Contrast scanners

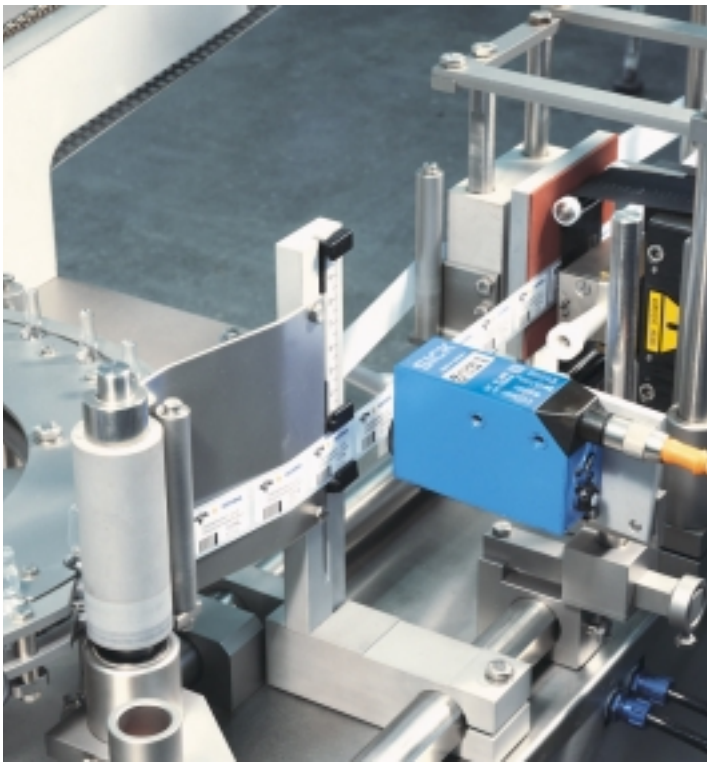
Contrast scanners detect the little differences

Nowadays, contrast scanners are indispensable in automated packaging processes. They are used wherever differences in contrast must be detected quickly and accurately. With over 30 distinguishable grey tones, they are able to detect all types of contrast markings, e.g. print marks on film or packaging materials. A large range of device types employing a variety of contrast detection techniques with different user interfaces are available to fulfil a wide range of application requirements.

- Adjustment of the standard version is carried out manually. The contrast scanner has an integrated adjustment aid for setting the switching threshold.
- The KT 5 is also available as a fibre-optic cable version which can be used in locations where space is restricted.
- In the case of versions with teach-in, the switching threshold can be set via the control cable or by means of the teach-in button on the device.
- A further variant offers dynamic teach-in where the switching threshold is adjusted automatically as markings and background pass through the scanning zone.
- The scanner with dynamic contrast detection offers maximum operating convenience. With this version, the switching threshold is automatically adjusted to the contrast currently being scanned.
- The small and extremely cost-effective KT 2 is the ideal solution for less complex applications.

► KT 5 G positioning tubes to allow precise labelling.

▼ Absolute reliability required: KT 5 monitoring the date stamp on the labels of pharmaceutical products.



► The KT 5 contrast scanner being used for calibrating gas meters.

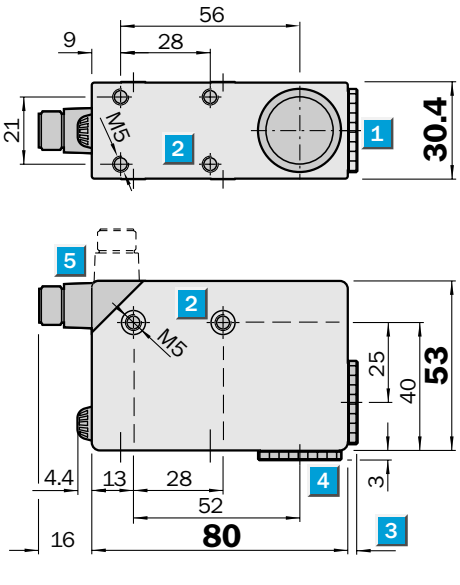
▲ Making sure the champagne doesn't bubble over too soon: KT 5 contrast scanner uses capsule marks to position champagne bottles.

Scanning distance 10/20/40 mm

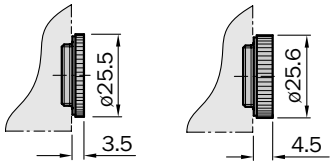
Contrast scanners

- Green light
- Manual switching threshold adjustment
- Adjustment switch
- Optional time delay
- Switching frequency 10 kHz

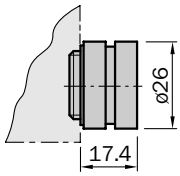
Dimensional drawing



KT 5G-2P 1111	KT 5G-2P 1211
KT 5G-2P 1121	KT 5G-2P 1221
KT 5G-2N 1111	KT 5G-2N 1211

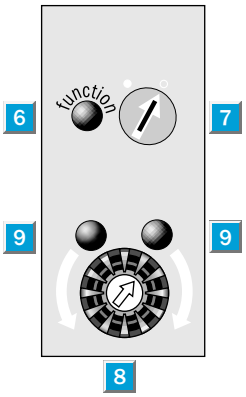


KT 5G-2P 1311	
KT 5G-2P 1321	
KT 5G-2N 1311	



Adjustments possible

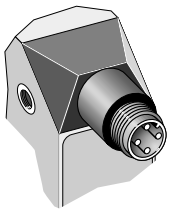
All types



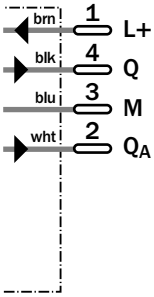
1 Lens (light transmission), can be replaced by item 4
2 M 5 mounting holes, 5.5 mm deep
3 See dimensional drawing of lens
4 Blind screw, can be replaced by item 1
5 4-pin, M 12 x 1 plug (rotatable through 90°)
6 Function signal indicator (yellow)
7 Operating mode selector switch
Light-switching
Dark-switching
8 Switching threshold adjustment
9 Adjustment indicators (green)

Connection type

All types



4-pin, M12

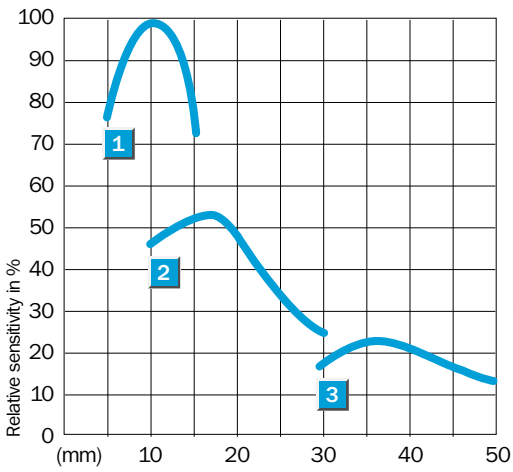


Accessories	page
Cable receptacles	496
Lens	556

Technical data	KT 5G-2	P1111	P1121	P1211	P1221	P1311	P1321	N1111	N1211	N1311
Scanning distance from front edge of lens/										
Light spot dimensions	10 ± 3 mm / 1.2 x 4.2 mm	■	■					■		
	20 ± 3 mm / 1.5 x 5.5 mm			■	■				■	
	40 ± 3 mm / 1.1 x 4.2 mm					■	■			■
Light spot direction	Longitudinal	■	■	■	■	■	■	■	■	■
Light source[1], **light type, wavelength**	LED, green light, 520 nm	■	■	■	■	■	■	■	■	■
Supply voltage V_S	10…30 V DC[2]	■	■	■	■	■	■	■	■	■
Ripple[3]	< 5 V_{SS}	■	■	■	■	■	■	■	■	■
Current consumption[4]	< 80 mA	■	■	■	■	■	■	■	■	■
Switching outputs	Light-/dark-switching, selectable	■	■	■	■	■	■	■	■	■
	PNP: HIGH = V_S – < 2 V / LOW = 0 V	■	■	■	■	■	■			
	NPN: HIGH = V_S / LOW = < 2 V							■	■	■
Output current I_A max.	100 mA	■	■	■	■	■	■	■	■	■
Response time[5]	50 µs	■	■	■	■	■	■	■	■	■
Max. switching frequency[6]	to 10 kHz	■	■	■	■	■	■	■	■	■
Time delay	No timing element	■		■		■		■	■	■
	Deactivation delay, …20 ms		■		■		■			
Analogue output Q_A, optional	0.3…10 mA	■	■	■	■	■	■	■	■	■
Switching threshold	Adjustable (standard type)	■	■	■	■	■	■	■	■	■
Connection type	Plug 4-pin, M 12 x 1	■	■	■	■	■	■	■	■	■
VDE protection class[7]	⧈	■	■	■	■	■	■	■	■	■
Enclosure rating	IP 67	■	■	■	■	■	■	■	■	■
Circuit protection[8]	A, B, C	■	■	■	■	■	■	■	■	■
Ambient temperature T_A	Operation – 10 °C…+ 55 °C	■	■	■	■	■	■	■	■	■
	Storage – 25 °C…+ 75 °C	■	■	■	■	■	■	■	■	■
Shock load	To IEC 68	■	■	■	■	■	■	■	■	■
Weight	Approx. 400 g	■	■	■	■	■	■	■	■	■
Housing material	Coated metal	■	■	■	■	■	■	■	■	■

1) Average service life 100,000 h at T_A = + 25 °C
2) Limit values
3) May not exceed or fall short of V_S tolerances
4) Without load
5) Signal transit time with resistive load
6) With light/dark ratio 1:1
7) Reference voltage 50 V DC
8) A = V_S connections reverse-polarity protected
B = Output Q and Q_A short-circuit protected
C = Interference pulse suppression

Scanning distance



1	Scanning distance 10 mm
2	Scanning distance 20 mm
3	Scanning distance 40 mm

Order information

Preferred type	Part no.
KT 5G-2P 1111	1 015 993
KT 5G-2P 1121	1 015 997
KT 5G-2P 1211	1 015 999
KT 5G-2P 1221	1 016 001
KT 5G-2P 1311	1 016 003
KT 5G-2P 1321	1 016 005
KT 5G-2N 1111	1 015 981
KT 5G-2N 1211	1 015 985
KT 5G-2N 1311	1 015 988

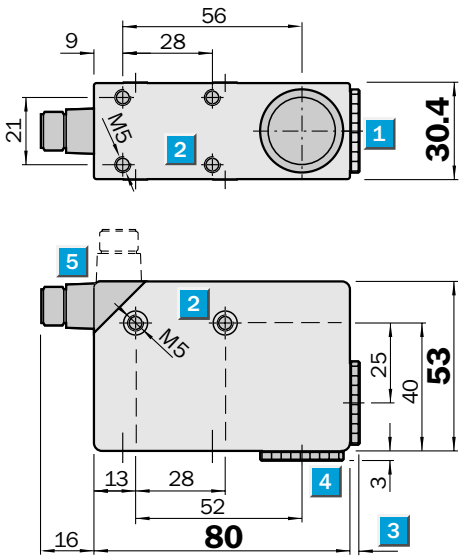
Scanning distance 10 mm/20 mm

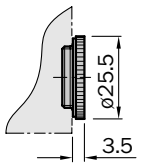
Contrast scanners

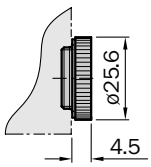
- Green light
- Static teach-in via control cable or control panel on unit
- Fine/coarse via control cable or control panel on unit
- No light-/dark-selection
- Switching frequency 10 kHz

Dimensional drawing

KT 5G-2P1112	KT 5G-2P1212
KT 5G-2N1112	KT 5G-2N1212

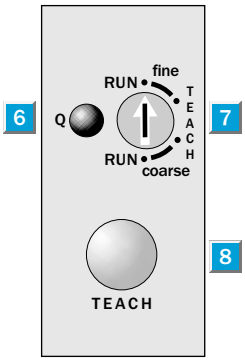






Adjustments possible

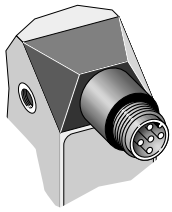
KT 5G-2P1112	KT 5G-2P1212
KT 5G-2N1112	KT 5G-2N1212



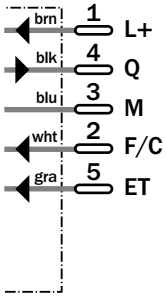
1 Lens (light transmission), can be replaced by Item 4
2 M 5 mounting holes, 5.5 mm deep
3 See dimensional drawing of lens
4 Blind screw, can be replaced by Item 1
5 5-pin, M 12 x 1 plug (rotatable through 90°)
6 Function signal indicator (yellow)
7 Pre-selection switch for minimum contrast
8 Teach-in button

Connection type

KT 5G-2P1112	KT 5G-2P1212
KT 5G-2N1112	KT 5G-2N1212



5-pin, M 12 x 1

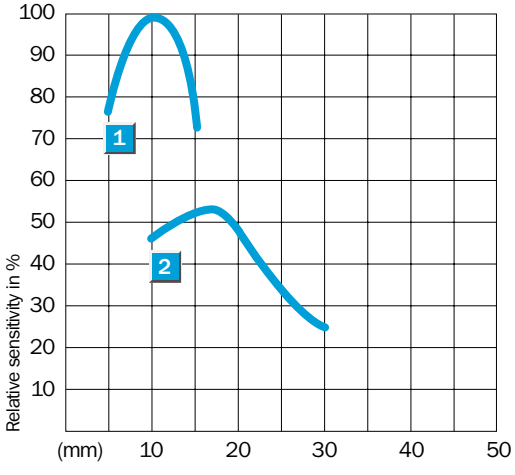


Accessories	page
Cable receptacles	496
Lens	556

Technical data	KT 5G-2	P1112	N1112	P1212	N1212
Scanning distance from front edge of lens					
	10 ± 3 mm	■	■		
	20 ± 3 mm			■	■
Light spot dimensions	1.2 x 4.2 mm	■	■	■	■
Light source[1], **light type**	LED, green	■	■	■	■
Supply voltage V_S	10…30 V DC[2]	■	■	■	■
Ripple[3]	< 5 V_{SS}	■	■	■	■
Current consumption[4]	< 80 mA	■	■	■	■
Switching outputs	PNP: HIGH = V_S – < 2 V / LOW = 0 V	■		■	
	NPN: HIGH = V_S / LOW = < 2 V		■		■
Output current I_A max.	100 mA, short circuit protected	■	■	■	■
Response time[5]	50 µs	■	■	■	■
Max. switching frequency[6]	to 10 kHz	■	■	■	■
Teach-in input ET	PNP: Teach > 10 V…< V_S	■		■	
	Run 0 V or unswitched	■		■	
	NPN: Teach 0 V		■		■
	Run V_S or unswitched		■		■
Pulse duration	ET > 10 ms	■	■	■	■
Retention time	25 ms non-volatile memory	■	■	■	■
Fine/coarse input F/C	PNP: Fine 0 V or unswitched	■		■	
	Coarse > 10 V…< V_S	■		■	
	NPN: Fine V_S or unswitched		■		■
	Coarse 0 V		■		■
Connection type	Plug 5-pin, M 12 x 1	■	■	■	■
VDE protection class[7]	⧈	■	■	■	■
Enclosure rating	IP 67	■	■	■	■
Circuit protection[8]	A, B, C	■	■	■	■
Ambient temperature T_A	Operation – 10 °C…+ 55 °C	■	■	■	■
	Storage – 25 °C…+ 75 °C	■	■	■	■
Shock load	To IEC 68	■	■	■	■
Weight	Approx. 400 g	■	■	■	■
Housing material	Coated metal	■	■	■	■

1) Average service life 100,000 h at T_A = + 25 °C
2) Limit values
3) May not exceed or fall short of V_S tolerances
4) Without load
5) Signal transit time with resistive load
6) With light/dark ratio 1:1
7) Reference voltage 50 V DC
8) A = V_S connections reverse-polarity protected
B = Output Q short-circuit protected
C = Interference pulse suppression

Scanning distance



1	Scanning distance with lens 211	10 mm
2	Scanning distance with lens 212	20 mm

Teach-in

Teach-in and fine/coarse (contrast resolution)
The two settings can be triggered simultaneously either via control panel or control cables.

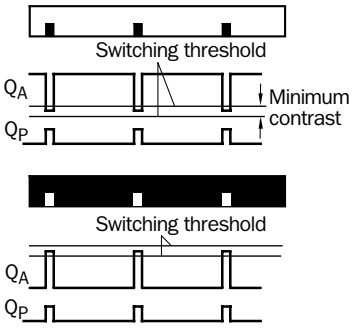
Control panel: The teach-in button can be locked against accidental actuation with "run".
In an undefined switching position, no teach-in procedure can be triggered.

Setting via control panel:
1. Select "fine" or "coarse" using rotating switch
2. Position light spot on mark
3. Trigger teach-in via teach-in switch
Light-/dark-switching is not required/acknowledge/signal or Q active = teach-in procedure completed

Setting via control cable:
1. Select "fine" or "coarse" using rotating switch
2. Position light spot on mark
3. Trigger teach-in via ET control cable

Order information

Type	Part no.
KT 5G-2P1112	1 016 628
KT 5G-2N1112	1 016 717
KT 5G-2P1212	1 016 718
KT 5G-2N1212	1 016 719



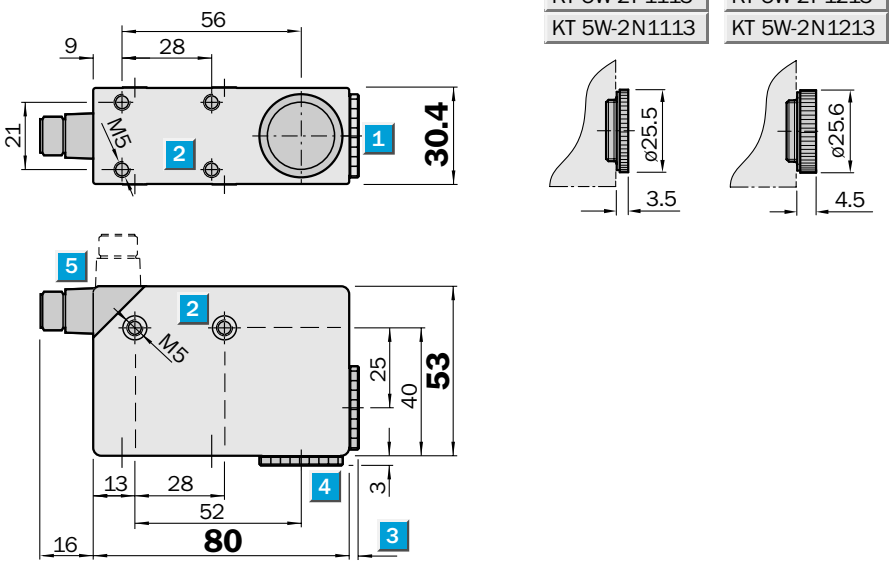
Scanning distance 10 mm/20 mm

Contrast scanners

- Dynamic teach-in
- Automatic light transmission selector, red, blue and green
- Teach-in: button on unit or via control cable
- L/D adjustable on unit or via control cable
- No light/dark selection
- Switching frequency 10 kHz

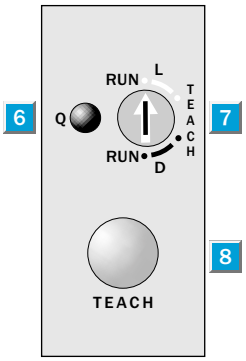
Dimensional drawing

KT 5W-2P1113 | KT 5W-2P1213
KT 5W-2N1113 | KT 5W-2N1213



Adjustments possible

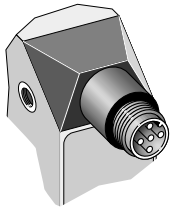
KT 5W-2P1113 | KT 5W-2P1213
KT 5W-2N1113 | KT 5W-2N1213



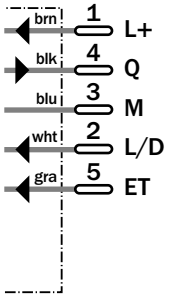
1 Lens (light transmission), can be replaced by Item 4
2 M 5 mounting holes, 5.5 mm deep
3 See dimensional drawing of lens
4 Blind screw, can be replaced by Item 1
5 5-pin, M 12 x 1 plug (rotatable through 90°)
6 Function signal indicator (yellow)
7 L/D pre-selection switch
8 Teach-in button

Connection type

KT 5W-2P1113 | KT 5W-2P1213
KT 5W-2N1113 | KT 5W-2N1213



5-pin, M 12 x 1

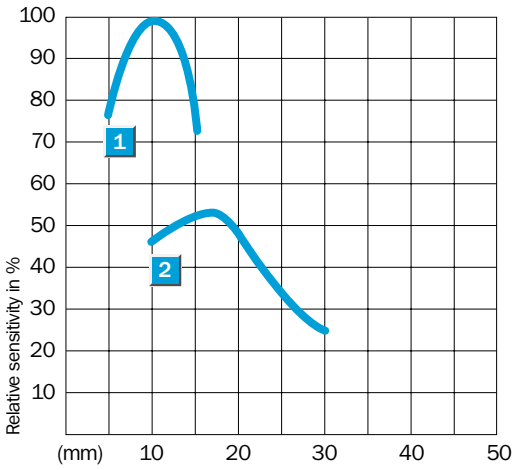


Accessories	page
Cable receptacles	496
Lens	556

Technical data	KT 5W-2	P1113	N1113	P1213	N1213
Scanning distance from front edge of lens					
	10 ± 3 mm	■	■		
	20 ± 3 mm			■	■
Light spot dimensions	1.2 x 4.2 mm	■	■		
Light source[1], **light type**	LED, red, blue, green	■	■	■	■
Supply voltage V_S	10…30 V DC[2]	■	■	■	■
Ripple[3]	< 5 V_{SS}	■	■	■	■
Current consumption[4]	< 80 mA	■	■	■	■
Switching outputs Q	PNP: HIGH = V_S – < 2 V / LOW = 0 V	■		■	
	NPN: HIGH = V_S / LOW = < 2 V		■		■
Output current I_A max.	100 mA, short-circuit protected	■	■	■	■
Response time[5]	50 µs	■	■	■	■
Max. switching frequency[6]	to 10 kHz	■	■	■	■
Teach-in input ET	PNP: Teach > 10 V…< V_S	■		■	
	Run 0 V or unswitched	■		■	
	NPN: Teach 0 V		■		■
	Run V_S or unswitched		■		■
Retention time	25 ms non-volatile memory	■	■	■	■
L/D input, light-/dark-switching	PNP: dark = > 10 V…< V_S	■		■	
	light = 0 V or unswitched	■		■	
	NPN: dark = 0 V		■		■
	light = V_S or unswitched		■		■
Connection type	Plug 5-pin, M 12 x 1	■	■	■	■
VDE protection class[7]	⧈	■	■	■	■
Enclosure rating	IP 67	■	■	■	■
Circuit protection[8]	A, B, C	■	■	■	■
Ambient temperature T_A	Operation – 10 °C…+ 55 °C	■	■	■	■
	Storage – 25 °C…+ 75 °C	■	■	■	■
Shock load	To IEC 68	■	■	■	■
Weight	Approx. 400 g	■	■	■	■
Housing material	Coated metal	■	■	■	■

1) Average service life 100,000 h at T_A = + 25 °C
2) Limit values
3) May not exceed or fall short of V_S tolerances
4) Without load
5) Signal transit time with resistive load
6) With light/dark ratio 1:1
7) Reference voltage 50 V DC
8) A = V_S connections reverse-polarity protected
B = Output Q short-circuit protected
C = Interference pulse suppression

Scanning distance



1	Scanning distance with lens 211	10 mm
2	Scanning distance with lens 212	20 mm

Teach-in

Teach-in and light/dark
The two settings can be triggered simultaneously either via control panel or control cable.

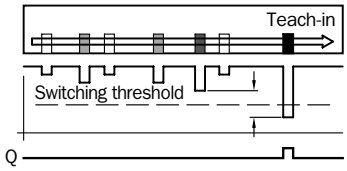
Control panel: The teach-in button can be locked against accidental actuation with "run".
In an undefined switching position, no teach-in procedure can be triggered.

Setting through control panel:
1. Select "light (L)" or "dark (D)" using rotating switch
2. Trigger teach-in via teach-in button
3. Run the object to be detected at least one register length through the light spot

Acknowledged via Q or LED control flashes = insufficient contrast.

Setting via control cable
1. Select "light" or "dark" using control cable
2. Trigger teach-in via ET control cable
3. Run the object to be detected at least one register length through the light spot
4. End teach-in

Material speed during teach-in:
min. 25 mm/s, max. 300 mm/s.



Order information

Type	Part no.
KT 5W-2P1113	1 016 629
KT 5W-2N1113	1 016 630
KT 5W-2P1213	1 016 715
KT 5W-2N1213	1 016 716

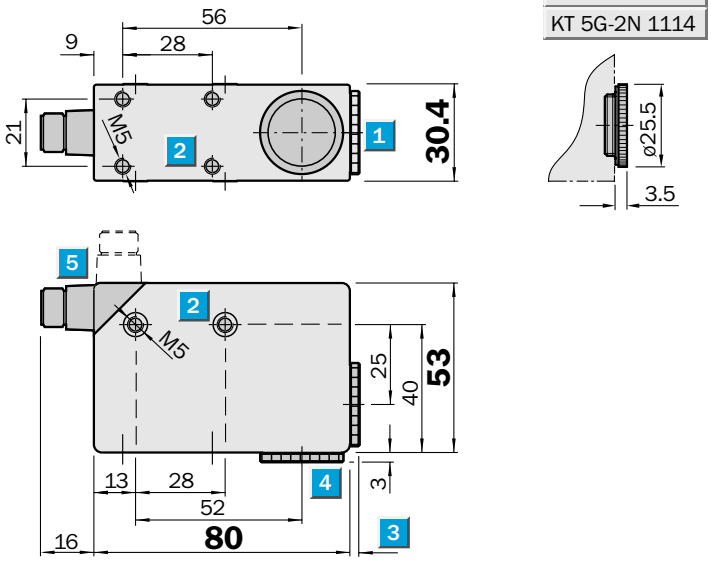
Scanning distance 10 mm

Contrast scanners

- Green light
- Dynamic contrast determination
- Fine/course adjustment
- Light/dark finely adjustable
- Switching frequency 10 kHz

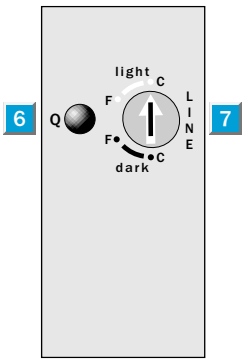
Dimensional drawing

KT 5G-2P 1114
KT 5G-2N 1114



Adjustments possible

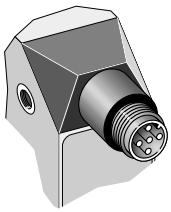
KT 5G-2P 1114
KT 5G-2N 1114



1 Lens (light transmission), can be replaced by Item 4
2 M 5 mounting holes, 5.5 mm deep
3 See dimensional drawing of lens
4 Blind screw, can be replaced by Item 1
5 5-pin, M 12
6 Function signal indicator (yellow)
7 Fine/coarse selection

Connection type

KT 5G-2P 1114
KT 5G-2N 1114



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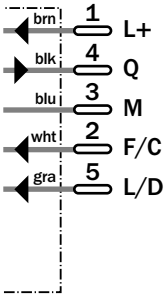
Lens	556

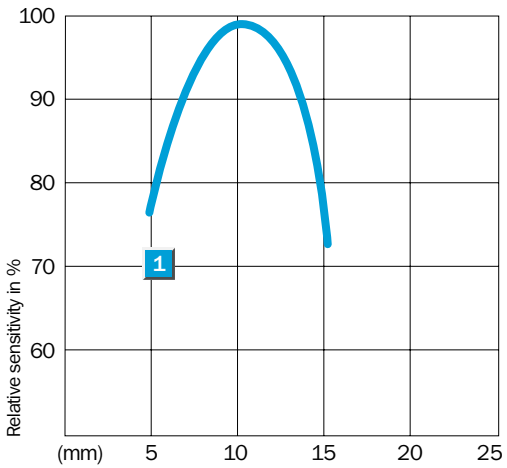
5-pin, M 12



Technical data		P1114	N1114
Scanning distance from front edge of lens	10 ± 3 mm	■	■
Light spot dimensions	1.2 x 4.2 mm	■	■
Light source[1], **light type**	LED, green	■	■
Supply voltage V_S	10…30 V DC[2]	■	■
Ripple[3]	< 5 V_{SS}	■	■
Current consumption[4]	< 80 mA	■	■
Switching outputs	PNP: HIGH = V_S – < 2 V / LOW = 0 V	■	
	NPN: HIGH = V_S / LOW = < 2 V		■
Output current I_A max.	100 mA, short-circuit protected	■	■
Response time[5]	50 µs	■	■
Max. switching frequency[6]	to 10 kHz	■	■
Fine/coarse input, F/C	PNP: Fine 0 V or unswitched	■	
	Coarse > 10 V…< V_S	■	
	NPN: Fine V_S or unswitched		■
	Coarse 0 V		■
L/D input, light-/dark-switching	PNP: dark = > 10 V…< V_S	■	
	light = 0 V or unswitched	■	
	NPN: dark = 0 V		■
	light = V_S or unswitched		■
Connection type	Plug 5-pin, M 12	■	■
VDE protection class[7]	⧈	■	■
Enclosure rating	IP 67	■	■
Circuit protection[8]	A, B, C	■	■
Ambient temperature T_A	Operation – 10 °C…+ 55 °C	■	■
	Storage – 25 °C…+ 75 °C	■	■
Shock load	To IEC 68	■	■
Weight	Approx. 400 g	■	■
Housing material	Coated metal	■	■

1) Average service life 100,000 h at T_A = + 25 °C
2) Limit values
3) May not exceed or fall short of V_S tolerances
4) Without load
5) Signal transit time with resistive load
6) With light/dark ratio 1:1
7) Do not bend below 0 °C
8) Reference voltage 50 V DC
9) A = V_S connections reverse-polarity protected
B = Output Q short-circuit protected
C = Interference pulse suppression

Scanning distance



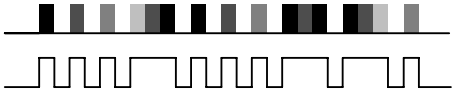
1 Scanning distance 10 mm

Function

The switching threshold for the KT 5G-2 P/N 1114 contrast scanner is tracked dynamically to the existing contrast. No teach-in procedure is required. The ”fine” or ”coarse” contrast and the ”light” or ”dark” selection can be triggered via the switch on the control panel or the control cable.

In the LINE switching position, the control panel is blocked, only F/C and L/D settlings triggered via the control cable are accepted.

The following example shows function in the ”coarse” position and the ”dark-switching” operating mode:



Order information

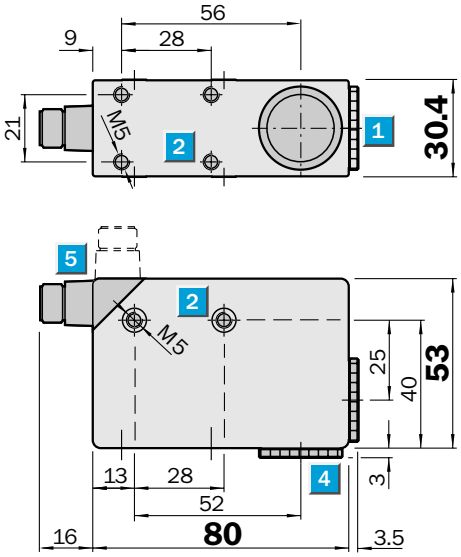
Type	Part no.
KT 5G-2P1114	1 016 999
KT 5G-2N1114	1 017 000

Scanning distance 10 mm

Contrast scanners

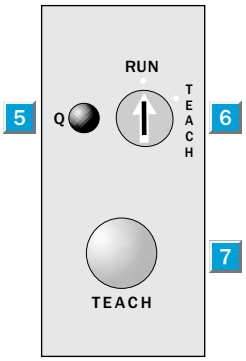
- Static teach-in to mark and background via control cable or control panel on unit
- Automatic switching threshold adjustment for detection of extremely shiny objects

Dimensional drawing



Adjustments possible

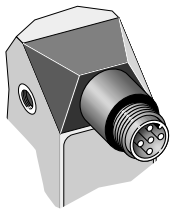
KT 5W-2 P 1116
KT 5W-2 N 1116



1 Lens (light transmission), can be replaced by Item 4
2 M 5 mounting holes, 5.5 mm deep
3 Blind screw, can be replaced by Item 1
4 5-pin, M 12 x 1 plug (rotatable through 90°)
5 Function signal indicator (yellow)
6 Pre-selection switch
7 Teach-in button

Connection type

KT 5W-2P 1116
KT 5W-2N 1116



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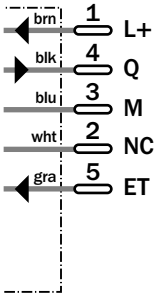
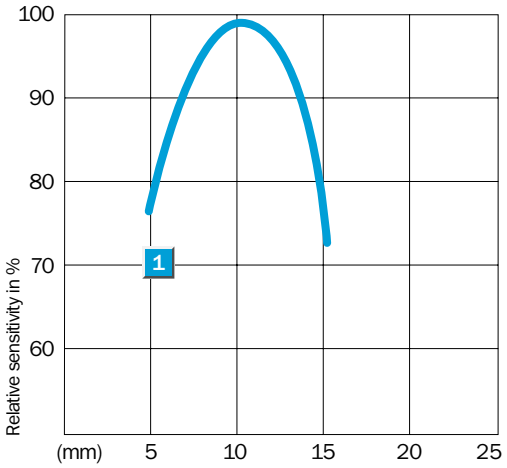
5-pin, M 12 x 1



Technical data	KT 5W-2	P1116	N1116
Scanning distance from front edge of lens	10 ± 3 mm		
Light spot dimensions	1.2 x 4.2 mm		
Light source[1], **light type**	LED, red, blue, green		
Supply voltage V_S	10…30 V DC[2]		
Ripple[3]	< 5 V_{SS}		
Current consumption[4]	< 80 mA		
Switching outputs	PNP: HIGH = V_S – < 2 V / LOW = 0 V		
	NPN: HIGH = V_S / LOW = < 2 V		
Output current I_A max.	100 mA, short-circuit protected		
Switching frequeny	To 10 kHz		
Response time[5]	50 µs		
Max. switching frequency[6]	to 10 kHz		
Teach-in input ET	PNP: Teach > 10 V…< V_S		
	Run 0 V or unswitched		
	NPN: Teach 0 V		
	Run V_S or unswitched		
Retention time	25 ms non-volatile memory		
Connection type	Plug 5-pin, M 12		
VDE protection class[7]	⧈		
Enclosure rating	IP 67		
Circuit protection[8]	A, B, C		
Ambient temperature T_A	Operation – 10 °C…+ 55 °C		
	Storage – 25 °C…+ 75 °C		
Shock load	To IEC 68		
Weight	Approx. 400 g		
Housing material	Coated metal		

1) Average service life 100,000 h at T_A = + 25 °C
2) Limit values
3) May not exceed or fall short of V_S tolerances
4) Without load
5) Signal transit time with resistive load
6) With light/dark ratio 1:1
7) Reference voltage 50 V DC
8) A = V_S connections reverse-polarity protected
B = Output Q short-circuit protected
C = Interference pulse suppression

Scanning distance



1 Scanning distance with lens 211 10 mm

Static teach-in

Control panel: The teach-in button can be locked against accidental actuation with "run". In an undefined switching position, no teach-in procedure can be triggered.

Setting via control panel:
1. Select teach-in using rotating switch
2. Position mark or background onto light spot
   – trigger first teach-in procedure via teach-in button
3. Position background or mark onto light spot
   – trigger second teach-in procedure via teach-in button.

Setting via control cable:
1. Position mark or background onto light spot
   – trigger first teach-in procedure via ET control cable
2. Position background or mark onto light spot
   – trigger second teach-in procedure via ET control cable.

Acknowledge:
After the first teach-in procedure, the red transmission light flashes and the function signal slowly indicates that a second teach-in procedure must be triggered.

LED and Q flash quickly = insufficient contrast

LED and Q do not flash = teach-in completed
Light-/dark-switching not required, unit switches on the object to be detected, that was under the light spot during the first teach-in procedure (mark or background).

Order information

Type	Part no.
KT 5W-2P 1116	1 018 044
KT 5W-2N 1116	1 018 045

Scanning distance 150 mm

Laser contrast scanners

- Laser class 2
- Adjustment switch
- Long scanning distance
- Accurate recording of very small marks
- Switching frequency 10 kHz

Laser class 2

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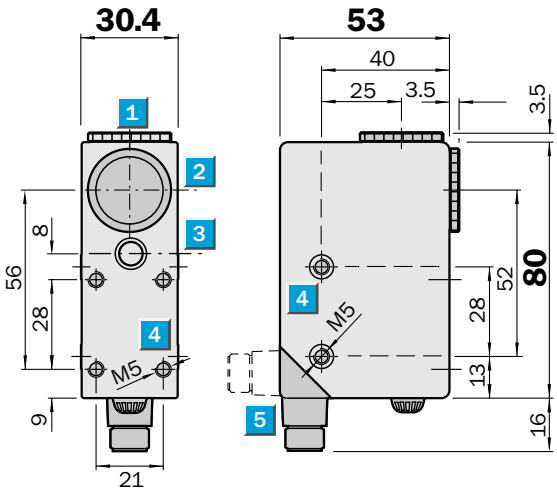
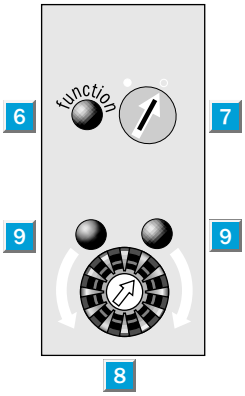
Dimensional drawing



Adjustments possible

KT 5L-P3611

KT 5L-N3611

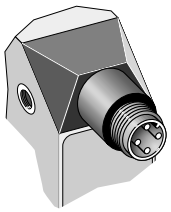


1	Blind screw
2	Receiver
3	Sender
4	M 5 mounting holes, 5.5 mm deep
5	4-pin, M 12 x 1 plug
6	Function signal indicator (red)
7	Operating mode selector switch
	Light-switching
	Dark-switching
8	Switching threshold adjustment
9	Adjustment indicators (green)

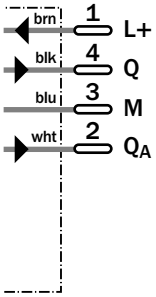
Connection type

KT 5L-P3611

KT 5L-N3611



4-pin, M12



Technical data	KT 5L-	P3611	N3611
Scanning distance from front	150 mm ± 10 mm		
edge of lens			
Light spot	< 0.3 mm at 150 mm		
Light source[1], **light type**	Laser diode, red light		
Supply voltage V_S	10 … 30 V DC[2]		
Ripple[3]	< 5 V_{SS}		
Current consumption[4]	< 80 mA		
Switching outputs	Light-/dark-switching, selectable		
	PNP: HIGH = V_S – < 2 V/LOW = 0 V		
	NPN: HIGH = V_S /LOW = < 2 V		
Output current I_A max.	100 mA, short-circuit protected		
Response time[5]	50 µs		
Max. switching frequency[6]	To 10 kHz		
Analogue output Q_A,	0.3…10 mA		
Connection type	Plug 4-pin, M 12		
VDE protection class[7]	⧈		
Laser class	2 (IEC 825/VDE 0837)		
Enclosure rating	IP 67		
Circuit protection[8]	A, B, C		
Ambient temperature T_A	Operation – 10 °C…+ 40 °C		
	Storage – 25 °C…+ 75 °C		
Shock load	To IEC 68		
Weight	Approx. 400 g		
Housing material	Coated metal		

1) Average service life 100,000 h at T_A = + 25 °C
2) Limit values
3) May not exceed or fall short of V_S tolerances
4) Without load
5) Signal transit time with resistive load
6) With light/dark ratio 1:1
7) Reference voltage 50 V DC
8) A = V_S connections reverse-polarity protected
B = Outputs Q and Q_A short-circuit protected
C = Interference pulse suppression

Order information	
Type	**Part no.**
KT 5L-P 3611	1 011 536
KT 5L-N 3611	1 013 266

Scanning distance up to 15 mm

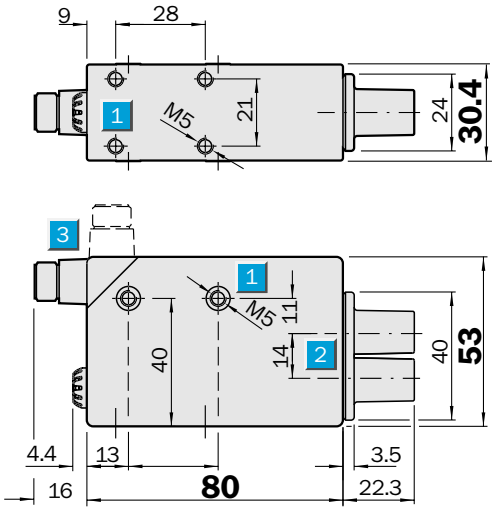
Proximity mode

Scanning range up to 60 mm

Through-beam mode

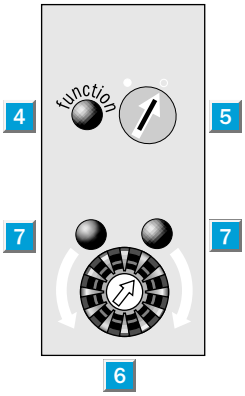
- Green light
- Switching threshold adjustable
- Insensitive to ambient light
- Adjustment switch
- Switching frequency 10 kHz
- High contrast resolution
- Fibre-optic cable for high temperatures

Dimensional drawing



Adjustments possible

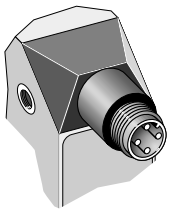
KTL 5G-2P11
KTL 5G-2N11



1 M 5 mounting holes, 5.5 mm deep
2 Fibre-optic adapter (M 12 x 1 internal thread)
3 4-pin, M 12 x 1 plug (rotatable through 90°)
4 Function signal indicator (yellow)
5 Operating mode selector switch
○ Light-switching
● Dark-switching
6 Switching threshold adjustment
7 Adjustment indicators (green)

Connection type

KTL 5G-2P11
KTL 5G-2N11



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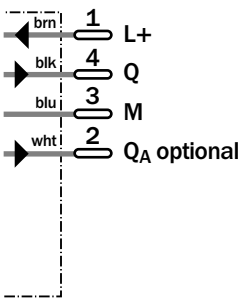
Fibre-optic cable	528

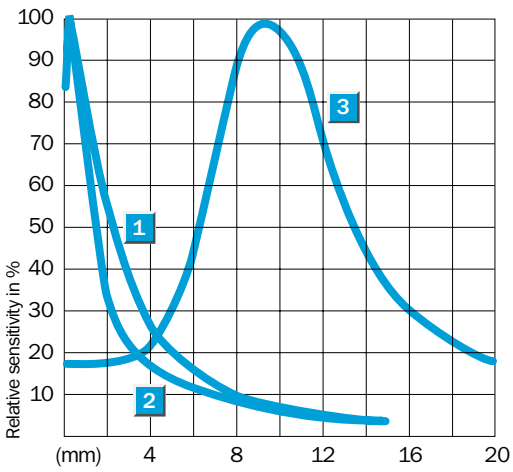
4-pin, M 12



Technical data	KTL 5G-2	P11	N11
Scanning distance/scanning range	15 mm/60 mm		
Light source[1], **light type**	LED, green		
Supply voltage V_S	10…30 V DC[2]		
Ripple[3]	< 5 V_{SS}		
Current consumption[4]	< 30 mA at 24 V DC		
Switching outputs	Light-/dark-switching, selectable		
	PNP: HIGH = V_S – < 2 V/LOW = 0 V		
	NPN: HIGH = V_S /LOW = < 2 V		
Output current I_A max.	100 mA, short-circuit protected		
Response time[5]	50 µs		
Max. switching frequency[6]	To 10 kHz		
Analogue output Q_A, optional	0.3…10 mA		
Connection type	Plug 4-pin, M 12		
VDE protection class[7]	⧈		
Enclosure rating	IP 67		
Circuit protection[8]	A, B, C		
Ambient temperature T_A	Operation – 10 °C…+ 55 °C		
	Storage – 25 °C…+ 75 °C		
Shock load	To IEC 68		
Weight	Approx. 400 g		
Housing material	Coated metal		

1) Average service life 100,000 h at T_A = + 25 °C
2) Limit values
3) May not exceed or fall short of V_S tolerances
4) Without load
5) Signal transit time with resistive load
6) With light/dark ratio 1:1
7) Reference voltage 50 V DC
8) A = V_S connections reverse-polarity protected
B = Outputs Q and Q_A short-circuit protected
C = Interference pulse suppression

Scanning distance



1	Fibre-optic cable LBST 32900
2	Fibre-optic cable LBSR 32900
3	Fibre-optic cable OCSL

Order information

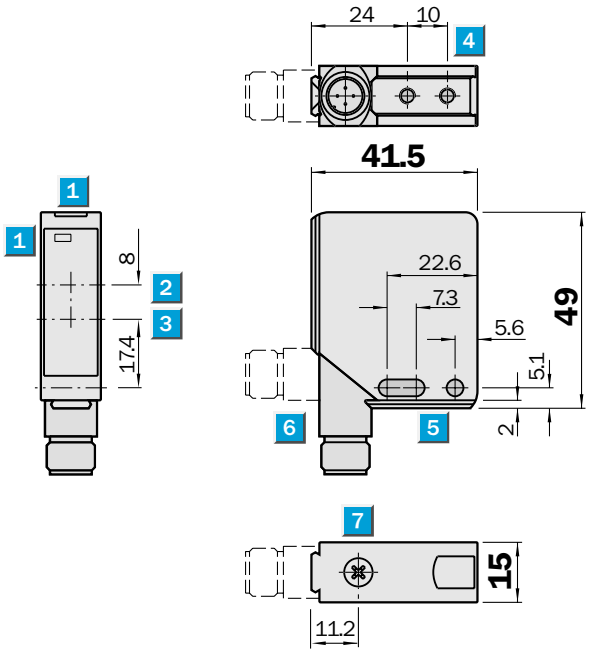
Type	Part no.
KTL 5G-2P11	1 016 294
KTL 5G-2N11	1 016 295

Scanning distance 13.5 mm

Contrast scanners

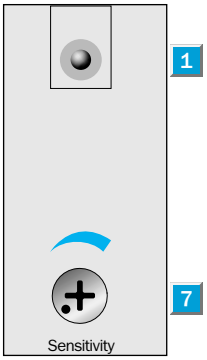
- Red or green light transmitter
- Sensitivity adjustable
- Light- or dark-switching selectable via control cable
- Switching frequency 10 kHz
- NPN and PNP switching output

Dimensional drawing



Adjustments possible

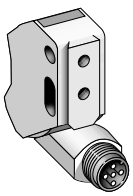
- KT 2R - 2B 3711
- KT 2G - 2B 3711
- KT 2R - 2B 3721



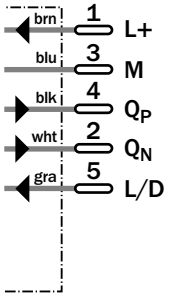
1	Reception indicator
2	Optical axis – receiver
3	Optical axis – sender
4	M 4 threaded mounting hole, 4 mm deep
5	Through hole ø 4.2 mm
6	M 12 plug (rotatable through 90°)
7	Sensitivity adjustment

Connection type

- KT 2R - 2B 3711
- KT 2G - 2B 3711
- KT 2R - 2B 3721



5-pin, M12



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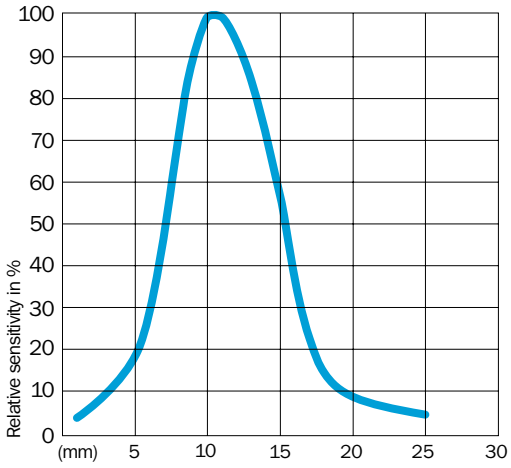
Cable receptacles	496
Terminal bracket*	510
Mounting brackets	510

* 2 units included with delivery

Technical data	KT 2	R-2B 3711	G-2B 3711	R-2B 3721
Scanning distance from front edge of lens	13.5 mm	■	■	■
Light spot diameter	2 mm	■	■	■
Light source[1], **light type**	LED, red	■		■
	LED, green		■	
Supply voltage V_S	10…30 V DC[2]	■	■	■
Ripple[3]	< 5 V_{SS}	■	■	■
Current consumption[4]	< 80 mA	■	■	■
Switching outputs	Light-/dark-switching, selectable	■	■	■
	PNP: HIGH = V_S – < 2.9V/	■	■	■
	LOW = approx. 0 V	■	■	■
	NPN: HIGH = V_S/LOW = < 1.5 V	■	■	■
Output current I_A max.	100 mA	■	■	■
Response time[5]	≤ 50 µs	■	■	■
Max. switching frequency[6]	10 kHz	■	■	■
Time delay	Deactivation delay 20 ms			■
L/D input, light-/dark-switching	PNP: dark = > 10 V…< V_S	■	■	■
	light = 0 V or unswitched	■	■	■
	NPN: dark = 0 V	■	■	■
	light = V_S or unswitched	■	■	■
Connection type	Plug 5-pin, M 12	■	■	■
VDE protection class[7]	⧈	■	■	■
Enclosure rating	IP 67	■	■	■
Circuit protection[8]	A, B, C	■	■	■
Ambient temperature T_A	Operation – 10 °C…+ 55 °C	■	■	■
	Storage – 25 °C…+ 75 °C	■	■	■
Shock load	To IEC 68	■	■	■
Weight	Approx. 400 g	■	■	■
Housing material	Coated metal	■	■	■

1) Average service life 100,000 h at T_A = + 25 °C
2) Limit values
3) May not exceed or fall short of V_S tolerances
4) Without load
5) Signal transit time with resistive load
6) With light/dark ratio 1:1
7) Reference voltage 50 V DC
8) A = V_S connections reverse-polarity protected
B = Output Q short-circuit protected
C = Interference pulse suppression

Scanning distance



1 Scanning distance TW 13.5 mm

Object shown with 90 % remission (based on standard white acc. to DIN 5033)

Order information

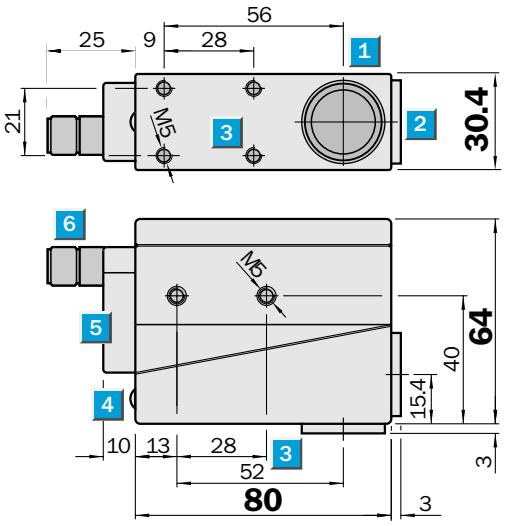
Type	Part no.
KT 2R-2B 3711	1 016 115
KT 2G-2B 3711	1 016 112
KT 2G-2B 3721	1 016 114

Scanning distance 9 mm

Contrast scanners

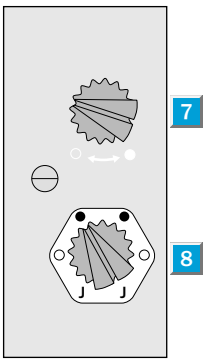
- LED light source with two switch-selectable spectral ranges
- Lens position selectable
- Light- or dark-switching selectable
- Rapid response times

Dimensional drawing



Adjustments possible

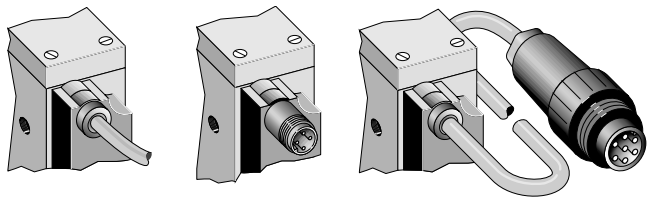
NT 6-03022	NT 6-04018
NT 6-13022	NT 6-03012
NT 6-04022	NT 6-13012
NT 6-03018	NT 6-04012



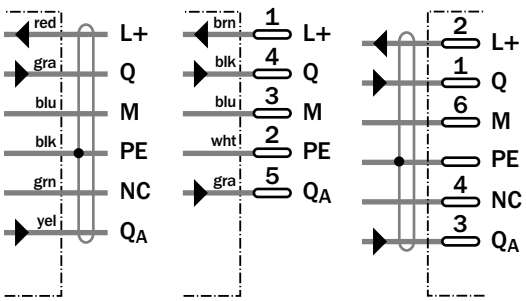
1 Blind screw can be replaced by Item 2
2 Lens can be replaced by Item 1
3 M 5 threaded mounting hole, 5.5 mm deep
4 Function signal indicator
5 Cover for adjuster
6 4-pin, M 12 plug
or 2m cable with T3104/1 plug
or 2m cable
7 Control for switching threshold
8 Switch for operating mode
Light-switching
Dark-switching

Connection types

NT 6-03022	NT 6-03018	NT 6-03012
NT 6-13022	NT 6-04018	NT 6-13012
NT 6-04022		NT 6-04012



6 x 0.34 mm²	4-pin, M 12	cable + plug



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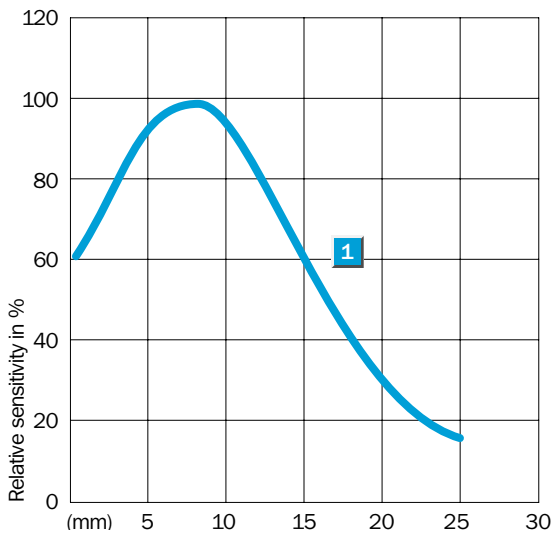
Cable receptacles	496
Lens	556

Technical data	NT 6-	03012	03022	03018	13012	13022	04012	04022	04018
Scanning distance from front edge of lens	9 mm ± 2 mm	■	■	■	■	■	■	■	■
Light type/light spot dimension	Green/1.5 x 5 mm	■	■	■	■	■	■	■	■
	Red/1.5 x 4 mm	■	■	■	■	■	■	■	■
Light source[1], **light type**	LED, red, green selectable	■	■	■	■	■	■	■	■
Light spot direction	Longitudinal	■	■	■			■	■	■
	Transverse				■	■			
Supply voltage V_S	10…30 V DC[2]	■	■	■	■	■	■	■	■
Ripple[3]	< 5 V	■	■	■	■	■	■	■	■
Current consumption[4]	< 80 mA	■	■	■	■	■	■	■	■
Switching outputs	Light-/dark-switching, selectable	■	■	■	■	■	■	■	■
	B: HIGH = V_S – < 2 V/LOW = < 2 V	■	■	■	■	■	■		
	PNP: HIGH = V_S – < 2 V/LOW = 0 V							■	■
Output current I_A max.	200 mA	■	■	■	■	■	■	■	■
Response time[5]	50 µs	■	■	■	■	■	■	■	■
Max. switching frequency[6]	To 10 kHz	■	■	■	■	■	■	■	■
Analogue output Q_A	0.15…6 V	■	■	■	■	■	■	■	■
Connection types	Cable[7] with T 3104/1 plug	■			■		■		
	Cable[7] without plug		■			■		■	
	Plug			■					■
VDE protection class[8]	⧈	■	■	■	■	■	■	■	■
Enclosure rating	IP 67	■	■	■	■	■	■	■	■
Circuit protection[9]	A, B, C	■	■	■	■	■	■	■	■
Ambient temperature T_A	Operation – 0 °C…+ 50 °C	■	■	■	■	■	■	■	■
	Storage – 25 °C…+ 75 °C	■	■	■	■	■	■	■	■
Shock load	To IEC 68	■	■	■	■	■	■	■	■
Weight	Approx. 540 g	■	■	■	■	■	■	■	■
Housing material	Cast metal	■	■	■	■	■	■	■	■

1) Average service life 100,000 h at T_A = + 25 °C
2) Limit values
3) May not exceed or fall short of V_S tolerances
4) Without load
5) Signal transit time with resistive load
6) With light/dark ratio 1:1
7) Do not bend below 0 °C
8) Reference voltage 50 V DC
9) A = V_S connections reverse-polarity protected
B = Outputs Q and Q_A short-circuit protected
C = Interference pulse suppression

Scanning distance



1 Scanning distance 9 mm

Order information

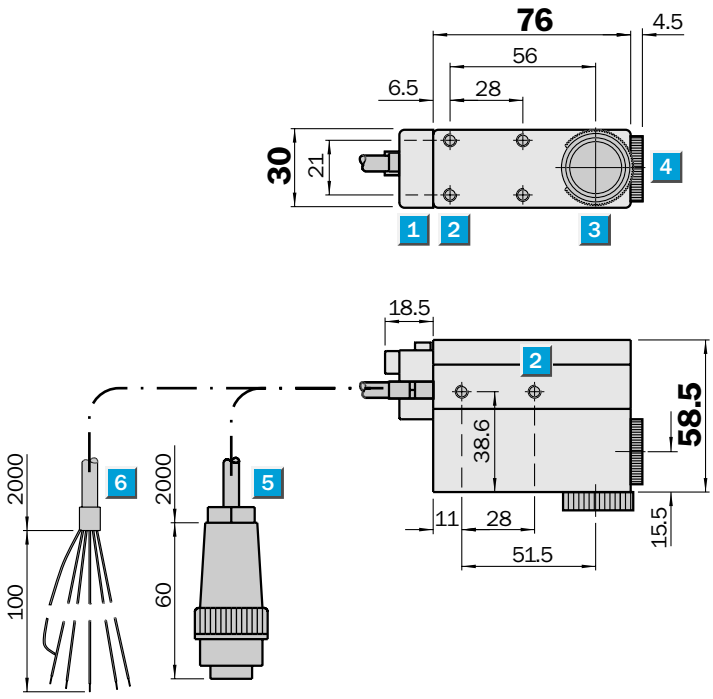
Type	Part no.
NT 6-03012	1 005 821
NT 6-03022	1 005 822
NT 6-03018	1 006 367
NT 6-13012	1 005 823
NT 6-13022	1 005 824
NT 6-04012	1 006 474
NT 6-04022	1 006 475
NT 6-04018	1 007 478

Scanning distance 9 mm

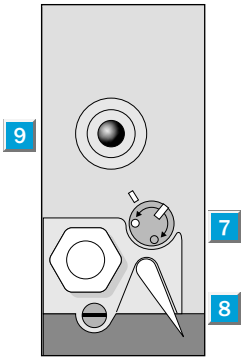
Contrast scanners

- White light source
- Light- or dark-switching selectable
- Rapid response times
- Adjustable switching threshold

Dimensional drawing



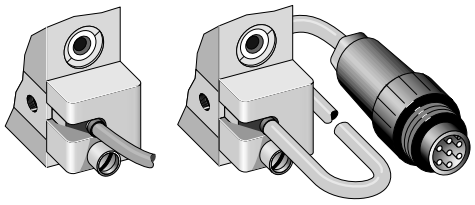
Adjustments possible
NT 8-01412
NT 8-02412



1 Cover for adjuster
2 M 5 threaded mounting hole, 5.5 mm deep
3 Dry cartridge with sight glass, can be replaced by Item 4
4 Lens, can be replaced by Item 3
5 2 m cable with 6-pin plug + PE
6 2 m cable
7 Control for switching threshold
8 "Light-/dark-switching" selector switch
9 Function signal indicator

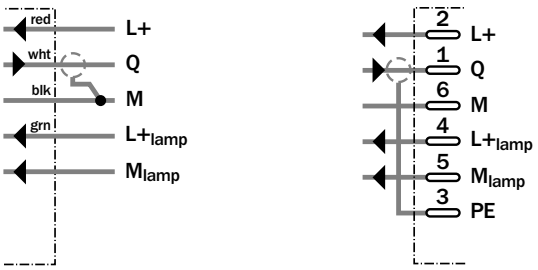
Connection types

NT 8-02412	NT 8-01412



Accessories	page
Cable receptacles	496
Cable	509
Lens	556

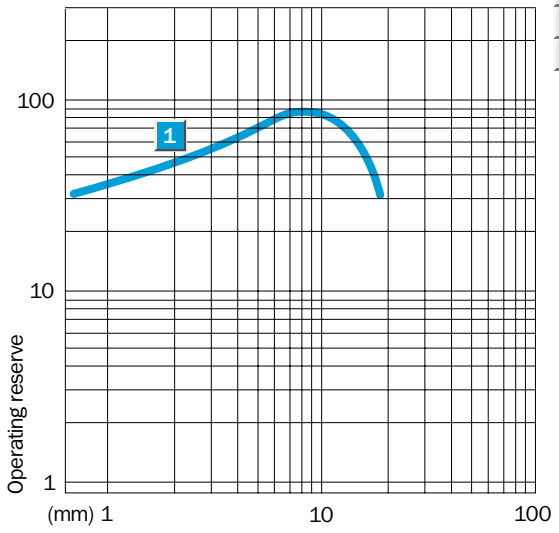
2 x 0.5 mm²	Cable + 6-pin plug + PE
2 x 0.14 mm²	
1 x 0.14 mm² sheathed	



Technical data	NT 8-	01412	02412
Scanning distance from front edge of lens	9 mm ± 2 mm		
Light	1.5 x 3.5 mm		
Light source[1], **light type**	Incandescent lamp, white		
Light spot direction	Longitudinal		
	Transverse		
Supply voltage V_S	10…30 V DC[2]		
Ripple[3]	< 2 V		
Current consumption[4]	< 50 mA		
Supply voltage for lamp	4.5 V ± 10 %		
Current consumption for lamp	840 mA		
Switching outputs	Light-/dark-switching, selectable		
	NPN: HIGH = V_S / LOW = < 2 V		
Output current I_A max.	200 mA		
Response time[5]	50 µs		
Max. switching frequency[6]	10 kHz		
Connection types	Cable[7] with 6-pin plug + PE		
	Cable[7] without plug		
VDE protection class[8]	⧈		
Enclosure rating	IP 67		
Circuit protection[9]	A, B, C		
Ambient temperature T_A	Operation – 0 °C…+ 50 °C		
	Storage – 25 °C…+ 85 °C		
Shock load	To IEC 68		
Weight	300 g		
Housing material	Cast metal		

1) Average service life 10,000 h at T_A = + 25 °C
2) Limit values
3) May not exceed or fall short of V_S tolerances
4) Without load
5) Signal transit time with resistive load
6) With light/dark ratio 1:1
7) Do not bend below 0 °C
8) Reference voltage 50 V DC
9) A = V_S connections reverse-polarity protected
B = Output Q short-circuit protected
C = Interference pulse suppression

Scanning distance



1 Scanning distance 9 mm

Order information

Type	Part no.
NT 8-01412	1 005 981
NT 8-02412	1 005 985