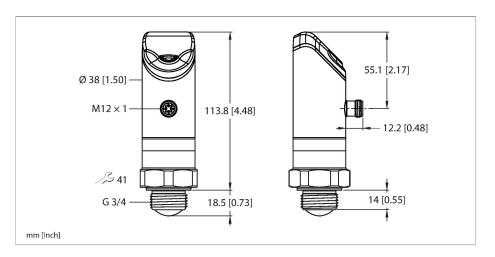


LRS510-10-51-2UPN8-H1141 Radar Sensor - Level Control





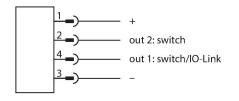
Туре	LRS510-10-51-2UPN8-H1141
ID	100012731
Radar data	
Function	Radar scanner
Frequency range	122 - 123 GHz
Range	35010000 mm
Resolution	1 mm
Minimum measuring range	500 mm
Minimum switching range	50 mm
Linearity error	≤ ± 0.1 %
Edge lengths of the nominal actuator	100 mm
Output power EIRP	10 dBm
Cone angle	10 °
Repeatability	2 mm
Hysteresis	≤ 50 mm
Electrical data	
Operating voltage U _B	1733 VDC
Residual ripple	< 10 % U _{ss}
DC rated operating current I _e	≤ 250 mA
No-load current	≤ 100 mA
Residual current	≤ 0.1 mA
Short-circuit protection	yes/Cyclic
Reverse polarity protection	yes
Communication protocol	IO-Link
Output function	NO/NC programmable, PNP/NPN
Output 2	Switching output
Voltage drop at I₅	≤ 2 V

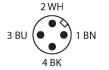


Features

- Range: 10 m ■Blind zone: 35 cm
- Resolution: 1 mm
- Cone angle of the radar beam: ±5° ■ Distance, level, volume or % output
- ■Approved according to ETSI 305550-2 ■ Approved according to FCC/CFR. 47 Part
- Male connector, M12 × 1, 4-pin
- Operating voltage 18...33 VDC
- Switching output switchable between PNP/ NPN
- **■IO-Link**
- ■4-digit, 2-colored, 14-segment display
- Housing is rotatable by 180° after mounting the process connection
- Process connection G3/4"
- Pressure resistance -1...16 bar rel.

Wiring diagram





Functional principle

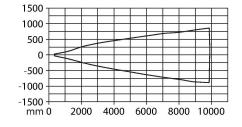
FMCW radar stands for frequency modulated continuous wave radar. FMCW is the English abbreviation for Frequency Modulated



Technical data

Response time typical < 10 ms IO-Link IO-Link specification V 1.1 IO-Link port type Class A Communication mode COM 3 (230.4 kBaud) Process data width 80 bit Measured value information 64 bit Switchpoint information 2 bit Frame type 2.2 Minimum cycle time 5 ms Function pin 4 IO-Link Function Pin 2 DI Maximum cable length 20 m Profile support Smart Sensor Profile Mechanical data Design With display (integrated probe), LRS Dimensions Q 38 x 132.3 x 38 x 50.2 mm Housing material Stainless-steel/Plastic, 1.4404 (AISI 316L.)/polyarylamide 50 % GF UL 94 V-0 PEEK Max. tightening torque of housing nut 45 Nm Electrical connection Connector, M12 x 1 Process connection G 3/4" Ambient temperature -25+65 °C Storage temperature -40+85 °C Pressure resistance 16 bar Protection class IP67 IP69K Not assessed by UL Switching state 2 x LEDs, Yellow Vibration resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v 1.6.1 Approvals CE, ETSI, FCC, UL	Switching frequency	≤ 10 Hz
IO-Link specification	Response time typical	< 10 ms
Class A	IO-Link	
Communication mode COM 3 (230.4 kBaud) Process data width 80 bit Measured value information 64 bit Switchpoint information 2 bit Frame type 2.2 Minimum cycle time 5 ms Function pin 4 IO-Link Function Pin 2 DI Maximum cable length 20 m Profile support Smart Sensor Profile Mechanical data With display (integrated probe), LRS Dimensions Ø 38 x 132.3 x 38 x 50.2 mm Housing material Stainless-steel/Plastic, 1.4404 (AISI 316L)/polyarylamide 50 % GF UL 94 V-0 PEEK Lens plastic, PEEK Max. tightening torque of housing nut 45 Nm Electrical connection Connector, M12 x 1 Process connection G 3/4" Ambient temperature -25+65 °C Storage temperature -40+85 °C Pressure resistance 16 bar Protection class IP67 IP69K Not assessed by UL Switching state 2 x LEDs, Yellow Vibration resistance 20 g (102000 H	IO-Link specification	V 1.1
Process data width Measured value information Switchpoint information 2 bit Frame type 2.2 Minimum cycle time 5 ms Function pin 4 IO-Link Function Pin 2 DI Maximum cable length Profile support Mechanical data Design With display (integrated probe), LRS Dimensions Ø 38 x 132.3 x 38 x 50.2 mm Housing material Stainless-steel/Plastic, 1.4404 (AISI 316L)/polyarylamide 50 % GF UL 94 V-0 PEEK Max. tightening torque of housing nut Electrical connection Connector, M12 x 1 Process connection G 3/4" Ambient temperature -25+65 °C Storage temperature -40+85 °C Pressure resistance 16 bar Protection class IP67 IP69K Not assessed by UL Switching state 2 x LEDs, Yellow Vibration resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	IO-Link port type	Class A
Measured value information 64 bit Switchpoint information 2 bit Frame type 2.2 Minimum cycle time 5 ms Function pin 4 IO-Link Function Pin 2 DI Maximum cable length 20 m Profile support Smart Sensor Profile Mechanical data Design With display (integrated probe), LRS Dimensions Ø 38 x 132.3 x 38 x 50.2 mm Housing material Stainless-steel/Plastic, 1.4404 (AISI 316L)/polyarylamide 50 % GF UL 94 V-0 PEEK Lens plastic, PEEK Max. tightening torque of housing nut 45 Nm Electrical connection Connector, M12 x 1 Process connection G 3/4" Ambient temperature -25+65 °C Storage temperature -40+85 °C Pressure resistance 16 bar Protection class IP67 IP69K Not assessed by UL Switching state 2 x LEDs, Yellow Vibration resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Communication mode	COM 3 (230.4 kBaud)
Switchpoint information 2 bit Frame type 2.2 Minimum cycle time 5 ms Function pin 4 IO-Link Function Pin 2 DI Maximum cable length 20 m Profile support Smart Sensor Profile Mechanical data With display (integrated probe), LRS Dimensions Ø 38 x 132.3 x 38 x 50.2 mm Housing material Stainless-steel/Plastic, 1.4404 (AISI 316L)/polyarylamide 50 % GF UL 94 V-0 PEEK Lens plastic, PEEK Max. tightening torque of housing nut 45 Nm Electrical connection Connector, M12 × 1 Process connection G 3/4" Ambient temperature -25+65 °C Storage temperature -40+85 °C Pressure resistance 16 bar Protection class IP67 IP69K Not assessed by UL Switching state 2 × LEDs, Yellow Vibration resistance 20 g (102000 Hz), EN 600068-2-6 Shock test EN 60068-2-2019 EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Process data width	80 bit
Frame type 2.2 Minimum cycle time 5 ms Function pin 4 IO-Link Function Pin 2 DI Maximum cable length 20 m Profile support Smart Sensor Profile Mechanical data With display (integrated probe), LRS Dimensions Ø 38 x 132.3 x 38 x 50.2 mm Housing material Stainless-steel/Plastic, 1,4404 (AISI 316L)/polyarylamide 50 % GF UL 94 V-0 PEEK Lens plastic, PEEK Max. tightening torque of housing nut 45 Nm Electrical connection Connector, M12 × 1 Process connection G 3/4" Ambient temperature -25+65 °C Storage temperature -40+85 °C Pressure resistance 16 bar Protection class IP67 IP69K Not assessed by UL Switching state 2 × LEDs, Yellow Vibration resistance 20 g (102000 Hz), EN 600068-2-6 Shock test EN 60068-2-27 Shock resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Measured value information	64 bit
Minimum cycle time 5 ms Function pin 4 IO-Link Function Pin 2 DI Maximum cable length 20 m Profile support Smart Sensor Profile Mechanical data Design With display (integrated probe), LRS Dimensions Ø 38 x 132.3 x 38 x 50.2 mm Housing material Stainless-steel/Plastic, 1.4404 (AISI 316L)/polyarylamide 50 % GF UL 94 V-0 PEEK Lens plastic, PEEK Max. tightening torque of housing nut 45 Nm Electrical connection Connector, M12 x 1 Process connection G 3/4" Ambient temperature -25+65 °C Storage temperature -40+85 °C Pressure resistance 16 bar Protection class IP67 IP69K Not assessed by UL Switching state 2 x LEDs, Yellow Vibration resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Switchpoint information	2 bit
Function pin 4 IO-Link Function Pin 2 DI Maximum cable length 20 m Profile support Smart Sensor Profile Mechanical data Design With display (integrated probe), LRS Dimensions Ø 38 x 132.3 x 38 x 50.2 mm Housing material Stainless-steel/Plastic, 1.4404 (AISI 316L)/polyarylamide 50 % GF UL 94 V-0 PEEK Lens plastic, PEEK Max. tightening torque of housing nut 45 Nm Electrical connection Connector, M12 x 1 Process connection G 3/4" Ambient temperature -40+85 °C Pressure resistance 16 bar Protection class IP67 IP69K Not assessed by UL Switching state 2 x LEDs, Yellow Vibration resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Frame type	2.2
Function Pin 2 Maximum cable length Profile support Mechanical data Design With display (integrated probe), LRS Dimensions Ø 38 x 132.3 x 38 x 50.2 mm Housing material Stainless-steel/Plastic, 1.4404 (AISI 316L)/polyarylamide 50 % GF UL 94 V-0 PEEK Lens plastic, PEEK Max. tightening torque of housing nut Electrical connection Connector, M12 × 1 Process connection G 3/4" Ambient temperature -25+65 °C Storage temperature -40+85 °C Pressure resistance 16 bar Protection class IP67 IP69K Not assessed by UL Switching state 2 × LEDs, Yellow Vibration resistance 50 g (102000 Hz), EN 600068-2-6 Shock test EN 60068-2-27 Shock resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Minimum cycle time	5 ms
Maximum cable length Profile support Smart Sensor Profile Mechanical data Design With display (integrated probe), LRS Dimensions Ø 38 x 132.3 x 38 x 50.2 mm Housing material Stainless-steel/Plastic, 1.4404 (AISI 316L)/polyarylamide 50 % GF UL 94 V-0 PEEK Lens plastic, PEEK Max. tightening torque of housing nut Electrical connection Connector, M12 × 1 Process connection G 3/4" Ambient temperature -25+65 °C Storage temperature -40+85 °C Pressure resistance 16 bar Protection class IP67 IP69K Not assessed by UL Switching state 2 × LEDs, Yellow Vibration resistance 20 g (102000 Hz), EN 600068-2-6 Shock test EN 60068-2-27 Shock resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Function pin 4	IO-Link
Profile support Mechanical data Design With display (integrated probe), LRS Dimensions Ø 38 x 132.3 x 38 x 50.2 mm Housing material Stainless-steel/Plastic, 1.4404 (AISI 316L)/polyarylamide 50 % GF UL 94 V-0 PEEK Lens plastic, PEEK Max. tightening torque of housing nut Electrical connection Connector, M12 x 1 Process connection G 3/4" Ambient temperature -25+65 °C Storage temperature -40+85 °C Pressure resistance 16 bar Protection class IP67 IP69K Not assessed by UL Switching state 2 x LEDs, Yellow Vibration resistance 20 g (102000 Hz), EN 600068-2-6 Shock test EN 60068-2-27 Shock resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Function Pin 2	DI
Mechanical data Design With display (integrated probe), LRS Dimensions Ø 38 x 132.3 x 38 x 50.2 mm Housing material Stainless-steel/Plastic, 1.4404 (AISI 316L)/polyarylamide 50 % GF UL 94 V-0 PEEK Lens plastic, PEEK Max. tightening torque of housing nut 45 Nm Electrical connection Connector, M12 × 1 Process connection G 3/4" Ambient temperature -25+65 °C Storage temperature -40+85 °C Pressure resistance 16 bar Protection class IP67 IP69K Not assessed by UL Switching state 2 x LEDs, Yellow Vibration resistance 20 g (102000 Hz), EN 600068-2-6 Shock test EN 60068-2-27 Shock resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Maximum cable length	20 m
Design With display (integrated probe), LRS Dimensions Ø 38 x 132.3 x 38 x 50.2 mm Housing material Stainless-steel/Plastic, 1.4404 (AISI 316L)/polyarylamide 50 % GF UL 94 V-0 PEEK Lens plastic, PEEK Max. tightening torque of housing nut 45 Nm Electrical connection Connector, M12 × 1 Process connection G 3/4" Ambient temperature -25+65 °C Storage temperature -40+85 °C Pressure resistance 16 bar Protection class IP67 IP69K Not assessed by UL Switching state 2 × LEDs, Yellow Vibration resistance 20 g (102000 Hz), EN 600068-2-6 Shock test EN 60068-2-27 Shock resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Profile support	Smart Sensor Profile
Dimensions Ø 38 x 132.3 x 38 x 50.2 mm Housing material Stainless-steel/Plastic, 1.4404 (AISI 316L)/polyarylamide 50 % GF UL 94 V-0 PEEK Lens plastic, PEEK Max. tightening torque of housing nut 45 Nm Electrical connection Connector, M12 × 1 Process connection G 3/4" Ambient temperature -25+65 °C Storage temperature -40+85 °C Pressure resistance 16 bar Protection class IP67 IP69K Not assessed by UL Switching state 2 × LEDs, Yellow Vibration resistance 20 g (102000 Hz), EN 600068-2-6 Shock test EN 60068-2-27 Shock resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Mechanical data	
Housing material Stainless-steel/Plastic, 1.4404 (AISI 316L)/polyarylamide 50 % GF UL 94 V-0 PEEK Lens plastic, PEEK Max. tightening torque of housing nut 45 Nm Electrical connection Connector, M12 × 1 Process connection G 3/4" Ambient temperature -25+65 °C Storage temperature -40+85 °C Pressure resistance 16 bar Protection class IP67 IP69K Not assessed by UL Switching state 2 × LEDs, Yellow Vibration resistance 20 g (102000 Hz), EN 600068-2-6 Shock test EN 60068-2-27 Shock resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Design	With display (integrated probe), LRS
And the protection class IP67 (P69K) Not assessed by UL Switching state 2 × LEDs, Yellow Vibration resistance 50 g (11 ms) EMV EMAX. 316L)/polyarylamide 50 % GF UL 94 V-0 PEEK Plastic, PEEK Plastic, PEEK At 9 plastic, PEEK Connector, M12 × 1 Connector, M12	Dimensions	Ø 38 x 132.3 x 38 x 50.2 mm
Max. tightening torque of housing nut Electrical connection Connector, M12 × 1 Process connection G 3/4" Ambient temperature -25+65 °C Storage temperature -40+85 °C Pressure resistance 16 bar Protection class IP67 IP69K Not assessed by UL Switching state 2 × LEDs, Yellow Vibration resistance 20 g (102000 Hz), EN 600068-2-6 Shock test EN 60068-2-27 Shock resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Housing material	316L)/polyarylamide 50 % GF UL 94 V-0
Electrical connection Connector, M12 × 1 Process connection G 3/4" Ambient temperature -25+65 °C Storage temperature -40+85 °C Pressure resistance 16 bar Protection class IP67 IP69K Not assessed by UL Switching state 2 × LEDs, Yellow Vibration resistance 20 g (102000 Hz), EN 600068-2-6 Shock test EN 60068-2-27 Shock resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Lens	plastic, PEEK
Process connection G 3/4" Ambient temperature -25+65 °C Storage temperature -40+85 °C Pressure resistance 16 bar Protection class IP67 IP69K Not assessed by UL Switching state 2 × LEDs, Yellow Vibration resistance 20 g (102000 Hz), EN 600068-2-6 Shock test EN 60068-2-27 Shock resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Max. tightening torque of housing nut	45 Nm
Ambient temperature -25+65 °C Storage temperature -40+85 °C Pressure resistance 16 bar Protection class IP67 IP69K Not assessed by UL Switching state 2 × LEDs, Yellow Vibration resistance 20 g (102000 Hz), EN 600068-2-6 Shock test EN 60068-2-27 Shock resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Electrical connection	Connector, M12 × 1
Storage temperature -40+85 °C Pressure resistance 16 bar Protection class IP67 IP69K Not assessed by UL Switching state 2 × LEDs, Yellow Vibration resistance 20 g (102000 Hz), EN 600068-2-6 Shock test EN 60068-2-27 Shock resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Process connection	G 3/4"
Pressure resistance 16 bar Protection class IP67 IP69K Not assessed by UL Switching state 2 × LEDs, Yellow Vibration resistance 20 g (102000 Hz), EN 600068-2-6 Shock test EN 60068-2-27 Shock resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Ambient temperature	-25+65 °C
Protection class IP67 IP69K Not assessed by UL Switching state 2 × LEDs, Yellow Vibration resistance 20 g (102000 Hz), EN 600068-2-6 Shock test EN 60068-2-27 Shock resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Storage temperature	-40+85 °C
IP69K Not assessed by UL	Pressure resistance	16 bar
Switching state 2 × LEDs, Yellow Vibration resistance 20 g (102000 Hz), EN 600068-2-6 Shock test EN 60068-2-27 Shock resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Protection class	
Vibration resistance 20 g (102000 Hz), EN 600068-2-6 Shock test EN 60068-2-27 Shock resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1		Not assessed by UL
Shock test EN 60068-2-27 Shock resistance 50 g (11 ms) EMV EN 61000-6-2:2019	Switching state	2 × LEDs, Yellow
Shock resistance 50 g (11 ms) EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Vibration resistance	20 g (102000 Hz), EN 600068-2-6
EMV EN 61000-6-2:2019 ETSI EN 301489-3 v.1.6.1	Shock test	EN 60068-2-27
ETSI EN 301489-3 v.1.6.1	Shock resistance	50 g (11 ms)
Approvals CE, ETSI, FCC, UL	EMV	
	Approvals	CE, ETSI, FCC, UL

Continuous Wave. Non-modulated continuous wave radars have the disadvantage that they cannot measure distances due to lack of time reference. Such a time reference for distance measurement of stationary objects can be generated by means of frequency modulation. Using this method, a signal is emitted which continually changes the frequency. A periodic, linear frequency which varies upwards and downwards is used to limit the frequency range and to simplify the signal evaluation. The factor for the rate of change df/dt remains constant. If an echo signal is received, then this has a runtime delay as with the pulse radar, and thus a different frequency that is proportional to the distance.





Accessories

Dimension drawing	Туре	ID	
M12×1 015	RKC4.4T-2/TEL	6625013	Connection cable, M12 female connector, straight, 4-pin, cable length: 2 m, jacket material: PVC, black; cULus approval
0 15 M12 x 1 26.5 32 	WKC4.4T-2/TEL	6625025	Connection cable, M12 female connector, angled, 4-pin, cable length: 2 m, jacket material: PVC, black; cULus approval
M12×1 0 15 5 14 0 15 14 14 M12×1 11.5 14 42 49.5	RKC4.4T-2-RSC4.4T/TEL	6625208	Extension cable, M12 female connector, straight, 4-pin to M12 male connector, straight, 4-pin, cable length: 2 m, jacket material: PVC, black; cULus approval

Accessories

Dimension drawing	Туре	ID	
	TBEN-S2-4IOL	6814024	Compact multiprotocol I/O module, 4 IO-Link Master 1.1 Class A, 4 universal PNP digital channels 0.5 A
	RR-6	100047726	Stainless steel radar reflector, optimized detection performance of an object, cathetus length: 60 mm, RadarCrossSection: 10 m² (cf. automobile), reliable object detection up to 6.5 m
	RR-12	100047727	Stainless steel radar reflector, optimized detection performance of an object, cathetus length: 120 mm, RadarCrossSection: 250 m² (cf. HGV), reliable object detection up to 15 m
	RR-20	100047728	Stainless steel radar reflector, optimized detection performance of an object, cathetus length: 200 mm, RadarCrossSection: 1115 m² (cf. ship), reliable object detection up to 25 m