Technical Description

SENSICK

KT Contrast Scanner

SICK

General

Contrast scanners are integral components of many automated production processes today, for example, in the packaging and printing industries. They are used to detect all kinds of contrasts, e.g., print marks on films or packaging materials. Of course, they can be used in all situations where contrasts have to be detected quickly and accurately. The difference in brightness between mark and background is decisive for reliable detection of contrasts.

The contrast scanners from SICK operate according to the reflectance principle and even detect weak gray value differences on matt, shiny and transparent surfaces. A large selection of equipment types is available with various procedures for detecting contrasts and with different user interfaces for multifaceted requirements.

Applications

Almost all goods and products can be counted, sorted and controlled when they have contrast marks. Typical examples included:

- Controlling packaging processes
- Printing, folding, cutting continuous formats and putting them into envelopes
- Positioning EDP forms
- Horizontal cutting control
- Positioning labels
- Positioning cans and tubes
- Checking counters
- Checking expiry dates
- Detecting codes

Selection/ Overview

KT 10: For accurate detecting of print, fold and repeat lengths in printing machines, highly efficient copying and for cutting, folding and putting into envelopes in continuous form systems at a high speed, a high degree of reproducibility and a high gray value resolution. The KT 10 can of course also be used in other applications with increased demands in the area of contrast detection.

KT 5G-2P/N _ _ _ 1: The switching threshold is setting manually using an adjustment aid on the equipment in the standard version of the KT 5. Analogue output and time delay are optionally available.

KTL 5-2: The KT 5 standard is available as a fibre-optic model for especially cramped spaces.

KT 5 Laser: The KT 5 with a red light laser as light transmitter is used for precise detection of the smallest marks with a large scanning distance.

KT 5G-2P/N _ _ _ 2; KT 5W-2P/N _ _ _ 6; KT 5W-2P/N _ _ _ 6D: The teach procedure is triggered via a control wire or the Teach-in button on the equipment when it is idle in the models with static Teach-in.

KT 5G-2P/N _ _ _ 3: Another model provides dynamic Teach-in. The teach procedure is triggered via a control wire or the Teach-in button on the equipment when the machine is running.

KT 5G-2P/N _ _ _ 4: The model with dynamic contrast detection operates completely without Teach-in. In this model, the switching threshold is set dynamically according to the existing contrast. This means that a switching signal is activated at each contrast that the KT5 detects.

KT 3: The KT 3 contrast scanner is small in price and design, but big in detecting contrasts in standard applications.

KT 2: The KT 2 is used for applications with fewer performance requirements for contrast detection due to simple coloring and design of the print marks and when a small, especially economical contrast scanner suffices.

Type selection table

	KT 10	KT 5G-2	KT 5W-2	KT 5 L	KTL 5	KT 3W	KT 3G	KT 3 L	KT 2
_ _ _1 Manual switching threshold setting		■		■	■				■
_ _ _2 Static Teach-in [1]		■							
_ _ _6/_ _ _6D Static Teach-in [2]		■	■		■	■	■	■	
_ _ _4 Dynamic contrast detection		■							
_ _ _3 Dynamic Teach-in			■		■				
_ _ _5 Dynamic Teach-in	■					■			

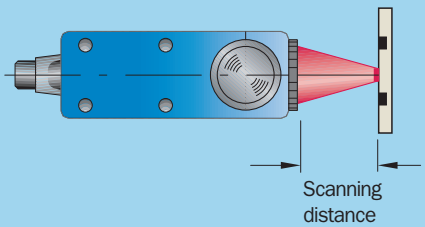
[1] 1-point Teach-in, Teach-in to mark

[2] 2-point Teach-in, Teach-in to mark and background

Definition

Scanning distance

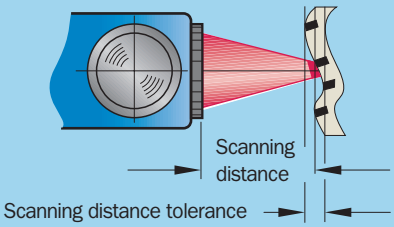
Distance between lens front edge and material to be scanned.



▲ **Scanning distance**

Scanning distance tolerance

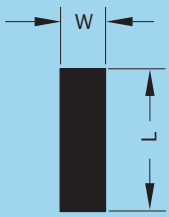
Operating range for the scanning distance in which a change of distance does not result in faulty switching. The size of the operating range depends on the size of the contrast to be resolved.



▲ **Scanning distance tolerance**

Light spot dimensions

Size of light spot at scanning distance. The light spot size is decisive for switching accuracy and for reliability of reading the printed image.

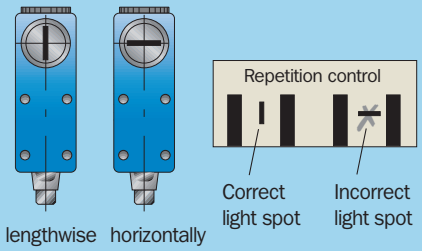


▲ **Light spot dimensions**

Definition

Light spot position

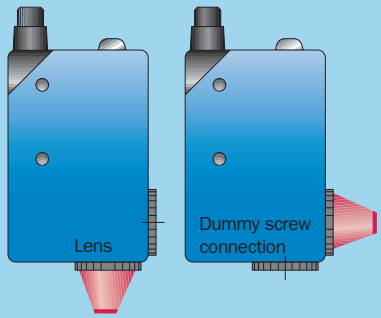
The light spot position vertical or horizontal to the short side of the equipment determines the insertion position. The best switching behavior is achieved when the light spot hits the mark lengthwise.



▲ **Light spot position**

Light emission side*

KT 5: You can select the light emission side.
The lens can be replaced by a dummy screw connection.

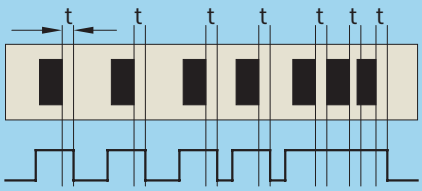


▲ **Light emission**

***Not with KT 10/KT 2/KT 3**

Release delay

The release delay enables increasing the impulse time of the switching signal. The diagram below shows the mode of operation.

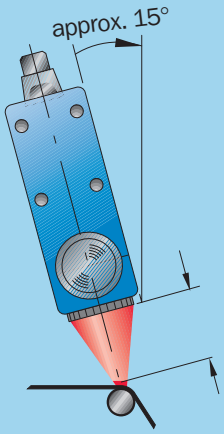


▲ **Release delay (PNP, dark-switching)**

Definition

Shiny surfaces

Increased switching reliability can be achieved on shiny surfaces by an angle of approx. 15° from a vertical line. The shiny components of the reflected light are mirrored away, and the KT only detects diffuse light scattered back.



▲ Mirroring away shiny effects

Mounting

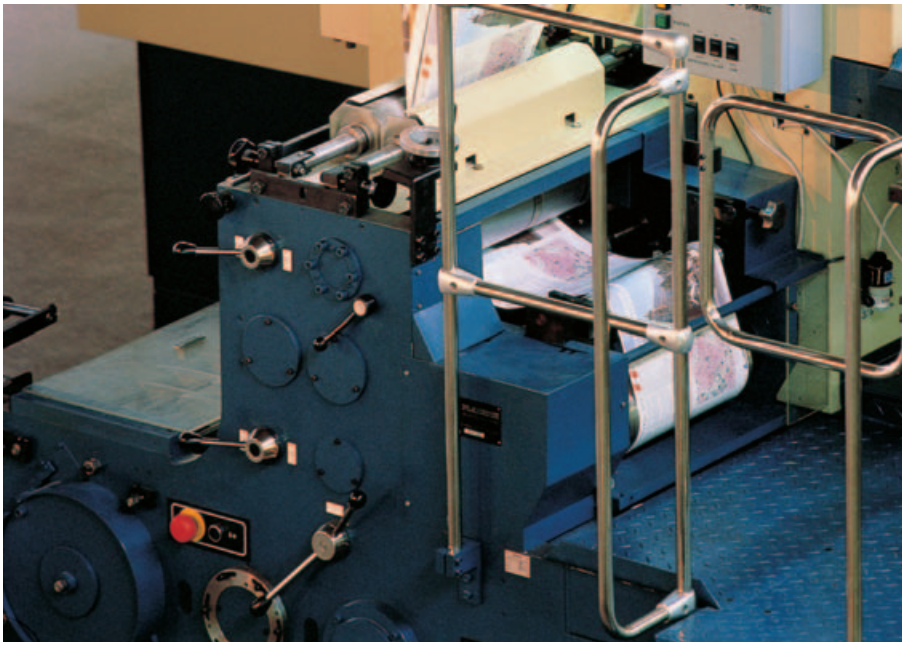
Mounting site

The contrast scanner is mounted at a spot at which the material to be scanned has the least lateral and vertical movements. Compensation is made for lateral movements by correspondingly long marks. The possible contrast resolution decreases with increasing vertical movements.

Attachment

Attachment must permit a reproducible, adjustable scanning distance in accordance with the purpose, i.e., flexible mounting with an adjustment option.

Strong vibrations, which influence the scanning distance, must be excluded.



Contrast scanner for flexible use in the printing industry

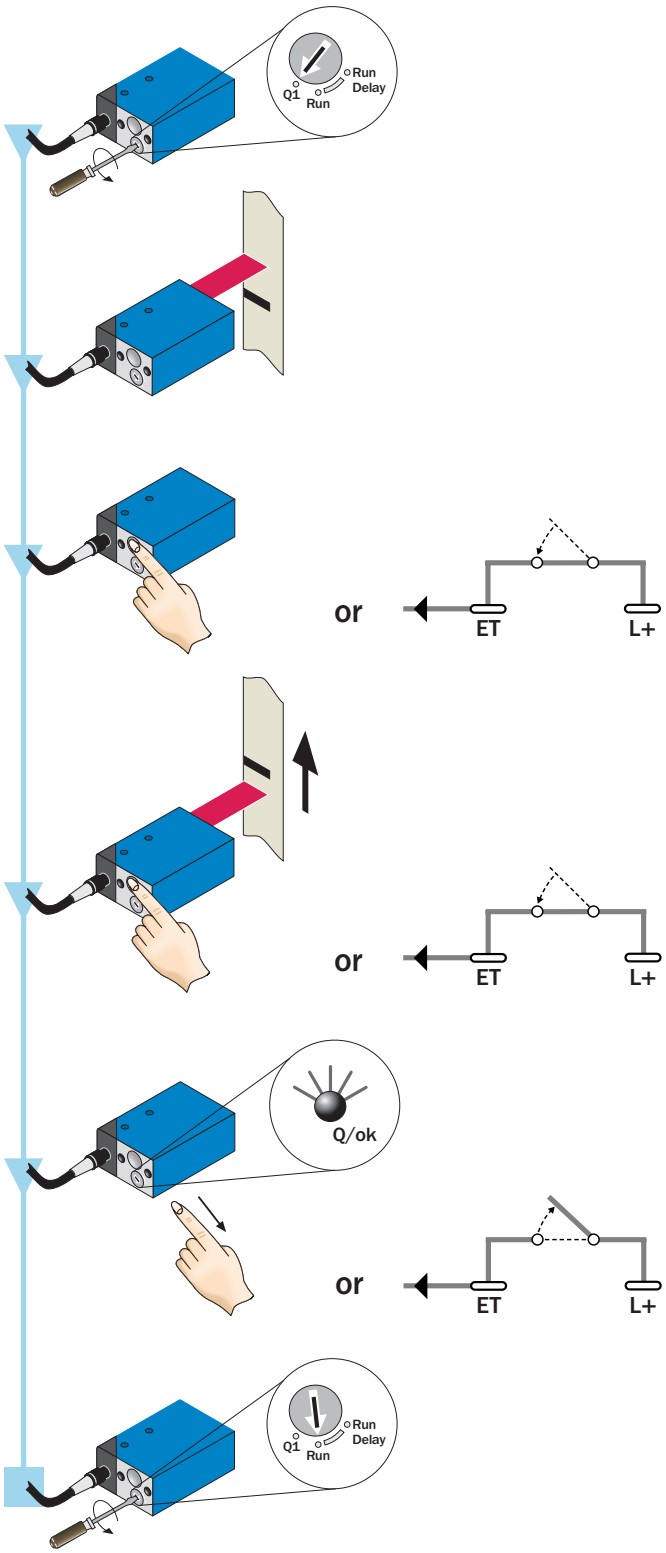
High speed, reflecting or transparent materials and changing contrasts distinguish demanding detection jobs in post-press processing. The KT 10 contrast scanner is designed for these application conditions as they are found in printing machines, continuous form systems and high-quality copying in daily work, for example.

Contrary to standard equipment, the repetition rate of 25 kHz makes the contrast scanner capable of high-speed scanning. The narrow light spot of only 0.8 mm x 4 mm enables precise detection of repetitions, print and fold marks. The adjustable release delay increases the impulse duration of the switching signal and consequently detection reliability even on reflecting or transparent materials.

One highlight of the KT 10 is its three-color transmitter light source. Red, green and blue – the sensor checks independently at each Teach-in procedures which of the three transmitter diodes is best suited for achieving the highest degree of detection reliability. This is then activated automatically by the evaluation logic of the KT 10. A propos Teach-in: The switching threshold of the KT 10 can be set either by entry via the Teach-in button on the equipment or externally via the control wire.

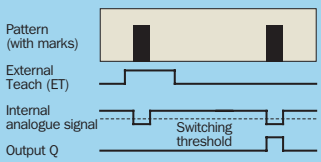
The KT 10: Three spectral ranges for a wide range of applications in the printing industry.

Teach-in: setting switching threshold



Status

- The switching threshold is in the middle between the reception signals from the background and mark and is stored permanently.
- The optimum transmission light was selected automatically.



Notes

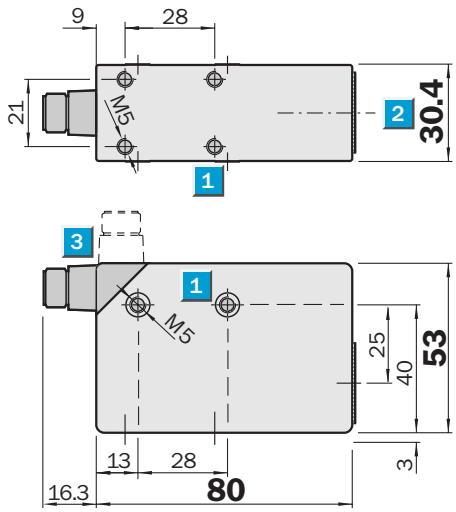
- The material speed during the Teach-in procedure must be slower than 10 m/minute when there are smaller marks.
- Only Teach-in one mark if possible.
- If the Teach-in procedure was unsuccessful, the output switches at approx. 5/s and the yellow LED display blinks.
  The reception signal was too weak, too strong (possibly due to shiny reflectance) or the contrast difference was too slight.
- The Teach-in button can be locked against unintentional activation with “Run”.
  A Teach-in procedure can be triggered when the switch setting is not defined.

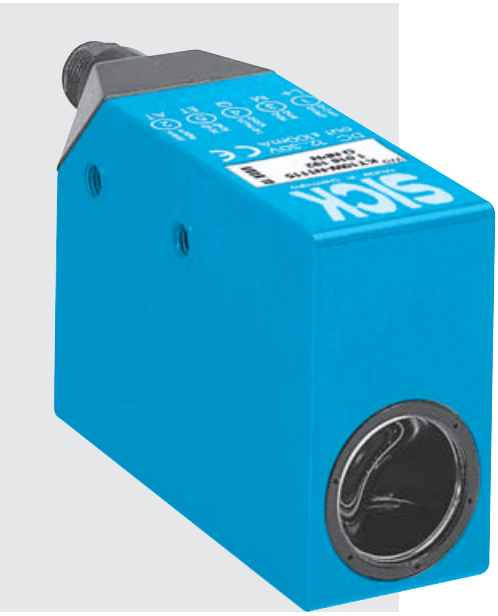
Scanning distance 12.5 mm

Contrast scanners

- 3 light emitters: red blue green. Optimum light emitter is selected automatically
- Programming by Teach-in: manually or by cable
- Very narrow, precise light spot
- High geometrical resolution
- Switching frequency 25 000/s

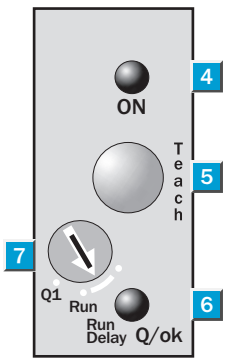
Dimensional drawing





Adjustments possible

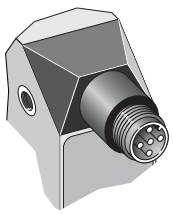
KT 10W-P 1115	KT 10W-P 2115
KT 10W-N 1115	KT 10W-N 2115



1 M5 threaded mounting hole, 5.5 mm deep
2 Lens (light transmission)
3 5-pin, M12 x 1 plug (rotatable)
4 Operating signal, green
5 Teach-in button
6 Function signal switching output indicator and Teach-in, yellow
7 Program selector switch

Connection type

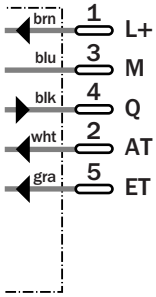
KT 10W-P 1115	KT 10W-P 2115
KT 10W-N 1115	KT 10W-N 2115



Accessories

Cables and connectors
Mounting systems

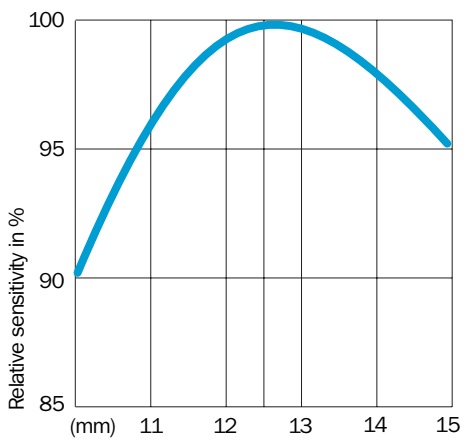
5-pin, M12



Technical data		KT 10W-	P 1115	N 1115	P 2115	N 2115
Scanning distance,	12.5 mm / ± 2 mm		■	■	■	■
from front edge of lens						
Light spot	0.8 x 4 mm		■	■	■	■
Light source[1]; light type;	LED; red, green, blue;		■	■	■	■
Wavelength (nm)	645, 525, 470		■	■	■	■
Light spot position	Longitudinal		■	■		
	Transverse				■	■
Supply voltage V_S	12 ... 30 V DC[2]		■	■	■	■
Residual ripple[3]	< 5 V		■	■	■	■
Current consumption[4]	< 150 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		■	■	■	■
Response time[5]; switching frequency[6]	< 20 µs; 25000/s		■	■	■	■
Jitter	< 10 µs		■	■	■	■
Time delay (deactivation delay)	20 ms, adjustable		■	■	■	■
Teach-in input ET	PNP: Teach > 10 V		■		■	
	Run < 2 V or unswitched					
	NPN: Teach < 2 V			■		■
	Run > 10 V or unswitched					
Blanking input AT						
Blanked	PNP: AT > 10 V		■		■	
Free running	AT < 2 V or unswitched		■		■	
	NPN: AT < 2 V			■		■
	AT > 10 V or unswitched			■		■
Connection type	Plug M12, 5-pin		■	■	■	■
VDE protection class[7]	⧈		■	■	■	■
Circuit protection[8]	A, B, C		■	■	■	■
Enclosure rating	IP 67		■	■	■	■
Ambient temperature T_A	Operation –10 °C ... +60 °C		■	■	■	■
	Storage –25 °C ... +75 °C		■	■	■	■
Shock load	To IEC 68		■	■	■	■
Weight	Approx. 400 g		■	■	■	■
Housing	Cast zinc		■	■	■	■

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 32 V DC
8) A = V_S connections reverse-polarity protected
B = Outputs short-circuit protected
C = Interference pulse suppression

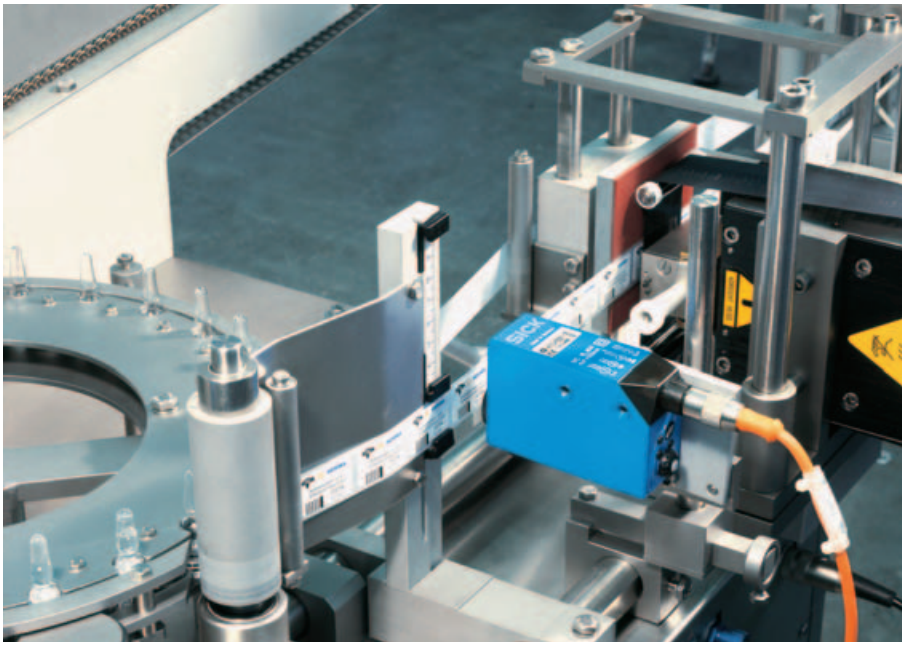
Scanning distance



Order information

Preferred type *)	Order no.
KT 10W-P 1115	1 016 169
KT 10W-N 1115	1 016 192
KT 10W-P 2115	1 016 562
KT 10W-N 2115	1 016 649

*) Further types on request



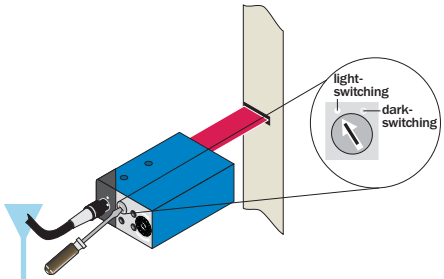
Contrast scanner with manual switching threshold adjustment

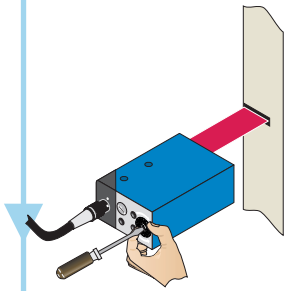
Industrial packaging processes are automated for the most part. Sensors are required for this, which can detect print marks on different films, cardboard packaging and wrapping materials quickly and reliably.

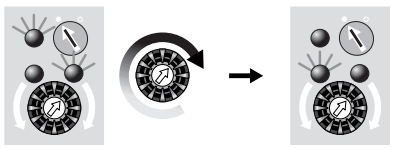
The KT 5G-2P/N_ _ _1 can resolve over 30 different contrast levels. This is the basic model of the KT 5 series. The gray value differentiation, switching sequence of 10 kHz and scanning ranges of optionally 10, 20 and 40 mm cover a wide range of applications in contrast detection. The switching threshold is adjusted manually with support from the status indicator as an adjustment aid. An optional release delay, which increases the impulse duration, optimizes detection reliability.

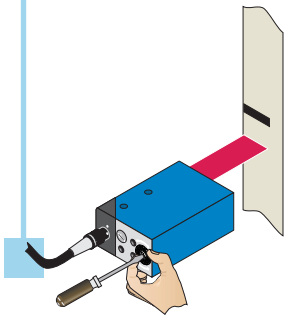
Easy to install too – through the 4-pin M12 plug connection, the comprehensive range of mounting accessories and the selectable light exit at the top or front of the housing.

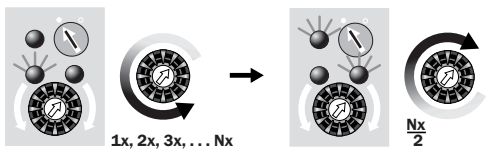
Setting switching threshold





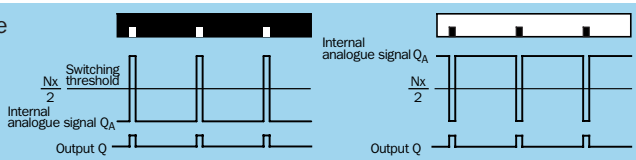






Status

- The switching threshold is set manually in the middle between the background and the mark.



Notes

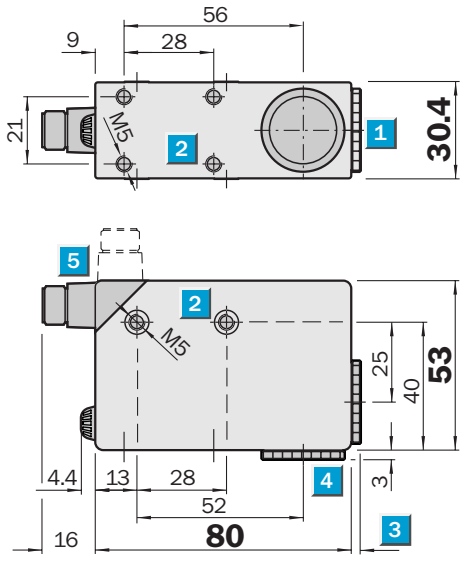
- The material speed must be zero (machine is idle).
- Turn the threshold adjustment knob until the status indicator just lights.
- Switching threshold setting at bright-switching analogue.

Scanning distance 10/20/40 mm

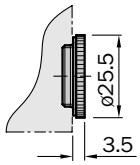
Contrast scanners

- Green light
- Manual switching threshold adjustment
- Adjustment switch
- Optional time delay
- Switching frequency 10 000/s

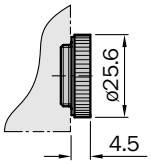
Dimensional drawing



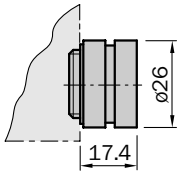
KT 5G-2P 1111
KT 5G-2P 1121
KT 5G-2P 1151



KT 5G-2P 1211
KT 5G-2P 1221

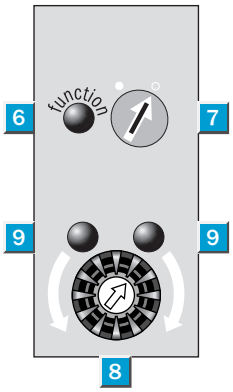


KT 5G-2P 1311
KT 5G-2P 1321



Adjustments possible

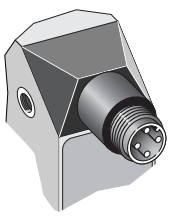
All types



1 Lens (light transmission), can be replaced by item 4
2 M5 mounting holes, 5.5 mm deep
3 See dimensional drawing of lens
4 Blind screw, can be replaced by item 1
5 4-pin, M12 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

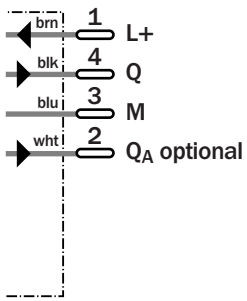
All types



Accessories

Cables and connectors
Mounting systems
Lens

4-pin, M12

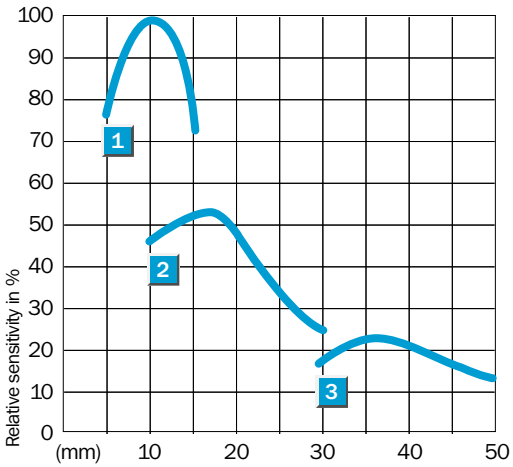


Technical data	KT 5G-2	P1111	P1121	P1151	P1211	P1221	P1311	P1321	P2111
Scanning distance	10 ± 3 mm	■	■	■					■
from front edge of lens	20 ± 3 mm				■	■			
	40 ± 3 mm						■	■	
Light spot dimension	1.2 x 4.2 mm	■	■	■					■
	1.5 x 5.5 mm				■	■			
	1.1 x 4.2 mm						■	■	
Light spot position	Longitudinal	■	■	■	■	■	■	■	
	Transverse								■
Light source[1]; light type;	LED; green light;	■	■	■	■	■	■	■	■
Wavelength (nm)	520	■	■	■	■	■	■	■	■
Supply voltage V_S	10 ... 30 V DC[2]	■	■	■	■	■	■	■	■
Residual ripple[3]	< 5 V_{PP}	■	■	■	■	■	■	■	■
Current consumption[4]	< 80 mA	■	■	■	■	■	■	■	■
Switching outputs	Light-/dark-switching, selectable	■	■	■	■	■	■	■	■
	PNP: HIGH = V_S – < 2 V/LOW = 0 V	■	■	■	■	■	■	■	■
Output current I_A max.	100 mA	■	■	■	■	■	■	■	■
Response time[5]; switching frequency[6]	50 µs; 10 000/s	■	■	■	■	■	■	■	■
Time delay	No timing element	■		■	■		■		■
	deactivation delay, ... 20 ms		■			■		■	
Analogue output Q_A	0.3 ... 10 mA			■					
Switching threshold	Adjustable (standard type)	■	■	■	■	■	■	■	■
Connection type	Plug 4-pin, M12	■	■	■	■	■	■	■	■
VDE protection class[7]	⧈	■	■	■	■	■	■	■	■
Enclosure rating	IP 67	■	■	■	■	■	■	■	■
Circuit protection[8]	A, B, C	■	■	■	■	■	■	■	■
Ambient temperature T_A	Operation –10 ... +55 °C	■	■	■	■	■	■	■	■
	Storage –25 ... +75 °C	■	■	■	■	■	■	■	■
Shock load	To IEC 68	■	■	■	■	■	■	■	■
Weight	Approx. 400 g	■	■	■	■	■	■	■	■
Housing	Cast zinc	■	■	■	■	■	■	■	■

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 32 V DC
8) A = V_S connections reverse-polarity protected
B = Outputs 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 *)	Order no.
KT 5G-2P 1111	1 015 993
KT 5G-2P 1121	1 015 997
KT 5G-2P 1151	1 016 195
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-2P 2111	1 016 008

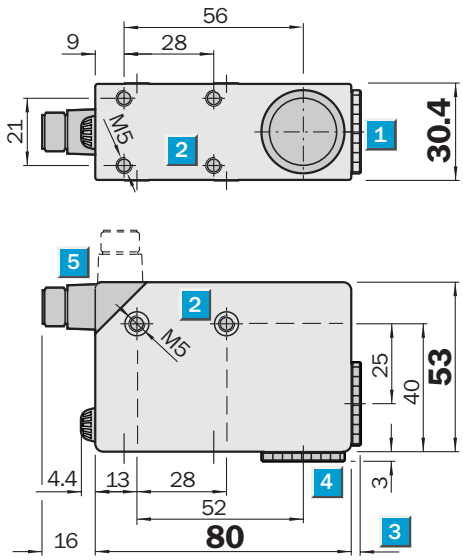
*) Further types on request

Scanning distance 10/20/40 mm

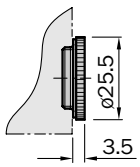
Contrast scanners

- Green light
- Manual switching threshold adjustment
- Adjustment switch
- Optional time delay
- Switching frequency 10 000/s

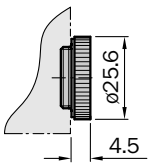
Dimensional drawing



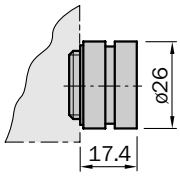
KT 5G-2N 1111
KT 5G-2N 1151



KT 5G-2N 1211

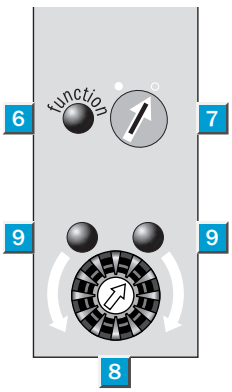


KT 5G-2N 1311



Adjustments possible

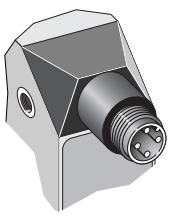
All types



1 Lens (light transmission), can be replaced by item 4
2 M5 mounting holes, 5.5 mm deep
3 See dimensional drawing of lens
4 Blind screw, can be replaced by item 1
5 4-pin, M12 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

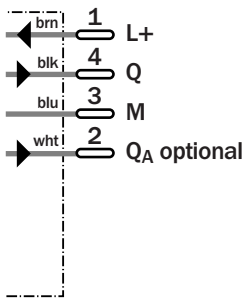
All types



Accessories

Cables and connectors
Mounting systems
Lens

4-pin, M12

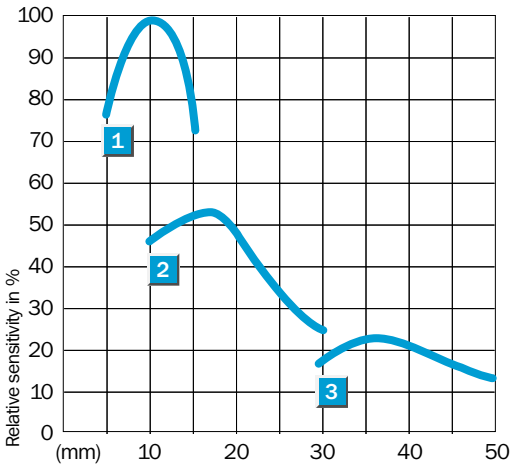


Technical data	KT 5G-2	N1111	N1151	N1211	N1311
Scanning distance	10 ± 3 mm	■	■		
from front edge of lens	20 ± 3 mm			■	
	40 ± 3 mm				■
Light spot dimension	1.2 x 4.2 mm	■	■		
	1.5 x 5.5 mm			■	
	1.1 x 4.2 mm				■
Light spot position	Longitudinal	■	■	■	■
Light source[1]; light type;	LED; green light;	■	■	■	■
Wavelength (nm)	520	■	■	■	■
Supply voltage V_S	10 ... 30 V DC[2]	■	■	■	■
Residual ripple[3]	< 5 V_{PP}	■	■	■	■
Current consumption[4]	< 80 mA	■	■	■	■
Switching outputs	Light-/dark-switching, selectable	■	■	■	■
	NPN: HIGH = V_S /LOW = < 2 V	■	■	■	■
Output current I_A max.	100 mA	■	■	■	■
Response time[5]; switching frequency[6]	50 µs; 10 000/s	■	■	■	■
Time delay	No timing element	■	■	■	■
Analogue output Q_A	0.3 ... 10 mA		■		
Switching threshold	adjustable (standard type)	■	■	■	■
Connection type	Plug 4-pin, M12	■	■	■	■
VDE protection class[7]	⧈	■	■	■	■
Enclosure rating	IP 67	■	■	■	■
Circuit protection[8]	A, B, C	■	■	■	■
Ambient temperature T_A	Operation –10 ... +55 °C	■	■	■	■
	Storage –25 ... +75 °C	■	■	■	■
Shock load	To IEC 68	■	■	■	■
Weight	Approx. 400 g	■	■	■	■
Housing	Cast zinc	■	■	■	■

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 32 V DC
8) A = V_S connections reverse-polarity protected
B = Outputs 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 *)	Order no.
KT 5G-2N 1111	1 015 981
KT 5G-2N 1151	1 016 385
KT 5G-2N 1211	1 015 985
KT 5G-2N 1311	1 015 988

*) Further types on request

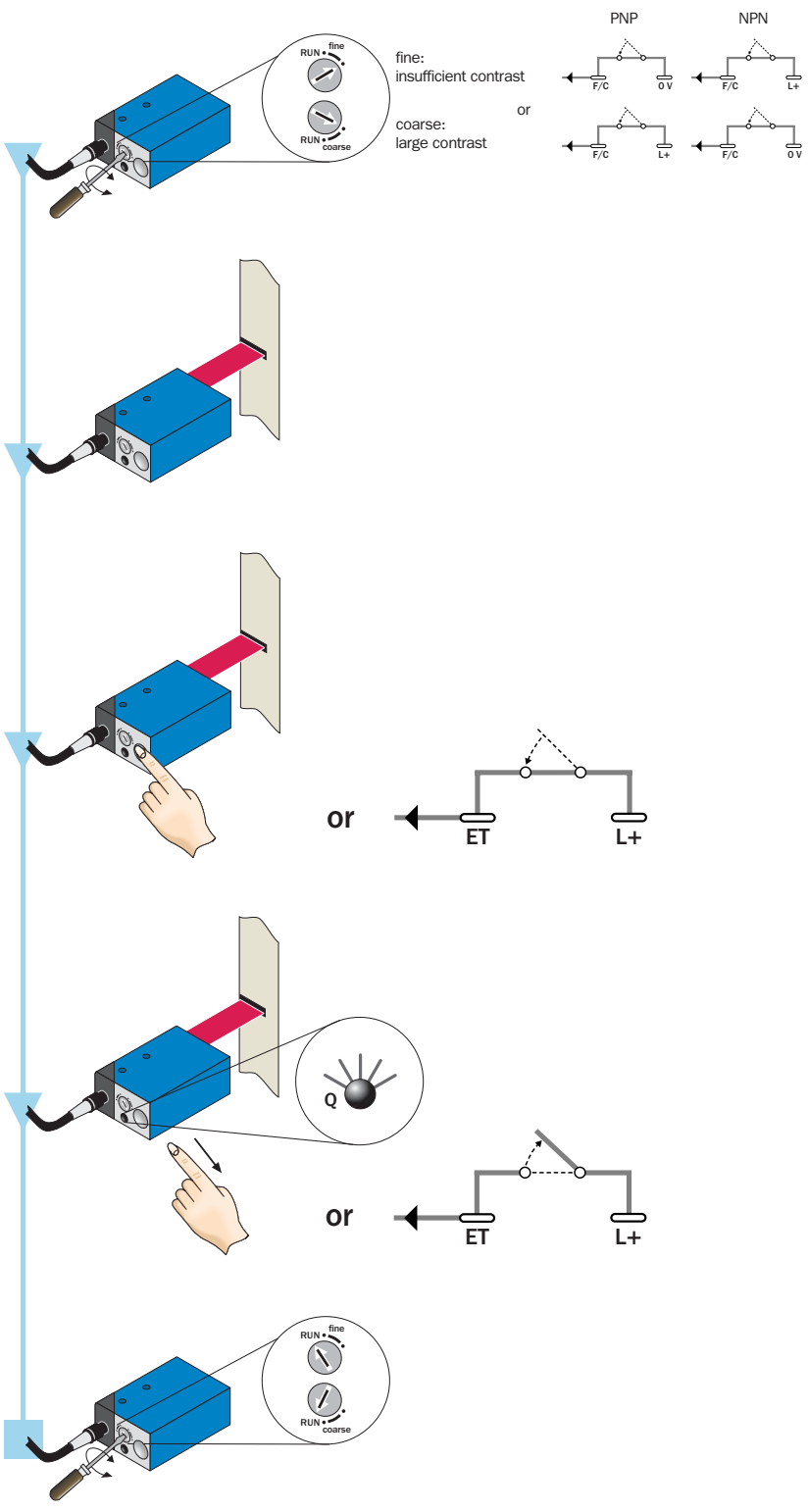
Contrast scanner with static Teach-in on mark

The contrast scanner KT 5G-2P/N___2 provides a great number of different gray level values and scanning distances of 10 mm and 20 mm. The equipment has a lot of convenient features with the option of teaching in the contrast and switching threshold, which many users greatly appreciate.

The light transmitted is aligned when the machine is idle, for example, on a repetition mark. The desired “fine/coarse” contrast resolution is set either using the rotary knob in the control panel of the scanner or externally via the control wire. Then a push of the button or a signal from the machine control triggers the Teach-in procedure. Setting the light or dark switching mode is not required.

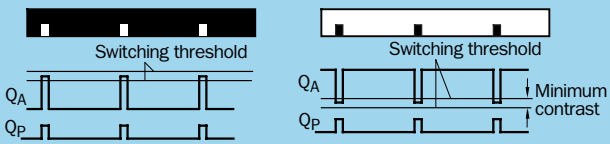
Then the contrast scanner sets a fast pace with up to 10,000 switchings per second when in operation.

Teach-in: setting switching threshold



Status

- The switching threshold is set automatically in the middle between the reception signals from the background and mark.



Notes

- The material speed must be zero (machine is idle).
- Light-/dark-switching is not required.
- The Teach-in procedure has been completed when the LED lights or Q is active.
- The Teach-in button can be locked against unintentional activation with “Run”. A Teach-in procedure can be triggered when the switch setting is not defined.

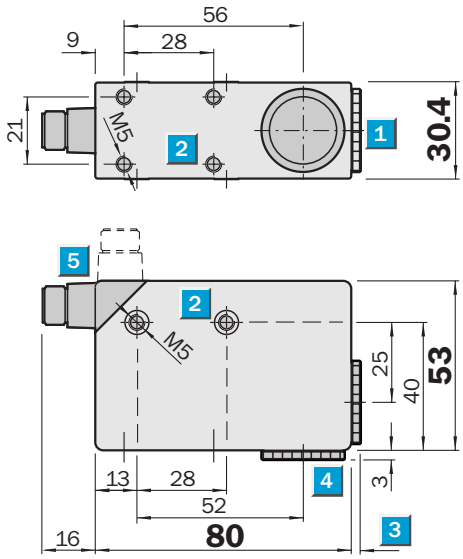
Scanning distance 10/20 mm

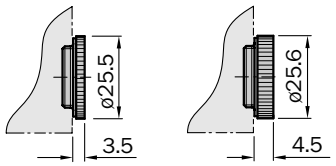
Contrast scanners

- 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 10 000/s

Dimensional drawing

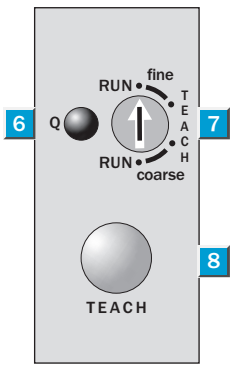
KT 5G-2P1112	KT 5G-2P1212
KT 5G-2N1112	KT 5G-2N1212
KT 5G-2P1122	KT 5G-2P2112
KT 5G-2N1122	KT 5G-2N2112





Adjustments possible

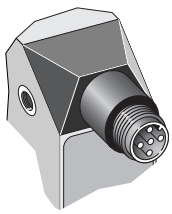
All types



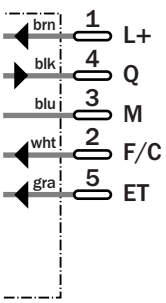
1 Lens (light transmission), can be replaced by item 4
2 M5 mounting holes, 5.5 mm deep
3 See dimensional drawing of lens
4 Blind screw, can be replaced by item 1
5 5-pin, M12 x 1 plug (rotatable through 90°)
6 Function signal indicator (yellow)
7 Pre-selection switch for minimum contrast
8 Teach-in button

Connection type

All types



5-pin, M12 x 1



Accessories

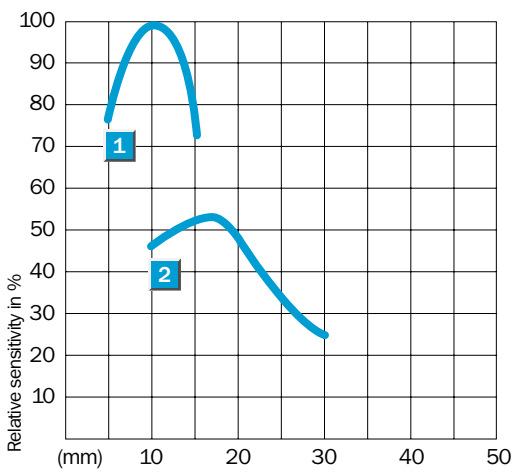
Cables and connectors
Mounting systems
Lens

Technical data	KT 5G-2	P1112	P1122	P1212	P2112	N1112	N1122	N1212	N2112
Scanning distance	10 ± 3 mm	■	■		■	■	■		■
from front edge of lens	20 ± 3 mm			■				■	
Light spot dimensions	1.2 x 4.2 mm	■	■		■	■	■		■
	1.5 x 5.5 mm			■				■	
Light spot position	Longitudinal	■	■	■		■	■	■	
	Transverse				■				■
Light source[1]; light type;	LED; green light;	■	■	■	■	■	■	■	■
Wavelength (nm)	520	■	■	■	■	■	■	■	■
Supply voltage V_S	10 ... 30 V DC[2]	■	■	■	■	■	■	■	■
Residual ripple[3]	< 5 V_{PP}	■	■	■	■	■	■	■	■
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]; switching frequency[6]	50 µs; 10 000/s	■	■	■	■	■	■	■	■
Time delay	No timing element	■		■	■	■		■	■
	Deactivation delay, ... 20 ms		■				■		
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, M12	■	■	■	■	■	■	■	■
VDE protection class[7]	⧈	■	■	■	■	■	■	■	■
Enclosure rating	IP 67	■	■	■	■	■	■	■	■
Circuit protection[8]	A, B, C	■	■	■	■	■	■	■	■
Ambient temperature T_A	Operation –10 ... +55 °C	■	■	■	■	■	■	■	■
	Storage –25 ... +75 °C	■	■	■	■	■	■	■	■
Shock load	To IEC 68	■	■	■	■	■	■	■	■
Weight	Approx. 400 g	■	■	■	■	■	■	■	■
Housing	Cast zinc	■	■	■	■	■	■	■	■

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 32 V DC
8) A = V_S connections reverse-polarity protected
B = Outputs short-circuit protected
C = Interference pulse suppression

Scanning distance

1 Scanning distance 10 mm
2 Scanning distance 20 mm



Order information

Preferred type *)	Order no.
KT 5G-2P1112	1 016 628
KT 5G-2P1122	1 017 976
KT 5G-2P1212	1 016 718
KT 5G-2P2112	1 017 956
KT 5G-2N1112	1 016 717
KT 5G-2N1122	1 017 977
KT 5G-2N1212	1 016 719
KT 5G-2N2112	1 018 164

*) Further types on request

Contrast scanner with dynamic contrast detection

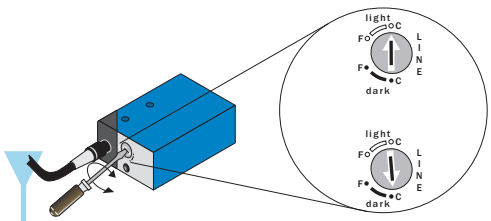
Contrast scanners with green light LED can distinguish up to 30 gray value levels. Color deviations due to printing can result in different gray values within a processing procedure.

In this model, the switching threshold is set dynamically according to the existing contrast. This means that a switching signal is activated at each contrast that the KT 5 detects.

Manual adjustment or a Teach-in procedure is not required with dynamic contrast detection. Of course, this equipment also has intensive green light for resolving at least 30 gray levels.

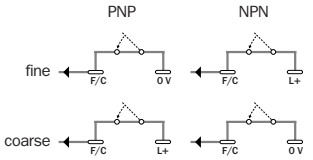
The “fine” or “coarse” contrast to be resolved and light-/dark-switching can be selected using the switch on the control panel or via the control wire.

Teach-in: setting switching threshold



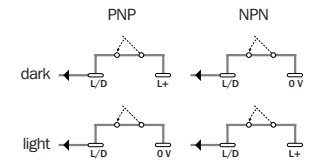
light (light-switching):
fine (insufficient contrast)
or coarse (large contrast)

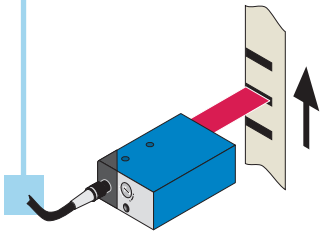
or



dark (dark-switching):
fine (insufficient contrast)
or coarse (large contrast)

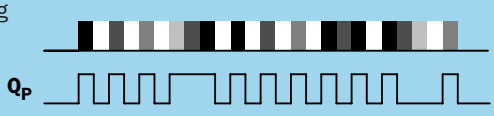
or





Status

- The example shows the mode of operation in the “coarse” setting with dark-switching.



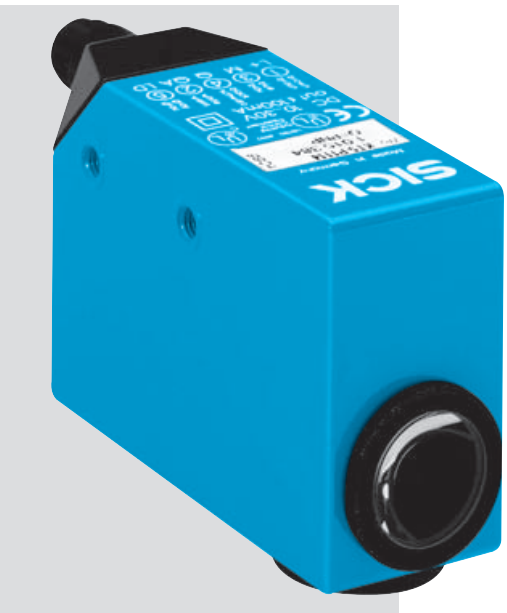
Notes

- The control panel is locked when the switch is set to LINE.
  Then the F/C and /L/D settings are only accepted via the control wire.

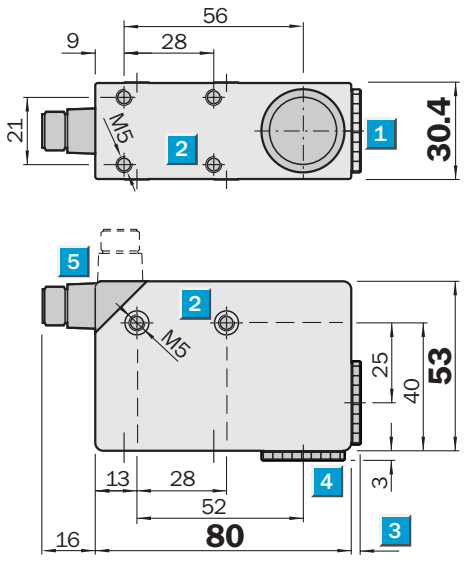
Scanning distance 10/20/40 mm

Contrast scanners

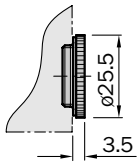
- Green light
- Dynamic contrast determination
- Fine/coarse adjustment
- Light/dark finely adjustable
- Switching frequency 10 000/s



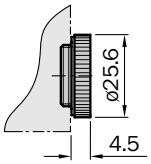
Dimensional drawing



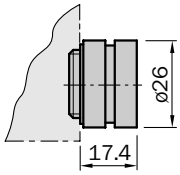
KT 5G-2P 1114
KT 5G-2N 1114
KT 5G-2P 2114



KT 5G-2P 1214
KT 5G-2N 1214

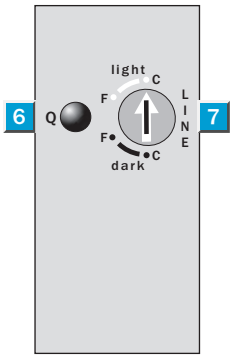


KT 5G-2P 1314
KT 5G-2N 1314



Adjustments possible

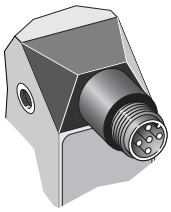
All types



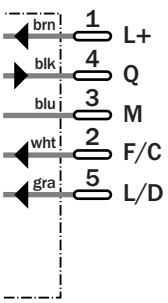
1 Lens (light transmission), can be replaced by item 4
2 M5 mounting holes, 5.5 mm deep
3 See dimensional drawing of lens
4 Blind screw, can be replaced by item 1
5 5-pin, M12 x 1 plug (rotatable through 90°)
6 Function signal indicator (yellow)
7 Fine/coarse selection

Connection type

All types



5-pin, M12



Accessories

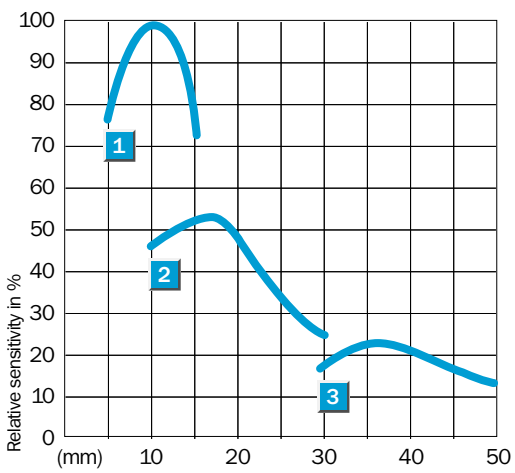
Cables and connectors
Mounting systems
Objektiv

Technical data	KT 5G-2	P1114	P1214	P1314	P2114	N1114	N1214	N1314
Scanning distance	10 ± 3 mm	■			■	■		
from front edge of lens	20 ± 3 mm		■				■	
	40 ± 3 mm			■				■
Light spot dimensions	1.2 x 4.2 mm	■			■	■		
	1.5 x 5.5 mm		■				■	
	1.1 x 4.2 mm			■				■
Light spot position	Longitudinal	■	■	■		■	■	■
	Transverse				■			
Light source[1]; light type;	LED; green light;	■	■	■	■	■	■	■
Wavelength (nm)	520	■	■	■	■	■	■	■
Supply voltage V_S	10 ... 30 V DC[2]	■	■	■	■	■	■	■
Residual ripple[3]	< 5 V_{PP}	■	■	■	■	■	■	■
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]; switching frequency[6]	50 µs; 10 000/s	■	■	■	■	■	■	■
Time delay	No timing element	■	■	■	■	■	■	■
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 M12, 5-pin	■	■	■	■	■	■	■
VDE protection class[7]	⧈	■	■	■	■	■	■	■
Enclosure rating	IP 67	■	■	■	■	■	■	■
Circuit protection[8]	A, B, C	■	■	■	■	■	■	■
Ambient temperature T_A	Operation –10 ... +55 °C	■	■	■	■	■	■	■
	Storage –25 ... +75 °C	■	■	■	■	■	■	■
Shock load	To IEC 68	■	■	■	■	■	■	■
Weight	Approx. 400 g	■	■	■	■	■	■	■
Housing	Cast zinc	■	■	■	■	■	■	■

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 32 V DC
9) A = V_S connections reverse-polarity protected
B = Outputs short-circuit protected
C = Interference pulse suppression

Scanning distance

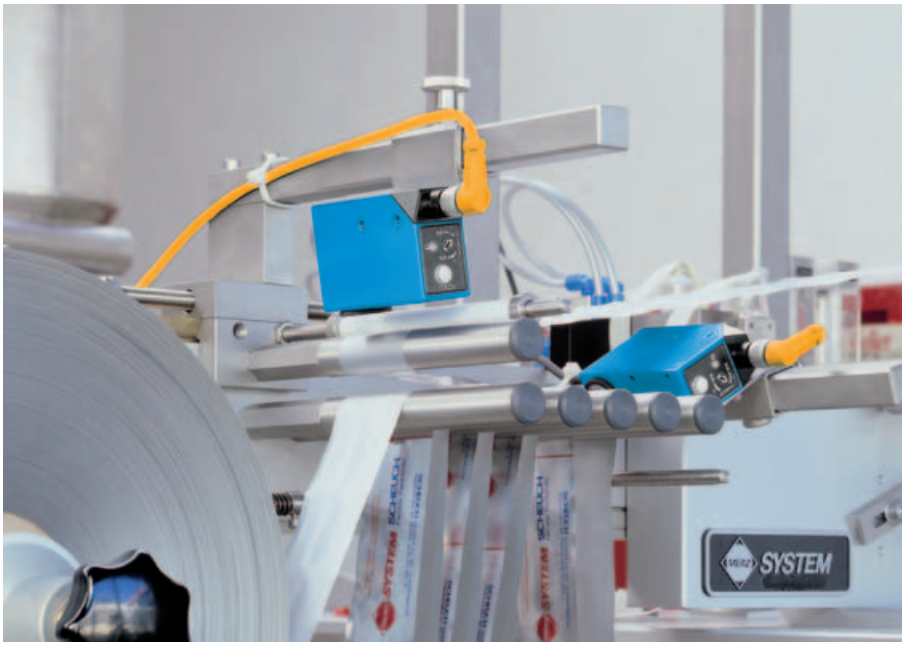
1 Scanning distance 10 mm
2 Scanning distance 20 mm
3 Scanning distance 40 mm



Order information

Preferred type *)	Order no.
KT 5G-2P1114	1 016 999
KT 5G-2P1214	1 017 870
KT 5G-2P1314	1 018 988
KT 5G-2P2114	1 018 309
KT 5G-2N1114	1 017 000
KT 5G-2N1214	1 017 871
KT 5G-2N1314	1 023 121

*) Further types on request



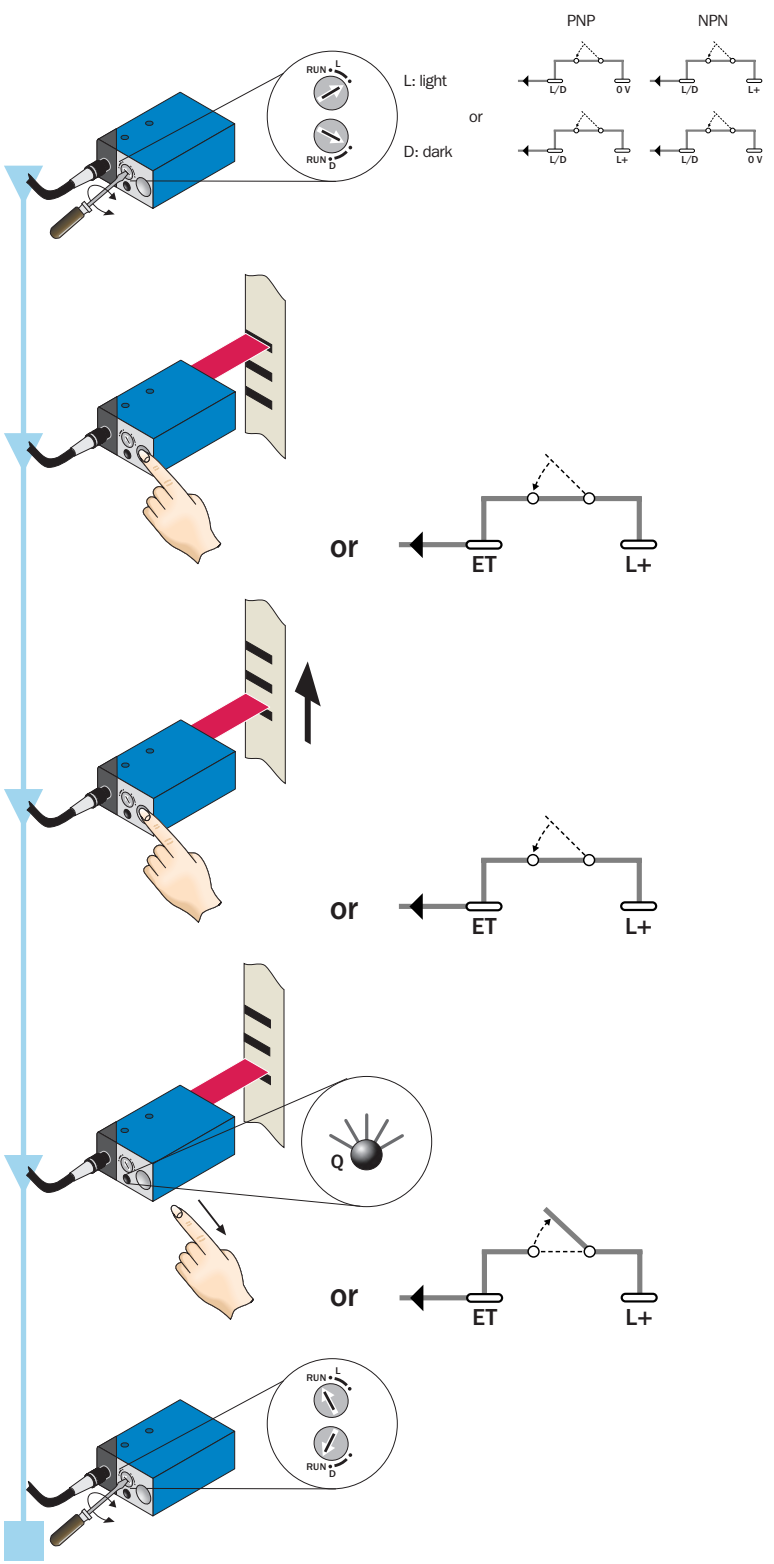
Contrast scanner with dynamic Teach-in

The KT 5G-2P/N___3 provides a high degree of user-friendly operation and detection reliability. This is the result of the dynamic Teach-in procedure in connection with the automatic light transmitter selection.

You can set the optimum switching threshold without stopping the machine, either using the push button on the equipment or an external impulse via the control wire. The equipment selects the light source between the red, blue and green transmission LED automatically, which achieves the respectively best contrast and consequently the highest possible detection reliability.

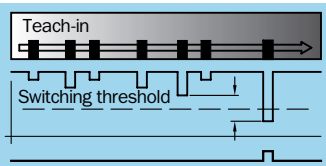
Especially in applications with a high throughput performance, e.g., packaging machines and fill lines, these features contribute to economical system operation because they are interruption-free. The same applies to highly flexible production processes where it is necessary to adapt contrast scanners fast and inexpensively.

Teach-in: setting switching threshold



Status

- The switching threshold is set automatically in the middle between the reception signals from the background and mark.
- The optimum transmission light was selected automatically.



Notes

- At least one repetition length must pass through the light spot with the material to be scanned.
- The material speed during Teach-in procedures is min. 25 mm/s and max. 300 mm/s.
- The Teach-in button can be locked against unintentional activation with “Run”.
  A Teach-in procedure can be triggered when the switch setting is not defined.

Scanning distance 10/20 mm

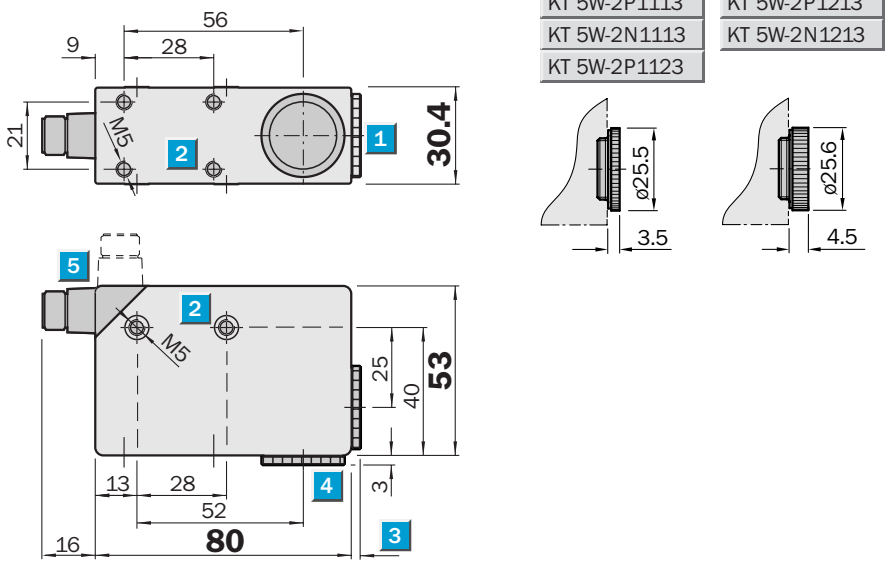
Contrast scanners

- 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
- Switching frequency 10 000/s

Dimensional drawing

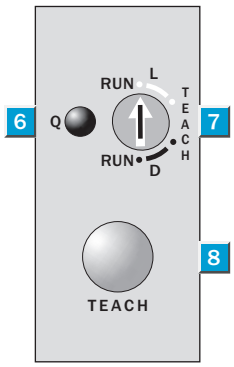
KT 5W-2P1113
KT 5W-2N1113
KT 5W-2P1123

KT 5W-2P1213
KT 5W-2N1213



Adjustments possible

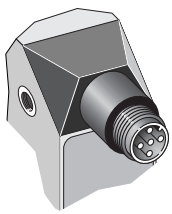
All types



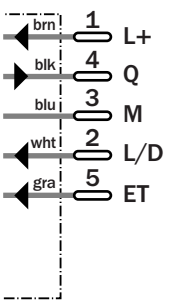
1 Lens (light transmission), can be replaced by item 4
2 M5 mounting holes, 5.5 mm deep
3 See dimensional drawing of lens
4 Blind screw, can be replaced by item 1
5 5-pin, M12 x 1 plug (rotatable through 90°)
6 Function signal indicator (yellow)
7 L/D pre-selection switch
8 Teach-in button

Connection type

All types



5-pin, M12 x 1



Accessories

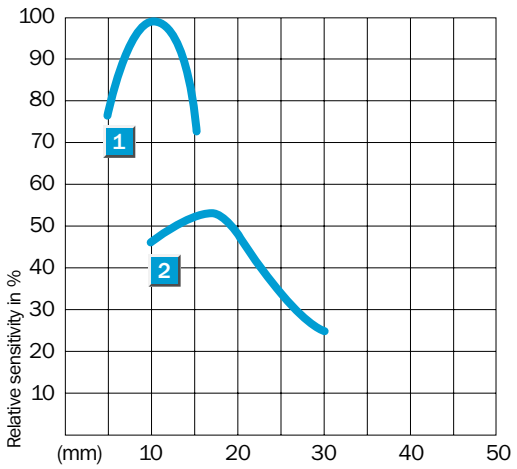
Cables and connectors
Mounting systems
Lens

Technical data	KT 5W-2	P1113	P1123	P1213	N1113	N1213
Scanning distance	10 ± 3 mm	■	■		■	
from front edge of lens	20 ± 3 mm			■		■
Light spot dimensions	1.2 x 4.2 mm	■	■		■	
	1.5 x 5.5 mm			■		■
Light source[1]; light type;	LED; red, blue, green;	■	■	■	■	■
Wavelength (nm)	640, 525, 470	■	■	■	■	■
Supply voltage V_S	10... 30 V DC[2]	■	■	■	■	■
Residual ripple[3]	< 5 V_{PP}	■	■	■	■	■
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 frequency	To 10 000/s	■	■	■	■	■
Response time[5]; switching frequency[6]	50 µs; 10 000/s	■	■	■	■	■
Time delay	No timing element	■		■	■	■
	Deactivation delay, ... 20 ms		■			
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 M12, 5-pin	■	■	■	■	■
VDE protection class[7]	⧈	■	■	■	■	■
Enclosure rating	IP 67	■	■	■	■	■
Circuit protection[8]	A, B, C	■	■	■	■	■
Ambient temperature T_A	Operation –10 ... +55 °C	■	■	■	■	■
	Storage –25 ... +75 °C	■	■	■	■	■
Shock load	To IEC 68	■	■	■	■	■
Weight	Approx. 400 g	■	■	■	■	■
Housing	Cast zinc	■	■	■	■	■

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 32 V DC
8) A = V_S connections reverse-polarity protected
B = Outputs short-circuit protected
C = Interference pulse suppression

Scanning distance

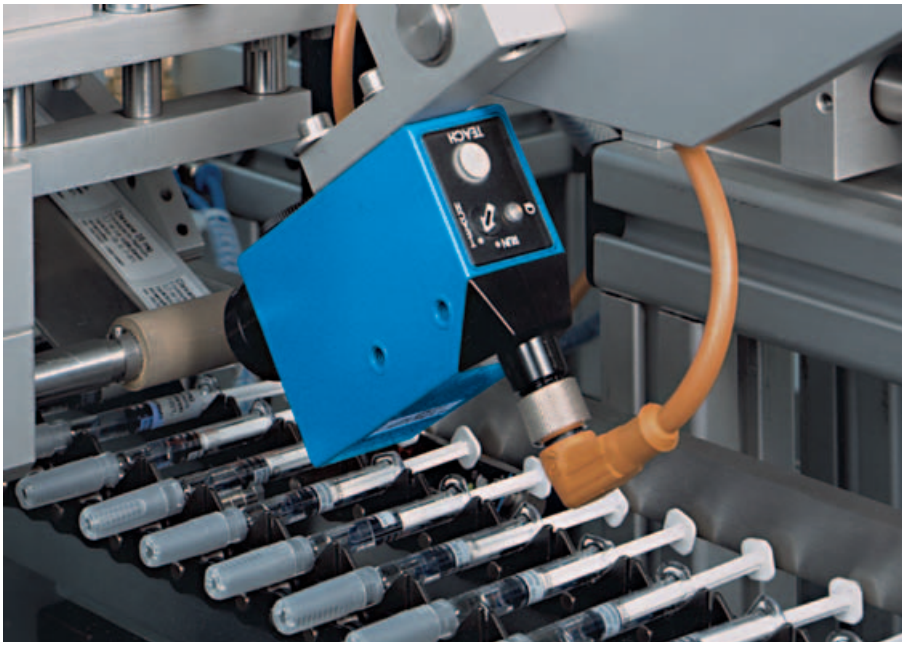
1	Scanning distance with lens 211	10 mm
2	Scanning distance with lens 212	20 mm



Order information

Preferred type *)	Order no.
KT 5W-2P1113	1 016 629
KT 5W-2P1123	1 017 810
KT 5W-2P1213	1 016 715
KT 5W-2N1113	1 016 630
KT 5W-2N1213	1 016 716

*) Further types on request



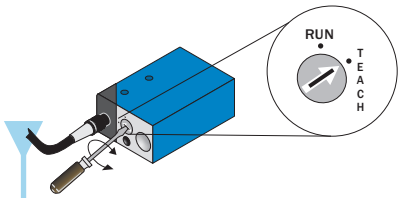
Contrast scanner with static Teach-in on mark and background

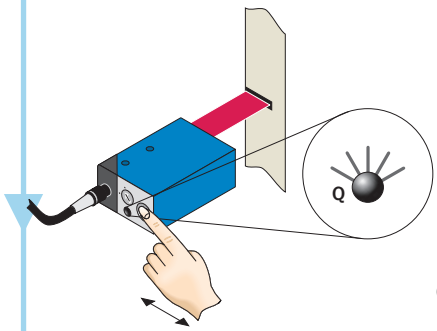
When especially high precision is required for contrast detection, e.g., in detecting marks on highly polished materials, the time (or – more precisely – the millisecond) is ripe for the KT 5W-2P/N___6 contrast scanner.

Thanks to its three-color LED, the equipment can activate the optimum transmitter light source for every contrast. Additionally, it has an especially accurate, static Teach-in procedure. The gray values of the mark to be detected are taught-in separately here either via the Teach-in button on the equipment or an external control wire. The scanner sets the ideal switching threshold from the two determined gray values.

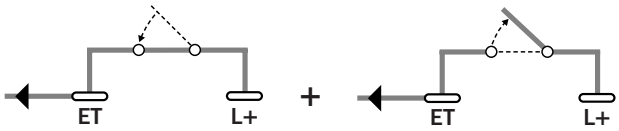
The high precision of the contrast detection, automatic shine adjustment with material to be scanned with high reflectance, scanning distances of 10 mm, 20 mm and 40 mm, switching sequence of 10 kHz and individual alignment and attachment options cover numerous tasks in which it is a questions of “brilliant” detection results.

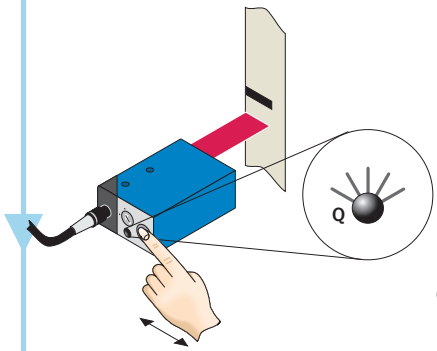
Teach-in: setting switching threshold



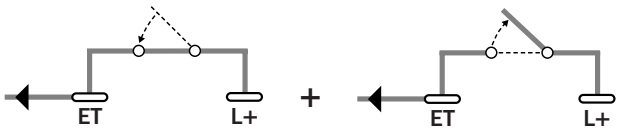


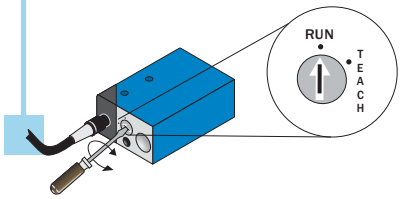
or





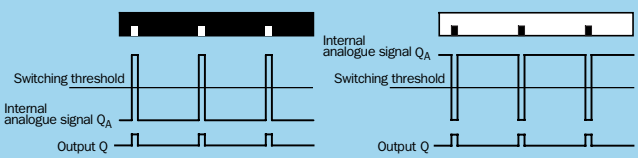
or





Status

- After the first Teach-in procedure, the red transmitter light and the status indicator blink and signal that a second Teach-in procedure must be triggered.
- The optimum transmission light was selected automatically.



Notes

- Light-/dark-switching not required: equipment switches for the material to be scanned, which was under the light spot at the first Teach-in procedure (mark or background).
- The material speed must be zero during Teach-in (machine is idle).
- The Teach-in button can be locked against unintentional activation with “Run”. A Teach-in procedure can be triggered when the switch setting is not defined.

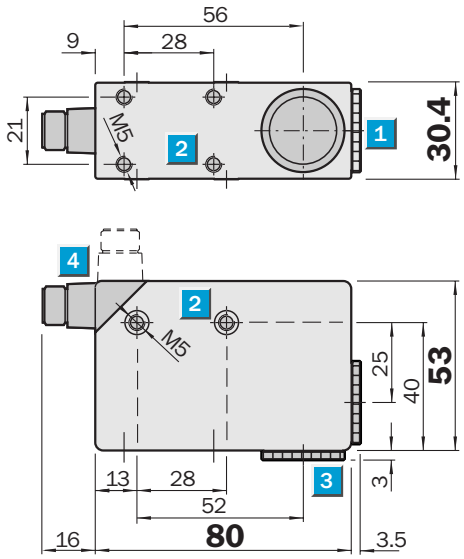
Scanning distance 10/20/40 mm

Contrast scanners

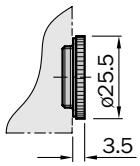
- Static Teach-in to mark and background via control cable or control panel on unit
- Automatic switching threshold adjustment for detection of extremely shiny objects
- Switching frequency 10 000/s
- Light source red, green, blue

Dimensional drawing

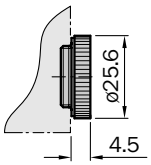
All types



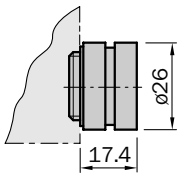
KT 5W-2P 1116
KT 5W-2P 1126



KT 5W-2P 1216
KT 5W-2N 1216

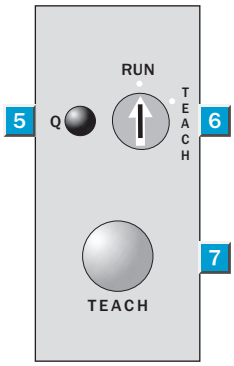


KT 5W-2P 1316
KT 5W-2N 1316



Adjustments possible

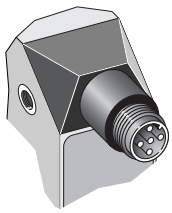
All types



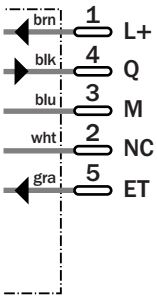
1 Lens (light transmission), can be replaced by item 3
2 M5 mounting holes, 5.5 mm deep
3 Blind screw, can be replaced by item 1
4 5-pin, M12 x 1 plug (rotatable through 90°)
5 Function signal indicator (yellow)
6 Pre-selection switch
7 Teach-in button

Connection type

All types



5-pin, M12 x 1



Accessories

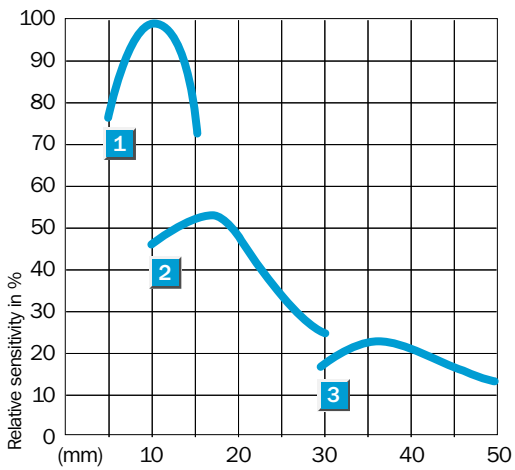
Cables and connectors
Mounting systems
Lens

Technical data	KT 5W-2	P1116	P1126	P1216	P1316	N1116	N1216	N1316
Scanning distance	10 ± 3 mm	■	■			■		
from front edge of lens	20 ± 3 mm			■			■	
	40 ± 3 mm				■			■
Light spot dimensions	1.2 x 4.2 mm	■	■			■		
	1.5 x 5.5 mm			■			■	
	1.1 x 4.2 mm				■			■
Light source[1]; light type;	LED; red, blue, green;	■	■	■	■	■	■	■
Wavelength (nm)	640, 525, 470	■	■	■	■	■	■	■
Supply voltage V_S	10... 30 V DC[2]	■	■	■	■	■	■	■
Residual ripple[3]	< 5 V_{PP}	■	■	■	■	■	■	■
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]; switching frequency	50 µs; 10000/s	■	■	■	■	■	■	■
Time delay	No timing element	■		■	■	■	■	■
	Deactivation delay, ... 20 ms		■					
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, M12	■	■	■	■	■	■	■
VDE protection class[6]	⧈	■	■	■	■	■	■	■
Enclosure rating	IP 67	■	■	■	■	■	■	■
Circuit protection[7]	A, B, C	■	■	■	■	■	■	■
Ambient temperature T_A	Operation –10 ... +55 °C	■	■	■	■	■	■	■
	Storage –25 ... +75 °C	■	■	■	■	■	■	■
Shock load	To IEC 68	■	■	■	■	■	■	■
Weight	Approx. 400 g	■	■	■	■	■	■	■
Housing	Cast zinc	■	■	■	■	■	■	■

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) Reference voltage 32 V DC
7) A = V_S connections reverse-polarity protected
B = Outputs 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 *)	Order no.
KT 5W-2P 1116	1 018 044
KT 5W-2P 1126	1 018 587
KT 5W-2P 1216	1 018 586
KT 5W-2P 1316	1 018 961
KT 5W-2N 1116	1 018 045
KT 5W-2N 1216	1 019 022
KT 5W-2N 1316	1 022 678

*) Further types on request

KT 5: Contrast scanner with intelligent display

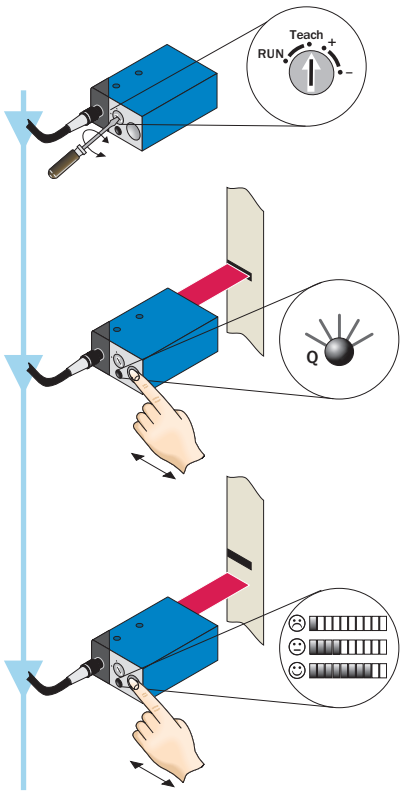
Contrast scanners are used mainly for reading print and registration marks. Here the KT 5 sets new standards in performance and friendlyness. The light bar display provides information about the security of detection. In addition, the user can see the current signal strength and switching threshold. Also, if required the switching threshold may be adjusted manually using the +/– keys. For example, if printing quality changes, the sensor can be adjusted simply “in process”.

Thanks to the three-colour-LED-technology, the optimum emission colour is automatically selected depending on the existing contrast. Futhermore, the precise 2-point-Teach-in procedure is provided, where the gray values of the mark and the background are taught-in. The sensor sets the optimum switching threshold automatically.

A high degree of repeatability is ensured due to the homogenous light spot and the automatic gloss adaptation for shiny materials. The switching frequency of 10,000/s enables an economic operation of the machine. A wide range of sensors with different scanning distances and individual alignment and attachment options cover a wide range of different applications.

Teach-in

Teach-in: setting switching threshold



- After the first Teach-in procedure, the red transmitter light and the status indicator blink and signal that a second Teach-in procedure must be triggered.
- The LED status indicator switches off after the second teach process.
- **Detection reliability:**

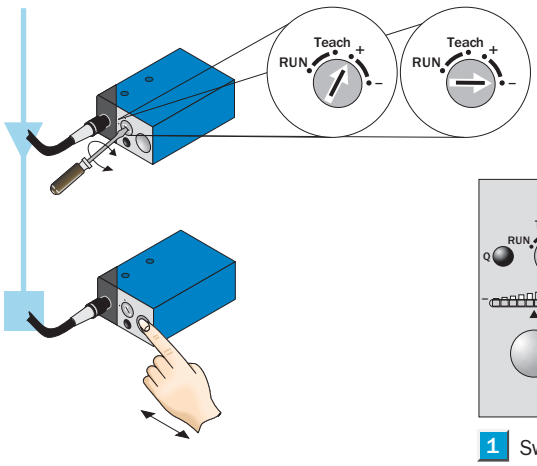
  1 LED on: No reliable operation – minimum contrast difference
  ≤ 4 LEDs on: Capable operation – sufficient contrast difference
  > 4 LEDs on: Reliable operation – high contrast difference

Status

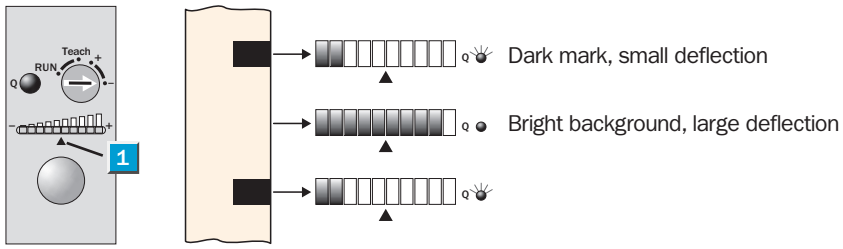
- **Detection reliability:** The bar display signals the quality of the taught-in contrast. The more LEDs light, the more reliable is the detection of the mark.

Manual precise setting

Teach-in: setting switching threshold



- Adjustment of the switching threshold via position +/– and pressing of keys.



1 Switching threshold

Status

- **Switching threshold adjustment:** The bar display visualizes the current level of the material to be scanned, which is on hand.
- The switching threshold is in the middle of the bar display.
- As soon as the switching threshold is exceeded or fallen short of, the switching output changes its state.
- The switching threshold is correspondingly raised or lowered a half LED segment per pressing of the keys.

Notes

- Light-/dark-switching not required: equipment switches for the material to be scanned, which was under the light spot at the first Teach-in procedure (mark or background).
- The material speed must be zero during Teach-in (machine is idle).
- The Teach-in button can be locked against unintentional activation with “Run”.
- A Teach-in procedure can be triggered when the switch setting is not defined.
- The optimum transmission light was selected automatically.
- Teach-in is also possible via control wire.

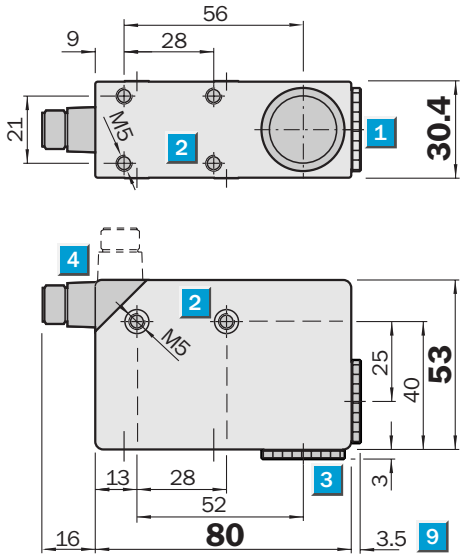
Scanning distance 10/20/40 mm

Contrast scanners

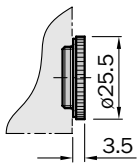
- 10-segment bar display
- Static 2-point Teach-in to mark and background via control cable or control panel on unit
- Detection reliability display
- Subsequent manual adjustment of the switching threshold
- Switching frequency 10,000/s
- Automatic gloss adaptation

Dimensional drawing

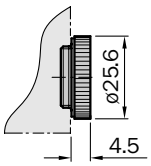
All types



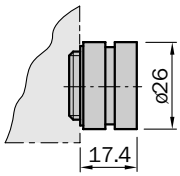
KT 5W-2P 1116D
KT 5W-2P 1126D
KT 5W-2P 2116D
KT 5W-2N 1116D
KT 5W-2N 1126D
KT 5W-2N 2116D



KT 5W-2P 1216D
KT 5W-2N 1216D

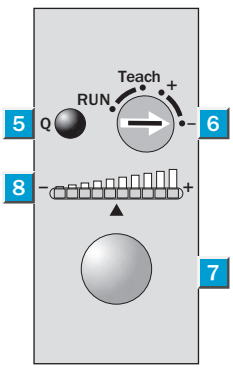


KT 5W-2P 1316D
KT 5W-2N 1316D



Adjustments possible

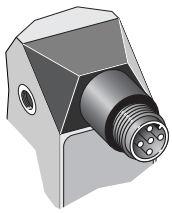
All types



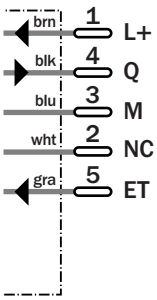
1 Lens (light transmission), can be replaced by item 3
2 M5 mounting holes, 5.5 mm deep
3 Blind screw, can be replaced by item 1
4 5-pin, M12 x 1 plug (rotatable through 90°)
5 Function signal indicator (yellow)
6 Pre-selection switch
7 Teach-in button
8 Bar display
9 See dimensional drawings of the lens

Connection type

All types



5-pin, M12 x 1



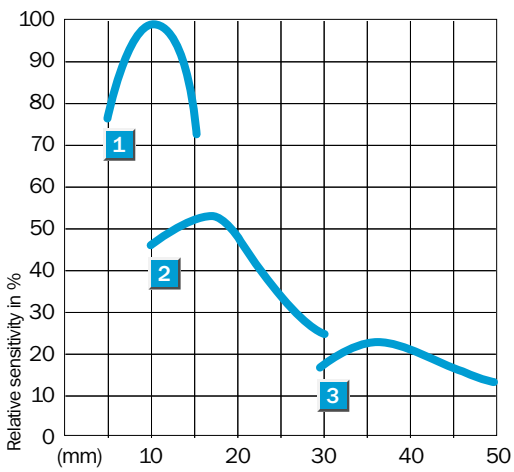
Accessories

Cables and connectors
Mounting systems
Lens

Technical data	KT 5W-2	P1116D	P1216D	P1316D	P1126D	P2116D	N1116D	N1216D	N1316D	N1126D	N2116D
Scanning distance	10 ± 3 mm	■			■	■	■			■	■
from front edge of lens	20 ± 3 mm		■					■			
	40 ± 3 mm			■					■		
Light spot dimensions	1.2 x 4.2 mm	■			■	■	■			■	■
	1.5 x 5.5 mm		■					■			
	1.1 x 4.2 mm			■					■		
Light source[1]; light type;	LED; red, blue, green;	■	■	■	■	■	■	■	■	■	■
Supply voltage V_S	10... 30 V DC[2]	■	■	■	■	■	■	■	■	■	■
Residual ripple[3]	< 5 V_{PP}	■	■	■	■	■	■	■	■	■	■
Current consumption[4]	< 130 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	■	■	■	■	■	■	■	■	■	■
Switching frequency[6]	To 10 000/s	■	■	■	■	■	■	■	■	■	■
Time delay	20 ms				■					■	
Light spot position	Longitudinal	■	■	■	■		■	■	■	■	
	Transverse					■					■
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, M12	■	■	■	■	■	■	■	■	■	■
VDE protection class[7]	⧈	■	■	■	■	■	■	■	■	■	■
Enclosure rating	IP 67	■	■	■	■	■	■	■	■	■	■
Circuit protection[8]	A, B, C	■	■	■	■	■	■	■	■	■	■
Ambient temperature T_A	Operation –10 ... +55 °C	■	■	■	■	■	■	■	■	■	■
	Storage –25 ... +75 °C	■	■	■	■	■	■	■	■	■	■
Shock load	To IEC 68	■	■	■	■	■	■	■	■	■	■
Weight	Approx. 400 g	■	■	■	■	■	■	■	■	■	■
Housing	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 32 V DC
8) A = V_S connections reverse-polarity protected
B = Outputs 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	Order no.
KT 5W-2P 1116D	1 026 538
KT 5W-2P 1216D	1 026 577
KT 5W-2P 1316D	1 026 578
KT 5W-2P 1126D	1 026 579
KT 5W-2P 2116D	1 026 584
KT 5W-2N 1116D	1 026 540
KT 5W-2N 1216D	1 026 580
KT 5W-2N 1316D	1 026 581
KT 5W-2N 1126D	1 026 582
KT 5W-2N 2116D	1 026 583

Scanning distance 150 mm

Contrast scanners

- Laser class 2
- Adjustment switch
- Long scanning distance
- Accurate recording of very small marks
- Switching frequency 10,000/s

Laser class 2

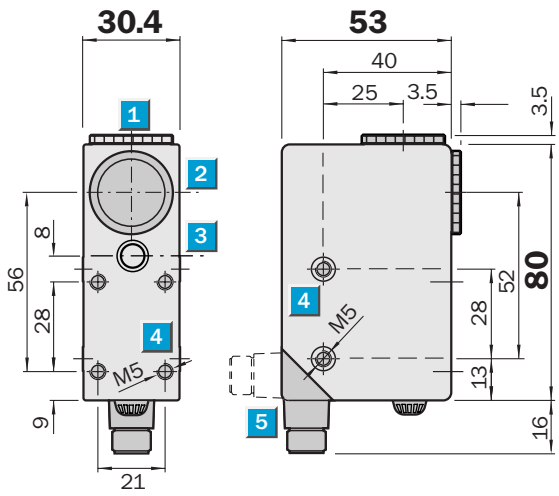
Accessories

Cables and connectors

Mounting systems

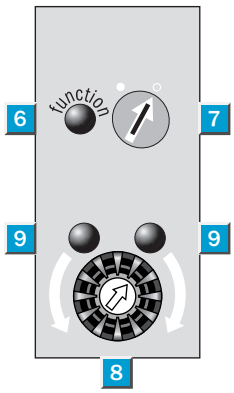
Dimensional drawing

All types



Adjustments possible

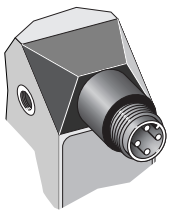
All types



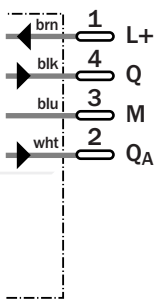
1	Blind screw
2	Receiver
3	Sender
4	M5 mounting holes, 5.5 mm deep
5	4-pin, M12 x 1 plug
6	Function signal indicator (red)
7	Operating mode selector switch
○	Light-switching
●	Dark-switching
8	Switching threshold adjustment
9	Adjustment indicators (green)

Connection type

All types



4-pin, M12



Technical data	KT 5L-	P3611	N3611								
Scanning distance	150 mm	■	■								
from front edge of lens											
Light spot	> 0.3 mm at 150 mm	■	■								
Light source[1]; light type;	Laser diode; red light;	■	■								
Wavelength (nm)	650	■	■								
Supply voltage V_S	10 ... 30 V DC[2]	■	■								
Residual ripple[3]	< 5 V_{PP}	■	■								
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]; switching frequency[6]	50 µs; 10000/s	■	■								
Analogue output Q_A	0.3 ... 10 mA	■	■								
Connection type	Plug M12, 4-pin	■	■								
VDE protection class[8]	⧈	■	■								
Laser class[9]	2 (IEC 825/VDE 0837)	■	■								
Enclosure rating	IP 67	■	■								
Ambient temperature T_A	Operation –10 ... +40 °C	■	■								
	Storage –25 ... +75 °C	■	■								
Shock load	To IEC 68	■	■								
Weight	Approx. 400 g	■	■								
Housing	Cast zinc	■	■								

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 32 V DC
8) A = V_S connections reverse-polarity protected
B = Outputs short-circuit protected
C = Interference pulse suppression

Order information	
Preferred type *)	**Order no.**
KT 5L-P 3611	1 011 536
KT 5L-N 3611	1 013 266

*) Further types on request

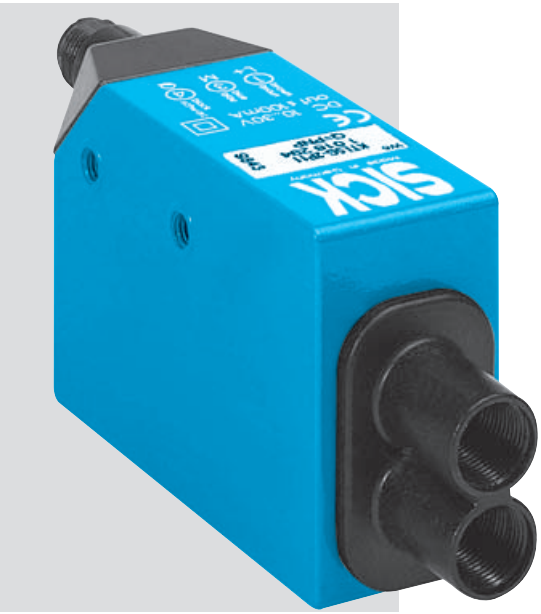
Scanning distance up to 15 mm

Proximity mode

Scanning range up to 60 mm

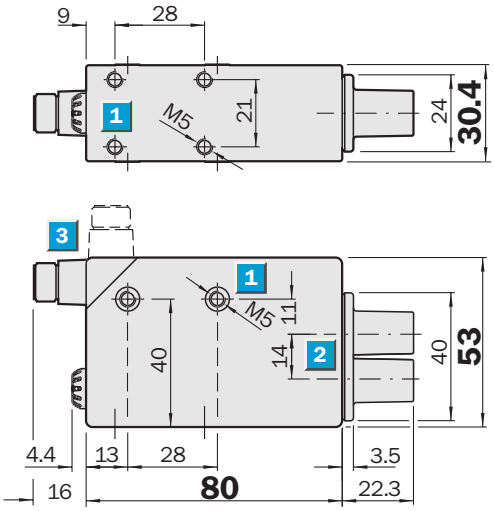
Through-beam mode

- Green light
- Switching threshold adjustable *or* static Teach-in to mark and background via control cable or control panel on unit *or* dynamic Teach-in
- Insensitive to ambient light



Dimensional drawing

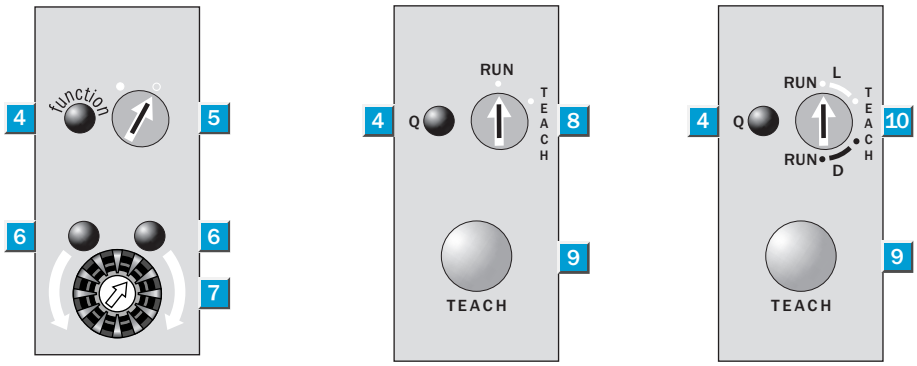
All types



1 M5 mounting holes, 5.5 mm deep
2 Fibre-optic adapter (M12 x 1 internal thread)
3 4-pin, M12 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)
8 Pre-selection switch
9 Teach-in button
10 L/D pre-selection switch

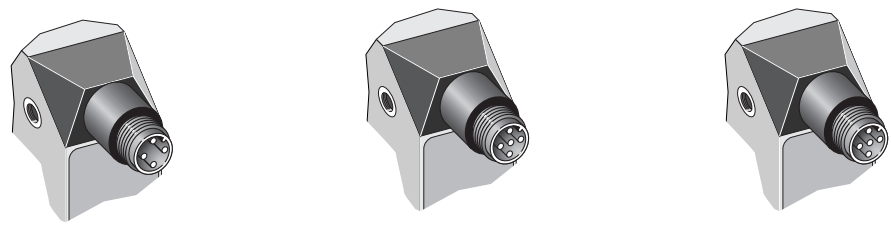
Adjustments possible

KTL 5G-2P11	KTL 5W-2P16	KTL 5W-2P23
KTL 5G-2N11		KTL 5W-2N13
KTL 5G-2P51		
KTL 5G-2N51		

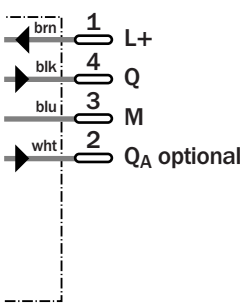


Connection type

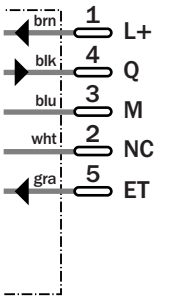
KTL 5G-2P11	KTL 5W-2P16	KTL 5W-2P23
KTL 5G-2N11		KTL 5W-2N13
KTL 5G-2P51		
KTL 5G-2N51		



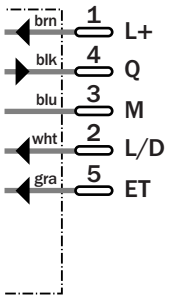
4-pin, M12



5-pin, M12x1



5-pin, M12x1



Accessories

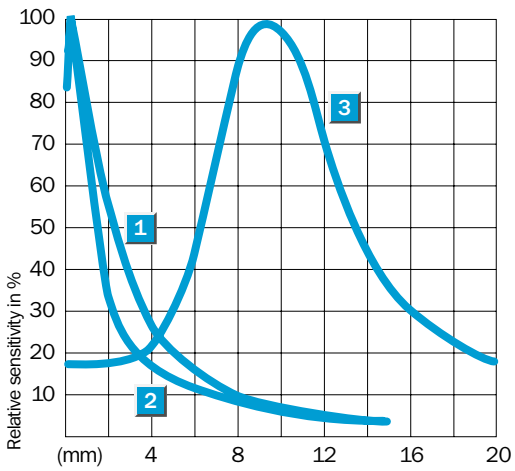
- Cables and connectors
- Mounting systems
- Fibre-optic cable

Technical data	KTL 5	G-2P11	G-2P51	G-2N11	G-2N51		W-2P16	W-2P23	W-2N13		
Scanning distance/scanning range	15 mm/60 mm	■	■	■	■		■	■	■		
Light source[1]; light type;	LED; green;	■	■	■	■						
Wavelength (nm)	520	■	■	■	■						
Light source[1]; light type;	LED; red, green, blue;						■	■	■		
Wavelength (nm)	640, 525, 470						■	■	■		
Supply voltage V_S	10... 30 V DC[2]	■	■	■	■		■	■	■		
Residual ripple[3]	< 5 V_{PP}	■	■	■	■		■	■	■		
Current consumption[4]	< 30 mA at DC 24 V	■	■	■	■		■	■	■		
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]; switching frequency[6]	50 µs; 10 000/s	■	■	■	■		■	■	■		
Time delay	No timing element	■	■	■	■		■		■		
	Deactivation delay, ... 20 ms							■			
Analogue output Q_A	0.3 ... 10 mA		■		■						
Connection type	Plug M12, 4-pin	■	■	■	■		■	■	■		
VDE protection class[8]	⧈	■	■	■	■		■	■	■		
Enclosure rating	IP 67	■	■	■	■		■	■	■		
Ambient temperature T_A	Operation –10 ... +55 °C	■	■	■	■		■	■	■		
	Storage –25 ... +75 °C	■	■	■	■		■	■	■		
Shock load	To IEC 68	■	■	■	■		■	■	■		
Weight	Approx. 400 g	■	■	■	■		■	■	■		
Housing	Cast zinc	■	■	■	■		■	■	■		
Switching threshold adjustment/	Manual switching threshold setting [9]	■	■	■	■						
Teach-in											
	Dynamic Teach-in [10]							■	■		
	Static Teach-in [11]						■				

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 32 V DC
8) A = V_S connections reverse-polarity protected
B = Outputs short-circuit protected
C = Interference pulse suppression
9) See page 11
10) See page 24
11) See page 29

Scanning distance

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



Order information

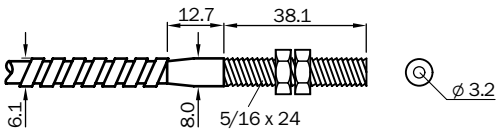
Preferred type *)	Order no.
KTL 5G-2P11	1 016 294
KTL 5G-2P51	1 016 950
KTL 5G-2N11	1 016 295
KTL 5G-2N51	1 016 951
KTL 5W-2P16	1 026 006
KTL 5W-2P23	1 019 551
KTL 5W-2N13	1 019 661

*) Further types on request

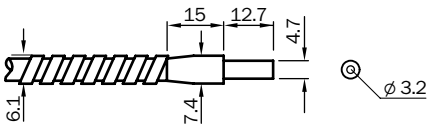
Dimension drawings and order information

- Fibre-optic cable with steel coating
- Transmission and reception fibres mixed randomly (scanning system)
- Ambient operating temperature –58 to +315 °C
- Fibre-optic cable length 900 mm (other lengths on request)
- Bending radius ≥ 19 mm

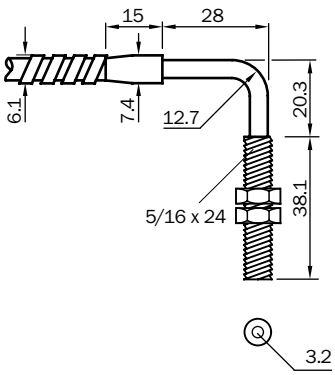
Fibre-optic cable LIS/LBS 32 900			
System	**Type**	**Order no.**	**Scanning ranges***
Through-beam	LIST 32 900	7 020 045	20 mm
Proximity	LBST 32 900	7 020 046	9 mm



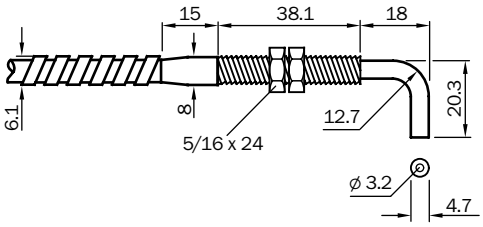
Fibre-optic cable LIS/LBS 32 900			
System	**Type**	**Order no.**	**Scanning ranges***
Through-beam	LISF 32 900	7 020 037	20 mm
Proximity	LBSF 32 900	7 020 038	9 mm



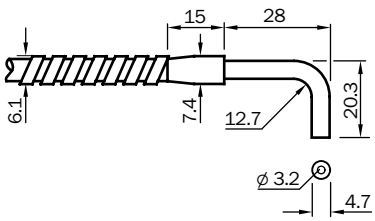
Fibre-optic cable LIS/LBS 32 900			
System	**Type**	**Order no.**	**Scanning ranges***
Through-beam	LISAT 32 900	7 020 035	20 mm
Proximity	LBSAT 32 900	7 020 036	9 mm



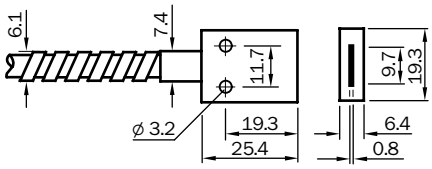
Fibre-optic cable LIS/LBS 32 900			
System	**Type**	**Order no.**	**Scanning ranges***
Through-beam	LISTA 32 900	7 020 047	20 mm
Proximity	LBSTA 32 900	7 020 048	9 mm



Fibre-optic cable LIS/LBS 32 900			
System	**Type**	**Order no.**	**Scanning ranges***
Through-beam	LISA 32 900	7 020 039	20 mm
Proximity	LBSA 32 900	7 020 040	9 mm



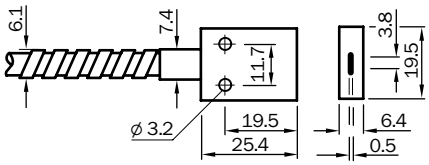
Fibre-optic cable LIS/LBS 32 900			
System	**Type**	**Order no.**	**Scanning ranges***
Through-beam	LISR 32 900	7 020 041	20 mm
Proximity	LBSR 32 900	7 020 042	9 mm



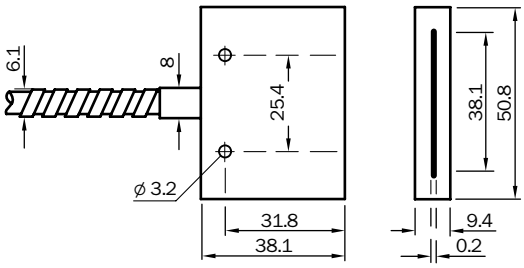
* Scanning distance/operating range
Material to be scanned with 90 % reflectance (DIN 5033)
Size of material to be scanned – light spot diameter
(acceptance angle approx. 60°)

The order number contains one fibre-optic cable.
Two fibre-optic cables are required for through-beam systems.

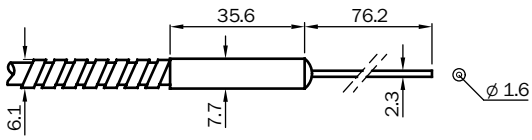
Fibre-optic cable LIS/LBS 16 900			
System	**Type**	**Order no.**	**Scanning ranges***
Through-beam	LISR 16 900	7 020 049	20 mm
Proximity	LBSR 16 900	7 020 050	9 mm



Fibre-optic cable LIS/LBS 40 900			
System	**Type**	**Order no.**	**Scanning ranges***
Through-beam	LISR 40 900	7 020 051	20 mm
Proximity	LBSR 40 900	7 020 052	9 mm

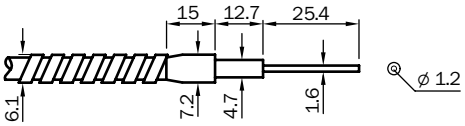


Fibre-optic cable LIS/LBS 16 900			
System	**Type**	**Order no.**	**Scanning ranges***
Through-beam	LISP 16 900	7 020 043	20 mm
Proximity	LBSP 16 900	7 020 044	9 mm



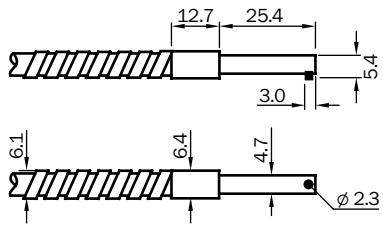
Bending radius of the end sleeve R_{min} = 12 mm

Fibre-optic cable LIS/LBS 12 900			
System	**Type**	**Order no.**	**Scanning ranges***
Through-beam	LISM 12 900	7 020 053	20 mm
Proximity	LBSM 12 900	7 020 054	9 mm

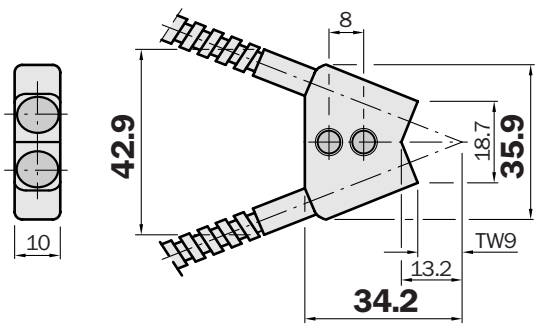


Bending radius of the end sleeve R_{min} = 6 mm

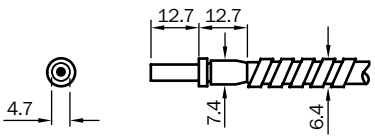
Fibre-optic cable LIS/LBS 23 900			
System	**Type**	**Order no.**	**Scanning ranges***
Through-beam	LISAA 23 900	7 020 102	20 mm
Proximity	LBSAA 23 900	7 020 103	9 mm



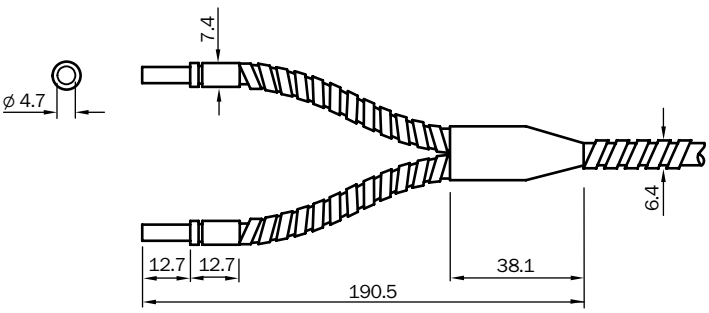
Fibre-optic cable OCSL			
System	**Type**	**Order no.**	**Scanning ranges***
Proximity	OCSL	1 016 296	9 mm



Fibre-optic cable adaption
Through-beam system



Proximity system



The mounting material is included with the scanner.
Sleeve nut: WLL 260
Snap ring, O-ring and mounting instructions: WLL 260 fibre-optic cable

* Scanning distance/operating range
Material to be scanned with 90 % reflectance (DIN 5033)
Size of material to be scanned – light spot diameter
(acceptance angle approx. 60°)

The order number contains one fibre-optic cable.
Two fibre-optic cables are required for through-beam systems.

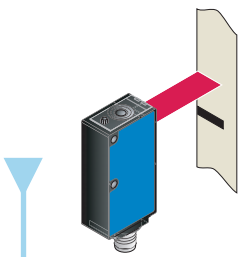
Dynamic, convenient, excellent: Contrast Scanners with dynamic Teach-in

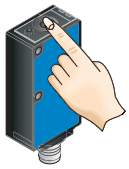
The new KT 3 contrast scanner is small in price and design, but big in detecting contrasts in standard applications. With scanning ranges to 12.5 mm and switching sequences up to 10,000/s, the mark sensor is predestined for use in packaging machines, for example.

Features such as integrated tuning of switching thresholds for high-gloss objects and dynamic Teach-in make the KT 3 easy to both commission and use. Depending on the existing contrast, the KT 3 selects the optimum transmission colour (red, green or blue). And thanks to the miniature design, the KT 3 is especially well suited for cramped quarters.

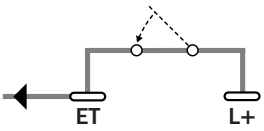
Contrasts do not need expensive technology, but instead simply the KT 3.

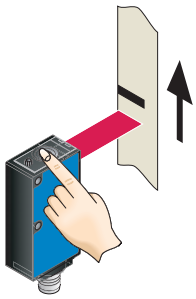
Teach-in: setting switching threshold



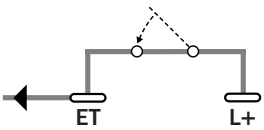


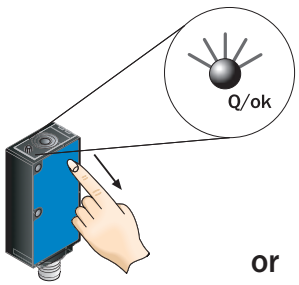
or



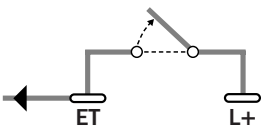


or



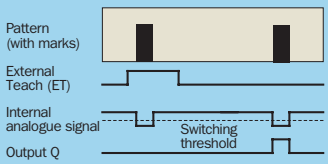


or



Notes

- The switching threshold is in the middle between the reception signals from the background and mark and is stored permanently.
- The optimum transmission light was selected automatically.



Status

- The material speed during the Teach-in procedure must be slower than 10 m/minute when there are smaller marks.
- Only teach-in one mark if possible.
- If the Teach-in procedure was unsuccessful, the output switches at approx. 3.5/s and the yellow LED display blinks. The reception signal was too weak, too strong (possibly due to shiny reflectance) or the contrast difference was too slight.

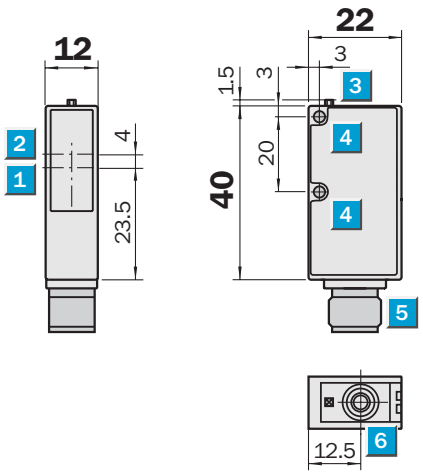
Scanning distance 12.5 mm

Contrast scanners

- Light source green or red, green, blue
- Integrated switching threshold adjustment for detection of extremely shiny objects
- Dynamic Teach-in via control panel or control wire while machine is running
- Switching frequency 10,000/s

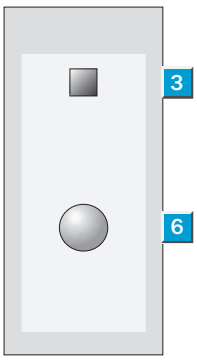
Dimensional drawing

All types



Adjustments possible

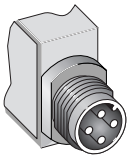
All types



1 Axis of the sender optics
2 Axis of the receiver optics
3 LED signal strength indicator
4 Mounting hole
5 Plug M12, 4-pin
6 Teach-in button

Connection type

All types

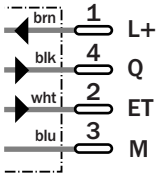


Accessories

Cables and connectors

Mounting systems

4-pin, M12

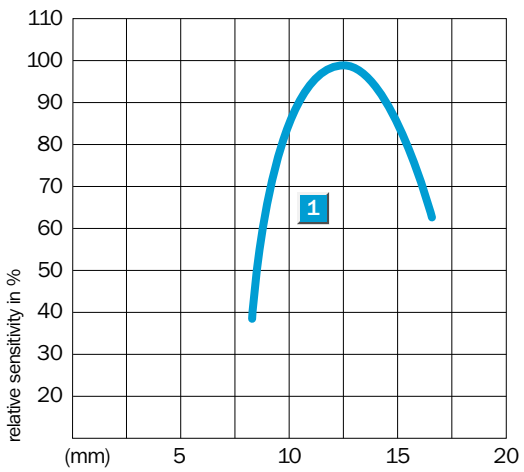


Technical data	KT 3	W-P 1115	W-N 1115
Scanning distance	12.5 mm		
from front edge of lens			
Scanning distance tolerance	± 2 mm		
Light spot dimensions	1.5 x 6.5 mm		
	1.5 x 3.5 mm		
Light source[1]; light type;	LED; red, green, blue;		
Wavelength (nm)	640, 525, 470		
Supply voltage V_S	24 V DC ± 20 %		
Residual ripple[2]	< 5 V_{PP}		
Current consumption[3]	< 35 mA		
Switching outputs	NPN: HIGH = V_S / LOW = < 2 V		
	PNP: HIGH = V_S- < 2 V/ LOW = approx.		
Output current I_A max.	100 mA		
Response time[4]	50 µs		
Switching frequency[5]	To 10 000/s		
Time delay optional	20 ms		
Teach-in input ET	PNP: Teach > 10 V...< V_S		
	NPN: Teach 0 V		
Connection type	Plug 4-pin, M12		
VDE protection class[6]	⧈		
Enclosure rating	IP 67		
Circuit protection[7]	A, B, C		
Ambient temperature T_A	Operation –10 ... +55 °C		
	Storage –20 ... +75 °C		
Shock load	To IEC 68		
Weight	Approx. 80 g		
Housing	ABS		
Switching threshold adjustment/ Teach-in	Dynamic Teach-in		

1) Average service life 100,000 h at T_A = + 25 °C
2) May not exceed or fall short of V_S tolerances
3) Without load
4) Signal transit time with resistive load
5) With light/dark ratio 1:1
6) Reference voltage 32 V DC
7) A = V_S connections reverse-polarity protected
B = Outputs short-circuit protected
C = Interference pulse suppression

Scanning distance

1 Scanning distance 12.5 mm



Order information

Preferred type *)	Order no.
KT 3W-P 1115	1 025 326
KT 3W-N 1115	1 025 325

*) Further types on request

KT 3G-P/N__-6
KT 3W-P/N__-6
KT 3L-P/N__-6

Contrast Scanners

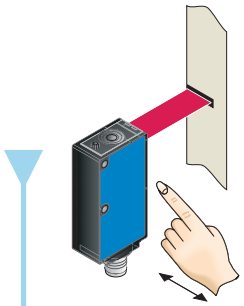
Ready, steady, go: Contrast Scanners with static Teach-in on mark and background

The proven static 2-point Teach-in is also available in the KT 3. You only need to teach on the mark and the background, and away you go. The sensor selects the optimum transmission colour (for KT 3 W) and matches the switching threshold according to the difference between mark and background. High-gloss foils are no problem, thanks to automatic gloss adjustment. The 10 kHz technology completes the superb functionality of this little wonder.

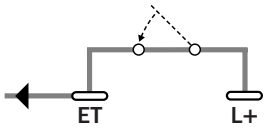
The laser version of the KT 3 is available for detecting small marks at great scanning distances. It features a small light spot, irrespective of changes in scanning distance. This leads to high repeat accuracy.

Thanks to its high switching frequency, the KT 3 laser ensures economical operation of your machine.

Teach-in: setting switching threshold



or



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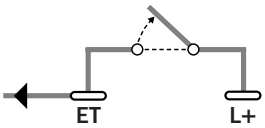
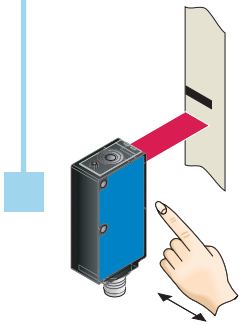
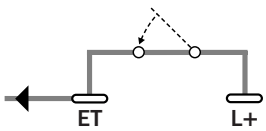
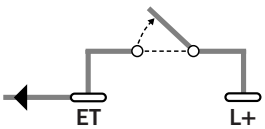




or

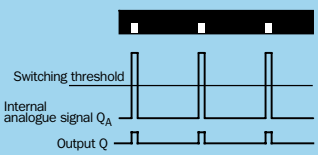


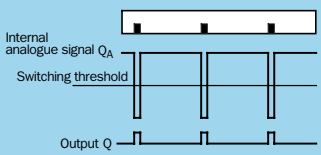
+



Status

- After the first stage of the Teach-in (longer than 1 s), the emitted light and the status indicator flash slowly which indicates that the second stage of Teach-in must be initiated.
- LED and signal strength indicator not flashing = Teach-in successfully completed.
- LED and signal strength indicator flashing rapidly = Teach-in unsuccessful.
- The optimum transmission light was selected automatically.





Notes

- Light-/dark-switching not required: equipment switches for the material to be scanned, which was under the light spot at the first Teach-in procedure (mark or background).
- The material speed must be zero during Teach-in (machine is idle).

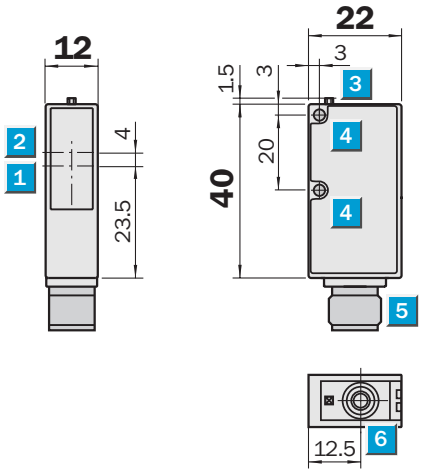
Scanning distance 12.5 mm

Contrast scanners

- Light source green or red, green, blue
- Integrated switching threshold adjustment for detection of extremely shiny objects
- Static 2-point Teach-in to mark and background via control cable or control panel on unit
- Switching frequency 10,000/s

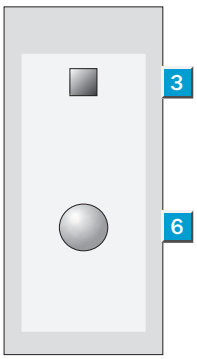
Dimensional drawing

All types



Adjustments possible

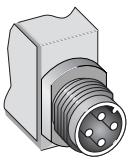
All types



1 Axis of the sender optics
2 Axis of the receiver optics
3 LED signal strength indicator
4 Mounting hole
5 Plug M12, 4-pin
6 Teach-in button

Connection type

All types

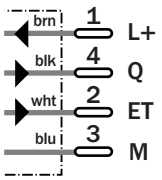


Accessories

Cables and connectors

Mounting systems

4-pin, M12

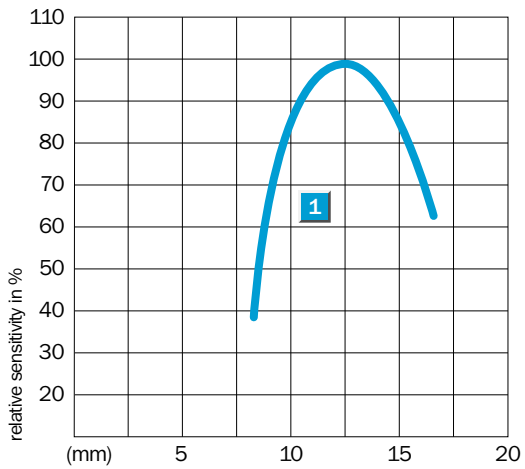


Technical data	KT 3	G-P 1116	G-N 1116		W-P 1116	W-P 1126	W-N 1116				
Scanning distance	12.5 mm, ± 2 mm	■	■		■	■	■				
from front edge of lens											
Light spot dimensions	1.5 x 6.5 mm				■	■	■				
	1.5 x 3.5 mm	■	■								
Light source[1]; light type;	LED; red, green, blue;				■	■	■				
Wavelength (nm)	640, 525, 470				■	■	■				
Light source[1]; light type;	green;	■	■								
Wavelength (nm)	520	■	■								
Supply voltage V_S	24 V DC ± 20 %	■	■		■	■	■				
Residual ripple[2]	< 5 V_{PP}	■	■		■	■	■				
Current consumption[3]	< 35 mA	■	■		■	■	■				
Switching outputs	NPN: HIGH = V_S /LOW = < 2 V		■				■				
	PNP: HIGH = V_S- < 2 V/	■			■	■					
	LOW = approx. 0 V										
Output current I_A max.	100 mA	■	■		■	■	■				
Response time[4]	50 µs	■	■		■	■	■				
Switching frequency[5]	To 10 000/s	■	■		■	■	■				
Time delay	No timing element	■	■		■		■				
	Deactivation delay, ... 20 ms					■					
Teach-in input ET	PNP: Teach > 10 V ... < V_S	■			■	■					
	NPN: Teach 0 V		■				■				
Connection type	Plug 4-pin, M12	■	■		■	■	■				
VDE protection class[6]	⧈	■	■		■	■	■				
Enclosure rating	IP 67	■	■		■	■	■				
Circuit protection[7]	A, B, C	■	■		■	■	■				
Ambient temperature T_A	Operation –10 ... +55 °C	■	■		■	■	■				
	Storage –20 ... +75 °C	■	■		■	■	■				
Shock load	To IEC 68	■	■		■	■	■				
Weight	Approx. 80 g	■	■		■	■	■				
Housing	ABS (plastic)	■	■		■	■	■				
Switching threshold adjustment/	Static Teach-in	■	■		■	■	■				
Teach-in											

1) Average service life 100,000 h at T_A = + 25 °C
2) May not exceed or fall short of V_S tolerances
3) Without load
4) Signal transit time with resistive load
5) With light/dark ratio 1:1
6) Reference voltage 32 V DC
7) A = V_S connections reverse-polarity protected
B = Outputs short-circuit protected
C = Interference pulse suppression

Scanning distance

1 Scanning distance 12.5 mm



Order information

Preferred type *)	Order no.
KT 3G-P 1116	1 019 446
KT 3G-N 1116	1 019 445
KT 3W-P 1116	1 019 338
KT 3W-P 1126	1 022 933
KT 3W-N 1116	1 019 337

*) Further types on request

Scanning distance
20 ... 60 mm

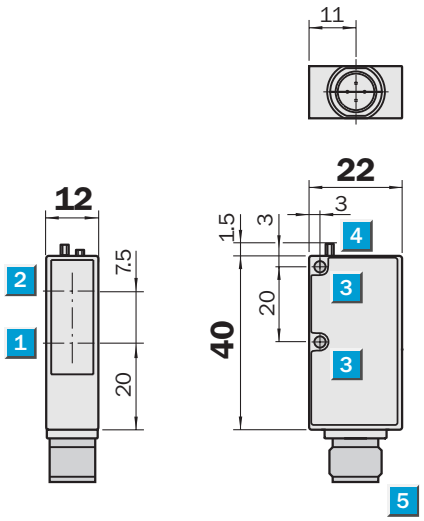
Contrast scanners

- Light source laser
- Automatic switching threshold adjustment for detection of extremely shiny objects
- Static Teach-in to mark and background via control cable and control panel
- Switching frequency 1,500/s
- M12 plug

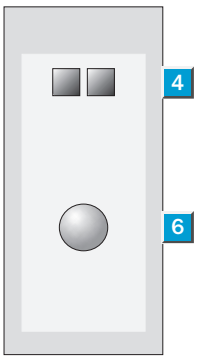
CE CDRH

Accessories
Cables and connectors
Mounting systems

Dimensional drawing
All types

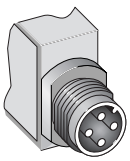


Adjustments possible
All types

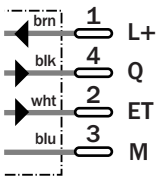


1 Axis of the sender optics
2 Axis of the receiver optics
3 Through hole Ø 3.2 mm
4 Operating signal green; signal strength indicator yellow
5 Plug M12 or M8, 4-pin
6 Teach-in button

Connection type
All types



4-pin, M12

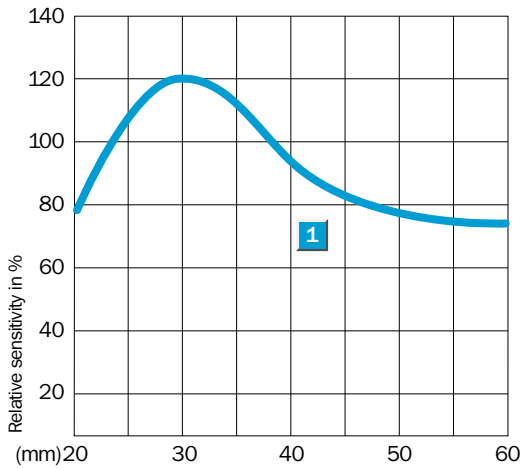


Technical data	KT 3	L-P 3216	L-N 3216
Scanning distance	20 ... 60 mm	■	■
from front edge of lens			
Light spot dimensions	At a nominal distance of 40 mm	■	■
	1 x 2 mm longitudinal		
Light source[1]	Laser class 2	■	■
Wavelength (nm)	655	■	■
Supply voltage V_S	10 ... 30 V DC	■	■
Residual ripple[2]	< 5 V_{PP}	■	■
Current consumption[3]	< 35 mA	■	■
Switching outputs	PNP: HIGH = V_S - < 2 V/	■	
	LOW = approx. 0 V		
	NPN: HIGH = V_S /LOW = < 2 V		■
Output current I_A max.	100 mA	■	■
Response time[4]	400 µs	■	■
Switching frequency[5]	1 500/s	■	■
Time delay, optional	20 ms	■	■
Teach-in input ET	PNP: Teach U < 2 V	■	
	NPN: Teach U > 8 V		■
Connection type	Plug 4-pin, M12	■	■
VDE protection class[6]	⧈	■	■
Enclosure rating	IP 67	■	■
Circuit protection[7]	A, B, C	■	■
Ambient temperature T_A	Operation –10 ... +55 °C	■	■
	Storage –20 ... +75 °C	■	■
Shock load	To IEC 68	■	■
Weight	Approx. 80 g	■	■
Housing	ABS	■	■

[1] Average service life 50,000 h at T_A = + 25 °C
[2] May not exceed or fall short of V_S tolerances
[3] Without load
[4] Signal transit time with resistive load
[5] With light/dark ratio 1:1
[6] Reference voltage 32 V DC
[7] A = V_S connections reverse-polarity protected
B = Oututs short-circuit protected
C = Interference pulse suppression

Scanning distance

1 Scanning distance 20 ... 60 mm



Order information	
Preferred type *)	**Order no.**
KT 3L-P 3216	1 026 244
KT 3L-N 3216	1 026 245

*) Further types on request

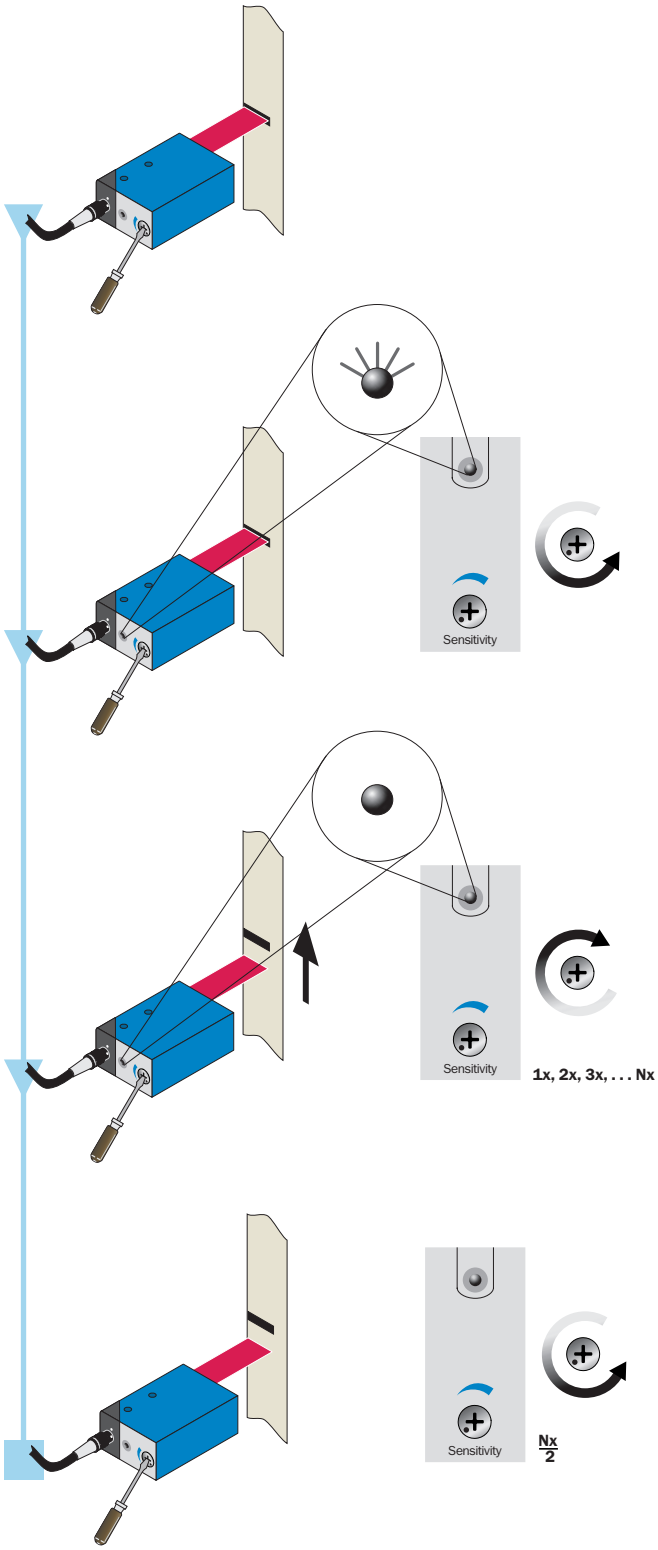
Contrast scanner with a good price/performance ratio

The KT 2 contrast scanner can be used in many industrial sectors in which print marks can control work processes. Dependent on the gray value difference, you can select between sensors with red or green transmission light. The manual switching threshold adjustment provides smooth operation and a high degree of detection reliability. Setting and resetting from dark to light marks and back is easy and simple via control wire.

Contrast scanners of the KT 2 series with compact metal housing are an inexpensive alternative for standard applications with only slight performance requirements for contrast detection due to simple colouring of the print marks.

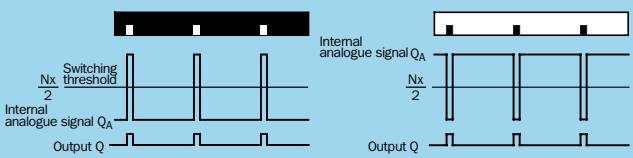
In addition to a 5-pin M12 standard plug, the KT 2 contrast scanner can be attached using a dovetail and additional mounting holes for convenient and flexible electric and mechanic integration in many different environments.

Setting switching threshold



Status

- The switching threshold is set in the middle between the background and the mark.



Note

- The material speed must be zero during Teach-in (machine is idle).

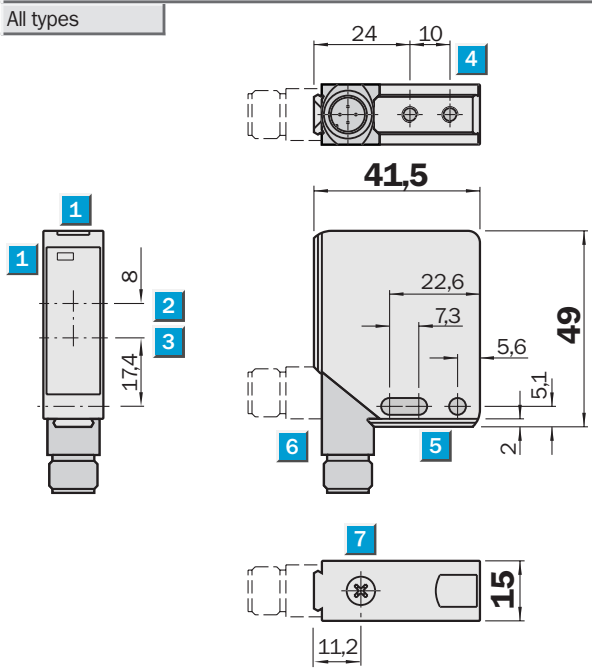
Scanning distance 13.5 mm

Contrast scanners

- Red or green light transmitter
- Sensitivity adjustable
- Light- or dark-switching selectable via control cable
- Switching frequency 10,000/s
- NPN and PNP switching output

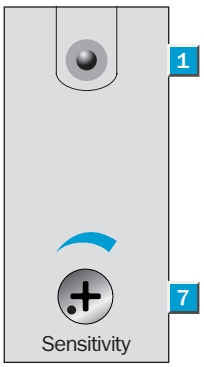
Dimensional drawing

All types



Adjustments possible

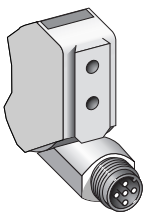
All types



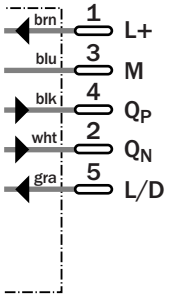
1 LED signal strength indicator
2 Optical axis – receiver
3 Optical axis – sender
4 M4 mounting holes, 4 mm deep
5 Through hole ø 4.2 mm
6 M12 plug (rotatable through 90°)
7 Sensitivity adjustment

Connection type

All types



5-pin, M12



Accessories

Cables and connectors

Mounting systems

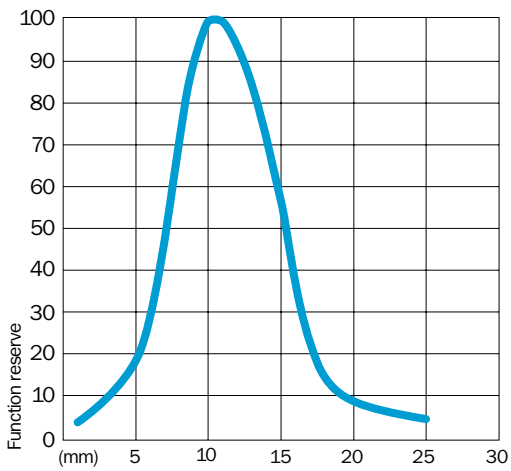
Technical data	KT 2	R-2B 3711	G-2B 3711	R-2B 3721
Scanning distance	13.5 mm	■	■	■
from front edge of lens				
Light spot dimensions	2 mm, round	■	■	■
Light source[1]; light type;	LED; red:	■		■
Wavelength (nm)	660	■		■
Light source[1]; light type;	LED; green;		■	
Wavelength (nm)	525		■	
Supply voltage V_S	10 ... 30 V DC[2]	■	■	■
Residual ripple[3]	< 5 V_{PP}	■	■	■
Current consumption[4]	< 80 mA	■	■	■
Switching outputs	light-/dark-switching	■	■	■
	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]; switching frequency[6]	≤ 300 µs; 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, M12, 5-pin	■	■	■
VDE protection class[7]	⧈	■	■	■
Enclosure rating	IP 67	■	■	■
Circuit protection[8]	A, B, C	■	■	■
Ambient temperature T_A	Operation –10 ... +55 °C	■	■	■
	Storage –25 ... +75 °C	■	■	■
Shock load	To IEC 68	■	■	■
Weight	Approx. 400 g	■	■	■
Housing	Cast zinc	■	■	■

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 32 V DC
8) A = V_S connections reverse-polarity protected
B = Outputs short-circuit protected
C = Interference pulse suppression

Scanning distance

Scanning distance SD, adjustable	13.5 mm

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



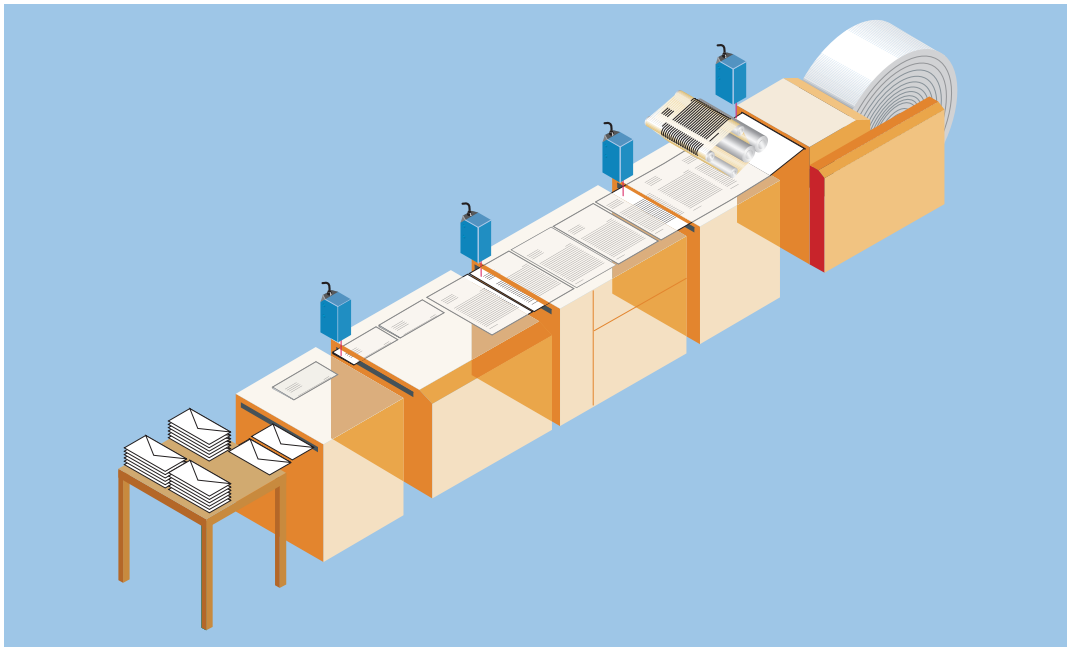
Order information

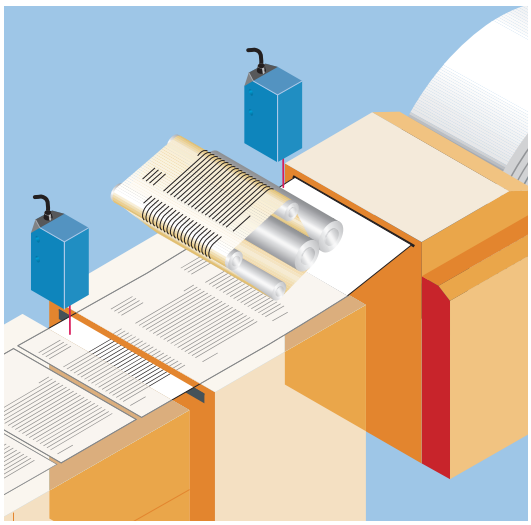
Preferred type *)	Order no.
KT 2R-2B 3711	1 016 112
KT 2G-2B 3711	1 016 115
KT 2R-2B 3721	1 016 114

*) Further types on request

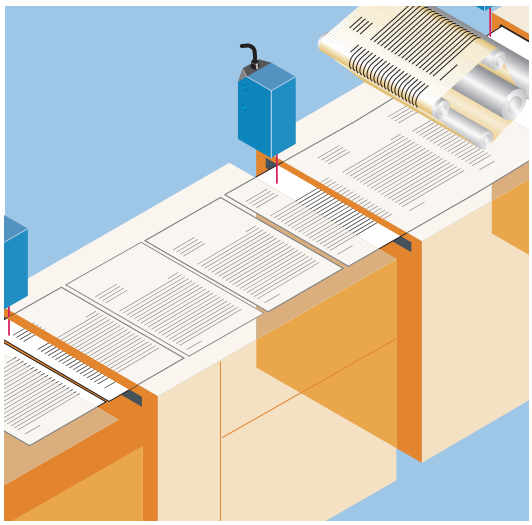
▶ Precise detection of printing, folding and reference marks as well as high processing speed is a matter of course for the contrast scanner, as is the great reproducibility required in printing machines, high performance copiers and in continuous form systems for printing, cutting, folding and inserting letters into envelopes.

Of course, the contrast scanner can also be used for other applications, i.e. packaging, which place great demands on contrast detection.

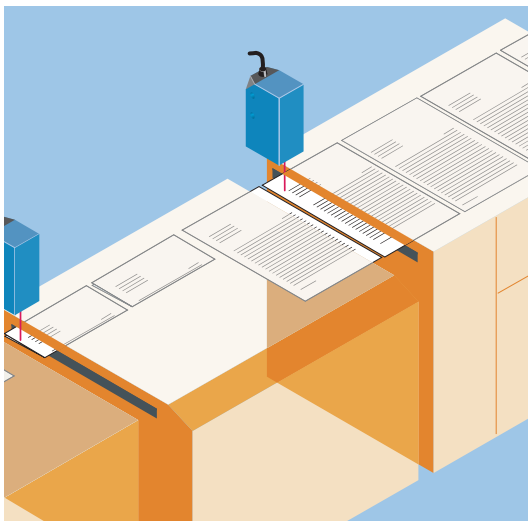




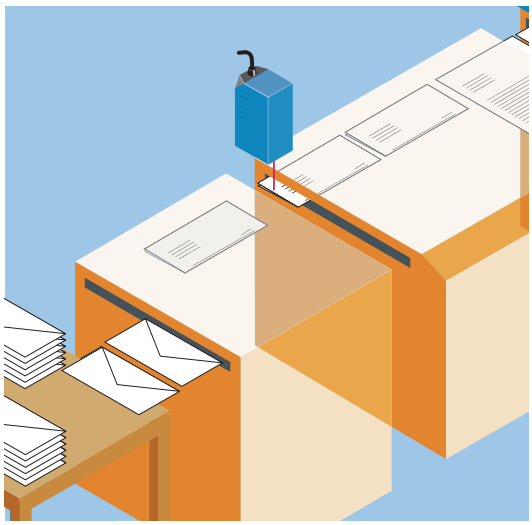
▲ Precise control of printing processes is made possible by the high contrast resolution of the contrast scanner.



▲ The high repeat accuracy of the contrast scanner is required to ensure precise cutting.



▲ Folding processes can be controlled without any problem using the contrast scanner even at extremely high processing speeds.



▲ Checking the presence of, for example, the address field when letters are put into envelopes, is no problem for the contrast scanner.

Dimension drawings and order information

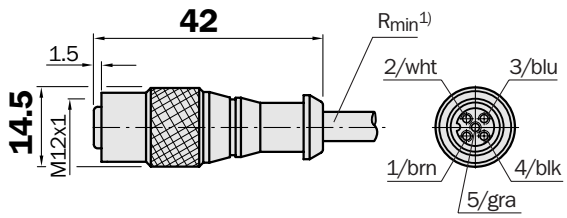
SENSICK screw-in system M12, 4- or 5-pin, enclosure rating IP 67

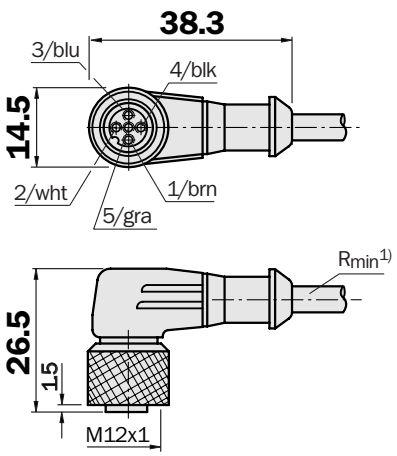
Female connector M12, 4- or 5-pin, straight
Cable diameter 5/6 mm, 4/5 x 0.25 mm², sheath PVC

Type	Order no.	Contacts	Cable length
DOL-1204-G02M	6 009 382	4	2 m
DOL-1204-G05M	6 009 866	4	5 m
DOL-1204-G10M	6 010 543	4	10 m
DOL-1204-G15M	6 010 753	4	15 m
DOL-1205-G02M	6 008 899	5	2 m
DOL-1205-G05M	6 009 868	5	5 m
DOL-1205-G10M	6 010 544	5	10 m

Female connector M12, 4- or 5-pin, right angle
Cable diameter 5/6 mm, 4/5 x 0.25 mm², sheath PVC

Type	Order no.	Contacts	Cable length
DOL-1204-W02M	6 009 383	4	2 m
DOL-1204-W05M	6 009 867	4	5 m
DOL-1204-W10M	6 010 541	4	10 m
DOL-1205-W02M	6 008 900	5	2 m
DOL-1205-W05M	6 009 869	5	5 m
DOL-1205-W10M	6 010 542	5	10 m

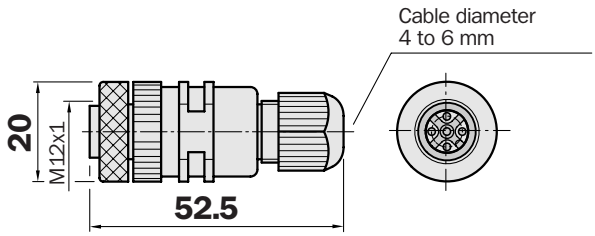




1) Minimum bend radius in dynamic use
R_{min} = 20 x cable diameter

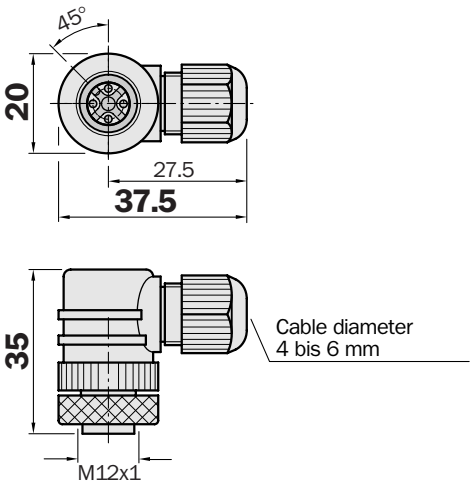
Female connector M12, 4- or 5-pin, straight

Type	Order no.	Contacts
DOS-1204-G	6 007 302	4
DOS-1205-G	6 007 719	5



Female connector M12, 4- or 5-pin, right angle

Type	Order no.	Contacts
DOS-1204-W	6 007 303	4
DOS-1205-W	6 007 720	5

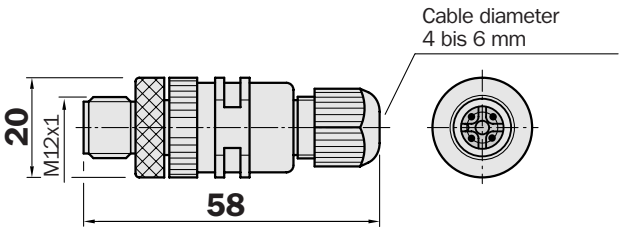


Dimension drawings and order information

SENSICK screw-in system M12, 4- or 5-pin, enclosure rating IP 67

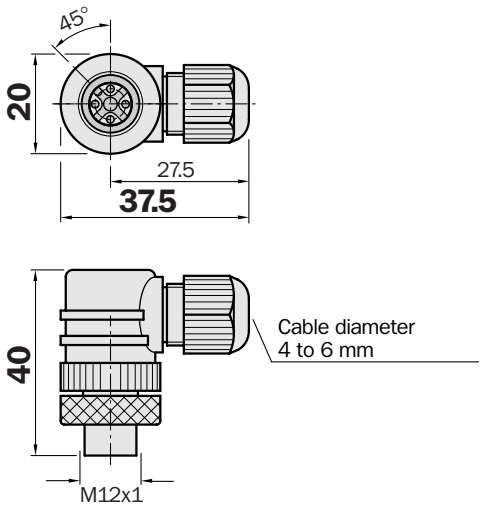
Male connector M12, 4- or 5-pin, straight

Type	Order no.	Contacts
STE-1204-G	6 009 932	4
STE-1205-G	6 022 083	5



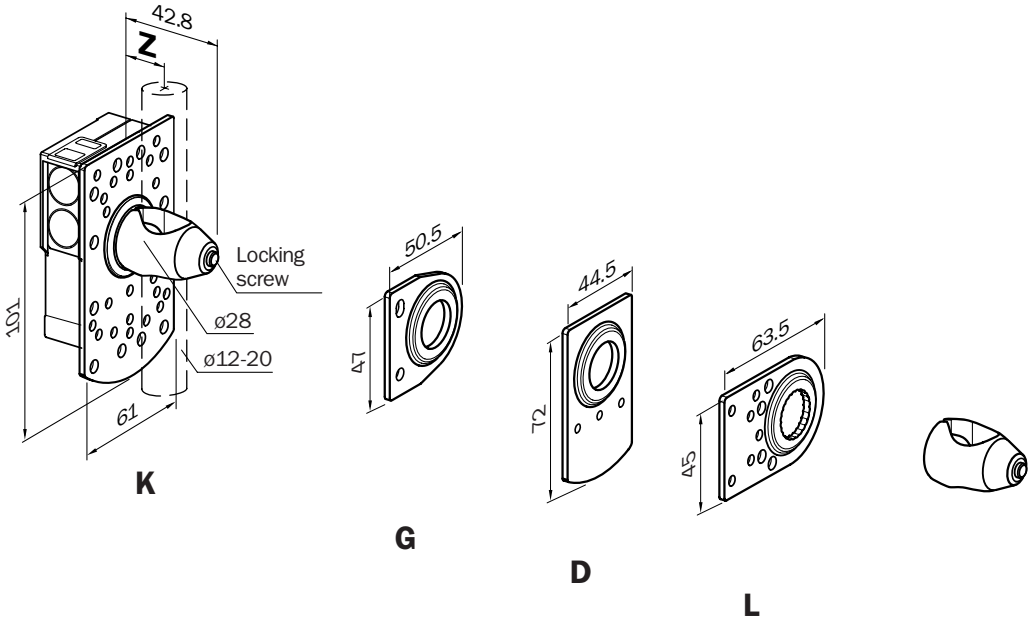
Male connector M12, 4- or 5-pin, right angle

Type	Order no.	Contacts
STE-1204-W	6 022 084	4
STE-1205-W	6 022 082	5



Mounting systems

Universal bar clamps for sensors and reflectors



Mounting plates	Type	Order no. [1]	for device/reflector type
D	BEF-KHS-D01	2 022 461	KT 2
G	BEF-KHS-G01	2 022 464	KT 5, KT 10
K	BEF-KHS-K01	2 022 718	KT 2, KT 5, KT 10
L	BEF-KHS-L01	2 023 057	KT 3
	BEF-KHS-KH1	2 022 726	Bracket for rod mounting without attachment plate and mounting material

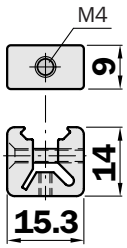
[1] Order no. includes bar support and mounting material

Dimension drawings and order information

Mounting systems

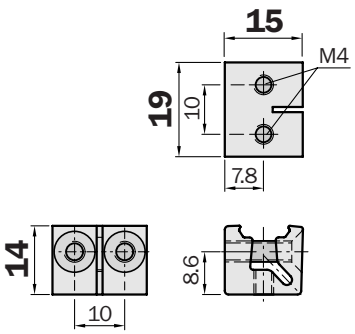
Clamp for KT 2

Type	Order no.
BEF-KH-W12	2 013 285



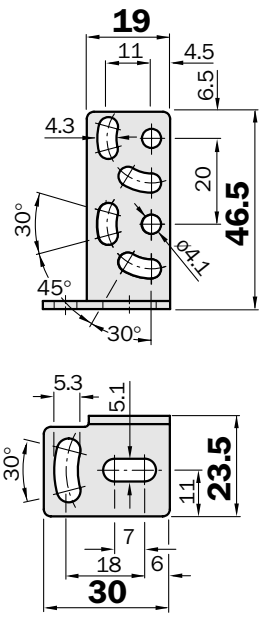
Double clamp for KT 2

Type	Order no.
BEF-DKH-W12	2 013 947



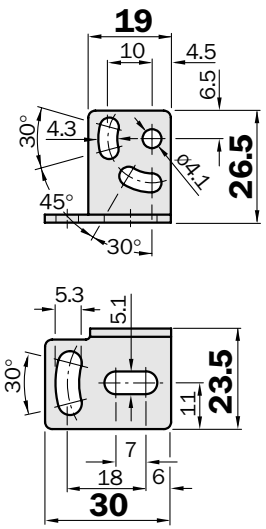
Mounting bracket, large for KT 2

Type	Order no.
BEF-WG-W12	2 013 942



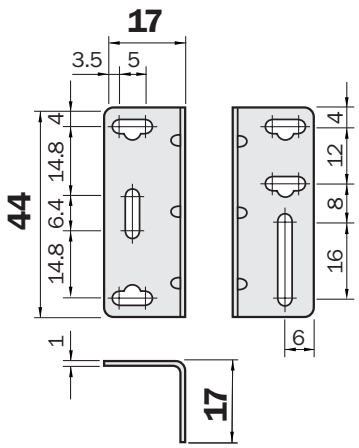
Mounting bracket, small for KT 2

Type	Order no.
BEF-WK-W12	2 012 938



Mounting bracket for KT 3

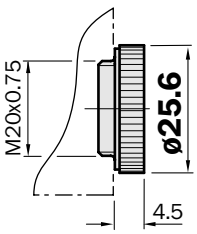
Type	Order no.
BEF-WN-W9-2	2 022 855



Lenses (SD = Scanning distance)

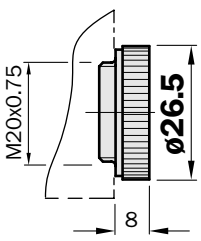
Lens, SD = 10 mm

Type	Order no.
OBJ-211	1 004 936



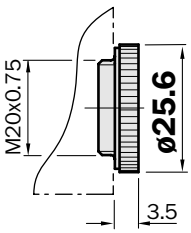
Lens, SD = 18 mm

Type	Order no.
OBJ-213	2 009 266



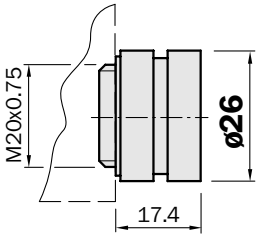
Lens, SD = 20 mm

Type	Order no.
OBJ-212	1 001 506



Lens, SD = 40 mm

Type	Order no.
OBJ-210	2 010 945



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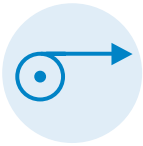
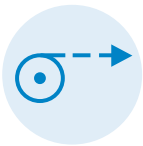
Explanation of the pictograms

Material feed

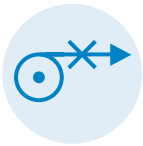
Machine is running



Machine is clocking



Machine is idle



Switching threshold setting

Teach-in per push of a button

Manual setting using knob

Manual setting using screwdriver

Setting via control wire (External Teach-in: ET; light/dark: L/D; fine/coarse: F/C)

Mark

Setting on mark or mark and background

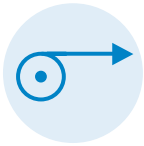
Setting via at least one repetition length

Dynamic contrast detection

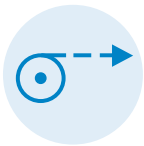
Explanation of the pictograms

Material feed

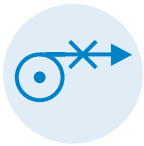
Machine is running



Machine is clocking



Machine is idle



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