



# UK1 and UKR1 series

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



M18 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



## code description

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

	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	80 - 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 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										

UK1 - UKR1



M18 with Teach-In button

## 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
		80...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
		80...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
		80...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
		80...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
		80...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
		80...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
		80...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
		80...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
	80...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
	80...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
	80...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
	80...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



M18 with  
Teach-In button



	UK1A/G*-**SY	UK1C/G*-**SY	UK1D/G*-**SY	UK1F/G*-**SY
maximum sensing distance	400 mm <sup>(1)</sup>	900 mm <sup>(2)</sup>	1,600 mm <sup>(2)</sup>	2,200 mm <sup>(2)</sup>
minimum sensing distance	50 mm	80 mm	150 mm	200 mm
sensing range (Sd)	50...400 mm	80...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%			
repeatability	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) <sup>(3)</sup>			
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
			80...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



M18 with  
Teach-In button

## technical specifications

### 90° emission models

	UK1A/G*-2ESY	UK1C/G*-2ESY	UK1D/G*-2ESY	UK1F/G*-2ESY
nominal sensing distance	400 mm <sup>(1)</sup>	900 mm <sup>(2)</sup>	1,600 mm <sup>(2)</sup>	2,200 mm <sup>(2)</sup>
minimum sensing distance	50 mm	80 mm	150 mm	200 mm
sensing range	50...400 mm	80...900 mm	150...1,600 mm	200...2,200 mm
beam angle	10° ± 2°	10° ± 2°	15° ± 2°	14° ± 2°
hysteresis	1%			
repeatability	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) <sup>(3)</sup>			
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



## available 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 distance (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 <sup>(1)</sup>	200-2,200 mm <sup>(2)</sup>
adjustable sensing range (Sd)	50-400 mm <sup>(1)</sup>	200-2,200 mm <sup>(2)</sup>
background min distance in BGS mode	100 mm	300 mm
sensitivity adjustment	Teach in button	
beam angle	10±2°	14±2°
repeatability	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) <sup>(3)</sup>	

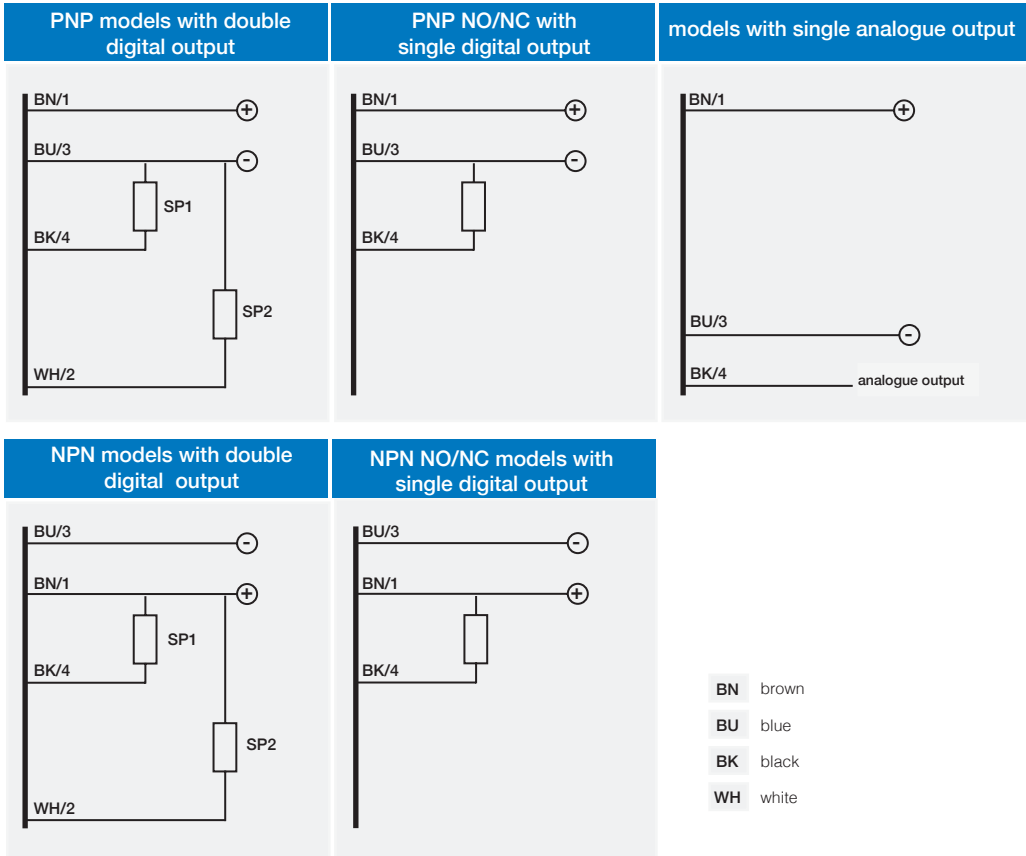
(1) Metallic target 100 x 100 mm (2) Metallic target 200 x 200 (3) Protection guarantee only with plug cable well mounted



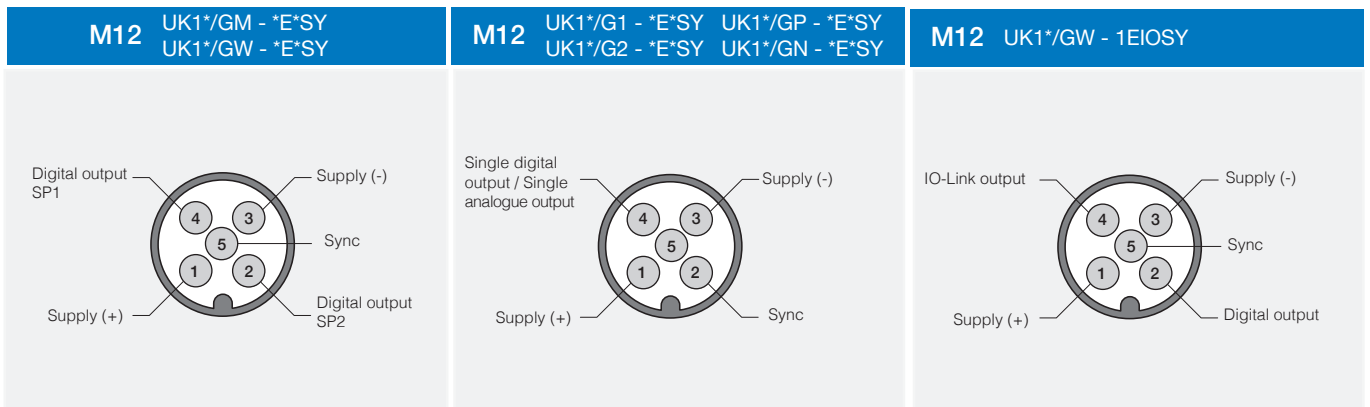


# electrical diagrams of connections

M18 with Teach-In button

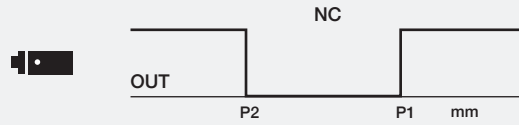
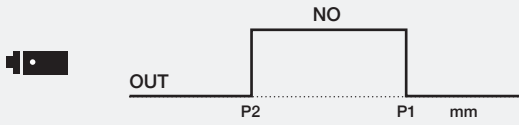


## connectors

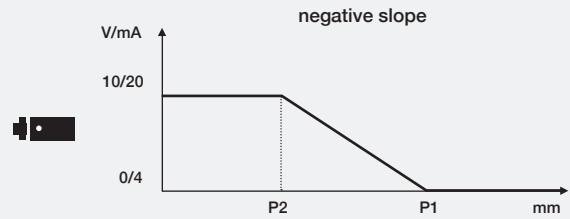
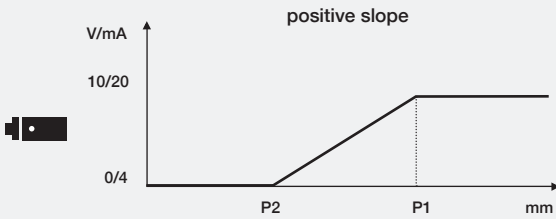




models with single digital output



models with single analogue output



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

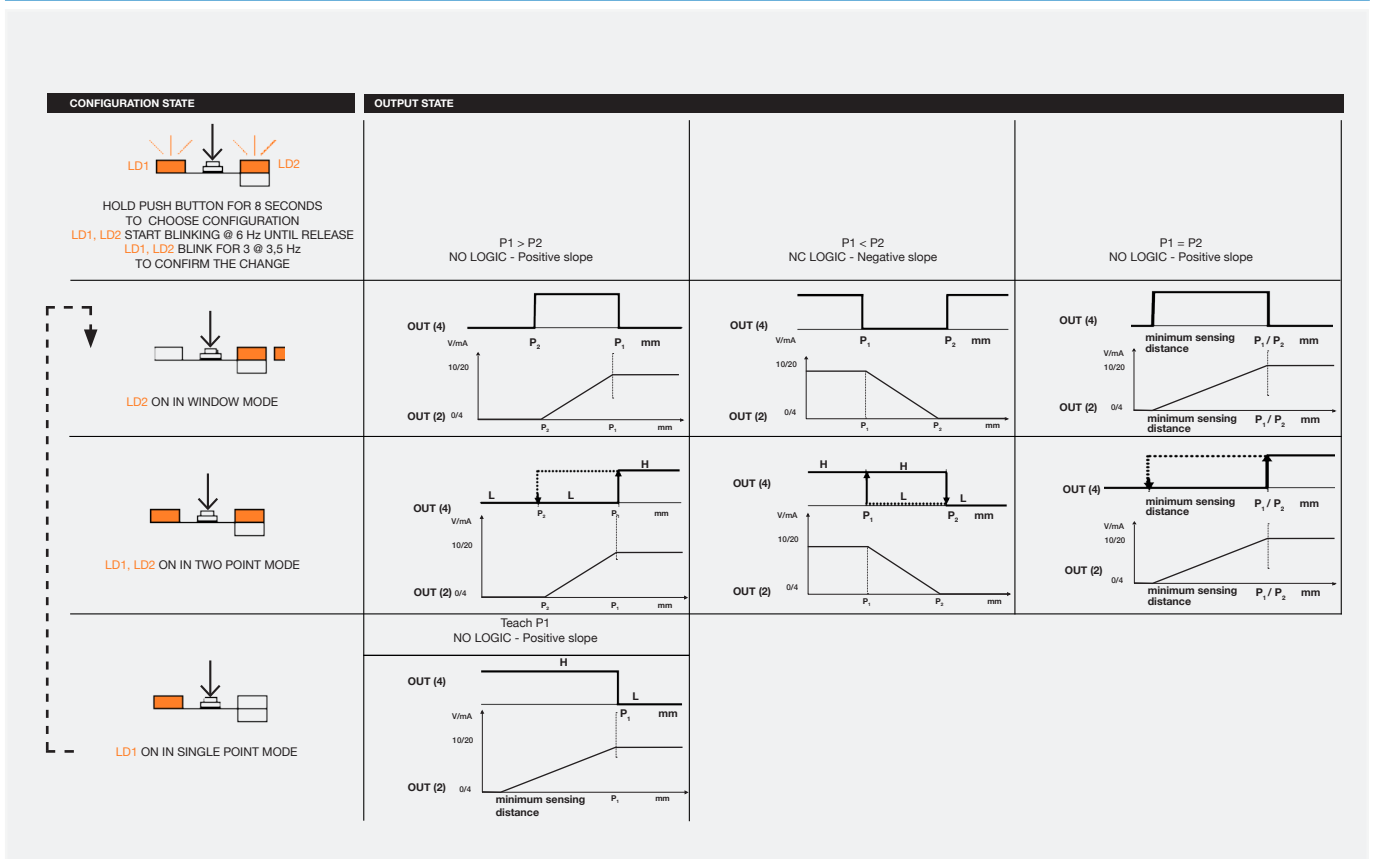
CONFIGURATION STATE	OUTPUT STATE		
<p>HOLD PUSH BUTTON FOR 8 SECONDS TO CHOOSE CONFIGURATION                      LD1, LD2 START BLINKING @ 6 Hz UNTIL RELEASE                      LD1, LD2 BLINK FOR 3 @ 3.5 Hz TO CONFIRM THE CHANGE</p>	<p><math>P_1 &gt; P_2</math> LOGICA NO</p>	<p><math>P_1 &lt; P_2</math> LOGICA NC</p>	<p><math>P_1 = P_2</math> LOGICA NC</p>
<p>LD1 ON IN SINGLE POINT MODE</p>			
<p>LD1 ON IN WINDOW MODE</p>			
<p>LD1, LD2 ON IN TWO POINT MODE</p>			

**P1** maximum selected working distance and first point to select

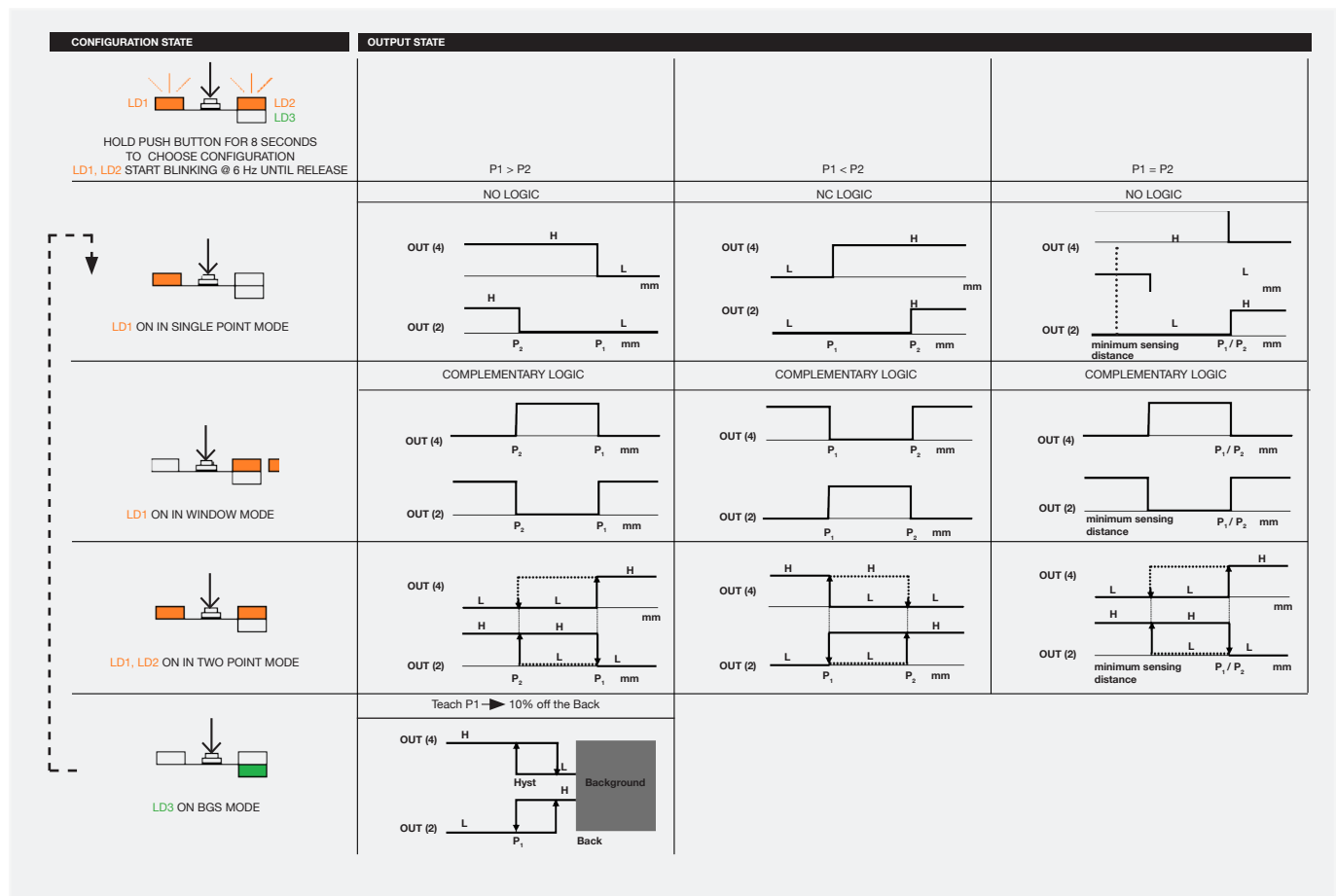
**P2** minimum selected working distance and second point to select



## models with mixed digital + analog output

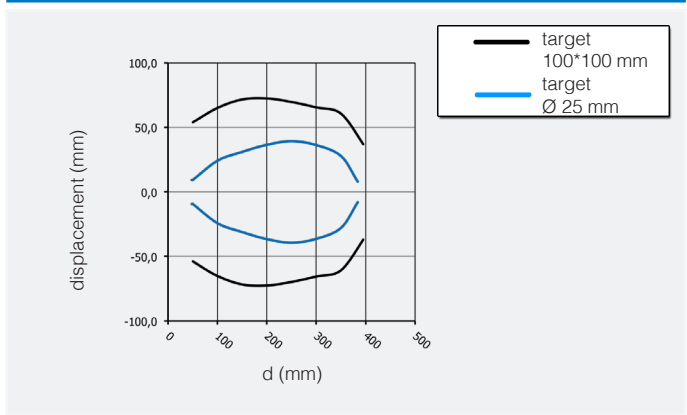


## models with IO-Link and digital outputs

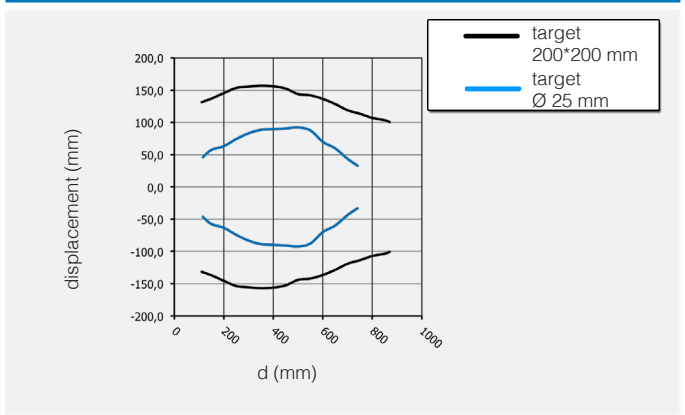




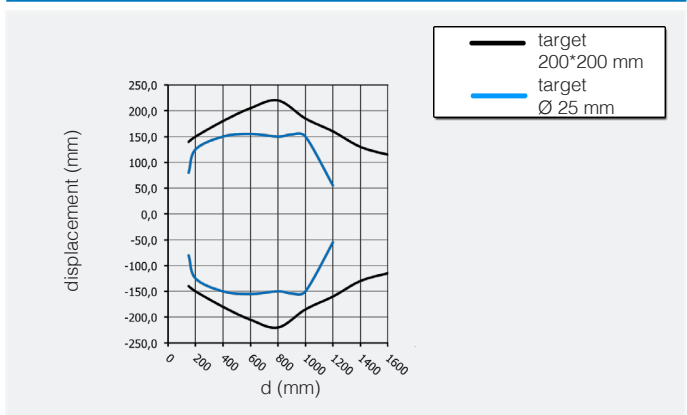
UK1A/\*\*-\*\* parallel displacement



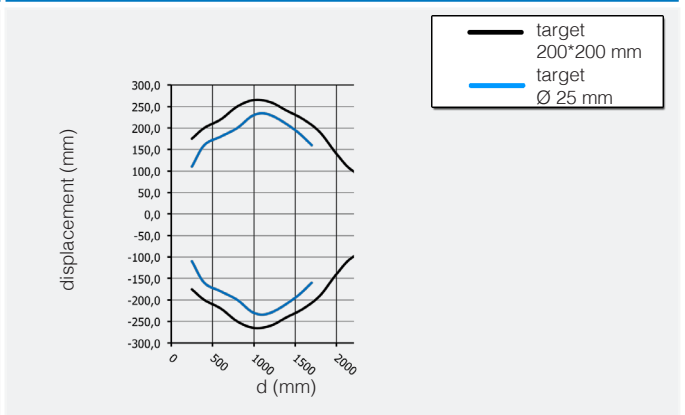
UK1C/\*\*-\*\* parallel displacement



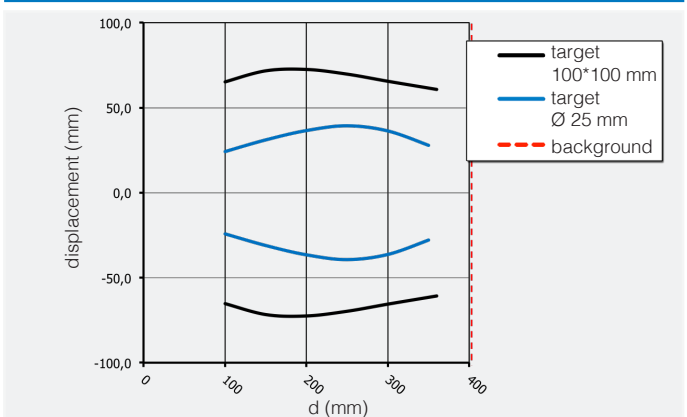
UK1D/\*\*-\*\* parallel displacement



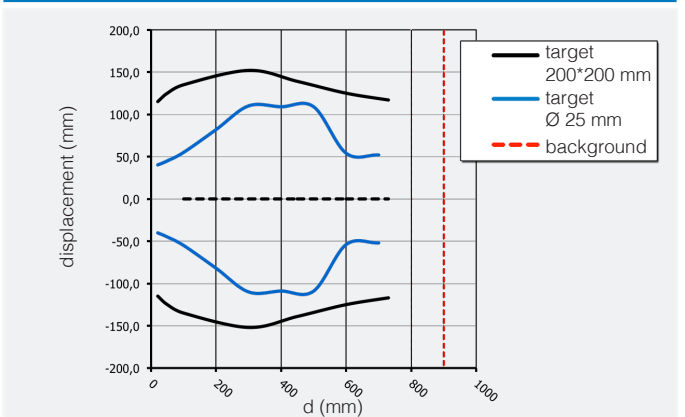
UK1F/\*\*-\*\* parallel displacement



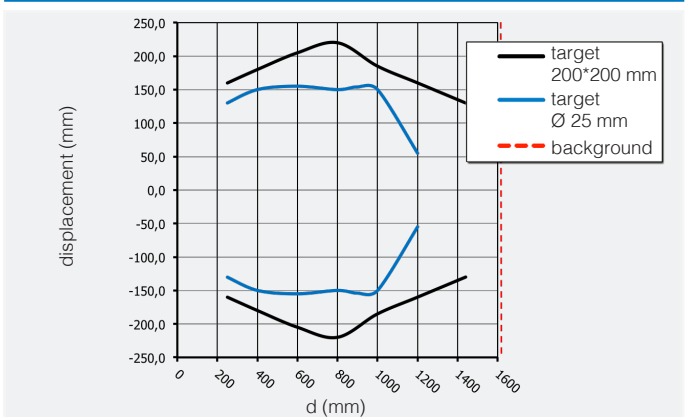
UKR1A/\*\*-\*\* parallel displacement



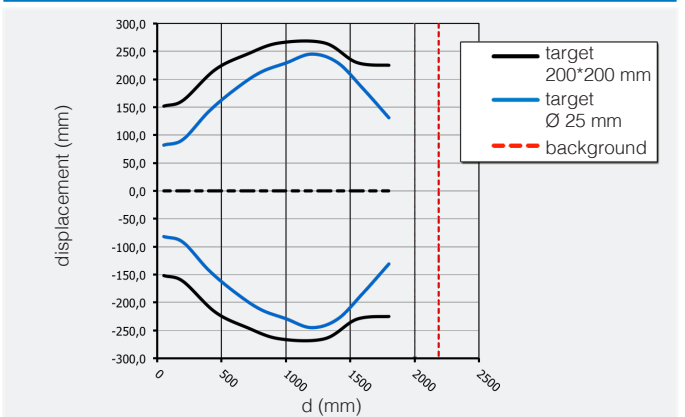
UKR1C/\*\*-\*\* parallel displacement



UKR1D/\*\*-\*\* parallel displacement



UKR1F/\*\*-\*\* parallel displacement

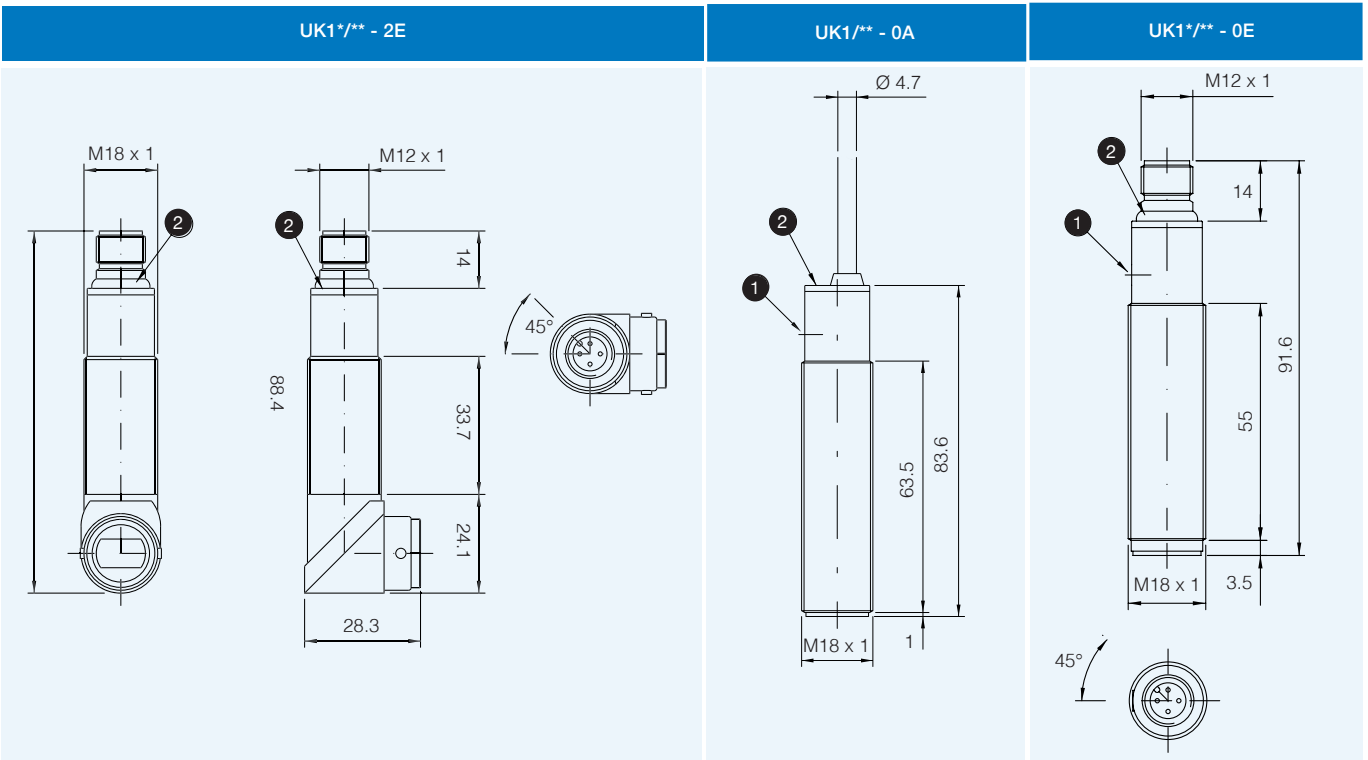




## dimensions (mm)

plastic models

M18 with  
Teach-In button

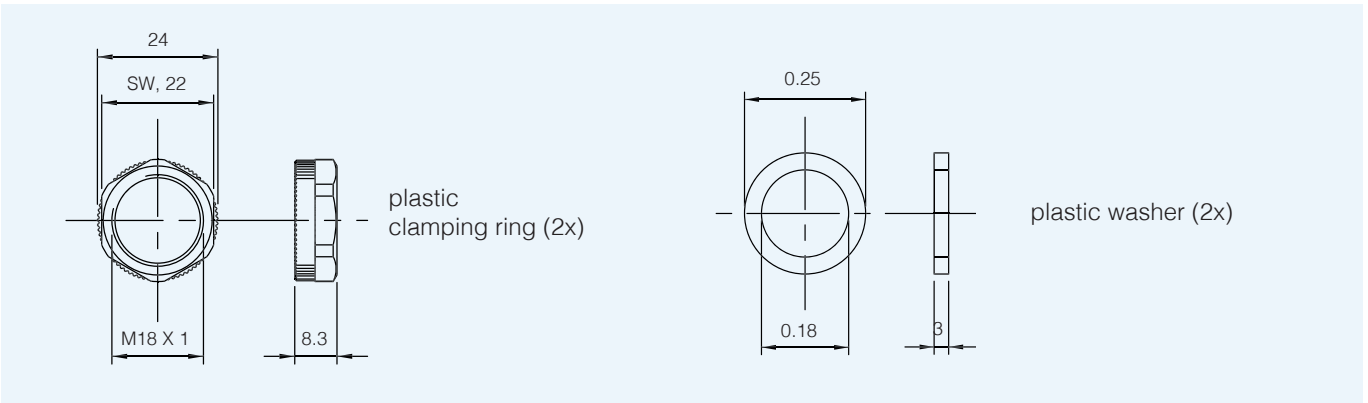


1 Teach-In button

2 LED

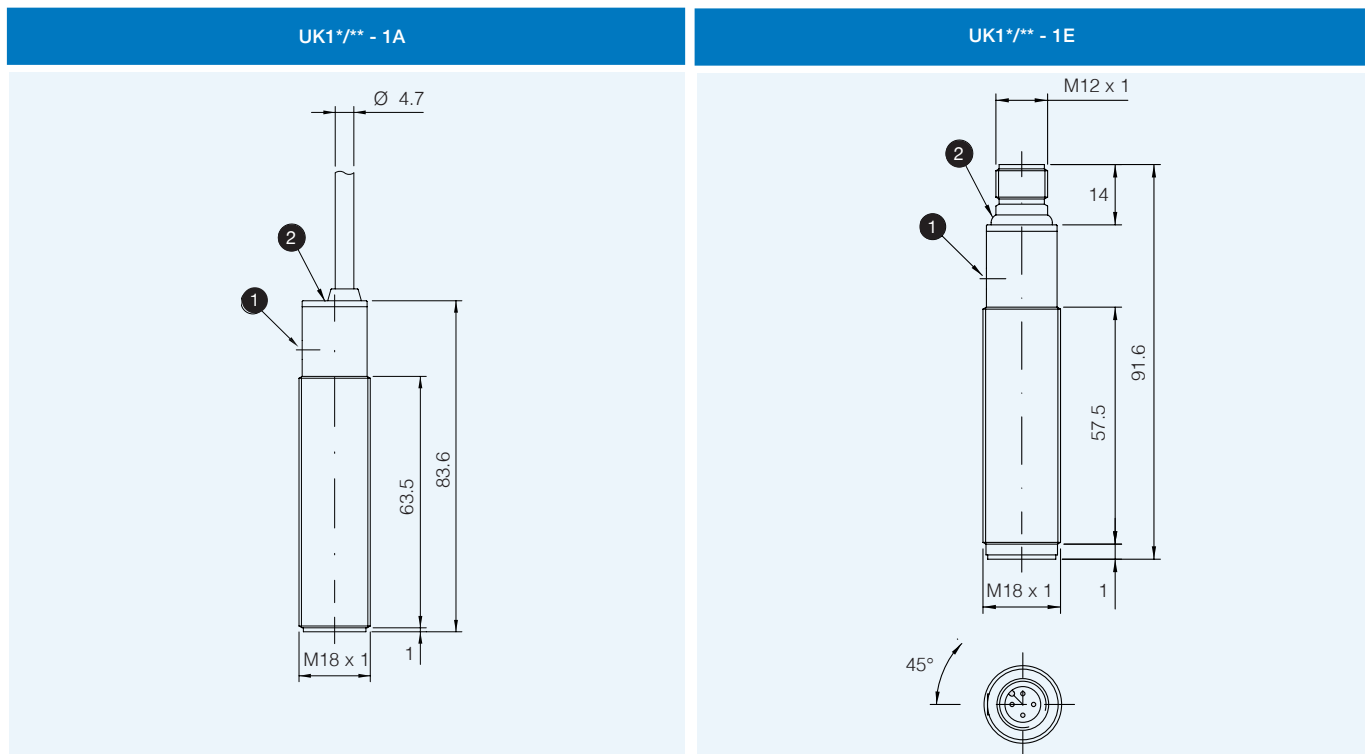
## dimensions (mm)

accessories included in all plastic models



## dimensions (mm)

metallic models



1 Teach-In button

2 LED

## dimensions (mm)

accessories included in all metallic models

