Leuze

Product overview
2020/2021

The Sensor People

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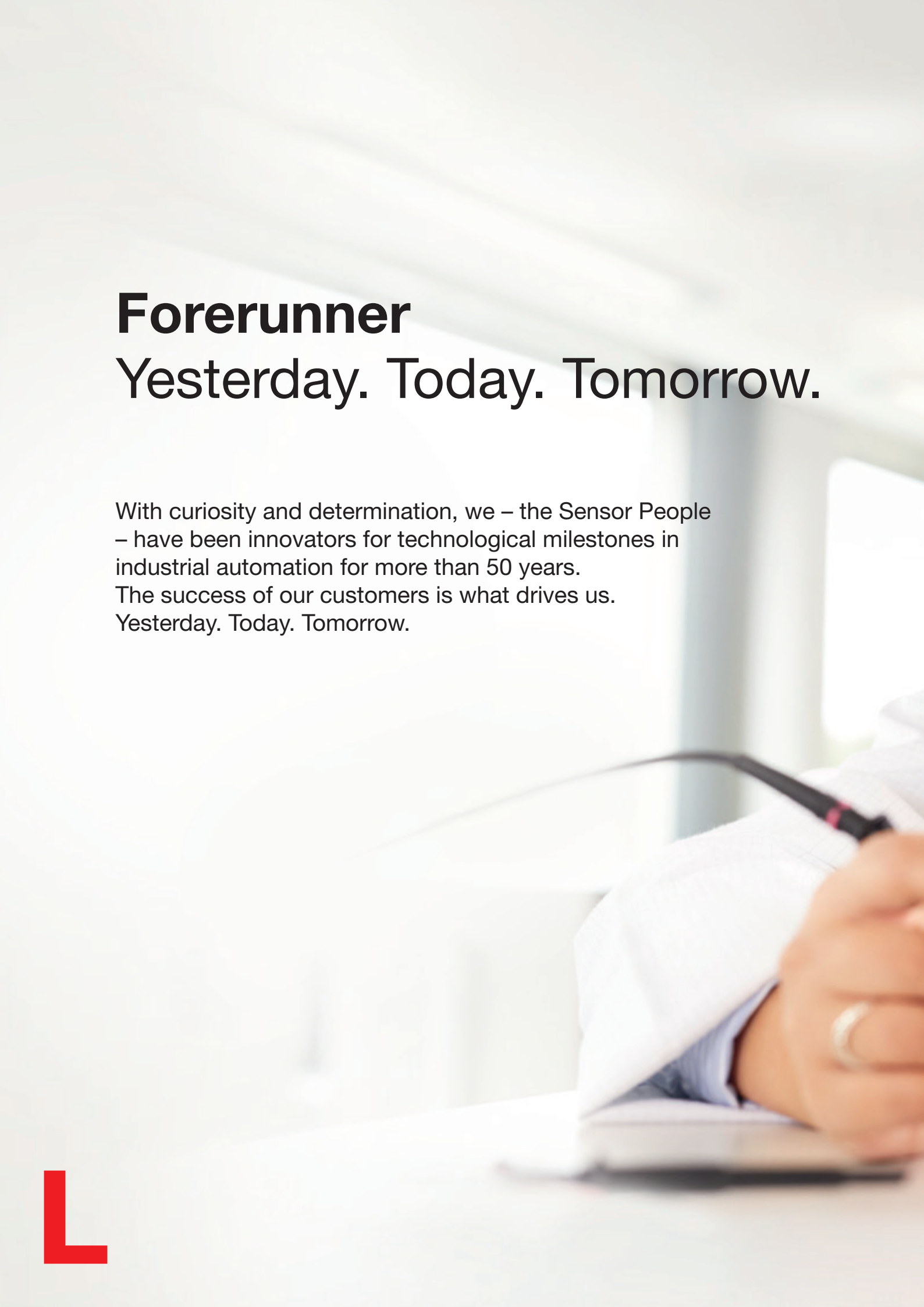
Forerunner
Yesterday. Today. Tomorrow.

With curiosity and determination, we – the Sensor People – have been innovators for technological milestones in industrial automation for more than 50 years.
The success of our customers is what drives us.
Yesterday. Today. Tomorrow.



Our company
Everything at a glance

In a constantly changing industry, we work together with our customers to find the best solution for their sensor applications: innovatively, precisely and efficiently.

Key figures

Foundation	1963
Company structure	GmbH + Co. KG, wholly family-owned
Executive management	Ulrich Balbach
Headquarters	Owen, Germany
Distribution companies	20
Production locations	5
Technological competence centers	3
Distributors	40
Employees	> 1,200

Product range

- Switching sensors
- Measuring sensors
- Products for safety at work
- Identification
- Data transmission systems
- Network and connection technology
- Industrial image processing
- Accessories

Focus industries

- Intralogistics
- Packaging industry
- Machine tools
- Automotive industry
- Laboratory automation

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Our Locations
At work for you around the world

Your success is our motivation. We therefore place great value on always being personally, quickly, and easily accessible to you. We produce on four continents, allowing us to offer you reliable product availability.

- Technological competence centers
- Production locations
- Distribution companies
- Distributors

Australia | Belgium | Brazil | China | Denmark/Sweden | France | Germany | Great Britain | Hong Kong | India
Italy | Mexico | the Netherlands | New Zealand | Singapore | South Korea | Spain | Switzerland | Turkey | USA/Canada

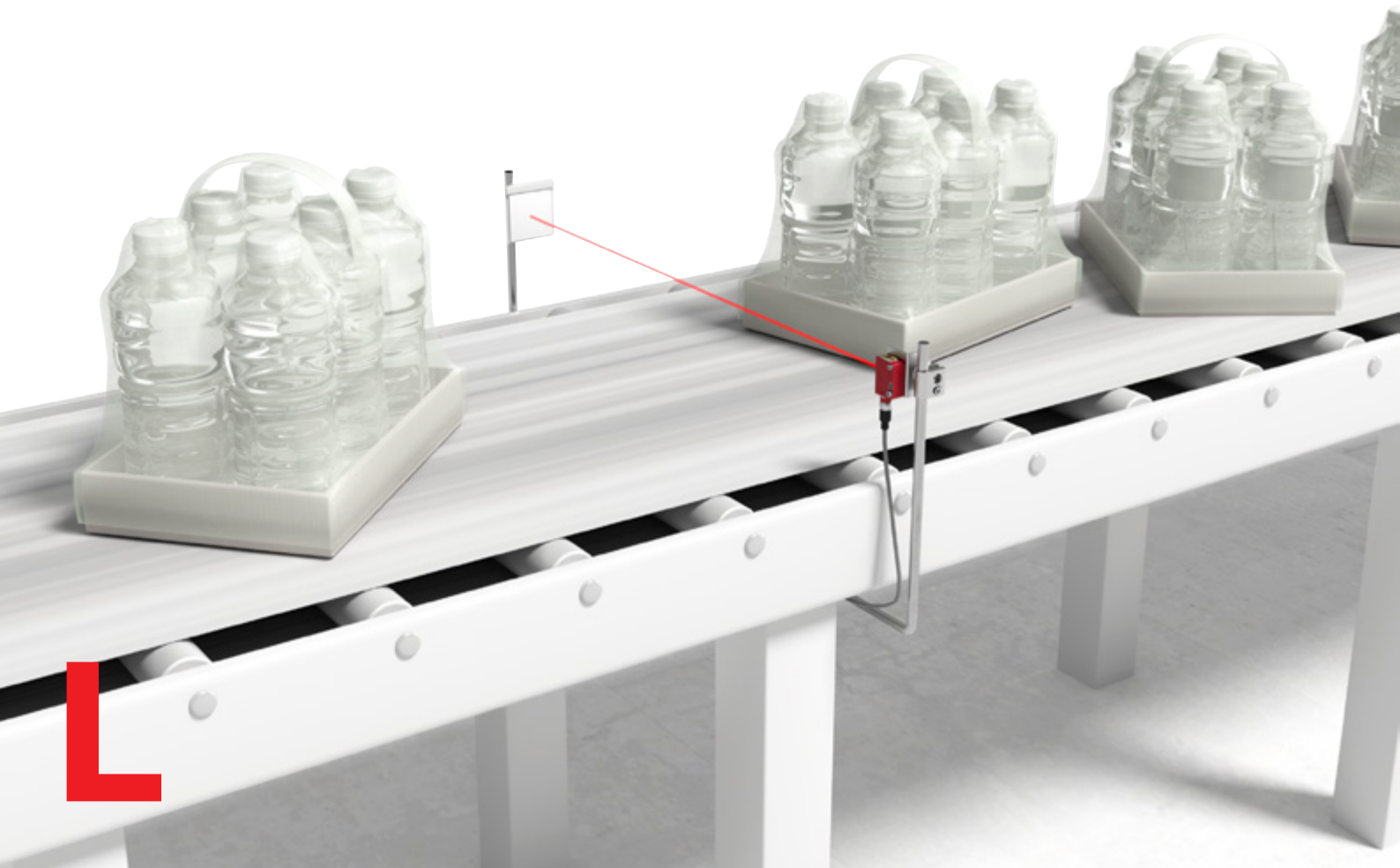
Switching sensors

Dependable switching:
All objects and packaging are detected stably and reliably

Using various operating principles and technologies, switching sensors detect objects reliably – at either the start or end point of the application.

We offer a variety of sensors that detect an object optoelectronically, with ultrasonics, inductively or capacitively and output a stable switching signal. We meet the diverse requirements from the production and packaging industry with a large number of different light spots, operating principles, designs and sizes.

The usability when aligning and adjusting the switching point is simple and intuitive for all models. The sensors output standardized switching signals, NPN/PNP as well as dual channel IO-Link data and can, thus, be integrated in all applications. Many series offer helpful additional functions to facilitate service intervals that are as long as possible.



Versatile miniature sensors: short response times, high degree of protection and new mounting bracket

With very long operating ranges, short response times and degrees of protection IP 67 and IP 69K, the 3C series sensors are suitable for applications in assembly, material flow and in the packaging field.

The series offers operating principles and light spot variants for the reliable detection of even transparent objects. The compact sensors are extremely robust and resistant against cleaning agents. This is verified by the ECOLAB certification as well as the highest degrees of protection.

There are two new mounting variants: an integrated M3 threaded sleeve for simple mounting without nuts as well as reinforced through holes.

3C series

- All operating principles available
- Autocollimation with automatic sensitivity readjustment (tracking) for the smallest differences
- Best performance in this size (11 × 34 × 18 mm)
- Range of models with many light spots; switching behavior appropriate for your application
- Degrees of protection IP 67 and IP 69K and ECOLAB certification
- Diffuse reflection sensor with remote function via IO-Link (according to Smart Sensor Profile) as well as 2 independent switching outputs

Photoel. sensors / diffuse sensors, cubic housing

	2 series Universal, micro	**3C series** Universal, mini	**23 series** Standard
Specifications			
Dimensions excl. connector, W × D × H	8 × 23 × 12 mm	11 × 32 × 17 mm	11 × 32 × 17 mm
Operating voltage	10–30 V DC	10–30 V DC	10–30 V DC
Switching outputs	PNP, NPN	Push-pull, PNP, NPN, IO-Link	PNP, NPN
Connection type	Cable, cable+M8 / M12	M8, cable, cable+M8 / M12	M8, cable, cable+M8 / M12
Degree of protection	IP 67	IP 67, IP 69K	IP 67
Certifications	CE cULus	CE CDRH cULus	CE cULus
Housing	Thermoelastic elastomer	Plastic	Plastic
Throughbeam photoelectric sensors			
Operating range*	0–2 m	0–10 m	0–8 m
Light source	Red light	Laser	Red light
Switching	Light, dark	Light, antivalent	PNP, NPN
Switching frequency	385 Hz	1,000 / 3,000 Hz	500 Hz
Retro-reflective photoelectric sensors			
Operating range*	0.07–4 m	0–7 / 0.02–5.5 / 0–3 m	0.1–4.5 m
Light source	Red light	Red light / infrared / laser (class 1)	Red light
Switching	Light, dark	Light, dark, antivalent	PNP, NPN
Switching frequency	700 Hz	1,000 / 1,500 / 3,000 Hz	500 Hz
Energetic diffuse sensor			
Operating range*			0...0.56 m
Light source			Red light
Switching			PNP, NPN
Switching frequency			500 Hz
Diffuse sensors with background suppression			
Operating range*	Permanently set to 15 mm, 30 mm, 50 mm	5–600 mm	0–400 mm
Light source	Red light	Red light / laser (class 1)	Red light
Switching	Light, dark	Light, antivalent	PNP, NPN
Switching frequency	700 Hz	1,000 / 3,000 Hz	1,000 Hz
Options			
Transparent media		X	
Protective sensors category 2/4			
Warning output		X	
Activation input		X	
Active ambient light suppression *A*²LS		X	
Properties			
	Pin-point LED | Powerful interference suppression | 2 inlaid metal sleeves | Sensor with a laser-like light spot | Polarized retro-reflective photoelectric sensor with glass optics	ECOLAB | 2 housings: through holes with metal sleeves or threaded sleeves | Sensor with different light-spot geometry and V-configuration | Laser variants | Teach-in | Bottle detection | Contrast sensors | Detection of labels on bottles | Devices with IO-Link communication interface	The diffuse sensor is intuitively operated via multiturn potentiometer | Indicator LEDs with all-round visibility | Switching output with either PNP or NPN design

* Typical operating range limit

5 series Standard	**28 series** Standard, multimount	**25C series** Universal	**15 series** Standard
14 × 33 × 20 mm	15 × 47 × 32 mm	15 × 43 × 30 mm	15 × 43 × 30 mm
10–30 V DC	10–30 V DC	10–30 V DC	10–30 V DC
PNP, NPN	PNP, NPN	PNP, NPN, push-pull	PNP, NPN
M8, cable, cable+M8 / M12	M12, cable, cable+M12	M8 / M8+snap / M12, cable, cable+M8 / M12	M12, cable, cable+M12
IP 67	IP 67	IP 67, IP 69K	IP 66, IP 67
CE c UL us	CE c UL us	CE CDRH c UL us	CE c UL us
Plastic	Plastic	Plastic	Plastic
0–15 m	0–15 m	0–30 m	0–30 m
Red light	Red light, infrared	Red light	Red light
Antivalent	Antivalent	Light, dark	Light, dark
500 Hz	500 Hz	1,500 Hz	500 Hz
0.02–6 m	0.02–6 m	0–10 / 0–12 / 0–25 m	0–8 / 0–10 m
Red light	Red light	Red light / laser	Red light
Antivalent	Antivalent	Light, dark, antivalent	Light, dark
500 Hz	500 Hz	2,500 Hz	500 Hz
0–1 m	0–0.85 m		
Red light / infrared	Red light		
Antivalent	Antivalent		
500 Hz	500 Hz		
0–400 mm		0–1,200 mm / 0–1,300 mm	0–1,000 mm
Red light		Red light / infrared	Red light / infrared
Light, dark		Light, dark, antivalent	Light, dark
1,000 Hz		1,000 Hz / 2,500 Hz	500 Hz
X		X	
		X (type 2)	
		X	
X	X	X	X
X	X	X	X
Simple mounting by means of integrated threaded sleeves | Flexible cable outlet to the rear or downward | Fast alignment through *bright*vision | Detection of semitransparent media | Teach variants available | Detection of empty bottles	Universal front- and plug-side M18-hole mounting option | Easy through-hole assembly with anti-rotation protection for mounting nuts on the housing | Fast alignment through *bright*vision	ECOLAB, M4 metal threaded sleeves, sensors with small and long light spot | Sensor for bay positioning / for the detection of broken containers | Focused light spot | Foreground suppression | High function reserve | For stretch-wrapped packages | Bottle detection | Laser variants | Teach-in | Dynamic reference diffuse sensor | Long-range sensor | IO-Link interface	Mechanically adjustable operating range | Sensitivity adjustment | Retro-reflective sensor with large function reserve / for stretch-wrapped containers

Photoel. sensors / diffuse sensors, cubic housing

	46C series Universal, long range	**49C series** Universal current	**55 series** Stainless steel, WASH DOWN design
Specifications			
Dimensions excl. connector, W × D × H	19 × 75 × 43 mm	31 × 110 × 56 mm	14 × 36 × 25 mm
Operating voltage	10–30 V DC	10–30 V DC / 20–250 V AC/DC	10–30 V DC
Switching outputs	PNP, NPN, push-pull	PNP, NPN, relay, MOSFET	Push-pull, PNP
Connection type	M12, cable, cable+M12	Cable, terminals	M8, cable+M12, cable
Degree of protection	IP 67, IP 69K	IP 67, IP 69K	IP 67, IP 69K
Certifications	CE CDRH c UL us	CE CDRH c UL us	CE CDRH c UL us
Housing	Plastic	Plastic	Stainless steel 316L
Throughbeam photoelectric sensors			
Operating range*	0–150 m	0–20 / 0–100 m	0–10 m
Light source	Red light / infrared	Red light / laser (class 2)	Red light
Switching	Light, dark, antivalent	Light, dark, antivalent	Antivalent
Switching frequency	25 / 150 / 500 Hz	1,500 / 2,800 Hz	1,000 Hz
Retro-reflective photoelectric sensors			
Operating range*	0.05–30 m	0–8 / 0–21 m	0–6 / 0–3 m
Light source	Red light / infrared	Red light / laser (class 1)	Red light / laser (class 1)
Switching	Light, dark, antivalent	Light, dark, antivalent	Antivalent
Switching frequency	25 / 150 / 500 Hz	1,500 / 2,800 Hz	1,000 / 2,000 Hz
Energetic diffuse sensor			
Operating range*			
Light source			
Switching			
Switching frequency			
Diffuse sensors with background suppression			
Operating range*	5–3,000 mm	5–3,000 mm	5–600 mm
Light source	Red light / infrared / red light laser (class 1/2)	Red light / infrared	Red light / infrared / laser (class 1)
Switching	Light, dark, antivalent	Light, dark, antivalent	Antivalent
Switching frequency	250 Hz	25 / 150 Hz	1,000 / 2,000 Hz
Options			
Transparent media			X
Protective sensors category 2/4	X		
Warning output	X	X	
Activation input	X	X	X
Active ambient light suppression ***A***²LS	X	X	X
Properties			
	Teach button | Retro-reflective photoelectric sensor with light-band for objects with openings / irregular shape | Detection of tubular bags on a conveyor belt | Can be used as muting sensor | Roller conveyor sensor | Anti-dust sensor | Parallel-operation photoelectric sensor | Extreme background suppression | Devices with IO-Link interface	Photoelectric sensors with a particularly high function reserve | Optional time function and optics heating | Terminal compartment accessible from front | Spring terminals	WASH-DOWN design | CleanProof+ | ECOLAB | Foil detection <20 µm | Bottle detection | Contrast sensors | Versions for Ex zone 2 and 22 | Model for detecting aqueous liquids in containers | Models with extra long light spot (XL) | Models with small light spot (S)

* Typical operating range limit

53 series Stainless steel, HYGIENE design	**18B series** Metal, detection of transparent objects	**8 series** Metal	**96 series** Metal, long range
14 × 54 × 20 mm	15 × 47 × 32.5 mm	15 × 48 × 38 mm	30 × 90 × 70 mm
10–30 V DC	10–30 V DC	10–30 V DC	18–30 V DC / 20–230 V AC/DC
Push-pull, PNP	PNP, NPN, analog	PNP, NPN, push-pull	PNP, NPN, push-pull, relay
M8, cable	M12, cable	M12, cable	M12, terminals
IP 67, IP 69K	IP 67, IP 69K	IP 67, IP 69K	IP 67, IP 69K
CE CDRH c UL us	CE c UL us	CE CDRH c UL us	CE CDRH c UL us
Stainless steel 316L	Metal	Metal, glass	Metal
0–10 m		0–20 / 0–100 m	0–39 / 0–150 m
Red light		Red light / laser (class 2)	Red light / infrared
Antivalent		Light, dark, antivalent	Light, dark, antivalent
1,000 Hz		1,500 / 2,800 Hz	500 Hz
0–5 / 0–3 m	0–6 m	0–8 / 0–21 m	0–28 / 0.1–18 m
Red light / laser (class 1)	Red light	Red light / laser (class 1)	Red light / infrared
Antivalent	Light, dark, antivalent	Light, dark, antivalent	Light, dark, antivalent
1,000 / 2,000 Hz	5,000 / 1,500 Hz	1,500 / 2,800 Hz	1,000 Hz
			30–700 / 20–1,200 mm
			Red light / infrared
			Light, antivalent
			1,000 Hz / 20 Hz
5–600 mm		5–400 mm	100–1,200 / 10–2,500 / 50–6,500 / 12,000 / 25,000 mm
Red light / infrared / laser (class 1)		Red light / infrared / laser (class 1/2)	Red light / infrared / red light laser (class 1/2) / infrared laser (class 1)
Antivalent		Light, antivalent	Light, dark, antivalent
1,000 / 2,000 Hz		1,000 / 1,000 / 2,000 Hz	300 / 10 Hz
X	X	X	X
			X
	X	X	X
X			X
X	X	X	X
HYGIENE design | CleanProof+ | ECOLAB, EHEDG | Foil detection <20 µm | Bottle detection | Model with extra long light spot for front edge detection | Models with small light spot	Bottle detection | Foil detection <20 µm | Target mark detection | Aligned optics | Tracking | EasyTune | User guidance | Trigger function with reduced signal jitter | IO-Link interface | Contrast sensors	Luminescence sensors | Foreground suppression | Turnable connector | Film detection | Bottle detection | ECOLAB	Optics heating | Switching delay | Up to 3 switching points | Deactivation | L/D switching | Mechanically adjustable operating range | Teach-in | Versions for Ex zones 2 and 22 / with window function / for collision protection / feed-through monitoring

Photoel. sensors / diffuse sensors, cylindrical housing

	412B series M12, cylindrical	**618 series** M18, cylindrical	**318(B) series, 328 series** M18, cylindrical
Specifications			
Dimensions excl. connector, W × D × H	M12 × 50 mm, M12 × 60 mm (with connector)	M18 × 46 mm, M18 × 60 mm	M18 × 46 mm, M18 × 60 mm
Operating voltage	10–30 V DC	10–30 V DC	10–30 V DC
Switching outputs	PNP, NPN	PNP, NPN, push-pull	PNP, NPN, push-pull
Connection type	M12, cable	M12, cable	M12, cable
Degree of protection	IP 67	IP 67	IP 67
Certifications	CE c UL us	CE	CE CDRH c UL us
Housing	Metal, stainless steel V2A	Full metal, stainless steel, plastic	Full metal, stainless steel, plastic
Throughbeam photoelectric sensors			
Operating range*	0–10 m / 0–50 m	0–15 / 0–23 / 0–120 m	0–15 / 0–23 / 0–120 m
Light source	Red light / laser (class 2)	Red light / infrared / laser (class 1)	Red light / infrared / laser (class 1)
Switching	Light, dark	Light, dark, antivalent	Light, dark, antivalent
Switching frequency	1,000 / 5,000 Hz	500 / 1,000 / 5,000 Hz	500 / 1,000 / 5,000 Hz
Retro-reflective photoelectric sensors			
Operating range*	0.02–1.8 m	0–7 / 0.02–6 / 0.1–15 m	0–7 / 0.02–6 / 0.1–15 m
Light source	Red light	Red light / laser (class 1)	Red light / laser (class 1)
Switching	Light, dark	Light, dark, antivalent	Light, dark, antivalent
Switching frequency	1,000 Hz	500 / 5,000 Hz	500 / 5,000 Hz
Energetic diffuse sensor			
Operating range*	0–540 mm	0–140 / 0–1,000 / 0–300 / 0–280 mm	0–140 / 0–1,000 / 0–300 / 0–280 mm
Light source	Red light	Red light / infrared / laser	Red light / infrared / laser
Switching	Light, dark	Light, dark, antivalent	Light, dark, antivalent
Switching frequency	1,000 Hz	500 / 1,000 / 5,000 Hz	500 / 1,000 / 5,000 Hz
Diffuse sensors with background suppression			
Operating range*		1–140 mm	1–140 mm
Light source		Red light	Red light
Switching		Antivalent	Antivalent
Switching frequency		1,000 Hz	1,000 Hz
Options			
Transparent media		X	X
Protective sensors category 2		X	X
Warning output			
Activation input		X	X
Deactivation input			X
Active ambient light suppression A^2LS		X	X
Properties			
	360° 4-hole LED for models with M12 connector	Bracket versions | Simple alignment with omni-mount | Embedded mounting option | Models with M18 stainless steel sleeve and full-metal version | Variant available with preset range and as label sensor	Bracket versions | Simple alignment with omni-mount | Embedded mounting option | Models with M18 stainless steel sleeve and full-metal version | Variant available with preset range and as label sensor

* Typical operating range limit

Long-range sensors

	25 LR series TOF, long range	**110 series** TOF, long range laser	**10 series** TOF, long range laser
Specifications			
Dimensions excl. connector, W × D × H	15 × 38.9 × 28.7 mm	50 × 23 × 50 mm	25 × 65 × 55 mm
Operating voltage	10–30 V DC	18–30 V DC	18–30 V DC
Switching outputs	PNP, NPN	Push-pull	Push-pull, IO-Link
Connection type	M12, cable	Turnable M12 connector	Cable+M12, cable, turnable M12 connector
Degree of protection	IP 67	IP 67, IP 69K	IP 67
Certifications	CE CDRH c UL US	CE c UL US	CE c UL US CDRH
Housing	Plastic	PMMA	Plastic
Diffuse sensors with background suppression			
Operating range*	50–3,500 mm	100–5,000 mm (WH) / 3,000 mm (BK)	50–8,000 mm / 25,000 mm
Light source	Infrared TOF (light propagation time measurement)	Laser, red, 655 nm	Red light laser (class 1)
Switching	Light, dark	Light	Light
Switching frequency	40 / 75 Hz	250 Hz	40 Hz
Options			
Transparent media			
Protective sensors category 2 / 4			
Warning output			X
Activation input	X	X	X
Active ambient light suppression ***A***²LS			X
Properties			
	Detection of objects with low diffuse reflection > 2% | 2 teachable switching points (TOF) | Line teach and deactivation | All devices with IO-Link interface for configuration (including adaptation to the application) and process data transfer | Very good fading | Operating range adjustment via IO-Link	All devices with IO-Link interface | Turnable M12 connector | 2 switching points | Small black-white error | High repeatability | Adjustment via teach buttons | Propagation time of the radiated light (TOF)	Turnable M12 connector | All devices with IO-Link interface | Light/dark switching via teach button | Window function | Adaptation to the application by means of configurable filters and gain values | Propagation time of the radiated light (TOF)

IS 203, 204, 205, 206
Miniature sensors,
cylindrical housing

Specifications	
Dimensions incl. connector, W × D × H	Ø 3.0: 22 mm Ø 4.0: 25 mm M5: 25–38 mm Ø 6.5: 35–65 mm
Type of installation	Embedded / non-embedded
Operating voltage	10–30 V DC
Operating range	1–3 mm
Switching outputs	PNP
Switching principle	NO, NC
Switching frequency	Up to 5,000 Hz
Connection type	M8, cable + M8, cable
Degree of protection	IP 67
Certifications	CE c UL US
Housing	Stainless steel (V2A)
Properties	
	Cylindrical miniature housing | Versions with increased operating range

IS 208, 212, 218, 230 Standard, cylindrical	**IS 208, 212, 218, 230** All stainless steel	**IS 255, 288** Miniature sensors, cubic housing	**IS 240, 244 / ISS 244** Standard, cubic
M8: 22–45 mm M12: 35–60 mm M18: 35–64 mm M30: 40.6–73.5 mm	M8: 45–60 mm M12: 50–60 mm M18: 51–63.5 mm M30: 50–63.5 mm	5 × 5 × 25 mm 8 × 8 × 40 mm 8 × 8 × 59 mm	12 × 40 × 26 mm 40 × 40 × 67 mm 40 × 40 × 118 mm
Embedded / non-embedded	Embedded / non-embedded	Embedded	Embedded / non-embedded
10–30 V DC	10–30 V DC	10–30 V DC	10–30 V DC
2–40 mm	2–40 mm	1.5–3 mm	4–40 mm
PNP, NPN	PNP, NPN	PNP, NPN	PNP, NPN
NO, NC, NO + NC (antivalent)	NO, NC	NO, NC	NO + NC (antivalent)
Up to 5,000 Hz	Up to 600 Hz	Up to 5,000 Hz	Up to 1,400 Hz
M12, cable + M12, cable	M8, M12, cable	M8, cable + M8, cable	M8, M12, terminal, cable
IP 67	IP 67, IP 68, IP 69 K	IP 67	IP 67, IP 68, IP 69 K
CE c UL us	CE c UL us	CE c UL us	CE c UL us
Metal	All stainless steel (V2A & V4A)	Metal	Plastic
Different versions available: | Short housing design | Increased range | AC/DC device versions | Antivalent switching output	Full stainless steel housing from a single piece (V2A & V4A) | Resistant against vibration and pressure shocks | Mechanically resistant against impacts on the active surface | Also available as a model with 316L stainless steel (ECOLAB) suitable for use in hygienic applications | Correction factor 1 (material-independent detection)	Cubic miniature housing | Versions with increased operating range	Bright status display | Antivalent switching outputs (NO+NC) | Increased ranges | M12 plug, turnable 270° and thus suitable even for angled connection cables | 360° visibility through 4-way LED indicator on the sensor head

Capacitive sensors

	LCS-1 Capacitive sensors, cylindrical	**LCS-1** Capacitive sensors, cubic	**LCS-2** Capacitive sensors, cylindrical
Specifications			
Dimensions	M12: 53–75 mm M18: 73–88.5 mm M30: 66.5–79 mm / 87.3 mm	54 × 20.3 × 5.5 mm 40 × 40 × 10 mm	M12: 55–68 mm M18: 70–85 mm M30: 85–98 mm
Type of installation	Embedded / non-embedded	Embedded	Embedded / non-embedded
Operating voltage	10–30 V DC / 12–35 V DC	10–30 V DC	10–30 V DC
Operating range	1–30 mm	1–20 mm	1–30 mm
Switching outputs	PNP, NPN	PNP, NPN	PNP, NPN
Switching principle	NO (make-contact), NC (break-contact) partially reversible	NO (make-contact), NC (break-contact)	NO (make-contact), NC (break-contact)
Switching frequency	100 Hz (10 Hz with IO-Link)	100 Hz	100 Hz
Connection type	M12 connector / PUR cable 2 m / PTFE cable 2 m	M12 connector / PUR cable 2 m / PUR cable 0.3 m	M12 connector / PUR cable 2 m
Degree of protection	IP 67	IP 67	IP 67
Certifications	CE c UL us	CE c UL us	CE
Housing	Metal / plastic / Teflon (PTFE)	Plastic	Metal / plastic
IO-Link	M18 and M30 version		
Properties			
	Adjustable switching distances | Versions with potentiometer or teach buttons | Models with chemical-resistant PTFE housing | IO-Link interface	Switching distances adjustable by means of potentiometer | Compact and flat design	Adjustable switching distances | Versions with potentiometer

Leuze

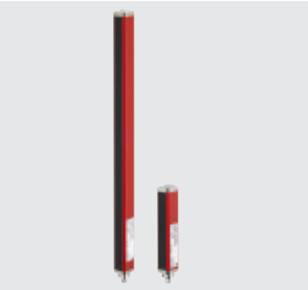
Fiber optic sensors / ultrasonic sensors

	LV46x Fiber optic amplifiers	**GF** Glass fiber optics
Specifications		
Dimensions excl. connector, W × D × H		Ø 4 × 250 / 500 / 1,000 / 3,000 / 5,000 mm
Operating voltage	10 – 30 V DC	
Switching outputs	PNP, NPN, IO-Link	
Connection type	M8, cable, cable+M8, able+M12	Ø 2.2 plugged
Degree of protection	IP 65	IP 65
Certifications	CE	CE
Housing	Plastic	Silicone, brass, stainless steel
Throughbeam photoelectric sensors		
Operating range*		0 – 450 mm
Light source	Red light, infrared	Red light , infrared (with LV46x)
Switching	Light, dark	
Switching frequency	250 Hz ... 50 kHz	
Retro-reflective photoelectric sensors		
Operating range*		
Light source		
Switching		
Switching frequency		
Energetic diffuse sensor		
Operating range*		0 – 80 mm
Light source	Red light, infrared	Red light , infrared (with LV46x)
Switching	Light, dark	
Switching frequency	250 Hz ... 50 kHz	
Diffuse sensors with background suppression		
Operating range*		
Light source		
Switching		
Switching frequency		
Options		
Repeatability		
Switching hysteresis		
Resolution		
Laser class		
Properties		
	For glass and plastic fiber optics | High-speed or long-range amplifier | Teach-in | Sensitivity adjustment | Time functions | Multifunction input | IO-Link interface	Straight or lateral optical outlet | Multiple fiber core | Various ancillary lenses | Heat resistant, highly precise, oil and chemical resistant

* Typical operating range limit

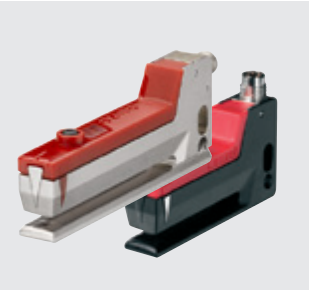
KF Plastic fiber optics	**USS 18, 420** Ultrasonic sensors, cubic	**300 series** Ultrasonic sensors, cylindrical	**400 series** Ultrasonic sensors, cylindrical
Ø 2.2 × 500 / 2,055 mm	15 × 33 × 50 mm 20 × 15 × 42 mm	M18 × 46.3 / 74.3 / 77.6 mm M30 × 88.8 mm	M12 × 70 mm M18 × 51.8 / 75 / 82.8 mm M30 × 75 / 142.5 mm
	10–30 V DC / 12–30 V DC	10–30 V DC / 12–30 V DC	10–30 V DC / 12–30 V DC
	PNP, NPN	PNP, NPN	PNP, NPN
Ø 2.2 plugged	M8, M12	M12	M8, M12, cable
	CE	CE c UL us	CE c UL us
Plastic, models with bending protection	Metal, plastic	Plastic	Metal, plastic
0–1,700 mm	0–650 mm		0–6,000 mm
Red light , infrared (with LV46x)	Ultrasonics (300 kHz)		Ultrasonics (200 / 310 kHz)
	NO/NC (object detected)		
	100 Hz		7 / 8 Hz
	0–400 mm	0–300, 0–800, 0–400, 0–1,600 mm	
	Ultrasonics (290 kHz)	Ultrasonics (300 / 230 kHz)	
	NC (object detected)	NC (object detected)	
	20 Hz	8 / 5 / 1 Hz	
0–270 mm			
Red light , infrared (with LV46x)			
	10–200 (100–1,000) mm	40–300, 50–400, 80–1,200, 150–1,600, 250–3,500, 350–6,000 mm	10–200, 40–400, 25–400, 150–1,300, 300–3,000, 600–6,000 mm
	Ultrasonics (240–400 kHz)	Ultrasonics (200 / 230 / 300 kHz)	Ultrasonics (200 / 310 kHz)
	NO/NC (object detected)	NO/NC (object detected)	NO/NC (object detected)
	10 / 50 Hz	1 / 2 / 5 / 8 / 10 Hz	7 / 8 / 20 / 50 Hz
Straight or lateral optical outlet | Various ancillary lenses | Arrays, V-arrangement | Various types of fiber structure, e.g., highly flexible, coax | Highly precise or heat resistant, models with bending protection	Configurable via PC | Various opening angles and sound lobes | 1 or 2 switching outputs	Configurable via PC | Teach-in | Design with angle head | 1 or 2 switching outputs | Synchronization and multiplex function | Temperature compensation	Configurable via PC | Teach-in | Design with angle head | 1 or 2 switching outputs | IO-Link interface | Synchronization and multiplex function | Temperature compensation

Light curtains

	CSL 505 Switching	**CSL 710** Switching	**CSR 780** Switching
			
Specifications			
Function	Throughbeam principle	Throughbeam principle	Reflection principle
Dimensions excl. connector, W × D × H	10 × 27 × 150 … 3,180 mm 12 × 58 × 120 … 480 mm	29 × 35 × 168 … 2,968 mm	28.6 × 34.2 × 142.8 … 478.8 mm
Operating voltage	24 V DC	18 – 30 V DC	18 – 30 V DC
Outputs	2x outputs / push-pull	4 I/Os (configurable) + IO-Link	Push-pull
Connection type	M8	M12	M12
Degree of protection	IP 65	IP 65	IP 65
Certifications	CE c SP us	CE c SP us	CE c UL us
Operating range*	Up to 5 m	Up to 3.5 … 7 m	700 mm
Light source	Infrared	Infrared	Infrared
Cycle time	1 ms per beam	30 µs per beam	> 2 ms (depending on measurement field length)
Measurement field length	35 – 3,100 mm	160 – 2,960 mm	96 / 432 mm
Resolution	5**, 12.5, 25, 50, 100 mm	5, 10, 20, 40 mm	1 mm
Number of beams	Max. 160	Max. 592	
Operation	Autocalibration, configuration software, configuration by means of pin assignment	Control buttons on foil display, 5 languages, configuration software	Status displays for detection / interruption of first and last beam
Properties			
	2 switching ranges | Narrow profile | Through holes | Suitable for low-temperature applications down to –30 °C	8 switching ranges | Simple area splitting | 4 switching outputs + 1 IO-Link | Robust metal housing | Extremely fast cycle time | Display for diagnosis and alignment | Suitable for low-temperature applications down to –30 °C	Detection of extremely small objects (1 mm) | Warning output for contamination display | High object speed (< 3.5 m/sec for 1 × 10 × 10 mm) | Robust metal housing | Optimal setting using reference teach, indicator LED | Reflective tape as reflector

* Guaranteed operating range
** 5 mm resolution only with 58 mm housing depth

Forked sensors

	(I)GSU 14D / GSU 06 GK 14 Label detection, ultrasonics / capacitive	**(I)GS 63B, 61** Label detection, optical	**GS (L) 04** Optical
			
Specifications			
Operating voltage	10–30 V DC / 12–30 V DC	10–30 V DC / 24 V DC	10–30 V DC
Switching outputs	Push-pull	Push-pull	PNP, NPN
Connection type	M8, M12, cable	M8, cable, cable+M12	M8
Degree of protection	IP 62 / IP 65	IP 65	IP 65
Certifications	CE c UL US*1	CE c UL US*2	CE CDRH c UL US
Housing	Metal	Metal, plastic	Metal
Throughbeam sensors			
Mouth width	4 mm; 1 mm	3 mm	20 / 30 / 50 / 80 / 120 / 220 mm
Light source	Ultrasonics	Infrared	Red light / laser (class 1)
Switching	Light, dark, antivalent	Light, dark, antivalent	Light, dark
Switching frequency	Up to 5,000 Hz	10,000 Hz	1,500 / 5,000 Hz
Options			
Operation	Teach	Teach / potentiometer	Potentiometer
Warning output	X	X	
Properties			
	Detection of transparent media and paper labels | Automatic tracking of the switching threshold ALC function | Teach-in | Model with mechanical tape guide | Splice inspection | Models with easy-teach process | Models with easy-tune for manual adaptation of the switching threshold	Detection of paper labels | Automatic tracking of the switching threshold ALC function | Storage of up to 10 teach values in the sensor | Removable operating head on potentiometer version	Detection of small objects | Light/dark switching on device

*1 (I)GSU 14D and GSU 06 only
*2 (I)GS 63, GS 61 only

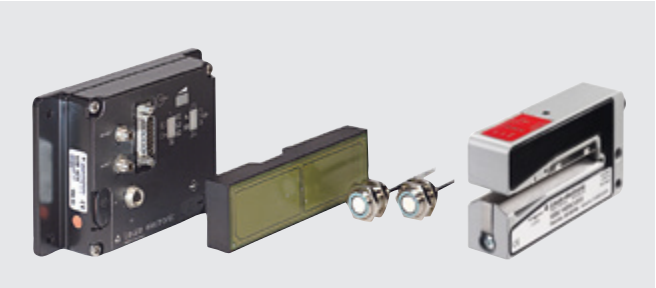
Special sensors

	KRT 20, 21, 18B, 55, 3B Contrast sensors	**CRT 20B, 448** Color sensors	**LRT 8** Luminescence sensors
Specifications			
Function	Contrast distinction	Color evaluation	Luminescence detection
Dimensions excl. connector, W × D × H	31 × 53 × 80 mm 15 × 47 × 33 mm 14 × 36 × 25 mm 11 × 32 × 17 mm	30 × 82 × 53 mm 17 × 46 × 50 mm	15 × 48 × 38 mm
Operating voltage	10–30 V DC / 12–30 V DC	10–30 V DC / 24 V DC / 12–28 V DC	10–30 V DC
Outputs	PNP, NPN, push-pull Analog, IO-Link	1 × PNP / 4 × PNP or 1 × NPN / 4 × NPN or 3 × PNP / 3 × NPN	PNP, NPN
Connection type	M12, M8, cable+M8, cable, cable+M12	M12	M12
Degree of protection	IP 67, IP 69K	IP 67	IP 67
Certifications	CE c UL us	CE c UL us	CE c UL us
Operating range*	13–80 mm	12 mm 60 mm 32 mm	0–400 mm
Light source	LED, laser (class 1)	LED	LED
Switching frequency	2,500–50,000 Hz	6,000 / 1,500 / 500 Hz	1,500 Hz
Transmitter color	RGB / white / red laser	RGB / white	UV / blue
Light beam gate	Lateral or frontal	Lateral or frontal	Front
Light spot shape	Round / rectangular	Round / rectangular	Round
Light spot orientation	Lengthwise, sideways	Vertical	
Operation	Teach-in, EasyTune, IO-Link, potentiometer	Teach-in	Potentiometer
Properties			
	Tracking function for faded marks | Display for optimum adaptation to the application | Automatic luster suppression | Temperature compensation | Pulse stretching | Light/dark switching | Reversible switching threshold | ECOLAB | IO-Link process data | IO-Link configuration | IO-Link diagnosis | Additional function for weak contrasts	Small construction | Glass optics | Turnable M12 connector | ECOLAB	Small construction | Sensitivity adjustment | ECOLAB | Detection of any kind of luminescence | Detection of white paper | Detection of printed luminescence marks | Detection of luminescence marks on wood

* Typical operating range limit

Double sheet monitoring / splice detection

DB 12B, 112B, 14B
Double sheet monitoring
VSU 12 / IGSU 14D
Splice detection



Description

The double-sheet monitoring systems reliably prevent the infeed of multiple sheets. This helps reliably prevent damage and the creation of scrap in machines that process paper and cardboard stacks.
The systems operate on the basis of various physical principles and are thus able to cover nearly the entire range of applications.
Splice detections reliably detect the spice on paper or plastic webs in paper- or foil-processing machines.

Typical applications

Double sheet detection of
- Paper sheets
- Cardboard sheets
- Films

Splice detection, e.g. on
- Paper rolls
- Paper and plastic webs

Technical information

Physical principles:
- Capacitive
- Ultrasonics (Ø 12 mm or 18 mm, short construction)

Working ranges:
- From 20 g/m² … 1,200 g/m² (cardboard thickness 2 mm)
- Detection of 1/2 or 2/3 plies
- Outputs for single or double sheets
- Configuration facility

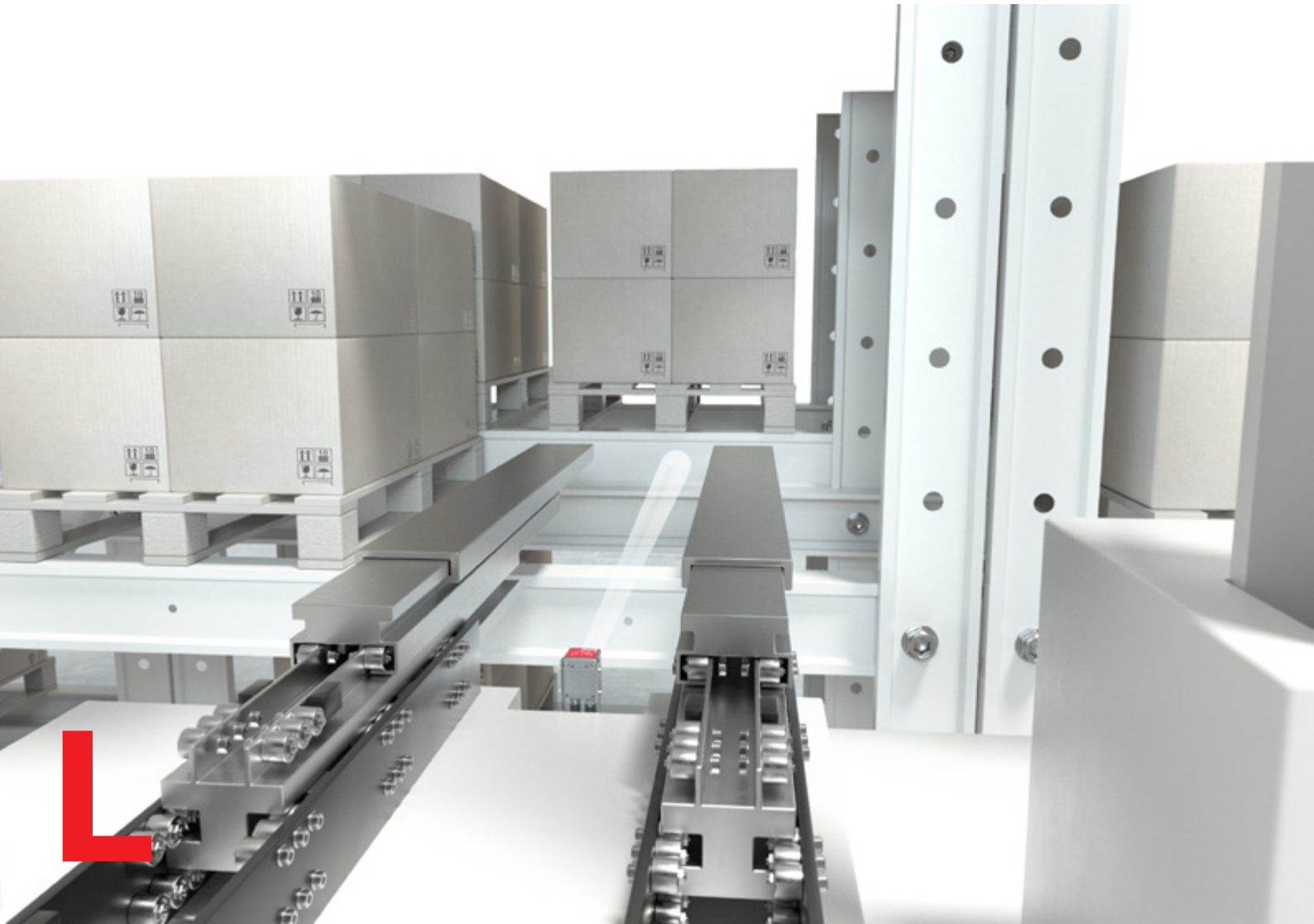
Models:
- Individual components (M12, M18)
- Compact fork designs

Measuring sensors

Intelligent monitoring and control through measuring sensors

Measuring sensors can actively check distances, position system parts and monitor other parameters in order to intelligently and independently initiate actions and, e.g., intervene in processes for control purposes.

We offer a large selection of different sensor technologies and designs that you can use to find solutions to measuring applications. Various powerful technologies facilitate optimum adaptation of our measuring sensors to a wide range of application requirements. Depending on the application, various communication interfaces are also available, such as IO-Link, bus interfaces or Ethernet-based interfaces.



Forward-looking compartment fine positioning with camera-based positioning system

The camera-based IPS 200i and IPS 400i sensors are for the compartment fine positioning of the chassis and lifting unit of the high-bay storage device in front of single- or double-depth shelf compartments.

Any deviations from the target reference position that occur during absolute positioning are thereby detected. The reference position is defined by simple bore holes or reflectors in the steel profiles in the shelf compartments. If the bore hole is located in the working range of the sensor, it delivers the current position relative to the reference position via the integrated Ethernet TCP/IP or PROFINET interface or via 4 digital switching outputs. When the current absolute and reference positions match, the ideal positioning of the high-bay storage device is reached.

Smallest size, simple operation, configuration via the integrated web server or directly on the sensor via configuration codes are just a few of the highlights of this device.

IPS 200*i* / 400*i* series

- Extremely small, camera-based positioning sensor
- Simple commissioning through printed configuration codes located directly on the device
- Fault-free use for a working range of up to 2,400 mm
- With Ethernet and PROFINET

Distance sensors

	ODSL 8 Optical distance sensors	**ODS 9** Optical distance sensors	**ODS 10** Optical distance sensors
Specifications			
Function	Distance measurement, optical	Distance measurement, optical	Distance measurement, optical
Dimensions excl. connector, W × D × H	15 × 48 × 38 mm	21 × 50 × 50 mm	25 × 65 × 55 mm
Operating voltage	18 – 30 V DC	18 – 30 V DC (analog, IO-Link)	18 – 30 V DC (analog, IO-Link)
Outputs	4 – 20 mA 1 – 10 V 2 × push-pull	4 – 20 mA 1 – 10 V, 0 – 10 V RS 232 / RS 485 Push-pull IO-Link	4 – 20 mA 1 – 10 V, 0 – 10 V Push-pull IO-Link
Connection type	M12	M12	M12
Degree of protection	IP 67, IP 69K	IP 67	IP 67
Certifications	CE CDRH c UL us ECOLAB	CE CDRH c UL us	CE CDRH c UL us
Measurement range	20 – 500 mm	50 – 650 mm	50 – 3,500 mm 50 – 8,000 mm (90 % diffuse reflection) 100 – 25,000 mm on reflective tape
Measurement principle	Optical / LED / laser (class 2)	Optical / laser (class 1, 2)	Optical / laser (class 1)
Measurement time	2 – 7 ms	2 ms	3,4 – 1,020 ms (adjustable)
Ultrasonic frequency			
Resolution	0.03 – 0.5 mm	0.01 – 0.5 mm	1 mm
Operation	Teach-in Potentiometer	Teach-in Control buttons on foil display or Sensor Studio	Control buttons on foil display or Sensor Studio
Properties			
	Compact metal housing | Turnable M12 connector | Triangulation measurement	Display for measured value display and configuration | Turnable M12 connector | Triangulation measurement | Supports the IO-Link smart sensor profile	Display for measured value display and configuration | Turnable M12 connector | All devices with IO-Link interface | Propagation time measurement (TOF)

ODS 110 Optical distance sensors	**ODSL 30** Optical distance sensors	**ODSL 96B** Optical distance sensors	**300, 400 series** Measuring ultrasonic sensors
Distance measurement, optical	Distance measurement, optical	Distance measurement, optical	Distance measurement, ultrasonics
50 × 23 × 50 mm	79 × 69 × 149 mm	30 × 90 × 70 mm	M18 × 46.3 / 51.8 / 74.3 / 75 / 77.6 / 82.8 mm M30 × 75 / 88.8 / 142.5mm
18 – 30 V DC (analog)	10 – 30 V DC 18 – 30 V DC (analog)	10 – 30 V DC 18 – 30 V DC (analog, IO-Link)	10 – 30 V DC 12 – 30 V DC
4 – 20 mA 1 – 10 V 1x push-pull	4 – 20 mA 1 – 10 V RS 232 / RS 485 1 × PNP, 2 × PNP, 3 × PNP	4 – 20 mA 1 – 10 V, 0 – 10 V RS 232 / RS 485 Push-pull IO-Link	PNP (NPN)
M12	M12, cable	M12, cable	M12
IP 67	IP 67	IP 67, IP 69K	IP 67
CE c UL us	CE CDRH c UL us	CE CDRH c UL us ECOLAB	CE c UL us
100 – 3,000 mm 100 – 5,000 mm (90 % diffuse reflection)	200 – 65,000 mm	60 – 25,000 mm	25 – 400 / 50 – 400 / 80 – 1,200 / 150 – 1,300 / 250 – 3,500 / 300 – 3,000 / 350 – 6,000 / 600 – 6,000 mm
Optical / laser (class 1)	Optical / laser (class 2)	Optical / LED / laser (class 1, 2)	Ultrasonics
4 ms	30 – 100 ms	1 – 100 ms	0.1 – 1 s
			200 kHz / 310 kHz
1 mm	1 mm	0.1 – 3 mm	1 mm
Teach-in or Sensor Studio	Teach-in Display	Teach-in Configuration software Display	Teach-In IO-Link
All devices with IO-Link interface | Turnable M12 connector | Adjustment via teach button | Propagation time measurement (TOF)	Metal housing | Display for measured value display and configuration | M12 connector | Ex-devices are also available | Phase measurement	Robust metal housing | Display for measured value display and configuration | M12 connector | Ex devices are also available | Triangulation measurement | Propagation time measurement (TOF) | Phase measurement	3/5 operating modes | Temperature-compensated | Metal/plastic housing | Small dead zone

Sensors for positioning

	AMS 300i Optical laser distance sensors	**BPS 8** Bar code positioning systems	**BPS 300i** Bar code positioning systems
Specifications			
Function	Distance measurement, optical	Position detection, optical	Position detection, optical
Operating range	40 / 120 / 200 / 300 m	10,000 m	10,000 m
Working range		60 … 120 mm, 80 … 140 mm	50 … 170 mm
Interfaces	**Integrated:** PROFIBUS and SSI PROFINET PROFINET and SSI DeviceNet EtherCAT EtherNet/IP CANopen Ethernet TCP/IP, UDP Interbus-S RS 232, RS 422, RS 485 SSI	**Integrated:** RS 232	**Integrated:** PROFINET EtherCAT PROFIBUS SSI RS 422 RS 232 RS 485
Connectivity	Via the interfaces mentioned above	**With MA 200i connection unit** PROFINET IO/RT, PROFIBUS, Ethernet TCP/IP, UDP, IP, EtherCAT, DeviceNet, CANopen	
Functional principle	Against reflector	Against bar code tape	Against bar code tape
Measurement value output	1.7 ms	3.3 ms	1 ms
Reproducibility	±0.9 / 1.5 / 2.1 / 3 mm (3 sigma)	±1 mm (3 sigma)	±0.15 mm (3 sigma)
Accuracy	±2 / 2 / 3 / 5 mm		
Degree of protection	IP 65	IP 67	IP 65
Light source	Red light laser (class 2)	Red light laser (class 2)	Red light laser (class 1, 2)
Supply voltage	18–30 V DC	5 V DC (24 V DC via MA 8-01)	18–30 V DC
Operating temperature	–5 °C … +50 °C (–30 °C … +50 °C with heating)	0 °C … +40 °C	–5 °C … +50 °C (–35 °C … +50 °C with heating)
Options	Speed measurement and monitoring	Customer-specific configuration facility	Speed measurement and monitoring
Certifications	CE CDRH c UL us	CE CDRH c UL us	CE CDRH c UL us
Properties			
	Absolute measurement system with very high accuracy, tested by the Physikalisch Technische Bundesanstalt (German Metrology Institute) | Simultaneous use of the PROFIBUS and SSI; alternatively, PROFINET and SSI interface | Easy programming via extensive configuration file | Optionally with heating | Multiple language menu-driven display | Heatable reflectors available as accessories	Distance measurements of up to 10,000 m, also for curves, gradients and track switches | Curve-going, horizontally and vertically | Compact metal housing | Turnable M12 connector | Large selection of different protocols via external MA 200i connection units	Positioning on curves, gradients and track switches | Curve-going, horizontally and vertically | Metal housing | 3 selectable connection systems | Fast, secure and position-neutral installation using special mounting device | Extensive diagnostic options | Comfortable programming via GSDML/GSD or ESI files | Optionally with heating or display

3D sensors / forked sensors

	LPS 36, 36 HI **LES 36, 36 HI** **LRS 36** Light section sensors	**ROD 4 (plus)** Measuring laser scanner	**GS 754B** CCD forked sensors
Specifications			
Function	Distance measurement, light section, optical	Distance measurement, scanner, optical	Edge/diameter measurement, optical
Dimensions excl. connector, W × D × H	56 × 74 × 160 mm	140 × 148 × 133 mm 141 × 167 × 168 mm	19.4 × 81.5 × 91 mm 20 × 155 × 91.5 mm
Operating voltage	18–30 V DC	24 V DC	10–30 V DC (digital) 18–30 V DC (analog)
Outputs	4–20 mA 1–10 V Ethernet 4 × push-pull PROFIBUS	Ethernet / RS 232 / RS 422 4 × PNP, 8 reversible detection field pairs	2 × 4–20 mA 2 × 0–10 V RS 232 / RS 422 / RS 485 1 × PNP, 2 × PNP
Connection type	M12	Sub-D, M12, M16	M12
Degree of protection	IP 67	IP 65	IP 67
Certifications	CE CDRH c UL us	CE CDRH c UL us	CE c UL us
Operating range*	200–800 / 200–600 mm	0–65 m	
Measurement principle	Optical / laser (class 2M)	Optical / laser (class 1)	Optical / LED
Measurement time	10 ms	20–40 ms/scan	Min. 2.5 ms
Measurement field width / Scanning angle	Max. 600 mm / max. 140 mm	0.36°	25 mm
Resolution	0.1–6 mm	5 mm	14 µm
Mouth width			27 mm / 98 mm
Mouth depth		7	42 mm
Number of inspection tasks	16	7	5
Operation	Configuration software Display	Configuration software	Terminal program via RS 232 interface
Properties			
	LPS 36: light section sensor for 2D/3D object measurement | LPS 36 HI: highly precise with a resolution of 0.1 mm | LES 36: light section sensor for width/height and position measurement | LRS 36: light section sensor for object detection in up to 16 detection fields | Alignment aid with OLED display; inputs: activation, cascading, trigger | Optional: encoder port	Laser scanners for object measurement and detection | Version with 20 ms/scan (50 Hz) | Version with 40 ms/scan (25 Hz) | Contamination suppression | Optionally with heating	Detection of transparent media | Foil detection > 0.1 mm | Turnable M12 connector | Wide-ranging evaluation functions | Perfect for thread and fiber measurement

* Guaranteed operating range

Sensors for compartment fine positioning

	IPS 200i Sensors for positioning	**IPS 400i** Sensors for positioning
Typical applications		
Compartment fine positioning	Single compartment depth	Double compartment depth
Sensor / cameras	CMOS (Global Shutter)	CMOS (Global Shutter)
Resolution (pixel)	1,280 × 960	1,280 × 960
Focal point	Reading distance 100 … 600 mm Marker dependent	Reading distance 250 – 2,400 mm Marker-dependent
Interface	**Integrated:** Ethernet TCP/IP, UDP PROFINET IO/RT	**Integrated:** Ethernet TCP/IP, UDP PROFINET IO/RT
Digital inputs/outputs	3x IN; 5x OUT	3x IN; 5x OUT
Optional	Cables, mounting devices, reflectors, heating model to –30°C	Cables, mounting devices, reflectors, heating model to –30°C, external illumination
Number of test routines	8	8
Configuration / Operating system	Web-based configuration tool (webConfig tool) XML commands; 2x operational controls	Web-based configuration tool (webConfig tool) XML commands; 2x operational controls
Options	Configuration on the device via configuration codes	Configuration on the device via configuration codes
Dimensions, W × H × D	43 × 61 × 44 mm	43 × 61 × 44 mm
Certifications	CE c UL us	CE c UL us
Properties		
	Time savings through fast commissioning via web-based configuration tool or printed configuration codes | Innovative alignment system via feedback LEDs simplifies alignment | One device for the entire region of interest from 100–600 mm | Quality score enables the early detection of a deterioration in reading performance | Can be used flexibly thanks to high-performance, infrared LED illumination that is independent of ambient light | Model with integrated heating for use to –30°C	Time savings through fast commissioning via web-based configuration tool or printed configuration codes | Innovative alignment system via feedback LEDs simplifies alignment | Quality score enables the early detection of a deterioration in reading performance | One device for double-depth working range from 250 – 2,400 mm | Can be used flexibly thanks to high-performance, infrared LED illumination that is independent of ambient light | Model with integrated heating for use to –30°C

Light curtains/ volume measurement system

	CML 700i Measuring	**CML 720i EX** Measuring	**CMS 700i** Measuring
Specifications			
Function	Size / contour detection, optical	Size / contour detection, optical	Size / contour detection, optical
Dimensions excl. connector, W × D × H	29 × 35 × 168 … 2,968 mm	29 × 35 × 168 … 2,968 mm	Dependent on the system configuration
Operating voltage	18 – 30 V DC	18 – 30 V DC	230 V AC
Outputs	Analog, CANopen, IO-Link, PROFIBUS PROFINET RS 485 (MODBUS)	CANopen, IO-Link, 2 to 4 I/Os (configurable)	4 I/Os , Ethernet TCP/IP, PROFINET
Connection type	M12	M12	M12 and Harting
Degree of protection	IP 65	IP 54	IP 54 switch cabinet / IP 65 light curtain
Certifications	CE c SP us	CE	CE
Operating range*	4.5 … 9.5 m	7 m	
Light source / Measurement principle	Infrared	Infrared	Infrared
Cycle time / Measurement time	10 – 30 µs per beam + 0,4 ms	30 µs per beam + 0,4 ms	Dependent on conveyor speed and object size
Measurement field length / Scanning angle	160 – 2,960 mm	130 – 2,870 mm	L × W × H: 50 × 50 × 5 mm³ – 2,000 × 2,000 × 2,000 mm³ 2,000 × 1,200 × 1,200 mm³
Resolution	5, 10, 20, 40 mm	5, 10, 20 mm	5 mm
Number of beams	Max. 592	Max. 592	
Mouth width			
Mouth depth			
Operation	Control buttons on foil display, 5 languages, configuration software	Control buttons on foil display, 5 languages, configuration software	webConfig
Properties			
	Cycle time CML 730: 10 µs x number of beams + 0.4 ms | Cycle time CML 720: 30 µs x number of beams + 0.4 ms | Detection of transparent media | Display for diagnosis and alignment | Standard profile for simple mounting | Robust metal housing | Suitable for low-temperature applications down to –30 °C	Cycle time: 30 µs x number of beams + 0.4 ms | Display for diagnosis and alignment | Standard profile for simple mounting | Robust metal housing	Contour measurement system for passing objects | Output of the smallest enclosing cuboid of the object | Output of object protrusions and bulges | Output of the object position and orientation angle on the conveyor | Collection and looping through of external data from, e.g., scales, bar code readers | Easy commissioning by the customer | Total system can be ordered with one part number

* Guaranteed operating range

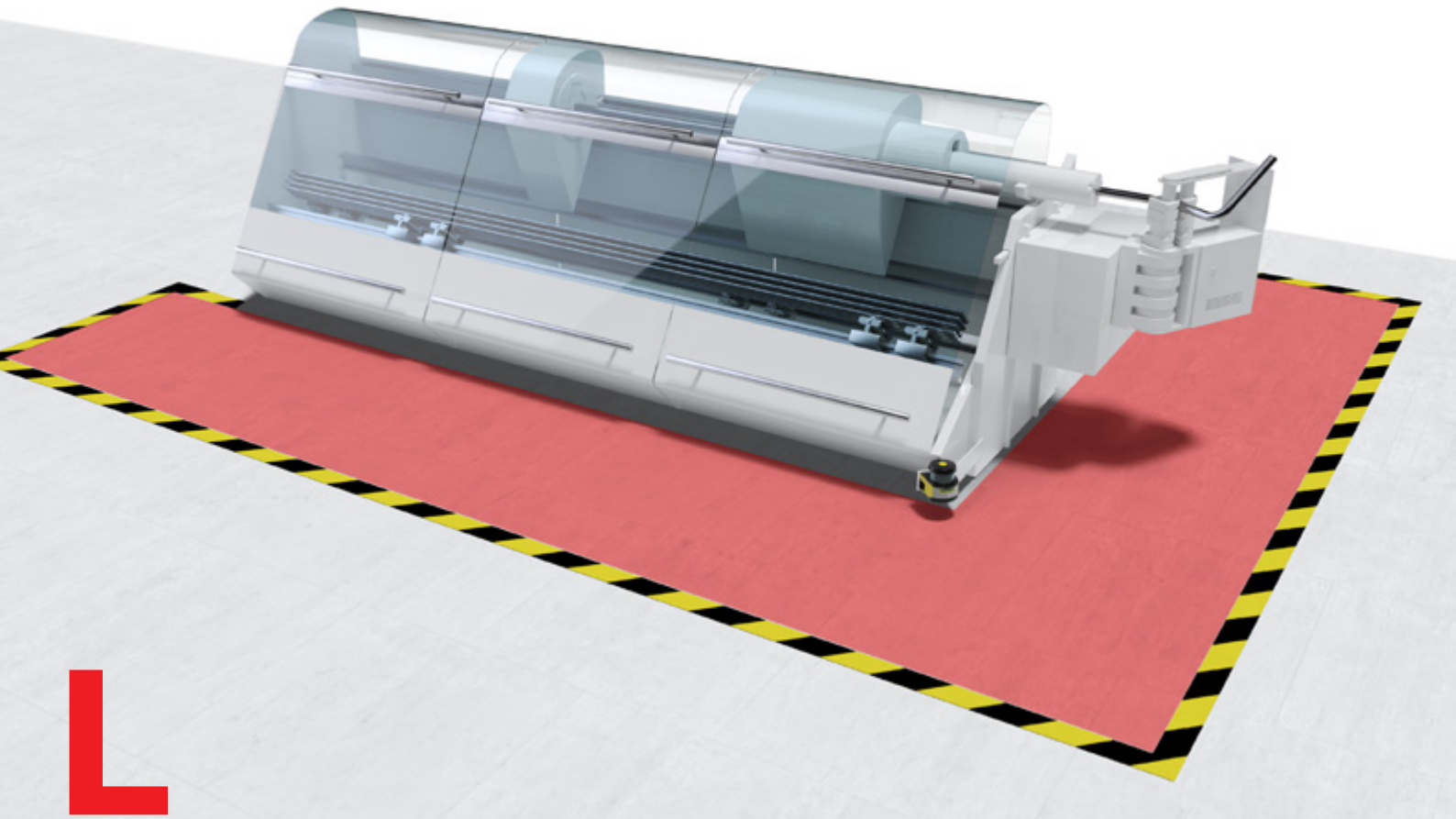
Products for safety at work

From a single source: Products and services that protect the operator and facilitate efficient processes

Machine safety no longer means just personnel protection. It also makes an important contribution to the efficient and smooth flow of processes.

As one of the technology leaders in the area of optoelectronic safety sensors, we offer competent and extensive consultation on the topic of safety at work. In addition to our wide range of safety sensors, we also offer safety switches and safety locking devices as well as safe control components. We provide you with well thought-out and reliable solutions for safety at work from a single source.

In doing so, we place great importance on the simple and efficient integration and installation of our safety technology. Innovative connection concepts, integrated alignment aids, operating mode selection without PC and integrated gateway functions are just a few examples here.



Highly efficient safety laser scanner: clever area protection and access guarding

With the RSL 400 safety laser scanner, we have set a new standard worldwide in the supreme discipline of safety sensor technology.

Thanks to our decades of experience, we have succeeded in developing a device which, through clever detailed solutions, combines reliable operation with simple configuration and installation of devices.

In many cases the RSL 400 can even be used to perform tasks that previously required two safety laser scanners.

RSL 400

- Scanning angle of 270° and operating range of 8.25 m
- Easy-to-mount, removable measuring unit for simple and quick exchange
- 2 independent protective functions in one device
- PROFINET/PROFIsafe interface for simple integration in industrial networks
- High-quality data output for navigation of automated guided vehicles and first-class safety technology in a single device

Safety laser scanners

	RSL 410 Safety laser scanners	**RSL 420, 425** Safety laser scanners
Specifications		
Type in accordance with EN IEC 61496	Type 3	Type 3
SIL in accordance with IEC 61508 and EN IEC 62061 (SILCL)	SIL 2	SIL 2
Performance Level (PL) in accordance with EN ISO 13849-1	PL d	PL d
Resolution (adjustable)	30 / 40 / 50 / 60 / 70 / 150 mm	30 / 40 / 50 / 60 / 70 / 150 mm
Operating range	3 / 4.5 / 6.25 / 8.25 m	3 / 4.5 / 6.25 / 8.25 m
Scanning angle	270°	270°
Number of field pairs / 4-field sets	1 / 1	10 / 10
Dimensions, W × H × D	140 × 149 × 140 mm	140 × 149 × 140 mm
Safety-related switching outputs	2 PNP transistor outputs	2 PNP transistor outputs
Connection type	M12 connector, configuration and diagnosis via Ethernet TCP/IP and Bluetooth	Cable or connector, 16-pin, configuration and diagnosis via Ethernet TCP/IP, USB and Bluetooth
Certifications	CE c UL us TÜV TÜV	CE c UL us TÜV TÜV
Functions		
	Selectable functions: resolution, dynamic contactor monitoring (EDM), start/restart interlock (RES) | Vertical access guarding with reference boundary monitoring | Four-field mode	Selectable functions: resolution, dynamic contactor monitoring (EDM), start/restart interlock (RES) | Vertical access guarding with reference boundary monitoring | Four-field mode | E-stop linkage | RSL 425: measurement value output for AGV navigation
Properties		
	1 field pair/4-field set | Basic functions such as automatic start/restart, start/restart interlock (RES), contactor monitoring (EDM) can be selected | Optimum handling by means of separate intelligent connection unit with integrated configuration memory and large, plain-text display with integrated electronic spirit level | 3 configurable signal outputs	10 field pairs/4-field sets | Basic functions such as automatic start/restart, start/restart interlock (RES), contactor monitoring (EDM) can be selected | Optimum handling by means of separate intelligent connection unit with integrated configuration memory and large, plain-text display with integrated electronic spirit level | 4 configurable signal outputs | RSL 425: output of high-quality measurement values for distance and signal strength via UDP, angular resolution 0.1°, configurable

RSL 430 Safety laser scanners	**RSL 440, 445** Safety laser scanners	**RSL 420P** Safety laser scanner PROFIsafe	**RSL 450P, 455P** Safety laser scanner PROFIsafe
Type 3	Type 3	Type 3	Type 3
SIL 2	SIL 2	SIL 2	SIL 2
PL d	PL d	PL d	PL d
30 / 40 / 50 / 60 / 70 / 150 mm	30 / 40 / 50 / 60 / 70 / 150 mm	30 / 40 / 50 / 60 / 70 / 150 mm	30 / 40 / 50 / 60 / 70 / 150 mm
3 / 4.5 / 6.25 / 8.25 m	3 / 4.5 / 6.25 / 8.25 m	3 / 4.5 / 6.25 / 8.25 m	3 / 4.5 / 6.25 / 8.25 m
270°	270°	270°	270°
10+10 / 10	100 / 50	10 / 10	100 / 50
140 × 149 × 140 mm	140 × 149 × 140 mm	140 × 169 × 140 mm	140 × 169 × 140 mm
2 x 2 PNP transistor outputs	2 x 2 PNP transistor outputs	PROFIsafe, 1 protective field	PROFIsafe, 4 parallel protective fields
Cable or connector, 29-pin, configuration and diagnosis via Ethernet TCP/IP, USB and Bluetooth	Cable or connector, 29-pin, configuration and diagnosis via Ethernet TCP/IP, USB and Bluetooth	3x M12 connection for 2-port switch and voltage supply, configuration also via USB and Bluetooth	3x M12 connection for 2-port switch and voltage supply, configuration also via USB and Bluetooth
Selectable functions: resolution, dynamic contactor monitoring (EDM), start/restart interlock (RES) | Vertical access guarding with reference boundary monitoring | Four-field mode | E-stop linkage | Safe time delay, internal | Data output, configurable	Selectable functions: resolution, dynamic contactor monitoring (EDM), start/restart interlock (RES) | Vertical access guarding with reference boundary monitoring | Four-field mode | E-stop linkage | Safe time delay, internal | Data output, configurable | RSL 445: measurement value output for AGV navigation	Selectable functions: resolution, start/restart interlock (RES) | Vertical access guarding with reference boundary monitoring | Four-field mode	Selectable functions: resolution, start/restart interlock (RES) | Vertical access guarding with reference boundary monitoring | Four-field mode | Data output, configurable | RSL 455: measurement value output for AGV navigation
10+10 field pairs/4-field sets, reversible | Two independent protective functions and OSSD pairs | Basic functions such as automatic start/restart, start/restart interlock (RES) | Optimum handling by means of separate intelligent connection unit with integrated configuration memory and large, plain-text display with integrated electronic spirit level | 9 configurable signal outputs | Safe, internal switch-off delay (Stop 1)	100 field pairs / 50 4-field sets, reversible | Two independent protective functions and OSSD pairs | Basic functions such as automatic start/restart, start/restart interlock (RES), contactor monitoring (EDM) can be selected | Optimum handling by means of separate intelligent connection unit with integrated configuration memory and large, plain-text display with integrated electronic spirit level | Up to 10 independent sensor configurations, ideal for mobile applications | 9 configurable signal outputs | Safe, internal switch-off delay (Stop 1) | RSL 445: output of high-quality measurement values for distance and signal strength via UDP, angular resolution 0.1°, configurable	Optimum handling through removable connection unit with integrated 2-port PROFINET-switch switch and integrated configuration memory | Conformance Class C, IRT-capable | 10 field pairs/4-field sets, reversible | Basic functions such as automatic start/restart, start/restart interlock (RES), can be selected | Large, plain-text display with integrated electronic spirit level | Configuration also via Bluetooth and USB interface	Optimum handling through removable connection unit with integrated 2-port PROFINET-switch switch and integrated configuration memory | Conformance Class C, IRT-capable | 100 field pairs / 50 4-field sets, reversible | Evaluation of up to 4 protective fields | Basic functions such as automatic start/restart, start/restart interlock (RES), can be selected | Large, plain-text display with integrated electronic spirit level | Configuration also via Bluetooth and USB interface | Up to 10 independent sensor configurations, ideal for mobile applications | RSL 455P: output of high-quality measurement values for distance and signal strength via UDP, angular resolution 0.1°, configurable

Safety light curtains

	MLC 310 Type 2 safety light curtains	**MLC 320** Type 2 safety light curtains
Specifications		
Type in accordance with EN IEC 61496	Type 2	Type 2
SIL in accordance with IEC 61508 and EN IEC 62061 (SILCL)	SIL 1	SIL 1
Performance Level (PL) in accordance with EN ISO 13849-1	PL c	PL c
Resolution	20 / 30 / 40 / 90 mm	20 / 30 / 40 / 90 mm
Operating range (depending on resolution)	15 / 10 / 20 / 20 m	15 / 10 / 20 / 20 m
Protective field height (type-dependent)	150 … 3,000 mm	150 … 3,000 mm
Profile cross section	29 × 35 mm	29 × 35 mm
Safety-related switching outputs (OSSDs)	2 PNP transistor outputs	2 PNP transistor outputs
Connection type	M12	M12
Certifications		
Functions		
	Transmission channel changeover | Range reduction	Transmission channel changeover | Range reduction | Start/restart interlock (RES) | Contactor monitoring (EDM) | 7-segment display
Properties		
	Configuration by wiring – automatic transfer to replacement device after device exchange	Configuration by wiring – automatic transfer to replacement device after device exchange

MLC 510 Type 4 safety light curtains	**MLC 520** Type 4 safety light curtains	**MLC 530** Type 4 safety light curtains	**MLC 530 SPG** Type 4 safety light curtains
Type 4	Type 4	Type 4	Type 4
SIL 3	SIL 3	SIL 3	SIL 3
PL e	PL e	PL e	PL e
14 / 20 / 30 / 40 / 90 mm	14 / 20 / 30 / 40 / 90 mm	14 / 20 / 30 / 40 / 90 mm	30 / 40 / 90 mm
6 / 15 / 10 / 20 / 20 m	6 / 15 / 10 / 20 / 20 m	6 / 15 / 10 / 20 / 20 m	10 / 20 / 20 m
150 … 3,000 mm	150 … 3,000 mm	150 … 3,000 mm	150 … 3,000 mm
29 × 35 mm	29 × 35 mm	29 × 35 mm	29 × 35 mm
2 PNP transistor outputs or AS-i Safety interface	2 PNP transistor outputs	2 PNP transistor outputs	2 PNP transistor outputs
M12	M12	M12	M12
Transmission channel changeover | Range reduction	Transmission channel changeover | Range reduction | Start/restart interlock (RES) | Contactor monitoring (EDM) | 7-segment display	Transmission channel changeover | Range reduction | Start/restart interlock (RES) | Contactor monitoring (EDM) | 7-segment display, linkage | Fixed and floating beam blanking| Reduced resolution | Timing controlled 2-sensor muting | Muting-timeout extension | Partial muting	Transmission channel changeover | Range reduction | Start/restart interlock (RES) | 7-segment display | Fixed blanking | Integrated muting function with control via PLC signal (no muting sensors necessary)
Configuration by wiring – automatic transfer to replacement device after device exchange | Extra impact-resistant models available | Models available with extra high interference rejection against ambient light	Configuration by wiring – automatic transfer to replacement device after device exchange | Extra impact-resistant models available	Configuration by wiring – automatic transfer to replacement device after device exchange | Linkage with safety devices via contact or OSSD output saves effort in downstream evaluation circuit | Multiple scanning and reduced resolution for operation which is immune to interference | Integrated muting and blanking function can be activated during operation | Extra impact-resistant models available	Configuration by wiring – automatic transfer to replacement device after device exchange | Efficient access guarding without muting sensors: high level of availability and protection against tampering with a very compact system design

MLC 511 AIDA
Type 4
safety light curtains

Specifications

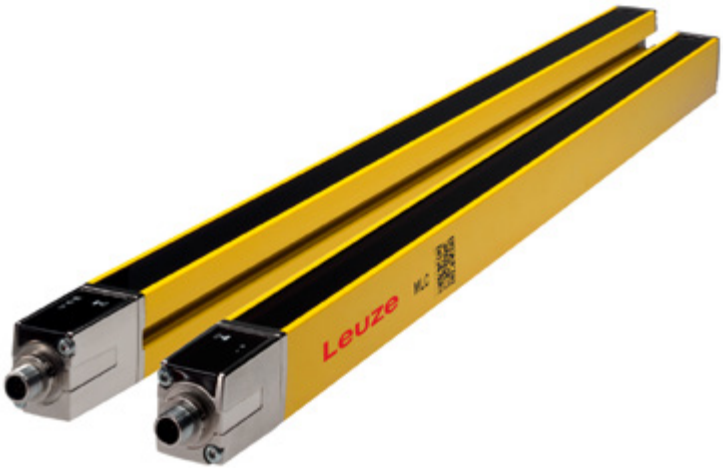
Type in accordance with EN IEC 61496	Type 4
SIL in accordance with IEC 61508 and EN IEC 62061 (SILCL)	SIL 3
Performance Level (PL) in accordance with EN ISO 13849-1	PL e
Resolution	14 / 30 mm
Operating range	6 / 10 m
Protective field height (type-dependent)	300 … 1,800 mm
Profile cross section	29 × 35 mm
Safety-related switching outputs (OSSDs)	2 PNP transistor outputs
Connection type	M12
Certifications	

Functions

Transmission channel changeover | Range reduction | Automatic start/restart

Properties

Plug connection with AIDA-compliant M12 pin assignment (4-pin) (Automatisierungs-Initiative deutscher Automobilisten (AIDA) = Automation initiative of German automobile manufacturers) | Configuration by wiring – automatic transfer to replacement device after device exchange



The external MLC alignment aid is a practical tool with which the transmitter can be precisely aligned more quickly.

MLC 520 **Host-Guest** Type 4 safety light curtains	**MLC 520** **EX2** Type 4 safety light curtains	**MLC 510** **IP 67/69K** Type 4 safety light curtains	**MLC 520-S** **Extra slim design** Type 4 safety light curtains
Type 4	Type 4	Type 4	Type 4
SIL 3	SIL 3	SIL 3	SIL 3
PL e	PL e	PL e	PL e
14 / 20 / 30 / 40 / 90 mm	20 / 30 mm	14 / 30 mm	14 / 24 mm
6 / 15 / 10 / 20 / 20 m	15 / 10 m	4.8 / 8 m	6 m
300 … 1,800 mm	600 … 1,500 mm	300 … 1,200 mm	150 … 1,200 mm
29 × 35 mm	29 × 35 mm	Ø 52.5 mm	15,4 × 32.6 mm
2 PNP transistor outputs AS-i Safety interface	2 PNP transistor outputs	2 PNP transistor outputs	2 PNP transistor outputs
M12	M12	Cable, 15 m	160 mm cable with M12 connector
CE TÜV cULus TÜV	CE TÜV cULus TÜV	CE TÜV cULus TÜV	CE cULus TÜV
Transmission channel change-over | Range reduction | Start / restart interlock (RES) | Contactor monitoring (EDM) | 7-segment display | Cascadable	Transmission channel change-over | Range reduction | Start/restart interlock (RES) | Contactor monitoring (EDM) | 7-segment display	Transmission channel change-over | Range reduction	Start/restart interlock (RES) | Contactor monitoring (EDM) | Cascadable via adapter cable
Host, middle-guest and guest devices combine point of operation guarding with area protection | Configuration by wiring – automatic transfer to replacement device after device exchange	Certified for applications in potentially explosive areas of group II, category 3, zone 2 (gas) and zone 22 (dust) | Configuration by wiring – automatic transfer to replacement device after device exchange	The configuration is simply performed by means of wiring | Pre-mounted in transparent, encapsulated tube	Extra slim design without dead zones | Especially fine length grid of 30 mm | Configuration by wiring – automatic transfer to replacement device after device exchange

Multiple light beam safety devices

Specifications

Type in accordance with EN IEC 61496

SIL in accordance with IEC 61508 and EN IEC 62061 (SILCL)

Performance Level (PL) in accordance with EN ISO 13849-1

Number of beams/beam distance

Operating range

Profile cross section

Safety-related switching outputs (OSSDs)

Connection type

Certifications

Functions

Properties

MLD 310, 510 Type 2 / 4 multiple light beam safety devices	**MLD 320, 520** Type 2 / 4 multiple light beam safety devices	**MLD 330, 530** Type 2 / 4 multiple light beam safety devices	**MLD 335, 535** Type 2 / 4 multiple light beam safety devices
Type 2 / Type 4	Type 2 / Type 4	Type 2 / Type 4	Type 2 / Type 4
SIL 1 / SIL 3	SIL 1 / SIL 3	SIL 1 / SIL 3	SIL 1 / SIL 3
PL c / PL e	PL c / PL e	PL c / PL e	PL c / PL e
2 / 500 mm 3 / 400 mm 4 / 300 mm	2 / 500 mm 3 / 400 mm 4 / 300 mm	2 / 500 mm 3 / 400 mm 4 / 300 mm	2 / 500 mm 3 / 400 mm 4 / 300 mm
0.5 ... 50 m or 20 ... 70 m (transmitter-receiver systems) 0.5 ... 6/8 m (transceiver systems)	0.5 ... 50 m or 20 ... 70 m (transmitter-receiver systems) 0.5 ... 6/8 m (transceiver systems)	0.5 ... 50 m or 20 ... 70 m (transmitter-receiver systems) 0.5 ... 6/8 m (transceiver systems)	0.5 ... 50 m or 20 ... 70 m (transmitter-receiver systems) 0.5 ... 6/8 m (transceiver systems)
52 × 65 mm	52 × 65 mm	52 × 65 mm	52 × 65 mm
2 PNP transistor outputs AS-i Safety interface	2 PNP transistor outputs	2 PNP transistor outputs	2 PNP transistor outputs
M12	M12	M12	M12
Automatic start/restart	Automatic start/restart | Start / restart interlock (RES), selectable | Contactor monitoring (EDM), selectable | Configurable operating modes	Start/restart interlock (RES) | Contactor monitoring (EDM), selectable | 2-sensor muting (timing controlled, sequence controlled) | Muting-timeout extension to up to 100 hours | Configurable operating modes | 7-segment display	Start/restart interlock (RES) | Contactor monitoring (EDM), selectable | 2-sensor muting (timing controlled, sequence controlled), 4-sensor muting (timing controlled) | Muting-time-out extension to up to 100 hours | Configurable operating modes | 7-segment display
Transceiver systems available in 2- or 3-beam version | Transmitter-receiver systems available in 2-, 3- or 4-beam version | The configuration is simply performed by means of wiring, i. e. no software, PC or DIP switch are necessary | The use at ambient temperatures as low as –30 °C is possible | Degree of protection IP 67 | Options: integrated laser alignment aid (with transmitter-receiver systems), integrated status indicator	Transceiver systems available in 2- or 3-beam version | Transmitter-receiver systems available in 2-, 3- or 4-beam version | The configuration is simply performed by means of wiring, i. e. no software, PC or DIP switch are necessary | The use at ambient temperatures as low as –30 °C is possible | Degree of protection IP 67 | Options: integrated laser alignment aid (with transmitter-receiver systems), integrated status indicator	Transceiver systems available in 2- or 3-beam version | Transmitter-receiver systems available in 2-, 3- or 4-beam version | Integrated muting function, no additional muting module is necessary | The configuration is simply performed by means of wiring, i. e. no software, PC or DIP switch are necessary | The use at ambient temperatures as low as –30 °C is possible | Degree of protection IP 67 | Options: integrated laser alignment aid (with transmitter-receiver systems), integrated muting and status indicator	Transceiver systems available in 2- or 3-beam version | Transmitter-receiver systems available in 2-, 3- or 4-beam version | Integrated muting function, no additional muting module is necessary | The configuration is simply performed by means of wiring, i. e. no software, PC or DIP switch are necessary | The use at ambient temperatures as low as –30 °C is possible | Degree of protection IP 67 | Options: integrated laser alignment aid (with transmitter-receiver systems), integrated muting and status indicator

Protective sensor sets and accessories

	UDC / DC Device columns	**UMC** Mirror columns	**MLC-UDC** Protective sensor sets
Description			
	The UDC / DC device columns enable the stable, freestanding mounting of protective sensors and safety light curtains on the floor | The robust profile construction in high-quality design will win you over with simple device mounting and the quick vertical and axial alignment in just a few steps	By combining UMC mirror columns with protective sensors or safety light curtains, cost-effective, multiple-side danger zone guarding can be realized | Robust design and simple handling also increase the effectiveness of the safety device	In addition to the MLC 500 safety light curtain as an optical protective device, these sets also include device columns in which the safety sensor is pre-mounted in such a manner that it can very easily be height-adjusted.
Properties			
	Simple, stepless mounting and height adjustment of the installed devices by means of supplied mounting brackets | Design with closed or open top by means of simple, snap-in column cover | Protection against device contamination and damage by means of easy-to-replace protective screens (PSC) | Automatic resetting after mechanical impacts with special spring elements (UDC) | Complete mounting set for floor fixing included with delivery (UDC)	Individual mirror, adjustable separately in height and alignment, for beam deflection with multiple light beam safety devices | Axially adjustable continuous mirror surface for beam deflection with safety light curtains | Automatic resetting after mechanical impacts with special spring elements | Complete mounting set for floor fixing included with delivery	Transmitter-receiver system with safety light curtain MLC 500 | Set for access guarding with hand / finger detection | Optimally matched mechanically; pre-mounted and pre-aligned | Device column with complete mounting kit for exact floor alignment; automatic resetting after mechanical impacts thanks to special spring elements

MLD-UDC
Protective sensor sets

In addition to the MLD 500 multiple light beam safety device as an optical protective device, these sets also include device columns in which the safety sensor is pre-mounted in such a manner that it can very easily be height-adjusted.

Plug & Play solutions, optionally as transceiver or transmitter-receiver system | Set for access guarding, i.e. pre-mounted transmitter / receiver or transceiver / deflecting mirror in device column | Optimally matched mechanically; pre-mounted and pre-aligned | Device column with complete mounting kit for exact floor alignment; automatic resetting after mechanical impacts thanks to special spring elements

Set-AC-M
Muting sensor sets

The Set-AC-M muting sensor sets for protective sensors and safety light curtains simplify the setup and operation of muting solutions | The sets are optimally tailored to modern machines and systems both mechanically and electrically and through their innovative design

Pre-mounted and aligned muting sensors for direct connection to the safety sensors | 2-sensor muting (timing controlled & sequential); 4-sensor muting (timing controlled) | Simple lateral mounting on device columns as well as on protective sensors and safety light curtains | Optimally matched to transceiver systems through the use of retro-reflective photoelectric sensors (only one-sided wiring) | Fast start-up through immediately ready-to-use, turnkey design

MLDSET
Protective sensor sets

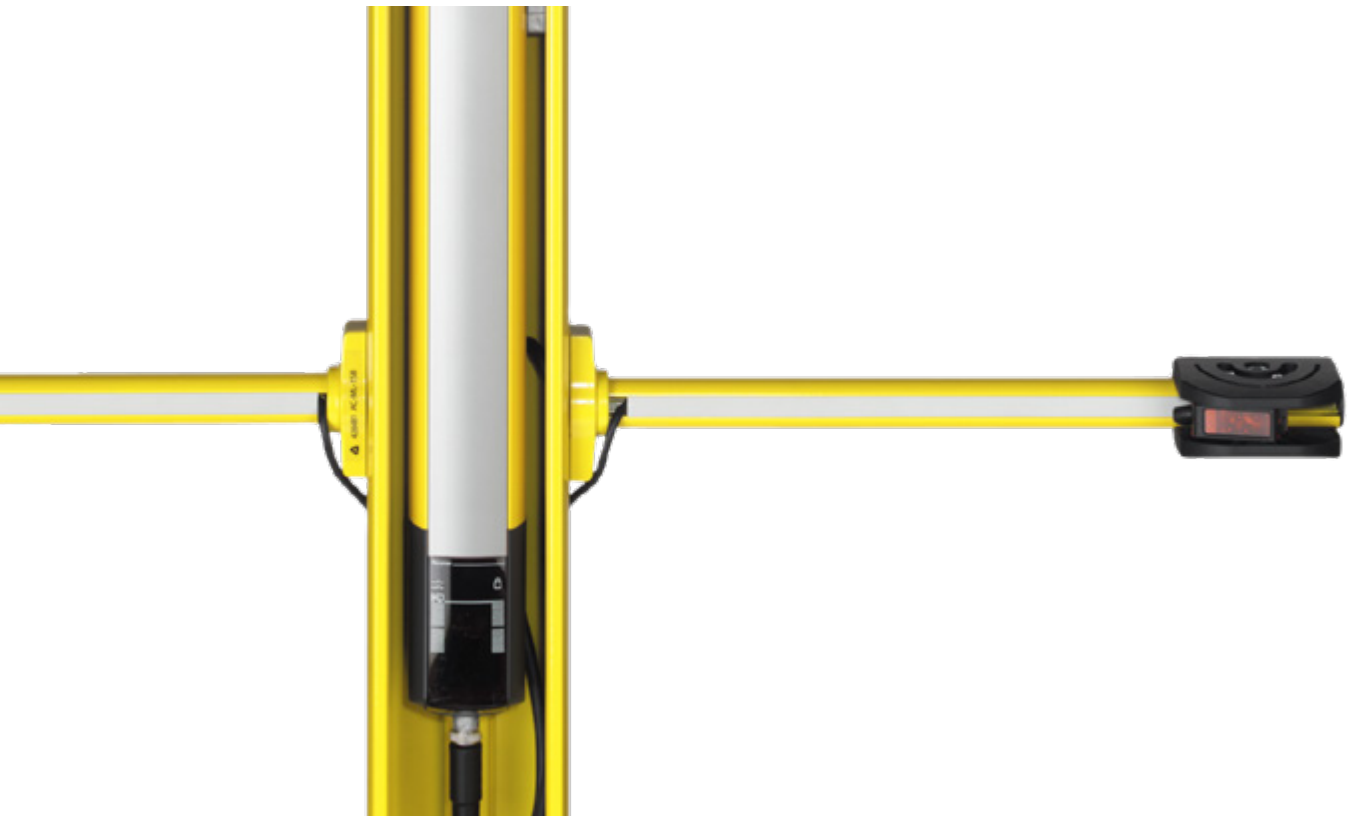
The MLDSET protective sensor sets offer complete solutions for access guarding in which muting functions are needed for material transport | The pre-mounted sets ensure efficient installation and quick and easy commissioning. Tailored to various muting tasks, a number of Plug & Play models are available

Pre-mounted and aligned protective sensor systems in device columns for direct integration in machine and system controls | 2-sensor muting (timing controlled & sequential); 4-sensor muting (timing controlled) | Simple logistical handling through individual complete solutions in a single set | Fast start-up of the complete system through immediately ready-to-use, turnkey design with pluggable connections

M4 / M7
Muting indicators

The M4 and M7 muting indicators are used for the reliable display of the muting state in safety-relevant applications | They are used in combination with protective sensors or safety light curtains

Simple mounting and commissioning, since M12 connector, interconnection cable (2 m), mounting bracket and mounting kit are included in the scope of delivery and are pre-mounted | Low risk of failure through the use of LEDs with a life expectancy of at least 100,000 hours | Modern design through the use of a clear housing, signal indicator with white continuous light | UL approval and high degree of protection IP 66



Single light beam safety devices

	MLD 500 Type 4 single light beam safety devices	**SLS 46C** Type 4 single light beam safety devices	**SLS 46C** Type 2 single light beam safety devices
Specifications			
Type in accordance with EN IEC 61496	Type 4 (self-monitoring)*	Type 4 in combination with a MSI-TRM safety relay	Type 2 in combination with a safety monitoring device
Operating range	0.5 … 70 m 20 … 100 m	0.25 … 40 m 5 … 70 m	0.5 … 40 m 5 … 70 m
Operating voltage U_B	+24 V DC ± 20 %	24 V DC, ± 20 % (incl. residual ripple)	24 V DC, ± 20 % (incl. residual ripple)
Operating temperature	–30 … +55 °C	–30 … +60 °C	–30 … +60 °C
Dimensions, W × H × D	52 × 65 × 193 mm	20.5 × 77 × 44 mm	20.5 × 77 × 44 mm
Housing	Metal	Plastic	Plastic
Light source	Infrared	Red light / infrared	Red light / infrared
Switching outputs	2 PNP transistor outputs (OSSDs)	2 push-pull transistor outputs	2 push-pull transistor outputs
Connection type	M12 AS-i Safety interface	Cable 2 m M12	Cable 2 m M12
Certifications	CE TÜV SP TÜV	CE c UL us TÜV ECOLAB	CE c UL us TÜV ECOLAB
Functions			
	Start/restart interlock (RES) | Contactor monitoring (EDM), selectable | 2-sensor muting (timing controlled, sequence controlled) | Muting-timeout extension to up to 100 hours | Configurable operating modes | 7-segment display	LED indicator | Activation input for test and series connection | Active ambient light suppression (A^2LS) | Diagnostic output	LED indicator | Activation input for test and series connection | Active ambient light suppression (A^2LS) | Diagnostic output
Properties			
	Integrated muting function, no additional muting module is necessary | The configuration is simply performed by means of wiring, i. e. no software, PC or DIP switch are necessary | The use at ambient temperatures as low as –30 °C is possible | Degree of protection IP 67	Single beam safety device with high function reserve | Compact plastic housing with degree of protection IP 67 | Clearly visible alignment indicator in the front screen | ECOLAB	Single beam safety device with high function reserve | Compact plastic housing with degree of protection IP 67 | Clearly visible alignment indicator in the front screen | ECOLAB

* For safety classification see MLD 500 multiple light beam safety device

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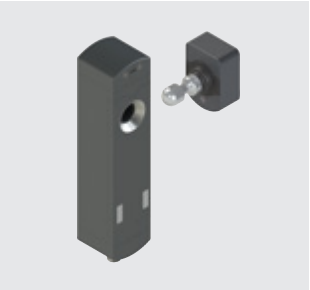
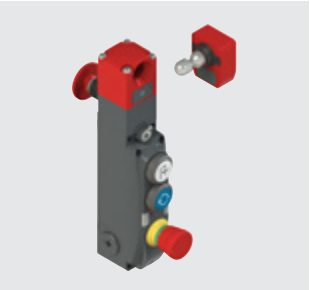
AS-i-safety product range

	MLC 510 / AS-i Type 4 safety light curtains	**MLD 500 / AS-i** Type 4 multiple light beam safety devices	**MLD 500 / AS-i** Type 4 single light beam safety devices
Specifications			
Type in accordance with EN IEC 61496	Type 4	Type 4	Type 4
SIL in accordance with IEC 61508 and EN IEC 62061 (SILCL)	SIL 3	SIL 3	SIL 3
Performance Level (PL) in accordance with EN ISO 13849-1	PL e	PL e	PL e
AS-i profile	Safe slave	Safe slave	Safe slave
Slave address	1 … 31, programmable (factory setting = 0)	1 … 31, programmable (factory setting = 0)	1 … 31, programmable (factory setting = 0)
Connection type	M12	M12	M12
Current consumption from AS-i circuit	50 mA (transmitter) 150 mA (receiver)	50 mA (transmitter) Max. 140 mA (receiver, type-dependent)	50 mA (transmitter) Max. 140 mA (receiver, type-dependent)
Sensor response time	3 … 39 ms (type-dependent)	25 ms	25 ms
Restart delay time	100 ms or 500 ms	100 ms or 500 ms	100 ms or 500 ms
Certifications			
Function extension with ASM1 / ASM1E safety monitor			
	Start/restart interlock | Contactor monitoring (EDM), selectable	Start/restart interlock (RES) | Contactor monitoring (EDM), selectable | 2-sensor muting (timing controlled, sequence controlled), 4-sensor muting (timing controlled) | Muting-time-out extension	Start/restart interlock (RES) | Contactor monitoring (EDM), selectable | 2-sensor muting (timing controlled, sequence controlled), 4-sensor muting (timing controlled) | Muting-time-out extension
Properties			
	Integrated AS-i interface for direct M12 connection to the AS-interface network | Safe data transfer of the OSSD signals via AS-interface | Device swap-out without PC via SERVICE function of the AS-i safety Monitor | Direct control without unique AS-i address possible | Also available as host/ middle-guest/guest variants	Integrated AS-i interface for direct M12 connection to the AS-interface network | Safe data transfer of the OSSD signals via AS-interface | Device swap-out without PC via SERVICE function of the AS-i safety Monitor | Integrated mut-ing indicator, integrated status indicator, direct control without unique AS-i address possible	Integrated AS-i interface for direct M12 connection to the AS-interface network | Safe data transfer of the OSSD signals via AS-interface | Device swap-out without PC via SERVICE function of the AS-i safety Monitor | Direct control without unique AS-i address possible

	ASM1 / ASM1E AS-i safety monitors category 4	**ASM2 / ASM2E** AS-i safety monitors category 4
Specifications		
SIL in accordance with IEC 61508 and EN IEC 62061 (SILCL)	SIL 3	SIL 3
Performance Level (PL) in accordance with EN ISO 13849-1	PL e	PL e
Safety category in accordance with EN ISO 13849-1	4	4
Stop category in accordance with EN IEC 60204-1	0 and 1	0 and 1
Supply voltage	24 V DC, ±15 %	24 V DC, ±15 %
System reaction time	Max. 40 ms (monitor without sensor reaction time)	Max. 40 ms (monitor without sensor reaction time)
Degree of protection	IP 20	IP 20
Number of safety monitors per AS-interface network	4 (with maximum 31 integrated AS-i slaves)	4 (with maximum 31 integrated AS-i slaves)
Certifications	CE c UL US	CE c UL US
Functions		
	E-Stop monitoring functions | Start/restart interlock, selectable | Dynamic contactor monitoring (EDM) | Muting | Timing controlled 2-sensor muting | Sequence controlled 4-sensor muting | 1 and 2-channel OSSD relay outputs | Status LED indicator | System signal output	E-Stop monitoring functions | Start/restart interlock, selectable | Dynamic contactor monitoring (EDM) | Muting | Timing controlled 2-sensor muting | Sequence controlled 4-sensor muting | 1 and 2-channel OSSD relay outputs | Status LED indicator | System signal output
Properties		
	Up to 31 safe AS-i slaves can be connected | Freely selectable assignment (Drag&Drop) of the sensors to OSSDs with “asimon” PC software | 32 logic devices (e.g. OR, AND, FLIPFLOP) and turn on/off delays can be configured for the monitoring devices | RS 232 interface for PC-supported system configuration and system diagnosis as well as configuration data transfer to replacement device | Immediate switch-off STOP 0 and delayed switch-off STOP 1 of the release circuits can be configured | Teach-in SERVICE button for automatic system integration of AS-i sensors on sensor exchange	Safe activation of safe AS-i actors with the same safe AS-i address | Primary start and E-Stop functions via safe coupling of neighboring AS-i networks | 48 logic devices (e.g. OR, AND, FLIPFLOP) and turn on/off delays can be configured for the monitoring devices | Auxiliary signals for start/restart interlock | Error reset of the AS-i actor | In addition, all functions and features of the ASM1E safety monitor are available

Safety switches and safety locking devices

	S20, S200 Safety switches	**S300** Safety position switches
Specifications		
Type	Type 2 interlock device without guard interlocking in acc. with EN ISO 14119	Type 1 interlock device without guard interlocking in acc. with EN ISO 14119
Housing / Degree of protection	Technopolymer (S20) or metal (S200) / both IP 67	Technopolymer or metal, both IP 67
Actuators	Mechanical tongue, with low coding level in accordance with EN ISO 14119	Actuated by unencoded cam in accordance with EN ISO 14119
Locking type, -force		
Connection type	Cable entry M20 × 1.5 (S20: optional 3-way), M12	Cable entry M20 × 1.5 (1- or 3-way), M12
Certifications	CE, c UL us	CE, c UL us
Functions		
	Safety switches with separate actuator are ideally suited for safeguarding points of operation by guards on machines without overrun | The coded actuator allows the machine to be started only if protective device is closed	Because of their construction design, these switches are used for the position monitoring of machines or as an alternative to hinge switches – always with the prerequisite that appropriate actuation tappets or notches can actuate the switch when friction closed
Properties		
	Metal or technopolymer housing | Easy mounting with standard construction | Universal use with 5 actuator approach directions | Up to 8 different actuators | Various contact blocks | 1–3 cable inlets | Versions with M12 connector | High-quality silver contacts for long life expectancy | Positive-opening contacts for integration in a safety circuit	Metal or technopolymer housing | Switching direction selectable | Universal use with individually set actuator approach directions and angles in 10° grid | Various actuators | Extremely durable / robust | Positive-opening contacts for integration in a safety circuit

S400, S410, S420 Safety hinge switches	**L10, L100, L200** Safety locking devices	**L250** Safety locking devices	**L300** Safety locking devices
			
Type 1 interlock device without guard interlocking in acc. with EN ISO 14119	Type 2 interlock device with guard interlocking in acc. with EN ISO 14119	Type 4 interlock device with guard interlocking in acc. with EN ISO 14119	Type 4 interlock device with guard interlocking in acc. with EN ISO 14119
Metal, IP 67 / IP 69K	Technopolymer or metal / both IP 67	Technopolymer IP 67 / IP 69K	Metal, IP 67 / IP 69K, IP 65 for integrated operational controls
Position switch encapsulated within the hinge	Mechanical tongue, with low coding level in accordance with EN ISO 14119	Mechanical tongue with RFID-encoded actuator in accordance with EN ISO 14119; AC-L250-SCA: low, AC-L250-UCA: high	Mechanical tongue with RFID-encoded actuator in accordance with EN ISO 14119; AC-L300-SCA: low, AC-L300-UCA: high
	With either quiescent current principle or open circuit current principle L100: F_{1max} 1,100 N acc. to ISO 14119 L200: F_{1max} 2,800 N acc. to ISO 14119	With either quiescent current principle or open circuit current principle F_{1max} 2,100 N acc. to ISO 14119	With either quiescent current principle or open circuit current principle F_{1max} 9,750 N acc. to ISO 14119
Cable or M12, top, bottom, at wall side	Cable entry M20 × 1.5 (3-way)	M12 connector, various outgoing lines	Cable entry M20 × 1.5 (3-way), M12 (8- or 12-pin), M23 (19-pin)
CE cULus	CE cULus	CE cULus ECOLAB	CE cULus ECOLAB
The hinge switches combine the functions of safety switch and door hinge in one component | They are used in guards and points of operation without overrun | The elegant design makes possible discreet and effective integration in the system	Safety locking devices keep protective doors securely locked and thereby prevent the inadmissible access of people until the guarded machine no longer poses a danger | In addition, safety locking devices are also used for process protection	Safety locking devices keep protective doors securely locked and thereby prevent the inadmissible access of people until the guarded machine no longer poses a danger | In addition, safety locking devices are also used for process protection	Safety locking devices keep protective doors securely locked and thereby prevent the inadmissible access of people until the guarded machine no longer poses a danger | In addition, safety locking devices are also used for process protection
Metal housing (IP 67/IP 69K) | Hidden cable routing thanks to connection on rear side | High protection against tampering through encapsulated position switch | Adjustable switching point | 180 ° maximum opening angle of the protective device | Positive-opening contacts for integration in a safety circuit | Model S410 with wide fork dimension for special materials, e.g., glass | Additional hinge (without contacts) **S420** | Stainless steel housing (IP 67/ IP 69K) | Model with OSSD safety outputs and status LED enables the maximum level of PL e / category 4 in accordance with ISO 13849-1 with just one device	Universal use with 5 actuator approach directions | Multiple heavy-duty actuators for a wide range of installation conditions | Positive-opening contacts for integration in the safety circuit | Models with escape release button (L200) | Status LED indicator (L200)	Compact design | Flexible mounting concept | Contactless actuation through RFID technology | OSSD safety-related switching outputs | Locking force of the actuator 2,100 N | Large center opening for actuator shaft | Flexibly mounted actuator enables secure closing even with warped doors | Status LED indicator for fast diagnosis | Models with and without escape release button	Contactless actuation through RFID technology | OSSD safety-related switching outputs | Locking force of the actuator 9,750 N | Large center opening for actuator shaft | Flexibly mounted actuator enables secure closing even with warped doors | Status LED indicator for fast diagnosis | Models with and without escape release button | Models with up to three integrated operational controls | Lock-out/tag-out functionality | Turnable actuator introduction for all installation positions | Optional door handle for simple mounting of switches and actuators

Safety
proximity sensors

	MC 300 Magnetically coded sensors	**RD 800** Safety transponders
Specifications		
Type	Type 4 interlock device, contactless actuation in accordance with EN ISO 14119	Type 4 interlock device, contactless actuation in accordance with EN ISO 14119
Category in accordance with EN IEC 13849-1	Up to 4 (depending on the number of sensors)	4
Performance Level (PL) in accordance with EN ISO 13849-1	Up to e (depending on the number of sensors)	e
Dimensions (housing)	M30 × 36 mm (MC 330) 36 × 26 × 13 mm (MC 336) 88 × 25 × 13 mm (MC 388)	87.5 × 25 × 18 mm (sensor) 45 × 25 × 18 mm (actuator)
Assured switching distances (Sao, Sar)	< 6 mm, > 14 mm (MC 330) < 3 mm, > 11 mm (MC 336) < 6 mm, > 30 mm (MC 388)	12 mm, 10 mm
Switching tolerance	± 1 mm	
Contact type	2 NC or 1 NC + 1 NO	OSSD safety outputs
Code type	Actuator with low coding level in accordance with EN ISO 14119	Actuator with low and high coding level in accordance with EN ISO 14119
Connection type	M8, M12, cable, cable+M12	M12, cable
Min. approach speed of actuator towards sensor	50 mm/s	
Response time	3 ms	7 ms (typical), 12 ms (max.)
Certifications	CE c UL us TÜV	CE c UL us TÜV
Functions		
	The magnetically coded sensors are used for monitoring guards | Together with a safe evaluation unit from Leuze, a certified system up to category 4 and PL e in accordance with EN ISO 13849-1 can be realized	The sensors of the RD 800 series are used for monitoring guards | The unique encoding of the actuator, made possible through RFID technology, offers maximum protection against tampering | The sensors are equipped with redundant electronics and OSSD safety outputs
Properties		
	Contactless actuation without mechanical contacts | Output contacts: 2 NC or 1 NC + 1 NO | Models with additional signal contact and status LED | Models with cable, M8 or M12 connector | Various compact designs | Simple commissioning | Insensitive to soiling | Degree of protection IP 67	Long life expectancy, even with frequent operating cycles thanks to contactless actuation | Maximum protection against tampering by means of an actuator with low or high coding level in accordance with EN ISO 14119 | Redundant electronics and OSSD safety outputs for the highest safety level | PL e and category 4 in accordance with EN ISO 13849-1 beginning with one device | Series connection possible | Status display on the sensor and signal contact | Models with cable or M12 connector | Models with additional programming input for teaching-in actuators | Degree of protection IP 67 and IP 69K

Safety command devices

	ERS 200 E-Stop rope switch	**ESB 200** E-Stop button
Specifications		
Type	E-Stop command device in accordance with EN ISO 13850, EN 60947-5-5	E-Stop command device in accordance with EN ISO 13850, EN 60947-5-5
Housing / Degree of protection	Metal, IP 67	UV-resistant, impact-resistant plastic, IP 67, IP 69K
Actuators	Stainless steel bolt, red, steel rope with sheathing	Button, 40 mm diameter, red, self-locking
Actuation	Position-independent per rope (pull: 83 N / 235 N, slacken: 63 N / 147 N). Pull on forced separation: 90 N / 250 N.	Position-dependent, manual, per button (25 N)
Mounting	Straight, angular	Structure
Connection type	Cable entry M20 × 1.5 (1- or 3-way), M12	Cable entry M20 × 1.5, M16 × 1.5 M12
Certifications	CE, cULus	CE
Functions		
	Integration in control circuits up to category 4 in accordance with EN ISO 13849-1 | Position-independent E-Stop command input | Reset function (reset button with indicator) | Rope head with alignment indicator	Integration in control circuits up to category 4 in accordance with EN ISO 13849-1 | Position-dependent E-Stop command input. Reset function (via rotary knob or key)
Properties		
	Machine is stopped by pulling the rope or on rope breakage | Simple rope adjustment by means of switching point indicator | Clicks in on both sides with friction-locking contacts | Compact metal housing | Use even under difficult conditions | Precise bolt guide	2 safety circuits, 1 signal circuit | Either screw terminals or M12 connection | Sturdy housing | Protected screw fitting | Ergonomically optimized

Safety relays

	MSI-SR-2H21	MSI-SR-ES31	MSI-MC310
Specifications			
Device type / function	Evaluation unit	Evaluation unit	Evaluation unit
Category / Performance Level (PL) in accordance with EN ISO 13849-1	4 / PL e	3 / PL d	4 / PL e
SIL in accordance with IEC 61508 and EN IEC 62061 (SILCL)	SIL 3 / SIL_{CL} 3	SIL 2 / SIL_{CL} 2	–
Number of release contacts (NO contact)	2	3	2 2
Number of signal contacts (NC contact)	1	1	1 –
Start / restart	Through synchronous actuation	Automatic, manual	Automatic, manual
Contactor monitoring (EDM)	X	X	X X
Regression delay	50 ms	60 ms	20 ms 20 ms
Max. continuous current per path	6 A	8 A	3 A 3 A
Ambient temperature, operation	–25 ... +55 °C	–25 ... +55 °C	0 ... +55 °C
Dimensions with screw terminals (W × H × D)	96.5 × 22.5 × 114.1 mm	96.5 × 22.5 × 107.6 mm	96.5 × 22.5 × 113.6 mm
Certifications	CE cULus TÜV	CE cULus TÜV	CE cULus TÜV
Sensors / application			
	Two-hand control device type III C, EN 574	E-Stop, safety switches with relay contacts	Safety solenoid switches Inputs: 1 NC contact, 1 NO contact
Properties			

MSI-SR-LC21	MSI-SR-LC31AR MSI-SR-LC31MR	MSI-SR4B MSI-SR5B	MSI-SR-LC21DT03 MSI-SR-LC21DT30 MSI-DT30
Evaluation unit	Evaluation unit	Evaluation unit	Evaluation unit with time delay
4/PL e	4/PL e	4/PL e	4/PL e LC21: 3/PL d for delayed contact
SIL 3/SIL_{CL} 3	SIL 3/SIL_{CL} 3	SIL 3/SIL_{CL} 3	SIL 3/SIL_{CL} 3 2/SIL_{CL} 2 for delayed contact
2	3	3 2	LC21: 2 + 1 delayed 2 + 2 delayed
1	1	1 –	
Automatic, manual	Automatic (AR), manual (MR)	Automatic, manual	Automatic, manual
X	X	X	X
25 ms	10 ms	10 ms	LC21: 25 ms 20 ms
6 A	8 A	3 A 2 A	6 A 6 A
–25 ... +55 °C	–25 ... +65 °C	0 ... +55 °C	–25 ... +55 °C –20 ... +55 °C
96.5 × 22.5 × 114 mm	96.5 × 22.5 × 114 mm	99.5 × 22.5 × 111.5 mm	96.5 × 22.5 × 114 mm 96.5 × 22.5 × 111.5 mm
CE cULus TÜV	CE cULus TÜV	CE cULus TÜV TÜV	CE cULus TÜV
E-Stop safety switches: – with relay contacts – with OSSD outputs – with reed contacts Safety light curtain Safety laser scanner	E-Stop safety switches: – with relay contacts – with OSSD outputs – with reed contacts Safety light curtain Safety laser scanner	E-Stop safety switches: – with relay contacts – with OSSD outputs – with reed contacts Safety light curtain Safety laser scanner	E-Stop safety switches: – with relay contacts – with OSSD outputs Safety light curtain Safety laser scanner
		SR5: 2 inputs (1- or 2-channel) for parallel evaluation of 2 sensors	Delay 0.15 – 3 s (MSI-SR-LC21DT03) Delay: 1.5 – 30 s (MSI-SR-LC21DT30) Delay: 0.1 – 30 s. (MSI-DT-30)

	MSI-RM2 MSI-SR-CM32	MSI-SR-CM42R
Specifications		
Device type / function	Output extension for OSSDs	Contact extension
Category / Performance Level (PL) in accordance with EN ISO 13849-1	4 / PL e	4 / PL e
SIL in accordance with IEC 61508 and EN IEC 62061 (SILCL)	SIL 3 / SIL_{CL} 3	SIL 3 / SIL_{CL} 3
Number of release contacts (NO contact)	2 (change-over contact) 3	2 × 2
Number of signal contacts (NC contact)	1 2	2 × 1
Start / restart	Automatic	Automatic
Contactor monitoring (EDM)		
Regression delay	10 ms 20 ms	15 ms
Max. continuous current per path	3 A 6 A	6 A
Ambient temperature, operation	0 ... +50 °C –25 ... +55 °C	–25 ... +65 °C
Dimensions (with screw terminals)	99 × 17.5 × 111.5 mm 96.5 × 22.5 × 114 mm	96.5 × 22.5 × 114 mm
Certifications	CE cULus CE cULus	CE cULus
Sensors / application		
	Safety light barrier Safety laser scanner Safety switch with OSSD outputs Additionally for CM 32: extension for safety PLCs	Extension for safety relays and safety PLCs
Properties		
		2 extensions in one device

MSI-SR-CM43	MSI-CM52	MSI-TR1/2 MSI-TRM	MSI-MD-FB
Contact extension	Contact extension	Evaluation unit for periodic testing	Muting controller
3/PL d	4/PL e	4/PL e	4/PL e
SIL 2/SIL_{CL} 2	SIL 3/SIL_{CL} 3	SIL 3/SIL_{CL} 3	SIL 3/SIL_{CL} 3
4	5	2	OSSD pair
3	2	2 (semiconductor)	–
Automatic	Automatic	Automatic, manual	Automatic, manual
		X	
40 ms	20 ms	20 ms 130 ms	
6 A	6 A	3 A	
–25 ... +55 °C	–20 ... +55 °C	–30 ... +60 °C –25 ... +55 °C	–30 ... +60 °C
96.5 × 22.5 × 114 mm	96.5 × 22.5 × 114.5 mm	99 × 22.5 × 111.5 mm	225 × 60 × 37 mm
CE cULus FS	CE cULus TÜV	CE cULus TÜV CE TÜV (in combination with SLS 46C)	CE cSAus TÜV
Extension for safety relays and safety PLCs	Extension for safety relays and safety PLCs	Testable optoelectronic protective devices of type 2 (MSI-TR1/2) Testable optoelectronic protective devices of type 4 (MSI-TRM)	Single light beam safety devices Multiple light beam safety devices Safety light curtains, each with muting sensors
		1 or 2 input circuits, up to 3 sensors each | Filter time 130 ms (TR2)	

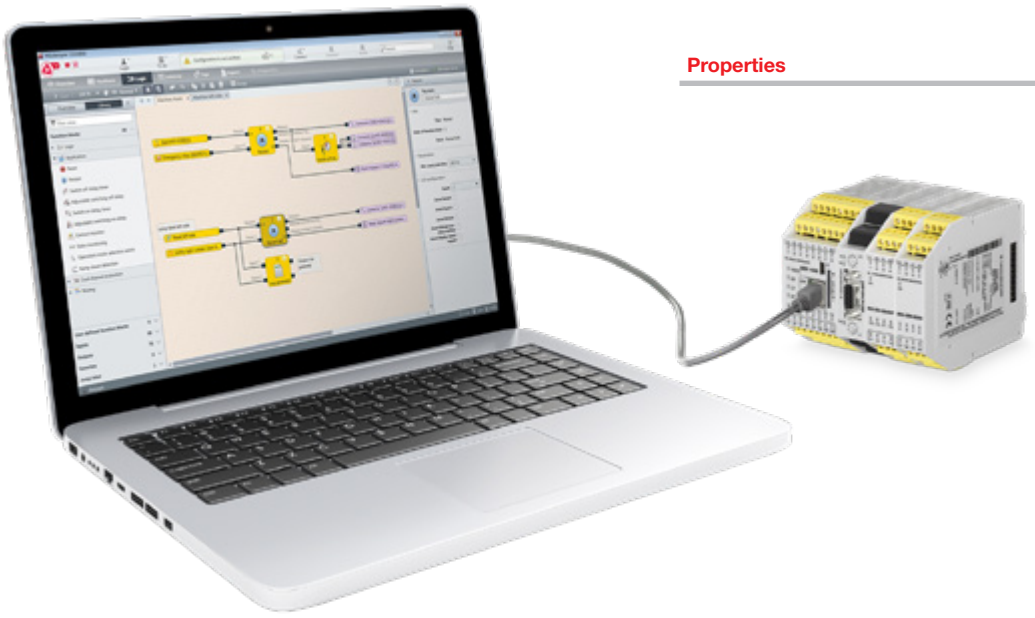
Programmable safety controls

MSI 410

Specifications	
Device type / function	Safety control base module
Category / Performance Level (PL) in accordance with EN ISO 13849-1	4 / PL e
SIL in accordance with IEC 61508 or EN IEC 62061 (SILCL)	3
Inputs / outputs / Inputs or outputs, configurable	20 / 4 / –
Maximum switching power per output	4 A
Test outputs / signal generators	4 / 4
Interfaces	USB mini
Fieldbus protocols	
Supply voltage	16.8 … 30 V DC
Ambient temperature, operation	
Dimensions	45 × 96 × 115 mm
Certifications	CE cULus TÜV FS
Functions	
	40 certified function blocks | Expandable to up to 116 safe inputs / 56 safe outputs and 2 gateway modules | F50 model with special function blocks for press control and safe movement monitoring, such as SLS, SSM, SSR acc. to EN61800-5-2
Properties	
	Configuration via MSI.designer configuration software (license-free): supports up to 300 function blocks in one project, integrated simulation with logic analyzer, configurable report, online diagnosis | Removable program memory in SD card format, 512 MB | Designs with screw or spring-cage terminals

MSI.designer

- Easy hardware configuration
- Simple logic programming
- Simulation and logic analysis for testing the safety function right from a PC
- Force mode for detailed function tests
- Configurable report for professional and well-organized documentation
- Online diagnosis for a fast state overview, including remote maintenance

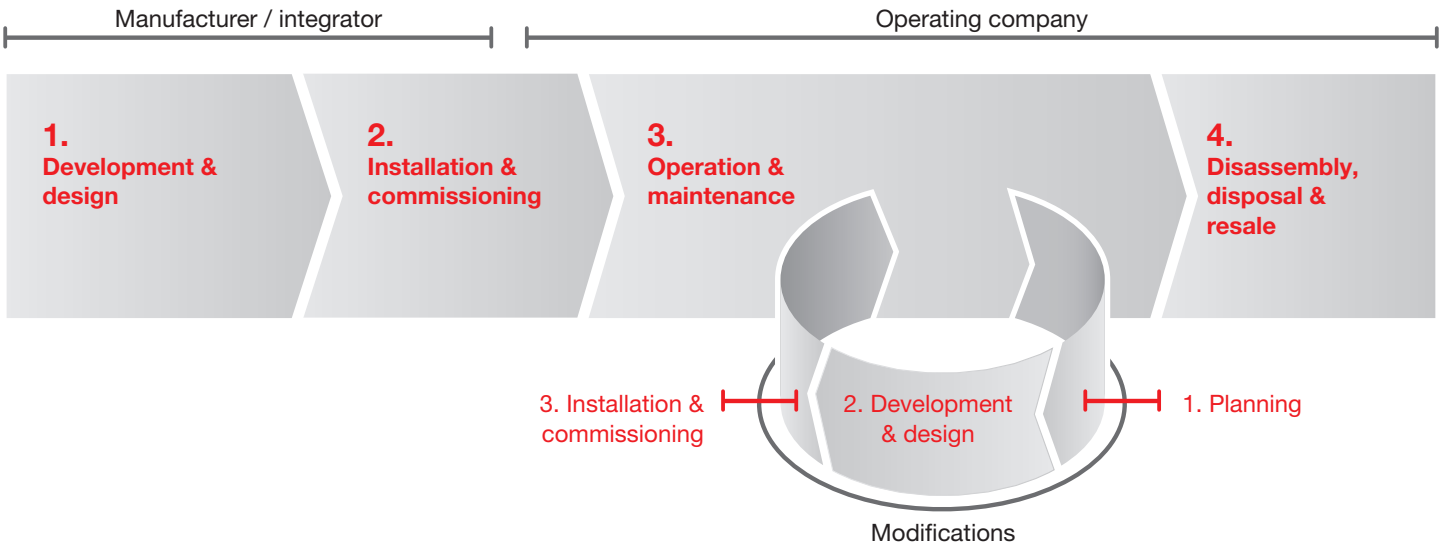


MSI 420 MSI 430	MSI-EM-I8 MSI-EM-I084	MSI-EM-IO84NP	MSI-FB-EtherCAT MSI-FB-PROFIBUS MSI-FB-CANopen
Safety control base module	Safe extension module	Non-safe extension module	Gateway
4 / PL e	4 / PL e		
3	3		
16 / 4 / 4	8 / – / – 8 / 4 / –	4 / 4 / 4	
4 A	4 A	0.5 A	
4 / 4	8 / 2 (EM-I8) 2 / 2 (EM-IO84)		
USB mini, Ethernet TCP/IP			2x RJ45 socket 1x RS485 (Sub-D) screw terminal, 5-pin
MSI 430: PROFINET IO, EtherNet/IP and Modbus TCP integrated			EtherCAT PROFIBUS-DP CANopen
16.8 … 30 V DC	16.8 … 30 V DC	16.8 … 30 V DC	Via base module
45 × 96 × 115 mm	22.5 × 93.7 × 120.8 mm	22.5 × 93.7 × 120.8 mm	22.5 × 96.5 × 121 mm
CE c UL us	CE c UL us	CE c UL us	CE c UL us
40 certified function blocks | Expandable to up to 116 safe inputs / 56 safe outputs and 2 gateway modules | F50 model with special function blocks for press control and safe movement monitoring, such as SLS, SSM, SSR acc. to EN61800-5-2	Safe extension modules | Each base module can be expanded by up to 12 freely selectable extension modules	Non-safe extension modules for economical actuation of non-safety relevant elements (e.g., signal lights) | Each base module can be expanded by up to 12 freely selectable extension modules	Each base module can be expanded with up to 2 gateway modules
Configuration via MSI.designer configuration software (license-free): supports up to 300 function blocks in one project, integrated simulation with logic analyzer, configurable report, online diagnosis | Removable program memory in SD card format, 512 MB | Designs with screw or spring-cage terminals			

Machine Safety Services

Sustainable machine safety begins with professional planning of the safety systems and spans the entire lifecycle of a machine. Our teams of experienced and certified experts offer the appropriate support here.

Stages of a machine life cycle



When designing and constructing machines, we create the safety-related concept together with you and support you in its realization. During operation, we regularly perform tests to ensure the permanent function of the safety systems. If changes are made to existing machines, we provide you with support on everything from the safety-related planning to renewed commissioning.

Through our services, you benefit from our many years of experience in the area of machine safety and our extensive industry and application knowledge. Efficient safety-related solutions for every phase of a machine's life cycle are thereby created together.

Our service offerings

Status check: ‘safety technology on machines and systems’

— Our experts analyze the safety-related condition of your machinery and check whether the current safety-related requirements are satisfied in accordance with the current state of the art.
— In the event of deviations, we provide recommendations on what corrections can be performed so as to comply with legal requirements.

Risk assessment and hazard evaluation

In accordance with applicable directives, the manufacturer of a machine is required to perform a risk assessment. This also applies in the case of significant modifications or extensions of machines.

The national regulations for the operation of machines require employers to conduct a hazard evaluation before using work equipment and to update this assessment at regular intervals according to the current state of the art.

— Our experts support you in identifying the dangers, in assessing and evaluating the risks as well as in defining the risk-reducing measures.

Inspection of protective devices

— Within the scope of the initial or regular inspection, we check the condition, mounting and correct function of the protective device as well as the correct integration in the safe part of the machine control
— We summarize the results of the tests in a detailed report.
If necessary, this includes practically oriented suggestions on how deviations can be corrected.

Stopping time measurement

For the correct placement of the protective device, the required minimum distance between protective device and dangerous movements is to be calculated. To do this, the stopping time of the machine must be known. With the stopping time measurement, we determine this value reliably.

— By measuring the stopping time within the scope of regular inspections, any wear, such in brake components, can be detected in good time.

Status check: ‘CE marking of machines’

During the development of machines, the specifications from the machinery directive must be adhered to and documented by the manufacturer. This is confirmed with the Declaration of Conformity and the CE marking.

— We check the documentation for completeness and give recommendations of how any deviations can be corrected.

Conformity assessment in accordance with the European machinery directive

The machinery directive defines the procedure for the design and construction of machines for satisfying the applicable safety and health protection requirements. This is a prerequisite for the Declaration of Conformity and the CE marking.

— We help you comply with and implement the legal requirements of the machinery directive.

Safety concept and safety design

The measures necessary for risk minimization are known from the risk analysis.
The safety concept and the safety functions are developed on the basis of these requirements.

— With our extensive industry knowledge and our many years of safety-related experience, we create practically oriented concept proposals for you and support you during their implementation.

Verification and validation

To avoid errors during the implementation of safety functions, both the hardware as well as the software must be checked to determine whether the requirements of the functional specification were met completely and correctly. The function test of all safety functions is to be performed according to the validation plan.

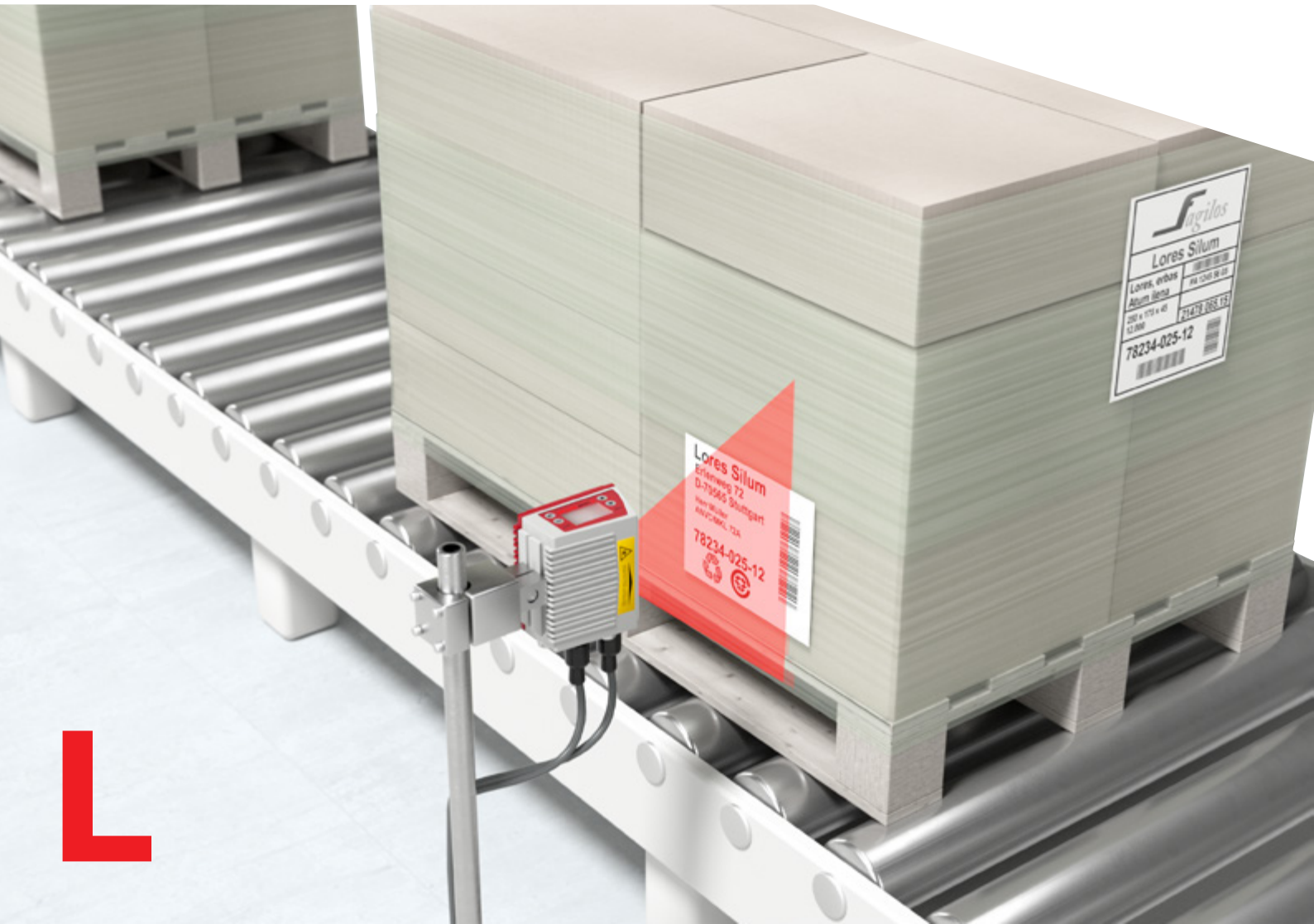
— We support you during the planning, development and execution of the function tests as well as with the creation of the required documentation.

Identification

Reliably detected:
Automatic bar code identification for continuous traceability

In many areas of production and logistics, goods and materials are labeled with bar codes or 2D-codes. They are used for identification in the automation process and simultaneously ensure the traceability of the production and packaging process of every single product.

We offer various technologies for reading these codes: e.g. mobile hand-held scanners for bar codes, 2D-codes or DPM codes, stationary laser scanners in line or raster scanner versions as well as high-speed scanners or scanners for the deep-freeze area with integrated heating.



Precise bar code reader:
the latest technology and numerous equipment options

For gapless product traceability, automatic identification of 1D- or 2D-codes is essential. The BCL 300i stationary bar code reader is used primarily for the reliable identification of bar codes on containers and packages.

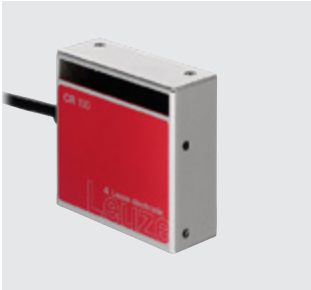
With the innovative code reconstruction technology, even soiled or damaged codes can be reliably detected. This increases system availability.

Through the modular design with many equipment options, the BCL 300i can be adapted flexibly and optimally to your specific application.

BCL 300*i*

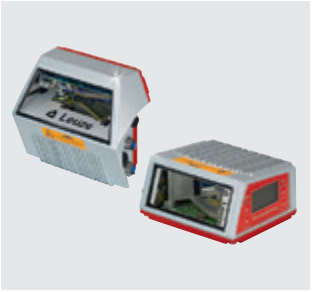
- Modular connection technology through pluggable connection hoods
- Integrated fieldbus interfaces, such as PROFINET or Ethernet IP
- Variants as line scanners, raster scanners, deflecting and oscillating mirrors available
- Code reconstruction technology (CRT) for reliable identification of damaged codes
- Optionally with display and heating

Stationary bar code readers

	CR 50, 55 Bar code readers	**CR 100** Bar code readers	**BCL 8** Bar code readers
			
Specifications			
Reading distance (dependent on version)	50–230 mm	15–67 mm	40–160 mm
Smallest resolution	0.127 mm	0.15 mm	0.125 mm
Scanning rate	330 scans/s	700 scans/s	600 / 500 scans/s
Optics models	M	M	N, M
Reading method	Single line scanner	Single line scanner Deflecting mirror	Single line scanner Deflecting mirror
Inputs/outputs	1 / 1	1 / 1	1 / 1
Interfaces	**Integrated:** RS 232 USB	**Integrated:** RS 232 USB	**Integrated:** RS 232
Connectivity			**With MA 8 connection unit (point to point)** RS 485 **With MA 200i connection unit** PROFINET IO/RT, PROFIBUS, Ethernet TCP/IP, UDP, EtherNet/IP EtherCAT, DeviceNet, CANopen
Supply voltage	5 V DC	5 V DC	5 V DC (10–30 V DC via MA)
Degree of protection	IP 54	IP 40	IP 67
Network master			MA 31
Certifications	CE cULus	CE cULus	CE CDRH cULus
Accessories			
Optional	MA-CR adapter circuit board for test purposes	MA-CR adapter circuit board for test purposes	
Mounting devices			BT 8
Properties			
	Very small construction | Configurable operating modes, including – among others – presentation mode	Output format selectable | Alignment mode | LED indicator | Large reading field even at close range	Reads all common 1D-codes including Pharmacode | Robust industrial version in a metal housing – IP 67 | M12 connection type or cable variant | Reference code comparison

BCL 92 / BCL 95 Bar code readers	**BCL 148** Bar code readers	**BCL 300i** Bar code readers	**BCL 500i** Bar code readers
25 – 250 mm	30 – 310 mm	20 – 700 mm	200 – 2,400 mm
0.15 mm	0.127 mm	0.127 mm	0.2 mm
600 scans/s	750 scans/s	1,000 scans/s	1,000 scans/s
M	Focus adjustment	N, M, F, L, J	N, M, F, L
Single line scanner Deflecting mirror	Single line scanner Deflecting mirror	Single line scanner Raster scanner Deflecting mirror Oscillating mirror Code reconstruction technology	Single line scanner Oscillating mirror Code reconstruction technology
2/2 | 1/1	1 / 1	1 / 1	2 / 2
Integrated: RS 232	**Integrated:** RS 232 / 485	**Integrated:** RS 232 / 485 / 422 multiNet PROFIBUS PROFINET IO/RT Ethernet TCP/IP, UDP Ethernet IP EtherCAT	**Integrated:** RS 232 / 485 / 422 multiNet PROFIBUS PROFINET IO/RT Ethernet TCP/IP, UDP Ethernet IP
		With MA 200i connection unit DeviceNet, CANopen	**With MA 200i connection unit** EtherCAT, DeviceNet, CANopen
10 – 30 V DC / 5V DC	18 – 30 V DC	18 – 30 V DC	10 – 30 V DC
IP 54	IP 65	IP 65	IP 65
		MA 31	Integrated
CE CDRH c UL us	CE CDRH c UL us	CE CDRH c UL us	CE CDRH c UL us
		BT 56, BT 59, BT 300 W, BT 300	BT 56, BT 59
Reads all common 1D-codes including Pharmacode | M12 connection type or cable variant | Reference code comparison	Reads all common 1D-codes | Robust industrial version in a metal housing – IP 65 | Connection type: cable tail with connector	Integrated fieldbus connectivity | Code reconstruction technology (CRT) | Available as a front scanner, deflecting mirror and oscillating mirror model | Simple configuration via USB interface without additional software or GSD/GSDML file | Modular connection type via M12 hood with integrated connectors, terminal hood or cable hood | Optional with display and as heating model	"webConfig" software integrated in the device permits configuration via USB interface without additional software | Multiple language menu-driven display | M12 connection type | Integrated fieldbus connectivity for convenient fieldbus link, networking and configuration via the GSD/GSDML file | Code reconstruction technology (CRT) for reliable identification of damaged codes | Optional heating models to –35 °C

Stationary bar code readers

	BCL 600i Bar code readers	**BCL 900i** Bar code readers
		
Specifications		
Reading distance (dependent on version)	300 – 1,500 mm	450 – 1,700 mm
Smallest resolution	0.25 mm	0.33 mm
Scanning rate	800 – 1,000 scans/s	1,000 scans/s
Optics models	M, F	M
Reading method	Single line scanner Oscillating mirror Code reconstruction technology	Single line scanner Code reconstruction technology
Inputs/outputs	2 / 2	3 / 2
Interfaces	**Integrated:** RS 232 / 485 / 422 multiNet PROFIBUS PROFINET IO/RT Ethernet TCP/IP, UDP	**Integrated:** RS 232 / 422 Ethernet TCP/IP, UDP Ethernet IP
Connectivity	**With MA 200i connection unit** EtherCAT, DeviceNet, CANopen	**With MA 900 connection unit** RS 232 / 422, Ethernet TCP/IP, UDP, Ethernet/IP, **With MA 200i connection unit** PROFINET IO/RT, PROFIBUS, EtherCAT, DeviceNet, CANopen
Supply voltage	10 – 30 V DC	10 – 30 V DC
Degree of protection	IP 65	IP 65
Network master	Integrated	MA 31
Certifications	CE CDRH c UL us	CE CDRH SP c us
Accessories		
Optional		Ext. parameter memory
Mounting devices	BT 56, BT 59	BT 900
Properties		
	“webConfig” software integrated in the device permits configuration via USB interface without additional software | Multiple language menu-driven display | M12 connection type | Integrated fieldbus connectivity for convenient fieldbus link and networking | Code reconstruction technology (CRT) for reliable identification of damaged codes | Optimized for modules from 0.25 to 0.5 mm	Code reconstruction technology (CRT) | Optionally as modular scanner portal (MSP) system

Stationary 2D-code readers

	LSIS 220 Stationary 2D-code readers	**DCR 200i** Stationary 2D-code readers	**LSIS 422** Stationary 2D-code readers (C-mount model)
Typical applications			
Code reading	Data Matrix, bar code, QR-Code, PDF 417, Aztec, GS1 Databar	Data Matrix, bar code, QR-Code, Pharmacode, Aztec, GS1 Databar	Data Matrix Code, bar code, Pharmacode
Sensor / cameras	CMOS (Global Shutter)	CMOS (Global Shutter)	CMOS (Global Shutter)
Resolution (pixel)	844 × 640	1,280 × 960	752 × 480
Focal point	127 mm	U optics: 50 mm N optics: 70 mm M optics: 105 mm F optics: 185 mm L optics: 285 mm	50 mm … ∞ (focal length 8 mm) 75 mm … ∞ (focal length 16 mm)
Interfaces	**Integrated:** RS 232 USB	**Integrated:** Ethernet TCP/IP, UDP PROFINET IO/RT RS 232 RS 422	**Integrated:** Ethernet RS 232 TCP/IP , UDP
Connectivity	**With MA 21 connection unit** multiNet **With MA 200i connection unit** PROFINET IO/RT PROFIBUS Ethernet TCP/IP, UDP, IP EtherCAT DeviceNet CANopen	**With MA 200i connection unit** PROFIBUS Ethernet TCP/IP, UDP, IP EtherCAT DeviceNet CANopen	**With MA 21 connection unit** multiNet **With MA 200i connection unit** PROFINET IO/RT PROFIBUS EtherCAT DeviceNet CANopen
Digital inputs/outputs	1 / 1	2 / 2	8, configurable
Number of test routines	Memory capacity for 1 parameter set in the camera	Memory capacity for 1 parameter set in the camera	Typically 10 to 60, depending on scope of test
Configuration / Operating system	Configuration via bar code or PC with setup program	Configuration via configuration codes or via PC using standard web browser without software to be installed additionally (web-Config tool)	Configuration via PC using standard Web browser without software to be installed additionally (webConfig tool)
Options	Optional: connection cables. Mounting devices: BTU 300M, BT 8-0	Optional: connection cables | Optical filters. Housing hoods | External illumination | Mounting devices: BTU 320M-D12, BT 320M. MA 150 modular connection unit	Reading of directly marked Data Matrix Codes | Multiple code reading | Display of the code content | Evaluation of the code quality of printed codes | Reference code comparison | Image memory | Optional: connection cables, optical filters | Mounting devices: BT 56, BT 59
Dimensions, W × H × D	47 × 40 × 32 mm	43 × 61 × 44 mm	75 × 113 × 55 mm 75 × 113 × 106 mm
Certifications	CE c UL us	CE c UL us	CE c UL us
Properties			
	Camera system for omnidirectional reading of bar codes and 2D-codes | Integrated illumination and decoder | Degree of protection IP 65	Camera system for omnidirectional reading of bar codes, stacked codes and 2D-codes | Integrated illumination (type-dependent: red or IR) | High object speed of up to 7 m/s | Integrated teach functions for simple adjustments via buttons | Optional robust stainless steel housing | Optional with NPN switching inputs/outputs	Camera system for omnidirectional reading of bar codes and 2D-codes | Integrated illumination (depends on type: white, IR or RGBW) and decoder | Degree of protection IP 65 / IP 67 | Flexible use through motor-driven focus adjustment

Stationary
2D-code readers

DCR 50, 55
Stationary
2D-code readers

Typical applications	
Code reading	All common 1D-codes such as EAN/UPC GS1 DataBar, Pharma-code and all common 2D-codes such as Data Matrix, QR code or Aztec
Sensor / cameras	CMOS (Rolling Shutter)
Resolution (pixel)	1280 × 960
Focal point	85 mm
Interfaces	**Integrated:** RS 232, USB (DCR 55)
Digital inputs/outputs	1 / 1
Configuration / Operating system	Configuration with the "Leuze Sensor Studio" | Alternatively, via online commands or configuration codes
Options	MA-CR adapter circuit board for test purposes
Dimensions, W × H × D	31.6 × 12.7 × 27.5 mm 31.5 × 20 × 40.3 mm
Certifications	CE c UL US*

Properties	
	Compact code reader as module or in aluminum housing | CMOS imager and integrated decoder for all commonly used 1D and 2D codes | RS 232 or USB interface, one trigger input, one switching output, degree of protection IP 54

* only DCR 55

RFID systems

	RFI 32 Stationary RFID readers	**RFM 12, 32, 62** Stationary RFID read/write systems
Specifications		
Working frequency	125 kHz	13.56 MHz
Max. RFID reading distance	80 mm	400 mm
Max. speed	6.0 m/s	6.0 m/s
Interfaces	**Integrated:** RS 232	**Integrated:** RS 232
Connectivity	**With MA 21 connection unit** multiNet **With MA 200i connection unit** PROFINET IO/RT PROFIBUS Ethernet TCP/IP, UDP EtherCAT DeviceNet EtherNet/IP CANopen	**With MA 21 connection unit** multiNet **With MA 200i connection unit** PROFINET IO/RT PROFIBUS Ethernet TCP/IP, UDP EtherCAT DeviceNet EtherNet/IP CANopen
Function	RFID reading	RFID reading / writing
Possible transponder types	– Disc – High temperature proof up to 200 °C	– Disc – High temperature proof up to 250 °C – Smart label
Supply voltage	12 – 30 V DC	12 – 30 V DC
Degree of protection	IP 65	IP 65 / IP 67
Certifications	CE	CE
Properties		
	Compact RFID reading unit | High degree of protection for tough industrial application | Mounting also in between conveyor rollers	Compact RFID write/read unit | High degree of protection for tough industrial application | Mounting also in between conveyor rollers | RFM 32 is also available as device with Ex certification

Mobile code readers

	IT 1300g Bar code hand-held readers	**IT 1470g, 1472g** Bar code hand-held readers	**IT 1280i, IT 1910i-1D, IT 1911i-1D** Bar code hand-held readers
Specifications			
Reading method	Line imager	Area imager / With Bluetooth	Laser/area imager / With Bluetooth
Reading distance	10–660 mm	18–400 mm	20–4,600 mm
Interfaces	**Integrated:** RS 232 / USB Keyboard Wedge PS 2	**Integrated:** RS 232 / USB Keyboard Wedge PS 2	**Integrated:** RS 232 / USB Keyboard Wedge PS 2
Connectivity	**With MA 21 connection unit** multiNet **With MA 200i connection unit** PROFINET IO/RT PROFIBUS Ethernet TCP/IP, UDP EtherCAT DeviceNet CANopen	**With MA 21 connection unit** multiNet **With MA 200i connection unit** PROFINET IO/RT PROFIBUS Ethernet TCP/IP, UDP EtherCAT DeviceNet CANopen	**With MA 21 connection unit** multiNet **With MA 200i connection unit** PROFINET IO/RT PROFIBUS Ethernet TCP/IP, UDP EtherCAT DeviceNet CANopen
Accessories	Cable for: RS 232, USB, Keyboard-Wedge; desktop support, wall support, power supply unit	Cable for: RS 232, USB, Keyboard-Wedge; desktop support, wall support, power supply unit	Cable for: RS 232, USB, Keyboard-Wedge; desktop support, wall support, power supply unit
Supply voltage	4.5–5.5 V DC	4.5–5.5 V DC	4.5–5.5 V DC
Area of application	Degree of protection IP 41	Degree of protection IP 41	Tough industrial use Degree of protection IP 65
Code types	Bar codes	Bar codes	Bar codes
Certifications	CE	CE	CE
Properties			
	Large reading field for bar code detection | Ergonomic and robust housing | Operating temperature 0 °C … +50 °C	Large reading field for bar code detection | Ergonomic and robust housing | Operating temperature 0 °C … +45 °C	Large reading field for bar code detection | Ergonomic and very robust housing for rough applications | Operating temperature from –30 °C … +50 °C (IT 1280i, IT 1910i-1D) –20 °C … +50 °C (IT1911i-1D)

IT 1950g, 1952g
Mobile 2D-code readers

Area imager	With Bluetooth
0–820 mm	
Integrated: RS 232 / USB Keyboard Wedge PS 2	
With MA 21 connection unit multiNet **With MA 200i connection unit** PROFINET IO/RT PROFIBUS Ethernet TCP/IP, UDP EtherCAT DeviceNet CANopen	
Cable for: RS 232, USB, Keyboard-Wedge; holder, power supply unit, base station	
4.5–5.5 V DC	
High-contrast codes Degree of protection IP 41	
Bar codes and 2D-codes	
CE	
Large reading field for detection of high-contrast codes | Ergonomic and robust housing | Operating temperature 0 °C … +50 °C	

IT 1910i, 1911i
IT 1980i, 1981i
Mobile 2D-code readers

Area imager	With Bluetooth
25–16,000 mm	
Integrated: RS 232 / USB Keyboard Wedge PS 2	
With MA 21 connection unit multiNet **With MA 200i connection unit** PROFINET IO/RT PROFIBUS Ethernet TCP/IP, UDP EtherCAT DeviceNet CANopen	
Cable for: RS 232, USB, Keyboard-Wedge; holder, power supply unit, base station	
4.5–5.5 V DC	
Tough industrial use High-contrast codes Degree of protection IP 65	
Bar codes and 2D-codes	
CE	
Large reading field for detection of high-contrast codes | Ergonomic and very robust housing for rough applications | Operating temperature from –30 °C … +50 °C (IT 1910i, IT 1980i), –20 °C … +50 °C (IT 1911i, IT 1981i)	

IT 1920i
Mobile 2D-code readers

Area imager
0–170 mm
Integrated: RS 232 / USB Keyboard Wedge PS 2
With MA 21 connection unit multiNet **With MA 200i connection unit** PROFINET IO/RT PROFIBUS Ethernet TCP/IP, UDP EtherCAT DeviceNet CANopen
Cable for: RS 232, USB; power supply unit, mounting bracket
4.5–5.5 V DC
Reading of directly marked codes (laser or matrix printed) with low contrast Degree of protection IP 65
Bar codes and directly marked 2D-codes
CE
High resolution for directly marked parts (laser or matrix printed) and labels | Ergonomic and robust housing | Operating temperature 30 °C … +50 °C

HS 6608, HS 6678
Mobile 2D-code readers

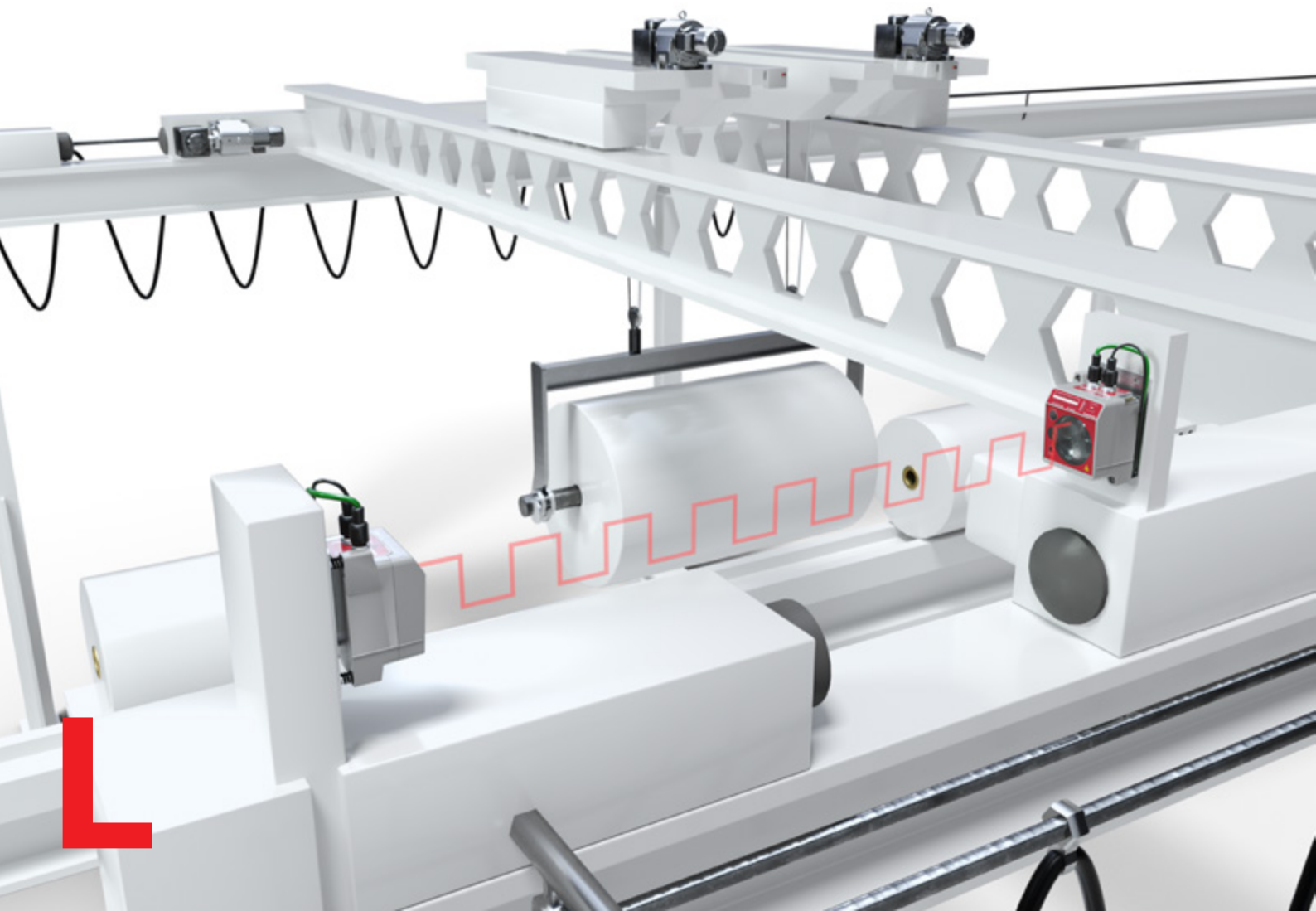
Area imager	With Bluetooth
0–147 mm	
Integrated: RS 232 / USB	
With MA 21 connection unit multiNet **With MA 200i connection unit** PROFINET IO/RT PROFIBUS Ethernet TCP/IP, UDP EtherCAT DeviceNet CANopen	
Cable for: RS 232, USB, Keyboard-Wedge; holder, power supply unit, base station	
4.5–5.5 V DC	
Tough industrial use Reading of directly marked codes (laser or matrix printed) with low contrast Degree of protection IP 65, IP 67	
Bar codes and directly marked 2D-codes	
CE	
High resolution for directl marked codes | Display for successful reading with LED, signal tone and vibration | Ergonomic and robust housing | Operating temperature –30 °C … +50 °C (HS 6608) –20 °C … +50 °C (HS 6678)	

Data transmission

Contact-free transmission of information by means of infrared light

Optical data transmission enables transparent, contact-free and wear-free transmission of industrial Ethernet protocols through light emissions.

This technology is used with high-bay storage devices, side-tracking skates, electroplating plants as well as gantry cranes. We offer optical data transceivers with various operating ranges and different Ethernet networks. The sensors are characterized by their easy alignment with integrated laser alignment aid, an integrated diagnosis function as well as a bar graph indicator, thereby allowing them to be quickly put into operation.



Data transmission photoelectric sensor with integrated web server for remote diagnosis

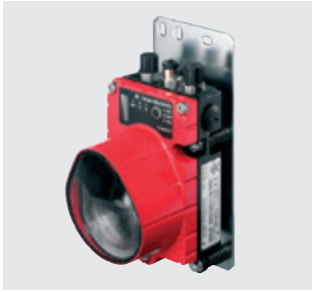
With a bandwidth of 100 Mbit/s, the DDLS 500 data transmission photoelectric sensor enables contact-free communication wherever WLAN or wired transmission systems are pushed to their limits. The integrated web server, which can handle remote diagnosis, is globally unique.

The DDLS 500 also stands out as a PROFINET participant with real-time data transmission over 200 meters. Models available with various operating ranges and interface protocols. Furthermore, we offer optional equipment features, such as a laser pointer for alignment or optics heating.

DDLS 500

- Pre-mounted mounting and alignment plate
- Operating ranges of 40 m, 120 m and 200 m
- Optionally with heating, web server and laser alignment aid
- Can be used for all industrial Ethernet networks as well as TCP/IP communication

Optical data transmission

	DDLS 200 Optical data transmission	**DDLS 500** Optical data transmission
		
Specifications		
Operating range	120, 200, 300, 500 m	40, 120, 200 m
Light source	Infrared LED	Infrared laser (laser class 1)
Transmission rate	2 Mbit/s	100 Mbit/s
Interfaces	PROFIBUS CAN DeviceNet Interbus Rockwell DH+ or RIO RS 422	PROFINET EtherNet IP EtherNet TCP/IP EtherCAT UDP
Degree of protection	IP 65	IP 65
Supply voltage	18–30 V DC	18–30 V DC
Operating temperature	–5 °C … +50 °C (–30 °C … +50 °C with heating)	–5 °C … +50 °C (–35 °C … +50 °C with heating)
Certifications	CE c UL us	CE CDRH c UL us
Properties		
	No-contact, wear-free data transmission | Integrated mounting and alignment plate | Optionally with heating	Transparent, real-time transmission of all TCP/IP- and UDP-based protocols | Very simple diagnosis of the transmission technology | Pre-mounted and complete delivery of all mounting and alignment elements | Integrated laser pointer for simple alignment (available optionally) | Simple remote diagnosis via web browser-based user interface (available optionally) | Device models as PROFINET network participants

H06
H07

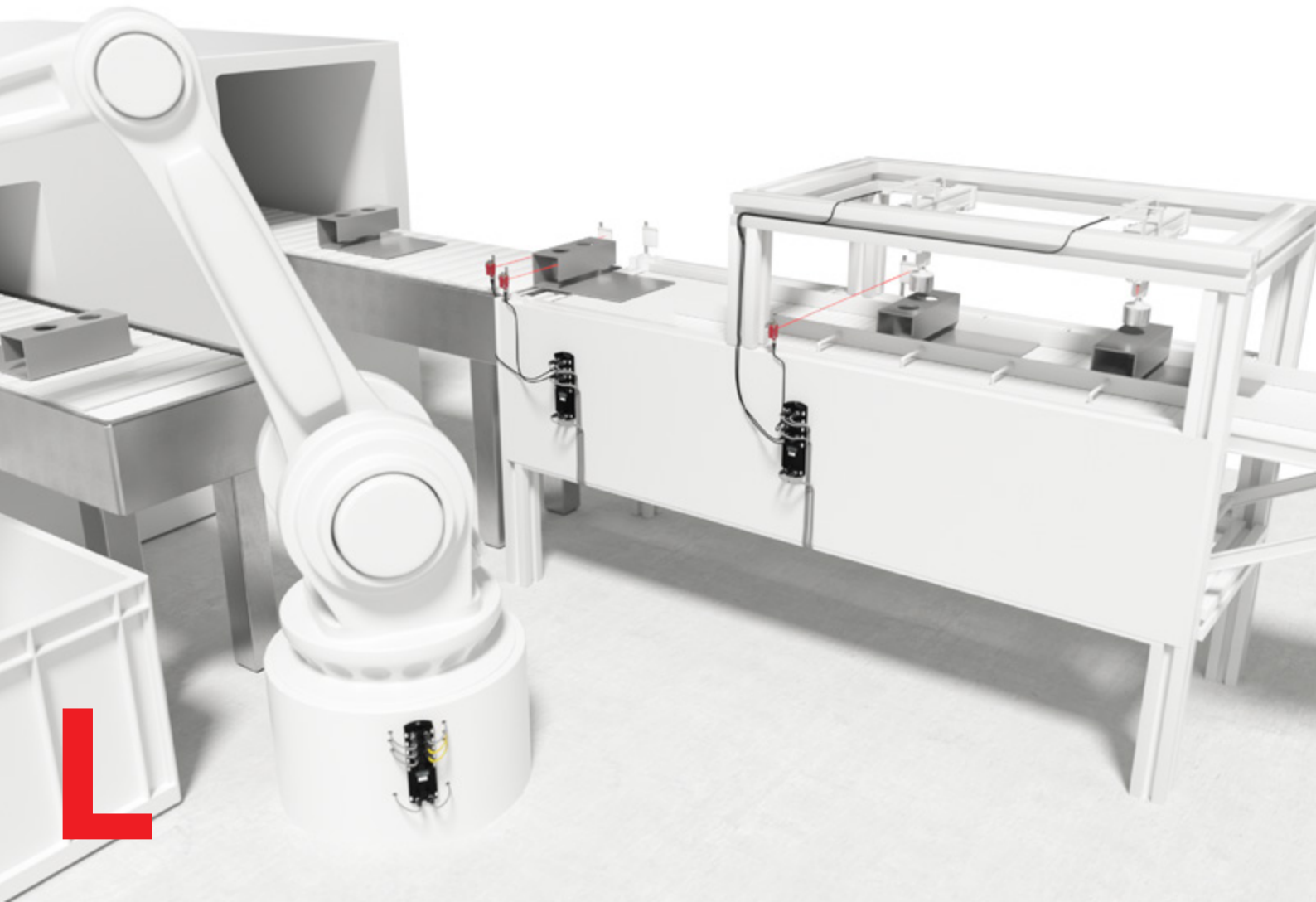
Network and connection technology

Correctly connected: with our extensive range of connections for all areas of automation

Sensors are integrated in control and automation processes using connection technology. Depending on production conditions, the connection types have different advantages.

We offer you an extensive range of connections, from the cable, to the connector and connection box to the IO-Link master for applications without primary control or hybrid solutions.

The connectors and interconnection cables are available in various materials and versions for all requirements and applications in the area of automation. Our wide product range affords you maximum flexibility in the planning of your machine.



Flexible communication: from the field to the cloud.
For applications without primary control or hybrid solutions

With the MD 700 and MD 200, we have IO-Link masters that offer an OPC-UA interface in addition to real-time-capable fieldbus protocols, making them ideal for cloud-based applications as well.

The completely web-based configuration concept offers an optimum stand-alone solution.

IO-Link master with OPC UA

- PROFINET/Ethernet IP interface for simple integration in industrial networks
- Switch cabinet model and field model
- Setup of hybrid systems – the time-critical application coordinates the control – aggregated condition data flows into the cloud
- Module cloning for device exchange and extension to new devices
- Stand-alone system with completely integrated web server, no further software necessary

Connection technology

	Sensor-actuator supply cables	Connectors for individual cable lengths	Connection cables for passive distribution boxes
Specifications			
Interfaces	Voltage supply, CANopen, DeviceNet, SSI, Interbus-S, Ethernet, PROFIBUS DP, PROFINET	Voltage supply, CANopen, DeviceNet, SSI, Interbus-S, Ethernet, PROFIBUS DP, PROFINET	Voltage supply, signal transmission
Screw fitting	Brass, nickel-plated, stainless steel	Brass, nickel-plated, stainless steel	Brass, nickel-plated, stainless steel
No. of pins	3-, 4-, 5-, 8-, 12-pin	3-, 4-, 5-, 8-pin	8-, 12-, 19-pin
Lengths	2, 5, 10 m (other lengths on request)	–	5, 10, 15 m (other lengths on request)
Shield	Shielded, conducted via the knurling / unshielded	Shielded, conducted via the knurling / unshielded	Unshielded
Degree of protection (only in the screwed-down state with the corresponding mating parts)	IP 65 / 67 / 69K	IP 65 / 67	IP 65 / 67 / 69K
Mechanical life time	> 100 mating cycles	> 100 mating cycles	> 100 mating cycles
Certifications	CE c UL us	CE c UL us	CE c UL us
Functions			
	Sensor-actuator voltage supply, signal transmission	Sensor-actuator voltage supply, signal transmission	Sensor-actuator voltage supply, signal transmission
Properties			
	Standardized product range for the connection of sensors | M8 and M12 connection cables for the connection of sensors in industrial environments | Select from 3-, 4-, 5-, 8-, 12-wire cables | Cables made of PUR, PVC, TPE and connectors with or without LED, angled or straight – high flexibility for many applications | Sensor-actuator cables satisfy the highest demands, are shock and vibration resistant, offer very bright LEDs and satisfy degrees of protection IP 65 and IP 67 (optionally IP 69K)	User-configurable connectors afford maximum flexibility when planning the machine | Individual cable lengths possible	Proper connection cable for passive distribution boxes | M12 or M23 – in 8- 12- or 19-pin version, straight or angled, cables made of PUR or PVC – high flexibility for many applications

	Passive distribution boxes	**MD 200i, 700i** IO-Link master	**MD 708** Ethernet switch
Specifications			
Interfaces	Voltage supply	PROFINET IO-Link master EtherNet/IP IO-Link Master	Ethernet data interface
Screw fitting	Brass, nickel-plated, stainless steel	–	–
No. of pins	4-, 6-, 8-, 10-pin	4/8 ports, M12 8 ports, terminals, DIN rail mounting	4/8 ports, M12
Lengths	3, 5, 10 m (other lengths on request)	–	–
Shield	Unshielded	Shielded	Shielded
Degree of protection (only in the screwed-down state with the corresponding mating parts)	IP 65 / 67	IP 20, IP 65 / 67	IP 65 / 67
Mechanical life time	> 100 mating cycles	> 100 mating cycles	> 100 mating cycles
Certifications	CE c UL us CSA	CE c UL us	CE c UL us
Functions			
		OPC UA IO-Link	
Properties			
	Passive distribution boxes for easy bundling of sensors | Mounting holes in the middle and additional fixing holes on the side enable flexible mounting on all standard profiles and mounting plates | Ideal for harsh industrial conditions through vibration and shock resistance | Best fit accuracy of the connectors	For the connection of up to 8 IO-Link devices | Devices for field use or installation in switch cabinets | Parallel data exchange with control and the IT world | Models with OPC UA as standardized model for transferring data from the field level to the cloud | Stand-alone system with completely integrated web server, no further software necessary | Module cloning for device exchange and extension to new devices	Robust design for harsh conditions | Mounting holes in the middle and additional fixing holes on the side enable flexible mounting on all standard profiles and mounting plates | Compatible design | Unmanaged switch | Auto negotiation | Auto crossing | Full duplex

Modular connection units

MA 8, MA 150
Point to Point

Specifications

Connection type	1 M12 connector, 5 pin 2 sockets M12, 5 pin	1 connector, 4 M12 sockets
Interfaces	RS 232 RS 485	RS 232 RS 422
Properties	1 switching input 1 switching output	Decentralized distribution of the signals
Degree of protection	IP 54	IP 54
Certifications	CE c UL us	CE c UL us

BCL 8	KB 008 / direct (MA 8 only)	
BCL 300i		
BCL 500i		
BCL 900i		
DCR 200i	Direct (MA 150 only)	●
LSIS 222		
LSIS 4x2i		
RFI / RFM		
ODS 96		
Mobile code readers		
BPS 8	KB 008 / direct (MA 8 only)	

● The red dots denote assignment of the connection units to the relevant devices.
See catalog, for more combination possibilities.

m = multiNet

MA 100 Point-to-point multiNet slave	**MA 900** Point to Point	**MA 31** multiNet master	**MA 200i** Fieldbus gateway
Spring terminals, 5 PGs	Spring terminals, 8 PGs	Spring terminals, 5 PGs, M12 connection sets available (optional)	4x M12 1x plug connection RS 232
RS 232 RS 422 RS 485 multiNet slave	RS 232 RS 422 RS 485	RS 232 – or RS 422 –, TTY – Host multiNet master RS 485 multiNet slave Service interface RS 232 9 pin Sub-D	PROFIBUS PROFINET IO/RT Ethernet TCP/IP EtherCAT DeviceNet EtherNet/IP CANopen
1 switching input 1 switching output Network address Termination	3 switching inputs 4 switching outputs Optional external parameter memory	2 switching inputs 2 switching outputs Network address Automatic parameter memory	Integrated switch Voltage IN/OUT 1 switching input 1 switching output
IP 54	IP 65	IP 65	IP 65
CE c UL us	CE c UL us	CE	CE c UL us

					KB JST-M12A-5P-3000 connection set ●
KB 301-3000 (only MA 100)	ⓜ				KB 301-3000-MA200
KB-500-3000-Y (only MA 100)	ⓜ				KB 500-3000-Y ●
		KB 900	●		●
KB M12A-8P-MA-3000	●				KB M12-8P-MA-3000 ●
KB JST	●				KB JST-M12A-8P-Y-3000 ●
Direct	●				Direct ●
					KB-JST-3000 ●
					KB-JST-HS-300 ●
					KB JST-M12-5P-3000 ●

Industrial image processing

Picture-perfect connection: innovative smart-camera technology paired with our code-reading competence

The product family includes devices for bar code and 2D-code reading as well as powerful tools for volume monitoring via edge scanning or for completeness and presence control through BLOB analysis.

In material processing, it is often necessary to monitor areas and processes that the system operator cannot access. Also under harsh ambient conditions.
Our LCAM 408i industrial IP camera provides this insight – even in real-time.
It allows individual process steps to be checked during the production of products.

The LSIS 400i smart camera is used above all for object detection, position determination or quality assurance in manufacturing processes.

High-performance camera technology: fast identification and economical quality assurance

The LSIS 462i smart camera is used anywhere different labels must be detected and evaluated at high speed. It reads printed and directly marked 1D- or 2D-codes absolutely reliably – independent of contrast.

In addition to BLOB analysis and code reading, it is now also possible to measure distances and geometric shapes such as circles, lines and edges, with a user interface.

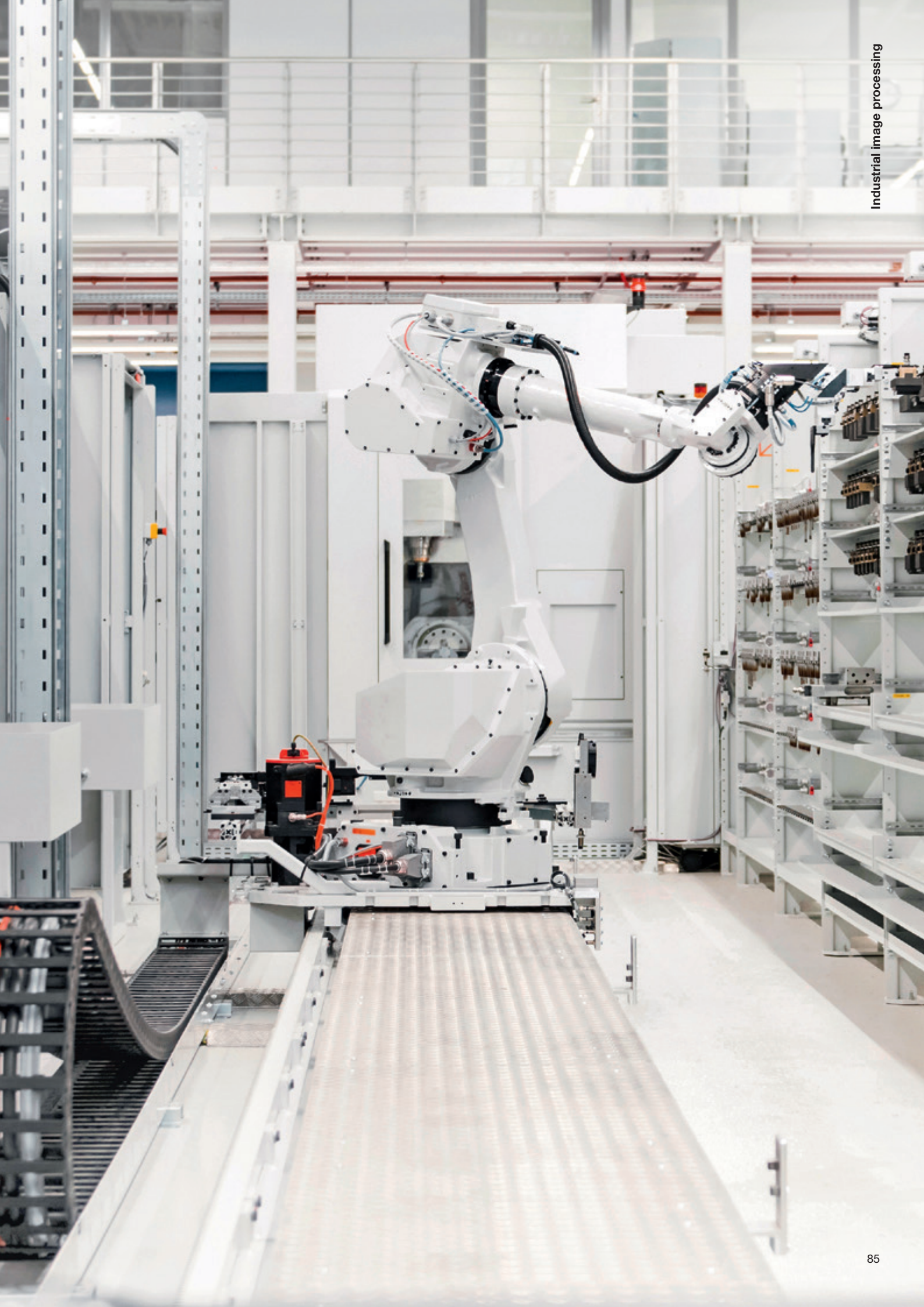
Due to the broad function range, the LSIS 462i is, in many, ways the best and most efficient solution for quality inspection, code reading and measurement tasks.

LSIS 462*i*

- 3 functions in one device (BLOB analysis, code reading, measurement through edge scanning)
- Fast integration via standard web browser
- Integrated display and well-structured software simplify operation
- All parameters are stored in the device and enable high availability
- Pulsed or continuous operation depending on the application

Smart cameras

	LSIS 412i Smart camera	**LSIS 462i** Smart camera	**LCAM 408i** Industrial IP camera
Typical applications			
Presence control / completeness monitoring	X	X	
Dimension / position monitoring	X	X	
Position and type detection	X	X	
Code reading		Data Matrix, bar code, Pharmacode	
Measurement		X	
Monitoring camera			X
Sensor / cameras	CMOS (Global Shutter)	CMOS (Global Shutter)	Color CMOS
Resolution (pixel)	752 × 480	752 × 480	2,592 × 1,944
Focal point	50 mm … ∞ (focal length 8 mm) 75 mm … ∞ (focal length 16 mm) Depends on lens with C-mount models	50 mm … ∞ (focal length 8 mm) 75 mm … ∞ (focal length 16 mm) Depends on lens with C-mount models	500 mm … ∞
Interface	**Integrated:** Ethernet, RS 232	**Integrated:** Ethernet, RS 232	**Integrated:** Ethernet
Connectivity	**With MA 200i connection unit** PROFINET IO/RT PROFIBUS EtherCAT DeviceNet CANopen	**With MA 200i connection unit** PROFINET IO/RT PROFIBUS EtherCAT DeviceNet CANopen	
Digital inputs/outputs	8, configurable	8, configurable	n. a.
Fast EtherNet	Yes	Yes	Gigabit
Optional	Cables, mounting devices, external illumination	Cables, mounting devices, external illumination	Cables, mounting devices, air blower
Number of test routines	Typically 10 to 60, depending on scope of test	Typically 10 to 60, depending on scope of test	n. a.
Configuration / Operating system	Configuration via PC using standard Web browser (webConfig tool)	Configuration via PC using standard Web browser (webConfig tool)	Configuration via PC using standard Web browser (webConfig tool)
Options		Such as LSIS 422i (s. p. 72)	
Dimensions, W × H × D	75 × 113 × 55 mm	75 × 113 × 55 mm	75 × 113 × 55 mm / 76.5 × 66 × 126 mm
Certifications	CE c UL us	CE c UL us	CE
Properties			
	Very well suited for industrial use through glass or plastic window | Metal housing and homogeneous integrated illumination (depends on type: white, IR or RGBW) | Degree of protection IP 65 / IP 67 | Flexible use through motor-driven focus adjustment	Very well suited for industrial use through glass or plastic window | Metal housing and homogeneous integrated illumination (depends on type: white, IR or RGBW) | Degree of protection IP 65 / IP 67 | Flexible use through motor-driven focus adjustment	Very well suited for industrial use through glass window and metal housing | Degree of protection IP 65 / IP 67 | 5 megapixel color camera chip for live transmission in MJPEG format

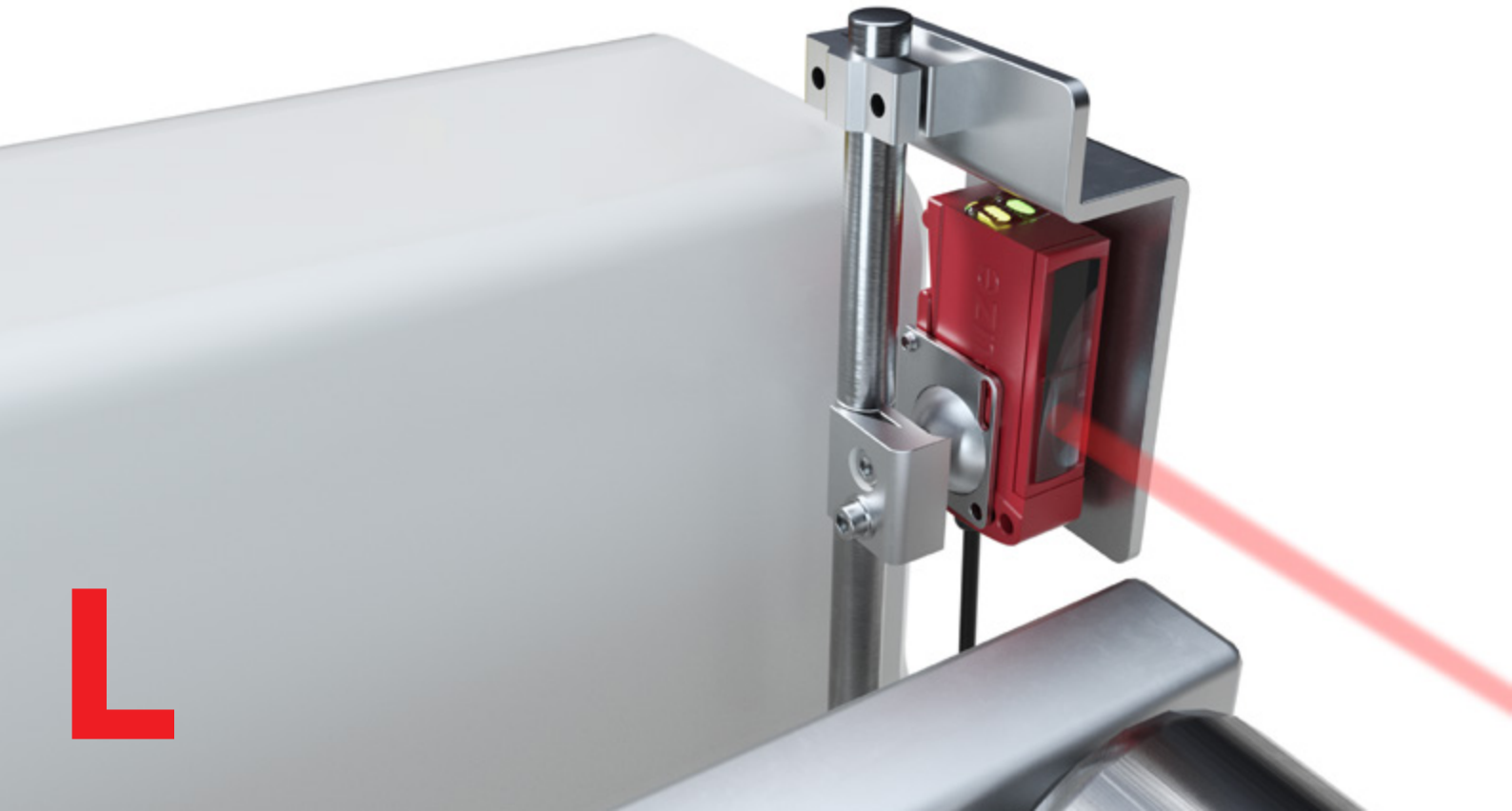


Accessories and supplementary products

Smooth running: Full performance with the right accessories and perfectly matched components

Efficient work requires more than just a sensor. Almost as important are the appropriate accessories, which allow the sensor to utilize its full functionality. No matter if you need easy mounting, uncomplicated connection or reliable signaling, you can easily find the right accessories for your application in our extensive product range.

You can find our complete accessories range on our website at www.leuze.com/en/accessories.



Cables

To facilitate the integration of our sensors, we offer a large variety of connection and interconnection cables with M8, M12, and M23 connectors – straight or angled, and with or without LED.

Mounting systems

We place great emphasis on our products being easy to mount and simple to align. For this reason, you will find specially-attuned mounting systems in our product range such as mounting brackets, rod holders or device columns.

Connection units

Today, sensors, safety switches and cameras are linked together via active or passive sensor distribution boxes with fieldbus interfaces from our product range to ensure more flexibility and transparency during installation.

Reflectors

Just how reliably retro-reflective photoelectric sensors can detect depends upon the selected reflector, among other things. That is why we offer various fitting solutions made of plastic, film, and glass for all conceivable conditions.

Power supply

A reliable and machine-independent power supply with 1- and 3-phase power supplies is an elementary part of an optimum and efficient sensor system. For this reason, we also offer load circuit monitoring modules to ensure a higher level of safeguarding against failure.

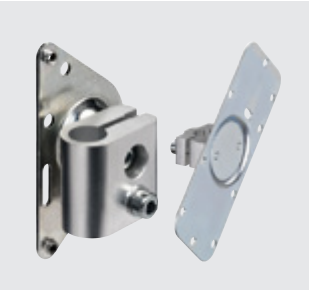
Signaling devices

For signaling in automated systems, we offer an extensive product range of single- and multi-colored transducers in order to ensure productivity and efficiency.

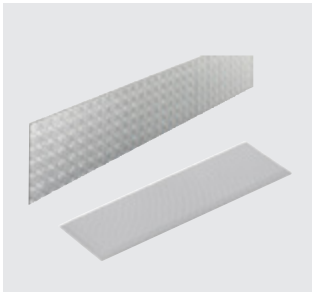
Signaling devices

	Signaling column, type A	Signaling column, type E	Other signaling devices
Specifications			
Operating voltage	24 V DC ±10 %	24 V AC/DC, ±10%	24 V AC/DC, ±10%
Degree of protection	IP 66	IP 66	IP 65
Diameter	70 mm	70 mm, 40 mm	30 / 45 / 65 mm and others
Certifications	CE c SP us	CE c UL us	CE c UL us
Housing	Plastic, PC-ABS	Plastic, PC	Plastic, PC
Functions			
	Optical & acoustic signaling for displaying machine states	Optical & acoustic signaling for displaying machine states	Optical & acoustic signaling for displaying machine states
Properties			
	Flexible configuration: 6 different colors (red, orange, yellow, green, blue, white) | Simple mounting: base mounting: 3 stand heights with plastic foot, flat mounting variant with and without M12 connector, hinged mounting variant | Module connection via bayonet lock | Position-independent – protection against interchanging | Transparent calottes / uniform clear glass optics | Single-sound & multi-sound buzzer modules (up to 105 dB) | Preassembled models & freely configurable elements | Signal image: continuous light & flashing light | Multicolor with 7 different colors	6 different colors (red, orange, green, blue, white, yellow) | Base mounting, bracket mounting, horizontal mounting | Single-sound buzzer module | Preassembled models & freely configurable elements | Signal image: continuous light & flashing light	Various installation versions: signaling columns, panel-mount modules, multitone & beacon

Mounting systems

	Mounting bracket	Rod mounting	Other mounting systems
			
Specifications			
Material	Galvanized steel, stainless steel	Galvanized steel, stainless steel, aluminum	Galvanized steel, stainless steel, aluminum, plastic
Mounting at device	Screw type	Screw type	Screw type or clampable
Mounting at system	Screw type	Clampable on rod	Screw type
Functions			
	Mounting bracket with possibility for device alignment	Mounting bracket with flexible alignment and alignment function for the device	Fixed mounting, with limit stop in some cases
Properties			
	Diverse versions for various sensors	Diverse versions for various sensors and reflectors	Diverse versions for various sensors with cylindrical design

Reflectors

	Standard reflectors, micro-triad-type reflectors	Reflective tapes	Reflectors
			
Specifications			
Material	PMMA	PMMA	Stainless steel and scratch-resistant plastics
Triple reflector size	0.3 – 4 mm	0.3 – 4 mm	0.3 – 4 mm
Functions			
	Various sizes, from 20 to 180 mm	Various films from 9 to 920 mm, also available as rolls of 45.7 m	Different designs available
Properties			
	Adhesive, pluggable and screw-type versions	Adhesive and self-adhesive versions	Adhesive, clampable and screw-type versions | Versions with increased resistance for intensive use of cleaning agents

Our product range at a glance

Switching sensors
- Optical Sensors
- Inductive Switches
- Capacitive Sensors
- Ultrasonic Sensors
- Fiber Optic Sensors
- Forked Sensors
- Light Curtains
- Special Sensors

Measuring sensors
- Distance Sensors
- Sensors for Positioning
- 3D Sensors
- Light Curtains
- Bar Code Positioning Systems
- Forked Sensors

Products for Safety at Work
- Optoelectronic Safety Sensors
- Safe Locking Devices, Switches and Proximity Sensors
- Safe Control Components
- Machine Safety Services

Identification
- Bar Code Identification
- 2D-Code Identification
- RF Identification

Data Transmission
- Optical Data Transmission Systems

Network and connection technology
- Connection Technology
- Modular Connection Units

Industrial image processing
- Light Section Sensors
- Smart Camera

Accessories

Your contact with us

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