

FT 90 ILA

Distance sensor



PRODUCT HIGHLIGHTS

- Long scanning distance (up to 10 m on white objects)
- High repeatability
- High measurement rates
- Open interfaces ensure maximum compatibility (SSI-compatible, RS422)
- Profibus and DeviceNet via gateway
- Switchable red-light pilot laser
- 2 switching outputs

Optical data		Functions	
Operating range	0.5 ... 10 m ¹	Indicator LED, green	Operating voltage indicator
Measurement range	9.5 m	Indicator LED, yellow	Switching output indicator
Type of light	Infrared, 905 nm (measurement laser) Laser, red, 650 nm (pilot laser)	Scanning distance adjustment	Via Teach-in button and control input
Laser Class (DIN EN 60825-1:2008-5)	1 (measurement laser) 2 (pilot laser)		
Resolution	0.1 mm or 0.125 mm		
Linearity	± 8 mm		
Repeatability	± 4 mm		
Electrical data		Mechanical data	
Operating voltage, +U _B	18 ... 30V DC ²	Dimensions	93 × 93 × 42 mm
Output current, I _e	≤ 100 mA	Enclosure rating	IP 67 ³
Plausibility output, Q _p	50 mA	Material, housing	ABS, impact-resistant
Service output, Q _s	50 mA	Material, front screen	PMMA
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection, Q	Type of connection	See Selection Table
Protection Class	2	Ambient temperature: operation	-10 ... +50 °C (-20 ... +50 °C in continuous operation)
Power On Delay	≤ 12 ms	Ambient temperature: storage	-30 ... +75 °C
Switching output, Q ₁ / Q ₂	PNP	Weight	230 g
Output function	N.O.	Vibration and impact resistance	EN 60947-5-2
Analogue output	4 ... 20 mA		
Temperature drift	< ± 5 mm absolute		
Serial interface	RS422 or SSI-compatible (GREY / BINARY) adjustable		
Bus interface	Profibus or DeviceNet, each via gateway (accessory)		
Cable length / m	< 25 / < 50 / < 100 / < 200 / < 400		
Cycle rate	< 500 kHz / < 400 kHz / < 300 kHz / < 200 kHz / < 100 kHz		

¹ Reference material: Kodak white, 90 % ² 10 % ripple, within U_B ³ With connected IP 67 plug

Type of connection	Part number	Article number
Plug, M16x1, 12-pin	FT 90 ILA-S2-Q12	591-91000

Pin	Name	Cable Type 1 (12-pin) colour	Cable Type 2 (5-pin) colour	Description
A	TX+	White		RS422: transmission data / SSI: Data+
B	Q1	Brown	Black	Switching output, Q1
C	RX+	Green		RS422: receiver data / SSI: clock+
D	analog	Yellow		Analogue output 4 ... 20 mA (only FT9X)
E	Qs	Grey	Orange	Service output, Qs
F	Qp	Pink		Plausibility output, Qp
G	U _B	Red	Brown	U _B + 18 ... 30 V
H	RX-	Black		RS422: receiver data / SSI: clock
J	NC	Violet		
K	TX-	Grey/pink		RS422: transmitter data / SSI: Data-
L	Q2	Red/blue	White	Switching output, Q2
M	CND	Blue	Blue	0V (GND)

The graph shows the current I (mA) on the y-axis versus the factory setting on the x-axis. The y-axis has labels at 3.6 mA, 4 mA, and 20 mA. The x-axis has labels at 0, 0.5, and 10 [m]. A horizontal dashed line is at 4 mA, and a vertical dashed line is at 0.5 m. The curve is constant at 3.6 mA for factory settings from 0 to approximately 0.3 m, then increases linearly to 20 mA at 10 m. A label 'invertible' is placed in the upper right area of the graph.

155-01406

155-01808

White 90 %	0.5 ... 10 m	Connection cables	From Page A-34
Grey 10 %	0.5 ... 7 m	Brackets	From Page A-4
Black 6 %	0.5 ... 3 m	AS F 90 Aligning aid	From Page A-4
		MSP F 90 A Fine adjustment	From Page A-4
		Converters and adapter cables	From Page A-38

FT 91 ILA

Distance sensor



PRODUCT HIGHLIGHTS

- Long scanning distance (up to 10 m on white objects)
- High repeatability
- High measurement rates
- Open interfaces ensure maximum compatibility (SSI-compatible, RS422)
- Profibus and DeviceNet via gateway
- Switchable red-light pilot laser
- 2 switching outputs

Optical data		Functions	
Operating range	0.5 ... 6 m ¹	Indicator LED, green	Operating voltage indicator
Type of light	Infrared, 905 nm (measurement laser) Laser, red, 650 nm (pilot laser)	Indicator LED, yellow	Switching output indicator
Laser Class (DIN EN 60825-1:2008-5)	1 (measurement laser) 2 (pilot laser)	Scanning distance adjustment	Via Teach-in button and control input
Resolution	0.1 mm or 0.125 mm		
Linearity	± 10 mm		
Repeatability	± 5 mm		
Electrical data		Mechanical data	
Operating voltage, +U _B	18 ... 30V DC ²	Dimensions	93 × 93 × 42 mm
Output current, I _e	≤ 100 mA	Enclosure rating	IP 67 ³
Plausibility output, Q _p	50 mA	Material, housing	ABS, impact-resistant
Service output, Q _s	50 mA	Material, front screen	PMMA
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection, Q	Type of connection	See Selection Table
Protection Class	2	Ambient temperature: operation	-10 ... +50 °C (-20 ... +50 °C in continuous operation)
Power On Delay	≤ 12 ms	Ambient temperature: storage	-30 ... +75 °C
Switching output, Q ₁ / Q ₂	PNP	Weight	230 g
Output function	N.O.	Vibration and impact resistance	EN 60947-5-2
Analogue output	4 ... 20 mA		
Temperature drift	< 0.5 mm / K		
Serial interface	RS422 or SSI-compatible (GREY / BINARY) adjustable		
Bus interface	Profibus or DeviceNet, each via gateway (accessory)		
Cable length / m	< 25 / < 50 / < 100 / < 200 / < 400		
Cycle rate	< 500 kHz / < 400 kHz / < 300 kHz / < 200 kHz / < 100 kHz		

¹ Reference material: Kodak white, 90 % ² 10 % ripple, within U_B ³ With connected IP 67 plug

Type of connection	Part number	Article number
Plug, M16, 12-pin	FT 91 ILA-S2-Q12	591-91003

Pin	Name	Cable Type 1 (12-pin) colour	Cable Type 2 (5-pin) colour	Description
A	TX+	White		RS422: transmission data / SSI: Data+
B	Q1	Brown	Black	Switching output, Q1
C	RX+	Green		RS422: receiver data / SSI: clock+
D	analog	Yellow		Analogue output 4 ... 20 mA (only FT9X)
E	Qs	Grey	Orange	Service output, Qs
F	Qp	Pink		Plausibility output, Qp
G	U _B	Red	Brown	U _B + 18 ... 30 V
H	RX-	Black		RS422: receiver data / SSI: clock
J	NC	Violet		
K	TX-	Grey/pink		RS422: transmitter data / SSI: Data-
L	Q2	Red/blue	White	Switching output, Q2
M	CND	Blue	Blue	0V (GND)

The graph shows the invertible region of the parameter space. The y-axis represents current I in mA, with values 0, 3.6, 4, and 20. The x-axis represents the Factory setting, with values 0, 0.5, and 6. A horizontal line at $I = 3.6$ mA is labeled 'invertible'. The region above this line is shaded gray, indicating the invertible region.

155-01809

Technical drawing of a mechanical assembly. The drawing includes a 3D perspective view of a component with dimensions: 10mm x 5mm, 27.5mm, 3mm x 10mm, 4mm, 4mm x 12mm, and 6mm. The 3D view shows a rectangular block with a circular feature on its side. The 2D view shows a side profile with a horizontal line and a vertical line. The dimensions are labeled as follows: 10mm x 5mm (width and height of the block), 27.5mm (length of the block), 3mm x 10mm (width and height of the circular feature), 4mm (radius of the circular feature), 4mm x 12mm (width and height of the rectangular feature), and 6mm (length of the rectangular feature).

155-01810

White 90 %	0.5 ... 6 m	Connection cables	From Page A-34
Grey 10 %	0.5 ... 4 m	Brackets	From Page A-4
Black 6 %	0.5 ... 2 m	AS F 90 Aligning aid	From Page A-4
		MSP F 90 A Fine adjustment	From Page A-4
		Converters and adapter cables	From Page A-38

FT 92 ILA / IRLA

Distance sensor



PRODUCT HIGHLIGHTS

- Long scanning distance and range
- High repeatability
- High measurement rates
- Very good price/performance ratio
- Switchable red-light pilot laser
- 2 PNP switching outputs
- 1 analogue output: 4 ... 20 mA
- All outputs in measurement range freely adjustable
- Standard M12 plug

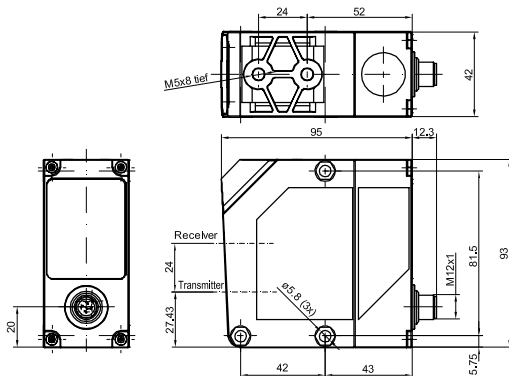
Optical data		Functions	
Scanning distance	0.2 ... 6 m ¹	Indicator LED, green	Operating voltage indicator
Type of light	Infrared, 905 nm (measurement laser) Laser, red, 650 nm (pilot laser)	Indicator LED, yellow	2 x switching output indicator
Laser Class (DIN EN 60825-1:2008-5)	1 (measurement laser) 2 (pilot laser)	Indicator LED, orange	Operating mode
Repeatability Fast/Slow	< ± 15 / 10 mm ²	Indicator LED, red	Menu Indicator
Linearity	≤ ± 40 mm ²	Scanning distance adjustment	Via Teach-in button
		Default settings	Max. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	18 ... 30V DC ³	Dimensions	95 x 93 x 42 mm
No-load current, I ₀	≤ 125 mA	Enclosure rating	IP 67 ⁴
Output current, I _e	≤ 100 mA	Material, housing	ABS, impact-resistant
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +50 °C
Switching output, Q ₁ / Q ₂	PNP / NPN 100 mA (see Selection Table)	Ambient temperature: storage	-40 ... +80 °C
Analogue output	4 ... 20 mA	Weight	200 g
Temperature drift	≤ 1.2 mm / K	Vibration and impact resistance	EN 60947-5-2
Load	≤ 500 Ω		

¹ With RL250 reflector ² Data apply after a minimum switch-on time of 30 min ³ 10 % ripple, within U_B ⁴ With connected IP 67 plug

Switching output	Type of connection	Part number	Article number
PNP	Plug, M12, 5-pin	FT 92 ILA-PSL5	591-91005
NPN	Plug, M12, 5-pin	FT 92 ILA-NSL5	591-91008
PNP	Plug, M12, 5-pin	FT 92 IRLA-PSL5 ⁵	591-91013

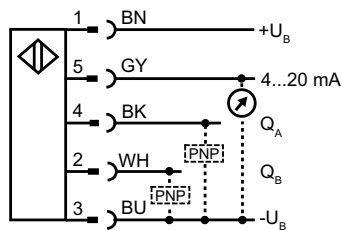
⁵ Pilot laser (red) on permanently

Plug connection



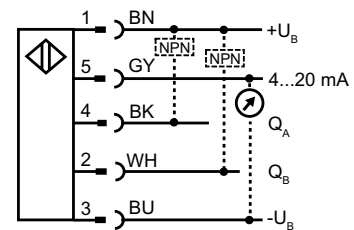
153-00346

Connection, 5-pin (PNP)



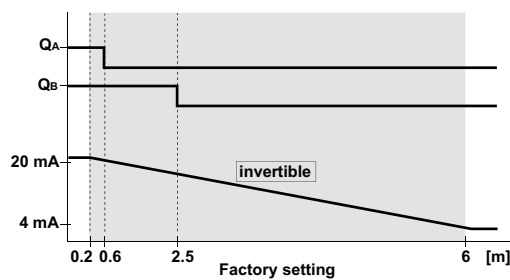
154-00125

Connection, 5-pin (NPN)



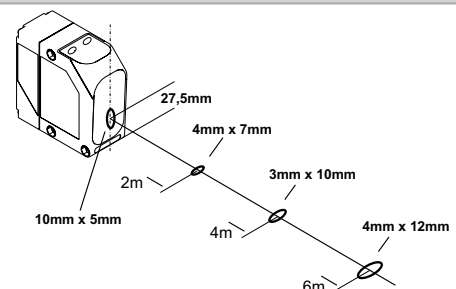
154-00472

Characteristic analogue curve



155-01373

Light spot geometry



155-00141

Scanning distance

White 90 %	0.2 ... 6 m
Grey 18 %	0.2 ... 6 m
Black 6 %	0.2 ... 2.5 m

Accessories

Connection cables	From Page A-34
Brackets	From Page A-4
AS F 90 Aligning aid	From Page A-4
MSP F 90 A Fine adjustment	From Page A-4
Converters and adapter cables	From Page A-38

FR 90 ILA

Reflector distance sensor



PRODUCT HIGHLIGHTS

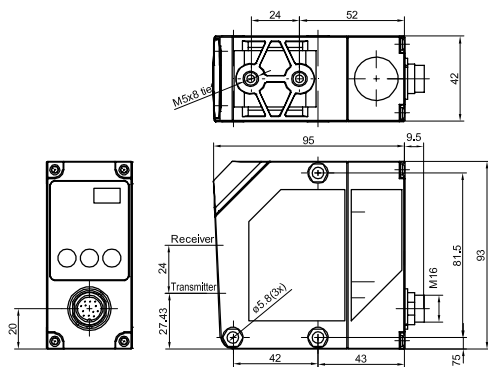
- Long range of up to 250 m on specified reflector
- High repeatability
- High measurement rates
- Ideal for precise positioning tasks
- Open interfaces ensure maximum compatibility (SSI-compatible, RS422)
- Profibus and DeviceNet via gateway
- Switchable red-light pilot laser
- 2 switching outputs

Optical data		Functions	
Scanning distance	0.5 ... 250 m	Indicator LED, green	Operating voltage indicator
Type of light	Infrared, 905 nm (measurement laser) Laser, red, 650 nm (pilot laser)	Indicator LED, yellow	Switching output indicator
Laser Class (DIN EN 60825-1:2008-5)	1 (measurement laser) 2 (pilot laser)	Scanning distance adjustment	Via Teach-in button and control input
Resolution	0.1 mm or 0.125 mm		
Linearity	± 3 mm (from 2 m)		
Repeatability	< ± 2 mm		
Light spot	20 × 20 mm ¹		
Electrical data		Mechanical data	
Operating voltage, +U _B	18 ... 30V DC ²	Dimensions	93 × 93 × 42 mm
Output current, I _e	≤ 100 mA	Enclosure rating	IP 67 ³
Plausibility output, Q _p	50 mA	Material, housing	ABS, impact-resistant
Service output, Q _s	50 mA	Material, front screen	PMMA
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection, Q	Type of connection	See Selection Table
Protection Class	2	Ambient temperature: operation	-10 ... +50 °C (-20 ... +50 °C in continuous operation)
Power On Delay	≤ 12 ms	Ambient temperature: storage	-30 ... +75 °C
Switching output, Q ₁ / Q ₂	PNP	Weight	230 g
Output function	N.O.	Vibration and impact resistance	EN 60947-5-2
Temperature drift	< ± 5 mm absolute		
Serial interface	RS422 or SSI-compatible (GREY / BINARY) adjustable		
Bus interface	Profibus or DeviceNet each via gateway (accessories)		
Cable length / m	< 25 / < 50 / < 100 / < 200 / < 400		
Cycle rate	< 500 kHz / < 400 kHz / < 300 kHz / < 200 kHz / < 100 kHz		

¹ At scanning distance of 10 m ² 10 % ripple, within U_B ³ With connected IP 67 plug

Type of connection	Part number	Article number
Plug, M16x1, 12-pin	FR 90 ILA-S2-Q12	591-91001

Plug connection

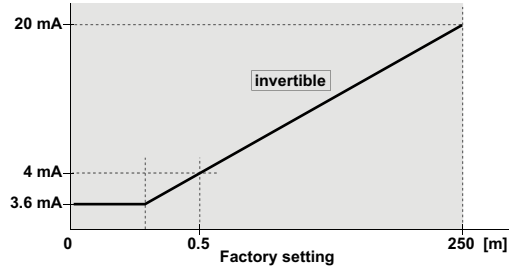


153-00457

Connection, 12-pin

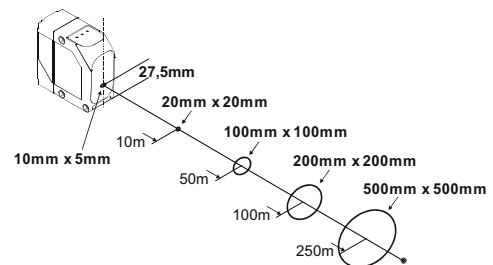
Pin	Name	Cable Type 1 (12-pin) colour	Cable Type 2 (5-pin) colour	Description
A	TX+	White		RS422: transmission data / SSi: Data+
B	Q1	Brown	Black	Switching output, Q1
C	RX+	Green		RS422: receiver data / SSi: clock+
D	analog	Yellow		Analogue output 4 ... 20 mA (only FT9X)
E	Qs	Grey	Orange	Service output, Qs
F	Qp	Pink		Plausibility output, Qp
G	U_B	Red	Brown	$U_B + 18 \dots 30V$
H	RX-	Black		RS422: receiver data / SSi: clock
J	NC	Violet		
K	TX-	Grey/pink		RS422: transmitter data / SSi: Data-
L	Q2	Red/blue	White	Switching output, Q2
M	CND	Blue	Blue	0V (GND)

Characteristic analogue curve



155-01811

Light spot geometry



155-01807

Accessories

Reflectors	From Page A-18
Connection cables	From Page A-34
Brackets	From Page A-4
AS F 90 Aligning aid	From Page A-4
MSP F 90 A Fine adjustment	From Page A-4
Converters and adapter cables	From Page A-38

FR 91 ILA

Reflector distance sensor



PRODUCT HIGHLIGHTS

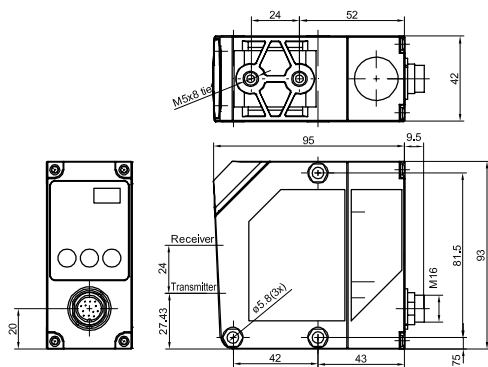
- Long range of up to 50 m on specified reflector
- High repeatability
- High measurement rates
- Very good price/performance ratio
- Open interfaces ensure maximum compatibility (SSI-compatible, RS422)
- Profibus and DeviceNet via gateway
- Switchable red-light pilot laser
- 2 switching outputs

Optical data		Functions	
Scanning distance	0.5 ... 50 m	Indicator LED, green	Operating voltage indicator
Type of light	Infrared, 905 nm (measurement laser) Laser, red, 650 nm (pilot laser)	Indicator LED, yellow	Switching output indicator
Laser Class (DIN EN 60825-1:2008-5)	1 (measurement laser) 2 (pilot laser)	Scanning distance adjustment	Via Teach-in button and control input
Resolution	0.1 mm or 0.125 mm		
Linearity	± 5 mm (from 2 m)		
Repeatability	< ± 4 mm		
Light spot	20 × 20 mm ¹		
Electrical data		Mechanical data	
Operating voltage, +U _B	18 ... 30V DC ²	Dimensions	95 × 93 × 42 mm
Output current, I _e	≤ 100 mA	Enclosure rating	IP 67 ³
Plausibility output, Q _p	50 mA	Material, housing	ABS, impact-resistant
Service output, Q _s	50 mA	Material, front screen	PMMA
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection, Q	Type of connection	See Selection Table
Protection Class	2	Ambient temperature: operation	-10 ... +50 °C
Power On Delay	≤ 12 ms	Ambient temperature: storage	-30 ... +75 °C
Switching output, Q ₁ / Q ₂	PNP	Weight	230 g
Output function	N.O.	Vibration and impact resistance	EN 60947-5-2
Temperature drift	< 0.5 mm / K		
Serial interface	RS422 or SSI-compatible (GREY / BINARY) adjustable		
Bus interface	Profibus or DeviceNet, each via gateway (accessories)		
Cable length / m	< 25 / < 50 / < 100 / < 200 / < 400		
Cycle rate	< 500 kHz / < 400 kHz / < 300 kHz / < 200 kHz / < 100 kHz		

¹ At scanning distance of 10 m ² 10 % ripple, within U_B ³ With connected IP 67 plug

Type of connection	Part number	Article number
Plug, M16, 12-pin	FR 91 ILA-S2-Q12	591-91002

Plug connection

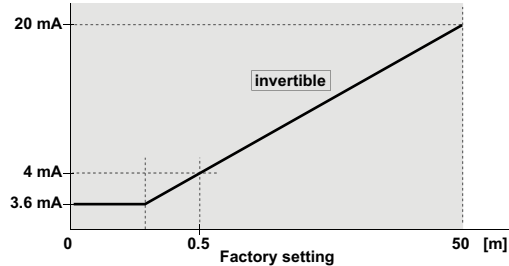


153-00457

Connection, 12-pin

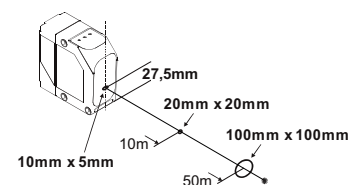
Pin	Name	Cable Type 1 (12-pin) colour	Cable Type 2 (5-pin) colour	Description
A	TX+	White		RS422: transmission data / SSi: Data+
B	Q1	Brown	Black	Switching output, Q1
C	RX+	Green		RS422: receiver data / SSi: clock+
D	analog	Yellow		Analogue output 4 ... 20 mA (only FT9X)
E	Qs	Grey	Orange	Service output, Qs
F	Qp	Pink		Plausibility output, Qp
G	U_B	Red	Brown	$U_B + 18 \dots 30V$
H	RX-	Black		RS422: receiver data / SSi: clock
J	NC	Violet		
K	TX-	Grey/pink		RS422: transmitter data / SSi: Data-
L	Q2	Red/blue	White	Switching output, Q2
M	CND	Blue	Blue	0V (GND)

Characteristic analogue curve



155-01812

Light spot geometry



155-01813

Accessories

Reflectors	From Page A-18
Connection cables	From Page A-34
Brackets	From Page A-4
AS F 90 Aligning aid	From Page A-4
MSP F 90 A Fine adjustment	From Page A-4
Converters and adapter cables	From Page A-38

FR 92 ILA

Reflector distance sensor



PRODUCT HIGHLIGHTS

- Long scanning distance and range (scanning up to 6 m on white objects, with reflector up to 30 m)
- High repeatability
- High measurement rates
- Switchable red-light pilot laser
- Simple teach-in

Optical data		Functions	
Scanning distance	0.2 ... 30 m ¹	Indicator LED, green	Operating voltage indicator
Type of light	Infrared, 905 nm (measurement laser) Laser, red, 650 nm (pilot laser)	Indicator LED, yellow	Switching output indicator
Laser Class (DIN EN 60825-1:2008-5)	1 (measurement laser) 2 (pilot laser)	Indicator LED, orange	Operating mode
Repeatability Fast/Slow	≤ ± 10 / 5 mm ²	Indicator LED, red	Menu Indicator
Linearity	≤ ± 60 mm ²	Scanning distance adjustment	Via Teach-in button
		Default settings	Max. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	18 ... 30V DC ³	Dimensions	95 x 93 x 42 mm
No-load current, I ₀	≤ 125 mA	Enclosure rating	IP 67 ⁴
Output current, I _e	100 mA	Material, housing	ABS
Max. voltage drop at switching output	≤ 2.4V	Material, front screen	PMMA
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection (Q)	Type of connection	See Selection Table
Protection Class	2	Ambient temperature: operation	-20 ... +50 °C
Power On Delay	< 300 ms	Ambient temperature: storage	-40 ... +80 °C
Response time fast / slow	30 ms / 65 ms	Weight	200 g
Switching output, Q ₁ / Q ₂	PNP	Vibration and impact resistance	EN 60947-5-2
Output function	N.O.		
Analogue output	4 ... 20 mA		
Temperature drift analogue	3 mm / K		
Temperature drift switching output	1.5 mm / K		

¹ With RL250 reflector ² Data apply after a minimum switch-on time of 30 min ³ 10 % ripple, within U_B ⁴ With connected IP 67 plug

Type of connection	Part number	Article number
Plug, M12, 5-pin	FR 92 ILA-PSL5	591-91006

153-00346

154-00125

155-01359

155-00210