



# USDS - Ultrasonic distance sensors

## Product description





# *USDS - Ultrasonic distance sensors*

## *Overview and advantages*

- Distance measurement using the ultrasonic principle
- Measurement ranges from 50mm to 6000mm

Distance information nearly independent of surface properties

- Outputs:
- 2 switching outputs
  - Analogue current output

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

HRTU 418M/V... and VRTU 430M/V... models can be configured via PC-software and programming terminal

M18 or M30 housings





Operating principle	Designation	Operating range	Housing	Measurement principle	Operating voltage	Switching		Output		
						Analogue output 4 ... 20mA	2nd switching output	PNP transistor	NPN transistor	
	RKU 418RM/P-5020-200-S12	0 ... 200mm	• Metal	• Ultrasonics	• 20 ... 30VDC			•		
	RKU 418WM/P-5020-200-S12	0 ... 200mm	•	•	•			•		
	RKU 418RM/P-3020-700-S12	0 ... 700mm	•	•	•			•		
	RKU 418WM/P-3020-700-S12	0 ... 700mm	•	•	•			•		
	RKU 8/24-400-S12	0 ... 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 8/24-400-S12	50 ... 400mm	•	•	•			•	•	
	HRTU 418M/P-5010-300-S12	50 ... 300mm	•	•	•			•		
	HRTU 418M/P-3010-1000-S12	150 ... 1000mm	•	•	•			•		
	HRTU 418M/V-5010-300-S12	50 ... 300mm	•	•	•	•				
	HRTU 418M/V-3010-1000-S12	150 ... 1000mm	•	•	•	•				
	VRTU 430M/P-5110-300-S12	60 ... 300 mm	•	•	•		•	•		
	VRTU 430M/P-3110-1300-S12	200 ... 1300mm	•	•	•		•	•		
	VRTU 430M/V-5710-300-S12	60 ... 300 mm	•	•	•	•		•		
	VRTU 430M/V-3710-1300-S12	200 ... 1300mm	•	•	•	•		•		
	VRTU 430M/P-2110-3000-S12	400 ... 3000mm	•	•	•		•	•		
	VRTU 430M/V-2710-3000-S12	400 ... 3000mm	•	•	•	•		•		
	VRTU 430M/P-1110-6000-S12	600 ... 6000 mm	•	•	•		•	•		
	VRTU 430M/V-1710-6000-S12	600 ... 6000 mm	•	•	•	•		•		



Connection		Switching frequency	Options							Page
Cable	M12 connector		Teachable switching outputs	Parameterisation possible	Synchronisation input	Background suppression	Foreground suppression	Operating range adjustment	Transparent media	
	•	10Hz	•			•			•	5
	•	10Hz	•			•			•	5
	•	5Hz	•			•			•	7
	•	5Hz	•			•			•	7
	•	8Hz	•		•	•			•	9
	•	10Hz	•			•			•	11
	•	10Hz	•			•			•	11
	•	5Hz	•			•			•	13
	•	5Hz	•			•			•	13
	•	8Hz	•		•	•			•	15
	•	5Hz		•	•	•		•	•	17
	•	4Hz		•	•	•		•	•	17
	•	5Hz		•	•	•		•	•	19
	•	4Hz		•	•	•		•	•	19
	•	8Hz		•	•	•	•	•	•	21
	•	4Hz		•	•	•	•	•	•	21
	•	8Hz		•	•	•	•	•	•	23
	•	4Hz		•	•	•	•	•	•	23
	•	2Hz		•	•	•	•	•	•	25
	•	2Hz		•	•	•	•	•	•	27
	•	1Hz		•	•	•	•	•	•	29
	•	1Hz		•	•	•	•	•	•	31



RKU 418 RM/WM

Ultrasonic sensors



0 ... 200mm



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

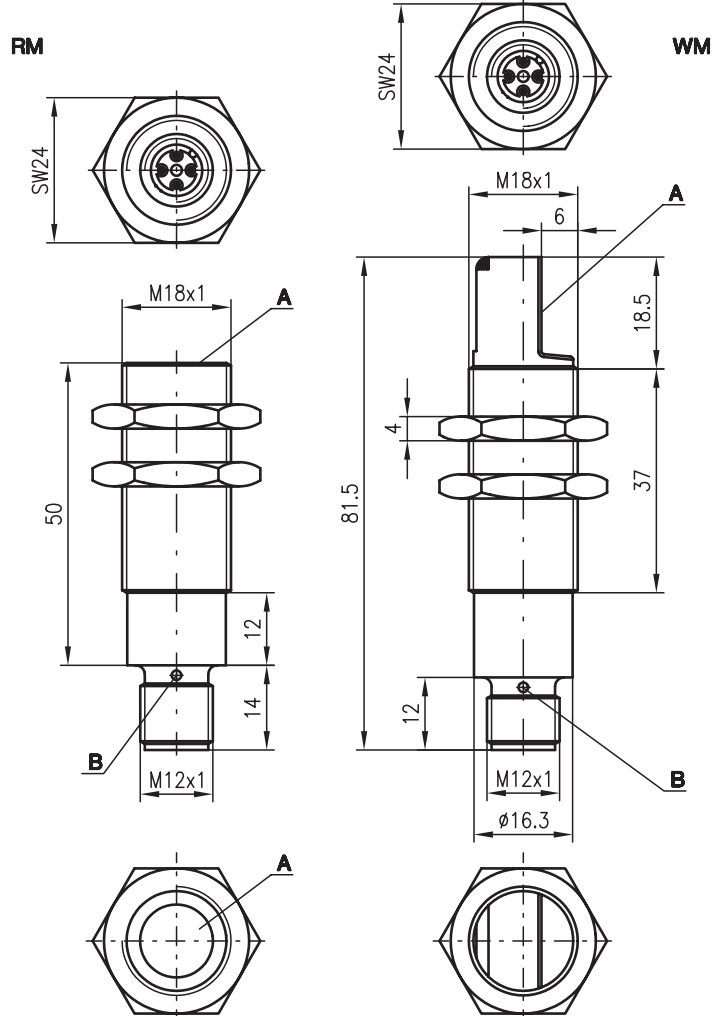


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Accessories:

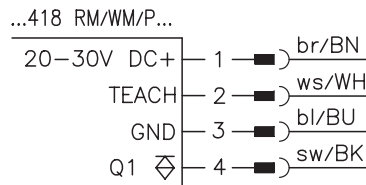
(available separately • see page 32)

Dimensioned drawing



A Active surface  
 B Indicator diode

Electrical connection



## Specifications

### Ultrasonic specifications

	RKU...RM/P...	RKU...WM/P...
Operating range <sup>1)</sup>	0 ... 200mm	
Adjustment range	120 ... 220 mm	
Dead zone	≤ 20mm in front of reflector surface	
Ultrasonic frequency	400kHz	
Typ. opening angle	see diagrams	
Direction of beam	straight	at an angle of 90°
Temperature drift	± 0.17%/K	

### Timing

Switching frequency	10Hz
Response time	50ms
Delay before start-up	20ms
Switching hysteresis	10mm

### 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

LED yellow	output activated
LED yellow flashing	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 <sup>2)</sup>	1, 2, 3
VDE safety class	III
Protection class	IP 65
Standards applied	IEC 60947-5-2
Fitting position	any

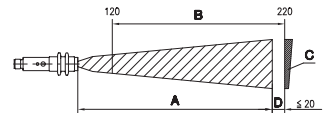
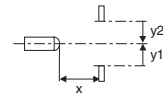
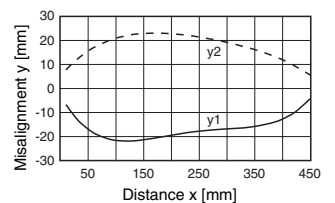
1) For the complete temperature range, measured object ≥ 20x20mm

2) 1=short-circuit and overload protection, 2=polarity reversal protection, 3=wire break and inductive protection

## Tables

## Diagrams

Typ. response behaviour (object 20x20mm)



- A Operating range
- B Adjustment range
- C Reflector
- D Dead zone

## Order guide

Designation	Part No.
RKU 418RM/P-5020-200-S12	500 38637
RKU 418WM/P-5020-200-S12	500 38638

## Remarks

- **Teach procedure:**  
position reflector at desired switching distance. Connect teaching input (PIN 2) to GND for ≥ 3s. Reconnect the teaching input to + $U_B$  or leave open; the switching output is now programmed.
- **Temperature drift**  
for temperature rise:  
+0.17%/K  
for temperature fall:  
-0.17%/K



RKU 418 RM/WM

Ultrasonic sensors



0 ... 700mm



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

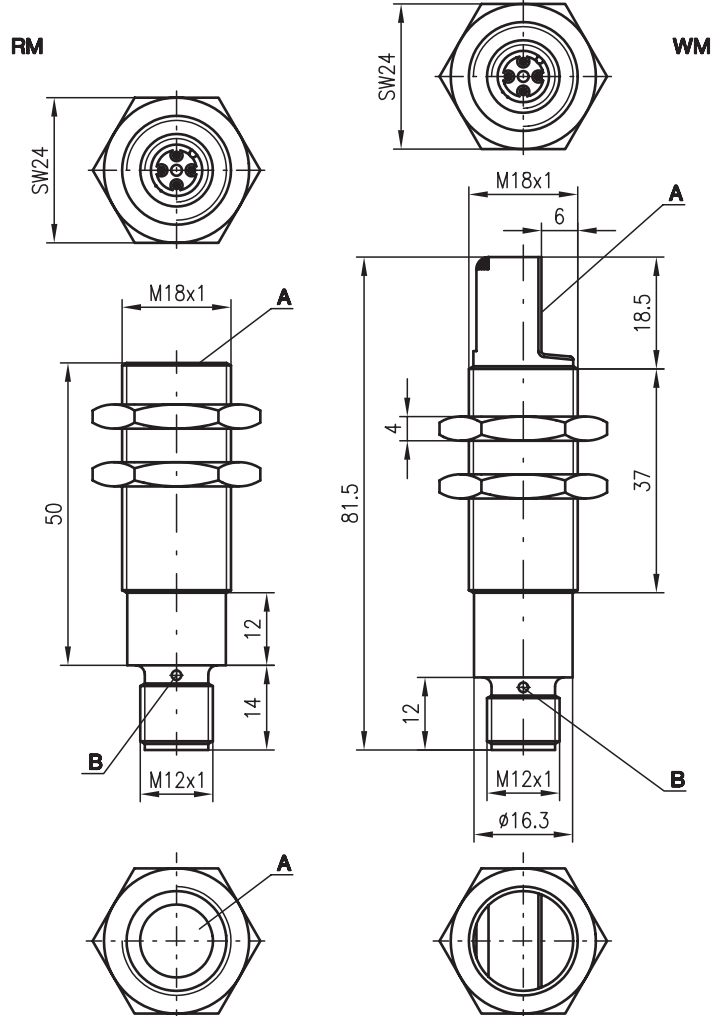


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Accessories:

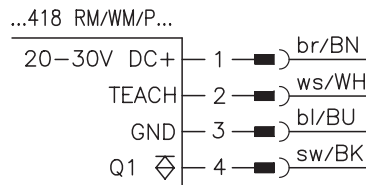
(available separately • see page 32)

Dimensioned drawing



- A Active surface
- B Indicator diode

Electrical connection





## Specifications

### Ultrasonic specifications

	RKU...RM/P...	RKU...WM/P...
Operating range <sup>1)</sup>	0 ... 700mm	
Adjustment range	350 ... 750 mm	
Dead zone	≤ 50mm in front of reflector surface	
Ultrasonic frequency	200kHz	
Typ. opening angle	see diagrams	
Direction of beam	straight	at an angle of 90°
Temperature drift	± 0.17%/K	

### Timing

Switching frequency	5Hz
Response time	100ms
Delay before start-up	20ms
Switching hysteresis	10mm

### 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

LED yellow	output activated
LED yellow flashing	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 <sup>2)</sup>	1, 2, 3
VDE safety class	III
Protection class	IP 65
Standards applied	IEC 60947-5-2
Fitting position	any

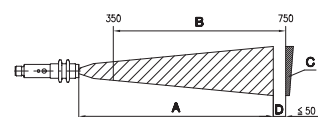
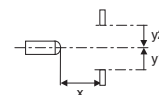
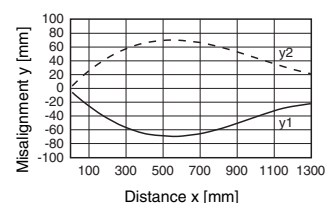
1) For the complete temperature range, measured object ≥ 20x20mm

2) 1=short-circuit and overload protection, 2=polarity reversal protection, 3=wire break and inductive protection

## Tables

## Diagrams

Typ. response behaviour (object 20x20mm)



- A Operating range
- B Adjustment range
- C Reflector
- D Dead zone

## Order guide

Designation	Part No.
RKU 418RM/P-3020-700-S12	500 38641
RKU 418WM/P-3020-700-S12	500 38642

## Remarks

- **Teach procedure:**  
position reflector at desired switching distance. Connect teaching input (PIN 2) to GND for ≥ 3s. Reconnect the teaching input to + $U_B$  or leave open; the switching output is now programmed.
- **Temperature drift**  
for temperature rise:  
+0.17%/K  
for temperature fall:  
-0.17%/K



RKU 8

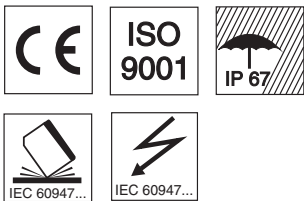
Retro-reflective ultrasonic sensor



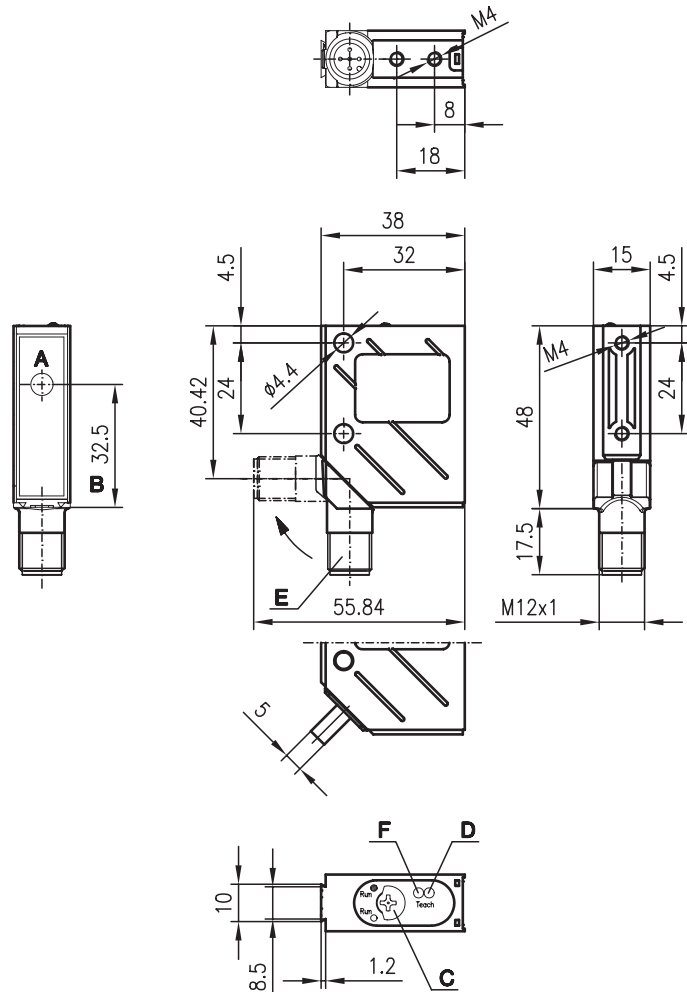
0 ... 400mm



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

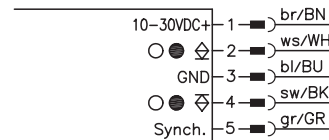


Dimensioned drawing



- A Converter
- B Ultrasonic axis
- C Operational control
- D LED green
- E 90° turning connector
- F LED yellow

Electrical Connection



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Accessories: (available separately)

## Specifications

### Ultrasonic specifications

Operating range <sup>1)</sup>	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

LED green	ready
LED green flashing	teaching in progress
LED yellow	object detected
LED yellow flashing	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 <sup>2)</sup>	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	LED green	LED yellow
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 it active when object was detected	ON	ON
	Run ● Output it not active when object was detected	ON	OFF

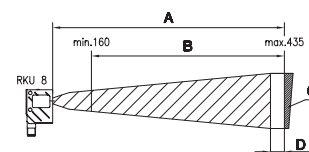
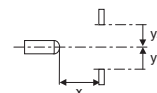
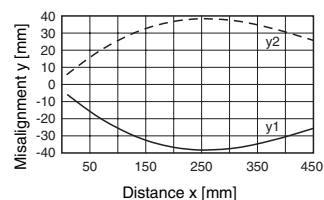
## Order guide

<b>Designation</b>	<b>Order code</b>
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

- **Synchronisation:**  
Max. 10 sensors may be synchronised by connecting the Synch inputs. Thus, mutual interference can be avoided.
- **Temperature drift**  
for temperature rise:  
+0.17 %/K  
for temperature fall:  
-0.17 %/K



HRTU 418 RM/WM

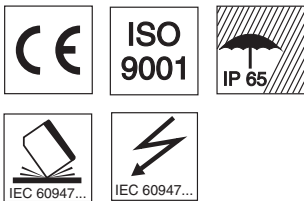
Ultrasonic sensors



30 ... 200mm



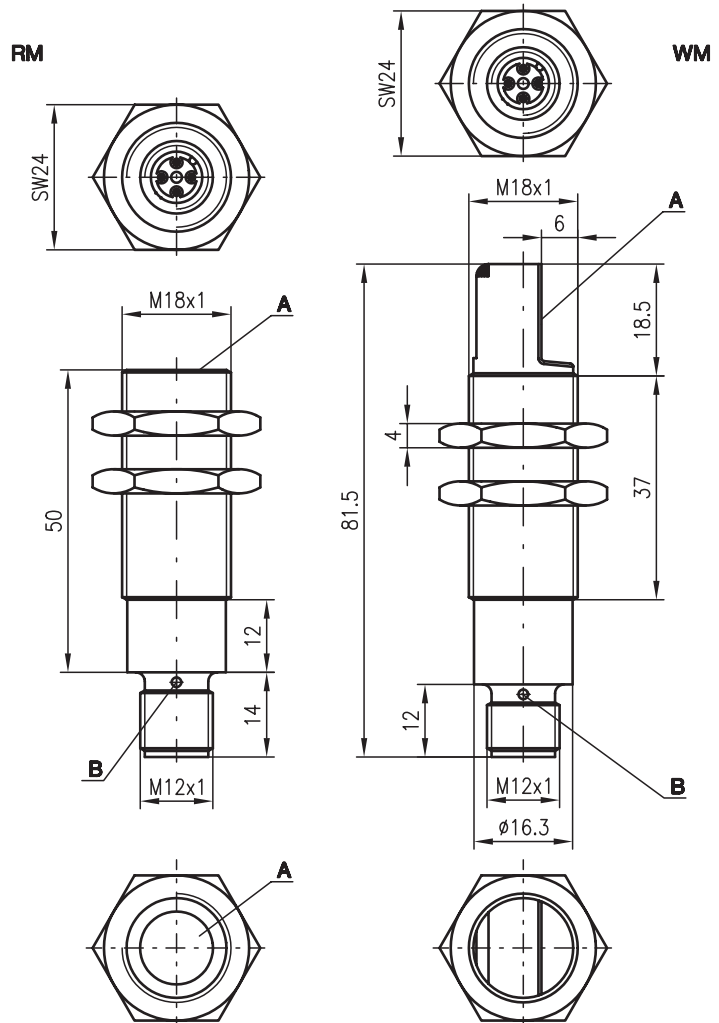
- Colour and transmission independent detection of objects
- Switching behaviour almost surface-independent
- Distance teachable
- Small construction



Accessories:

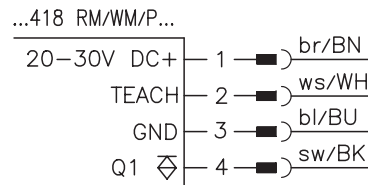
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Dimensioned drawing



- A Active surface
- B Indicator diode

Electrical connection



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## Specifications

### Ultrasonic specifications

Operating range <sup>1)</sup>	30 ... 200mm
Adjustment range	50 ... 200mm
Ultrasonic frequency	400kHz
Typ. opening angle	see diagrams
Resolution	1mm
Direction of beam	straight
Reproducibility	± 1mm
Temperature drift	± 0.17%/K

### HRTU...WM/P...

at an angle of 90°

### Timing

Switching frequency	10Hz
Response time	50ms
Delay before start-up	20ms
Switching hysteresis	10mm

### 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

LED yellow	output activated
LED yellow flashing	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 <sup>2)</sup>	1, 2, 3
VDE safety class	III
Protection class	IP 65
Standards applied	IEC 60947-5-2
Fitting position	any

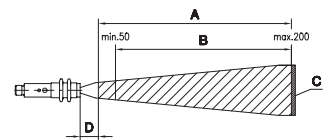
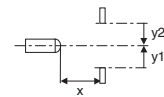
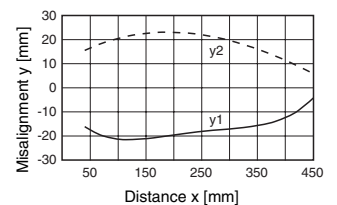
1) For the complete temperature range, measured object ≥ 20x20mm

2) 1=short-circuit and overload protection, 2=polarity reversal protection, 3=wire break and inductive protection

## Tables

### Diagrams

Typ. response behaviour (object 20x20mm)



- A Operating range
- B Adjustment range
- C Object
- D Dead zone

## Order guide

Designation	Part No.
HRTU 418RM/P-5020-200-S12	500 38635
HRTU 418WM/P-5020-200-S12	500 38636

## Remarks

- **Teach procedure:**  
position measured object at desired measurement distance. Connect teaching input (PIN 2) to GND for ≥ 3s. Reconnect the teaching input to + $U_B$  or leave open; the switching output is now programmed.
- **Temperature drift**  
for temperature rise:  
+0.17%/K  
for temperature fall:  
-0.17%/K



HRTU 418 RM/WM

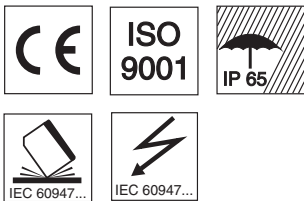
Ultrasonic sensors



100 ... 700mm



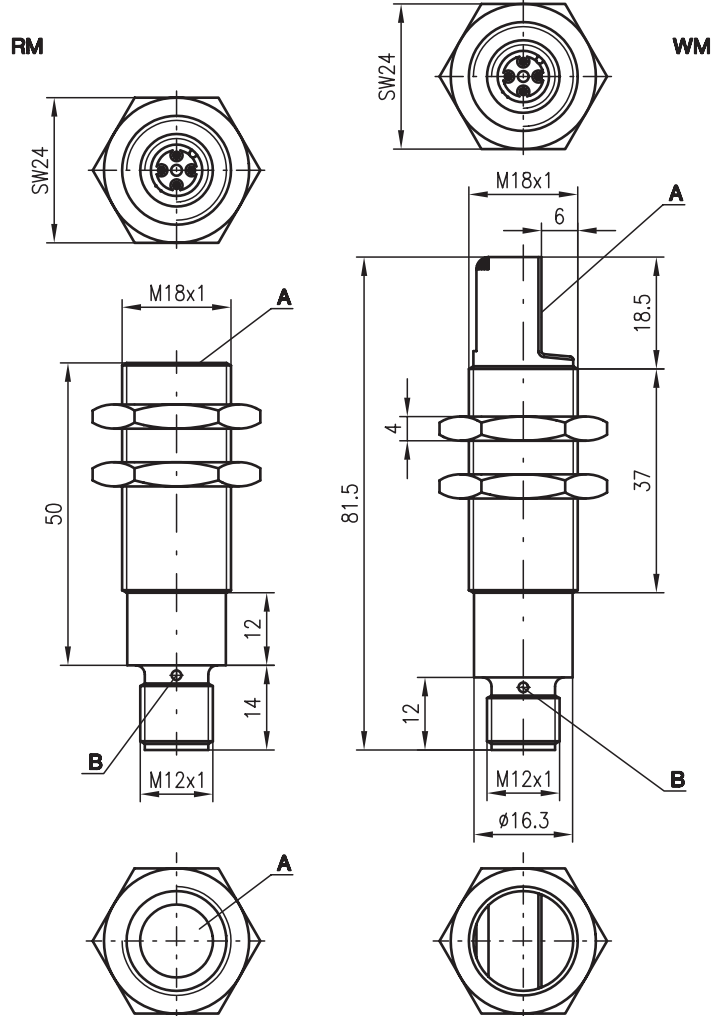
- Colour and transmission independent detection of objects
- Switching behaviour almost surface-independent
- Distance teachable
- Small construction



Accessories:

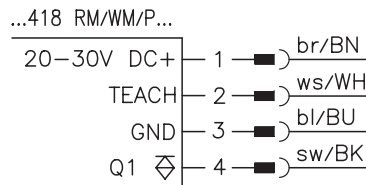
(available separately • see page 32)

Dimensioned drawing



- A Active surface
- B Indicator diode

Electrical connection



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## Specifications

### Ultrasonic specifications

Operating range <sup>1)</sup>	100 ... 700mm
Adjustment range	150 ... 700mm
Ultrasonic frequency	200kHz
Typ. opening angle	see diagrams
Resolution	1 mm
Direction of beam	straight
Reproducibility	± 1 mm
Temperature drift	± 0.17%/K

### HRTU...WM/P...

at an angle of 90°

### Timing

Switching frequency	5Hz
Response time	100ms
Delay before start-up	20ms
Switching hysteresis	10mm

### 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

LED yellow	output activated
LED yellow flashing	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 <sup>2)</sup>	1, 2, 3
VDE safety class	III
Protection class	IP 65
Standards applied	IEC 60947-5-2
Fitting position	any

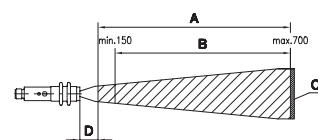
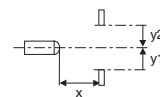
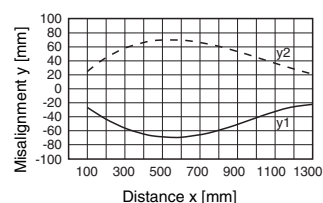
1) For the complete temperature range, measured object ≥ 20x20mm

2) 1=short-circuit and overload protection, 2=polarity reversal protection, 3=wire break and inductive protection

## Tables

## Diagrams

Typ. response behaviour (object 20x20mm)



- A Operating range
- B Adjustment range
- C Object
- D Dead zone

## Order guide

Designation	Part No.
HRTU 418RM/P-3020-700-S12	500 38639
HRTU 418WM/P-3020-700-S12	500 38640

## Remarks

- **Teach procedure:**  
position measured object at desired measurement distance. Connect teaching input (PIN 2) to GND for ≥ 3s. Reconnect the teaching input to + $U_B$  or leave open; the switching output is now programmed.
- **Temperature drift**  
for temperature rise: +0.17%/K  
for temperature fall: -0.17%/K



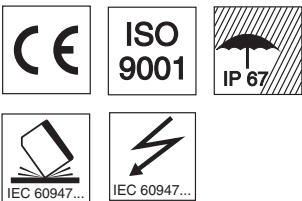
# HRTU 8 Diffuse reflection ultrasonic scanner with background suppression



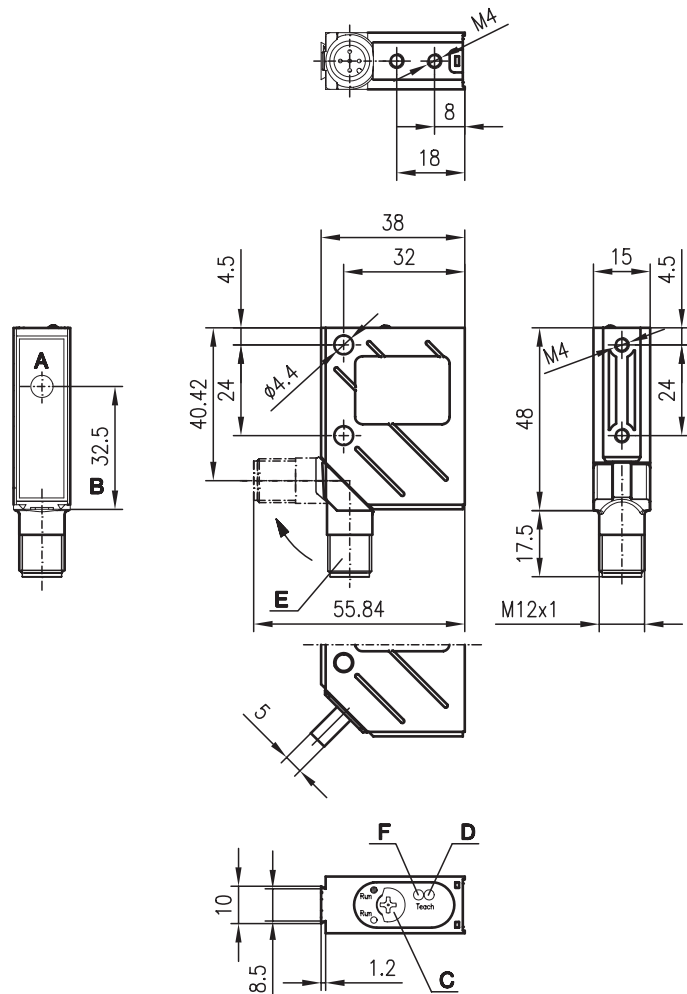
50 ... 400mm



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

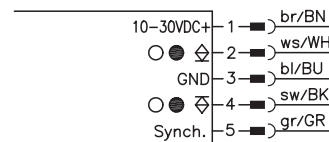


## Dimensioned drawing



- A Converter
- B Ultrasonic axis
- C Operational control
- D LED green
- E 90° turning connector
- F LED yellow

## Electrical Connection



We reserve the right to make changes • 8\_e05e.fm

**Accessories:**  
(available separately)



## Specifications

### Ultrasonic specifications

Operating range <sup>1)</sup>	50 ... 400mm
Adjustment range	60 ... 400mm
Ultrasonic frequency	300kHz
Typ. opening angle	see diagrams
Resolution	1 mm
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

LED green	ready
LED green flashing	teaching in progress
LED yellow	object detected
LED yellow flashing	device or teach error

### Mechanical data

Housing	metal
Weight	70g
Connection type	M 12 connector, 5-pin

### Environmental data

Ambient temp. (operation/storage)	-25°C ... +70°C/-40°C ... +85°C
Protective circuit <sup>2)</sup>	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	LED green	LED yellow
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"	1Hz	ON
	"Teach-in was not successful"	ON	1Hz
4.	Put step switch in position "Run"	-	-
	Run ○ Output it active when object was detected	ON	ON
	Run ● Output it not active when object was detected	ON	OFF

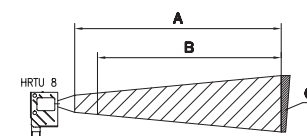
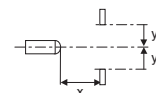
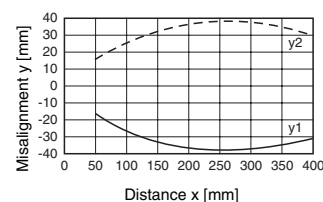
## Order guide

<b>Designation</b>	<b>Order code</b>
HRTU 8/24-400-S12	500 38912

## Tables

## Diagrams

Typ. response behaviour (object 20x20mm)



- A Operating range
- B Adjustment range
- C Object

## Remarks

- **Synchronisation:**  
Max. 10 sensors may be synchronised by connecting the Synch inputs. Thus, mutual interference can be avoided.
- **Temperature drift**  
for temperature rise:  
+0.17 %/K  
for temperature fall:  
-0.17 %/K



## HRTU 418

## Ultrasonic distance sensors



50 ... 300mm  
150 ... 1000mm



- Ideal for detection of levels of liquids, bulk materials, transparent media, ...
- Distance information does not depend on the surface properties
- All settings are adjustable
- Up to 10 devices can be synchronised via the SYNC input
- Start and end of switching range adjustable separately

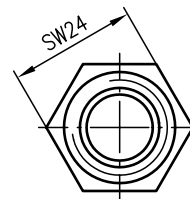
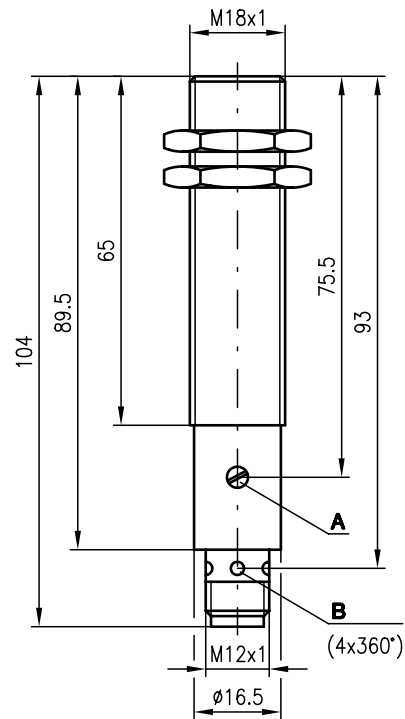


### Accessories:

(available separately • see page 32)

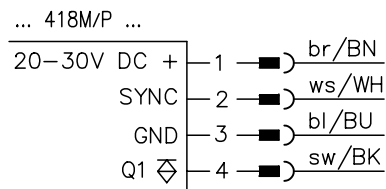
- Programming software "USDS-Config"
- PGU 01 (programming device)

### Dimensioned drawing



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

### Electrical connection



We reserve the right to make changes • USDS\_01e.fm

## Specifications

### Ultrasonic specifications

Operating range <sup>1)</sup>  
 Ultrasonic frequency  
 Opening angle  
 Resolution  
 Absolute measurement accuracy  
 Reproducibility

### HRTU...-5010-300...

50 ... 300mm  
 400kHz  
 6°  
 1 mm  
 ± 2.5% of the measurement range  
 ± 1mm

### HRTU...-3010-1000...

150 ... 1000mm  
 200kHz  
 ± 2mm

### Timing

Switching frequency  
 Response time  
 Delay before start-up  
 Switching hysteresis

5Hz  
 100ms  
 280ms  
 10mm

4Hz  
 120ms  
 280ms  
 10mm

### Electrical data

Operating voltage  $U_B$   
 Residual ripple  
 Bias current  
 Switching output  
 Function characteristics  
 Output current  
 Switching range adjustment

20 ... 30V DC (incl. ± 10% residual ripple)  
 ± 10% of  $U_B$   
 ≤ 60mA  
 PNP transistor  
 switching in case of object recognition  
 150mA  
 potentiometer 270°

### Indicators

LED yellow

output activated

### Mechanical data

Housing  
 Weight  
 Connection type

metal / CuZn  
 50g  
 M12 connector, plastic, 4-pin

### Environmental data

Ambient temp. (operation/storage)  
 Protective circuit <sup>2)</sup>  
 VDE safety class  
 Protection class  
 Standards applied  
 Fitting position

-25°C ... +70°C/-40°C ... +85°C  
 1, 2, 3  
 III  
 IP 67  
 IEC 60947-5-2  
 any

1) For the complete temperature range, measured object ≥ 10x10mm

2) 1=short-circuit and overload protection, 2=polarity reversal protection, 3=wire break and inductive protection

## Order guide

### Designation

HRTU 418M/P-5010-300-S12  
 HRTU 418M/P-3010-1000-S12

### Part No.

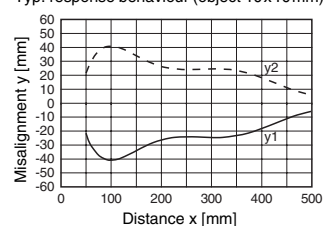
500 36257  
 500 36258

## Tables

## Diagrams

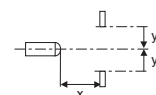
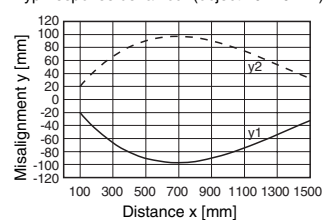
### HRTU...-5010-300...

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.
- Multiplex:  
Achieved by parameterisation of the sensors using the "USDS-Config" software.

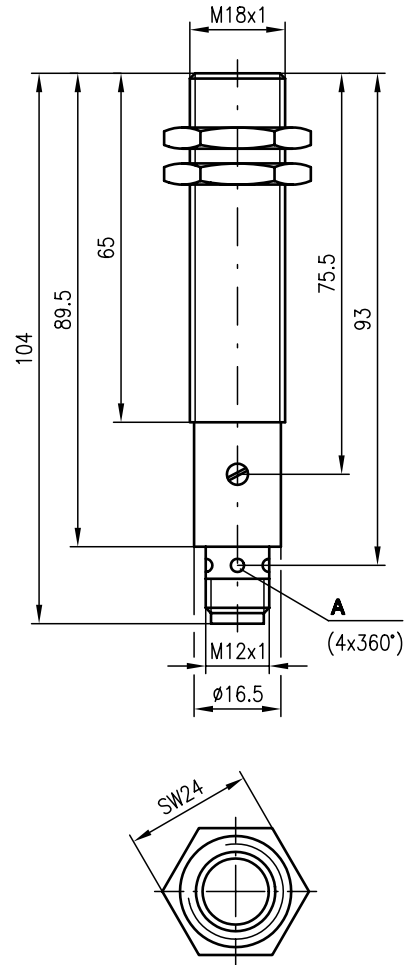


HRTU 418

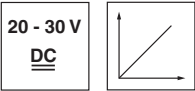
Ultrasonic distance sensors



Dimensioned drawing



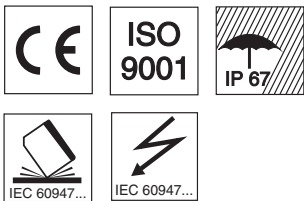
50 ... 300 mm  
150 ... 1000 mm



- Ideal for detection of levels of liquids, bulk materials, transparent media, ...
- Distance information does not depend on the surface properties
- All settings are adjustable
- Up to 10 devices can be synchronised via the SYNC input
- Start and end of switching range adjustable separately

A Indicator diodes Q1

Electrical connection



Accessories:

(available separately • see page 32)

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

... 418M/V ...	
20-30V DC +	1 —■) br/BN
SYNC	2 —■) ws/WH
GND	3 —■) bl/BU
4-20mA	4 —■) sw/BK

We reserve the right to make changes • USDS\_02e.fm

## Specifications

### Ultrasonic specifications

	HRTU...-5010-300...	HRTU...-3010-1000...
Operating range <sup>1)</sup>	50 ... 300mm	150 ... 1000mm
Ultrasonic frequency	400kHz	200kHz
Opening angle	6°	
Resolution	1 mm	
Absolute measurement accuracy	± 2.5% of the measurement range	
Reproducibility	± 1mm	± 2mm

### Timing

	5Hz	4Hz
Switching frequency	5Hz	4Hz
Response time	100ms	120ms
Delay before start-up	280ms	280ms
Switching hysteresis	10mm	10mm

### Electrical data

Operating voltage $U_B$	20 ... 30VDC (incl. ± 10% residual ripple)
Residual ripple	± 10% of $U_B$
Bias current	≤ 60mA
Switching output	analogue
Output current	4 ... 20 mA
Analogue output	$R_L$ 0 ... 300Ω
Characteristic curve	ascending

### Indicators

LED yellow	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 <sup>2)</sup>	1, 2, 3
VDE safety class	III
Protection class	IP 67
Standards applied	IEC 60947-5-2
Fitting position	any
Explosion protection	ex zone 2 / zone 11 / temperature class T5

1) For the complete temperature range, measured object ≥ 10x10mm

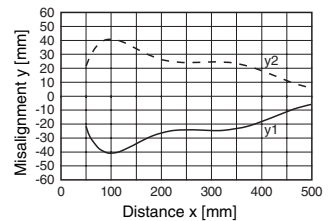
2) 1=short-circuit and overload protection, 2=no polarity reversal protection, 3=wire break and inductive protection

## Tables

## Diagrams

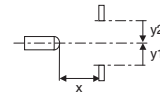
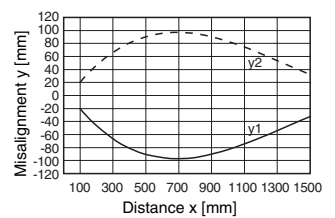
### HRTU...-5010-300...

Typ. response behaviour (object 10x10mm)



### HRTU...-3010-1000...

Typ. response behaviour (object 10x10mm)



## Order guide

Designation	Part No.
HRTU 418M/V-5010-300-S12	500 36259
HRTU 418M/V-3010-1000-S12	500 36260

## Remarks

- Synchronisation: mutual interference is excluded by connecting the sensors with the SYNC input.
- Multiplex: Achieved by parameterisation of the sensors using the "USDS-Config" software.

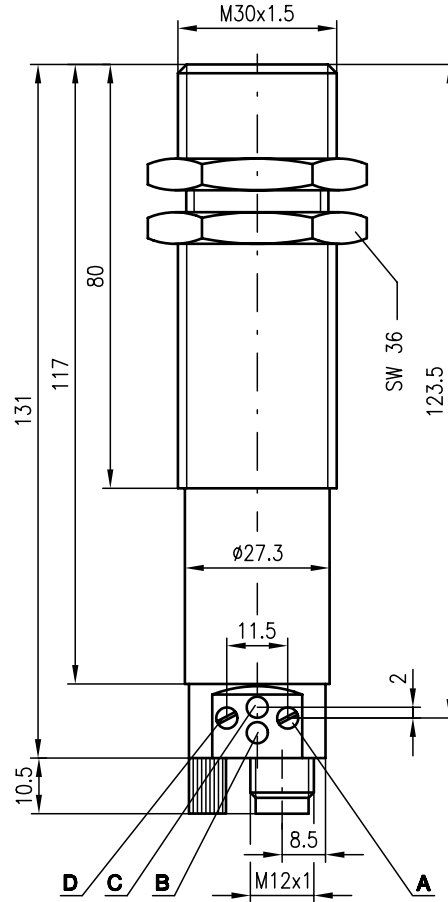


VRTU 430

Ultrasonic distance sensors



Dimensioned drawing



- A End of switching range
- B Indicator diode Q2 only for ... 430M/P ...
- C Indicator diode Q1
- D Start of switching range

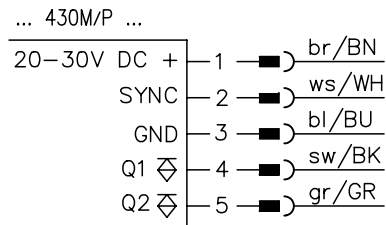


60 ... 300 mm  
200 ... 1300 mm



- Ideal for detection of levels of liquids, bulk materials, transparent media, ...
- Distance information does not depend on the surface properties
- All settings are adjustable
- Up to 10 devices can be synchronised via the SYNC input
- Start and end of switching range adjustable separately

Electrical connection



Accessories:

(available separately • see page 32)

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

We reserve the right to make changes • Usds\_05e.fm

## Specifications

### Ultrasonic specifications

Operating range <sup>1)</sup>  
 Ultrasonic frequency  
 Opening angle  
 Resolution  
 Absolute measurement accuracy  
 Reproducibility

### VRTU...-5110-300...

60 ... 300mm  
 400kHz  
 6°  
 ≤ 1mm  
 ± 1.5% of the measurement range  
 ± 0.45 mm

### VRTU...-3110-1300...

200 ... 1300mm  
 200kHz  
 ≥ 1mm  
 ± 2mm

### Timing

Switching frequency  
 Response time  
 Delay before start-up  
 Switching hysteresis

8Hz	4Hz
80ms	110ms
280ms	280ms
10mm	10mm

### Electrical data

Operating voltage  $U_B$   
 Residual ripple  
 Bias current  
 Switching output  
 Function characteristics  
 Output current  
 Switching range adjustment

20 ... 30VDC (incl. ± 10% residual ripple)  
 ± 10% of  $U_B$   
 ≤ 50mA (without load)  
 2 PNP transistors  
 switching in case of object recognition  
 300mA  
 potentiometer 270°

### Indicators

LED yellow  
 LED yellow flashing

output activated  
 programming error

### Mechanical data

Housing  
 Weight  
 Connection type

metal / CuZn  
 210g  
 M12 connector, plastic, 5-pin

### Environmental data

Ambient temp. (operation/storage)  
 Protective circuit <sup>2)</sup>  
 VDE safety class  
 Protection class  
 Standards applied  
 Fitting position  
 Explosion protection

-25°C ... +70°C / -40°C ... +85°C  
 1, 2, 3  
 III  
 IP 65  
 IEC 60947-5-2  
 any  
 ex zone 2 / zone 11 / temperature class T5

1) For the complete temperature range, measured object ≥ 10x10mm

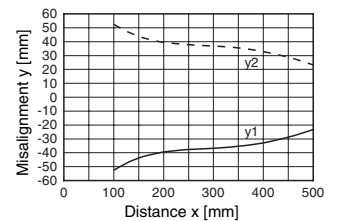
2) 1=short-circuit and overload protection, 2=polarity reversal protection, 3=wire break and inductive protection

## Tables

## Diagrams

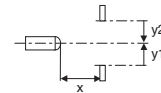
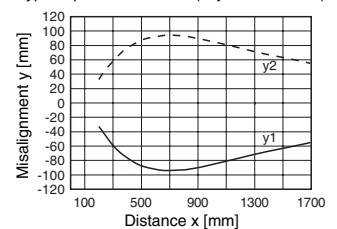
### VRTU...-5110-300...

Typ. response behaviour (object 10x10mm)



### VRTU...-3110-1300...

Typ. response behaviour (object 10x10mm)



## Order guide

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

## Remarks

- Synchronisation: mutual interference is excluded by connecting the sensors with the SYNC input.
- Multiplex: Achieved by parameterisation of the sensors using the "USDS-Config" software.

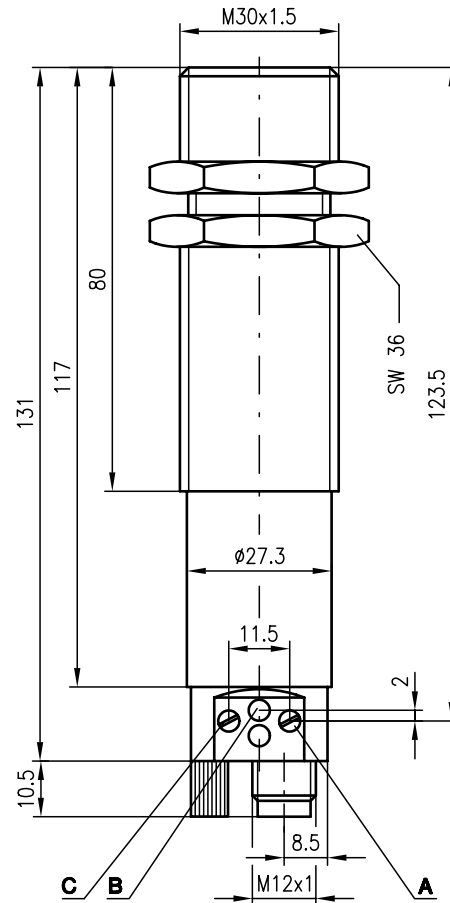


VRTU 430

Ultrasonic distance sensors



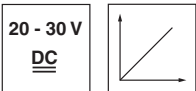
Dimensioned drawing



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

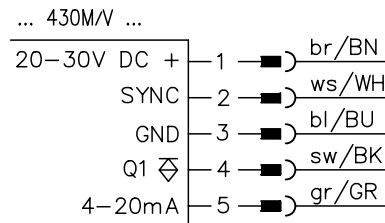


60 ... 300 mm  
200 ... 1300 mm



- Ideal for detection of levels of liquids, bulk materials, transparent media, ...
- Distance information does not depend on the surface properties
- Analogue current 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

Electrical connection



Accessories:

(available separately • see page 32)

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

We reserve the right to make changes • USDS\_03e.fm



## Specifications

### Ultrasonic specifications

Operating range <sup>1)</sup>  
 Ultrasonic frequency  
 Opening angle  
 Resolution  
 Absolute measurement accuracy  
 Reproducibility

### VRTU...-5710-300...

60 ... 300mm  
 400kHz  
 6°  
 ≤ 1mm  
 ± 1.5% of the measurement range  
 ± 0.45 mm

### VRTU...-3710-1300...

200 ... 1300mm  
 200kHz  
 ≥ 1mm  
 ± 2mm

### Timing

Switching frequency  
 Response time  
 Delay before start-up  
 Switching hysteresis

8Hz  
 80ms  
 280ms  
 10mm

4Hz  
 110ms  
 280ms  
 10mm

### Electrical data

Operating voltage  $U_B$   
 Residual ripple  
 Bias current  
 Outputs

20 ... 30VDC (incl. ± 10% residual ripple)  
 ± 10% of  $U_B$   
 ≤ 50mA (without load)  
 1 PNP transistor,  
 1 analogue output  
 switching in case of object recognition  
 300 mA / 4 ... 20 mA  
 $R_L$  0 ... 300Ω  
 ascending  
 potentiometer 270°

Function characteristics  
 Output current (PNP/analogue)  
 Analogue output  
 Characteristic curve  
 Sensitivity

### Indicators

LED yellow  
 LED yellow flashing

output activated  
 programming error

### Mechanical data

Housing  
 Weight  
 Connection type

metal / CuZn  
 210g  
 M12 connector, plastic, 5-pin

### Environmental data

Ambient temp. (operation/storage)  
 Protective circuit <sup>2)</sup>  
 VDE safety class  
 Protection class  
 Standards applied  
 Fitting position  
 Explosion protection

-25°C ... +70°C/-40°C ... +85°C  
 1, 2, 3  
 III  
 IP 65  
 IEC 60947-5-2  
 any  
 ex zone 2 / zone 11 / temperature class T5

1) For the complete temperature range, measured object ≥ 10x10mm

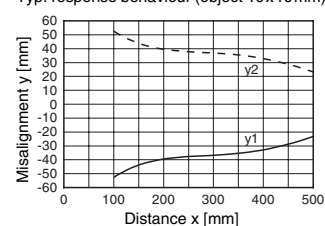
2) 1=short-circuit and overload protection, 2=no polarity reversal protection, 3=wire break and inductive protection

## Tables

## Diagrams

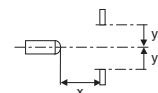
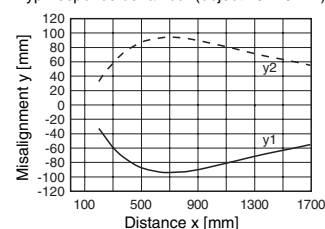
### VRTU...-5110-300...

Typ. response behaviour (object 10x10mm)



### VRTU...-3110-1300...

Typ. response behaviour (object 10x10mm)



## Order guide

Designation	Part No.
VRTU 430M/V-5710-300-S12	500 36266
VRTU 430M/V-3710-1300-S12	500 36267

## Remarks

- Synchronisation:  
mutual interference is excluded by connecting the sensors with the SYNC input.
- Multiplex:  
Achieved by parameterisation of the sensors using the "USDS-Config" software.



## VRTU 430

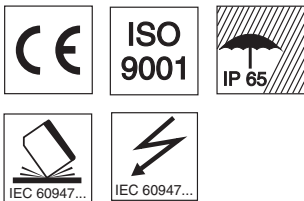
## Ultrasonic distance sensors



400 ... 3000mm



- Ideal for detection of levels of liquids, bulk materials, transparent media, ...
- Distance information does not depend on the surface properties
- All settings are adjustable
- Up to 10 devices can be synchronised via the SYNC input
- Start and end of switching range adjustable separately

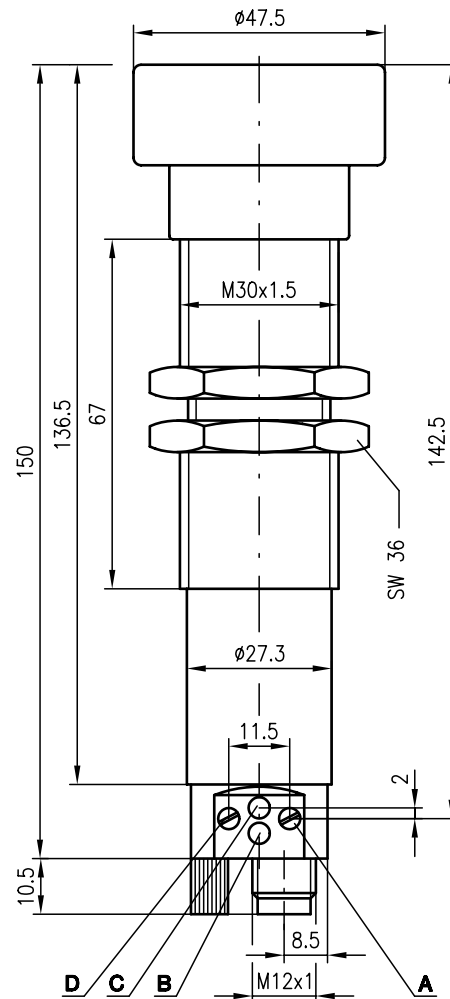


### Accessories:

(available separately • see page 32)

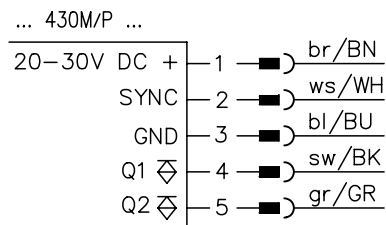
- Programming software "USDS-Config"
- PGU 01 (programming device)

### Dimensioned drawing



- A End of switching range
- B Indicator diode Q2 (only for ... 430M/P ...)
- C Indicator diode Q1
- D Start of switching range

### Electrical connection



We reserve the right to make changes • USDS\_04e.fm

## Specifications

### Ultrasonic specifications

Operating range <sup>1)</sup>	400 ... 3000mm
Ultrasonic frequency	120kHz
Opening angle	6°
Resolution	≥ 1mm
Absolute measurement accuracy	± 1.5% of the measurement range
Reproducibility	± 5mm

### Timing

Switching frequency	2Hz
Response time	200ms
Delay before start-up	280ms
Switching hysteresis	20mm

### Electrical data

Operating voltage $U_B$	20 ... 30VDC (incl. ± 10% residual ripple)
Residual ripple	± 10% of $U_B$
Bias current	≤ 50mA (without load)
Switching output	2 PNP transistors
Function characteristics	switching in case of object recognition
Output current	300mA
Switching range adjustment	potentiometer 270°

### Indicators

LED yellow	output activated
LED yellow flashing	programming error

### Mechanical data

Housing	metal / CuZn
Weight	340g
Connection type	M 12 connector, plastic, 5-pin

### Environmental data

Ambient temp. (operation/storage)	-25°C ... +70°C / -40°C ... +85°C
Protective circuit <sup>2)</sup>	1, 2, 3
VDE safety class	III
Protection class	IP 65
Standards applied	IEC 60947-5-2
Fitting position	any
Explosion protection	ex zone 2 / zone 11 / temperature class T5

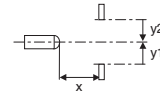
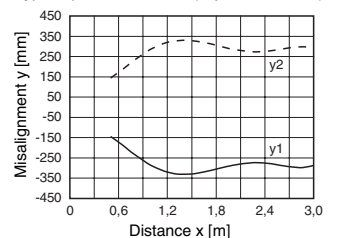
1) For the complete temperature range, measured object ≥ 50x50mm

2) 1=short-circuit and overload protection, 2=polarity reversal protection, 3=wire break and inductive protection

## Tables

## Diagrams

Typ. response behaviour (object 50x50mm)



## Order guide

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

## Remarks

- Synchronisation: mutual interference is excluded by connecting the sensors with the SYNC input.
- Multiplex: Achieved by parameterisation of the sensors using the "USDS-Config" software.

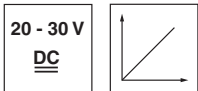


## VRTU 430

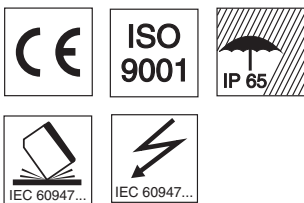
## Ultrasonic distance sensors



400 ... 3000mm



- Ideal for detection of levels of liquids, bulk materials, transparent media, ...
- Distance information does not depend on the surface properties
- Analogue current 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

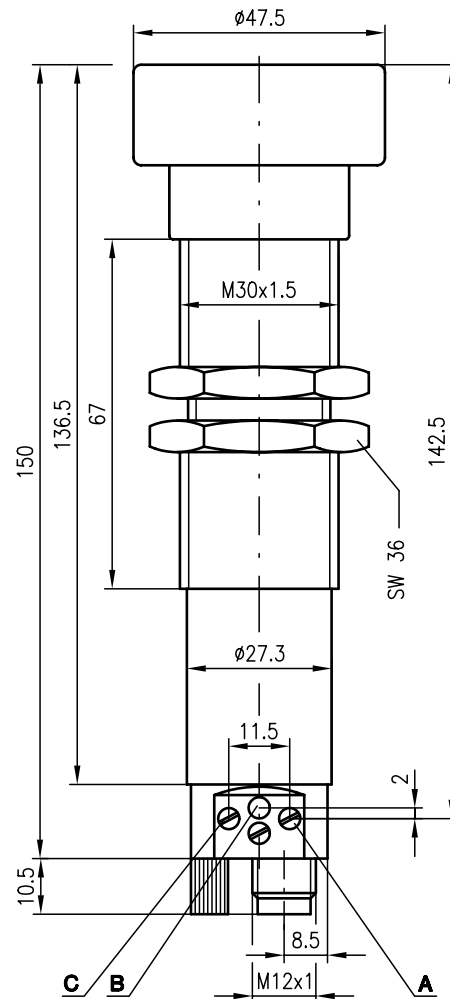


### Accessories:

(available separately • see page 32)

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

### Dimensioned drawing



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

### Electrical connection

... 430M/V ...		
20-30V DC +	1	br/BN
SYNC	2	ws/WH
GND	3	bl/BU
Q1	4	sw/BK
4-20mA	5	gr/GR

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## Specifications

### Ultrasonic specifications

Operating range <sup>1)</sup>	400 ... 3000mm
Ultrasonic frequency	120kHz
Opening angle	6°
Resolution	≥ 1mm
Absolute measurement accuracy	± 1.5% of the measurement range
Reproducibility	± 5mm

### Timing

Switching frequency	2Hz
Response time	200ms
Delay before start-up	280ms
Switching hysteresis	20mm

### 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

LED yellow	output activated
LED yellow flashing	programming error

### Mechanical data

Housing	metal / CuZn
Weight	340g
Connection type	M 12 connector, plastic, 5-pin

### Environmental data

Ambient temp. (operation/storage)	-25°C ... +70°C/-40°C ... +85°C
Protective circuit <sup>2)</sup>	1, 2, 3
VDE safety class	III
Protection class	IP 65
Standards applied	IEC 60947-5-2
Fitting position	any
Explosion protection	ex zone 2 / zone 11 / temperature class T5

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

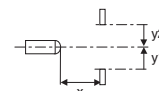
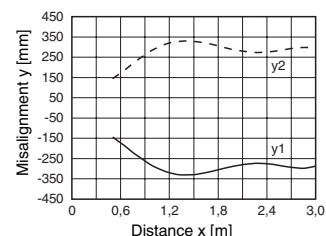
## Order guide

Designation	Part No.
VRTU 430M/V-2710-3000-S12	500 36268

## Tables

## Diagrams

Typ. response behaviour (object 50x50mm)



## Remarks

- Synchronisation: mutual interference is excluded by connecting the sensors with the SYNC input.
- Multiplex: Achieved by parameterisation of the sensors using the "USDS-Config" software.

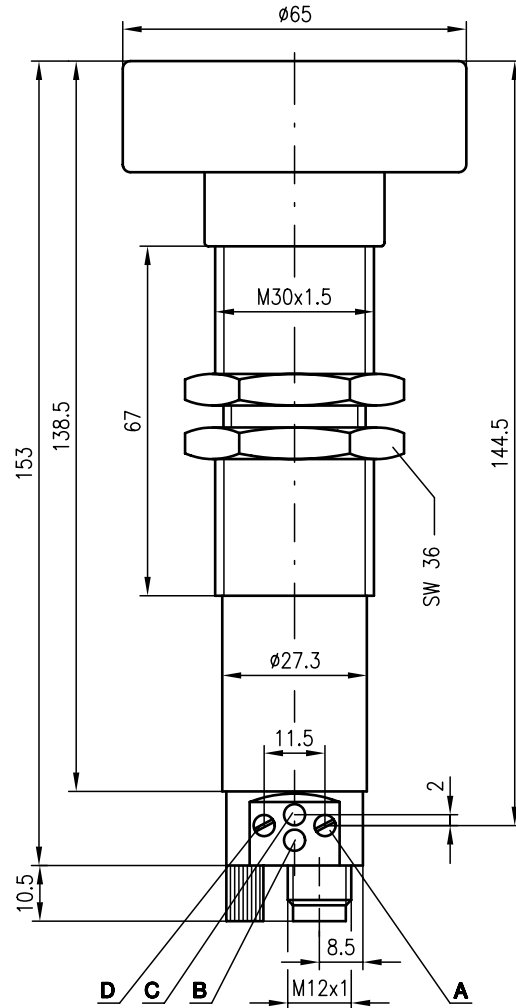


VRTU 430

Ultrasonic distance sensors



Dimensioned drawing



- A End of switching range
- B Indicator diode Q2 only for ... 430M/P ...
- C Indicator diode Q1
- D Start of switching range

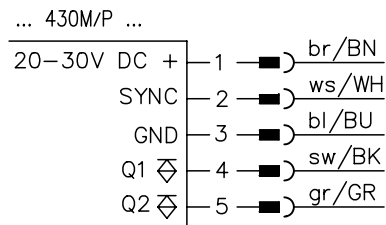


600 ... 6000mm



- Ideal for detection of levels of liquids, bulk materials, transparent media, ...
- Distance information does not depend on the surface properties
- All settings are adjustable
- Up to 10 devices can be synchronised via the SYNC input
- Start and end of switching range adjustable separately

Electrical connection



Accessories:

(available separately • see page 32)

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

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## Specifications

### Ultrasonic specifications

Operating range <sup>1)</sup>	600 ... 6000mm
Ultrasonic frequency	80kHz
Opening angle	6°
Resolution	≥ 1mm
Absolute measurement accuracy	± 1.5% of the measurement range
Reproducibility	± 9mm

### Timing

Switching frequency	1Hz
Response time	400ms
Delay before start-up	280ms
Switching hysteresis	60mm

### Electrical data

Operating voltage $U_B$	20 ... 30VDC (incl. ± 10% residual ripple)
Residual ripple	±10% of $U_B$
Bias current	≤ 50mA (without load)
Switching output	2 PNP transistors
Function characteristics	switching in case of object recognition
Output current	300mA
Switching range adjustment	potentiometer 270°

### Indicators

LED yellow	output activated
LED yellow flashing	programming error

### Mechanical data

Housing	metal / CuZn
Weight	380g
Connection type	M 12 connector, plastic, 5-pin

### Environmental data

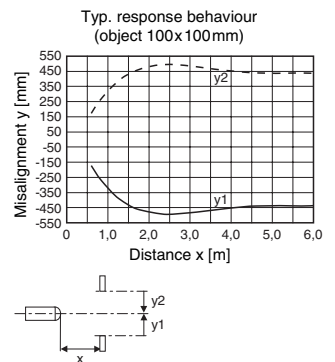
Ambient temp. (operation/storage)	-25°C ... +70°C / -40°C ... +85°C
Protective circuit <sup>2)</sup>	1, 2, 3
VDE safety class	III
Protection class	IP 65
Standards applied	IEC 60947-5-2
Fitting position	any
Explosion protection	ex zone 2 / zone 11 / temperature class T5

1) For the complete temperature range, measured object ≥ 100x100 mm

2) 1=short-circuit and overload protection, 2=polarity reversal protection, 3=wire break and inductive protection

## Tables

## Diagrams



## Order guide

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

## Remarks

- Synchronisation:  
mutual interference is excluded by connecting the sensors with the SYNC input.
- Multiplex:  
Achieved by parameterisation of the sensors using the "USDS-Config" software.

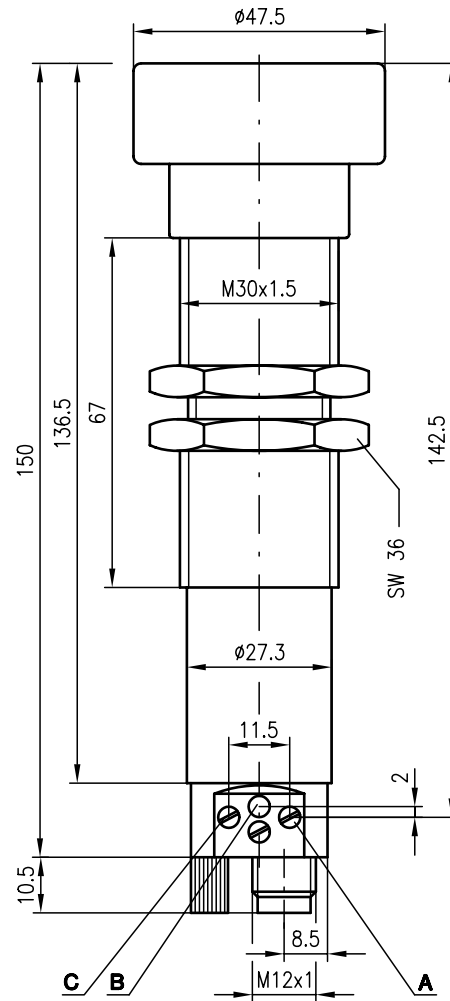


VRTU 430

Ultrasonic distance sensors

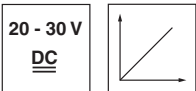


Dimensioned drawing



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

600 ... 6000mm



- Ideal for detection of levels of liquids, bulk materials, transparent media, ...
- Distance information does not depend on the surface properties
- Analogue current 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

Electrical connection

... 430M/V ...

20-30V DC +	1	br/BN
SYNC	2	ws/WH
GND	3	bl/BU
Q1	4	sw/BK
4-20mA	5	gr/GR



Accessories:

(available separately • see page 32)

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

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## Specifications

### Ultrasonic specifications

Operating range <sup>1)</sup>	600 ... 6000mm
Ultrasonic frequency	80kHz
Opening angle	6°
Resolution	≥ 1mm
Absolute measurement accuracy	± 1.5% of the measurement range
Reproducibility	± 9mm

### Timing

Switching frequency	1Hz
Response time	400ms
Delay before start-up	280ms
Switching hysteresis	60mm

### 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

LED yellow	output activated
LED yellow flashing	programming error

### Mechanical data

Housing	metal / CuZn
Weight	380g
Connection type	M 12 connector, plastic, 5-pin

### Environmental data

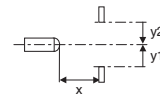
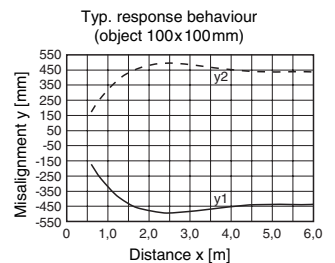
Ambient temp. (operation/storage)	-25°C ... +70°C / -40°C ... +85°C
Protective circuit <sup>2)</sup>	1, 2, 3
VDE safety class	III
Protection class	IP 65
Standards applied	IEC 60947-5-2
Fitting position	any
Explosion protection	ex zone 2 / zone 11 / temperature class T5

1) For the complete temperature range, measured object ≥ 100x100 mm

2) 1=short-circuit and overload protection, 2=no polarity reversal protection, 3=wire break and inductive protection

## Tables

## Diagrams



## Order guide

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

## Remarks

- Synchronisation: mutual interference is excluded by connecting the sensors with the SYNC input.
- Multiplex: Achieved by parameterisation of the sensors using the "USDS-Config" software.



Accessories

Ultrasonic distance sensors

M12 connectors

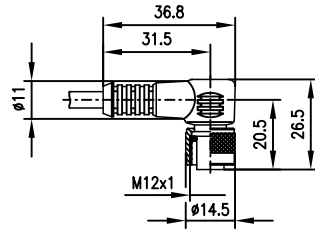


Leuze electronic offers connectors with ready-made cables in various lengths suited for the connector-type devices.

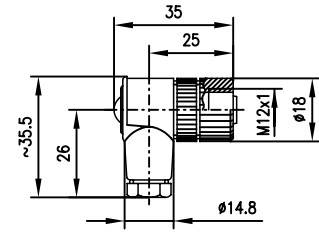
Select the appropriate cable for the device with the desired cable length from the following tables.

For devices with M12 connectors, there are available: connectors with ready-made 2m, 5m and 10m cable and 2 connectors with screw connection.

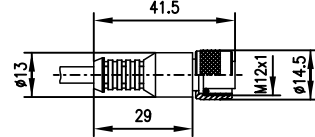
Dimensioned drawings



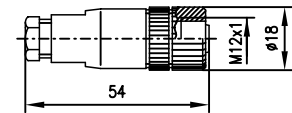
KB 450-...-...



KD 095-...



KB 450-...-...A



KD 095-...A

Selection table

M12 connectors				
with cable			without cable	
		5m		
KB 095-5000-5 Part No. 500 20500	KB 095-5000-5A Part No. 500 20499		KD 095-5 Part No. 500 20502	KD 095-5A Part No. 500 20501
		2m		
KB 450-2000-4 Part No. 500 80833	KB 450-2000-4A Part No. 500 80841		KD 095-4 Part No. 500 31324	KD 095-4A Part No. 500 31323
		5m		
KB 450-5000-4 Part No. 500 80834	KB 450-5000-4A Part No. 500 80842			
		10 m		
KB 450-10000-4 Part No. 500 80840	KB 450-10000-4A Part No. 500 80843			

Programming device

PGU 01 (Part No. 500 36559)



The "USDS-Config" software is supplied with the PGU 01 programming device

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