UK1 and UKR1series

M18 cylindrical direct diffuse & retro-reflective Ultrasonic Sensor UK1 with Teach-In button

features

- **Models with adjustable digital output**
- **Models with current or voltage analogue outputs**
- **Working area adjusting (single point teach, standard window, adjustable hysteresis) by Teach-in button suitable for all models for a fast coming into work**
- **Multifunction LED indicator: output state, echo presence, fw identification, teach block**
- **Plastic or metallic (AISI 316L) housing, M12 plug exit and PVC cable**



web contents

- **Application notes**
- **Photos**
- **Catalogue / Manuals**

IO-Link CE cULus Ex

code description

UK [ ] 1 A / G 1 - 0 E SY AN IO

series	UK	M18 Ultrasonic Sensor
function		Direct diffuse models
	R	Retroreflective models
housing type	1	Standard housing
nominal sensing distance Sn	A	50 - 400 mm (150 - 900 mm retroreflective models)
	C	100 - 900 mm (150 - 800 mm retroreflective models)
	D	150 - 1,600 mm (250 - 1,600 mm retroreflective models)
	F	200 - 2,200 mm (300 - 2,200 mm retroreflective models)
adjustment	G	Adjustment by Teach-In button
output	1	0...10 V single voltage analogue output
	2	4...20 mA single current analogue output
	4	NPN - NO/NC digital output + 4 ... 20 mA current analogue output
	6	PNP - NO/NC digital output + 4 ... 20 mA current analogue output
	7	PNP - NO/NC digital output + 0 ... 10 V voltage analogue output
	9	NPN - NO/NC digital output + 0 ... 10 V voltage analogue output
	N	NPN - NO/NC single digital output
	P	PNP - NO/NC single digital output
	W	PNP - two digital outputs with adjustable firmware (standard window, coded window, adjustable hysteresis)
	M	NPN - two digital outputs with with adjustable firmware (standard window, coded window, adjustable hysteresis)
housing materials	0	Plastic housing
	1	AISI 316L (DIN 1.4404) stainless steel housing (axial)
	2	90° emission, plastic housing
cable exit / connector	A	Axial cable exit (2 m)
	E	M12 plug cable exit
SY	SY	SYNC/MUX function
ATEX	AN	ATEX certified, Cat.3 2.22 Zone
IO-Link	IO	IO-Link models

available models

single output

housing	output	distance (mm)	analogue output 0...10 V	analogue output 4...20 mA	1 x PNP - NO/NC	1 x NPN - NO/NC
plastic	M12 connector	50...400	UK1A/G1-0ESY	UK1A/G2-0ESY	UK1A/GP-0ESY	UK1A/GN-0ESY
		100...900	UK1C/G1-0ESY	UK1C/G2-0ESY	UK1C/GP-0ESY	UK1C/GN-0ESY
		150...1,600	UK1D/G1-0ESY	UK1D/G2-0ESY	UK1D/GP-0ESY	UK1D/GN-0ESY
		200...2,200	UK1F/G1-0ESY	UK1F/G2-0ESY	UK1F/GP-0ESY	UK1F/GN-0ESY
stainless steel AISI 316L		50...400	UK1A/G1-1ESY	UK1A/G2-1ESY	UK1A/GP-1ESY	UK1A/GN-1ESY
		100...900	UK1C/G1-1ESY	UK1C/G2-1ESY	UK1C/GP-1ESY	UK1C/GN-1ESY
		150...1,600	UK1D/G1-1ESY	UK1D/G2-1ESY	UK1D/GP-1ESY	UK1D/GN-1ESY
		200...2,200	UK1F/G1-1ESY	UK1F/G2-1ESY	UK1F/GP-1ESY	UK1F/GN-1ESY
plastic	cable	50...400	UK1A/G1-0ASY	UK1A/G2-0ASY	UK1A/GP-0ASY	UK1A/GN-0ASY
		100...900	UK1C/G1-0ASY	UK1C/G2-0ASY	UK1C/GP-0ASY	UK1C/GN-0ASY
		150...1,600	UK1D/G1-0ASY	UK1D/G2-0ASY	UK1D/GP-0ASY	UK1D/GN-0ASY
		200...2,200	UK1F/G1-0ASY	UK1F/G2-0ASY	UK1F/GP-0ASY	UK1F/GN-0ASY
stainless steel AISI 316L		50...400	UK1A/G1-1ASY	UK1A/G2-1ASY	UK1A/GP-1ASY	UK1A/GN-1ASY
		100...900	UK1C/G1-1ASY	UK1C/G2-1ASY	UK1C/GP-1ASY	UK1C/GN-1ASY
		150...1,600	UK1D/G1-1ASY	UK1D/G2-1ASY	UK1D/GP-1ASY	UK1D/GN-1ASY
		200...2,200	UK1F/G1-1ASY	UK1F/G2-1ASY	UK1F/GP-1ASY	UK1F/GN-1ASY

available models

double digital output

housing	output	distance (mm)	2 x PNP - NO/NC	2 x NPN - NO/NC
plastic	M12 connector	50...400	UK1A/GW-0ESY	UK1A/GM-0ESY
		100...900	UK1C/GW-0ESY	UK1C/GM-0ESY
		150...1,600	UK1D/GW-0ESY	UK1D/GM-0ESY
		200...2,200	UK1F/GW-0ESY	UK1F/GM-0ESY
stainless steel AISI 316L		50...400	UK1A/GW-1ESY	UK1A/GM-1ESY
		100...900	UK1C/GW-1ESY	UK1C/GM-1ESY
		150...1,600	UK1D/GW-1ESY	UK1D/GM-1ESY
		200...2,200	UK1F/GW-1ESY	UK1F/GM-1ESY
plastic	cable	50...400	UK1A/GW-0ASY	UK1A/GM-0ASY
		100...900	UK1C/GW-0ASY	UK1C/GM-0ASY
		150...1,600	UK1D/GW-0ASY	UK1D/GM-0ASY
		200...2,200	UK1F/GW-0ASY	UK1F/GM-0ASY
stainless steel AISI 316L		50...400	UK1A/GW-1ASY	UK1A/GM-1ASY
		100...900	UK1C/GW-1ASY	UK1C/GM-1ASY
		150...1,600	UK1D/GW-1ASY	UK1D/GM-1ASY
		200...2,200	UK1F/GW-1ASY	UK1F/GM-1ASY

available models

analog and digital output

housing	distance (mm)	output	1 x PNP - NO/NC + 1 x 4...20 mA	1 x NPN - NO/NC + 1 x 4...20 mA	1 x PNP - NO/NC + 1 x 0...10 V	1 x NPN - NO/NC + 1 x 0...10 V
plastic	50...400	M12 connector	UK1A/G6-0ESY	UK1A/G4-0ESY	UK1A/G7-0ESY	UK1A/G9-0ESY
	100...900		UK1C/G6-0ESY	UK1C/G4-0ESY	UK1C/G7-0ESY	UK1C/G9-0ESY
	150...1,600		UK1D/G6-0ESY	UK1D/G4-0ESY	UK1D/G7-0ESY	UK1D/G9-0ESY
	200...2,200		UK1F/G6-0ESY	UK1F/G4-0ESY	UK1F/G7-0ESY	UK1F/G9-0ESY
	50...400	cable	UK1A/G6-0ASY	UK1A/G4-0ASY	UK1A/G7-0ASY	UK1A/G9-0ASY
	100...900		UK1C/G6-0ASY	UK1C/G4-0ASY	UK1C/G7-0ASY	UK1C/G9-0ASY
	150...1,600		UK1D/G6-0ASY	UK1D/G4-0ASY	UK1D/G7-0ASY	UK1D/G9-0ASY
	200...2,200		UK1F/G6-0ASY	UK1F/G4-0ASY	UK1F/G7-0ASY	UK1F/G9-0ASY
stainless steel AISI 316L	50...400	M12 connector	UK1A/G6-1ESY	UK1A/G4-1ESY	UK1A/G7-1ESY	UK1A/G9-1ESY
	100...900		UK1C/G6-1ESY	UK1C/G4-1ESY	UK1C/G7-1ESY	UK1C/G9-1ESY
	150...1,600		UK1D/G6-1ESY	UK1D/G4-1ESY	UK1D/G7-1ESY	UK1D/G9-1ESY
	200...2,200		UK1D/G6-1ESY	UK1D/G4-1ESY	UK1D/G7-1ESY	UK1D/G9-1ESY
	50...400	cable	UK1A/G6-1ASY	UK1A/G4-1ASY	UK1A/G7-1ASY	UK1A/G9-1ASY
	100...900		UK1C/G6-1ASY	UK1C/G4-1ASY	UK1C/G7-1ASY	UK1C/G9-1ASY
	150...1,600		UK1D/G6-1ASY	UK1D/G4-1ASY	UK1D/G7-1ASY	UK1D/G9-1ASY
	200...2,200		UK1D/G6-1ASY	UK1D/G4-1ASY	UK1D/G7-1ASY	UK1D/G9-1ASY

technical specifications

	UK1A/G*-**SY	UK1C/G*-**SY	UK1D/G*-**SY	UK1F/G*-**SY
				
maximum sensing distance	400 mm (1)	900 mm (2)	1,600 mm (2)	2,200 mm (2)
minimum sensing distance	50 mm	100 mm	150 mm	200 mm
sensing range (Sd)	50...400 mm	100...900 mm	150...1,600 mm	200...2,200 mm
beam angle	10° ± 2°	10° ± 2°	15° ± 2°	14° ± 2°
switching frequency (digital output)	10 Hz	4 Hz	3 Hz	2 Hz
response time analogue output (10...90% final value)	500 ms			
hysteresis	1%			
repeatibility	0.5%			
resolution	± 1 mm	± 2 mm	± 3 mm	± 3 mm
linearity error	1%			
temperature range	- 20°C...+ 70°C			
temperature compensation	●			
operating voltage	10 - 30 Vcc			
temperature drift	± 2 %			
ripple	5%			
leakage current	10 µA @ 30 Vcc			
output voltage drop	2.2 V max. (IL = 100 mA)			
no-load supply current	≤ 50 mA			
output current (digital output)	100 mA			
minimum load resistance (analog voltage output)	3 k Ω			
set point adjustment	Teach-In button			
power on delay	≤ 300 ms			
short-circuit protection	● (autoreset)			
induction protection	●			
voltage reversal protection	●			
EMC	conforming to EMC Directive, according to EN 60947-5-2			
protection degree	IP67 (EN60529) (3)			
housing material	PBT/stainless steel AISI 316L			
active head material	Epoxy-Glass resin			
tightening torque	1 Nm plastic housing / 50 Nm metallic housing			
weight	plastic version: 70 g connector - 110 g cable metallic version: 100 g connector - 170 g cable			
storage temperature	- 35°C...+ 70° without freezing			
LEDs	green: echo - yellow: output			

(1) Metallic target 100 x 100 mm (2) Metallic target 200 x 200 (3) Protection guarantee only with plug cable well mounted

available models

90° emission models

housing	material	output	distance (mm)	1xPNP-NO/NC + 1x4...20 mA	1xNPN-NO/NC + 1x4...20 mA	1xPNP-NO/NC + 1x0...10 V	1xNPN-NO/NC + 1x0...10 V	2 x PNP	2 x NPN
M18	plastic	M12	50...400	UK1A/G6-2ESY	UK1A/G4-2ESY	UK1A/G7-2ESY	UK1A/G9-2ESY	UK1A/GW-2ESY	UK1A/GM-2ESY
			100..900	UK1C/G6-2ESY	UK1C/G4-2ESY	UK1C/G7-2ESY	UK1C/G9-2ESY	UK1C/GW-2ESY	UK1C/GM-2ESY
			150...1.600	UK1D/G6-2ESY	UK1D/G4-2ESY	UK1D/G7-2ESY	UK1D/G9-2ESY	UK1D/GW-2ESY	UK1D/GM-2ESY
			200...2.200	UK1F/G6-2ESY	UK1F/G4-2ESY	UK1F/G7-2ESY	UK1F/G9-2ESY	UK1F/GW-2ESY	UK1F/GM-2ESY

technical specifications

90° emission models

	UK1A/G*-2ESY	UK1C/G*-2ESY	UK1D/G*-2ESY	UK1F/G*-2ESY
				
nominal sensing distance	400 mm(1)	400 mm(2)	1,600 mm(2)	2,200 mm(2)
minimum sensing distance	50 mm	100 mm	150 mm	200 mm
sensing range	50...400 mm	100...400 mm	150...1,600 mm	200...2,200 mm
beam angle	10° ± 2°	10° ± 2°	15° ± 2°	14° ± 2°
hysteresis	1%			
repeatibility	0.5%			
resolution	± 1 mm	± 2 mm	± 3 mm	± 3 mm
linearity error	1%			
switching frequency	10 Hz	4 Hz	3 Hz	2 Hz
response time analogue output (10...90% final value)	500 ms			
operating voltage	10...30 Vdc			
max. ripple content	5%			
output current	100 mA (digital output)			
minimum load resistance (analog voltage output)	3 k Ω			
set point adjustment	Teach-In button			
output voltage drop	≤ 2.2 V (@ I = 100mA)			
no-load supply current	≤ 50 mA			
leakage current	≤ 10 µA @ 30V			
power on delay	≤ 300 ms			
ambient temperature range	- 20°C...+ 70°C			
temperature drift of Sr	± 2%			
short-circuit protection	● (autoreset)			
induction protection	●			
voltage reversal protection	●			
EMC	conforming to EMC Directive, according to EN 60947-5-2			
weight	75 g			
LEDs	green: echo - yellow: output			
protection degree	IP67 (EN 60529)(3)			
housing material	plastic housing: PBT			
active head material	epoxy glass resin			
connection	M12 plug cable exit			
storage temperature	- 35°C...+ 70° without freezing			
tightening torque	1 Nm			

(1) Metallic target 100 x 100 mm (2) Metallic target 200 x 200 (3) Protection guarantee only with plug cable well mounted

avalaible models

retroreflective models

housing	material	output	distance (mm)	PNP - NO/NC	NPN - NO/NC
M18	plastic	M12 connector	100...400	UKR1A/GW-0ESY	UKR1A/GM-0ESY
			150...900	UKR1C/GW-0ESY	UKR1C/GM-0ESY
			250...1.600	UKR1D/GW-0ESY	UKR1D/GM-0ESY
			300...2.200	UKR1F/GW-0ESY	UKR1F/GM-0ESY
	stainless steel AISI 316L		100...400	UKR1A/GW-1ESY	UKR1A/GM-1ESY
			150...900	UKR1C/GW-1ESY	UKR1C/GM-1ESY
			250...1.600	UKR1D/GW-1ESY	UKR1D/GM-1ESY
			300...2.200	UKR1F/GW-1ESY	UKR1F/GM-1ESY

technical specifications

retroreflective models

	UKR1A/G*-*SY	UKR1C/G*-* SY	UKR1D/G*-* SY	UKR1F/G*-* SY
				
nominal sensing distance	400 mm	900 mm	1,600 mm	2,200 mm
reflector minimum sensing distance	100 mm	150 mm	250 mm	300 mm
beam angle	10° ± 2°	10° ± 2°	15° ± 2°	14° ± 2°
switching frequency	10 Hz	4 Hz	3 Hz	2 Hz
operating voltage	10...30 Vdc			
max. ripple content	5%			
output type	PNP or NPN			
output current	100 mA			
output voltage drop	≤ 2.2 V (@ I = 100mA)			
no-load supply current	≤ 50 mA @ Val=24V			
leakage current	≤ 10 µA @ 30V			
power on delay	≤ 300 ms			
ambient temperature range	- 20°C...+ 70°C			
temperature drift of Sr	± 2 %			
short-circuit protection	● (autoreset)			
induction protection	●			
voltage reversal protection	●			
LEDs	green: echo - yellow: output			
protection degree	IP67			
EMC	conforming to EMC Directive, according to EN 60947-5-2			
housing material	PBT / stainless steel AISI 316L			
active head material	epoxy - glass resin			
connection	M12 plug cable exit			
weight	plastic version: 70 g - metallic version: 100 gr			
storage temperature	-35°..+70°C			
set point adjustment	teach-in button			
tightening torque	1 Nm plastic housing / 50 Nm metallic housing			

adjustment

Reflector detection (Sd)
Install the sensor in the correct position. Install the background (any solid, flat, fixed surface) perpendicularly to the sensor's axes. Press the Teach-in button. Yellow LED blink for 5 times, after that, the sensor acquires the background position (Sd distance).
Operating distance (Sr)
The effective operating distance (Sr) is equivalent to background diastance (Sd) decreases of 10%. This hysteresis allows the correct detection of the target even if the background is vibrating during the machine normal operations

available models

IO-Link

housing	output	output	distance	model
stainless steel AISI 316L	M12 connector	IO-Link or push-pull	50...400	UK1A/GW-1EIOSY
			200...2.200	UK1F/GW-1EIOSY

technical specifications

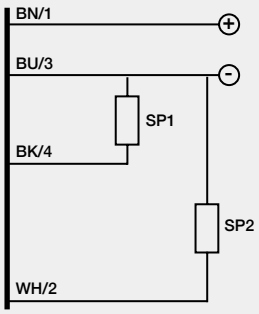
IO-Link models

	UK1A/GP-1EIOSY	UK1F/GP-1EIOSY
		
nominal sensing distance (Sn)	50-400 mm(1)	200-2,200 mm(2)
adjustable sensing range (Sd)	50-400 mm(1)	200-2,200 mm(2)
background min distance in BGS mode	100 mm	300 mm
sensitivity adjustment	Teach in button	
beam angle	10±2°	14±2°
repeatibility	0.5%	
resolution	1 mm	
operating voltage	10-30 Vdc	
ripple	5%	
no-load current	≤50 mA	
transducer frequency	300 kHz	200 kHz
power on delay (digital output)	≤ 500 ms	
power supply protections	polarity reversal, transient	
digital output electrical protections	short circuit (autoreset), over voltage pulses	
max. current analogical voltage output	40 mA	
LEDs	green: echo - yellow: output	
temperature range	-20°..+70°C	
temperature compensation	●	
temperature drift (digital output)	±2%	
housing material	AISI316L	
active head material	Epoxy - Glass resin	
protection degree	IP67 (EN 60529)(3)	

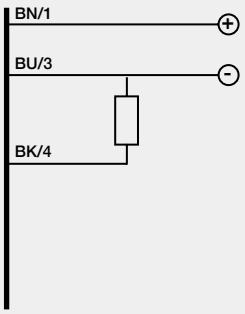
(1) Metallic target 100 x 100 mm (2) Metallic target 200 x 200 (3) Protection guarantee only with plug cable well mounted

electrical diagrams of connections

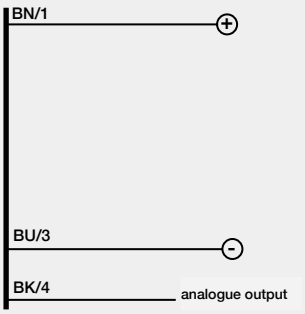
PNP models with double digital output



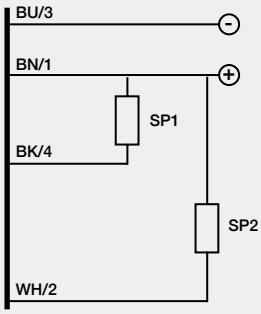
PNP NO/NC with single digital output



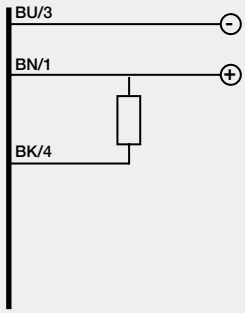
models with single analogue output



NPN models with double digital output



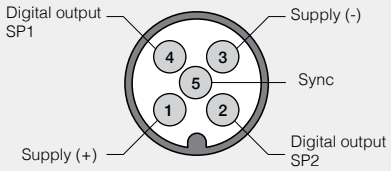
NPN NO/NC models with single digital output



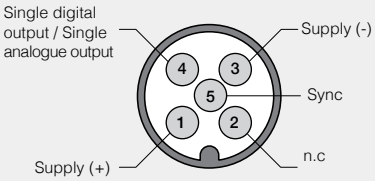
BN	brown
BU	blue
BK	black
WH	white

connectors

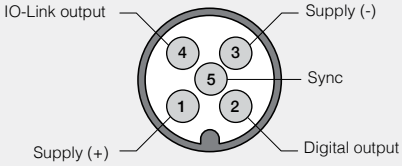
M12 UK1*/GM - *E*SY
UK1*/GW - *E*SY



M12 UK1*/G1 - *E*SY UK1*/GP - *E*SY
UK1*/G2 - *E*SY UK1*/GN - *E*SY

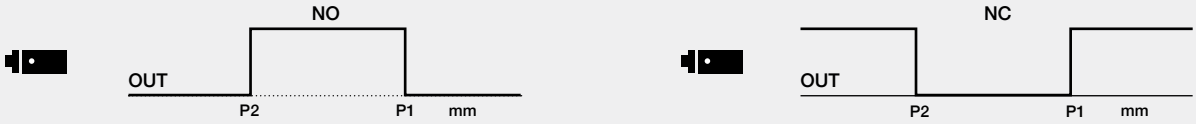


M12 UK1*/GW - 1EIOSY

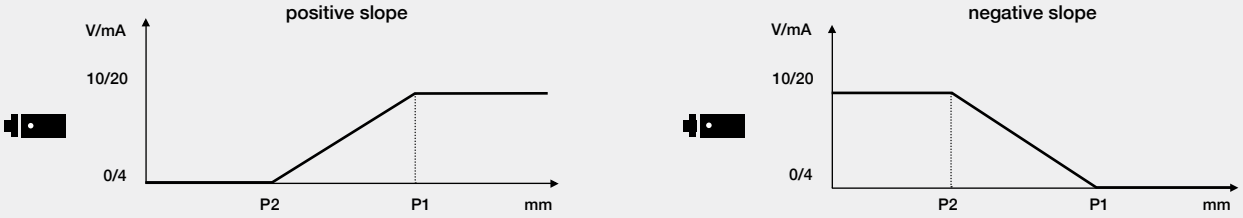


available outputs

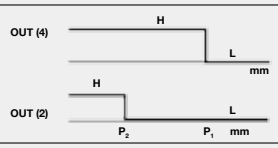
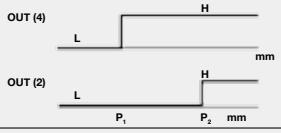
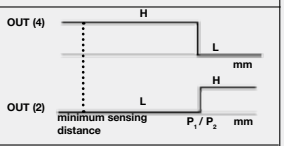
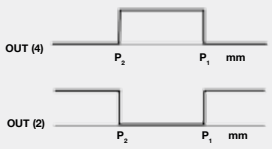
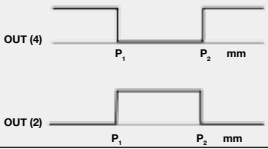
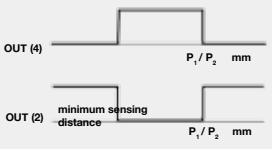
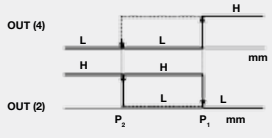
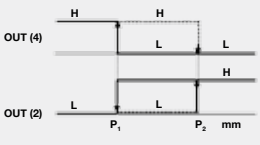
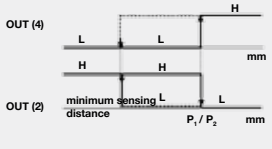
models with single digital output



models with single analogue output



models with double digital output - coded window, adjustable hysteresis, standard window

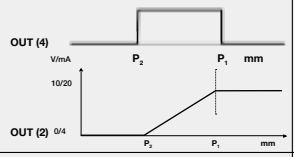
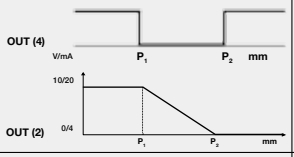
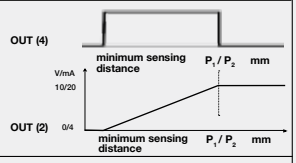
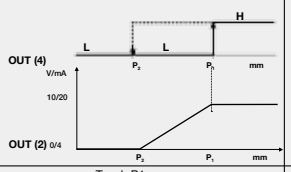
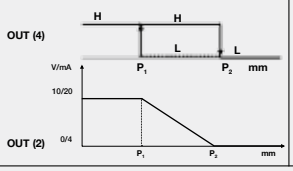
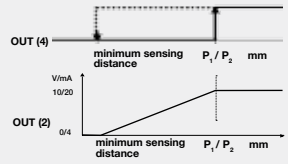
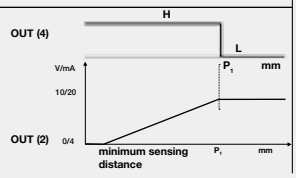
CONFIGURATION STATE	OUTPUT STATE		
LD1 LD2 HOLD PUSH BUTTON FOR 8 SECONDS TO CHOOSE CONFIGURATION LD1, LD2 START BLINKING @ 6 Hz UNTIL RELEASE LD1, LD2 BLINK FOR 3 @ 3,5 Hz TO CONFIRM THE CHANGE	P1 > P2 LOGICA NO	P1 < P2 LOGICA NC	P1 = P2 LOGICA NO
LD1 ON IN SINGLE POINT MODE			
LD1 ON IN WINDOW MODE			
LD1, LD2 ON IN TWO POINT MODE			

P1 maximum selected working distance and first point to select

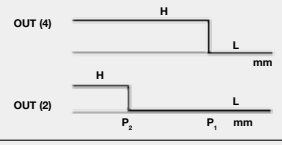
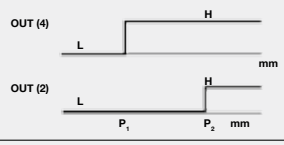
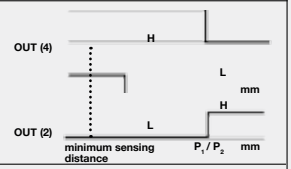
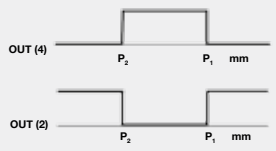
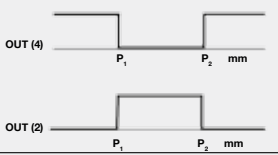
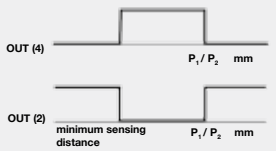
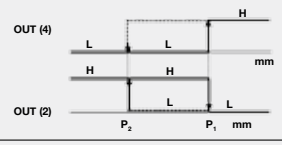
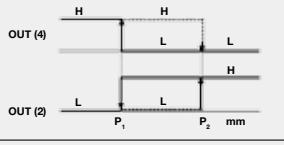
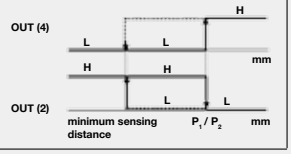
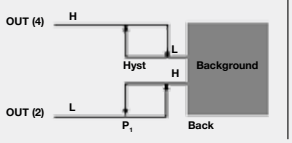
P2 minimum selected working distance and second point to select

available outputs

models with mixed digital + analog output

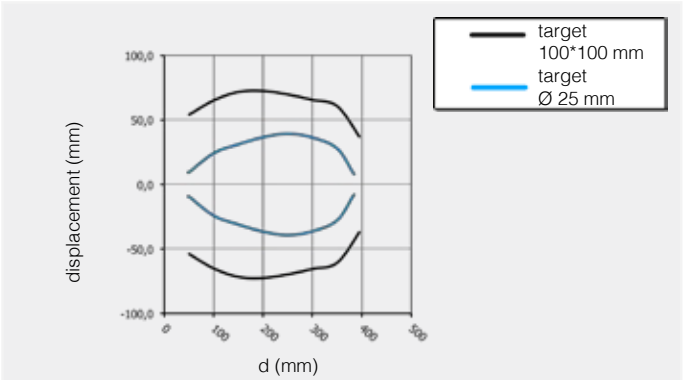
CONFIGURATION STATE	OUTPUT STATE		
LD1 LD2 HOLD PUSH BUTTON FOR 8 SECONDS TO CHOOSE CONFIGURATION LD1, LD2 START BLINKING @ 6 Hz UNTIL RELEASE LD1, LD2 BLINK FOR 3 @ 3,5 Hz TO CONFIRM THE CHANGE	P1 > P2 NO LOGIC - Positive slope	P1 < P2 NC LOGIC - Negative slope	P1 = P2 NO LOGIC - Positive slope
LD2 ON IN WINDOW MODE			
LD1, LD2 ON IN TWO POINT MODE			
LD1 ON IN SINGLE POINT MODE	Teach P1 NO LOGIC - Positive slope 		

models with IO-Link and digital ouputs

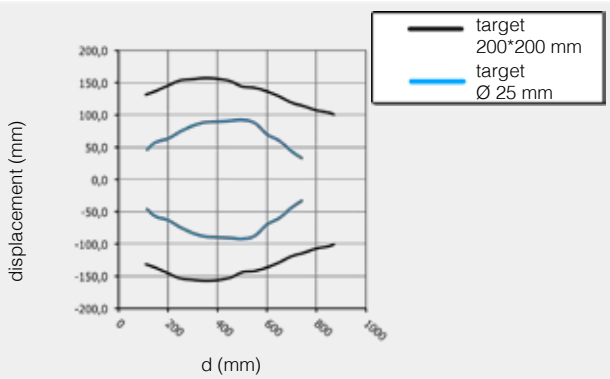
CONFIGURATION STATE	OUTPUT STATE		
LD1 LD2 LD3 HOLD PUSH BUTTON FOR 8 SECONDS TO CHOOSE CONFIGURATION LD1, LD2 START BLINKING @ 6 Hz UNTIL RELEASE	P1 > P2	P1 < P2	P1 = P2
LD1 ON IN SINGLE POINT MODE	NO LOGIC 	NC LOGIC 	NO LOGIC 
LD1 ON IN WINDOW MODE	COMPLEMENTARY LOGIC 	COMPLEMENTARY LOGIC 	COMPLEMENTARY LOGIC 
LD1, LD2 ON IN TWO POINT MODE			
LD3 ON BGS MODE	Teach P1 ▶ 10% off the Back 		

response diagrams

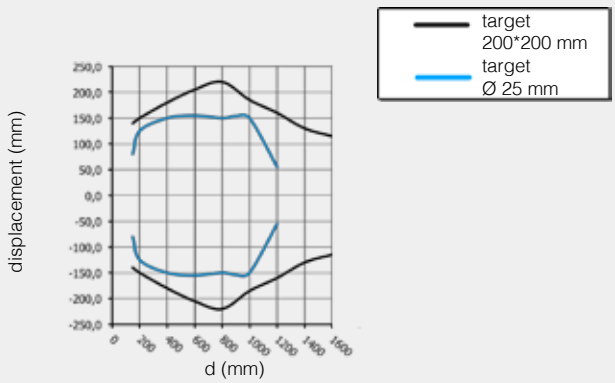
UK1A/**-** parallel displacement



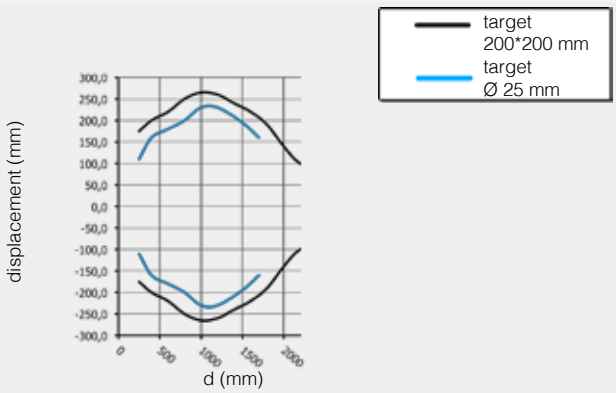
UK1C/**-** parallel displacement



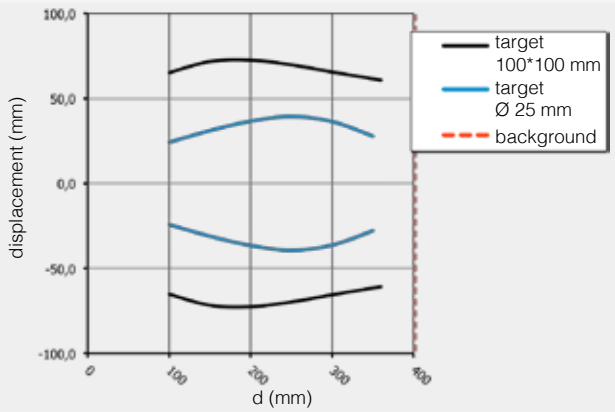
UK1D/**-** parallel displacement



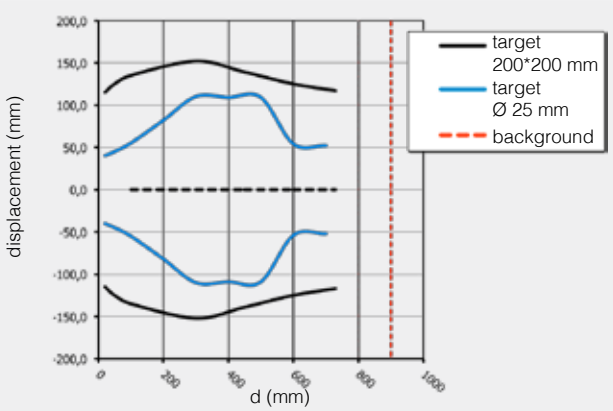
UK1F**-** parallel displacement



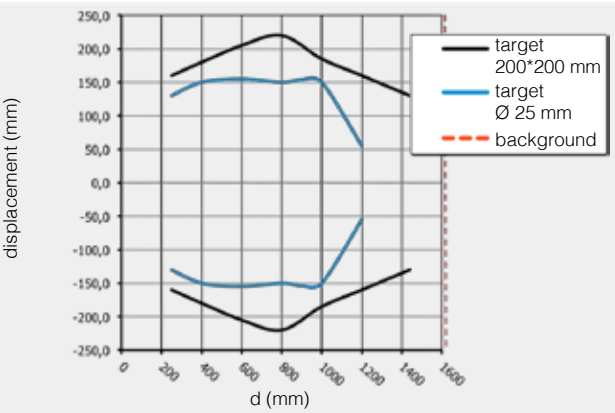
UKR1A/**-** parallel displacement



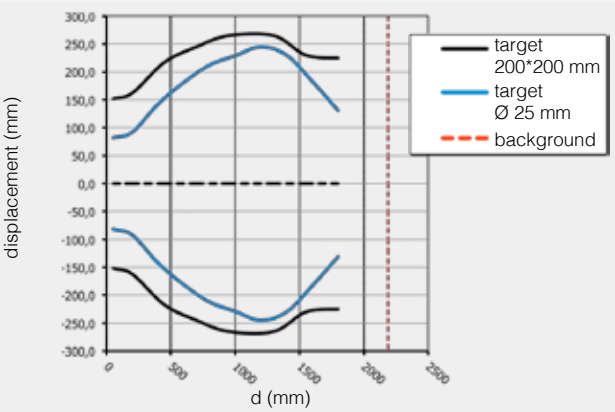
UKR1C/**-** parallel displacement



UKR1D/**-** parallel displacement



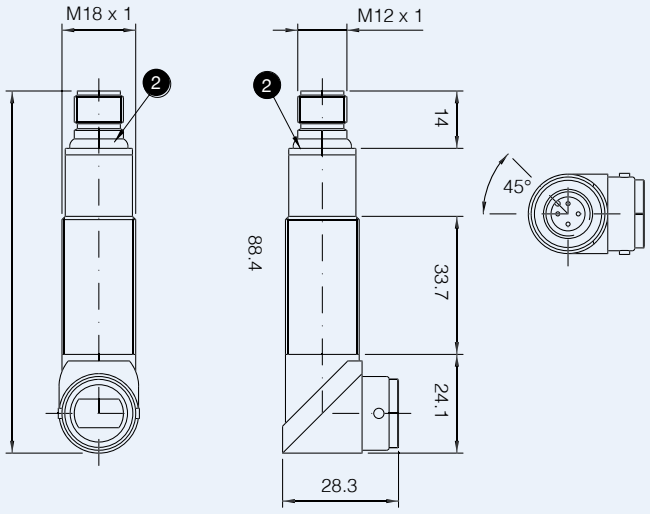
UKR1F**-** parallel displacement

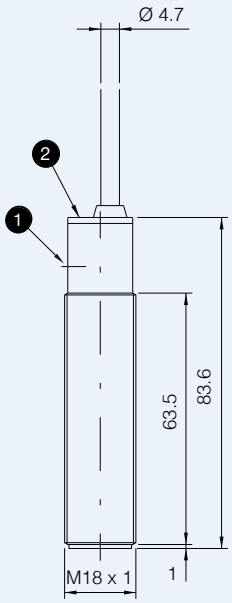


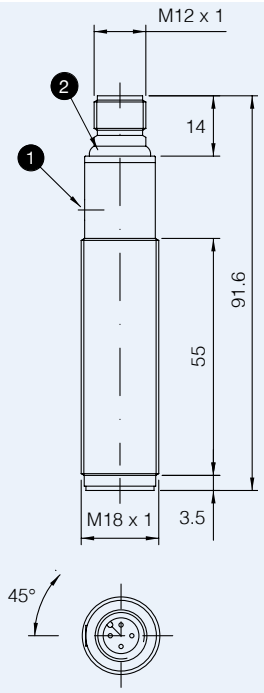
dimensions (mm)

plastic models

UK1*/** - 2E	UK1/** - 0A	UK1*/** - 0E





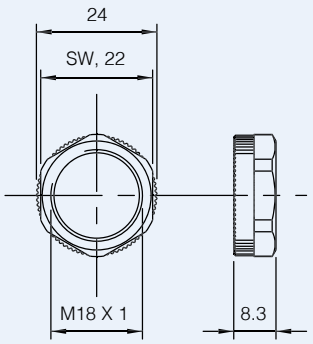


1 Teach-In button

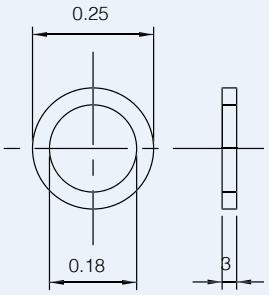
2 LED

dimensions (mm)

accessories included in all plastic models



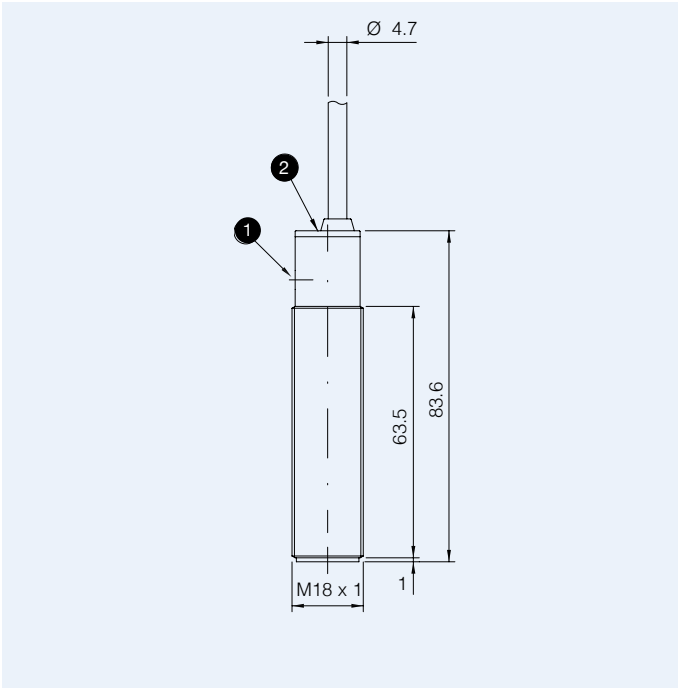
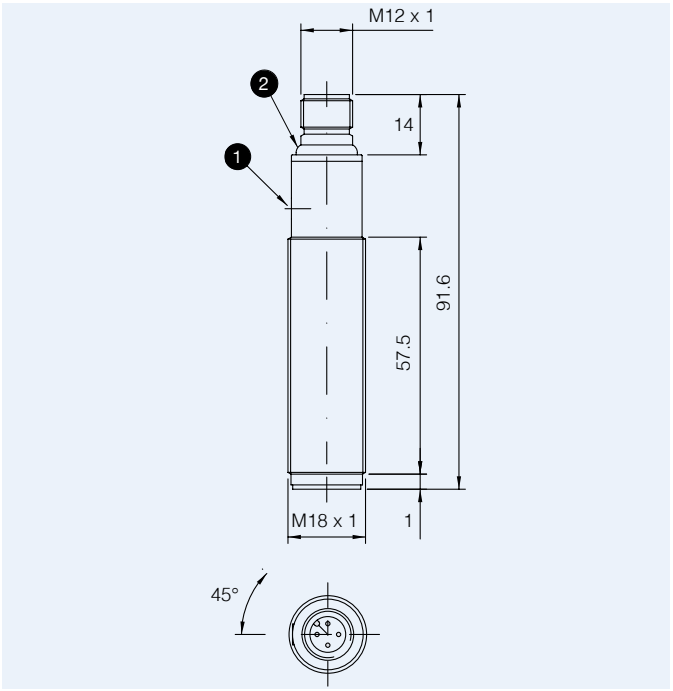
plastic clamping ring (2x)



plastic washer (2x)

dimensions (mm)

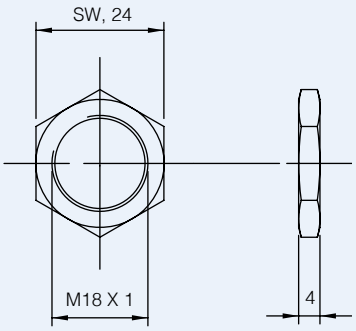
metallic models

UK1*/** - 1A	UK1*/** - 1E
	

1 Teach-In button 2 LED

dimensions (mm)

accessories included in all metallic models



metallic
clamping ring (2x)