP 67 IP 69K		
	M12 connector	PA / PA	IP 67 IP 69K	a, b, c, d, e	
	Terminals	PA / PA	IP 67 IP 69K		
	M12 connector	PA / PA	IP 67 IP 69K	a, b, c, d, e	
	Terminals	PA / PA	IP 67 IP 69K		
	M12 connector	PA / PA	IP 67 IP 69K	a, b, c, d, e	
	Terminals	PA / PA	IP 67 IP 69K		
	M12 connector	PA / PA	IP 67 IP 69K	a, b, c, d, e	
	Terminals	PA / PA	IP 67 IP 69K		
	M12 connector	PA / PA	IP 67 IP 69K	a, b, c, d, e	

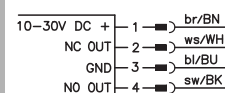


Inductive Switch

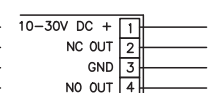
- Functionality P. 700
- Outputs / Switching functions P. 701
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Electrical connection

M12 connector

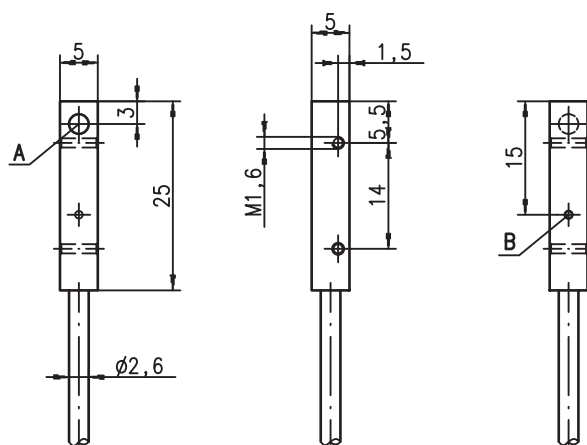


Terminals



OVERVIEW

Dimensioned drawing



- A** Active surface
B Yellow indicator diode



Further details can be found in the respective data sheet.



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IS 255 SERIES

Installation	Typ. scan range limit S_n	Page
 Embedded	 1.5 mm	372



Common technical data

Electrical data	Operating voltage U_B	10 ... 30VDC
	Residual ripple σ	$\leq 20\%$ 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	$\leq 2\%$
Indicators	Yellow LED	Switching state
Mechanical data	Standard target (Fe360)	5 x 5mm ²
	Weight	Approx. 34g
Environmental data	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 1 kV
		IEC 61000-4-2 Level 2
		IEC 61000-4-3 Level 3
		IEC 61000-4-4 Level 3

Features

- Slim and short 5 x 5mm cubical metal housing
- Chromium-plated brass housing
- Built-in short circuit protection, inductive protection, polarity reversal protection
- LED for switching state



Inductive Switch

- Functionality P. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

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INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] ☐ Typ. scan range limit S_n [mm] ☐	Switching frequency	Installation	Output	Switching	
Inductive switches 5 x 5, embedded installation						
IS 255 MP/4NO - 1E5 50113209	☐ 0 1.2 ☒ 0 1.5	3000Hz	Embedded	1 x PNP	NO (normally open)	
IS 255 MP/4NO - 1E5, 200 - S8.3 50117200	☐ 0 1.2 ☒ 0 1.5	3000Hz	Embedded	1 x PNP	NO (normally open)	
IS 255 MP/2NO - 1E5 50113210	☐ 0 1.2 ☒ 0 1.5	3000Hz	Embedded	1 x NPN	NO (normally open)	

Accessories / connection cables

More accessories can be found from **page 643** onwards

Part no.	Designation	Features
a 50104521	K - D M8W - 3P - 2m - PVC	Connection cable 2000mm, M8 angular, 3-pin, PVC
b 50104520	K - D M8A - 3P - 2m - PVC	Connection cable 2000mm, M8 axial, 3-pin, PVC
c 50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000mm, M8 angular, 3-pin, PVC
d 50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000mm, M8 axial, 3-pin, PVC
e 50104582	D M8A - 3P - SK	Cable socket, M8 axial, 3-pin, insulation displacement connections, user-configurable



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IS 255 SERIES

Inductive Switches



Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
cylindric housing

Measuring
Sensors

Ultrasonic
Sensors

Inductive
Switches

Forked
Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

Connection	Material housing / active surface	Protection class	Accessories
Cable, 2 m, PUR	Brass, chromium-plated / PA66	IP 67	
Cable, 0.2 m, with M8 connector	Brass, chromium-plated / PA66	IP 67	a, b, c, d, e
Cable, 2 m, PUR	Brass, chromium-plated / PA66	IP 67	

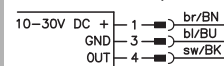


Inductive Switch

- Functionality P. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Electrical connection

M8 connector, 3-pin

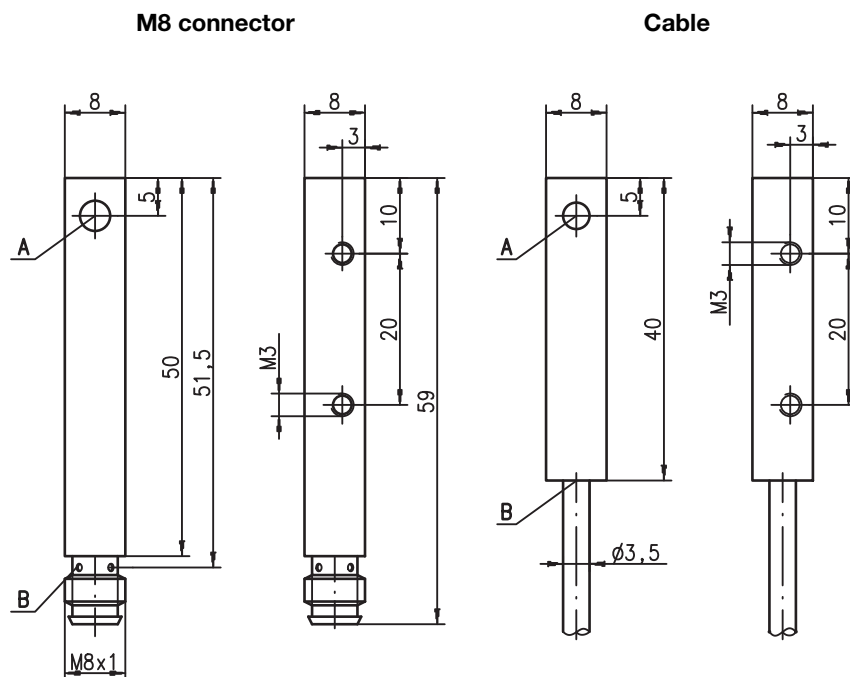


Cable



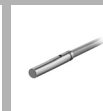
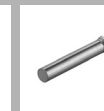
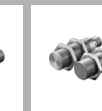
OVERVIEW

Dimensioned drawing



- A** Active surface
B Yellow indicator diode

 Further details can be found in the respective data sheet.

										
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IS 288 SERIES

Installation	Typ. scan range limit S_n	Page
 Embedded	0 3 mm	376



Common technical data

Electrical data	Operating voltage U_B	10 ... 30VDC
	Residual ripple σ	$\leq 20\%$ 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	$\leq 5\% / \leq 10\%$
	Temperature drift of S_r	$\leq 10\%$ (entire temp. range)
	Repeatability	$\leq 2\% / 5\%$
Indicators	Yellow LED	Switching state
Mechanical data	Standard target (Fe360)	8 x 8 (9 x 9)mm ²
	Weight (connector/cable)	Approx. 15g/45g
Environmental data	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 1 kV
		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 643 onwards

Features

- Slim and short 8 x 8mm cubical metal housing
- Nickel-plated brass housing
- Built-in short circuit protection, inductive protection, polarity reversal protection
- LED for switching state



Inductive Switch

- Functionality P. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
cylindric housing

Measuring
Sensors

Ultrasonic
Sensors

Inductive
Switches

Forked
Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	☐ ☐	Switching frequency	Installation	Output	Switching
Inductive switches 8 x 8, embedded installation						
IS 288 MP/4NO - 1E5 - S8.3 50112886	0 1.2 0 1.5		5000Hz	Embedded	1 x PNP	NO (normally open)
IS 288 MP/4NO - 1E5 50112885	0 1.2 0 1.5		5000Hz	Embedded	1 x PNP	NO (normally open)
IS 288 MP/2NO - 1E5 50113208	0 1.2 0 1.5		5000Hz	Embedded	1 x NPN	NO (normally open)
IS 288 MP/4NO - 2E0 - S8.3 50112888	0 1.6 0 2		3000Hz	Embedded	1 x PNP	NO (normally open)
IS 288 MP/4NO - 2E0 50112887	0 1.6 0 2		3000Hz	Embedded	1 x PNP	NO (normally open)
IS 288 MP/4NC - 2E0 50113783	0 1.6 0 2		3000Hz	Embedded	1 x PNP	NC (normally closed)
IS 288 MP/4NO - 3E0 - S8.3 50112890	0 2.4 0 3		1000Hz	Embedded	1 x PNP	NO (normally open)
IS 288 MP/4NO - 3E0 50112889	0 2.4 0 3		1000Hz	Embedded	1 x PNP	NO (normally open)

Accessories / connection cables

More accessories can be found from **page 643** onwards

Part no.	Designation	Features
a 50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000mm, M8 angular, 3-pin, PVC
b 50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000mm, M8 axial, 3-pin, PVC
c 50106692	K - D M8W - 3P - 5m - PUR	Connection cable 5000mm, M8 angular, 3-pin, PUR
d 50106691	K - D M8A - 3P - 5m - PUR	Connection cable 5000mm, M8 axial, 3-pin, PUR
e 50104582	D M8A - 3P - SK	Cable socket, M8 axial, 3-pin, user-configurable



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IS 288 SERIES

Inductive Switches



Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
cylindric housing

Measuring
Sensors

Ultrasonic
Sensors

Inductive
Switches

Forked
Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

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

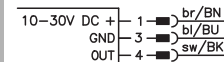


Inductive Switch

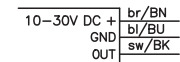
- Functionality P. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Electrical connection

M8 connector

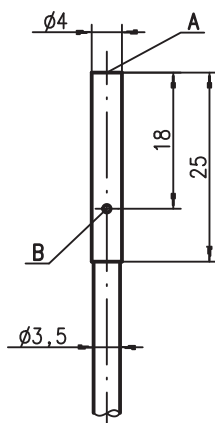


Cable



OVERVIEW

Dimensioned drawing



- A** Active surface
B Yellow indicator diode



Further details can be found in the respective data sheet.



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IS 204 SERIES

Installation	Typ. scan range limit S_n	Page
 Embedded	 1.5 mm	380



Common technical data

Electrical data	Operating voltage U_B	10 ... 30VDC
	Residual ripple σ	$\leq 20\%$ 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	$\leq 2\%$
Indicators	Yellow LED	Switching state
Mechanical data	Standard target (Fe360)	4.5 x 4.5 mm ²
	Weight	Approx. 32g
Environmental data	Ambient temperature	-25°C ... +70°C
	Protective circuit	Polarity reversal protection, short circuit prot., inductive prot.
	Standards applied	IEC 60947-5-2
	Electromagnetic compatibility	IEC 60255-5 1 kV
		IEC 61000-4-2 Level 2
		IEC 61000-4-3 Level 3
		IEC 61000-4-4 Level 3

Features

- Slim and short cylindrical metal housing $\varnothing 4\text{mm}$
- Stainless steel housing
- Built-in short circuit protection, inductive protection, polarity reversal protection
- LED for switching state



Inductive Switch

- | | |
|---------------------------------|--------|
| ● Functionality | P. 700 |
| ● Outputs / Switching functions | P. 701 |
| ● Mounting / Installation | P. 702 |
| ● Characteristic values | P. 703 |

Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
cylindric housing

Measuring
Sensors

Ultrasonic
Sensors

Inductive
Switches

Forked
Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	☐	Switching frequency	Installation	Output	Switching	
Inductive switches Ø 4, embedded installation							
IS 204 MP/4NO - 1E5 50113478	0 1.2 0 1.5		3000Hz	Embedded	1 x PNP	NO (normally open)	

										
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IS 204 SERIES

Inductive Switches



Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
cylindric housing

Measuring
Sensors

Ultrasonic
Sensors

Inductive
Switches

Forked
Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

Connection	Material housing / active surface	Protection class	Accessories
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Cable, 2m, PVC	Stainless steel / PA66	IP 67	
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Inductive Switch

- Functionality P. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

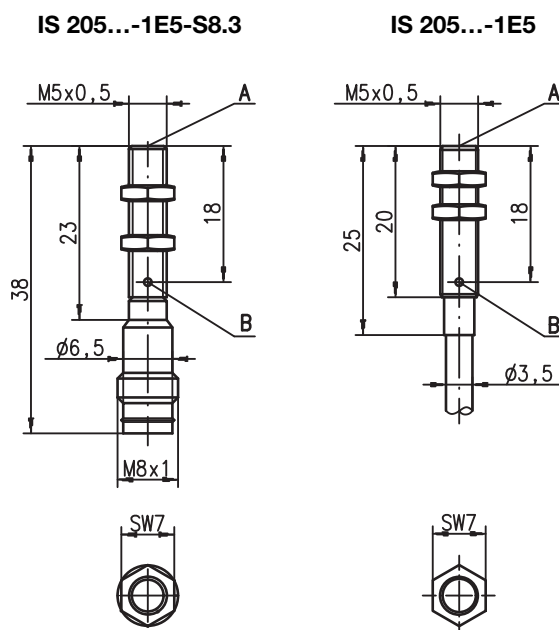
Electrical connection

Cable

10-30V DC +	br/BN
GND	bl/BU
OUT	sw/BK

OVERVIEW

Dimensioned drawing



A Active surface
B Yellow indicator diode

 Further details can be found in the respective data sheet.

										
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IS 205 SERIES

Installation	Typ. scan range limit S_n	Page
 Embedded	 mm	384



Common technical data

Electrical data	Operating voltage U_B	10 ... 30VDC
	Residual ripple σ	$\leq 20\%$ 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	$\leq 2\%$
Indicators	Yellow LED	Switching state
Mechanical data	Standard target (Fe360)	5 x 5 mm ²
	Weight (connector/cable)	Approx. 5g/approx. 35g
Environmental data	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 1 kV
		IEC 61000-4-2 Level 2
		IEC 61000-4-3 Level 3
		IEC 61000-4-4 Level 3

Features

- Slim and short cylindrical metal housing M5
- Stainless steel housing
- Built-in short circuit protection, inductive protection, polarity reversal protection
- LED for switching state



Inductive Switch

- | | |
|---------------------------------|--------|
| ● Functionality | P. 700 |
| ● Outputs / Switching functions | P. 701 |
| ● Mounting / Installation | P. 702 |
| ● Characteristic values | P. 703 |

Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
cylindrical housing

Measuring
Sensors

Ultrasonic
Sensors

Inductive
Switches

Forked
Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] ☐ Typ. scan range limit S_n [mm] ☐	Switching frequency	Installation	Output	Switching	
Inductive switches M5, embedded installation						
IS 205 MM/4NO - 1E5 50113213	☐ 0 1.2 ☐ 0 1.5	3000Hz	Embedded	1 x PNP	NO (normally open)	
IS 205 MM/4NO - 1E5 - S8.3 50113212	☐ 0 1.2 ☐ 0 1.5	3000Hz	Embedded	1 x PNP	NO (normally open)	

Accessories / connection cables

More accessories can be found from **page 643** onwards

Part no.	Designation	Features
a 50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000mm, M8 angular, 3-pin, PVC
b 50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000mm, M8 axial, 3-pin, PVC
c 50106692	K - D M8W - 3P - 5m - PUR	Connection cable 5000mm, M8 angular, 3-pin, PUR
d 50106691	K - D M8A - 3P - 5m - PUR	Connection cable 5000mm, M8 axial, 3-pin, PUR
e 50104582	D M8A - 3P - SK	Cable socket, M8 axial, 3-pin, user-configurable



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IS 205 SERIES

Inductive Switches



Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
cylindric housing

Measuring
Sensors

Ultrasonic
Sensors

Inductive
Switches

Forked
Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

	Connection	Material housing / active surface	Protection class	Accessories	
	Cable, 2m, PVC	Stainless steel / PA66	IP 67		
	M8 connector	Stainless steel / PA66	IP 67	a, b, c, d, e	



Inductive Switch

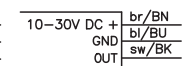
- Functionality P. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Electrical connection

M8 connector

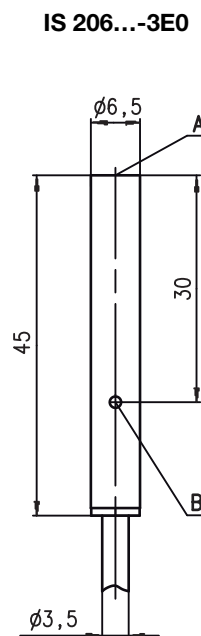
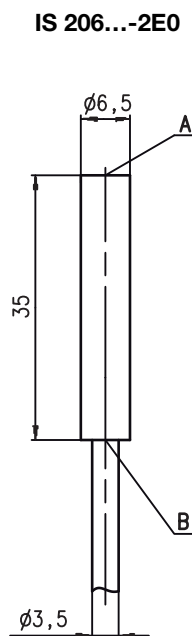
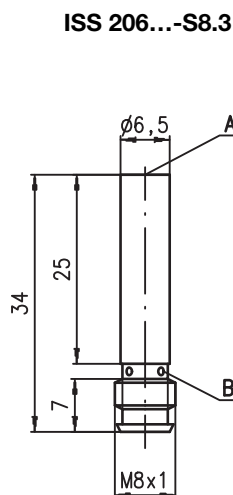


Cable



OVERVIEW

Dimensioned drawing



- A** Active surface
B Yellow indicator diode

 Further details can be found in the respective data sheet.



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IS 206 SERIES

Installation	Typ. scan range limit S_n	Page
 Embedded	0 3 mm	388



Common technical data

Electrical data	Operating voltage U_B	10 ... 30VDC
	Residual ripple σ	$\leq 20\%$ 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	$\leq 2\%/5\%$
Indicators	Yellow LED (360° visible)	Switching state
Mechanical data	Standard target (Fe360)	6.5 x 6.5 (9 x 9)mm ²
	Weight (connector/cable)	Approx. 4g/61g
Environmental data	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 1 kV
		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 643 onwards

Features

- Slim and short cylindrical metal housing Ø 6.5mm
- 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. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
cylindric housing

Measuring
Sensors

Ultrasonic
Sensors

Inductive
Switches

Forked
Sensors

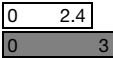
Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches Ø 6.5, embedded installation					
IS 206 MP/4NO - 2EO 50111437		5000Hz	Embedded	1 x PNP	NO (normally open)
ISS 206 MP/4NO - 2EO - S8.3 ¹⁾ 50111438		5000Hz	Embedded	1 x PNP	NO (normally open)
IS 206 MP/4NO - 3EO 50109686		1000Hz	Embedded	1 x PNP	NO (normally open)

1) Short construction

Accessories / connection cables

More accessories can be found from **page 643** onwards

Part no.	Designation	Features
a 50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000mm, M8 angular, 3-pin, PVC
b 50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000mm, M8 axial, 3-pin, PVC
c 50106692	K - D M8W - 3P - 5m - PUR	Connection cable 5000mm, M8 angular, 3-pin, PUR
d 50106691	K - D M8A - 3P - 5m - PUR	Connection cable 5000mm, M8 axial, 3-pin, PUR
e 50104582	D M8A - 3P - SK	Cable socket, M8 axial, 3-pin, user-configurable



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IS 206 SERIES

Inductive Switches



Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
cylindric housing

Measuring
Sensors

Ultrasonic
Sensors

Inductive
Switches

Forked
Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

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	

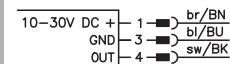


Inductive Switch

- Functionality P. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Electrical connection

M8 connector

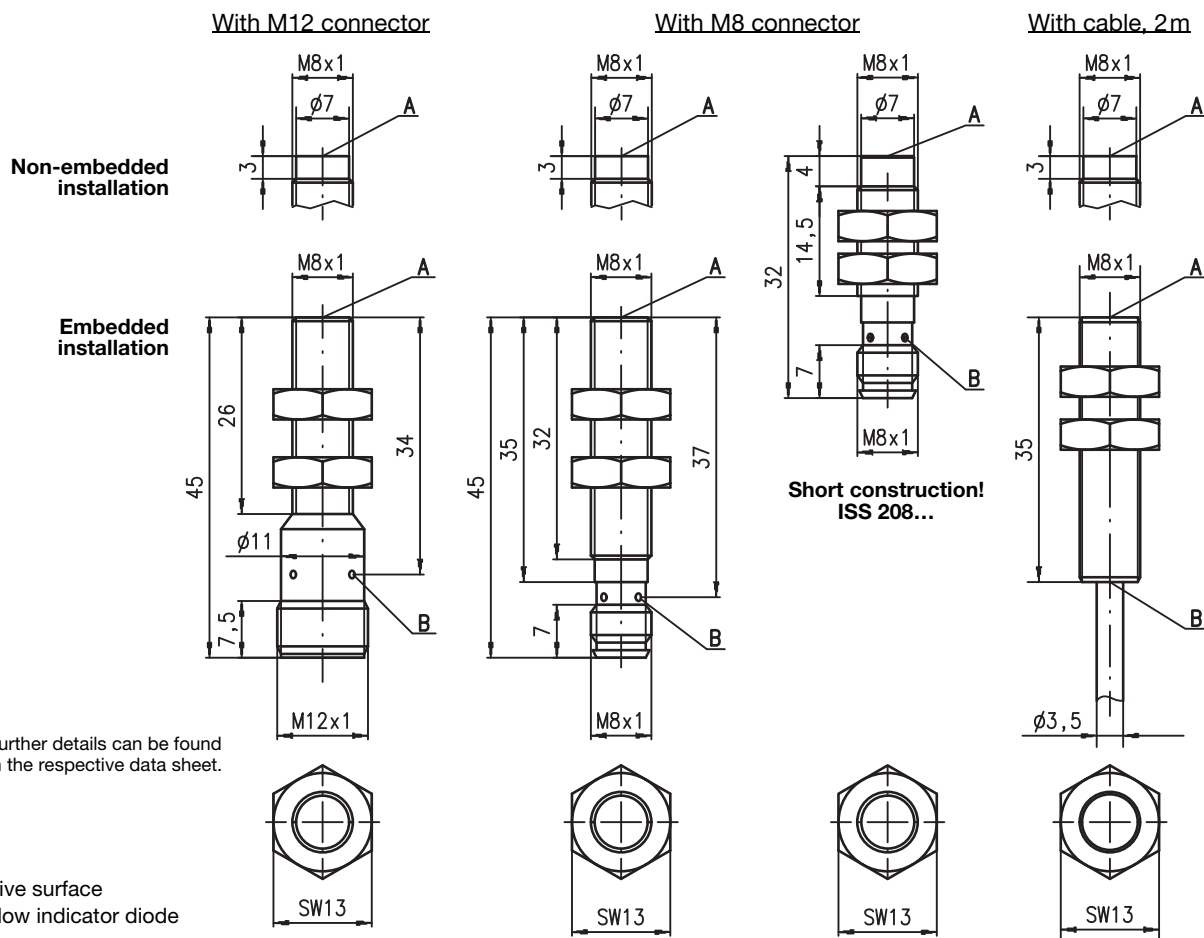


Cable



OVERVIEW

Dimensioned drawing



We reserve the right to make changes • BR208_Overview_EN.fm



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IS 208 SERIES

Installation	Typ. scan range limit S_n	Page
 Embedded	0 2 mm	392
 Non-embedded	0 4 mm	396



Common technical data

Electrical data	Operating voltage U_B	10 ... 30VDC
	Residual ripple σ	$\leq 20\%$ 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	$\leq 5\%$
Indicators	Yellow LED (360° visible)	Switching state
Mechanical data	Standard target (Fe360)	8 x 8 (12 x 12)mm ²
	Weight (connector/cable)	Approx. 12g/70g
Environmental data	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 1 kV
		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 643 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. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
cylindric housing

Measuring
Sensors

Ultrasonic
Sensors

Inductive
Switches

Forked
Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M8, embedded installation					
IS 208 MM/4NO - 1E5 50109639	 	5000Hz	Embedded	1 x PNP	NO (normally open)
IS 208 MM/4NO - 1E5 - S8.3 50109640	 	5000Hz	Embedded	1 x PNP	NO (normally open)
IS 208 MM/4NO - 1E5 - S12 50109641	 	5000Hz	Embedded	1 x PNP	NO (normally open)
IS 208 MM/4NC - 1E5 50112444	 	5000Hz	Embedded	1 x PNP	NC (normally closed)
IS 208 MM/2NO - 1E5 50109642	 	5000Hz	Embedded	1xNPN	NO (normally open)
IS 208 MM/2NC - 1E5 50113207	 	5000Hz	Embedded	1xNPN	NC (normally closed)

Accessories / connection cables

More accessories can be found from **page 643** onwards

Part no.	Designation	Features
a 50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000mm, M8 angular, 3-pin, PVC
b 50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000mm, M8 axial, 3-pin, PVC
c 50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000mm, M12 angular, 3-pin, PVC
d 50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000mm, M12 axial, 3-pin, PVC
e 50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
f 50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
g 50104582	D M8A - 3P - SK	Cable socket, M8 axial, 3-pin, user-configurable



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IS 208 SERIES

Inductive Switches



Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
cylindrical housing

Measuring
Sensors

Ultrasonic
Sensors

Inductive
Switches

Forked
Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

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

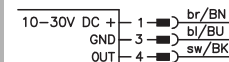


Inductive Switch

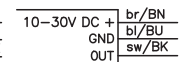
- Functionality P. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Electrical connection

M8 connector

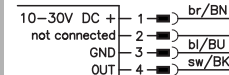


Cable

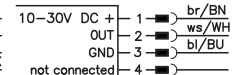


M12 connector

...NO... (normally open)



...NC... (normally closed)



...NO...-S12 (normally open):

3-pin or 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):

only 4-pin M12 connection cables can be used.

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M8, embedded installation					
IS 208 MM/4NO - 2EO 50109652		5000Hz	Embedded	1 x PNP	NO (normally open)
IS 208 MM/4NO - 2EO - S8.3 50109653		5000Hz	Embedded	1 x PNP	NO (normally open)
ISS 208 MM/4NO - 2EO - S8.3 ¹⁾ 50117201		5000Hz	Embedded	1 x PNP	NO (normally open)
IS 208 MM/4NO - 2EO, 200 - S8.3 50114051		5000Hz	Embedded	1 x PNP	NO (normally open)
ISS 208 MM/4NO - 2EO, 200 - S8.3 ¹⁾ 50118369		5000Hz	Embedded	1 x PNP	NO (normally open)
IS 208 MM/4NC - 2EO 50113211		5000Hz	Embedded	1 x PNP	NC (normally closed)
IS 208 MM/4NC - 2EO - S8.3 50109654		5000Hz	Embedded	1 x PNP	NC (normally closed)
IS 208 MM/2NO - 2EO 50109655		5000Hz	Embedded	1 x NPN	NO (normally open)
IS 208 MM/2NO - 2EO - S8.3 50109656		5000Hz	Embedded	1 x NPN	NO (normally open)

1) Short construction

Accessories / connection cables

More accessories can be found from **page 643** onwards

Part no.	Designation	Features
a 50104521	K - D M8W - 3P - 2m - PVC	Connection cable 2000mm, M8 angular, 3-pin, PVC
b 50104520	K - D M8A - 3P - 2m - PVC	Connection cable 2000mm, M8 axial, 3-pin, PVC
c 50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000mm, M8 angular, 3-pin, PVC
d 50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000mm, M8 axial, 3-pin, PVC
e 50104582	D M8A - 3P - SK	Cable socket, M8 axial, 3-pin, user-configurable



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IS 208 SERIES

Inductive Switches



Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
cylindric housing

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Ultrasonic
Sensors

Inductive
Switches

Forked
Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

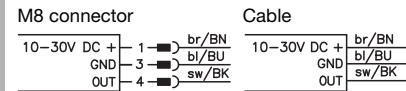
Connection	Material housing / active surface	Protection class	Accessories	
Cable, 2 m, PVC	Stainless steel / PA12	IP 67		
M8 connector	Stainless steel / PA12	IP 67	a, b, c, d, e	
M8 connector	Stainless steel / PA12	IP 67	a, b, c, d, e	
Cable, 0.2 m, with M8 connector	Stainless steel / PA12	IP 67	a, b, c, d, e	
Cable, 0.2 m, with M8 connector	Stainless steel / PA12	IP 67	a, b, c, d, e	
Cable, 2 m, PVC	Stainless steel / PA12	IP 67		
M8 connector	Stainless steel / PA12	IP 67	a, b, c, d, e	
Cable, 2 m, PVC	Stainless steel / PA12	IP 67		
M8 connector	Stainless steel / PA12	IP 67	a, b, c, d, e	



Inductive Switch

- Functionality P. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Electrical connection



INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M8, non-embedded installation					
IS 208 MM/4NO - 2N5 50109645		5000Hz	Non-embedded	1 x PNP	NO (normally open)
IS 208 MM/4NO - 2N5 - S8.3 50109646		5000Hz	Non-embedded	1 x PNP	NO (normally open)
ISS 208 MM/4NO - 2N5 - S8.3 ¹⁾ 50114490		5000Hz	Non-embedded	1 x PNP	NO (normally open)
IS 208 MM/4NO - 2N5 - S12 50109647		5000Hz	Non-embedded	1 x PNP	NO (normally open)
IS 208 MM/2NO - 2N5 50109649		5000Hz	Non-embedded	1xNPN	NO (normally open)

1) Short construction

Accessories / connection cables

More accessories can be found from **page 643** onwards

Part no.	Designation	Features
a 50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000mm, M8 angular, 3-pin, PVC
b 50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000mm, M8 axial, 3-pin, PVC
c 50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000mm, M12 angular, 3-pin, PVC
d 50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000mm, M12 axial, 3-pin, PVC
e 50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
f 50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
g 50104582	D M8A - 3P - SK	Cable socket, M8 axial, 3-pin, user-configurable



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IS 208 SERIES

Inductive Switches



Photoel. sensors/
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Photoel. sensors/
light scanners,
cylindric housing

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Switches

Forked
Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

	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, g	
	M8 connector	Stainless steel / PBTP	IP 67	a, b, g	
	M12 connector	Stainless steel / PBTP	IP 67	c, d, e, f	
	Cable, 2m, PVC	Stainless steel / PBTP	IP 67		

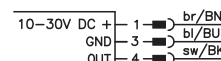


Inductive Switch

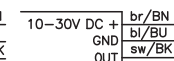
- Functionality P. 700
- Outputs / Switching functions P. 701
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- Characteristic values P. 703

Electrical connection

M8 connector

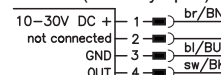


Cable

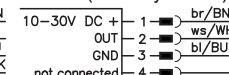


M12 connector

...NO... (normally open)



...NC... (normally closed)



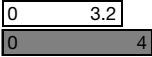
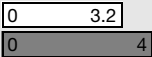
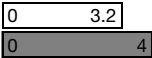
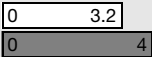
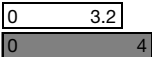
...NO...-S12 (normally open):

3-pin or 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):

only 4-pin M12 connection cables can be used.

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M8, non-embedded installation					
IS 208 MM/4NO - 4NO 50109658		3500Hz	Non-embedded	1 x PNP	NO (normally open)
IS 208 MM/4NO - 4NO - S8.3 50109659		3500Hz	Non-embedded	1 x PNP	NO (normally open)
IS 208 MM/4NC - 4NO - S8.3 50109660		3500Hz	Non-embedded	1 x PNP	NC (normally closed)
IS 208 MM/2NO - 4NO 50109661		3500Hz	Non-embedded	1 x NPN	NO (normally open)
IS 208 MM/2NO - 4NO - S8.3 50109662		3500Hz	Non-embedded	1 x NPN	NO (normally open)

Accessories / connection cables

More accessories can be found from **page 643** onwards

Part no.	Designation	Features
a 50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000mm, M8 angular, 3-pin, PVC
b 50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000mm, M8 axial, 3-pin, PVC
c 50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000mm, M12 angular, 3-pin, PVC
d 50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000mm, M12 axial, 3-pin, PVC
e 50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
f 50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
g 50104582	D M8A - 3P - SK	Cable socket, M8 axial, 3-pin, user-configurable



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IS 208 SERIES

Inductive Switches



Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
cylindrical housing

Measuring
Sensors

Ultrasonic
Sensors

Inductive
Switches

Forked
Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

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

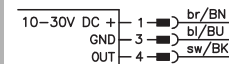


Inductive Switch

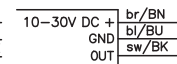
- Functionality P. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Electrical connection

M8 connector

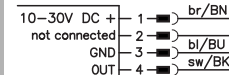


Cable

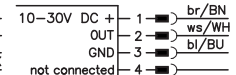


M12 connector

...NO... (normally open)



...NC... (normally closed)



...NO...-S12 (normally open):

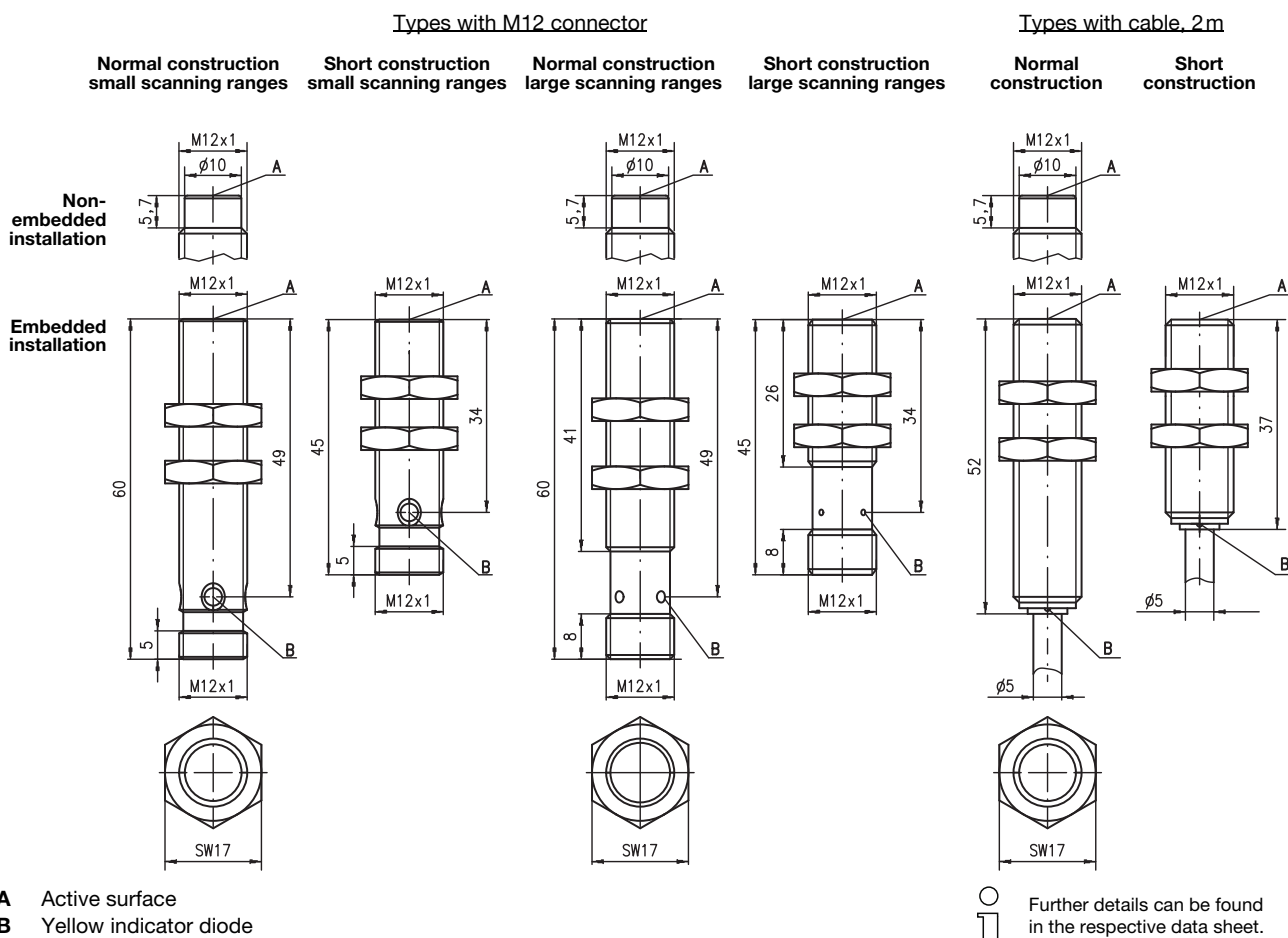
3-pin or 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):

only 4-pin M12 connection cables can be used.

OVERVIEW

Dimensioned drawing



We reserve the right to make changes • BR212_Overview_EN.fm

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IS 212 SERIES

Installation	Typ. scan range limit S_n	Page
 Embedded	0 6 mm	402
 Non-embedded	0 10 mm	408



Common technical data

Electrical data	Operating voltage U_B	10 ... 30VDC
	Residual ripple σ	$\leq 20\%$ 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	$\leq 5\%$
Indicators	Yellow LED (360° visible)	Switching state
Mechanical data	Standard target (Fe360)	12x 12 (30x 30)mm ²
	Weight (connector/cable)	Approx. 30g/95g
Environmental data	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 1 kV 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 632 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. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
cylindric housing

Measuring
Sensors

Ultrasonic
Sensors

Inductive
Switches

Forked
Sensors

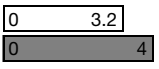
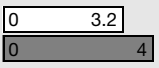
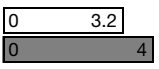
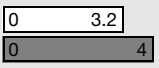
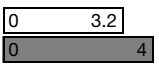
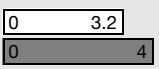
Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M12, embedded installation					
IS 212 MM/4NO - 2EO 50109664		3000Hz	Embedded	1 x PNP	NO (normally open)
IS 212 MM/4NO - 2EO - S12 50109665		3000Hz	Embedded	1 x PNP	NO (normally open)
IS 212 MM/4NC - 2EO - S12 50111870		3000Hz	Embedded	1 x PNP	NC (normally closed)
IS 212 MM/2NO - 2EO 50109666		3000Hz	Embedded	1 x NPN	NO (normally open)
IS 212 MM/4NO - 4EO 50109672		2000Hz	Embedded	1 x PNP	NO (normally open)
IS 212 MM/4NO - 4EO - S12 50109673		2000Hz	Embedded	1 x PNP	NO (normally open)
ISS 212 MM/4NO - 4EO ¹⁾ 50109684		2000Hz	Embedded	1 x PNP	NO (normally open)
ISS 212 MM/4NO - 4EO - S12 ¹⁾ 50109685		2000Hz	Embedded	1 x PNP	NO (normally open)
IS 212 MM/4NC - 4EO - S12 50109674		2000Hz	Embedded	1 x PNP	NC (normally closed)
ISS 212 MM/4NC - 4EO - S12 ¹⁾ 50109676		2000Hz	Embedded	1 x PNP	NC (normally closed)

Accessories / connection cables

More accessories can be found from **page 643** onwards

Part no.	Designation	Features
a 50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000mm, M12 angular, 3-pin, PVC
b 50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000mm, M12 axial, 3-pin, PVC
c 50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d 50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e 50031324	KD 095 - 4	Cable socket, M12 angular, 4-pin, user-configurable
f 50031323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable



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IS 212 SERIES

Inductive Switches



Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
cylindrical housing

Measuring
Sensors

Ultrasonic
Sensors

Inductive
Switches

Forked
Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

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

1) Short construction



Inductive Switch

- Functionality P. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Electrical connection

Cable

10-30V DC +	br/BN
GND	bl/BU
OUT	sw/BK

M12 connector

...NO... (normally open)	...NC... (normally closed)
10-30V DC + 1 — br/BN	10-30V DC + 1 — br/BN
not connected 2 —	OUT 2 — ws/WH
GND 3 — bl/BU	GND 3 — bl/BU
OUT 4 — sw/BK	not connected 4 —



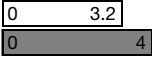
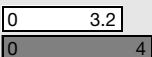
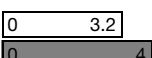
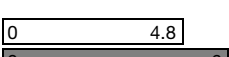
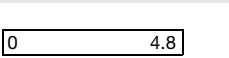
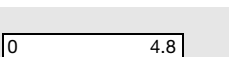
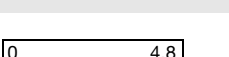
...NO...-S12 (normally open):

3-pin or 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):

only 4-pin M12 connection cables can be used.

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M12, embedded installation					
IS 212 MM/2NO - 4EO 50109675		2000Hz	Embedded	1xNPN	NO (normally open)
ISS 212 MM/2NO - 4EO - S12 ¹⁾ 50109687		2000Hz	Embedded	1xNPN	NO (normally open)
IS 212 MM/2NC - 4EO 50114380		2000Hz	Embedded	1xNPN	NC (normally closed)
IS 212 MM/4NO - 6EO 50109678		800Hz	Embedded	1 x PNP	NO (normally open)
ISS 212 MM/4NO - 6EO - S12 ¹⁾ 50109679		800Hz	Embedded	1 x PNP	NO (normally open)
IS 212 MM/2NO - 6EO 50109682		800Hz	Embedded	1xNPN	NO (normally open)
ISS 212 MM/2NO - 6EO - S12 ¹⁾ 50109688		800Hz	Embedded	1xNPN	NO (normally open)
IS 212 FM/4NO.5F - 6EO - S12 ²⁾ 50109736		600Hz	Embedded	1 x PNP	NO (normally open)
IS 212 FM/4NO.5W - 6EO - S12 ³⁾ 50117127		15Hz	Embedded	1 x PNP	NO (normally open)

Accessories / connection cables

More accessories can be found from **page 643** onwards

Part no.	Designation	Features
a 50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000mm, M12 angular, 3-pin, PVC
b 50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000mm, M12 axial, 3-pin, PVC
c 50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d 50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e 50104573	K - D M12W - 4P - 5m - FAB	Connection cable 5000mm, M12 angular, 4-pin, Food+Bev.
f 50104572	K - D M12A - 4P - 5m - FAB	Connection cable 5000mm, M12 axial, 4-pin, Food+Bev.
g 50031324	KD 095 - 4	Cable socket, M12 angular, 4-pin, user-configurable
h 50031323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable



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IS 212 SERIES

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Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

Connection	Material housing / active surface	Protection class	Accessories
Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, g, h
Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67	
Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, g, h
Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, g, h
M12 connector	Stainless steel AISI 316L (DIN 1.4404) / stainless steel AISI 316L (DIN 1.4404)	IP 67, IP 69K	e, f
M12 connector	Stainless steel AISI 303L (DIN 1.4305) / stainless steel AISI 303L (DIN 1.4305)	IP 67, IP 69K	a, b, g, h

- 1) Short construction
- 2) Food + Beverage version for the food and beverage industries
- 3) Version for welding applications, resistant to electromagnetic fields and welding sparks



Inductive Switch

- Functionality P. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Electrical connection

Cable

10-30V DC +	br/BN
GND	bl/BU
OUT	sw/BK

M12 connector

...NO... (normally open)	...NC... (normally closed)
10-30V DC + 1 — br/BN	10-30V DC + 1 — br/BN
not connected 2 —	OUT 2 — ws/WH
GND 3 — bl/BU	GND 3 — bl/BU
OUT 4 — sw/BK	not connected 4 —



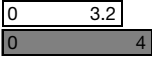
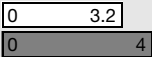
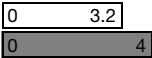
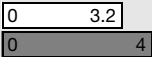
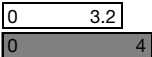
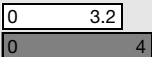
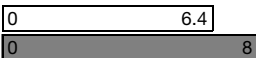
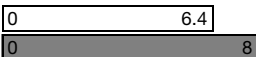
...NO...-S12 (normally open):

3-pin or 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):

only 4-pin M12 connection cables can be used.

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M12, non-embedded installation					
IS 212 MM/4NO - 4NO 50109668		2000Hz	Non-embedded	1 x PNP	NO (normally open)
IS 212 MM/4NO - 4NO - S12 50109669		2000Hz	Non-embedded	1 x PNP	NO (normally open)
ISS 212 MM/4NO - 4NO - S12 ¹⁾ 50111963		2000Hz	Non-embedded	1 x PNP	NO (normally open)
IS 212 MM/4NC - 4NO - S12 50112914		2000Hz	Non-embedded	1 x PNP	NC (normally closed)
IS 212 MM/2NO - 4NO 50109670		2000Hz	Non-embedded	1 x NPN	NO (normally open)
ISS 212 MM/2NO - 4NO ¹⁾ 50112209		2000Hz	Non-embedded	1 x NPN	NO (normally open)
IS 212 MM/4NO - 8NO 50112807		1500Hz	Non-embedded	1 x PNP	NO (normally open)
IS 212 MM/4NO - 8NO - S12 50112808		1500Hz	Non-embedded	1 x PNP	NO (normally open)
IS 212 MM/2NO - 8NO 50112806		1500Hz	Non-embedded	1 x NPN	NO (normally open)
IS 212 MM/2NO - 8NO - S12 50120274		1500Hz	Non-embedded	1 x NPN	NO (normally open)

Accessories / connection cables

More accessories can be found from **page 643** onwards

Part no.	Designation	Features
a 50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000mm, M12 angular, 3-pin, PVC
b 50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000mm, M12 axial, 3-pin, PVC
c 50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d 50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e 50031324	KD 095 - 4	Cable socket, M12 angular, 4-pin, user-configurable
f 50031323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable



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Inductive Switches



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Forked
Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

Connection	Material housing / active surface	Protection class	Accessories
Cable, 2 m, 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	Brass, chromium-plated / PBTP	IP 67	c, d, e, f
Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67	
Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67	
Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f
Cable, 2 m, 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. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Electrical connection

Cable

10-30V DC +	br/BN
GND	bl/BU
OUT	sw/BK

M12 connector

...NO... (normally open)	...NC... (normally closed)
10-30V DC + 1 — br/BN	10-30V DC + 1 — br/BN
not connected 2 —	OUT 2 — ws/WH
GND 3 — bl/BU	GND 3 — bl/BU
OUT 4 — sw/BK	not connected 4 —



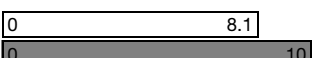
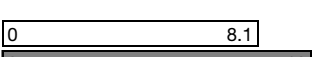
...NO...-S12 (normally open):

3-pin or 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):

only 4-pin M12 connection cables can be used.

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M12, non-embedded installation					
IS 212 MM/4NO - 10N 50109689		400Hz	Non-embedded	1 x PNP	NO (normally open)
ISS 212 MM/4NO - 10N - S12 ¹⁾ 50109680		400Hz	Non-embedded	1 x PNP	NO (normally open)
IS 212 MM/4NC - 10N - S12 50114052		400Hz	Non-embedded	1 x PNP	NC (normally closed)
IS 212 MM/2NO - 10N 50111952		400Hz	Non-embedded	1 x NPN	NO (normally open)
IS 212 FM/4NO.5F - 10N - S12 ²⁾ 50109738		400Hz	Non-embedded	1 x PNP	NO (normally open)

Accessories / connection cables

More accessories can be found from **page 643** onwards

Part no.	Designation	Features
a 50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000mm, M12 angular, 3-pin, PVC
b 50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000mm, M12 axial, 3-pin, PVC
c 50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d 50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e 50104573	K - D M12W - 4P - 5m - FAB	Connection cable 5000mm, M12 angular, 4-pin, Food+Bev.
f 50104572	K - D M12A - 4P - 5m - FAB	Connection cable 5000mm, M12 axial, 4-pin, Food+Bev.
g 50031324	KD 095 - 4	Cable socket, M12 angular, 4-pin, user-configurable
h 50031323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable



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IS 212 SERIES

Inductive Switches



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Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

Connection	Material housing / active surface	Protection class	Accessories
Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, g, h
M12 connector	Brass, chromium-plated / PBTP	IP 67	c, d, g, h
Cable, 2 m, 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 69K	e, f

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



Inductive Switch

- Functionality P. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Electrical connection

Cable

10-30V DC +	br/BN
GND	bl/BU
OUT	sw/BK

M12 connector

...NO... (normally open)	...NC... (normally closed)
10-30V DC + 1 — br/BN	10-30V DC + 1 — br/BN
not connected 2 —	OUT 2 — ws/WH
GND 3 — bl/BU	GND 3 — bl/BU
OUT 4 — sw/BK	not connected 4 —



...NO...-S12 (normally open):

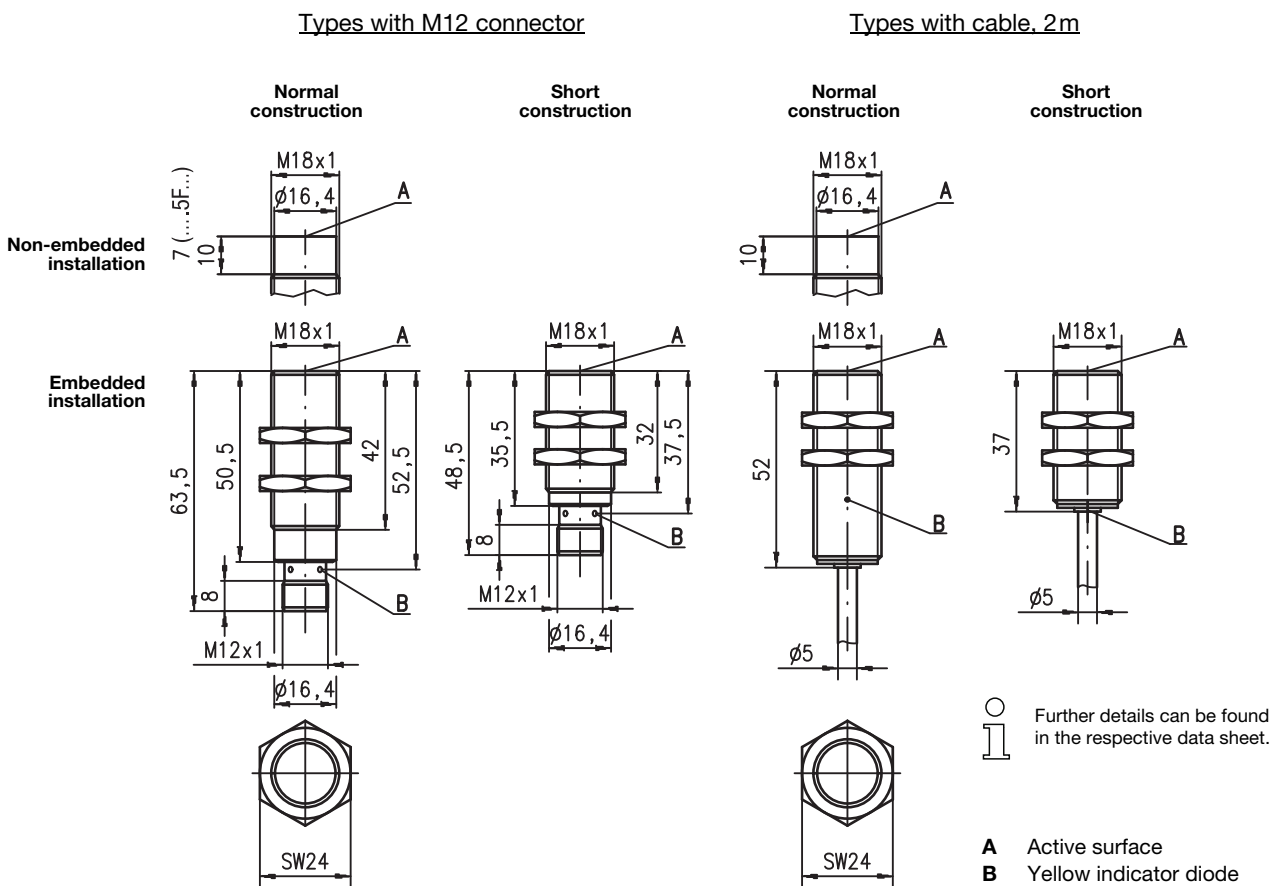
3-pin or 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):

only 4-pin M12 connection cables can be used.

OVERVIEW

Dimensioned drawing



We reserve the right to make changes • BR218_Overview_EN.fm



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IS 218 SERIES

Installation	Typ. scan range limit S_n	Page
 Embedded	0 12 mm	412
 Non-embedded	0 20 mm	418



Common technical data

Electrical data	Operating voltage U_B	10 ... 30VDC
	Residual ripple σ	$\leq 20\%$ 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	$\leq 5\%$
Indicators	Yellow LED (360° visible)	Switching state
Mechanical data	Standard target (Fe360)	18x 18 (60x 60)mm ²
	Weight (connector/cable)	Approx. 50g/165g
Environmental data	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 1 kV 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 630 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. 700 |
| ● Outputs / Switching functions | P. 701 |
| ● Mounting / Installation | P. 702 |
| ● Characteristic values | P. 703 |

Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
cylindric housing

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INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M18, embedded installation					
IS 218 MM/4NO - 5EO 50109692		2000Hz	Embedded	1 x PNP	NO (normally open)
IS 218 MM/4NC - 5EO 50118521		2000Hz	Embedded	1 x PNP	NC (normally closed)
IS 218 MM/4NO - 5EO - S12 50109693		2000Hz	Embedded	1 x PNP	NO (normally open)
ISS 218 MM/4NO - 5EO ¹⁾ 50112915		2000Hz	Embedded	1 x PNP	NO (normally open)
ISS 218 MM/4NO - 5EO - S12 ¹⁾ 50112293		2000Hz	Embedded	1 x PNP	NO (normally open)
IS 218 MM/2NO - 5EO 50109694		2000Hz	Embedded	1 x NPN	NO (normally open)

Accessories / connection cables

More accessories can be found from **page 643** onwards

Part no.	Designation	Features
a 50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000mm, M12 angular, 3-pin, PVC
b 50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000mm, M12 axial, 3-pin, PVC
c 50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d 50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e 50031324	KD 095 - 4	Cable socket, M12 angular, 4-pin, user-configurable
f 50031323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable



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IS 218 SERIES

Inductive Switches



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cubic housing

Photoel. sensors/
light scanners,
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Sensors

Inductive
Switches

Forked
Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

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

1) Short construction



Inductive Switch

- Functionality P. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Electrical connection

Cable

10-30V DC +	br/BN
GND	bl/BU
OUT	sw/BK

M12 connector

...NO... (normally open)	...NC... (normally closed)
10-30V DC + 1 — br/BN	10-30V DC + 1 — br/BN
not connected 2 —	OUT 2 — ws/WH
GND 3 — bl/BU	GND 3 — bl/BU
OUT 4 — sw/BK	not connected 4 —



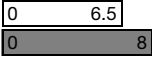
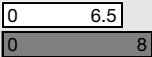
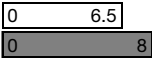
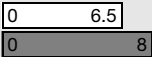
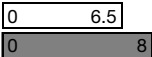
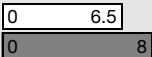
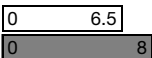
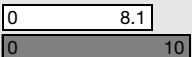
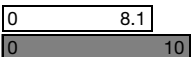
...NO...-S12 (normally open):

3-pin or 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):

only 4-pin M12 connection cables can be used.

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M18, embedded installation					
IS 218 MM/4NO - 8EO 50109700		1500Hz	Embedded	1 x PNP	NO (normally open)
IS 218 MM/4NO - 8EO - S12 50109701		1500Hz	Embedded	1 x PNP	NO (normally open)
ISS 218 MM/4NO - 8EO - S12 ¹⁾ 50111743		1500Hz	Embedded	1 x PNP	NO (normally open)
IS 218 MM/4NC - 8EO - S12 50109702		1500Hz	Embedded	1 x PNP	NC (normally closed)
IS 218 MM/2NO - 8EO 50112104		1500Hz	Embedded	1xNPN	NO (normally open)
IS 218 MM/2NO - 8EO - S12 50109704		1500Hz	Embedded	1xNPN	NO (normally open)
ISS 218 MM/2NO - 8EO - S12 ¹⁾ 50109703		1500Hz	Embedded	1xNPN	NO (normally open)
IS 218 FM/4NO.5F - 10E - S12 ²⁾ 50109732		300Hz	Embedded	1 x PNP	NO (normally open)
IS 218 FM/4NO.5W - 10E - S12 ³⁾ 50117128		15Hz	Embedded	1 x PNP	NO (normally open)

Accessories / connection cables

More accessories can be found from **page 643** onwards

Part no.	Designation	Features
a 50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000mm, M12 angular, 3-pin, PVC
b 50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000mm, M12 axial, 3-pin, PVC
c 50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d 50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e 50104573	K - D M12W - 4P - 5m - FAB	Connection cable 5000mm, M12 angular, 4-pin, Food+Bev.
f 50104572	K - D M12A - 4P - 5m - FAB	Connection cable 5000mm, M12 axial, 4-pin, Food+Bev.
g 50031324	KD 095 - 4	Cable socket, M12 angular, 4-pin, user-configurable
h 50031323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable



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Connection	Material housing / active surface	Protection class	Accessories
Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, c, d, g, h
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, c, d, g, h
M12 connector	Brass, chromium-plated / PBTP	IP 67	c, d, g, h
Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, c, d, g, h
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, c, d, g, h
M12 connector	Stainless steel AISI 316L (DIN 1.4404) / stainless steel AISI 316L (DIN 1.4404)	IP 67, IP 69K	e, f
M12 connector	Stainless steel AISI 303L (DIN 1.4305) / stainless steel AISI 303L (DIN 1.4305)	IP 67, IP 69K	a, b, c, d, g, h

- 1) Short construction
- 2) Food + Beverage version for the food and beverage industries
- 3) Version for welding applications, resistant to electromagnetic fields and welding sparks



Inductive Switch

- Functionality P. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Electrical connection

Cable

10-30V DC +	br/BN
GND	bl/BU
OUT	sw/BK

M12 connector

...NO... (normally open)	...NC... (normally closed)
10-30V DC + 1 — br/BN	10-30V DC + 1 — br/BN
not connected 2 —	OUT 2 — ws/WH
GND 3 — bl/BU	GND 3 — bl/BU
OUT 4 — sw/BK	not connected 4 —



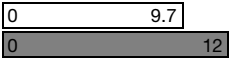
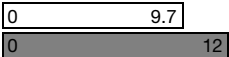
...NO...-S12 (normally open):

3-pin or 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):

only 4-pin M12 connection cables can be used.

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching	
Inductive switches M18, embedded installation						
IS 218 MM/4NO - 12E 50109706		500Hz	Embedded	1 x PNP	NO (normally open)	
IS 218 MM/4NO - 12E - S12 50114427		500Hz	Embedded	1 x PNP	NO (normally open)	
ISS 218 MM/4NO - 12E - S12 ¹⁾ 50109707		500Hz	Embedded	1 x PNP	NO (normally open)	
ISS 218 MM/4NC - 12E - S12 ¹⁾ 50120273		500Hz	Embedded	1 x PNP	NC (normally closed)	
IS 218 MM/2NO - 12E 50111954		500Hz	Embedded	1 x NPN	NO (normally open)	
ISS 218 MM/2NO - 12E - S12 ¹⁾ 50109708		500Hz	Embedded	1 x NPN	NO (normally open)	

Accessories / connection cables

More accessories can be found from **page 643** onwards

Part no.	Designation	Features
a 50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000mm, M12 angular, 3-pin, PVC
b 50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000mm, M12 axial, 3-pin, PVC
c 50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d 50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e 50031324	KD 095 - 4	Cable socket, M12 angular, 4-pin, user-configurable
f 50031323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable



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IS 218 SERIES

Inductive Switches



Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
cylindrical housing

Measuring
Sensors

Ultrasonic
Sensors

Inductive
Switches

Forked
Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

Connection	Material housing / active surface	Protection class	Accessories
Cable, 2 m, 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	Brass, chromium-plated / PBTP	IP 67	c, d, e, f
Cable, 2 m, 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. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Electrical connection

Cable

10-30V DC +	br/BN
GND	bl/BU
OUT	sw/BK

M12 connector

...NO... (normally open)	...NC... (normally closed)
10-30V DC + 1 — br/BN	10-30V DC + 1 — br/BN
not connected 2 —	OUT 2 — ws/WH
GND 3 — bl/BU	GND 3 — bl/BU
OUT 4 — sw/BK	not connected 4 —



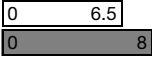
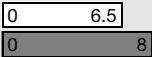
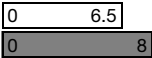
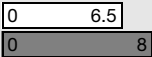
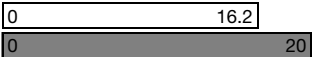
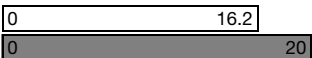
...NO...-S12 (normally open):

3-pin or 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):

only 4-pin M12 connection cables can be used.

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M18, non-embedded installation					
IS 218 MM/4NO - 8NO 50109696		2000Hz	Non-embedded	1 x PNP	NO (normally open)
IS 218 MM/4NO - 8NO - S12 50109697		2000Hz	Non-embedded	1 x PNP	NO (normally open)
IS 218 MM/2NO - 8NO 50109698		2000Hz	Non-embedded	1 x NPN	NO (normally open)
IS 218 MM/2NO - 8NO - S12 50109699		2000Hz	Non-embedded	1 x NPN	NO (normally open)
IS 218 MM/4NO - 20N 50109709		200Hz	Non-embedded	1 x PNP	NO (normally open)
ISS 218 MM/4NO - 20N - S12 ¹⁾ 50109710		200Hz	Non-embedded	1 x PNP	NO (normally open)
IS 218 MM/2NO - 20N 50111953		200Hz	Non-embedded	1 x NPN	NO (normally open)
IS 218 FM/4NO.5F - 20N - S12 ²⁾ 50109734		200Hz	Non-embedded	1 x PNP	NO (normally open)

1) Short construction

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

Accessories / connection cables

More accessories can be found from **page 643** onwards

Part no.	Designation	Features
a 50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000mm, M12 angular, 3-pin, PVC
b 50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
c 50104573	K - D M12W - 4P - 5m - FAB	Connection cable 5000mm, M12 angular, 4-pin, Food+Bev.
d 50104572	K - D M12A - 4P - 5m - FAB	Connection cable 5000mm, M12 axial, 4-pin, Food+Bev.
e 50031324	KD 095 - 4	Cable socket, M12 angular, 4-pin, user-configurable
f 50031323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable



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IS 218 SERIES

Inductive Switches



Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
cylindrical housing

Measuring
Sensors

Ultrasonic
Sensors

Inductive
Switches

Forked
Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

Connection	Material housing / active surface	Protection class	Accessories
Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f
Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f
Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f
Cable, 2 m, 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 69K	c, d



Inductive Switch

- Functionality P. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Electrical connection

Cable

10-30V DC +	br/BN
GND	bl/BU
OUT	sw/BK

M12 connector

...NO... (normally open)	...NC... (normally closed)
10-30V DC + 1 — br/BN	10-30V DC + 1 — br/BN
not connected 2 —	OUT 2 — ws/WH
GND 3 — bl/BU	GND 3 — bl/BU
OUT 4 — sw/BK	not connected 4 —



...NO...-S12 (normally open):

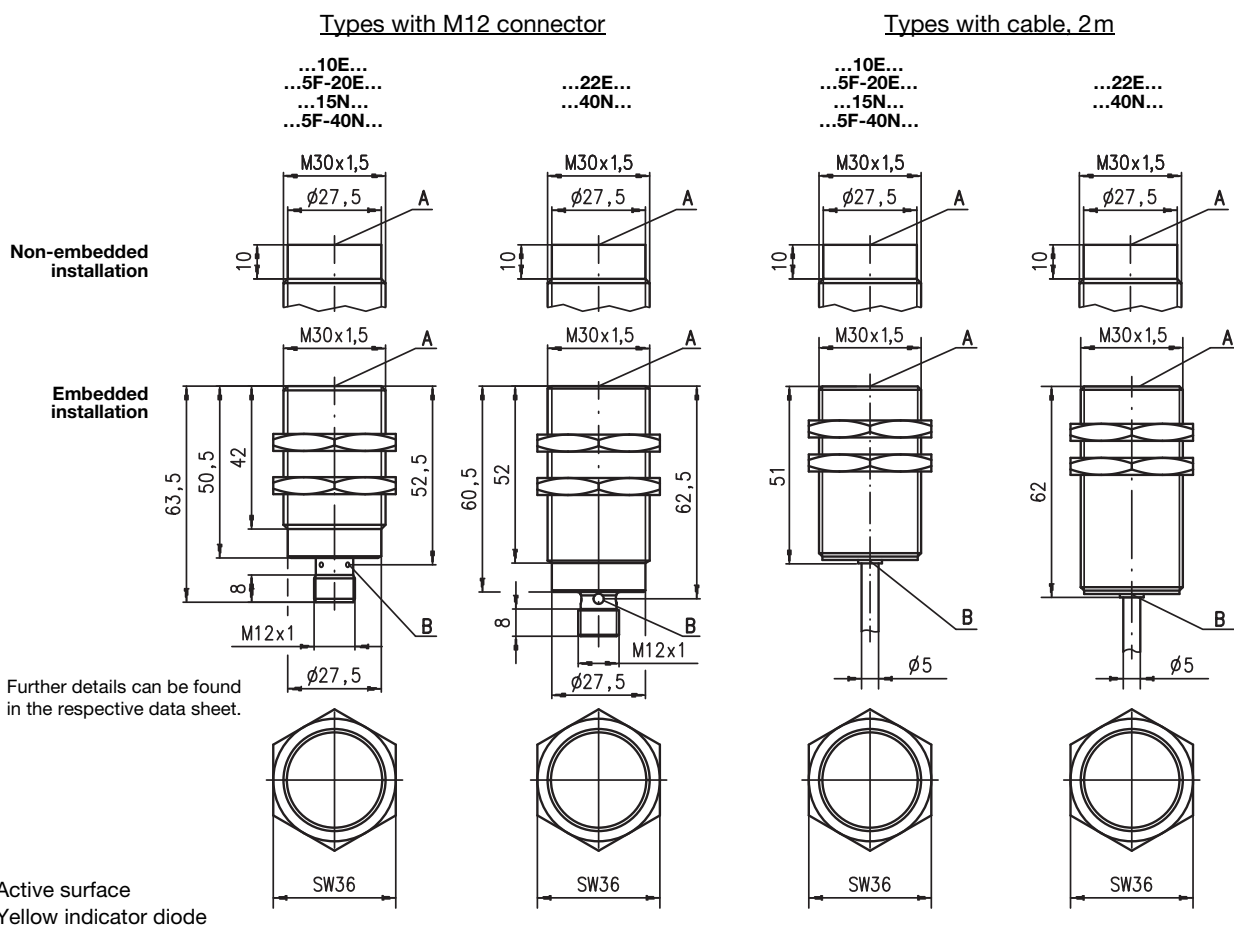
3-pin or 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):

only 4-pin M12 connection cables can be used.

OVERVIEW

Dimensioned drawing



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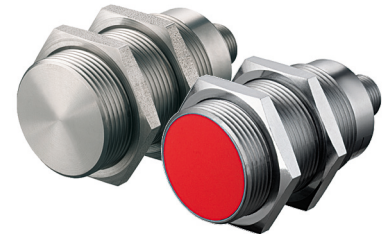
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IS 230 SERIES

Installation	Typ. scan range limit S_n	Page
 Embedded	0  22 mm	422
 Non-embedded	0  40 mm	424



Common technical data

Electrical data	Operating voltage U_B	10 ... 30VDC
	Residual ripple σ	$\leq 20\%$ 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	$\leq 5\%$
Indicators	Yellow LED (360° visible)	Switching state
Mechanical data	Standard target (Fe360)	30x30 (120x120)mm ²
	Weight (connector/cable)	Approx. 155g/210g
Environmental data	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 1 kV
		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 632 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. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
cylindric housing

Measuring
Sensors

Ultrasonic
Sensors

Inductive
Switches

Forked
Sensors

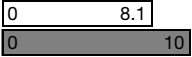
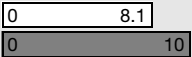
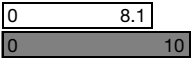
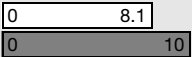
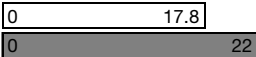
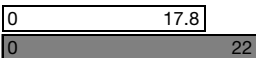
Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M30, embedded installation					
IS 230 MM/4NO - 10E 50109712		1200Hz	Embedded	1 x PNP	NO (normally open)
IS 230 MM/4NO - 10E - S12 50109713		1200Hz	Embedded	1 x PNP	NO (normally open)
IS 230 MM/4NC - 10E - S12 50111871		1200Hz	Embedded	1 x PNP	NC (normally closed)
IS 230 MM/2NO - 10E 50109714		1200Hz	Embedded	1 x NPN	NO (normally open)
IS 230 MM/4NO - 22E 50109720		200Hz	Embedded	1 x PNP	NO (normally open)
IS 230 MM/4NO - 22E - S12 50109721		200Hz	Embedded	1 x PNP	NO (normally open)
IS 230 MM/4NC - 22E - S12 50109722		200Hz	Embedded	1 x PNP	NC (normally closed)
IS 230 MM/2NO - 22E 50109723		200Hz	Embedded	1 x NPN	NO (normally open)
IS 230 FM/4NO.5F - 20E - S12 ¹⁾ 50111435		100Hz	Embedded	1 x PNP	NO (normally open)

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

Accessories / connection cables

More accessories can be found from **page 643** onwards

Part no.	Designation	Features
a 50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000mm, M12 angular, 3-pin, PVC
b 50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000mm, M12 axial, 3-pin, PVC
c 50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d 50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e 50104573	K - D M12W - 4P - 5m - FAB	Connection cable 5000mm, M12 angular, 4-pin, Food+Bev.
f 50104572	K - D M12A - 4P - 5m - FAB	Connection cable 5000mm, M12 axial, 4-pin, Food+Bev.



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IS 230 SERIES

Inductive Switches



Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
cylindrical housing

Measuring
Sensors

Ultrasonic
Sensors

Inductive
Switches

Forked
Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

Connection	Material housing / active surface	Protection class	Accessories
Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, c, d
M12 connector	Brass, chromium-plated / PBTP	IP 67	c, d
Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67	
Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, c, d
M12 connector	Brass, chromium-plated / PBTP	IP 67	c, d
Cable, 2 m, 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 69K	e, f



Inductive Switch

- Functionality P. 700
- Outputs / Switching functions P. 701
- Mounting / Installation P. 702
- Characteristic values P. 703

Electrical connection

Cable

10-30V DC +	br/BN
GND	bl/BU
OUT	sw/BK

M12 connector

...NO... (normally open)	...NC... (normally closed)
10-30V DC + 1 — br/BN	10-30V DC + 1 — br/BN
not connected 2 —	OUT 2 — ws/WH
GND 3 — bl/BU	GND 3 — bl/BU
OUT 4 — sw/BK	not connected 4 —



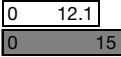
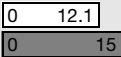
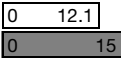
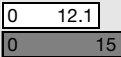
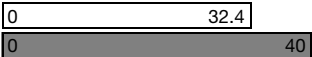
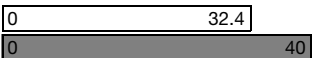
...NO...-S12 (normally open):

3-pin or 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):

only 4-pin M12 connection cables can be used.

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M30, non-embedded installation					
IS 230 MM/4NO - 15N 50109716		700Hz	Non-embedded	1 x PNP	NO (normally open)
IS 230 MM/4NO - 15N - S12 50109717		700Hz	Non-embedded	1 x PNP	NO (normally open)
IS 230 MM/2NO - 15N 50109718		700Hz	Non-embedded	1 x NPN	NO (normally open)
IS 230 MM/2NO - 15N - S12 50109719		700Hz	Non-embedded	1 x NPN	NO (normally open)
IS 230 MM/4NO - 40N 50109726		100Hz	Non-embedded	1 x PNP	NO (normally open)
IS 230 MM/4NO - 40N - S12 50109727		100Hz	Non-embedded	1 x PNP	NO (normally open)
IS 230 MM/2NO - 40N 50109728		100Hz	Non-embedded	1 x NPN	NO (normally open)
IS 230 FM/4NO.5F - 40N - S12 ¹⁾ 50111436		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 • BR230_2_EN.fm

Accessories / connection cables			More accessories can be found from page 643 onwards
Part no.	Designation	Features	
a 50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000mm, M12 angular, 3-pin, PVC	
b 50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000mm, M12 axial, 3-pin, PVC	
c 50104573	K - D M12W - 4P - 5m - FAB	Connection cable 5000mm, M12 angular, 4-pin, Food+Bev.	
d 50104572	K - D M12A - 4P - 5m - FAB	Connection cable 5000mm, M12 axial, 4-pin, Food+Bev.	
e 50031324	KD 095 - 4	Cable socket, M12 angular, 4-pin, user-configurable	
f 50031323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable	

										
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IS 230 SERIES

Inductive Switches



Photoel. sensors/
light scanners,
cubic housing

Photoel. sensors/
light scanners,
cylindrical housing

Measuring
Sensors

Ultrasonic
Sensors

Inductive
Switches

Forked
Sensors

Special
Sensors

Fiber Optic
Sensors

Light
Curtains

Protective
Sensors

Connection	Material housing / active surface	Protection class	Accessories
Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f
Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f
Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67	
M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f
Cable, 2 m, 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 69K	c, d



Inductive Switch

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Electrical connection

Cable

10-30V DC +	br/BN
GND	bl/BU
OUT	sw/BK

M12 connector

...NO... (normally open)	...NC... (normally closed)
10-30V DC + 1 — br/BN	10-30V DC + 1 — br/BN
not connected 2 —	OUT 2 — ws/WH
GND 3 — bl/BU	GND 3 — bl/BU
OUT 4 — sw/BK	not connected 4 —



...NO...-S12 (normally open):

3-pin or 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):

only 4-pin M12 connection cables can be used.