Leuze electronic

the sensor people

Ultrasonic sensors

PRODUCT DESCRIPTION

Contents:

Ultrasonic sensors
Overview and advantages

- Distance measurement using the ultrasonic principle
- Measurement ranges to 6000 mm

Distance information largely independent of surface properties

Outputs:
- 2 switching outputs
- analogue current output
- analogue voltage output

Operating principles:
- LSU models
- RKU models
- HRTU models with background suppression
- VRTU models with foreground and background suppression

Models HRTU 418M/V… and VRTU 430M/V… can be configured via PC software and programming terminal

Construction
- Series 8 cubic housing
- Series 18 cubic housing
- Cylindrical housing M18
- Cylindrical housing M30

Special features of the ultrasonic sensors

Series 8

- Throughbeam ultrasonic sensors
- Retro-reflective ultrasonic sensors
- Diffuse reflection ultrasonic scanners with background suppression
- Maximum operating range: 800 mm
- PNP/NPN switching outputs
- M12 turning connector
- Protection class IP 67

✔ **Advantage 1:** Ideal for detection of transparent objects and liquids
✔ **Advantage 2:** Detection largely independent of surface properties
✔ **Advantage 3:** Large detection range
✔ **Advantage 4:** Compact construction
✔ **Advantage 5:** Easy operation

Series 418

- Diffuse reflection ultrasonic scanners with background suppression
- Maximum operating range: 1000 mm
- PNP switching output
- Analogue current and voltage output (0 … 20 mA or 0 … 10 V)
- Configuration of sensor and output functions via PC
- M12 connector
- Protection class IP 65, IP 67

✔ **Advantage 1:** Ideal for detection of transparent objects and liquids
✔ **Advantage 2:** Detection largely independent of surface properties
✔ **Advantage 3:** Large detection range
✔ **Advantage 4:** Compact construction
✔ **Advantage 5:** Beam direction either straight or 90°
✔ **Advantage 6:** Teachable switching output

Series 430

- Diffuse reflection ultrasonic scanners with background suppression
- Maximum operating range: 6000mm
- PNP switching output
- Analogue current and voltage output (0 … 20mA or 0 … 10V)
- Configuration of sensor and output functions via PC
- M12 connector
- Protection class IP 65

✔ **Advantage 1:** Ideal for detection of transparent objects and liquids
✔ **Advantage 2:** Detection largely independent of surface properties
✔ **Advantage 3:** Large detection range
✔ **Advantage 4:** Flexible PC-configuration for adapting to the application
✔ **Advantage 5:** Temperature-compensated version
✔ **Advantage 6:** Synchronisation operation possible

Series 430

- Diffuse reflection ultrasonic scanners with background suppression
- Maximum operating range: 6000mm
- PNP switching output
- Analogue current and voltage output (0 … 20mA or 0 … 10V)
- Configuration of sensor and output functions via PC
- M12 connector
- Protection class IP 65

✔ **Advantage 1:** Ideal for detection of transparent objects and liquids
✔ **Advantage 2:** Detection largely independent of surface properties
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✔ **Advantage 5:** Temperature-compensated version
✔ **Advantage 6:** Synchronisation operation possible

Series 18

- Throughbeam ultrasonic sensors
- Stainless steel housing
- Teflon coated transducer
- Maximum operating range: 650 mm
- PNP/NPN switching outputs
- Stainless steel M12 connector
- Protection class IP 67 and IP 69K
- ECOLAB and Clean*Proof*+

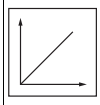
✔ **Advantage 1:** Ideal for the detection of transparent objects (e.g. PET bottles in the infeed area of fillers and rinsers)

✔ **Advantage 2:** Ideal for the detection of PET bottles in linear transportation systems

✔ **Advantage 3:** Highly resistant to interference caused by compressed air

✔ **Advantage 4:** Short response behaviour for the detection of minimal gaps

✔ **Advantage 5:** High chemical resistance acc. to Clean*Proof*+ (see data sheet)

Operating principle	Designation	Operating range	Housing		Measurement principle	Operating voltage		Switching			Output	
			Stainless steel	Metal	Ultrasonics	10 … 30VDC	20 … 30VDC	Analogue current output 4 … 20mA	Analogue voltage output 0 … 10V	2nd switching output	PNP transistor	NPN transistor
	Throughbeam ultrasonic sensors, switching											
	LSU 8/24-S12	0 … 800mm		•	•		•				•	•
	LSU 18/4.52-S12 [1]	0 … 500mm	•		•	•					•	
	LSU 18/24-S12	0 … 650mm		•	•	•				•	•	•
	Retro-reflective ultrasonic sensors, switching											
	RKU 8/24-400-S12	0 … 400mm		•	•		•				•	•
	RKU 418RM/P-5020-200-S12	0 … 200mm		•	•		•				•	
	RKU 418WM/P-5020-200-S12	0 … 200mm		•	•		•				•	
	RKU 418RM/P-3020-700-S12	0 … 700mm		•	•		•				•	
	RKU 418WM/P-3020-700-S12	0 … 700mm		•	•		•				•	
	Diffuse reflection ultrasonic scanners, switching											
	HRTU 8/24-400-S12	50 … 400mm		•	•		•				•	•
	HRTU 418RM/P-5020-200-S12	30 … 200mm		•	•		•				•	
	HRTU 418WM/P-5020-200-S12	30 … 200mm		•	•		•				•	
	HRTU 418RM/P-3020-700-S12	100 … 700mm		•	•		•				•	
	HRTU 418WM/P-3020-700-S12	100 … 700mm		•	•		•				•	
	HRTU 418RM/P-5220-400-S12	25 … 400mm		•	•		•				•	
	HRTU 418WM/P-5220-400-S12	25 … 400mm		•	•		•				•	
	HRTU 418M/P-5010-300-S12	50 … 300mm		•	•		•				•	
	HRTU 418M/P-3010-1000-S12	150 … 1000mm		•	•		•				•	
	HRTU 418RM/P-5220-700-S12	100 … 700mm		•	•		•				•	
	HRTU 418WM/P-5220-700-S12	100 … 700mm		•	•		•				•	
	VRTU 430M/P-5110-300-S12	60 … 300mm		•	•		•			•	•	
	VRTU 430M/P-3110-1300-S12	200 … 1300mm		•	•		•			•	•	
	VRTU 430M/P-2110-3000-S12	400 … 3000mm		•	•		•			•	•	
	VRTU 430M/P-1110-6000-S12	600 … 6000mm		•	•		•			•	•	
	Diffuse reflection ultrasonic scanners, measuring											
	HRTU 418M/V-5010-300-S12	50 … 300mm		•	•		•	•				
	HRTU 418M/V-5310-300-S12	50 … 300mm		•	•		•		•			
	HRTU 418M/V-3010-1000-S12	150 … 1000mm		•	•		•	•				
	HRTU 418M/V-3310-1000-S12	150 … 1000mm		•	•		•		•			
	VRTU 430M/V-5710-300-S12	60 … 300mm		•	•		•	•			•	
	VRTU 430M/V-5510-300-S12	60 … 300mm		•	•		•		•		•	
	VRTU 430M/V-3710-1300-S12	200 … 1300mm		•	•		•	•			•	
	VRTU 430M/V-3510-1300-S12	200 … 1300mm		•	•		•		•		•	
	VRTU 430M/V-2710-3000-S12	400 … 3000mm		•	•		•	•			•	
	VRTU 430M/V-2510-3000-S12	400 … 3000mm		•	•		•		•		•	
	VRTU 430M/V-1710-6000-S12	600 … 6000mm		•	•		•	•			•	

1) Stainless steel housing and Teflon-coated transducer

Connection	Switching frequency	Options								Page
M12 connector		Teachable switching outputs	Configurable	Synchronisation input	Background suppression	Foreground suppression	Range adjustment	Transparent media	For use in wet environments	
•	250 Hz	•			•		•	•		9
•	200 Hz							•	•	11
•	100 Hz						•	•		13
•	8 Hz	•		•				•		15
•	10 Hz	•						•		17
•	10 Hz	•						•		17
•	5 Hz	•						•		17
•	5 Hz	•						•		17
•	8 Hz	•		•	•			•		19
•	10 Hz	•			•			•		21
•	10 Hz	•			•			•		21
•	5 Hz	•			•			•		21
•	5 Hz	•			•			•		21
•	10 Hz	•			•			•		25
•	10 Hz	•			•			•		25
•	5 Hz		•	•	•		•	•		23
•	4 Hz		•	•	•		•	•		23
•	5 Hz	•			•			•		25
•	5 Hz	•			•			•		25
•	8 Hz		•	•	•	•	•	•		29
•	4 Hz		•	•	•	•	•	•		29
•	2 Hz		•	•	•	•	•	•		31
•	1 Hz		•	•	•	•	•	•		33
•	5 Hz		•	•	•		•	•		35
•	5 Hz		•	•	•		•	•		35
•	4 Hz		•	•	•		•	•		35
•	4 Hz		•	•	•		•	•		35
•	8 Hz		•	•	•	•	•	•		37
•	8 Hz		•	•	•	•	•	•		37
•	4 Hz		•	•	•	•	•	•		37
•	4 Hz		•	•	•	•	•	•		37
•	2 Hz		•	•	•	•	•	•		39
•	2 Hz		•	•	•	•	•	•		39
•	1 Hz		•	•	•	•	•	•		41

LSU 8 — Throughbeam ultrasonic sensor

0 … 800 mm

20 - 30 V DC

- Colour and transmission independent detection of objects, even in wet and foggy environment
- Detection of narrow gaps
- Detection of fast moving objects
- Switching frequency 250 Hz
- M12 turning connector

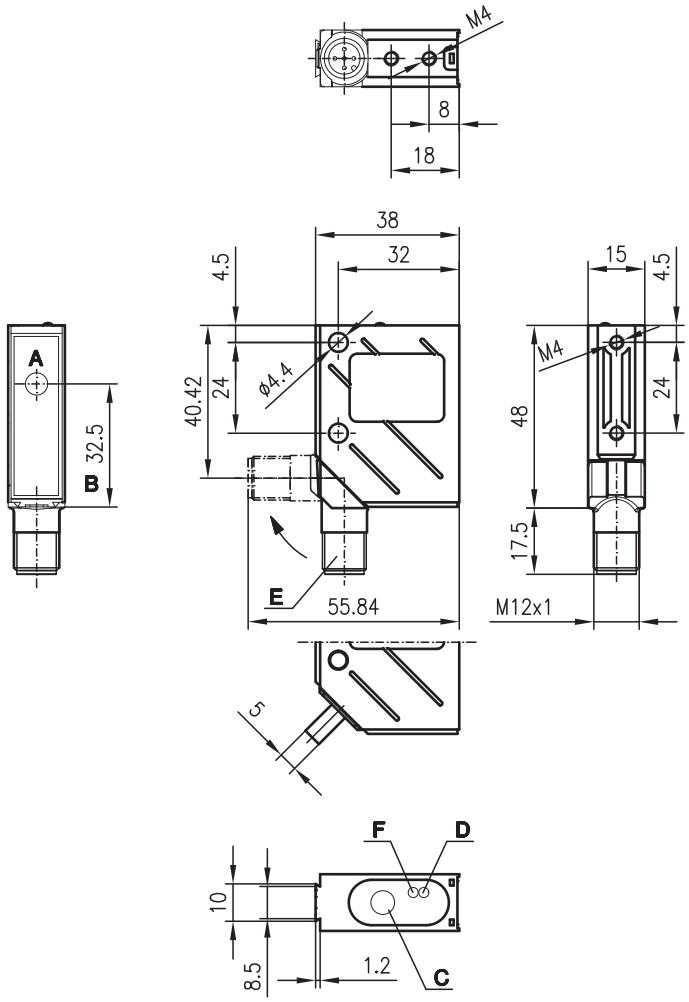
IEC 60947... IEC 60947... IP 67

Accessories:

(available separately • see page 42)

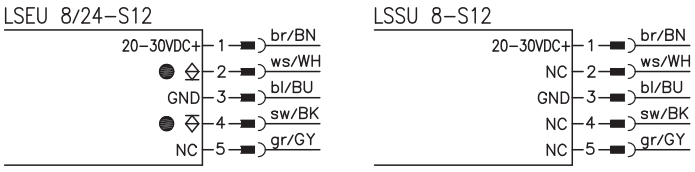
- Mounting systems
- Cable with M12 connector (K-D …)
- Control guard

Dimensioned drawing



A Converter
B Ultrasonic axis
C Step switch (receiver)
D Green LED
E 90° turning connector
F Yellow LED

Electrical connection



Specifications

Ultrasonic specifications

Operating range [1]	0 … 800 mm
Adjustment range	0 … 800 mm in steps
Ultrasonic frequency	300 kHz
Typ. opening angle	see diagrams
Temperature drift	± 0.17%/K, see remarks

Timing

Switching frequency	max. 250 Hz
Delay before start-up	2 ms

Electrical data

Operating voltage U_B	20 … 30 V DC (incl. ± 10% residual ripple)
Residual ripple	± 10% of U_B
Bias current	receiver ≤ 25 mA, transmitter ≤ 35 mA
Switching output	1 PNP and 1 NPN transistor
Function characteristics	object detected
Output current	max. 150 mA
Switch positions	positions 1 … 5, see Tables

Indicators

Green LED	ready
Yellow LED	object detected

Mechanical data

Housing	metal
Weight	70 g each
Connection type	M12 connector, 5-pin (turning)

Environmental data

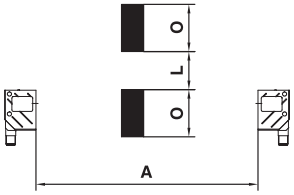
Ambient temp. (operation/storage)	0 °C … +70 °C/-40 °C … +85 °C
Protective circuit [2]	1, 2, 3
VDE safety class	III
Protection class	IP 67
Standards applied	IEC 60947-5-2
Fitting position	any

1) For the complete temperature range, measured object ≥ 20x20 mm
2) 1=short-circuit and overload protection, 2=polarity reversal protection (not for analogue inputs), 3=wire break and inductive protection

Tables

Switch position [1]	Switching frequency [Hz]	Typical values [1]		
		A_{max} [mm]	O_{min} [mm]	L_{min} [mm]
1	250	200	10	2.5
2	200	350	15	3.0
3	150	500	25	5.0
4	100	650	30	5.0
5	50	800	60	3.5

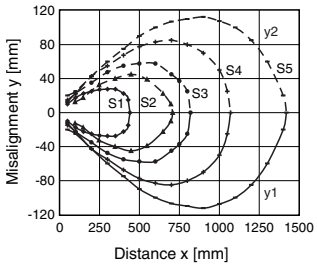
1) Different adjustments may produce better values



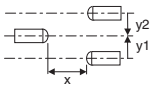
O Object
L Gap
A Distance transmitter/receiver

Diagrams

Typ. response behaviour



S1 Switch position 1
S2 Switch position 2
S3 Switch position 3
S4 Switch position 4
S5 Switch position 5



Order guide

	Designation	Part No.
With M12 connector	LSU 8/24-S12	
Transmitter	LSSU 8-S12	500 38914
Receiver	LSEU 8/24-S12	500 38915

Remarks

- **Approved purpose**: The throughbeam ultrasonic sensors are ultrasonic sensors for acoustic, contactless detection of objects.
- **Temperature drift** ± 0.17%/K

LSU 18 — Throughbeam ultrasonic sensor

0 … 500 mm

10 - 30 V DC

- Colour and transmission independent detection of objects, even in extremely wet environments
- Optimised for container entry
- Stainless steel housing
- Teflon coated ultrasonic transducer
- Insensitive to chemical cleaning agents
- Detection of narrow gaps
- Detection of fast moving objects

IEC 60947... IEC 60947... IP 69K IP 67 Wash Down

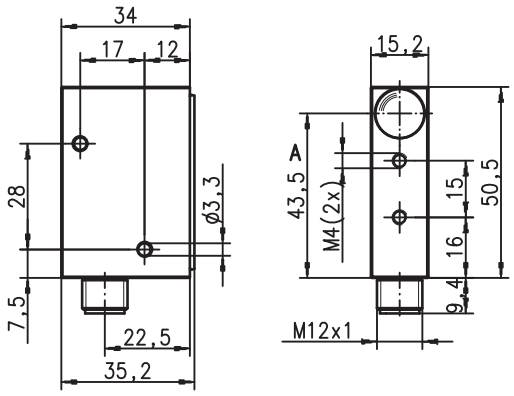
Accessories:

(available separately • see page 42)

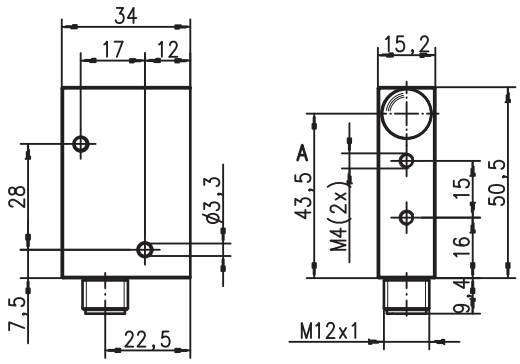
- Mounting systems
- Cable with M12 connector (K-D …)

Dimensioned drawing

Transmitter

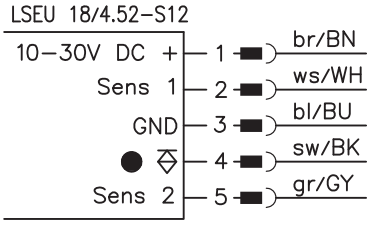


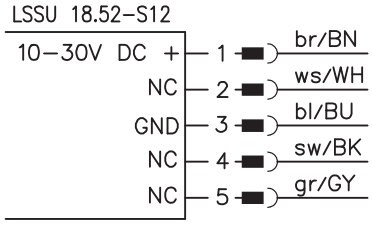
Receiver



A Centre of ultrasonic transducer

Electrical connection





Specifications

Ultrasonic specifications

Operating range	0 … 500 mm
Adjustment range	0 … 500 mm in steps, see Tables
Ultrasonic frequency	300 kHz
Typ. opening angle	12°

Timing

Switching frequency	200 Hz
Delay before start-up	100 ms

Electrical data

Operating voltage U_B	10 … 30 V DC (incl. ± 10% residual ripple)
Residual ripple	± 10% of U_B
Bias current	receiver ≤ 15 mA, transmitter ≤ 35 mA
Switching output	1 PNP transistor (dark switching)
Function characteristics	object detected
Output current	max. 150 mA
Range adjustment	external, via Sens 1 and Sens 2, see Tables

Mechanical data

Housing	stainless steel
Transducer	Teflon coated
Weight	90 g each
Connection type	M12 connector, stainless steel, 5-pin with gold-plated contacts

Environmental data

Ambient temp. (operation/storage)	0°C … +70°C/-40°C … +85°C
Protective circuit [1)]	1, 2, 3
VDE safety class	III
Protection class	IP 67, IP 69K
Environmentally tested acc. to	ECOLAB, Clean*Proof*+
Standards applied	IEC 60947-5-2
Fitting position	any
Chemical resistance	tested in accordance with ECOLAB and Clean*Proof*+ (see Chemical resistance)

Options

Range adjustment	Sens 1 and Sens 2
Active/not active	≥ 8 V/≤ 2 V or not connected
Input resistance	R_{in}: 10 kΩ

1) 1=short-circuit and overload protection, 2=polarity reversal protection (not for analogue inputs), 3=wire break and inductive protection

Chemical resistance

Product group	Product designation	Concentration	Temp.	Applic. time	
Foam cleaner	P3-topactive 200	**4%**	20°C	28 days	ECOLAB
Foam cleaner	P3-topax 19	**5%**	20°C	28 days	
Foam cleaner	P3-topax 56	**5%**	20°C	28 days	
Disinfection agent	P3-topax 91	**3%**	20°C	28 days	
Foam cleaner	P3-topactive 200	**4%**	50°C	21 days	CleanProof+
Disinfection agent	P3-topactive DES	**3%**	50°C	21 days	
Foam cleaner	P3-topax 52	**5%**	50°C	21 days	
Disinfection agent	P3-topax 66	**5%**	50°C	21 days	
Disinfection agent	P3-steril	**1%**	50°C	21 days	
Conveyor belt lubricant	P3-lupodrive	**0.1%**	50°C	21 days	
Disinfection agent	Hydrogen peroxide H_2O_2	**6%**	20°C	21 days	
Disinfection agent	Peracetic acid	**1%**	20°C	21 days	
Disinfection agent	Ethanol	**70%**	20°C	10 hours *	

* corresponds to approx. 5000 wipe cycles at 10 sec. per cycle.

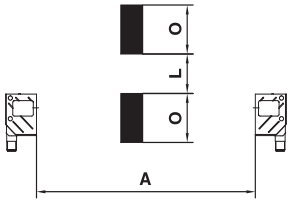
ECOLAB	Test procedure according to Ecolab F&E No. 40-1
Clean*Proof*+	Leuze test procedure (based on Ecolab F&E No. 40-1)

Order guide

	Designation	Part No.
Stainless steel housing with M12 connector	LSU 18/4.52-S12	
Transmitter	LSSU 18.52-S12	501 08348
Receiver	LSEU 18/4.52-S12	501 08347

Tables

Pin 5 (Sens 2)	Pin 2 (Sens 1)	Switching frequency [Hz]	Typical values		
			A_{max} [mm]	O_{min} [mm]	L_{min} [mm]
1	1	200	250	10	2
0	1	200	300	10	2
1	0	200	400	10	3
0	0	200	500	10	5



O Object
L Gap
A Distance transmitter/receiver

Diagrams

Remarks

- **Approved purpose**: The throughbeam ultrasonic sensors are ultrasonic sensors for acoustic, contactless detection of objects.
- The response behaviour is dependent on the container shape.
- Direct spraying results in switching errors.
- Mount sensors in such a way that no drops can collect near the transducer.

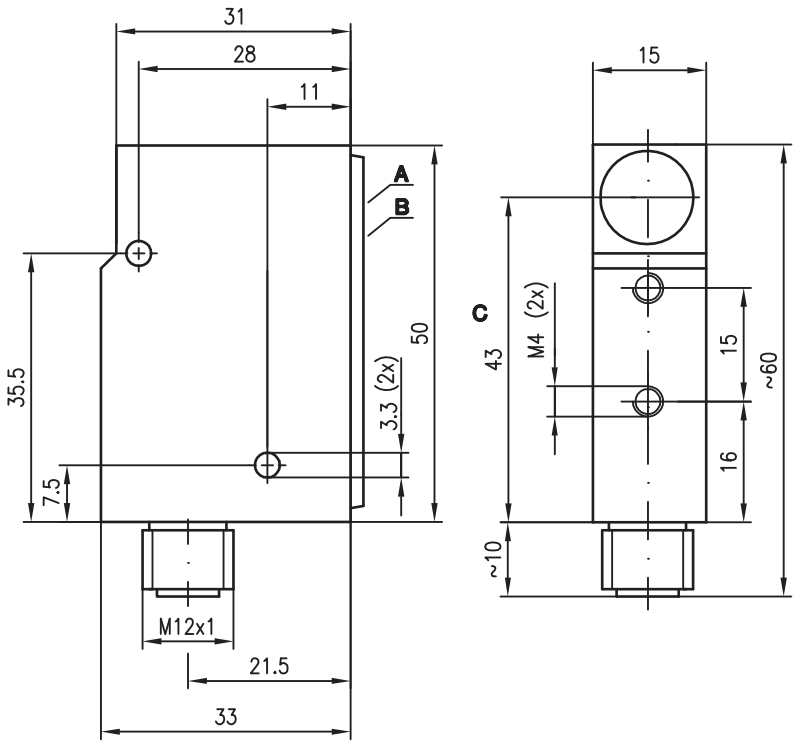
LSU 18 — Throughbeam ultrasonic sensor

0 … 650 mm

10 - 30 V DC

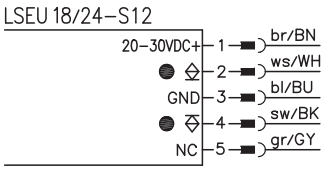
- Colour and transmission independent detection of objects, even in humid and foggy environment
- Optimised for air transport systems
- Metal housing
- Insensitive to dust
- Detection of narrow gaps

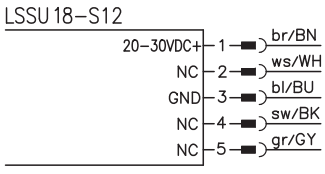
Dimensioned drawing



A Indicator diodes
B Sensitivity adjustment
C Centre of ultrasonic transducer

Electrical connection





IEC 60947... IEC 60947... IP 65

Accessories:

(available separately • see page 42)

- Mounting systems
- Cable with M12 connector (K-D …)

Specifications

Ultrasonic specifications

Operating range [1]	0 … 650 mm
Adjustment range	0 … 650 mm in steps
Ultrasonic frequency	300 kHz
Typ. opening angle	12°

Timing

Switching frequency	max. 100 Hz
Delay before start-up	100 ms

Electrical data

Operating voltage U_B	10 … 30 V DC (incl. ± 10% residual ripple)
Residual ripple	± 10% of U_B
Bias current	receiver ≤ 15 mA, transmitter ≤ 35 mA
Switching output	1 PNP and 1 NPN transistor
Function characteristics	object detected
Output current	max. 150 mA
Switch positions	positions 1 … 5, see Tables

Indicators

Green LED	ready
Yellow LED	object detected

Mechanical data

Housing	metal
Transducer	see remarks
Weight	70 g each
Connection type	M12 connector, 5-pin

Environmental data

Ambient temp. (operation/storage)	0°C … +70°C/-40°C … +85°C
Protective circuit [2]	1, 2, 3
VDE safety class	III
Protection class	IP 65
Standards applied	IEC 60947-5-2
Fitting position	any

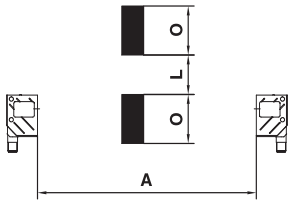
1) For the complete temperature range, measured object ≥ 20x20 mm
2) 1=short-circuit and overload protection, 2=polarity reversal protection (not for analogue inputs), 3=wire break and inductive protection

Order guide

	Designation	Part No.
With M12 connector	LSU 18/24-S12	
Transmitter	LSSU 18-S12	501 03365
Receiver	LSEU 18/24-S12	501 03364

Tables

Switch position	Switching frequency [Hz]	Typical values		
		A_{max} [mm]	O_{min} [mm]	L_{min} [mm]
1	100	250	20	1
2	100	350	30	1
3	50	450	40	1
4	50	550	50	1
5	50	650	50	2



O Object
L Gap
A Distance transmitter/receiver

Diagrams

Remarks

- **Approved purpose**: The throughbeam ultrasonic sensors are ultrasonic sensors for acoustic, contactless detection of objects.
- The response behaviour is dependent on the container shape.
- Not suitable for use in wet environments. Avoid cleaning with cleaning agents.

RKU 8 — Retro-reflective ultrasonic sensor

0 … 400 mm

20 - 30 V DC

- Colour and transmission independent detection of objects, even in wet and foggy environment
- Switching behaviour largely independent of surface properties
- Teach function for adjustment
- M12 turning connector

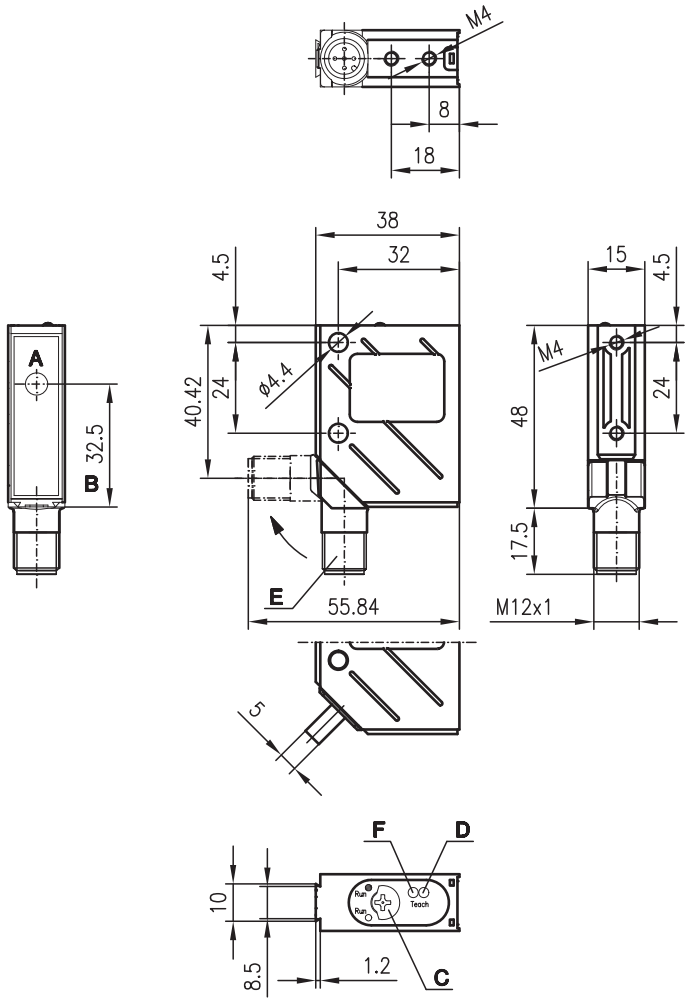
IEC 60947... IEC 60947... IP 67

Accessories:

(available separately • see page 42)

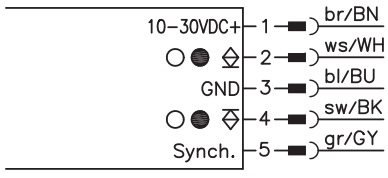
- Mounting systems
- Cable with M12 connector (K-D …)
- Control guard

Dimensioned drawing



A Converter
B Ultrasonic axis
C Operational control
D Green LED
E 90° turning connector
F Yellow LED

Electrical connection



Specifications

Ultrasonic specifications	**RKU 8/24-400-S12**
Operating range [1]	0 … 400mm
Adjustment range	160 … 435mm
Dead zone	≤ 35mm
Ultrasonic frequency	300kHz
Typ. opening angle	see diagrams
Resolution	1mm
Reproducibility	± 1mm
Temperature drift	± 0.17%/K
Timing	
Switching frequency	8Hz
Delay before start-up	250ms
Electrical data	
Operating voltage U_B	20 … 30V DC (incl. ± 10% residual ripple)
Residual ripple	± 10% of U_B
Bias current	≤ 25mA
Switching output	1 PNP and 1 NPN transistor
Function characteristics	reversible, object detected/not detected
Output current	max. 150mA
Indicators	
Green LED	ready
Flashing green LED	teaching in progress
Yellow LED	object detected
Flashing yellow LED	device or teach error
Mechanical data	
Housing	metal
Weight	70g
Connection type	M12 connector, 5-pin
Environmental data	
Ambient temp. (operation/storage)	-25°C … +70°C/-40°C … +85°C
Protective circuit [2]	1, 2, 3
VDE safety class	III
Protection class	IP 67
Standards applied	IEC 60947-5-2
Fitting position	any
Options	
Synch. input	
Sensor synchronisation	see remarks
Sensor active/not active	U_B or not connected/0V
Activation delay	< 100ms

1) For the complete temperature range, measured object ≥ 20x20mm
2) 1=short-circuit and overload protection, 2=polarity reversal protection (not for analogue inputs), 3=wire break and inductive protection

Teach process

	Operation	**Green LED**	**Yellow LED**
1.	Mount reflector at the desired distance (switching distance + dead zone)	ON	ON/OFF
2.	Put step switch in position "Teach"	-	-
3.	Wait for acknowledge signal	-	-
	"Teach-in was successful"	1Hz	ON
	"Teach-in was not successful"	ON	1Hz
4.	Put step switch in position "Run"	-	-
	Run ❍ Output is active when object was detected	ON	ON
	Run ● Output is not active when object was detected	ON	OFF

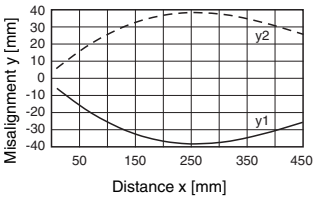
Order guide

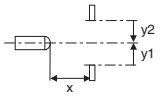
	Designation	**Part No.**
With 8Hz max. switching frequency	RKU 8/24-400-S12	500 38913

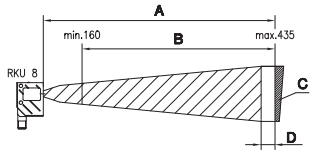
Tables

Diagrams

Typ. response behaviour (object 20x20mm)







A Operating range
B Adjustment range
C Reflector
D Dead zone

Remarks

- **Approved purpose**: The retro-reflective ultrasonic sensors are ultrasonic sensors for acoustic, contactless detection of objects.
- **Synchronisation:** Max. 10 sensors may be synchronised by connecting the Synch inputs. Thus, mutual interference can be avoided.
- **Temperature drift** ± 0.17%/K

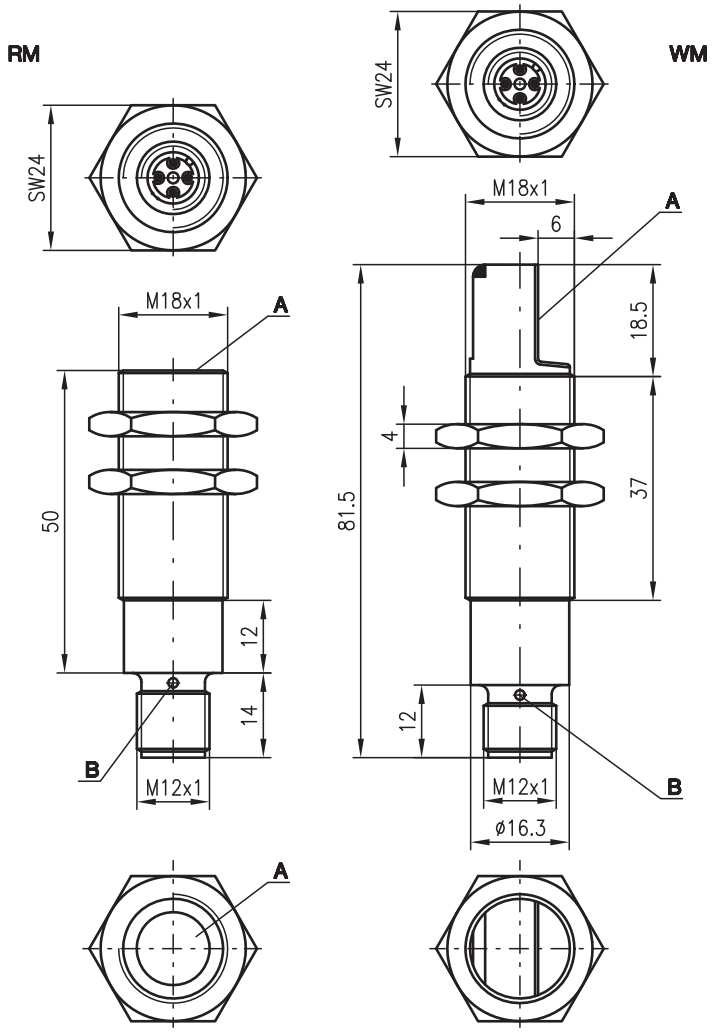
RKU 418 RM/WM — Retro-reflective ultrasonic sensor

0 … 200 mm
0 … 700 mm

20 - 30 V DC

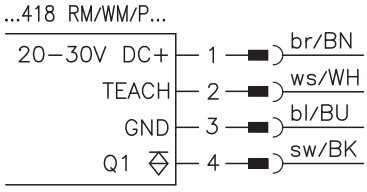
- Colour and transmission independent detection of objects
- Switching behaviour largely independent of surface properties
- No dead zone
- Distance teachable
- Small construction

Dimensioned drawing



A Active surface
B Indicator diode Q1

Electrical connection



IEC 60947... IEC 60947... IP 65

Accessories:

(available separately • see page 42)

- Mounting systems
- Cable with M12 connector (K-D …)

Specifications

Ultrasonic specifications	**RKU 418 …-200-S12**	**RKU 418 …-700-S12**
Operating range [1]	0 … 200mm	0 … 700mm
Adjustment range	120 … 220mm	350 … 750mm
Dead zone	≤ 20mm in front of reflector surface	≤ 50mm in front of reflector surface
Ultrasonic frequency	400kHz	200kHz
Typ. opening angle	see diagrams	
Direction of beam	RKU 418RM/P…: straight, RKU 418WM/P…: angular, 90°	
Temperature drift	± 0.17%/K	
Timing		
Switching frequency	10Hz	5Hz
Response time	50ms	100ms
Delay before start-up	20ms	
Electrical data		
Operating voltage U_B	20 … 30V DC (incl. ± 10% residual ripple)	
Residual ripple	± 10% of U_B	
Bias current	≤ 20mA	
Switching output	PNP transistor	
Function characteristics	switching in case of object recognition	
Output current	150mA	
Switching range adjustment	teach-in, teach input (pin 2) connected to GND for ≥ 3s	
Indicators		
Yellow LED	output activated	
Flashing yellow LED	teaching procedure	
Mechanical data		
Housing	metal / CuZn	
Weight	50g	
Connection type	M12 connector, plastic, 4-pin	
Environmental data		
Ambient temp. (operation/storage)	-25°C … +70°C/-40°C … +85°C	
Protective circuit [2]	1, 2, 3	
VDE safety class	III	
Protection class	IP 65	
Standards applied	IEC 60947-5-2	
Fitting position	any	

1) For the complete temperature range, measured object ≥ 20x20mm
2) 1=short-circuit and overload protection, 2=polarity reversal protection, 3=wire break and inductive protection

Order guide

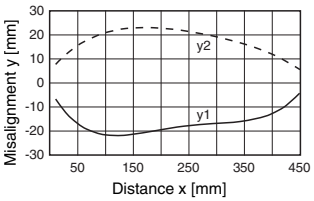
	Designation	**Part No.**
Range: 0 … 200mm, direction of beam: straight	RKU 418RM/P-5020-200-S12	500 38637
Range: 0 … 200mm, direction of beam: 90°	RKU 418WM/P-5020-200-S12	500 38638
Range: 0 … 700mm, direction of beam: straight	RKU 418RM/P-3020-700-S12	500 38641
Range: 0 … 700mm, direction of beam: 90°	RKU 418WM/P-3020-700-S12	500 38642

Tables

Diagrams

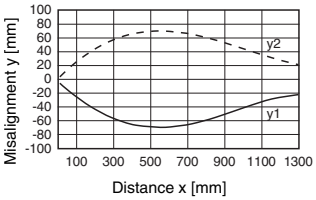
RKU 418 …-200-S12

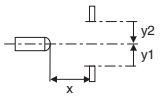
Typ. response behaviour (object 20x20mm)

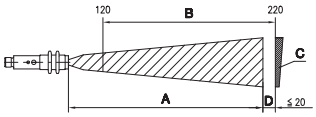


RKU 418 …-700-S12

Typ. response behaviour (object 20x20mm)







A Operating range
B Adjustment range
C Reflector
D Dead zone

Remarks

- **Approved purpose**: The retro-reflective ultrasonic sensors are ultrasonic sensors for acoustic, contactless detection of objects.
- **Teaching procedure:** Position reflector at the desired switching distance. Connect teach input (pin 2) to GND for ≥ 3s. Reconnect teach input to $+U_B$ or leave unconnected; switching output is taught.
- **Temperature drift** ± 0.17%/K

HRTU 8 Diffuse reflection ultrasonic scanner with background suppression

50 … 400 mm

20 - 30 V DC

- Colour and transmission independent detection of objects, even in wet and foggy environment
- Switching behaviour largely independent of surface properties
- Teach function for adjustment
- M12 turning connector

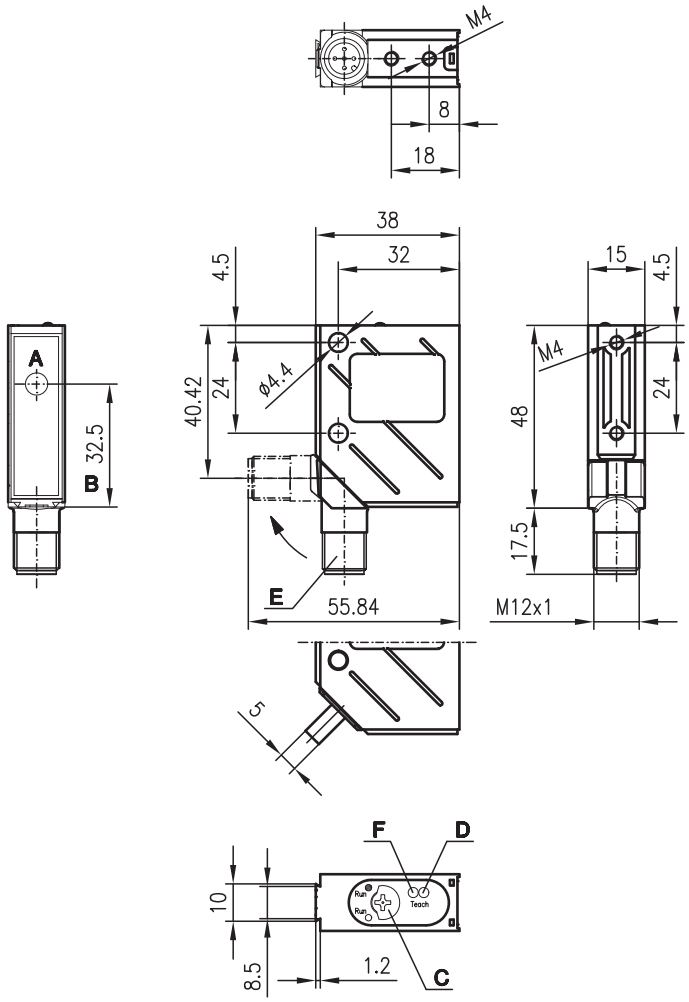
IEC 60947... IEC 60947... IP 67

Accessories:

(available separately • see page 42)

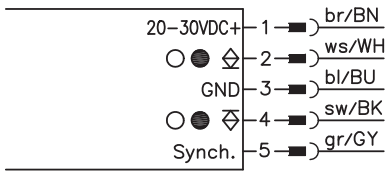
- Mounting systems
- Cable with M12 connector (K-D …)
- Control guard

Dimensioned drawing



A Converter
B Ultrasonic axis
C Operational control
D Green LED
E 90° turning connector
F Yellow LED

Electrical connection



Specifications

Ultrasonic specifications	**HRTU 8/24-400-S12**
Operating range [1]	50 … 400 mm
Adjustment range	60 … 400 mm
Ultrasonic frequency	300 kHz
Typ. opening angle	see diagrams
Resolution	1 mm
Reproducibility	± 1 mm
Temperature drift	± 0.17 %/K
Timing	
Switching frequency	8 Hz
Delay before start-up	250 ms
Electrical data	
Operating voltage U_B	20 … 30 V DC (incl. ± 10 % residual ripple)
Residual ripple	± 10 % of U_B
Bias current	≤ 25 mA
Switching output	1 PNP and 1 NPN transistor
Function characteristics	reversible, object detected/not detected
Output current	max. 150 mA
Indicators	
Green LED	ready
Flashing green LED	teaching in progress
Yellow LED	reversible, object detected/not detected
Flashing yellow LED	device or teach error
Mechanical data	
Housing	metal
Weight	70 g
Connection type	M12 connector, 5-pin
Environmental data	
Ambient temp. (operation/storage)	-25 °C … +70 °C/-40 °C … +85 °C
Protective circuit [2]	1, 2, 3
VDE safety class	III
Protection class	IP 67
Standards applied	IEC 60947-5-2
Fitting position	any
Options	
Synch. input	
Sensor synchronisation	see remarks
Sensor active/not active	U_B or not connected/0 V
Activation delay	< 100 ms

1) For the complete temperature range, measured object ≥ 20 x 20 mm
2) 1=short-circuit and overload protection, 2=polarity reversal protection (not for analogue inputs), 3=wire break and inductive protection

Teach process

	Operation	Green LED	Yellow LED
1.	Place object at desired distance	ON	ON/OFF
2.	Put step switch in position "Teach"	-	-
3.	Wait for acknowledge signal	-	-
	"Teach-in was successful"	1 Hz	ON
	"Teach-in was not successful"	ON	1 Hz
4.	Put step switch in position "Run"	-	-
	Run ❍ Output and yellow LED are not active when object was detected	ON	OFF
	Run ● Output and yellow LED are active when object was detected	ON	ON

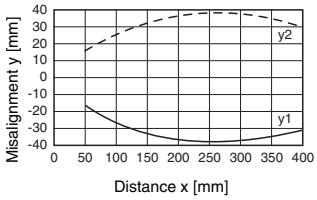
Order guide

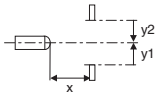
Designation	Part No.
HRTU 8/24-400-S12	500 38912

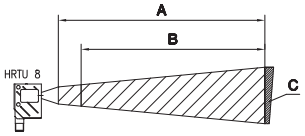
Tables

Diagrams

Typ. response behaviour (object 20 x 20 mm)







A Operating range
B Adjustment range
C Object

Remarks

- **Approved purpose**:
  The diffuse reflection ultrasonic scanners are ultrasonic sensors for acoustic, contactless detection of objects.
- **Synchronisation:**
  Max. 10 sensors may be synchronised by connecting the Synch inputs. Thus, mutual interference can be avoided.
- **Temperature drift**
  ± 0.17 %/K

HRTU 418 RM/WM — Ultrasonic sensors

30 … 200 mm
100 … 700 mm

20 - 30 V
DC

- Colour and transmission independent detection of objects
- Switching behaviour largely independent of surface properties
- Distance teachable
- Small construction

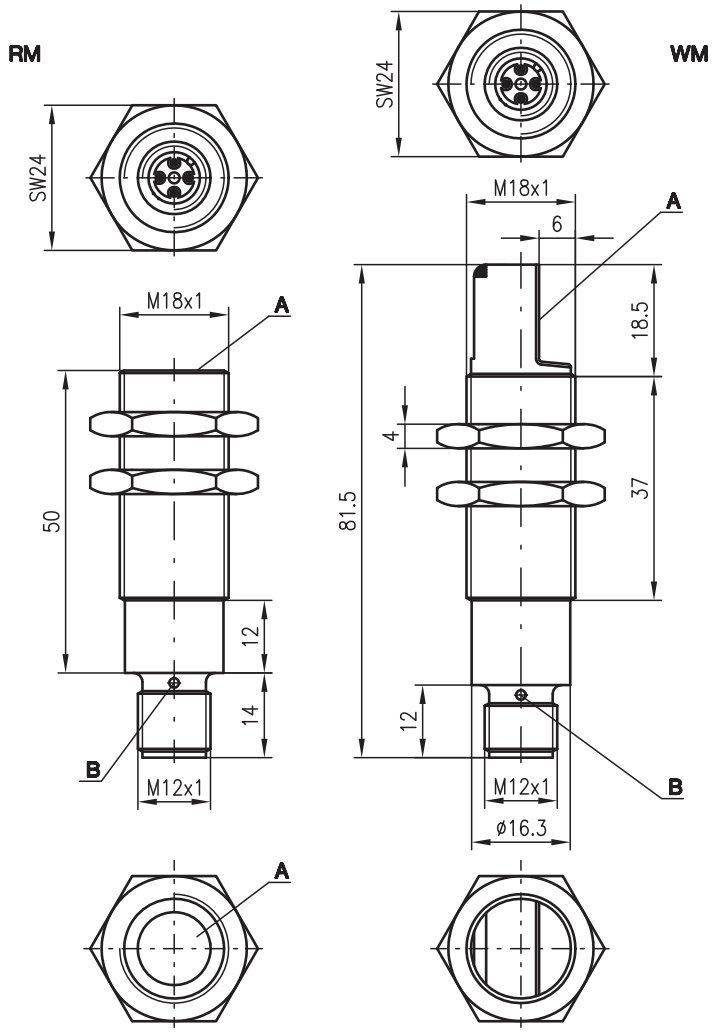
IEC 60947...
IEC 60947...
IP 65

Accessories:

(available separately • see page 42)

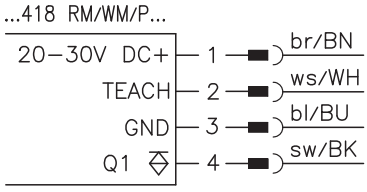
- Mounting systems
- Cable with M12 connector (K-D …)

Dimensioned drawing



A Active surface
B Indicator diode Q1

Electrical connection



Specifications

	HRTU 418…-200-S12	HRTU 418…-700-S12
Ultrasonic specifications		
Operating range [1]	30 … 200 mm	100 … 700 mm
Adjustment range	50 … 200 mm	150 … 700 mm
Ultrasonic frequency	400 kHz	200 kHz
Typ. opening angle	see diagrams	
Resolution	1 mm	
Direction of beam	HRTU 418RM/P…: straight, HRTU 418WM/P…: angular, 90°	
Reproducibility	± 1 mm	
Switching hysteresis	10 mm	
Temperature drift	± 0.17 %/K	
Timing		
Switching frequency	10 Hz	5 Hz
Response time	50 ms	100 ms
Delay before start-up	20 ms	
Electrical data		
Operating voltage U_B	20 … 30 V DC (incl. ± 10% residual ripple)	
Residual ripple	± 10% of U_B	
Bias current	≤ 20 mA	
Switching output	PNP transistor	
Function characteristics	switching in case of object recognition	
Output current	150 mA	
Switching range adjustment	teach-in, teach input (pin 2) connected to GND for ≥ 3 s	
Indicators		
Yellow LED	output activated	
Flashing yellow LED	teaching procedure	
Mechanical data		
Housing	metal / CuZn	
Weight	50 g	
Connection type	M12 connector, plastic, 4-pin	
Environmental data		
Ambient temp. (operation/storage)	-25 °C … +70 °C/-40 °C … +85 °C	
Protective circuit [2]	1, 2, 3	
VDE safety class	III	
Protection class	IP 65	
Standards applied	IEC 60947-5-2	
Fitting position	any	

1) For the complete temperature range, measured object ≥ 20x20 mm
2) 1=short-circuit and overload protection, 2=polarity reversal protection, 3=wire break and inductive protection

Order guide

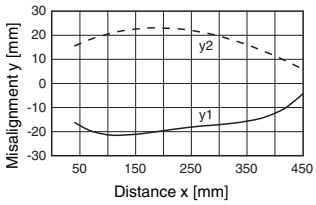
	Designation	Part No.
Operating range: 30 … 200 mm, direction of beam: straight	HRTU 418RM/P-5020-200-S12	500 38635
Operating range: 30 … 200 mm, direction of beam: 90°	HRTU 418WM/P-5020-200-S12	500 38636
Operating range: 100 … 700 mm, direction of beam: straight	HRTU 418RM/P-3020-700-S12	500 38639
Operating range: 100 … 700 mm, direction of beam: 90°	HRTU 418WM/P-3020-700-S12	500 38640

Tables

Diagrams

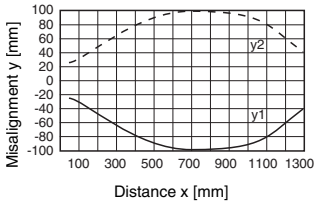
HRTU 418 …-200-S12

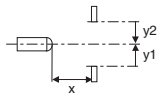
Typ. response behaviour (object 20x20 mm)

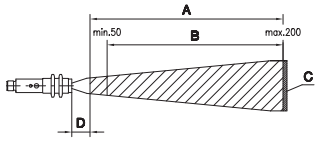


HRTU 418 …-700-S12

Typ. response behaviour (object 20x20 mm)







A Operating range
B Adjustment range
C Object
D Dead zone

Remarks

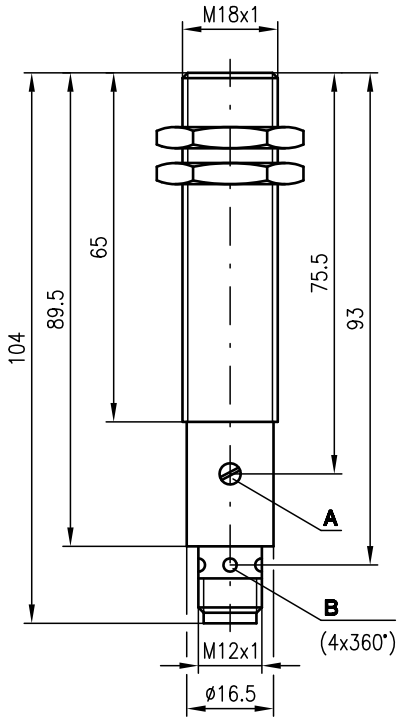
- **Approved purpose**: The ultrasonic sensors are used for acoustic, contact-less detection of objects.
- **Teaching procedure:** Position measured object at the desired measure-ment distance. Connect teach input (pin 2) to GND for ≥ 3 s. Reconnect teach input to $+U_B$ or leave unconnected; switching output is taught.
- **Temperature drift** ± 0.17 %/K

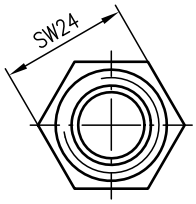
50 … 300 mm
150 … 1000 mm

20 - 30 V
DC

- Ideal for detection of levels of liquids, bulk materials, transparent media, …
- Distance information largely independent of surface properties
- PC-configuration software for configuring sensor and switching output
- Up to 10 devices can be synchronised via the SYNC input
- Start and end of switching range adjustable separately via PC

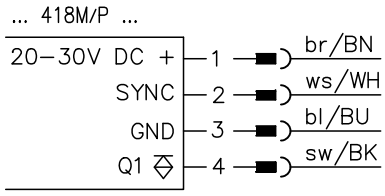
Dimensioned drawing





A End of switching range (only for … 418M/P …)
B Indicator diodes Q1

Electrical connection



IEC 60947... IEC 60947... IP 67

Accessories:

(available separately • see page 42)

- Mounting systems
- Cable with M12 connector (K-D …)
- "USDS-Config" configuration software (free download from *www.leuze.com*)
- PGU 01 (programming unit)

Specifications

Ultrasonic specifications	**HRTU…-5010-300…**	**HRTU…-3010-1000…**
Operating range [1]	50 … 300mm	150 … 1000mm
Ultrasonic frequency	400kHz	200kHz
Opening angle	6°	
Resolution	1mm	
Absolute measurement accuracy	± 2.5% of the measurement range end value	
Reproducibility	± 1mm	± 2mm
Switching hysteresis	10mm	10mm
Timing		
Switching frequency (min.) [2]	5Hz	4Hz
Response time (max.) [2]	100ms	120ms
Delay before start-up	280ms	280ms
Electrical data		
Operating voltage U_B	20 … 30V DC (incl. ± 10% residual ripple)	
Residual ripple	± 10% of U_B	
Bias current	≤ 60mA	
Switching output	PNP transistor	
Function characteristics	switching in case of object recognition	
Output current	150mA	
Switching range adjustment	potentiometer 270°	
Indicators		
Yellow LED	output activated	
Mechanical data		
Housing	metal / CuZn	
Weight	50g	
Connection type	M12 connector, plastic, 4-pin	
Environmental data		
Ambient temp. (operation/storage)	-25°C … +70°C/-40°C … +85°C	
Protective circuit [3]	1, 2, 3	
VDE safety class	III	
Protection class	IP 67	
Standards applied	IEC 60947-5-2	
Fitting position	any	

1) For the complete temperature range, measured object ≥ 10x10mm
2) Can be configured up to 3 times faster using "USDS-Config"
3) 1=short-circuit and overload protection, 2=polarity reversal protection, 3=wire break and inductive protection

Remarks

- **Approved purpose**:
  The ultrasonic sensors are used for acoustic, contactless detection of objects.

Order guide

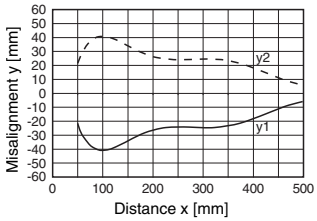
Designation	**Part No.**
HRTU 418M/P-5010-300-S12	500 36257
HRTU 418M/P-3010-1000-S12	500 36258

Tables

Diagrams

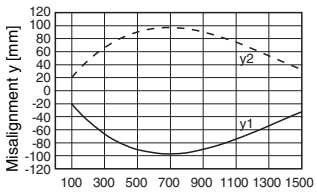
HRTU…-5010-300…

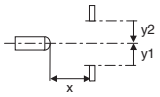
Typ. response behaviour (object 10x10mm)



HRTU…-3010-1000…

Typ. response behaviour (object 10x10mm)





Remarks

- Synchronisation:
  Mutual interference is excluded by connecting the sensors with the SYNC input.

Configuration software "USDS-Config"

The configuration software runs under Windows 95/98/NT/2000/XP and offers the following features:

- Configuration of multiplex operation
- Configuration of the sensor (attenuation, switching frequency, response time)
- Adjustment of the switching output (start/end of switching range, hysteresis, object present yes/no)
- Adjustment of the analogue output
- Support of various languages

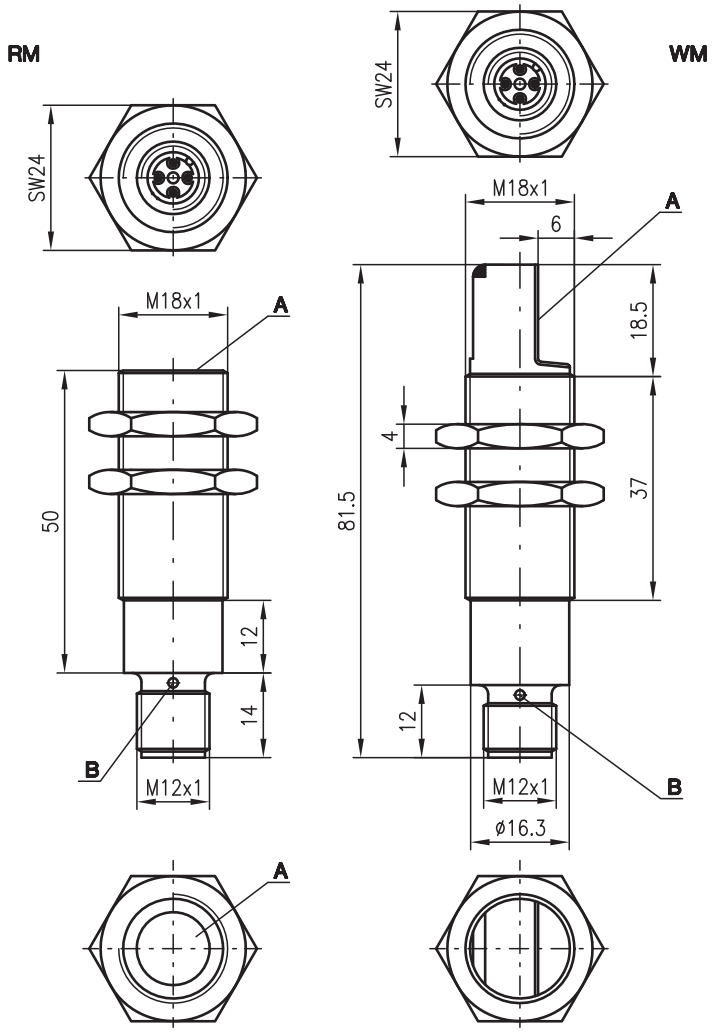
HRTU 418 RM/WM — Ultrasonic sensors

25 … 400 mm
100 … 700 mm

20 - 30 V
DC

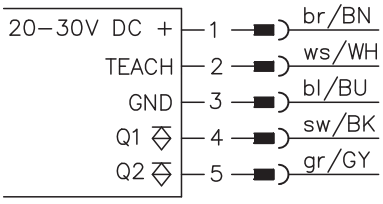
- Colour and transmission independent detection of objects
- Switching behaviour largely independent of surface properties
- Two mutually independent switching points
- Distance teachable
- Small construction

Dimensioned drawing



A Active surface
B Indicator diode Q1, Q2

Electrical connection



IEC 60947...
IEC 60947...
IP 65

Accessories:

(available separately • see page 42)

- Mounting systems
- Cable with M12 connector (K-D …)

Specifications

	HRTU 418 …-400-S12	HRTU 418…-700-S12
Ultrasonic specifications		
Operating range [1]	25 … 400mm	50 … 700mm
Adjustment range	40 … 300mm	75 … 700mm
Ultrasonic frequency	300kHz	200kHz
Typ. opening angle	see diagrams	
Resolution	1mm	
Direction of beam	HRTU 418RM/P…: straight, HRTU 418WM/P…: angular, 90°	
Reproducibility	± 1mm	
Switching hysteresis	10mm	
Temperature drift	± 0.17%/K	
Timing		
Switching frequency	10Hz	5Hz
Response time	50ms	100ms
Delay before start-up	20ms	
Electrical data		
Operating voltage U_B	20 … 30V DC (incl. ± 10% residual ripple)	
Residual ripple	± 10% of U_B	
Bias current	≤ 20mA	
Switching output	2x PNP transistor	
Function characteristics	switching in case of object recognition	
Output current	300mA	
Switching range adjustment	teach-in Q1: teach input (pin 2) connected to GND for 3 … 6s teach-in Q2: teach input (pin 2) connected to GND for 6 … 9s	
Indicators		
Yellow LED	output Q1, output Q2	
Flashing yellow LED	teaching procedure	
Mechanical data		
Housing	metal/brass nickel-plated	
Weight	50g	
Connection type	M12 connector, plastic, 5-pin	
Environmental data		
Ambient temp. (operation/storage)	-25°C … +70°C/-40°C … +85°C	
Protective circuit [2]	1, 2, 3	
VDE safety class	III	
Protection class	IP 65	
Standards applied	IEC 60947-5-2	
Fitting position	any	

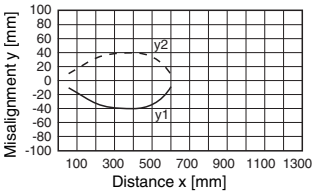
1) For the complete temperature range, measured object ≥ 20x20mm
2) 1=short-circuit and overload protection, 2=polarity reversal protection, 3=wire break and inductive protection

Tables

Diagrams

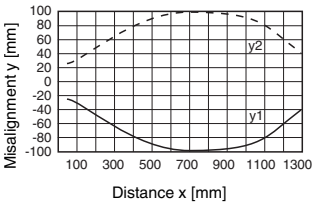
HRTU 418 …-400-S12

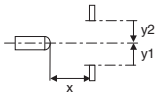
Typ. response behaviour (object 20x20mm)

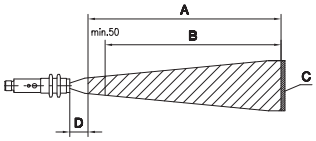


HRTU 418 …-700-S12

Typ. response behaviour (object 20x20mm)







A Operating range
B Adjustment range
C Object
D Dead zone

Order guide

	Designation	Part No.
Operating range: 25 … 400mm, direction of beam: straight	HRTU 418RM/P-5220-400-S12	501 09016
Operating range: 25 … 400mm, direction of beam: 90°	HRTU 418WM/P-5220-400-S12	501 09017
Operating range: 50 … 700mm, direction of beam: straight	HRTU 418RM/P-5220-700-S12	501 09018
Operating range: 50 … 700mm, direction of beam: 90°	HRTU 418WM/P-5220-700-S12	501 09019

Remarks

- **Approved purpose**:
  The ultrasonic sensors are used for acoustic, contact-less detection of objects.
- **Temperature drift**
  ± 0.17%/K

Teach-in via input

1. Position measurement object at the desired distance.
2. The respective teach function is activated by applying GND to the teach input (pin 2).
   The teach event is signalled by slow flashing of the LEDs.

Teach function	Teach phase / duration of the teach signal	LED Q1	LED Q2
Teach preparation	A / 0 … 3s	off	off
switching output Q1	B / 3 … 6s	flashes	off
switching output Q2	C / 6 … 9s	off	flashes

3. To finish the teach event, disconnect the teach input from GND or switch it to $+U_B$ after the desired time. If the teach event has not completed after 9s, it begins again with phase B.
4. A successful teach event is signalled by the end of the flashing.

Error messages

LEDs which continuously flash fast signal an unsuccessful teach event (sensor not ready):

LED Q1	LED Q2	Error
flashes rapidly	switching state output Q2	teach switching output Q1 unsuccessful
switching state output Q1	flashes rapidly	teach switching output Q1 unsuccessful

Remedy:

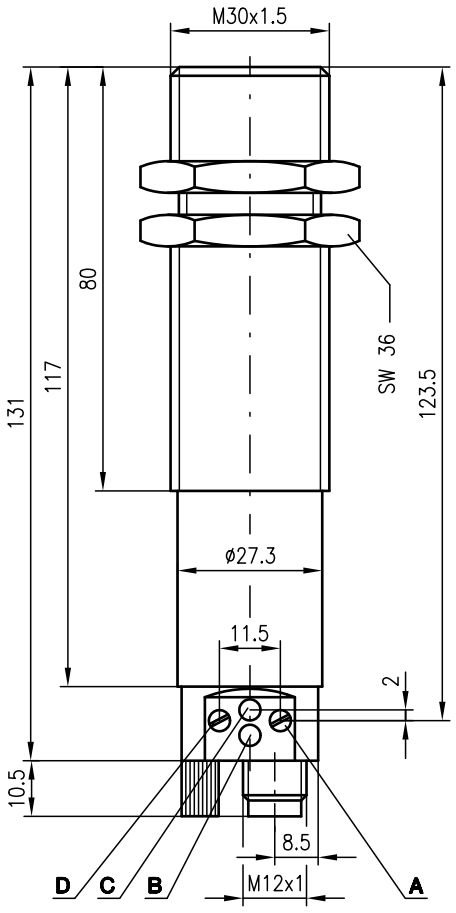
- Disconnect sensor from voltage to restore the old values.
- Repeat teach event

60 … 300 mm
200 … 1300 mm

20 - 30 V
DC

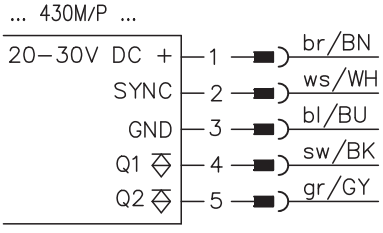
- Ideal for detection of levels of liquids, bulk materials, transparent media, …
- Distance information largely independent of surface properties
- PC-configuration software for configuring sensor and switching output
- Up to 10 devices can be synchronised via the SYNC input
- Separate adjustment of start and end of switching range (Q1) via potentiometer and PC

Dimensioned drawing



A Potentiometer for end of switching range Q1
B Indicator diode Q2 only for … 430M/P …
C Indicator diode Q1
D Potentiometer for start of switching range Q1

Electrical connection



Switching outputs Q1 and Q2 switch alternately!

IEC 60947...
IEC 60947...
IP 65

Accessories:

(available separately • see page 42)

- Cable with M12 connector (K-D …)
- "USDS-Config" configuration software (free download from *www.leuze.com*)
- PGU 01 (programming unit)

Specifications

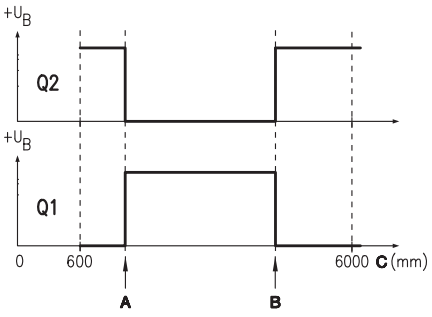
Ultrasonic specifications	VRTU…-5110-300…	VRTU…-3110-1300…
Operating range [1]	60 … 300 mm	200 … 1300 mm
Ultrasonic frequency	400 kHz	200 kHz
Opening angle	6°	
Resolution	≤ 1 mm	≥ 1 mm
Absolute measurement accuracy	± 1.5% of the measurement range end value	
Reproducibility	± 0.45 mm	± 2 mm
Switching hysteresis	10 mm	10 mm
Timing		
Switching frequency (min.) [2]	8 Hz	4 Hz
Response time (max.) [2]	80 ms	110 ms
Delay before start-up	280 ms	280 ms
Electrical data		
Operating voltage U_B	20 … 30 VDC (incl. ± 10% residual ripple)	
Residual ripple	± 10% of U_B	
Bias current	≤ 50 mA (without load)	
Switching output	2 PNP transistors	
Function characteristics	switching in case of object recognition	
Output current	300 mA	
Switching range adjustment	potentiometer 270°	
Indicators		
Yellow LED	output activated	
Flashing yellow LED	programming error	
Mechanical data		
Housing	metal / CuZn	
Weight	210 g	
Connection type	M12 connector, plastic, 5-pin	
Environmental data		
Ambient temp. (operation/storage)	-25 °C … +70 °C/-40 °C … +85 °C	
Protective circuit [3]	1, 2, 3	
VDE safety class	III	
Protection class	IP 65	
Standards applied	IEC 60947-5-2	
Fitting position	any	

1) For the complete temperature range, measured object ≥ 10x10 mm
2) Can be configured up to 3 times faster using "USDS-Config"
3) 1=short-circuit and overload protection, 2=polarity reversal protection, 3=wire break and inductive protection

Remarks

- **Approved purpose**:
  The ultrasonic sensors are used for acoustic, contactless detection of objects.

Characteristic curve of switching outputs:



A Start of switching range Q1, end of switching range Q2
B End of switching range Q1, start of switching range Q2
C Measurement distance

Order guide

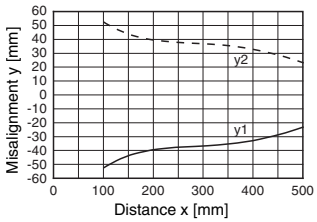
Designation	Part No.
VRTU 430M/P-5110-300-S12	500 36261
VRTU 430M/P-3110-1300-S12	500 36262

Tables

Diagrams

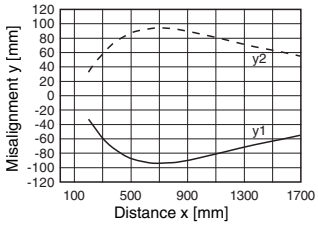
VRTU…-5110-300…

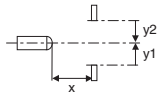
Typ. response behaviour (object 10x10 mm)



VRTU…-3110-1300…

Typ. response behaviour (object 10x10 mm)





Remarks

- Synchronisation:
  Mutual interference is excluded by connecting the sensors with the SYNC input.

Configuration software "USDS-Config"

The configuration software runs under Windows 95/98/NT/2000/XP and offers the following features:

- Configuration of multiplex operation
- Configuration of the sensor (attenuation, switching frequency, response time)
- Adjustment of the switching output (start/end of switching range, hysteresis, object present yes/no)
- Adjustment of the analogue output
- Support of various languages

400 … 3000 mm

20 - 30 V
DC

- Ideal for detection of levels of liquids, bulk materials, transparent media, …
- Distance information largely independent of surface properties
- PC-configuration software for configuring sensor and switching output
- Up to 10 devices can be synchronised via the SYNC input
- Separate adjustment of start and end of switching range (Q1) via potentiometer and PC

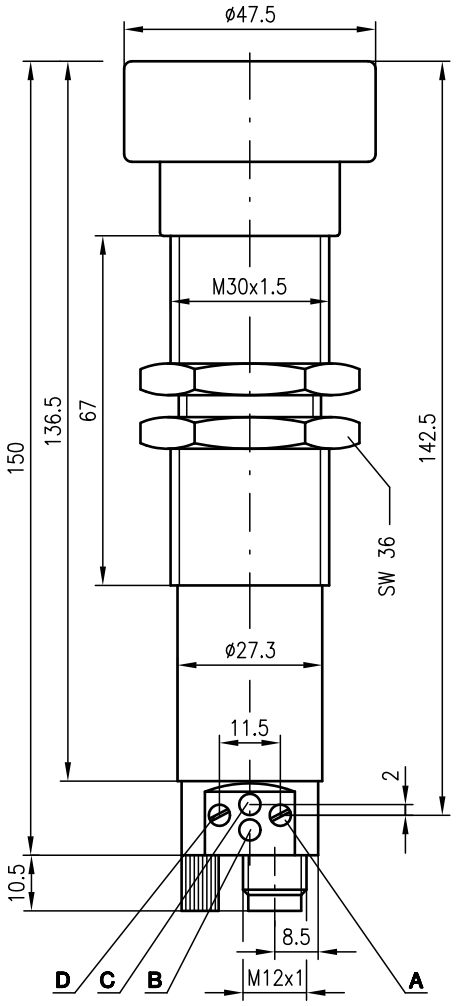
IEC 60947... IEC 60947... IP 65

Accessories:

(available separately • see page 42)

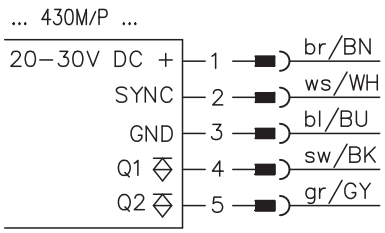
- Cable with M12 connector (K-D …)
- "USDS-Config" configuration software (free download from *www.leuze.com*)
- PGU 01 (programming unit)

Dimensioned drawing



A Potentiometer for end of switching range Q1
B Indicator diode Q2 (only for … 430M/P …)
C Indicator diode Q1
D Potentiometer for start of switching range Q1

Electrical connection



Switching outputs Q1 and Q2 switch alternately!

Specifications

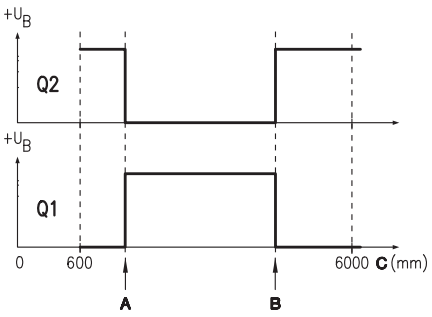
Ultrasonic specifications	**VRTU…-2110-3000…**
Operating range [1]	400 … 3000 mm
Ultrasonic frequency	120 kHz
Opening angle	6°
Resolution	≥ 1 mm
Absolute measurement accuracy	± 1.5% of the measurement range end value
Reproducibility	± 5 mm
Switching hysteresis	20 mm
Timing	
Switching frequency (min.) [2]	2 Hz
Response time (max.) [2]	200 ms
Delay before start-up	280 ms
Electrical data	
Operating voltage U_B	20 … 30 VDC (incl. ± 10% residual ripple)
Residual ripple	± 10% of U_B
Bias current	≤ 50 mA (without load)
Switching output	2 PNP transistors
Function characteristics	switching in case of object recognition
Output current	300 mA
Switching range adjustment	potentiometer 270°
Indicators	
Yellow LED	output activated
Flashing yellow LED	programming error
Mechanical data	
Housing	metal / CuZn
Weight	340 g
Connection type	M12 connector, plastic, 5-pin
Environmental data	
Ambient temp. (operation/storage)	-25 °C … +70 °C/-40 °C … +85 °C
Protective circuit [3]	1, 2, 3
VDE safety class	III
Protection class	IP 65
Standards applied	IEC 60947-5-2
Fitting position	any

1) For the complete temperature range, measured object ≥ 50x50 mm
2) Can be configured up to 3 times faster using "USDS-Config"
3) 1=short-circuit and overload protection, 2=polarity reversal protection, 3=wire break and inductive protection

Remarks

- **Approved purpose**:
  The ultrasonic sensors are used for acoustic, contactless detection of objects.

Characteristic curve of switching outputs:



A Start of switching range Q1, end of switching range Q2
B End of switching range Q1, start of switching range Q2
C Measurement distance

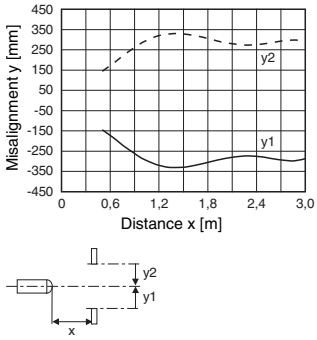
Order guide

Designation	Part No.
VRTU 430M/P-2110-3000-S12	500 36263

Tables

Diagrams

Typ. response behaviour (object 50x50 mm)



Remarks

- Synchronisation:
  Mutual interference is excluded by connecting the sensors with the SYNC input.

Configuration software "USDS-Config"

The configuration software runs under Windows 95/98/NT/2000/XP and offers the following features:

- Configuration of multiplex operation
- Configuration of the sensor (attenuation, switching frequency, response time)
- Adjustment of the switching output (start/end of switching range, hysteresis, object present yes/no)
- Adjustment of the analogue output
- Support of various languages

600 … 6000 mm

20 - 30 V DC

- Ideal for detection of levels of liquids, bulk materials, transparent media, …
- Distance information largely independent of surface properties
- PC-configuration software for configuring sensor and switching output
- Up to 10 devices can be synchronised via the SYNC input
- Separate adjustment of start and end of switching range (Q1) via potentiometer and PC

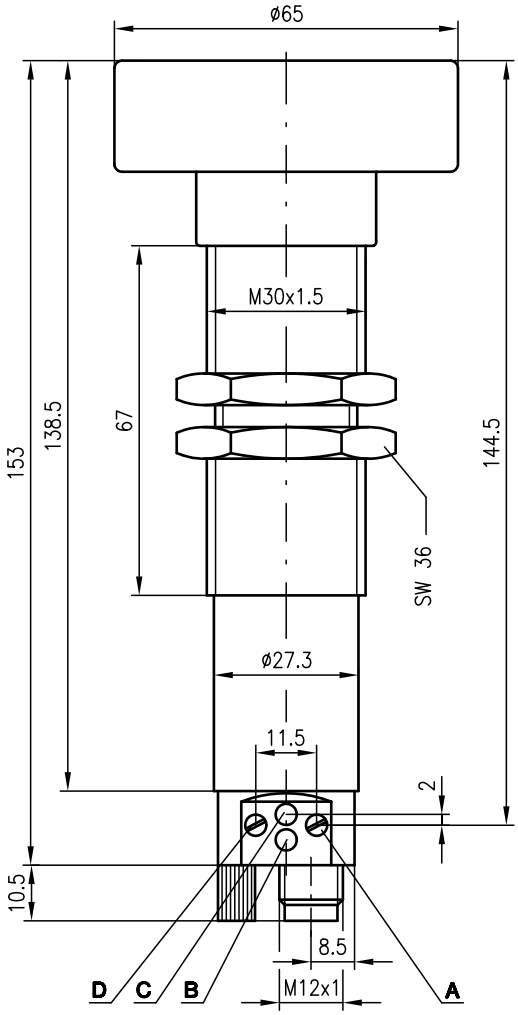
IEC 60947... IEC 60947... IP 65

Accessories:

(available separately • see page 42)

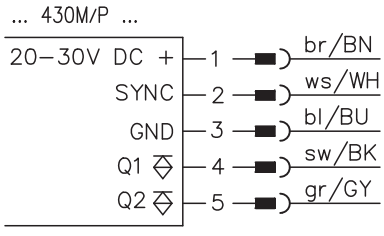
- Cable with M12 connector (K-D …)
- "USDS-Config" configuration software (free download from *www.leuze.com*)
- PGU 01 (programming unit)

Dimensioned drawing



A Potentiometer for end of switching range Q1
B Indicator diode Q2 only for … 430M/P …
C Indicator diode Q1
D Potentiometer for start of switching range Q1

Electrical connection



Switching outputs Q1 and Q2 switch alternately!

Specifications

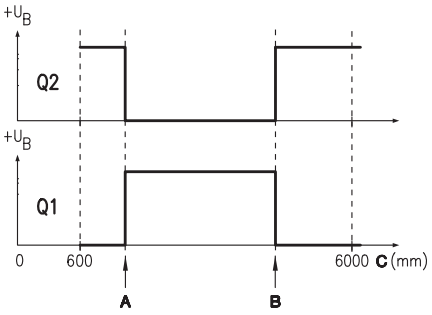
Ultrasonic specifications	**VRTU…-1110-6000…**
Operating range [1]	600 … 6000 mm
Ultrasonic frequency	80 kHz
Opening angle	6°
Resolution	≥ 1 mm
Absolute measurement accuracy	± 1.5% of the measurement range end value
Reproducibility	± 9 mm
Switching hysteresis	60 mm
Timing	
Switching frequency (min.) [2]	1 Hz
Response time (max.) [2]	400 ms
Delay before start-up	280 ms
Electrical data	
Operating voltage U_B	20 … 30 V DC (incl. ± 10% residual ripple)
Residual ripple	± 10% of U_B
Bias current	≤ 50 mA (without load)
Switching output	2 PNP transistors
Function characteristics	switching in case of object recognition
Output current	300 mA
Switching range adjustment	potentiometer 270°
Indicators	
Yellow LED	output activated
Flashing yellow LED	programming error
Mechanical data	
Housing	metal / CuZn
Weight	380 g
Connection type	M12 connector, plastic, 5-pin
Environmental data	
Ambient temp. (operation/storage)	-25 °C … +70 °C/-40 °C … +85 °C
Protective circuit [3]	1, 2, 3
VDE safety class	III
Protection class	IP 65
Standards applied	IEC 60947-5-2
Fitting position	any

1) For the complete temperature range, measured object ≥ 100x100 mm
2) Can be configured up to 3 times faster using "USDS-Config"
3) 1=short-circuit and overload protection, 2=polarity reversal protection, 3=wire break and inductive protection

Remarks

- **Approved purpose**:
  The ultrasonic sensors are used for acoustic, contactless detection of objects.

Characteristic curve of switching outputs:



A Start of switching range Q1, end of switching range Q2
B End of switching range Q1, start of switching range Q2
C Measurement distance

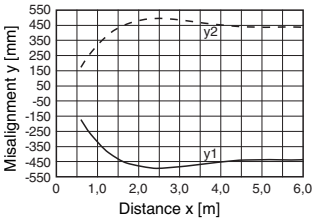
Order guide

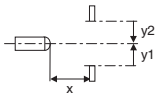
Designation	Part No.
VRTU 430M/P-1110-6000-S12	500 36264

Tables

Diagrams

Typ. response behaviour
(object 100x100 mm)





Remarks

- Synchronisation:
  Mutual interference is excluded by connecting the sensors with the SYNC input.

Configuration software "USDS-Config"

The configuration software runs under Windows 95/98/NT/2000/XP and offers the following features:

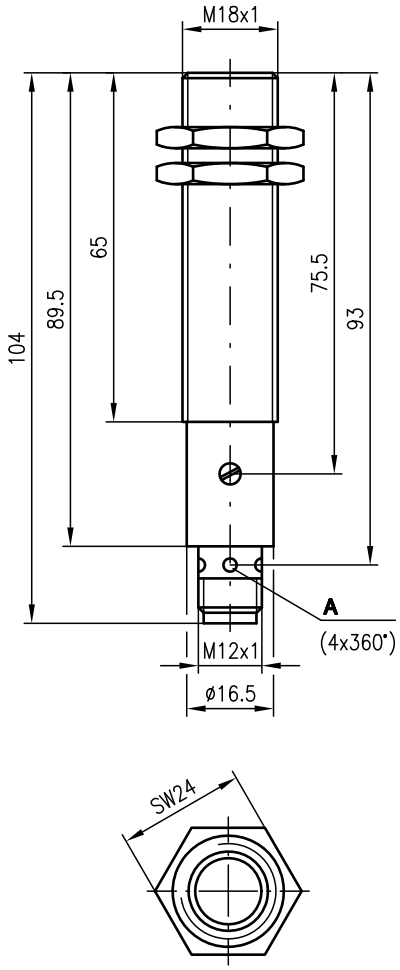
- Configuration of multiplex operation
- Configuration of the sensor (attenuation, switching frequency, response time)
- Adjustment of the switching output (start/end of switching range, hysteresis, object present yes/no)
- Adjustment of the analogue output
- Support of various languages

50 … 300 mm
150 … 1000 mm

20 - 30 V
DC

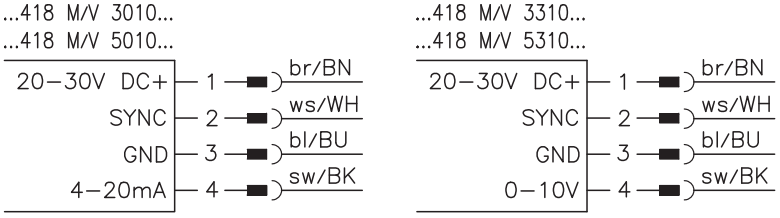
- Ideal for detection of levels of liquids, bulk materials, transparent media, …
- Distance information largely independent of surface properties
- PC-configuration software for configuring sensor and analogue output
- Up to 10 devices can be synchronised via the SYNC input

Dimensioned drawing



A Indicator diodes Q1

Electrical connection



IEC 60947... IEC 60947... IP 67

Accessories:

(available separately • see page 42)

- Mounting systems
- Cable with M12 connector (K-D …)
- "USDS-Config" configuration software (free download from *www.leuze.com*)
- PGU 01 (programming unit)

Specifications

	HRTU…-5x10-300…	HRTU…-3x10-1000…
Ultrasonic specifications		
Operating range [1]	50 … 300mm	150 … 1000mm
Ultrasonic frequency	400kHz	200kHz
Opening angle	6°	
Resolution	1mm	
Absolute measurement accuracy	± 2.5% of the measurement range end value	
Reproducibility	± 1mm	± 2mm
Switching hysteresis	10mm	10mm
Timing		
Switching frequency (min.) [2]	5Hz	4Hz
Response time (max.) [2]	100ms	120ms
Delay before start-up	280ms	280ms
Electrical data		
Operating voltage U_B	20 … 30V DC (incl. ± 10% residual ripple)	
Residual ripple	± 10% of U_B	
Bias current	≤ 60mA	
Switching output	analogue	
Current output	**only HRTU…-x010-…**	
Output current	4 … 20mA	
Load resistor	R_L = 0 … 300Ω	
Characteristic curve	ascending	
Voltage output	**only HRTU…-x310-…**	
Output voltage	0 … 10V	
Load resistor	R_L ≥ 500Ω	
Characteristic curve	ascending	
Indicators		
Yellow LED	object detected	
Mechanical data		
Housing	metal / CuZn	
Weight	50g	
Connection type	M12 connector, plastic, 4-pin	
Environmental data		
Ambient temp. (operation/storage)	-25°C … +70°C/-40°C … +85°C	
Protective circuit [3]	1, 2, 3	
VDE safety class	III	
Protection class	IP 67	
Standards applied	IEC 60947-5-2	
Fitting position	any	

1) For the complete temperature range, measured object ≥ 10x10mm
2) Can be configured up to 3 times faster using "USDS-Config"
3) 1=short-circuit and overload protection, 2=no polarity reversal protection, 3=wire break and inductive protection

Remarks

- **Approved purpose**:
  The ultrasonic distance sensors are used for acoustic, contactless detection of objects.

Order guide

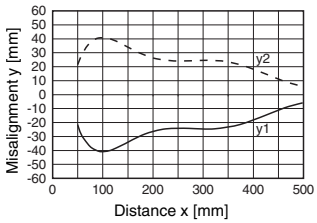
	Designation	Part No.
Current output	HRTU 418M/V-5010-300-S12	500 36259
Current output	HRTU 418M/V-3010-1000-S12	500 36260
Voltage output	HRTU 418M/V-5310-300-S12	500 40616
Voltage output	HRTU 418M/V-3310-1000-S12	500 40618

Tables

Diagrams

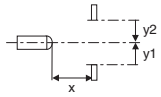
HRTU…-5x10-300…

Typ. response behaviour (object 10x10mm)



HRTU…-3x10-1000…

Typ. response behaviour (object 10x10mm)



Remarks

- Synchronisation:
  Mutual interference is excluded by connecting the sensors with the SYNC input.

Configuration software "USDS-Config"

The configuration software runs under Windows 95/98/NT/2000/XP and offers the following features:

- Configuration of multiplex operation
- Configuration of the sensor (attenuation, switching frequency, response time)
- Adjustment of the switching output (start/end of switching range, hysteresis, object present yes/no)
- Adjustment of the analogue output
- Support of various languages

VRTU 430 — Ultrasonic distance sensors

60 … 300 mm
200 … 1300 mm

20 - 30 V DC

- Ideal for detection of levels of liquids, bulk materials, transparent media, …
- Distance information largely independent of surface properties
- 1 analogue output, 1 switching output
- PC-configuration software for configuring sensor and switching output / analogue output
- Up to 10 devices can be synchronised via the SYNC input
- Separate adjustment of start and end of switching range (Q1) via potentiometer and PC

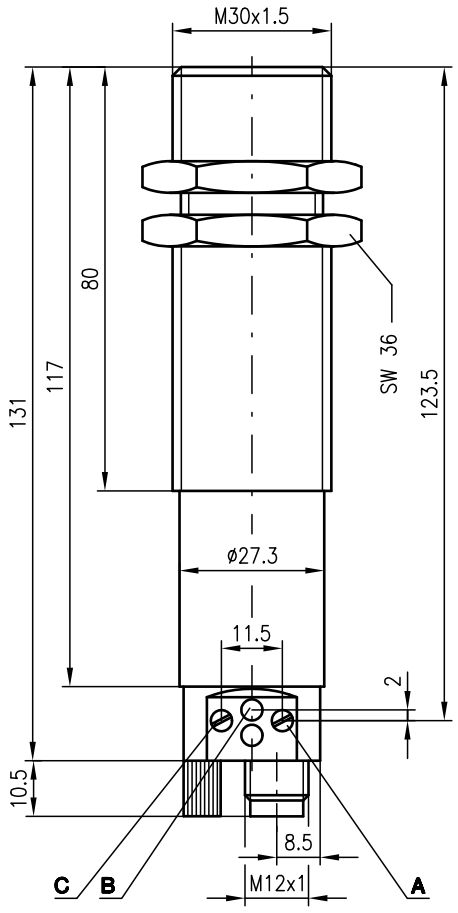
IEC 60947... IEC 60947... IP 65

Accessories:

(available separately • see page 42)

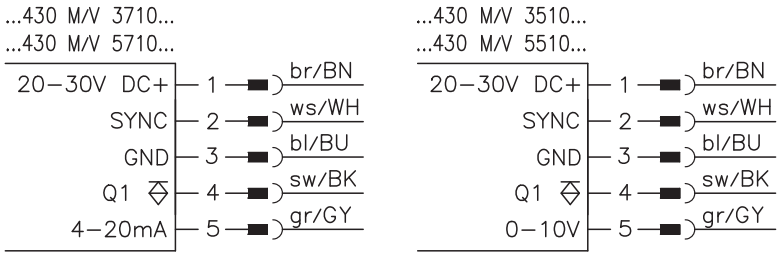
- Cable with M12 connector (K-D …)
- "USDS-Config" configuration software (free download from *www.leuze.com*)
- PGU 01 (programming unit)

Dimensioned drawing



A Potentiometer for end of switching range Q1
B Indicator diode Q1
C Potentiometer for start of switching range Q1

Electrical connection



Specifications

Ultrasonic specifications	**VRTU…-5x10-300…**	**VRTU…-3x10-1300…**
Operating range [1]	60 … 300 mm	200 … 1300 mm
Ultrasonic frequency	400 kHz	200 kHz
Opening angle	6°	
Resolution	≤ 1 mm	≥ 1 mm
Absolute measurement accuracy	± 1.5% of the measurement range end value	
Reproducibility	± 0.45 mm	± 2 mm
Switching hysteresis	10 mm	10 mm
Sensitivity	potentiometer 270°	
Timing		
Switching frequency (min.) [2]	8 Hz	4 Hz
Response time (max.) [2]	80 ms	110 ms
Delay before start-up	280 ms	280 ms
Electrical data		
Operating voltage U_B	20 … 30 V DC (incl. ± 10% residual ripple)	
Residual ripple	± 10% of U_B	
Bias current	≤ 50 mA (without load)	
Outputs	1 PNP transistor, 1 analogue output	
Switching output		
Function characteristics	switching in case of object recognition	
Output current (PNP)	300 mA	
Current output	**only HRTU…-x710-…**	
Output current	4 … 20 mA	
Load resistor	R_L = 0 … 300 Ω	
Characteristic curve	ascending	
Voltage output	**only HRTU…-x510-…**	
Output voltage	0 … 10 V	
Load resistor	R_L ≥ 500 Ω	
Characteristic curve	ascending	
Indicators		
Yellow LED	output activated	
Flashing yellow LED	programming error	
Mechanical data		
Housing	metal / CuZn	
Weight	210 g	
Connection type	M12 connector, plastic, 5-pin	
Environmental data		
Ambient temp. (operation/storage)	-25 °C … +70 °C/-40 °C … +85 °C	
Protective circuit [3]	1, 2, 3	
VDE safety class	III	
Protection class	IP 65	
Standards applied	IEC 60947-5-2	
Fitting position	any	

1) For the complete temperature range, measured object ≥ 10x10 mm
2) Can be configured up to 3 times faster using "USDS-Config"
3) 1=short-circuit and overload protection, 2=no polarity reversal protection, 3=wire break and inductive protection

Remarks

- **Approved purpose**:
  The ultrasonic distance sensors are used for acoustic, contactless detection of objects.

Order guide

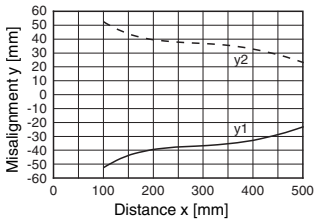
	Designation	**Part No.**
Current output	VRTU 430M/V-5710-300-S12	500 36266
Current output	VRTU 430M/V-3710-1300-S12	500 36267
Voltage output	VRTU 430M/V-5510-300-S12	500 40771
Voltage output	VRTU 430M/V-3510-1300-S12	500 40772

Tables

Diagrams

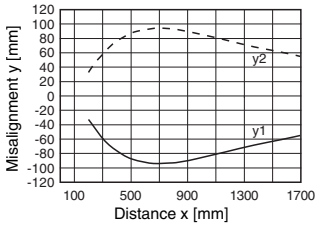
VRTU…-5x10-300…

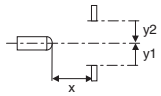
Typ. response behaviour (object 10x10 mm)



VRTU…-3x10-1300…

Typ. response behaviour (object 10x10 mm)





Remarks

- Synchronisation:
  Mutual interference is excluded by connecting the sensors with the SYNC input.

Configuration software "USDS-Config"

The configuration software runs under Windows 95/98/NT/2000/XP and offers the following features:

- Configuration of multiplex operation
- Configuration of the sensor (attenuation, switching frequency, response time)
- Adjustment of the switching output (start/end of switching range, hysteresis, object present yes/no)
- Adjustment of the analogue output
- Support of various languages

VRTU 430 — Ultrasonic distance sensors

400 … 3000 mm

20 - 30 V DC

- Ideal for detection of levels of liquids, bulk materials, transparent media, …
- Distance information largely independent of surface properties
- Analogue current output or voltage output, 1 switching output
- All settings are adjustable
- Up to 10 devices can be synchronised via the SYNC input
- Start and end of switching range adjustable separately

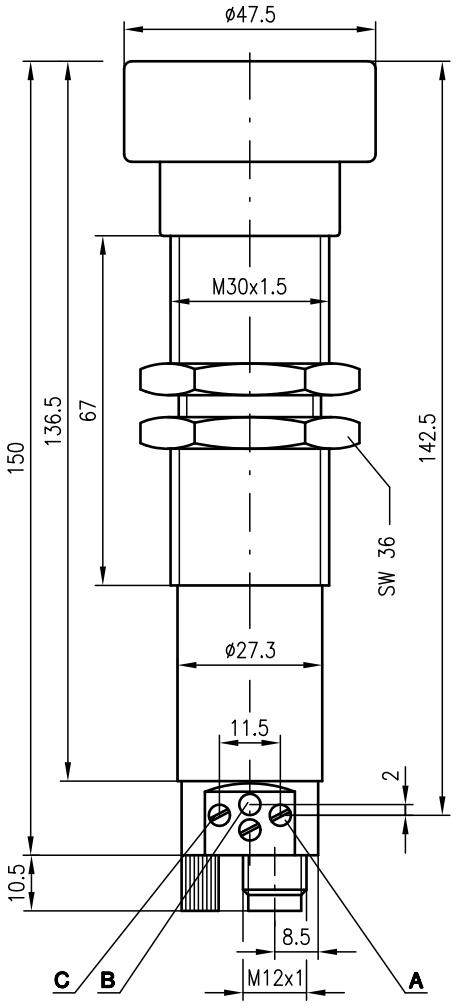
IEC 60947... IEC 60947... IP 65

Accessories:

(available separately • see page 42)

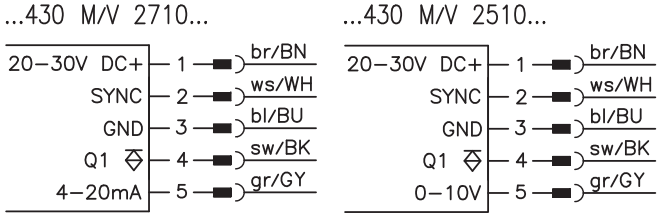
- Programming software "USDS-Config"
- PGU 01 (programming unit)

Dimensioned drawing



A End of switching range
B Indicator diode Q1
C Start of switching range

Electrical connection



Specifications

Ultrasonic specifications	**VRTU…-2710-3000…**	**VRTU…-2510-3000…**
Operating range [1]	400 … 3000mm	
Ultrasonic frequency	120kHz	
Opening angle	6°	
Resolution	≥ 1mm	
Absolute measurement accuracy	± 1.5% of the measurement range end value	
Reproducibility	± 5mm	
Switching hysteresis	20mm	
Timing		
Switching frequency	2Hz	
Response time	200ms	
Delay before start-up	280ms	
Electrical data		
Operating voltage U_B	20 … 30VDC (incl. ± 10% residual ripple)	
Residual ripple	± 10% of U_B	
Bias current	< 60mA	
Outputs	1 PNP transistor, 1 analogue current output	1 PNP transistor, 1 analogue voltage output
Function characteristics	switching in case of object recognition	
Output current (PNP switching output)	max. 300mA	
Analogue output	4 … 20mA	0 … 10V
Load resistance (analogue output)	R_L 0 … 300Ω	R_L ≥ 2kΩ
Characteristic curve	ascending	
Switching range adjustment	potentiometer 270°	
Indicators		
Yellow LED	output activated	
Flashing yellow LED	programming error	
Mechanical data		
Housing	metal / CuZn	
Weight	340g	
Connection type	M12 connector, plastic, 5-pin	
Environmental data		
Ambient temp. (operation/storage)	-25°C … +70°C/-40°C … +85°C	
Protective circuit [2]	1, 2, 3	
VDE safety class	III	
Protection class	IP 65	
Standards applied	IEC 60947-5-2	
Fitting position	any	

1) For the complete temperature range, measured object ≥ 50x50mm
2) 1=short-circuit and overload protection, 2=no polarity reversal protection, 3=wire break and inductive protection

Remarks

- **Approved purpose**:
  The ultrasonic distance sensors are used for acoustic, contactless detection of objects.

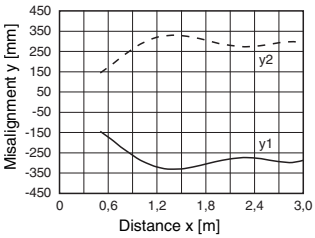
Order guide

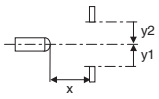
	Designation	Part No.
With analogue current output	VRTU 430M/V-2710-3000-S12	500 36268
With analogue voltage output	VRTU 430M/V-2510-3000-S12	501 07096

Tables

Diagrams

Typ. response behaviour (object 50x50mm)





Remarks

- Synchronisation:
  Mutual interference is excluded by connecting the sensors with the SYNC input.
- Multiplex:
  Achieved by configuring the sensors with the "USDS-Config" software.

VRTU 430 — Ultrasonic distance sensors

600 … 6000 mm

20 - 30 V DC

- Ideal for detection of levels of liquids, bulk materials, transparent media, …
- Distance information largely independent of surface properties
- Analogue current output, 1 switching output
- PC-configuration software for configuring sensor and switching output / analogue output
- Up to 10 devices can be synchronised via the SYNC input
- Separate adjustment of start and end of switching range (Q1) via potentiometer and PC

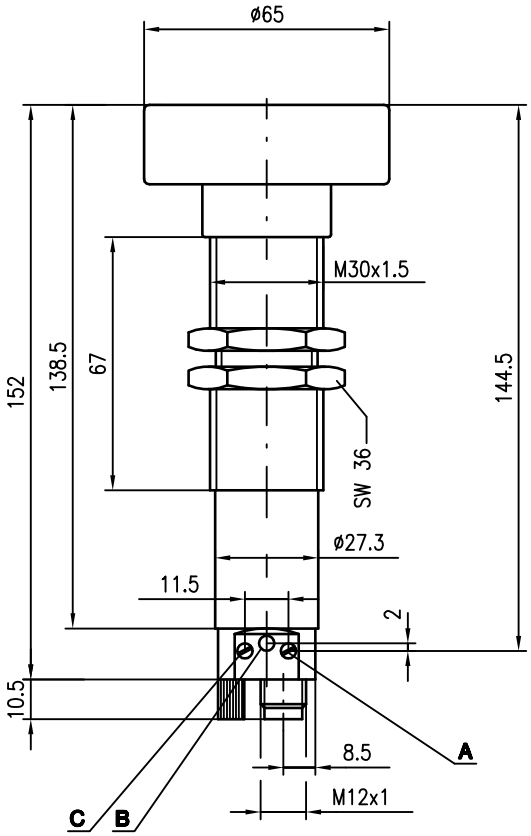
IEC 60947... IEC 60947... IP 65

Accessories:

(available separately • see page 42)

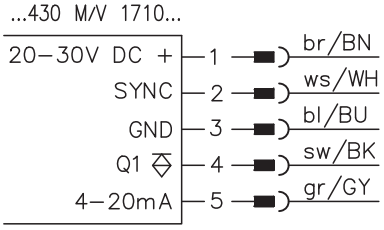
- Cable with M12 connector (K-D …)
- "USDS-Config" configuration software (free download from *www.leuze.com*)
- PGU 01 (programming unit)

Dimensioned drawing



A Potentiometer for end of switching range Q1
B Indicator diode Q1
C Potentiometer for start of switching range Q1

Electrical connection



Specifications

Ultrasonic specifications	**VRTU…-1710-6000…**
Operating range [1]	600 … 6000mm
Ultrasonic frequency	80kHz
Opening angle	6°
Resolution	≥ 1mm
Absolute measurement accuracy	± 1.5% of the measurement range end value
Reproducibility	± 9mm
Switching hysteresis	60mm
Timing	
Switching frequency (min.) [2]	1Hz
Response time (max.) [2]	400ms
Delay before start-up	280ms
Electrical data	
Operating voltage U_B	20 … 30VDC (incl. ± 10% residual ripple)
Residual ripple	± 10% of U_B
Bias current	< 60mA
Outputs	1 PNP transistor, 1 analogue output
Function characteristics	switching in case of object recognition
Output current (PNP/analogue)	300mA/4 … 20mA
Analogue output	R_L 0 … 300Ω
Characteristic curve	ascending
Switching range adjustment	potentiometer 270°
Indicators	
Yellow LED	output activated
Flashing yellow LED	programming error
Mechanical data	
Housing	metal / CuZn
Weight	380g
Connection type	M12 connector, plastic, 5-pin
Environmental data	
Ambient temp. (operation/storage)	-25°C … +70°C/-40°C … +85°C
Protective circuit [3]	1, 2, 3
VDE safety class	III
Protection class	IP 65
Standards applied	IEC 60947-5-2
Fitting position	any

1) For the complete temperature range, measured object ≥ 100x100 mm
2) Can be configured up to 3 times faster using "USDS-Config"
3) 1=short-circuit and overload protection, 2=no polarity reversal protection, 3=wire break and inductive protection

Remarks

- **Approved purpose**:
  The ultrasonic distance sensors are used for acoustic, contactless detection of objects.

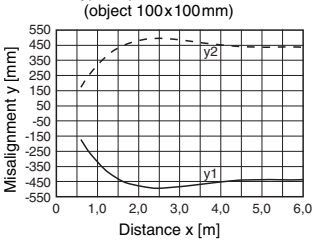
Order guide

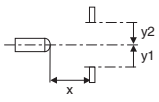
Designation	Part No.
VRTU 430M/V-1710-6000-S12	500 36269

Tables

Diagrams

Typ. response behaviour
(object 100x100mm)





Remarks

- Synchronisation:
  Mutual interference is excluded by connecting the sensors with the SYNC input.

Configuration software "USDS-Config"

The configuration software runs under Windows 95/98/NT/2000/XP and offers the following features:

- Configuration of multiplex operation
- Configuration of the sensor (attenuation, switching frequency, response time)
- Adjustment of the switching output (start/end of switching range, hysteresis, object present yes/no)
- Adjustment of the analogue output
- Support of various languages

Accessories Ultrasonic sensors

Connectors, cables

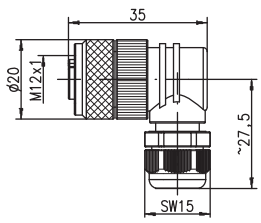
The following connectors are available for devices with M12 connectors: angled or straight, with and without cable connection.

Protection class (DIN 40050)
plugged and screwed down: IP 67

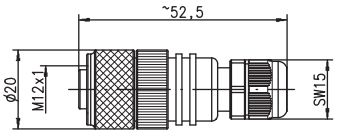
Important:
With throughbeam photoelectric sensors, a connector is required both for the transmitter and the receiver.

Dimensioned drawings

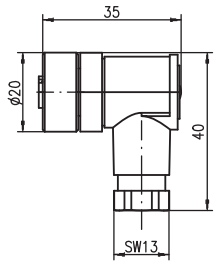
KD 095-4



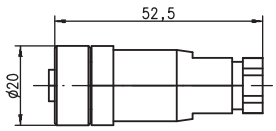
KD 095-4A



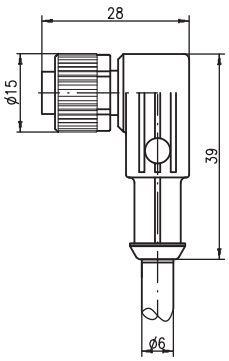
KD 095-5



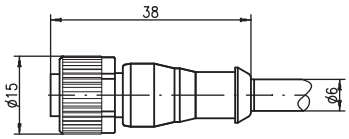
KD 095-5A



K-D M12W-4P-…
K-D M12W-5P-…



K-D M12A-4P-…
K-D M12A-5P-…



Selection table

M12 connector, user-configurable		
		
Connection type	**Without cable, 4-pin**	
Screw terminals	**KD 095-4** Part No. 500 31324	**KD 095-4A** Part No. 500 31323
	Without cable, 5-pin	
Screw terminals	**KD 095-5** Part No. 500 20502	**KD 095-5A** Part No. 500 20501

M12 connection cable with connector, single-sided		
		
Length	**PVC cable sheath, 4-pin**	
2m	**K-D M12W-4P-2m-PVC** Part No. 501 04543	**K-D M12A-4P-2m-PVC** Part No. 501 04542
5m	**K-D M12W-4P-5m-PVC** Part No. 501 04545	**K-D M12A-4P-5m-PVC** Part No. 501 04544
10m	**K-D M12W-4P-10m-PVC** Part No. 501 04547	**K-D M12A-4P-10m-PVC** Part No. 501 04546
20m	–	**K-D M12A-4P-20m-PVC** Part No. 501 04753
Length	**PUR cable sheath, 4-pin**	
2m	**K-D M12W-4P-2m-PUR** Part No. 501 04562	**K-D M12A-4P-2m-PUR** Part No. 501 04561
5m	**K-D M12W-4P-5m-PUR** Part No. 501 04564	**K-D M12A-4P-5m-PUR** Part No. 501 04563
10m	**K-D M12W-4P-10m-PUR** Part No. 501 04566	**K-D M12A-4P-10m-PUR** Part No. 501 04565

M12 connection cable with connector, single-sided		
		
Length	**PVC cable sheath, 5-pin**	
2m	**K-D M12W-5P-2m-PVC** Part No. 501 04556	**K-D M12A-5P-2m-PVC** Part No. 501 04555
5m	**K-D M12W-5P-5m-PVC** Part No. 501 04558	**K-D M12A-5P-5m-PVC** Part No. 501 04557
10m	**K-D M12W-5P-10m-PVC** Part No. 501 04560	**K-D M12A-5P-10m-PVC** Part No. 501 04559
Length	**PUR cable sheath, 5-pin**	
2m	**K-D M12W-5P-2m-PUR** Part No. 501 04568	**K-D M12A-5P-2m-PUR** Part No. 501 04567
5m	**K-D M12W-5P-5m-PUR** Part No. 501 04762	**K-D M12A-5P-5m-PUR** Part No. 501 04569

Connectors, cables

Accessories Ultrasonic sensors

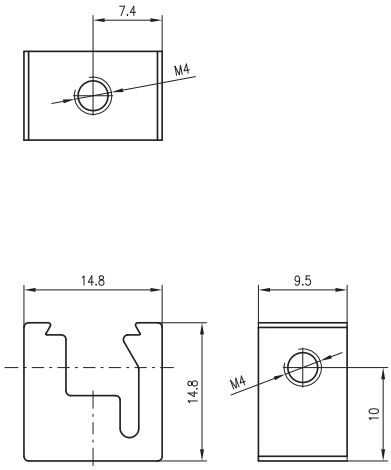
Mounting systems

BT 8-0 (Part No. 500 36196)

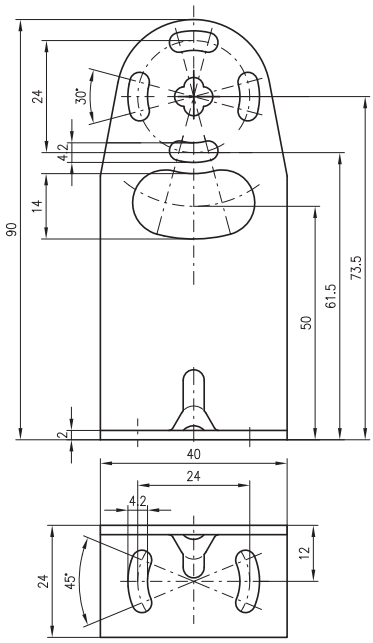
BT 8 (Part No. 500 36195)

Dimensioned drawings

BT 8-0

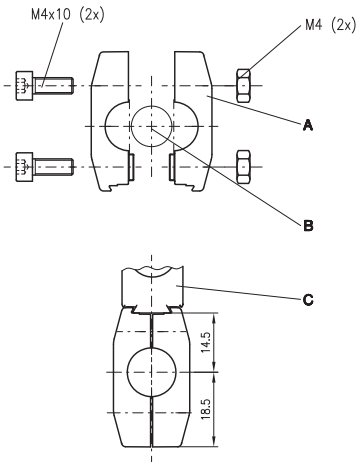


BT 8



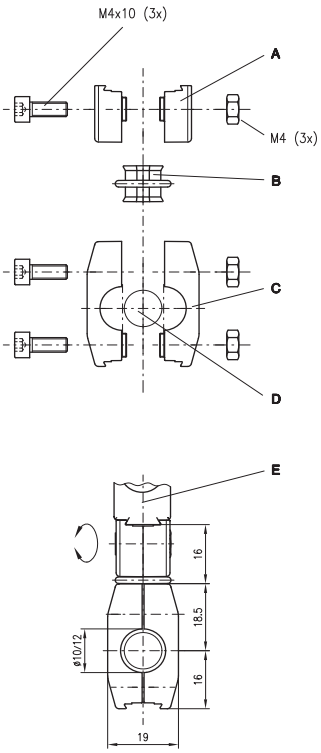
Dimensioned drawings

UMS 8-D…



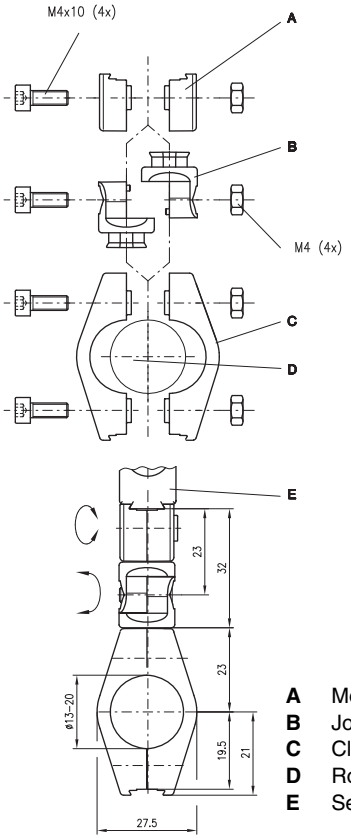
A Clamp
B Rod
C Sensor

UMS 8.1-D…



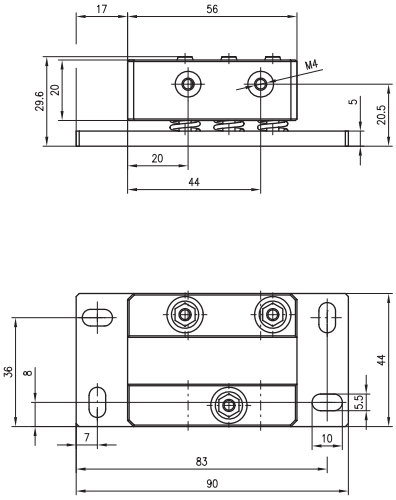
A Mount
B Joint
C Clamp
D Rod
E Sensor

UMS 8.2-D…



A Mount
B Joint
C Clamp
D Rod
E Sensor

BT 8-ARH

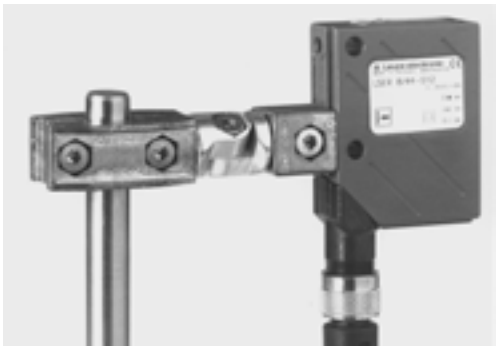


Mounting systems

UMS 8-D10 (Ø10mm, Part No. 500 35020)
UMS 8-D12 (Ø12mm, Part No. 500 35021)
UMS 8-D14 (Ø14mm, Part No. 500 35022)

UMS 8.1-D10 (Ø10mm, Part No. 500 35023)
UMS 8.1-D12 (Ø12mm, Part No. 500 35024)
UMS 8.1-D14 (Ø14mm, Part No. 500 35025)

UMS 8.2-D10 (Ø10mm, Part No. 500 35026)
UMS 8.2-D12 (Ø12mm, Part No. 500 35027)
UMS 8.2-D14 (Ø14mm, Part No. 500 35028)



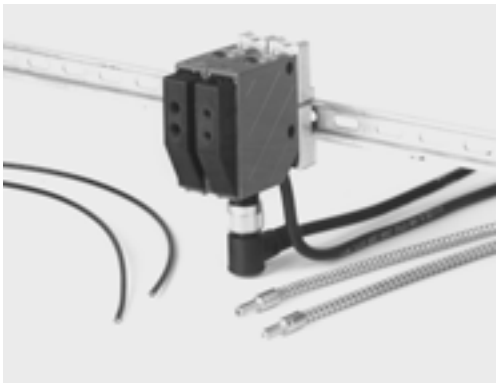
BT 8-ARH (Part No. 500 35030)

Accessories Ultrasonic sensors

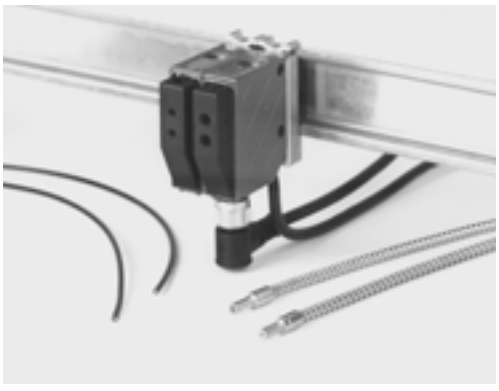
Mounting systems

BT 8-D10 (Ø10mm, Part No. 500 35017)
BT 8-D12 (Ø12mm, Part No. 500 35018)
BT 8-D14 (Ø14mm, Part No. 500 35019)

BT 8-C15 (Part No. 500 35016)

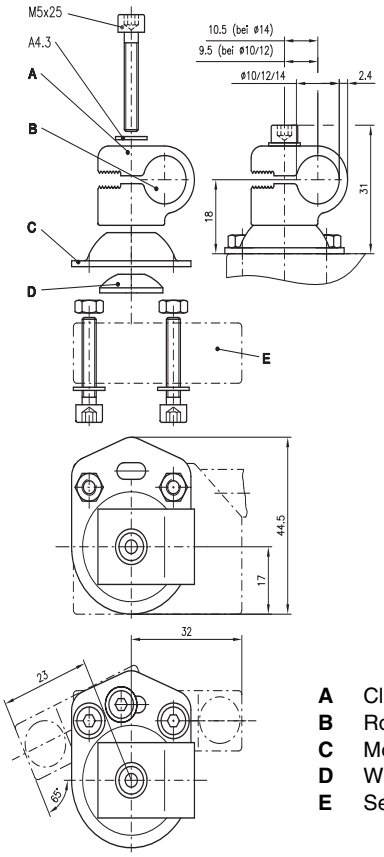


BT 8-C35x7,5 (Part No. 500 35015)



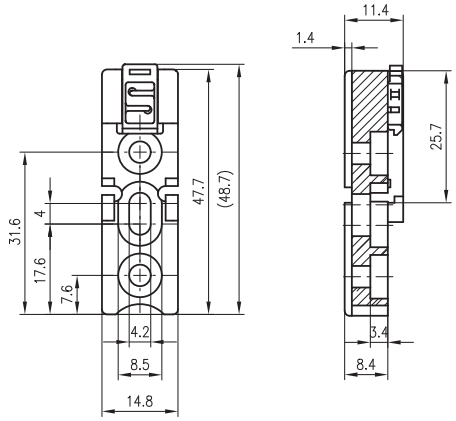
Dimensioned drawings

BT 8-D…

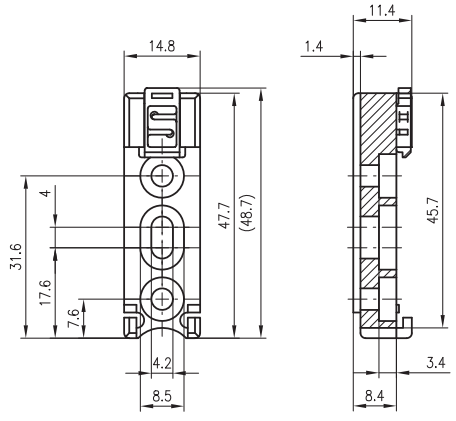


A Clamp
B Rod diameter
C Mounting plate
D Washer
E Sensor

BT 8-C15

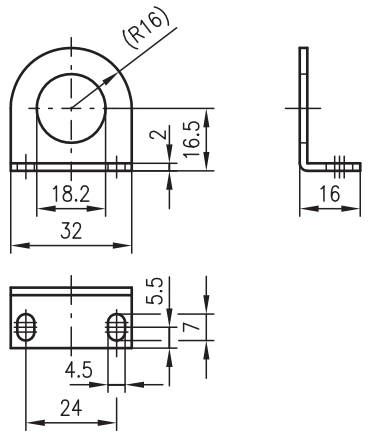


BT 8-C35x7,5

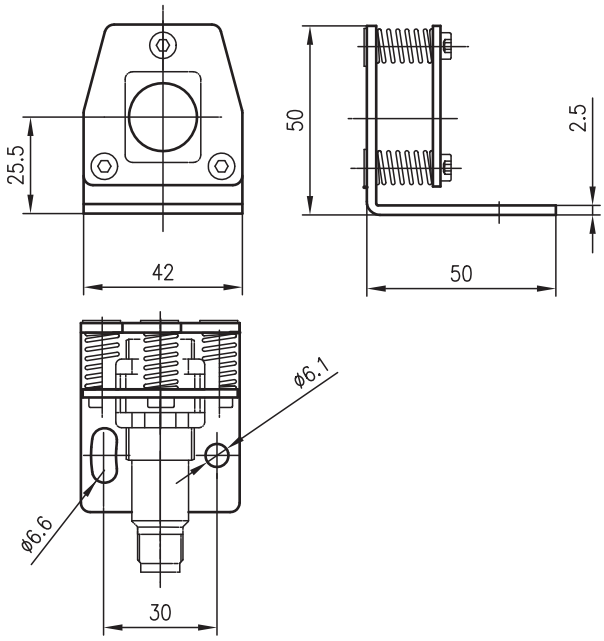


Dimensioned drawings

BT 318

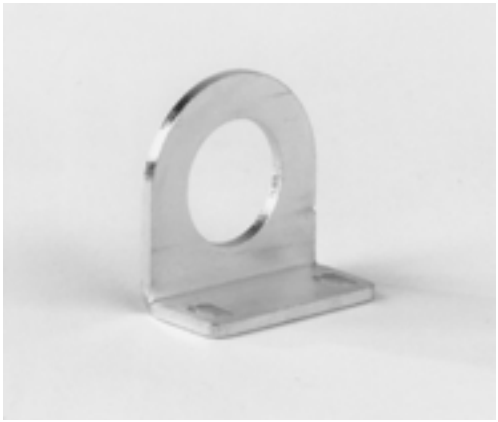


BT 318-ARH



Mounting systems

BT 318

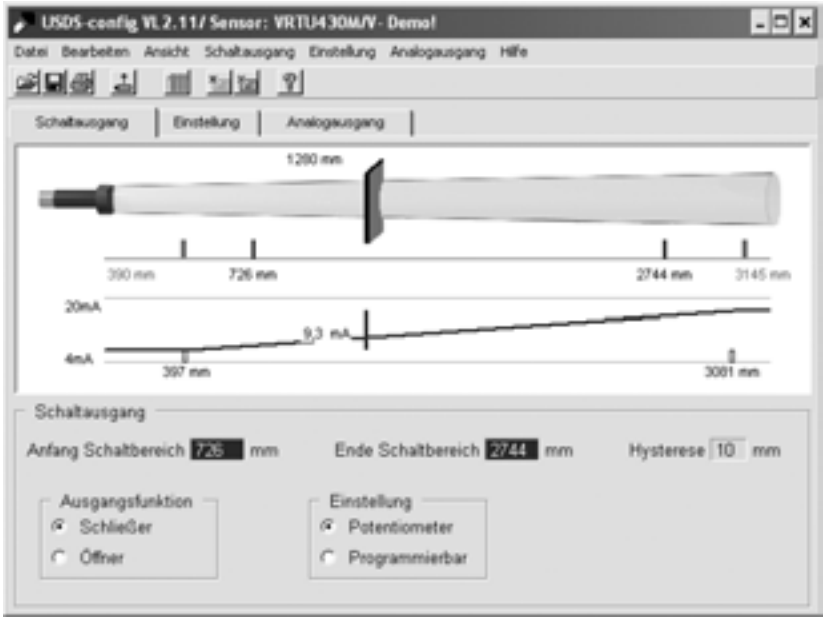


BT 318-ARH

Accessories Ultrasonic sensors

Configuration software

USDS-Config
(free download from *www.leuze.com*)



Programming unit

PGU 01 (Part No. 500 36559)

The **USDS-Config** software is supplied with the PGU 01 programming unit

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Barcode Readers
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Industrial Image Processing Systems
Optical Data Transmission Systems
Optical Distance Measurement/Positioning
Hand-Held Readers

Safety Sensors
Safety Systems
Safety Services

Safety Laser Scanners
Safety Light Curtains
Transceiver and Multiple Light Beam Safety Devices
Single Light Beam Safety Devices
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