



FACTORY AUTOMATION

ULTRASONIC SENSORS

PRODUCT OVERVIEW



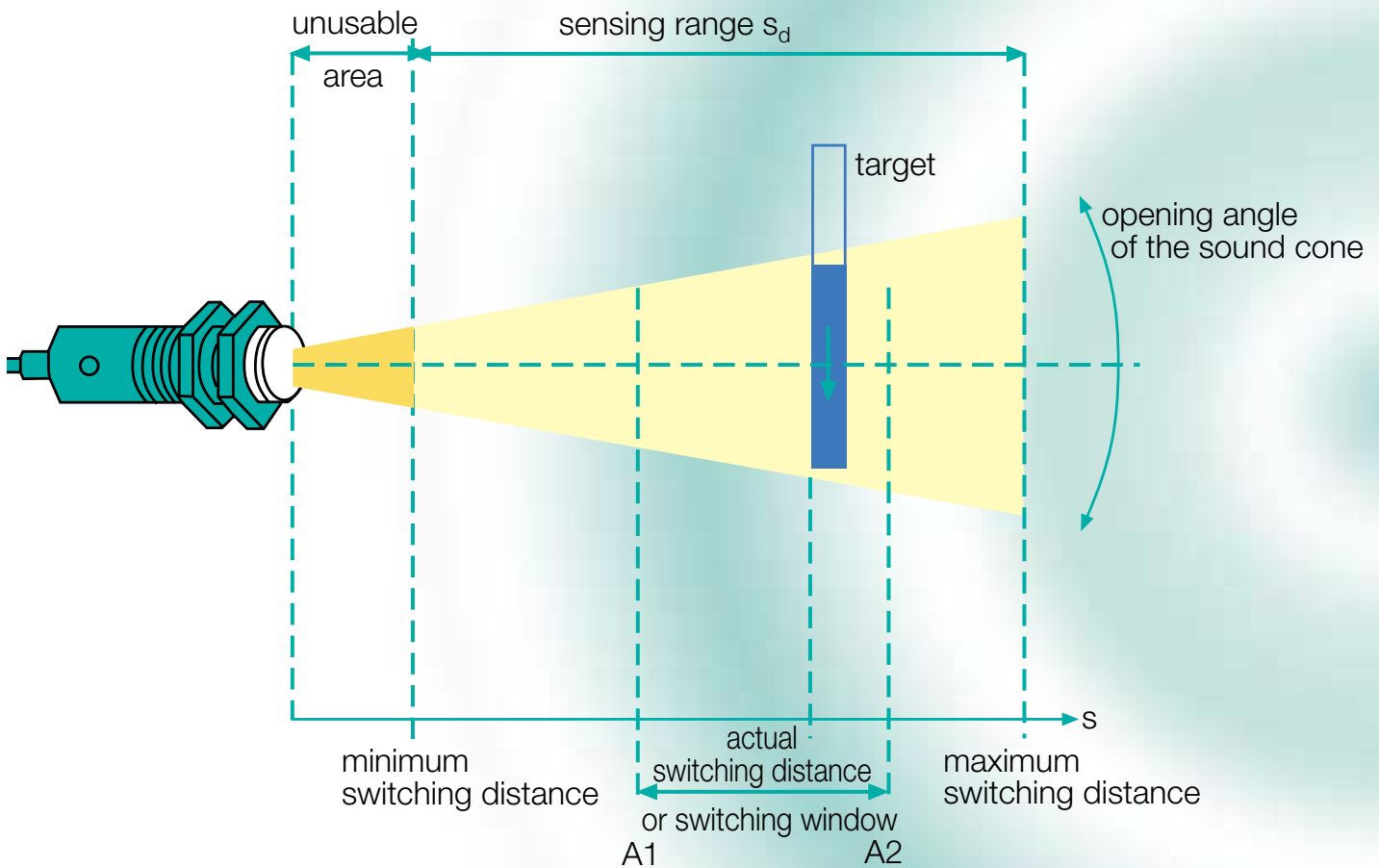
ULTRASONIC SENSORS

PRINCIPLES AND TECHNOLOGY

Ultrasonic sensors made by Pepperl+Fuchs operate with Piezo-ceramics as sound emitter and receiver. A patented decoupling layer in special material is used to decouple the ultrasonics to the air – an acoustically thin medium.

This ultrasonic transducer is embedded, watertight, into the sensor housing, in polyurethane foam. The transducer transmits a packet of

sonic pulses and converts the echo pulse into voltage. The integrated controller computes the distance from the echo time and the velocity of sound. The transmitted pulse duration Δt and the decay time of the sonic transducer result in an unusable area in which the ultrasonic sensor cannot detect an object.



The ultrasonic frequency lies between 65 kHz and 400 kHz, depending on the sensor type; the pulse repetition frequency is between 14 Hz and 140 Hz.

The active range of the ultrasonic sensor is referred to as the detection range s_d . This range is bounded by the lowest and highest sensing distances, whose values depend on the characteristics of the transducer. The highest sensing distance is given in the type code.

The sound cone detects objects which move along a line through the axis of the sensor or move laterally into the cone.

Ultrasonic sensors are available with switching outputs and/or analogue outputs and/or Rs 232 interface; various output functions are available.

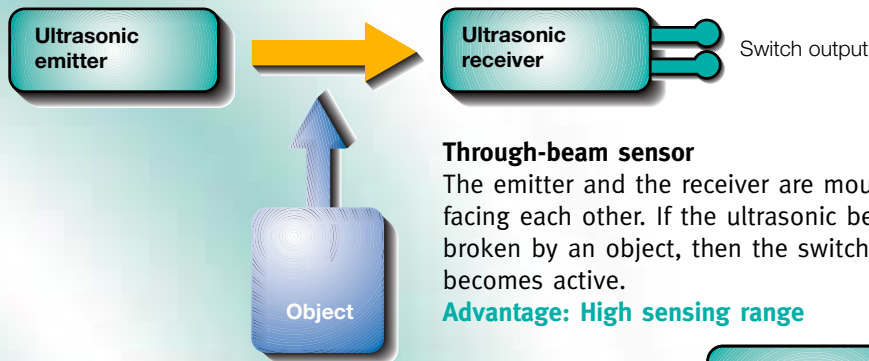
ULTRASONIC SENSORS

FUNCTIONS

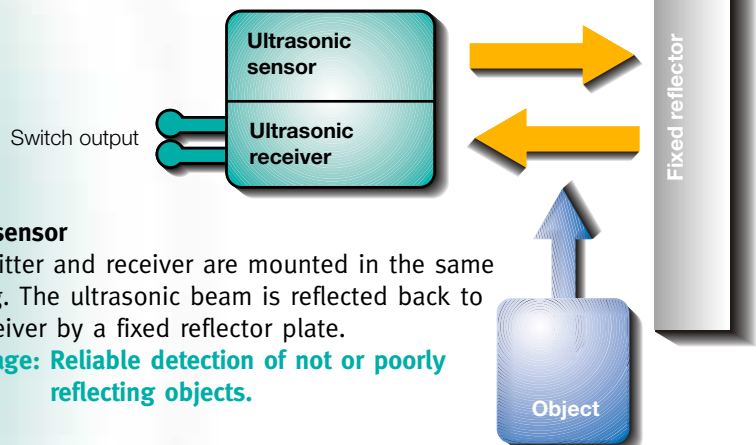
The following distinctions are made between types of sensor function:

The principle by which ultrasonic sensors yield measurements is that evaluating the time taken for the sound to travel between transmission and reception (direct detection), or a process of checking whether the transmitted signal has been received (reflex mode).

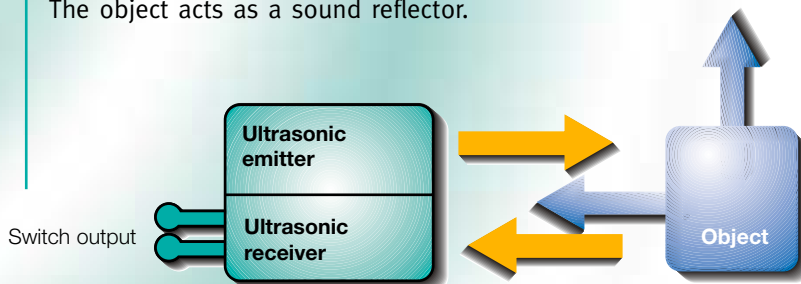
Reflex mode



Direct detection mode



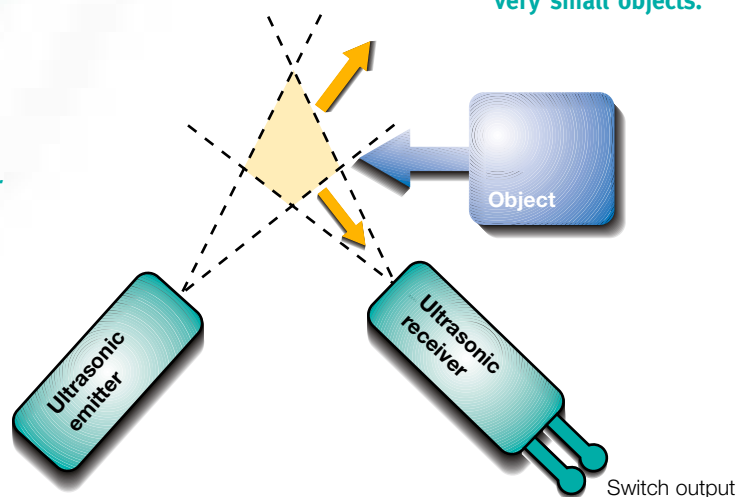
The object acts as a sound reflector.



Direct detection type

The emitter and receiver are mounted in the same housing (reflex sensor).

Advantage: Simple and compact sensor most frequently used principle



ULTRASONIC SENSORS

**Series –12GM–
with analogue output,
1 switch output**



Operating data

Detection range	30 mm ... 400 mm
Unusable area	0 mm ... 30 mm
Response time	approx. 50 ms
Switching frequency (sensors with switch output)	approx. 10 Hz
Resolution max. (sensors with analogue output)	0.13 mm (at max. detection range)
Setting of switching points and evaluation limits	TEACH-IN with programming device UB-PROG or teach input set to +U _B or -U _B

Electrical data

Operating voltage	10 V DC ... 30 V DC 15 V DC ... 30 V DC (sensors with analogue voltage output)
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Mechanical Data

Ambient temperature	248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)
Protection	IP65
Method of connection	V1 plug connector (M12 x 1), 4-pin

Outputs (Order code):

Analogue output (4 mA ... 20 mA)	UB400-12GM-I-V1
Analogue outputs (0 V ... 10 V)	UB400-12GM-U-V1
1 switch output, pnp N.O./N.C.	UB400-12GM-E5-V1
1 switch output, npn N.O./N.C.	UB400-12GM-E4-V1

**Series –18GM–
with analogue output,
1 or 2 switch outputs,
temperature
compensated,
synchronisation input**



Operating data

Detection range	30 mm ... 500 mm
Unusable area	0 mm ... 30 mm
Response time	approx. 50 ms
Switching frequency (sensors with switch output)	approx. 10 Hz
Resolution max. (sensors with analogue output)	0.13 mm (at max. detection range)
Setting of switching points and evaluation limits	TEACH-IN with programming device UB-PROG or teach input set to +U _B or -U _B

Electrical data

Operating voltage	10 V DC ... 30 V DC 15 V DC ... 30 V DC (sensors with analogue voltage output)
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Mechanical Data

Ambient temperature	248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)
Protection	IP65
Method of connection	V15 plug connector (M12 x 1), 5-pin

Outputs (Order code):

Analogue output (4 mA ... 20 mA)	UB500-18GM75-I-V15
Analogue outputs (0 V ... 10 V)	UB500-18GM75-U-V15
1 switch output, pnp N.O./N.C.	UB500-18GM75-E5-V15
1 switch output, npn N.O./N.C.	UB300-18GM75-E4-V15
2 switch outputs, pnp N.O./N.C.	UB500-18GM75-E6-V15
2 switch outputs, npn N.O./N.C.	UB500-18GM75-E7-V15
2 switch outputs, pnp N.O./N.C.	UB500-18GM75-E23-V15
2 switch outputs, npn N.O./N.C.	UB500-18GM75-E01-V15

**Series -30GM-
with one
switch output**



Operating data

Detection range	30 mm ... 500 mm	80 mm ... 2000 mm	200 mm ... 4000 mm	350 mm ... 6000 mm
Unusable area	0 mm ... 30 mm	0 mm ... 80 mm	0 mm ... 200 mm	0 mm ... 350 mm
Response time	approx. 50 ms	approx. 150 ms	approx. 325 ms	approx. 650 ms
Switching frequency	approx. 10 Hz	approx. 3.3 Hz	approx. 1.5 Hz	approx. 0.8 Hz

Setting of switching points
and output functions (N.O./N.C.)

TEACH-IN with programming device UB-PROG
or teach input set to $+U_B$ or $-U_B$

Electrical data

Operating voltage 10 V DC ... 30 V DC

Mechanical data

Working temperature 248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)

Protection IP65

Method of connection V15 plug connector (M12 x 1), 5-pin

Outputs

(Order code):

Switch output, pnp, N.O./N.C.	UB500-30GM-E5-V15	UB2000-30GM-E5-V15	UB4000-30GM-E5-V15	UB6000-30GM-E5-V15
Switch output, npn, N.O./N.C.	UB500-30GM-E4-V15	UB2000-30GM-E4-V15	UB4000-30GM-E4-V15	UB6000-30GM-E4-V15



ULTRASONIC SENSORS

**Series -30GM-
with analogue output,
temperature compensated,
synchronisation input**



Operating data				
Detection range	15 mm ... 300 mm	30 mm ... 500 mm	80 mm ... 2000 mm	350 mm ... 6000 mm
Unusable area	0 mm ... 15 mm	0 mm ... 30 mm	0 mm ... 80 mm	0 mm ... 350 mm
Response time	≤ 35 ms	≤ 63 ms	≤ 195 ms	≤ 850 ms
Resolution max.	0.172 mm	≥ 0.35 mm	≥ 0.35 mm	≥ 0.35 mm
Temperature/ TEACH-IN connector	TEACH-IN of evaluation limits and output functions (falling/rising slope) During normal operation the TEACH-IN connector has to be set in position T (temperature compensation)!			
Parameterising interface	RS 232 interface (Parameterisation with Windows-Software Ultra 2001)			
Electrical data				
Operating voltage	10 V DC ... 30 V DC			
Mechanical data				
Ambient temperature	273 Kelvin ... 323 Kelvin (0 °C ... +50 °C)	248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)		
Protection	IP65			
Method of connection	V15 plug connector (M12 x 1), 5-pin			
Outputs (Order codes):				
Analogue output (4 mA ... 20 mA) and (0 V ... 10 V)	UC300-30GM-IU-V1	UC500-30GM-IUR2-V15	UC2000-30GM-IUR2-V15	UC6000-30GM-IUR2-V15

**Series -30GM-
with 2 switch outputs,
temperature compensated,
synchronisation input**



Operating data				
Detection range	30 mm ... 500 mm	80 mm ... 2000 mm	200 ... 4000 mm	350 mm ... 6000 mm
Unusable area	0 mm ... 30 mm	0 mm ... 80 mm	0 mm ... 200 mm	0 mm ... 350 mm
Response time	≤ 63 ms	≤ 195 ms	≤ 300 ms	≤ 850 ms
Switching frequency	≤ 7 Hz	≤ 2.5 Hz	≤ 1 Hz	≤ 0.5 Hz
Temperature/ TEACH-IN connector	TEACH-IN of evaluation limits and output functions (N.O./N.C. operation modes) During normal operation the TEACH-IN connector has to be set in position T (temperature compensation)!			
Parameterising interface	RS 232 interface (Parameterisation with Windows-Software Ultra 2001)			
Electrical data				
Operating voltage	10 V DC ... 30 V DC			
Mechanical data				
Ambient temperature	248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)			
Protection	IP65			
Method of connection	V15 plug connector (M12 x 1), 5-pin			
Outputs (Order code):				
Switch output 1 and 2, pnp, N.O./N.C.	UC500-30GM-E6R2-V15	UC2000-30GM-E6R2-V15	UC4000-30GM-E6R2-V15	UC6000-30GM-E6R2-V15
Switch output 1 and 2, npn, N.O./N.C.	UC500-30GM-E7R2-V15	UC2000-30GM-E7R2-V15	UC4000-30GM-E7R2-V15	UC6000-30GM-E7R2-V15

**Series -30GM-
with 2 switch outputs
or analogue output,
temperature compensated
remote M18 Sensor head**



■ Design permits installation in confined spaces

Operating voltage

Detection range	30 mm ... 300 mm	30 mm ... 300 mm
Unusable area	0 mm ... 30 mm	0 mm ... 30 mm
Response time	≤ 63 ms	≤ 63 ms
Switching frequency	-	≤ 7 Hz
Resolution max.	≥ 0.35 mm	-
Temperature/ TEACH-IN connector	TEACH-IN of evaluation limits and outputs functions (falling/rising slope). During normal operation the TEACH-IN connector has to be set in position T (temperature compensation)!	TEACH-IN of the switching points and output functions (N.O./N.C.). During normal operation the TEACH-IN connector has to be set in position T (temperature compensation)!

Parameterising interface RS 232 interface (Parameterisation with Windows-Software Ultra 2001)

Electrical data

Operating voltage 10 V DC ... 30 V DC

Mechanical data

Ambient temperature	248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)
Protection	IP65
Method of connection	V15 plug connector (M12 x 1), 5-pin

Outputs

(Order code):

Analogue output (4 mA ... 20 mA) and (0 V ... 10 V) 2 switch outputs pnp, N.O./N.C.	UC300-30GM-IUR2-K-V15	UC300-30GM-E6R2-K-V15
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**Series -30GM-
with two switch outputs
or analogue output
temperature compensated
remote M30 Sensor head**



■ Design permits installation in confined space

Operating data

Detection range	80 mm ... 1000 mm	80 mm ... 1000 mm
Unusable area	0 mm ... 80 mm	0 mm ... 80 mm
Response time	≤ 195 ms	≤ 195 ms
Switching frequency	-	≤ 2.5 Hz
Resolution max.	≥ 0.35 mm	-
Temperature/ TEACH-IN connector	TEACH-IN of evaluation limits and outputs functions (falling/rising slope). During normal operation the TEACH-IN connector has to be set in position T (temperature compensation)!	TEACH-IN of the switching points and output functions (N.O./N.C.). During normal operation the TEACH-IN connector has to be set in position T (temperature compensation)!

Parameterising interface RS 232 interface (Parameterisation with Windows-Software Ultra 2001)

Electrical data

Operating voltage 10 V DC ... 30 V DC

Mechanical data

Ambient temperature	248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)
Protection	IP65
Method of connection	V15 plug connector (M12 x 1), 5-pin

Outputs

(Order code):

Analogue output (4 mA ... 20 mA) and (0 V ... 10 V) 2 switch outputs pnp, N.O./N.C.	UC1000-30GM-IUR2-K-V15	UC1000-30GM-E6R2-K-V15
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ULTRASONIC SENSORS



Series 30GM
with 2 switch outputs,
or analogue output,
temperature compensated,
resistant to chemicals

■ High resistance to chemicals
due to Teflon-coated surface

Operating data

Detection range	200 mm ... 1000 mm	200 mm ... 1000 mm
Unusable area	0 mm ... 200 mm	0 mm ... 200 mm
Response time	≤ 100 ms	≤ 100 ms
Switching frequency	–	≤ 5 Hz
Resolution max.	0.35 mm (at max. detection range)	–
Temperature/ TEACH-IN connector	TEACH-IN of evaluation limits and outputs functions (falling/rising slope). During normal operation the TEACH-IN connector has to be set in position T (temperature compensation)!	TEACH-IN of the switching points and output functions (N.O./N.C.). During normal operation the TEACH-IN connector has to be set in position T (temperature compensation)!

Electrical data

Operating voltage 10 V DC ... 30 V DC

Mechanical data

Ambient temperature 248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)

Protection IP65

Method of connection V1 plug connector (M12 x 1), 4-pin

Outputs

(Order code):

Analogue output (4 mA ... 20 mA) and (0 V ... 10 V)
2 switch outputs pnp, N.O./N.C.

UCC1000-30GM-IU-V1

UCC1000-30GM-E6-V1

Ultrasonic level sensor
Series LUC- with
analogue output and
active moving-target
indication, temperature
compensated



Operating data

Detection range	0.3 m ... 4 m, for liquids
Accuracy	0.5 % of the measuring area terminal value
Resolution	2 mm

Electrical data

Operating voltage	20 V DC ... 30 V DC
Analogue output	4 mA ... 20 mA and 0 V ... 20 V

Mechanical data

Ambient temperature	248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)
Protection	IP65
Method of connection	V15 plug connector (M12 x 1), 5-pin

Process connection (Order code):

Screwed connection G1½A, high-grade steel 1.4571	LUC4T-G5S-IU-V15
Screwed connection G1½A, Polypropylene	LUC4T-G5P-IU-V15
Screwed connection G1½"NPT, high-grade steel 1.4571	LUC4T-N5S-IU-V15
Screwed connection G1½"NPT, Polypropylene	LUC4T-N5P-IU-V15

Ultrasonic level sensor
Series -D1- with
3 relay outputs,
temperature
compensated



Operating data

Detection range	60 mm... 550 mm
Unusable are	0 mm ... 60 mm
Response time	10 s

Electrical data

Operating voltage	10 VDC ... 252 VDC 20 VAC ... 252 VAC, 47 Hz ... 63 Hz
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Mechanical data

Working temperature	253 Kelvin ... 333 Kelvin (-20 °C ... +60 °C)
Protection	IP65
Method of connection	V7 plug connector, 7-pin

Process connection (Order code):

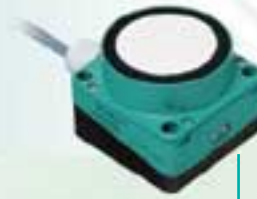
3 relay outputs, N.O./N.C.	UC500-D1-3K-V7
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ULTRASONIC SENSORS

Series VariKont

Series FP

Series VariKont/FP
with serial Interface
and 8 bit output



Operating data

Detection range	300 mm ... 3000 mm	800 mm ... 6000 mm
Unusable area	0 mm ... 300 mm	0 mm ... 800 mm
Response time	≤ 100 ms	≤ 270 ms
Resolution	11 mm Δ 1 LSB ¹	21 mm Δ 1 LSB ²

Electrical data

Operating voltage 20 V DC ... 30 V DC

Mechanical data

Ambient temperature 263 Kelvin ... 323 Kelvin (-10 °C ... +50 °C)

Protection IP65

Method of connection 2 m cable, 14 x 0.14 mm²

Serial interface RS 232 interface (Parameterisation with Windows-Software Ultra 2001)

Outputs (Order code):

8 Bit output, error output,

Test input

UJ3000+U1+8B+RS

UJ6000-FP-8B+RS

¹ with 300 mm ... 3000 mm detection range

² with 800 mm ... 6000 mm detection range

Series VariKont

Series VariKont

Series FP

Series VariKont/FP
with serial interface and
two switch outputs,
temperature compensated,
synchronisation input



Operating data

Detection range	60 mm ... 500 mm	300 mm ... 3000 mm	800 mm ... 6000 mm
Unusable area	0 mm ... 60 mm	0 mm ... 300 mm	0 mm ... 800 mm
Response time	≤ 30 ms	≤ 120 ms	≤ 270 ms

Setting the switching points and output functions (N.O.)

with DIP switch or RS 232

Electrical Data

Operating voltage 20 V DC ... 30 V DC

Mechanical Data

Ambient temperature 248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)

Protection IP65

Method of connection Terminal housing, Pg 13.5, core cross-section ≤ 2.5 mm²

Serial Interface RS 232 interface (Parameterisation with Windows-Software Ultra 2001)

Operating modes

- switching point mode
- window mode
- hysteresis mode
- reflex mode
- area monitoring

Outputs (Order code):

Switch output 1 und 2, pnp, N.O./N.C.

UC500+U9+E6+R2

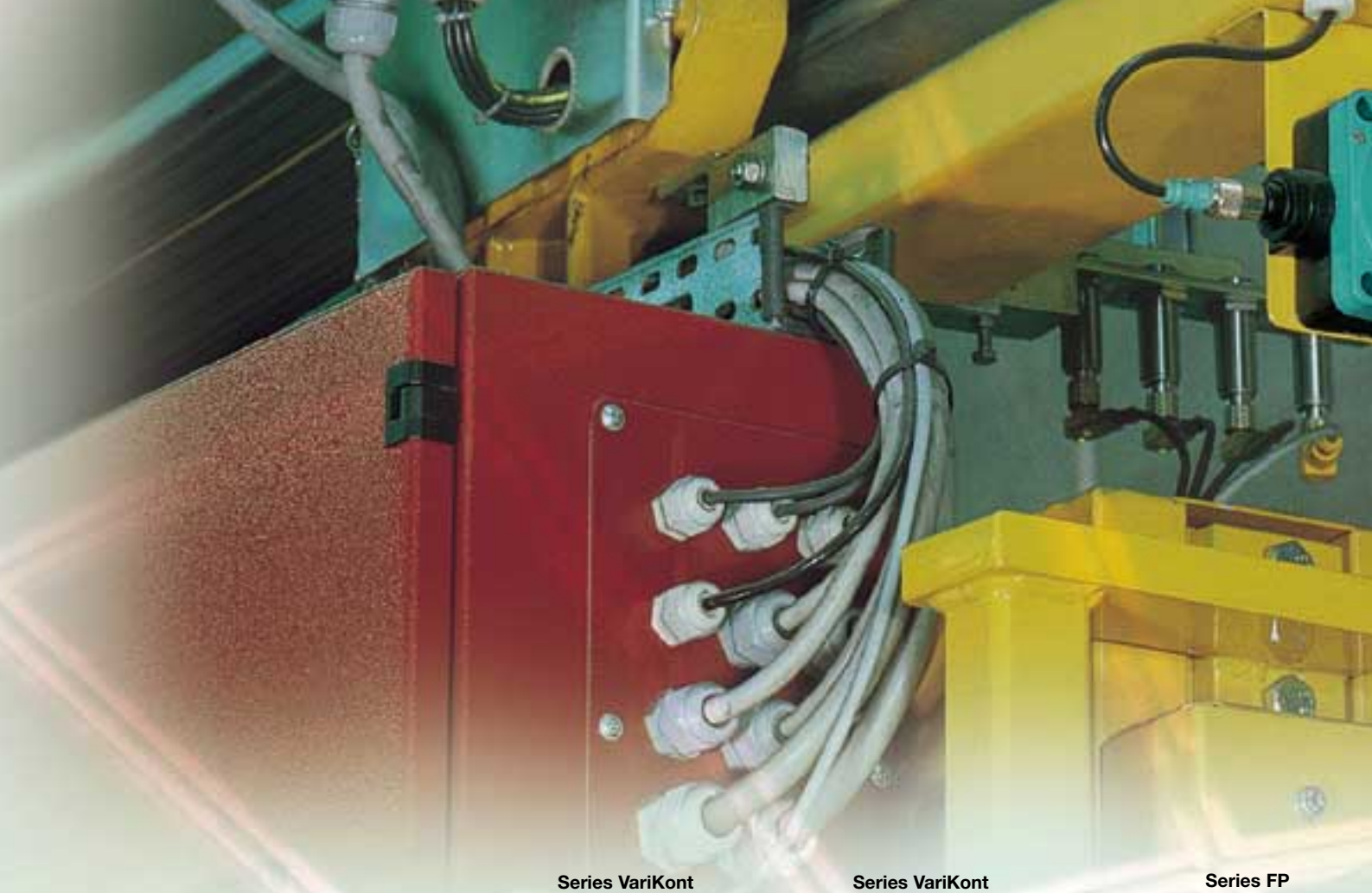
UC3000+U9+E6+R2

UC6000-FP-E6-R2-P5

Switch output 1 und 2, npn, N.O./N.C.

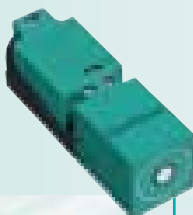
UC3000+U9+E7+R2

UC6000-FP-E7-R2-P5



Series VariKont/FP with serial interface, one switch output and one analogue output, temperature compensated synchronisation input

Series VariKont



Series VariKont



Series FP



Operating data

Detection range	60 mm ... 500 mm	300 mm ... 3000 mm	800 mm ... 6000 mm
Unusable area	0 mm ... 60 mm	0 mm ... 300 mm	0 mm ... 800 mm
Response time	≤ 30 ms	≤ 120 ms	≤ 270 ms
Resolution max.	≥ 0.172 mm	≥ 0.172 mm	≥ 0.172 mm

Setting of the evaluation limits and output functions (falling, rising slope and N.O./N.C.)

with DIP switch or RS 232 interface

Electrical data

Operating voltage 20 V DC ... 30 V DC

Mechanical data

Ambient temperature 248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)

Protection IP65

Method of connection terminal housing, Pg 13.5, core cross-section ≤ 2.5 mm²

Serial interface

RS 232 interface (Parameterisation with Windows-Software Ultra 2001)

Operating modes

- switching point mode
- window mode
- hysteresis mode
- reflex mode
- area monitoring

Outputs (Order code):

Analogue output 4 mA ... 20 mA / 2 V ... 10 V The output switching is dependent on the connected load between current output and voltage output.

Switch output, pnp, N.O./N.C.	UC500+U9+IUE2+R2	UC3000+U9+IUE2+R2	UC6000-FP-IUE2-R2-P5
Switch output, npn, N.O./N.C.		UC3000+U9+IUE0+R2	UC6000-FP-IUE0-R2-P5

Series FP



Operating data

Detection range	200 mm ... 1000 mm	0 mm ... 4000 mm
Unusable area	0 mm ... 200 mm	(beam interruption)
Response time	≅ 100 ms	≅ 150 ms
Switching frequency	≅ 5 Hz	≅ 3 Hz
Setting the limits of the IU-ramp and output function (N.O./N.C. and operating mode)	with DIP switch	with teach input (TEACH-IN)

Electrical data

Operating voltage	20 V DC ... 30 V DC
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Mechanical data

Ambient temperature	263 Kelvin ... 323 Kelvin (-10 °C ... +50 °C)
Protection	IP65
Method of connection	terminal housing, Pg 13.5, core cross-section ≤ 2.5 mm ²

Outputs (Order code):

Operating modes	reflex mode/window operating or independent switching points	reflex mode, on fixed reflector permissible distance 1000 mm ... 4000 mm
Switch output 1 and 2, pnp, N.O./N.C.	UB1000+FP1+E6	
Switch output, pnp, N.O.		UJ4000-FP-E2-P1

Series -F42-
with one or two
switch outputs,
temperature compensated,
synchronisation input



- Disturbing target suppression
- Adjustable sensitivity

Operating data

Detection range	30 mm ... 500 mm	60 mm ... 2000 mm	200 mm ... 4000 mm
Unusable area	0 mm ... 30 mm	0 mm ... 60 mm	0 mm ... 200 mm
Response time	approx. 50 ms	approx. 150 ms	approx. 325 ms
Switching frequency	≤ 8 Hz	≤ 3 Hz	≤ 1.5 Hz

Setting the switching points and output functions

with two button keypad

Electrical data

Operating voltage 10 V DC ... 30 V DC

Mechanical data

Working temperature 248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)

Protection class IP65

Method of connection V15 plug connector (M12x1), 5-pin

Operating modes

- switching point mode
- hysteresis mode
- window mode
- area monitoring

Outputs (Order code):

One Switch output pnp, N.O./N.C. selectable	UB500-F42-E5-V15	UB2000-F42-E5-V15	UB4000-F42-E5-V15
Two Switch outputs pnp, N.O./N.C. selectable	UB500-F42-E6-V15	UB2000-F42-E6-V15	UB4000-F42-E6-V15
One Switch output npn, N.O./N.C. selectable	UB500-F42-E4-V15	UB2000-F42-E4-V15	UB4000-F42-E4-V15
Two Switch outputs pnp, N.O./N.C. selectable	UB500-F42-E7-V15	UB2000-F42-E7-V15	UB4000-F42-E7-V15

Series -F42-
with one or two switch outputs,
temperature compensated,
synchronisation input



- Disturbing target suppression
- Adjustable sensitivity

Operating data

Detection range	30 mm ... 500 mm	60 mm ... 2000 mm
Unusable area	0 mm ... 30 mm	0 mm ... 60 mm
Response time	approx. 50 ms	approx. 150 ms
Switching frequency	≤ 8 Hz	≤ 3 Hz

Setting the switching points and output functions

with two button keypad

Electrical data

Operating voltage 10 V DC ... 30 V DC

Mechanical data

Working temperature 248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)

Protection class IP65

Method of connection V15 plug connector (M12x1), 5-pin

Operating modes

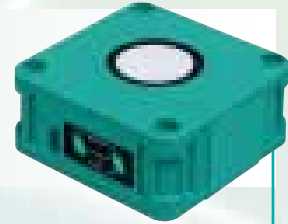
- switching point mode
- hysteresis mode
- window mode
- area monitoring

Outputs (Order code):

One Switch output pnp, N.O./N.C. selectable	UB500-F42S-E5-V15	UB2000-F42S-E5-V15
Two Switch outputs pnp, N.O./N.C. selectable	UB500-F42S-E6-V15	UB2000-F42S-E6-V15
One Switch output npn, N.O./N.C. selectable	UB500-F42S-E4-V15	UB2000-F42S-E4-V15
Two Switch outputs pnp, N.O./N.C. selectable	UB500-F42S-E7-V15	UB2000-F42S-E7-V15

ULTRASONIC SENSORS

Series - F42-
with analogue output,
temperature compensated,
synchronisation input



- Disturbing target suppression
- Adjustable sensitivity

Operating data

Detection range	30 mm ... 500 mm	60 mm ... 2000 mm	200 mm ... 4000 mm
Unusable area	0 mm ... 30 mm	0 mm ... 60 mm	0 mm ... 200 mm
Response time	approx. 50 ms	approx. 150 ms	approx. 325 ms
Resolution max.	0.2 mm	0.35 mm (at max. detection range)	0.35 mm (at max. detection range)

Setting the evaluation limits and output functions with two button keypad

Electrical data

Operating voltage	10 V DC ... 30 V DC 15 V DC ... 30 V DC (sensors with voltage output)
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Mechanical data

Working temperature	248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)
Protection class	IP65
Method of connection	V15 plug connector (M12x1), 5-pin

Outputs (Order code):

Analogue output 4 mA ... 20 mA (Falling/rising slope selectable)	UB500-F42-I-V15	UB2000-F42-I-V15	UB4000-F42-I-V15
Analogue output 0 V ... 10 V (Falling/rising slope selectable)	UB500-F42-U-V15	UB2000-F42-U-V15	UB4000-F42-U-V15

Series - F42-
with analogue output,
temperature compensated,
synchronisation input



- Disturbing target suppression
- Adjustable sensitivity

Operating data

Detection range	30 mm ... 500 mm	60 mm ... 2000 mm
Unusable area	0 mm ... 30 mm	0 mm ... 60 mm
Response time	approx. 50 ms	approx. 150 ms
Resolution	0.2 mm (at max. detection range)	0.7 mm (at max. detection range)

Setting the evaluation limits and output functions with two button keypad

Electrical data

Operating voltage	10 V DC ... 30 V DC 15 V DC ... 30 V DC (sensors with voltage output)
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Mechanical data

Working temperature	248 Kelvin ... 358 Kelvin (-25 °C ... +70 °C)
Protection class	IP65
Method of connection	V15 plug connector (M12x1), 5-pin

Outputs (Order code):

Analogue output 4 mA ... 20 mA (Falling/rising slope selectable)	UB500-F42S-I-V15	UB2000-F42S-I-V15
Analogue output 0 V ... 10 V (Falling/rising slope selectable)	UB500-F42S-U-V15	UB2000-F42S-U-V15

**Series - F42-
with relay output,
temperature compensated**



- Disturbing target suppression
- Adjustable sensitivity

Operating data

Detection range	30 mm ... 400 mm	80 mm ... 1500 mm	200 mm ... 3000 mm
Unusable area	0 mm ... 30 mm	0 mm ... 80 mm	0 mm ... 200 mm
Response time	approx. 50 ms	approx. 150 ms	approx. 325 ms
Switching frequency	≤ 8 Hz	≤ 3 Hz	≤ 1.5 Hz

Setting the switch points and output functions with two button keypad

Electrical data

Operating voltage 20 V DC ... 230 V AC

Mechanical data

Working temperature 248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)

Protection class IP67

Method of connection V95 plug connector (7/8"-16 UNF), 5-pin

Outputs (Order code):

Universal current; relay output	UB400-F42-UK-V95	UB1500-F42-UK-V95	UB3000-F42-UK-V95
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**Series - F42-
with relay output,
temperature compensated**



- Disturbing target suppression
- Adjustable sensitivity

Operating data

Detection range	30 mm ... 400 mm	80 mm ... 1500 mm
Unusable area	0 mm ... 30 mm	0 mm ... 80 mm
Response time	approx. 50 ms	approx. 150 ms
Switching frequency	≤ 8 Hz	≤ 3 Hz

Setting the switch points and output functions with two button keypad

Electrical data

Operating voltage 20 V DC ... 230 V AC

Mechanical data

Working temperature 248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)

Protection class IP67

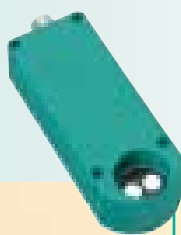
Method of connection V95 plug connector (7/8"-16 UNF), 5-pin

Outputs (Order code):

Universal current; relay output	UB400-F42S-UK-V95	UB1500-F42S-UK-V95
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**Series -F43-
with serial interface,
2 relay outputs and one analogue output,
temperature compensated**



Operating data

Detection range	0 mm ... 300 mm	100 mm ... 2000 mm
Unusable area	0 mm	100 mm
Response time, dynamic	≤ 30 ms	≤ 75 ms
Resolution max. (analogue output)	0.17 mm	0.35 mm

Setting the switch points/evaluation limits and output functions (falling/rising slope) with RS 232 interface

Electrical Data

Operating voltage	10 V DC ... 30 V DC (without current output function) 15 V DC ... 30 V DC (with current output function)
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Mechanical data

Ambient temperature	273 Kelvin... 343 Kelvin (-25 °C ... +70 °C)
Protection	IP65
Method of connection	V17 plug connector (M12 x 1), 8-pin

Serial interface RS 232; parameterisation with Windows-Software Ultra 2001

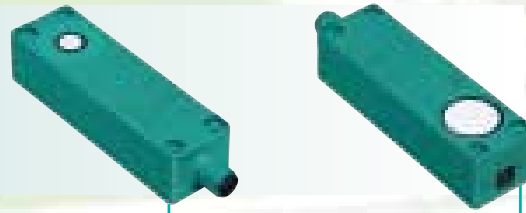
Outputs

Relay output 1, 2	1 A at 24 V DC
Analogue output	4 mA ... 20 mA

Order code	UC300-F43-2KIR2-V17	UC2000-F43-2KIR2-V17
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ULTRASONIC SENSORS

Series F54
with one switch output,
temperature compensated



Operating data

Detection range	30 mm ... 500 mm	80 mm ... 2000 mm
Unusable area	0 mm ... 30 mm	0 mm ... 80 mm
Response time	≤ 50 ms	≤ 150 ms
Switching frequency	≤ 10 Hz	≤ 3 Hz

Setting the switch points and output functions
TEACH-IN with programming device UB-PROG or teach input set to +U_B or -U_B

Electrical data

Operating voltage 10 V DC ... 30 V DC

Mechanical data

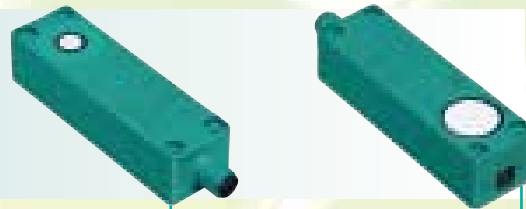
Ambient temperature 248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)
Protection IP65
Method of connection V15 plug connector (M12 x 1), 5-pin

Outputs

(Order code):

Switch output, npn, N.O./N.C.	UB500-F54-E4-V15	UB2000-F54-E4-V15
Switch output, pnp, N.O./N.C.	UB500-F54-E5-V15	UB2000-F54-E5-V15

Series F54
with analogue output,
temperature compensated



Operating data

Detection range	30 mm ... 500 mm	80 mm ... 2000 mm
Unusable area	0 mm ... 30 mm	0 mm ... 80 mm
Response time	≤ 50 ms	≤ 150 ms
Resolution max.	0.13 mm	0.35 mm

Setting the evaluation limits and output functions (falling/rising slope)
TEACH-IN with programming device UB-PROG or teach input set to +U_B or -U_B

Electrical data

Operating voltage 10 V DC ... 30 V DC
15 V DC ... 30 V DC (sensors with voltage output)

Mechanical data

Ambient temperature 248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)
Protection IP65
Method of connection V15 plug connector (M12 x 1), 5-pin

Outputs

(Order code):

Analogue output (4 mA ... 20 mA)	UB500-F54-I-V15	UB2000-F54-I-V15
Analogue output (0 V ... 10 V)	UB500-F54-U-V15	UB2000-F54-U-V15

ULTRASONIC SENSORS

THROUGH BEAM SENSORS

Series -18GK-
with one
switch output



Operating data

Detection range	0 mm ... 500 mm
Mounting separation emitter – receiver	15 mm ... 500 mm
Response time	5 ms
Switching frequency	100 Hz

Electrical data

Operating voltage	18 V DC ... 30 V DC
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Mechanical data

Ambient temperature	273 Kelvin ... 333 Kelvin (0 °C ... + 60 °C)
Protection	IP65
Method of connection	V1 plug connector (M12 x 1), 4-pin

Outputs

Order codes, emitter and receiver included in the delivery package

1 switch output, pnp, N.O.	UBE500-18GK-SE2-V1
1 switch output, npn, N.O.	UBE500-18GK-SE0-V1

Series
-30GM-
with two
switch outputs,
antivalent



Operating data

Detection range	0 mm ... 4000 mm
Mounting separation emitter – receiver	500 mm ... 4000 mm
Response time	30 ... 3000 ms, selectable
Switching frequency	≤ 15 Hz

Electrical data

Operating voltage	18 V DC ... 30 V DC
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Mechanical data

Ambient temperature	273 Kelvin ... 333 Kelvin (0 °C ... + 60 °C)
Protection	IP65
Method of connection	V1 plug connector (M12 x 1), 4-pin

Outputs

Order codes, emitter and receiver included in the delivery package

2 switch outputs, pnp, antivalent	UBE4000-30GM-SA2-V1
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Series
VariKont
with one
switch output



Operating data

Detection range	0 mm ... 6000 mm
Mounting separation emitter – receiver	0 mm ... 6000 mm
Switching frequency	≤ 30 Hz

Electrical data

Operating voltage	20 V DC ... 30 V DC
-------------------	---------------------

Mechanical data

Ambient temperature	248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)
Protection	IP65
Method of connection	Terminal housing, Pg 13,5, Core cross section ≤ 2,5 mm ²

Outputs

Order codes, emitter and receiver included in the delivery package:

2 switch outputs, pnp, antivalent	UBE6000+U1+SA2
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**Series -F64-
with one
switch output**



Operating data		
Detection range	0 mm ... 500 mm	0 mm ... 500 mm
Mounting separation emitter – receiver	15 mm ... 500 mm	15 mm ... 500 mm
Response time	5 ms	5 ms
Switching frequency	100 kHz	100 kHz
Electrical data		
Operating voltage	18 V DC ... 30 V DC	18 V DC ... 30 V DC
Mechanical data		
Ambient temperature	273 Kelvin ... 333 Kelvin (0 °C ... + 60 °C)	273 Kelvin ... 333 Kelvin (0 °C ... + 60 °C)
Protection	IP54	IP54
Method of connection	2 m LiYY cable emitter: 2 x 0.34 mm ² receiver: 3 x 0.34 mm ²	V3 plug connector (M8 x 1), 3-pin
Outputs		
Order codes, emitter and receiver included in the delivery package		
1 switch output, pnp, N.O.	UBE500-F64-SE2	UBE500-F64-SE2-V3
1 switch output, npn, N.O.	UBE500-F64-SE0	UBE500-F64-SE0-V3

**Series -F64-
with one
switch output**



Operating data		
Detection range	0 mm ... 1500 mm	0 mm ... 1500 mm
Mounting separation emitter – receiver	20 mm ... 1500 mm	20 mm ... 1500 mm
Response time	approx. 4 ms	approx. 4 ms
Switching frequency	120 kHz	120 kHz
Electrical data		
Operating voltage	18 V DC ... 30 V DC	18 V DC ... 30 V DC
Mechanical data		
Ambient temperature	273 Kelvin ... 333 Kelvin (0 °C ... + 60 °C)	273 Kelvin ... 333 Kelvin (0 °C ... + 60 °C)
Protection	IP54	IP54
Method of connection	2 m LiYY-cable emitter: 2 x 0.34 mm ² receiver: 3 x 0.34 mm ²	V3 plug connector (M8 x 1), 3-pin
Outputs		
Order codes, emitter and receiver included in the delivery package		
1 switch output, pnp, N.O.	UBE1500-F64-SE2	UBE1500-F64-SE2-V3
1 switch output, npn, N.O.	UBE1500-F64-SE0	UBE1500-F64-SE0-V3

ULTRASONIC DOUBLE SHEET, LABEL AND JOINTING POSITION CONTROL

Highlights:

- Zero-contact differentiation of single sheets, and double sheet, label and joints
- Paper weights between 30 g and approx. 1200 g are detectable
- Metallised, glossy and transparent surfaces can be detected without problem, so that ultrasonic double sheet control can be used when capacitive and optical systems reach the limits of their capabilities.
- Easy TEACH-IN of different materials and thickness reduced down times
- Automatic switching threshold compensation when ambient conditions are gradually changing, means that in contrast to mechanical systems, no readjustment is necessary.
- Short response time of up to 1 ms
- Insensitive to dust and dirt



Applications:

- In printing machinery, where the ultrasonic double sheet control protects the complex mechanics from damage and prevents a second sheet from lodging in the machine, by avoiding the situation in which two sheets are drawn into it.
- In the control of adhesive films in label making machines, in which the application of the films to a carrier material can be detected and counted.
- In letter opening equipment, where the complete emptying of the opened envelope is controlled.
- In receipt and voucher counting machines, in which the ultrasonic double sheet control ensures that bank receipts are not counted incorrectly.
- In packaging machines, in which the jointing positions for the connection of an aluminium packaging film to the beginning and the end of a sheet are detected and the running speed of the machine is adjusted accordingly.
- In paper processing machinery, for the detection of air, single and double sheets and/or jointing positions.
- In paper sorting systems in the manufacture of calendars – no “month” must be missing or inserted twice.

Technical data

Detectable paper thickness	30 g/m ² ... 1200 g/m ²
Response time	1 ms, 5 ms*

Electrical data

Rated operating voltage	20 V DC ... 30 V DC
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Mechanical data

Ambient temperature	0 °C ... +60 °C
Protection class	IP65
Connection	connector M12
Switch outputs	3 x pnp normally-open

Range of application (Order code):

Double sheet detection	UDB-18GM35-3E2
Label detection	UDBL-18GM35-3E2
Jointing position detection	UDBK-18GM35-3E2

*according to device version

ULTRASONIC SENSORS

WITH SEPARATE EVALUATION

Series -30GM-H1/H2 in through beam or direct detection mode



Operating data

Detection range	direct detection mode	50 mm ... 2000 mm
	through-beam mode	10 mm ... 5000 mm
Unusable area	direct detection mode	0 mm ... 50 mm
	through-beam mode	0 mm ... 10 mm

Electrical data

Operating voltage	10 V DC ... 30 V DC
Determination	the determination of the detection range is carried out by the control unit electronics (e.g. units UH3-KHD2-4E5, UH3-KHD2-4I or UH3-T1-KT); in pulse-echo operation the detection range is derived from the emitter pulse propagation time.

Mechanical data

Ambient temperature	248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)
Protection	IP65
Method of connection	2 m, PVC cable, 3 (H1)/4 (H2) x 0.75 mm ²

Version (Order code):

Emitter	UB2000-30GM-H1
Receiver	UB2000-30GM-H2

Series -30GM- in through beam or direct detection mode



Operating data

Detection range	60 mm ... 500 mm	200 mm ... 2000 mm	500 mm ... 4000 mm	800 mm ... 6000 mm
Unusable area	0 mm ... 60 mm	0 mm ... 200 mm	0 mm ... 500 mm	0 mm ... 800 mm

Electrical data



Operating voltage	20 V DC ... 30 V DC			
Determination	the determination of the detection range is carried out by the control unit electronics (e.g. units UH3-KHD2-4E5, UH3-KHD2-4I or UH3-T1-KT); in pulse-echo operation the detection range is derived from the emitter pulse propagation time.			

Mechanical data

Ambient temperature	248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)			
Protection	IP65			
Method of connection	2 m, PVC cable, 4 x 0.75 mm ²			

Version (Order code):

Transceiver	UB500-30GM-H3	UB2000-30GM-H3	UB4000-30GM-H3	UB6000-30GM-H3
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	Series VariKont	Series VariKont	Series FP
Series VariKont/FP in direct detection mode			
Operating data			
Detection range	60 mm ... 500 mm	300 mm ... 3000 mm	800 mm ... 6000 mm
Unusable area	0 mm ... 60 mm	0 mm ... 300 mm	0 mm ... 800 mm
Electrical data	20 V DC ... 30 V DC		
Temperature compensation	a temperature signal is available at the temperature output for external temperature compensation.		
Determination	the determination of the detection range is carried out by the control unit electronics (e.g. units UH3-KHD2-4E5, UH3-KHD2-4I or UH3-T1-KT); in pulse-echo operation the detection range is derived from the emitter pulse propagation time.		
Mechanical data	248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)		
Ambient temperature	IP65		
Protection	terminal housing, Pg 13.5, core cross section ≤ 2.5 mm ²		
Method of connection			
Version (Order code):			
Transceiver	UB500+U9+H3	UB3000+U9+H3	UB6000-FP-H3



Operating data	
Detection range	60 mm ... 500 mm
Unusable area	0 mm ... 60 mm
Electrical data	
Operating voltage	10 V DC ... 30 V DC
Determination	the determination of the detection range is carried out by the control unit electronics (e.g. units UH3-KHD2-4E5, UH3-KHD2-4I or UH3-T1-KT); in pulse-echo operation the detection range is derived from the emitter pulse propagation time.
Mechanical data	
Ambient temperature	248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)
Protection	IP65
Method of connection	plug connector V1 (M12 x 1), 4-pin
Version (Order code):	
Transceiver	UB500-F54-H3-V1

INTERFACE UNITS FOR SENSORS

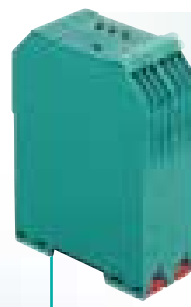
WITH SEPARATE EVALUATION

Ultrasonic
evaluation equipment
UH3-KHD2-4I



UB500/2000/4000/6000-30GM-H3

Ultrasonic
evaluation equipment
UH3-KHD2-4E5



UB500/2000/4000/6000-30GM-H3
UB2000-30GM-H1/H2

(up to 15 m for operation as through beam barrier)

Interconnectable
ultrasonic sensors

- Switch point or evaluation limit memorising
- Simultaneous operating of up to 4 sensors with ranges from 60 mm to 6 m
- Selectable measurement window
- Multiplex mode – no mutual interference, operation possible in restricted space
- Synchronous mode
- Temperature compensation
- Reference measurement of high accuracy

Technical data

Operating voltage	20 V DC ... 30 V DC	
Operating modes	selectable: multiplex-channels switched in succession synchronous-channels switched simultaneously	
Ambient temperature	253 Kelvin ... 343 Kelvin (-20 °C ... +70 °C)	
Display	4 yellow LEDs: channels A1 ... A4 target in switching range 4 green LEDs: sensor type/channel active 2 green LEDs: current slope: $\sqrt{\quad}$ / REF 2 green LEDs: near/far measuring limits	4 yellow LEDs: channels A1 ... A4 target in switching range 4 green LEDs: sensor type/channel active 2 green LEDs: N.O./N.C./REF 1 green LEDs: switch point
Outputs	4 analogue outputs (4 mA ... 20 mA, rising/falling slope)	4 switch outputs (N.O./N.C. – selectable)
Order codes:	UH3-KHD2-4I	UH3-KHD2-4E5

Ultrasonic evaluation
equipment
UH3-T1-KT



Interconnectable sensors all ultrasonic sensors for separate evaluation

- Relay output for high performance
- Adjustable on-/off delay
- N.C./N.O. function
- Switchpoint in sensing area can be selected at increments

Technical data

Operating voltage	20 V DC ... 30 V DC
Ambient temperature	253 Kelvin ... 333 Kelvin (-20 °C ... +60 °C)
Display	yellow LED: Object detected yellow LED: Relay green LED: Power ON
Input	a maximum of 3 ultrasonic sensors in direct detection mode
Order code:	UH3-T1-KT

ULTRASONIC SENSORS

ACCESSORIES



Mounting bracket MH04-3505

for Series FP

The type MH4-3505 facilitates adjustment of ultrasonic sensors by allowing the sensor to be turned by a maximum of $\pm 30^\circ$ in both the vertical and horizontal planes. Setting is carried out by means of the fixing screws.

Mounting aid MH04-2681F

for VariKont series

Ample adjustment range in X and Y directions and the 360° rotation range simplify and reduce the effort required for installation and adjustment.



Mounting flange BF30

for sensors with $\varnothing 30$ mm



Mounting flange BF18

for sensors with $\varnothing 18$ mm



Mounting flange BF18-F

for sensors with $\varnothing 18$ mm



Mounting flange BF30-F

for sensors with $\varnothing 30$ mm

External temperature probe LUC4-Z30-G2V/LUC4-Z30-N2V

for ultrasonic fill level sensors of the LUC4T-... and UC...-30GM-... series



External temperature probe UCM-30GM-TEMP

for ultrasonic sensors of the UC...-30GM-... and LUC4T-... series



OMH-04 mounting accessory

for sensors with $\varnothing 18$ mm

For mounting on $\varnothing 12$ mm round bar or on sheet metal (plate thickness 1.5 mm ... 3 mm).

Mounting accessory M105

for all cylindrical -30GM series sensors

- Secure mounting
- Easy installation
- Robust design
- Chemical resistant



Mounting adapter BF 5-30

Universal mounting for all cylindrical sensors with $\varnothing 5$ mm to $\varnothing 30$ mm.

- Secure fixing
- Simple mounting
- Mounting head and foot fixing may be independently rotated through 360°
- Robust construction

The BF 5-30 mounting adapter is supplied complete with 2 mounting heads ($\varnothing 18$ mm, $\varnothing 30$ mm) and 4 adapter bushes ($\varnothing 5$ mm, $\varnothing 8$ mm, $\varnothing 12$ mm, $\varnothing 14$ mm).



Focusing sound deflector UVW90-M30

for series -30GM-

Focusing sound deflector for cylindrical ultrasonic sensors.

- Universal installation options
- 90° sound deflection for difficult installation conditions
- Universal installation position
- Ultrasonic focusing effect

Sound deflector UVW90-K18/UVW90-K30

for series -30GM- and 18-GM-



ULTRASONIC SENSORS

ACCESSORIES



**Digital display
DA5-IU-C**



**Digital display
DA5-IU-2K-V
DA5-IU-2K-C**

- Programmable characteristic
- 2 limits values can be set
- Current/voltage input
- 2 relay outputs

Technical data		DA5-IU-2K-V	DA5-IU-2K-C
Operating voltage	10 V DC ... 30 V DC	90 V AC ... 260 V AC	90 V AC ... 260 V AC
Display	6 digit display, red 7-segment LED, 8 mm	5 digit display, red 7-segment-LED 14.2 mm, 2 LED for relays	
Sensor supply	–	24 V DC, 100 mA	–
2 Relay outputs	–	2 x 250 V AC/300 V DC, 3 A	
Housing	48 x 24 x 65 mm (w x h x d)	96 x 48 x 75 mm (w x h x d)	
Method of connection	7-pin connector with screw terminals max. 0.34 mm ² ... 1.5 mm ² core cross-section	8-pin and 11-pin connector with plug-in screw terminals max. 0.25 mm ² ... 2.5 mm ² core cross-section max. 0.14 mm ² ... 1.5 mm ² core cross-section	
Protection class		Front: IP65	



**RS 232 Interface
UC-F43-R2**

- For setting and parameter assignment of sensor types UC300-F43-2KIR2-V17 and UC2000-F43-2KIR2-V17 by means of Ultra 2001
- Simple interface connection in the sensor cable and connection of the Sub-D connector with the PC serial interface.



**Extension cable
UC-30GM-PROG**

The extension cable enables the TEACH-IN of ultrasonic sensors of the type UC...-30GM-... and LUC... even in installation locations that are difficult to access. Here, the sensor end of the extension cable is connected with the plug socket on the sensor. Sensor programming can be carried out on the other end of the cable using the temperature plug connector.

**Programming Device
UB-PROG2 + UB-PROG3**

- For sensors UB500/2000/4000/6000/-30GM-E0/E2-V15
- Easy TEACH-IN of the switching points A1/A2 or measurement window
- Easy TEACH-IN of the output function:
 - window operation, normally-open/normally-closed function
 - one switch point, normally-open/normally-closed function
 - monitoring of the detection range



Mating connectors, order code

V1-G-2M-PVC	V15-W-PG9
V1-G-5M-PVC	V15-G-PG9
V1-W-2M-PVC	V15-G-2M-PVC
V1-W-5M-PVC	V15-W-2M-PUR
V1-W-E2-2M-PUR	V15-W-5M-PUR
V1-W-E2-5M-PUR	V15-W-15M-PUR
V1-W-A2-5M-PUR	V17-G-2M-PUR
V1-W-A0-5M-PUR	V17-G-5M-PUR
V1-G	V3-GM-5M-PUR
V1-W	V3-WM-2M-PUR
	V95-G-YE2M-STOOW
	V95-G-YE2M



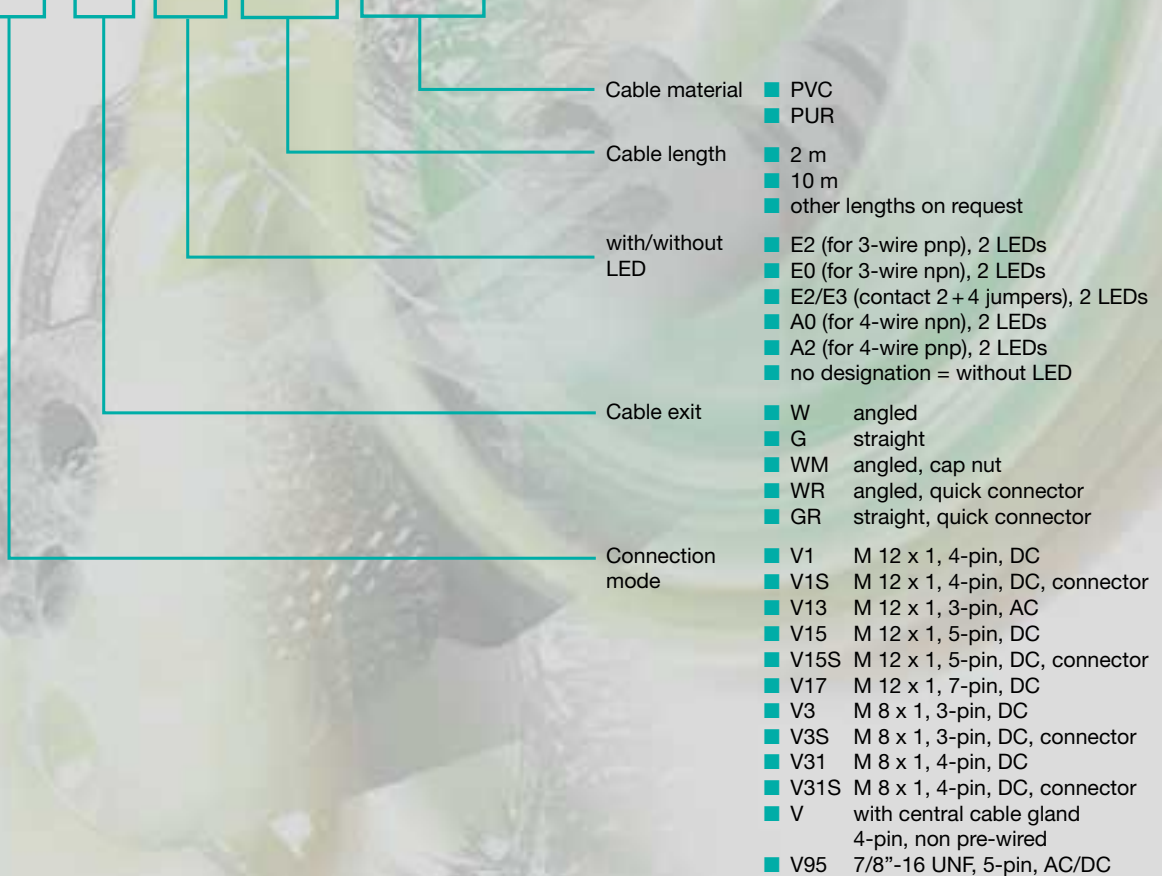
Type-G
(straight version)

Type-W
(angled version)

For other mating connectors and connection cable see Flyer "System accessories for fixing and connection".

Type code, mating connectors

e.g. **V1-W-E2-2M-PUR**



ULTRASONIC SENSORS

SERVICE PROGRAM ULTRA 2001

With the service program ULTRA 2001 ultrasonic sensors can be optimally adapted even to difficult tasks.



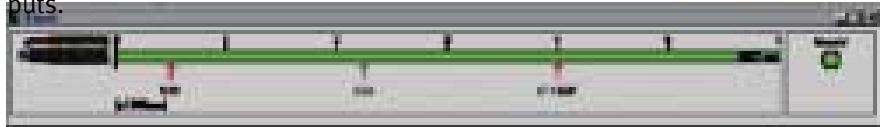
The following sensors can communicate with the software:

Series:	sensor types:
-30GM VariKont	UC...-30GM-...R2-V15 UC...+U9+E6/E7+R2 UC...+U9+IUE0/E2+R2 UJ3000+U1+...+RS
-FP	UC6000-FP-...R2-P5 UJ6000-FP-...+RS
-F43	UC...-F43-2KIR2-V17

Requirements

The ULTRA 2001 program is compatible with any PC or laptop.
Windows 95, 98, 2000
an EGA or VGA graphics card, as well as an RS 232 interface are required.

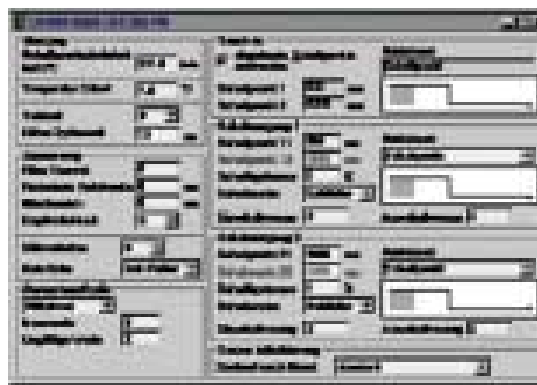
Show It: Graphical display of the measured distance. The set switching distances are marked. Simulated LEDs display the switching states of outputs.



Distance: Display of the currently measured distance in mm.



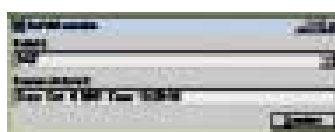
Parameter settings: All parameters are editable here. Display and input fields permit commands or parameters to be changed at the click of the mouse without detailed knowledge of the relevant commands or their syntax.



Port Monitor: Display of commands sent to the sensor and received by it.



Send Command: Sensor parameters are set and queried here in the same manner as with a terminal program (alternatively to the parameterisation window).



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SIGNALS FOR THE WORLD OF AUTOMATION

Worldwide Headquarters

Pepperl+Fuchs GmbH · Königsberger Allee 87
68307 Mannheim · Germany
Tel. +49-6 21-7 76-0 · Fax +49-6 21-7 76-10 00
<http://www.pepperl-fuchs.com>

Asia Pacific Headquarters

Pepperl+Fuchs Pte Ltd. · P+F Building
18 Ayer Rajah Crescent · Singapore 139942
Tel. +65-67 79 90 91 · Fax +65-68 73 16 37
e-mail: sales@sg.pepperl-fuchs.com

USA Headquarters

Pepperl+Fuchs Inc. · 1600 Enterprise Parkway
Twinsburg, Ohio 44087 · Cleveland-USA
Tel. +01-330-4 25 35 55 · Fax +01-330-4 25 93 85
e-mail: sales@us.pepperl-fuchs.com

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