KT2

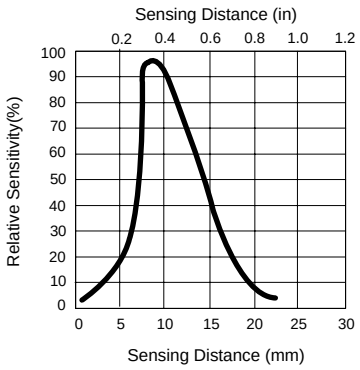
contrast sensor

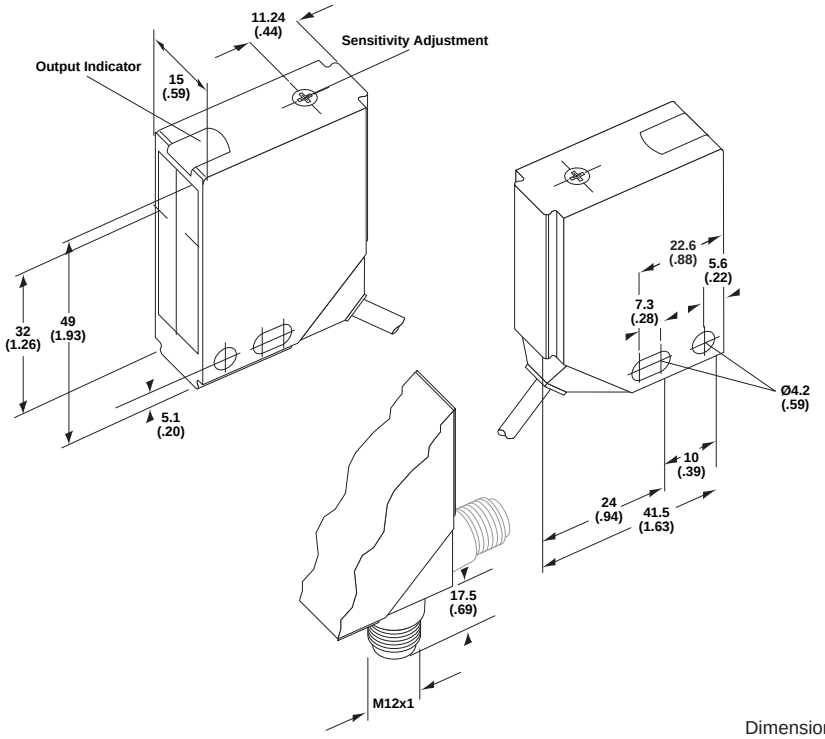
PRODUCT HIGHLIGHTS

- ▶ Rugged diecast metal housing
- ▶ Green light sender
- ▶ High switching frequency
- ▶ Outputs short circuit protected
- ▶ Power supply reverse polarity protected
- ▶ PNP and NPN in the same switch
- ▶ Rotatable quick disconnect

13.5 mm (.53 in)

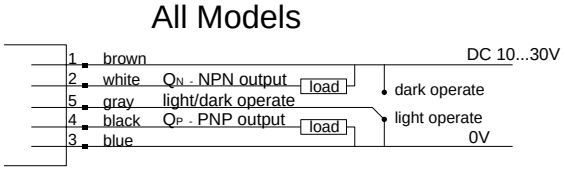
relative sensitivity



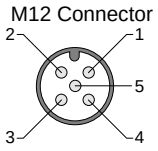


Dimensions in mm (in)

connection diagram



wire colors refer to standard cable, not included



KT2

contrast sensor

KT 2

Part Number	for model and part numbers please see page 355
Sensing Distance	13.5 mm (0.54 in)
Sensing Distance Tolerance	± 1.5 mm (0.06 in)
Light Spot Size	2 mm (0.08 in)
Light Source	LED Blue-Green (520 nm) or Red, average service life 100,000 hours @ 25°C (77°F)
External Light Immunity	Modulated light source with digital evaluation via SICK custom ASIC
Crosstalk Immunity	Automatic modulation frequency shift via SICK custom ASIC
Response Time / Frequency	≤ 360 µs / 1300 Hz
Supply Voltage (limit values)	10...30 V DC
Current Consumption (no load) at 24 V DC	≤ 25 mA
Ripple (within V_S tolerance)	≤ 5 V peak-to-peak
Output Type	PNP or NPN
Output Voltage High	PNP: V_S - (≤ 2 V); NPN: approx. V_S
Output Voltage Low	PNP: approx. 0 V; NPN: ≤ 2 V
Output Current Max.	100 mA
Operation Mode	Light or dark switching selectable via wire
Connection Type	M12 5-pin plug
Connecting Cable	see accessories
Housing	Diecast zinc
Enclosure Rating	IP 67 / NEMA 6
VDE Protection Class	II Double Insulated
EMC	IEC 801, parts 2, 3, 4
Circuit Protection	Outputs short circuit protected, V_S reverse polarity protected
Shock / Vibration	IEC 68
Test Input	-
Alarm Output	-
Timing Options	-
Ambient Operating Temperature	-40...60°C (-40...140°F)
Storage Temperature	-40...75°C (-40...167°F)
Mounting Bracket	2 013 285 dovetail (2 included), 2 012 938 small bracket, 2 013 942 large bracket
Weight	approx. 120 g (4.2 oz)

KT5-2

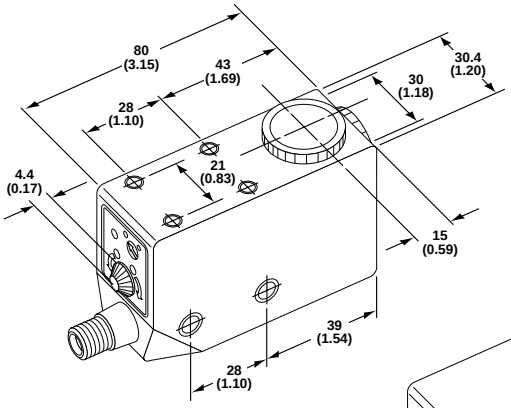
contrast sensor

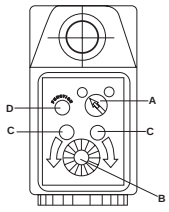
PRODUCT HIGHLIGHTS

- ▶ Rugged diecast metal housing
- ▶ Blue-green LED light source
- ▶ Insensitive to ambient light
- ▶ Switching rate up to 10 kHz
- ▶ Fast response time
- ▶ Changeable lens position
- ▶ Reverse polarity protected
- ▶ Selectable light or dark switching
- ▶ PNP or NPN output
- ▶ Rotatable quick disconnect
- ▶ Indicator LEDs for easy set up

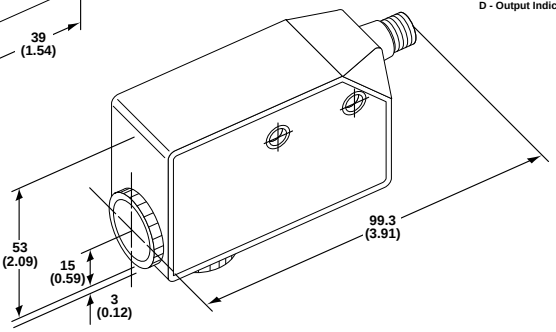
CE

10/20/40 mm
(0.4/0.8/1.6 in)



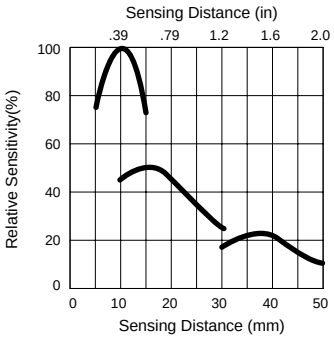


A - Operating Mode Switch
B - Switching Threshold
C - Setting Aid (Green)
D - Output Indicator (Red)



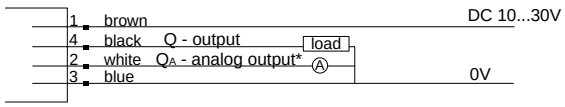
Dimensions in mm (in)

relative sensitivity

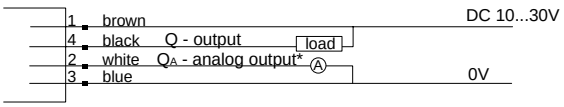


connection diagram

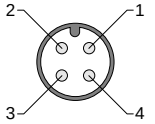
PNP Models



NPN Models



M12 Connector



wire colors refer to standard cable, not included

*analog output available on selected models

KT5-2

contrast sensor

KT 5

Part Number	for model and part numbers please see page 354		
Connection Type	M12 4-pin plug		
Sensing Distance	**Sensing Distance**	**Sensing Distance Tolerance**	**Light spot dimensions**
With Lens 211	10 mm (0.39 in)	±3 mm (.12 in)	1.2 mm x 4.2 mm (0.05 x 0.17 in)
With Lens 212	20 mm (0.79 in)	±3 mm (.12 in)	1.5 mm x 5.5 mm (0.06 x 0.22 in)
With Lens 210	40 mm (1.57 in)	±3 mm (.12 in)	1.1 mm x 4.2 mm (0.04 x 0.17 in)
Supply Voltage (limit values)	10...30 V DC		
Current Consumption (no load)	≤ 80 mA		
Ripple (within V_s tolerance)	≤ 5 V peak-to-peak		
Light Source	LED Blue-Green (520 nm), average service life 100,000 hours @ 25°C (77°F)		
Light Spot Orientation	Parallel or perpendicular to long side of device		
Operation Mode	Light or dark switching selectable via switch		
Type	PNP	NPN	
Output Voltage High	V_s - (≤ 2 V)	approx. V_s	
Output Voltage Low	approx. 0 V	≤ 2 V	
Output Current Max.	100 mA		
Response Time / Switching Frequency	≤ 50 µs / 10 kHz		
Optional Timing Functions	see table of model and part numbers, page 354		
Analog Output (optional)	0.3...10 mA @ $R_{L\ max}$ = 800 Ω (no reflection to total reflection)		
Enclosure Rating	IP 67 / NEMA 6		
Ambient Operating Temperature	-10...55°C (14...131°F)		
Storage Temperature	-25...75°C (-13...167°F)		
EMC	IEC 801		
Circuit Protection	Outputs short circuit protected, V_s reverse polarity protected		
Shock / Vibration	IEC 68		
VDE Protection Class	II Double Insulated		
Weight	approx. 400 g (14 oz)		

KT

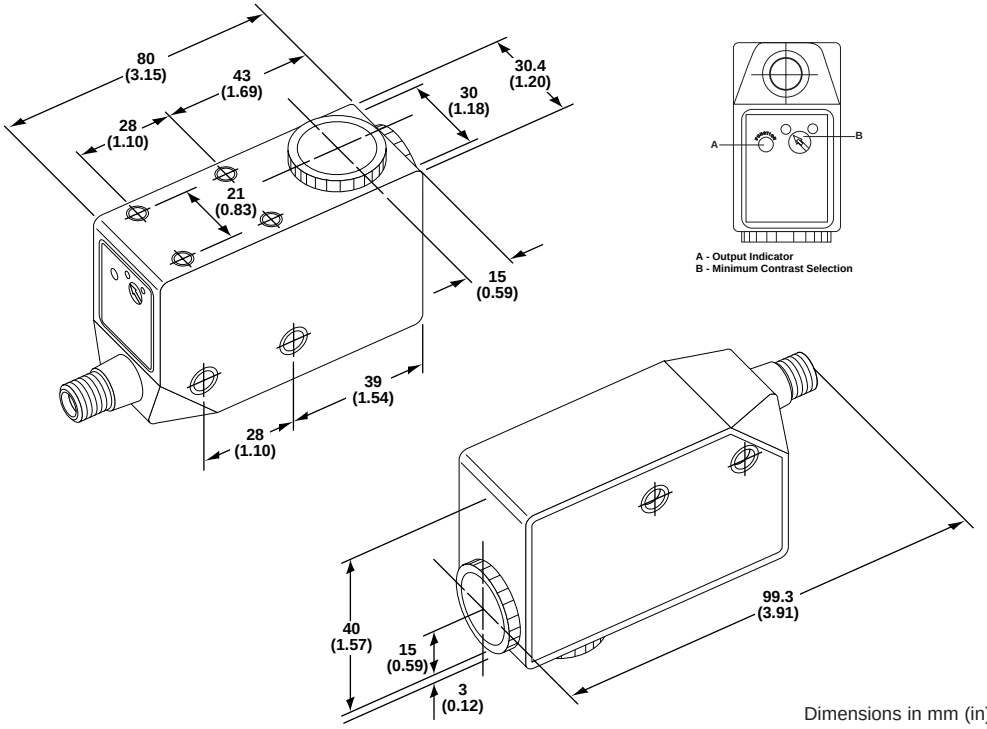
KT5 TEACH

teach-in contrast sensor

10 mm (0.39 in)

PRODUCT HIGHLIGHTS

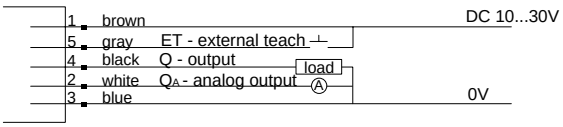
- Teach-in sensitivity setting
- Rugged diecast metal housing
- 6 LED array light source
- Insensitive to ambient light
- Switching rate up to 10 kHz
- Fast response time
- Analog output
- Changeable lens position
- Reverse polarity protected
- Selectable light or dark switching
- Rotatable quick disconnect



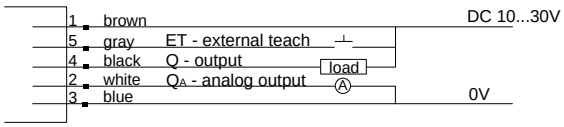
Dimensions in mm (in)

connection diagram

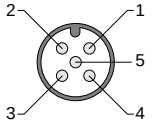
PNP Models



NPN Models



M12 Connector



wire colors refer to standard cable, not included

KT 5 TEACH

teach-in contrast sensor

KT 5

Part Number	for model and part numbers please see page 354		
Connector	M12 5-pin plug		
Sensing Distance	10 mm (0.39 in)	20 mm (0.79 in)	10 mm (0.39 in)
Sensing Distance Tolerance	± 3 mm		
Light Spot at 10 mm	1.2 mm x 4.2 mm (0.048 x 0.168 in)		
Supply Voltage (limit values)	10...30 V DC		
Current Consumption (no load)	≤ 80 mA		
Ripple (within V_S tolerance)	≤ 5 V peak-to-peak		
Light Source	LED Green, average life 100,000 hours @ 25°C (77°F)		
Switching Method	PNP		NPN
Output Voltage High	V_S - (≤ 2 V)		approx. V_S
Output Voltage Low	approx. 0 V		≤ 2 V
Output Current Max.	100 mA		
Response Time / Switching Frequency	≤ 50 µs / 10 kHz		
Teach-In Mode	HIGH: > 10 V to V_S / LOW: 0 V or open ended		
Pulse-Length / Storage Time	Volatile storage: pulse TE> 100 µs < 4 ms Non-volatile storage: pulse TE > 10 ms / < 25 µs		
Degree of Protection	IP 67 / NEMA 6		
Ambient Temperature	-10...55°C (14...131°F)		
Storage Temperature	-25...75°C (-13...167°F)		
EMC	IEC 801		
Circuit Protection	Outputs short circuit protected, V_S reverse polarity protected		
Shock / Vibration	IEC 68		
VDE Protection Class	II Double Insulated		
Weight	approx. 400 g (14 oz.)		

KT

KT5 DYNAMIC TEACH

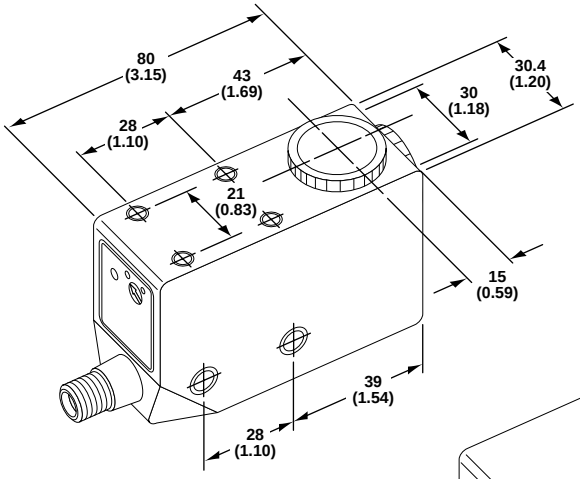
teach-in contrast sensor

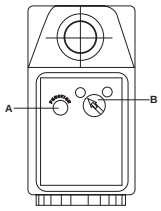
10 mm (0.39 in)

PRODUCT HIGHLIGHTS

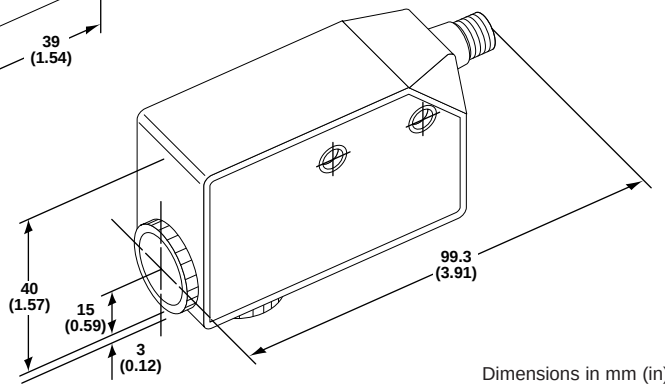
- Teach-in sensitivity adjustment “on the fly”
- Rugged diecast metal housing
- 6 LED array light source
- Insensitive to ambient light
- Switching rate up to 10 kHz
- Fast response time
- Analog output
- Changeable lens position
- Reverse polarity protected
- Selectable light or dark switching
- Rotatable quick disconnect

CE



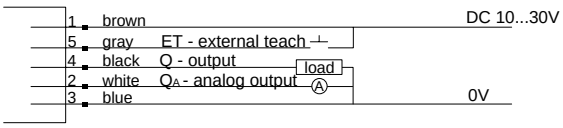


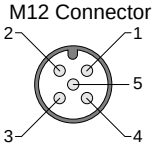
A - Output Indicator
B - Light/Dark Switch



Dimensions in mm (in)

connection diagram





wire colors refer to standard cable, not included

KT 5 DYNAMIC TEACH

teach-in contrast sensor

KT 5

Part Number	for model and part numbers please see page 354
Connector	M12 5-pin plug
Sensing Distance	10 mm (0.39 in)
Sensing Distance Tolerance	± 3 mm
Light Spot at 10 mm	1.2 mm x 4.2 mm (0.048 x 0.168 in)
Supply Voltage (limit values)	10...30 V DC
Current Consumption (no load)	≤ 80 mA
Ripple (within V_S tolerance)	≤ 5 V peak-to-peak
Light Source	LED Green, average service life 25,000 hours @ 25°C (77°F)
Switching Method	PNP
Output Voltage High	V_S - (≤ 2 V)
Output Voltage Low	approx. 0 V
Output Current Max.	100 mA
Response Time / Switching Frequency	≤ 50 µs / 10 kHz
Teach-In Mode	HIGH: > 10 V to V_S / LOW: 0 V or open-ended
Pulse-Length / Storage Time	Volatile storage: pulse TE> 100 µs < 4 ms Non-volatile storage: pulse TE > 10 ms / < 25 µs
Degree of Protection	IP 67 / NEMA 6
Ambient Temperature	-10...55°C (14...131°F)
Storage Temperature	-25...75°C (-13...167°F)
EMC	IEC 801
Circuit Protection	Outputs short circuit protected, V_S reverse polarity protected
Shock / Vibration	IEC 68
VDE Protection Class	II Double Insulated
Weight	approx. 400 g (14 oz.)

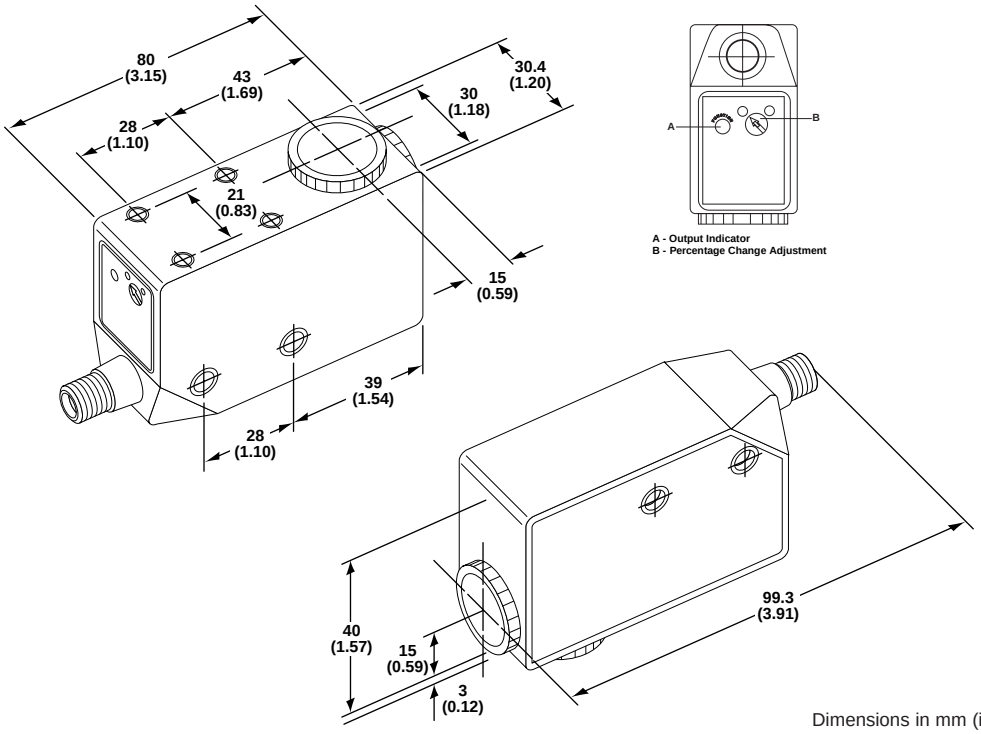
KT5 AUTOMATIC

automatic contrast sensor

10 mm (0.39 in)

PRODUCT HIGHLIGHTS

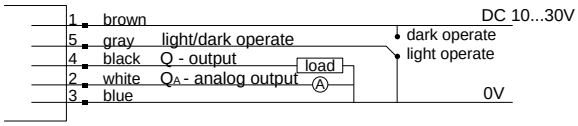
- Continuous, automatic sensitivity adjustment
- Rugged diecast metal housing
- 6 LED array light source
- Insensitive to ambient light
- Switching rate up to 10 kHz
- Fast response time
- Analog output
- Changeable lens position
- Reverse polarity protected
- Selectable light or dark switching
- Rotatable quick disconnect



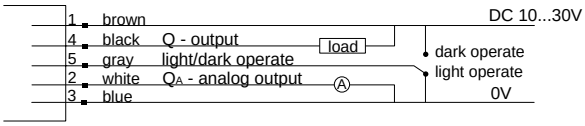
Dimensions in mm (in)

connection diagram

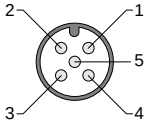
PNP Models



NPN Models



M12 Connector



wire colors refer to standard cable, not included

KT 5 AUTOMATIC

automatic contrast sensor

KT 5

Part Number	for model and part numbers please see page 354	
Connector	M12 5-pin plug	
Sensing Distance	10 mm (0.39 in)	
Sensing Distance Tolerance	± 3 mm	
Light Spot at 10 mm	1.2 mm x 4.2 mm (0.048 x 0.168 in)	
Supply Voltage (limit values)	10...30 V DC	
Current Consumption (no load)	≤ 80 mA	
Ripple (within V_S tolerance)	≤ 5 V peak-to-peak	
Light Source	LED Green, average service life 25,000 hours @ 25°C (77°F)	
Switching Method	PNP	NPN
Output Voltage High	V_S - (≤ 2 V)	approx. V_S
Output Voltage Low	approx. 0 V	≤ 2 V
Output Current Max.	100 mA	
Response Time / Switching Frequency	≤ 50 µs / 10 kHz	
Degree of Protection	IP 67 / NEMA 6	
Ambient Temperature	-10...55°C (14...131°F)	
Storage Temperature	-25...75°C (-13...167°F)	
EMC	IEC 801	
Circuit Protection	Outputs short circuit protected, V_S reverse polarity protected	
Shock / Vibration	IEC 68	
VDE Protection Class	II Double Insulated	
Weight	approx. 400 g (14 oz.)	

KT5L

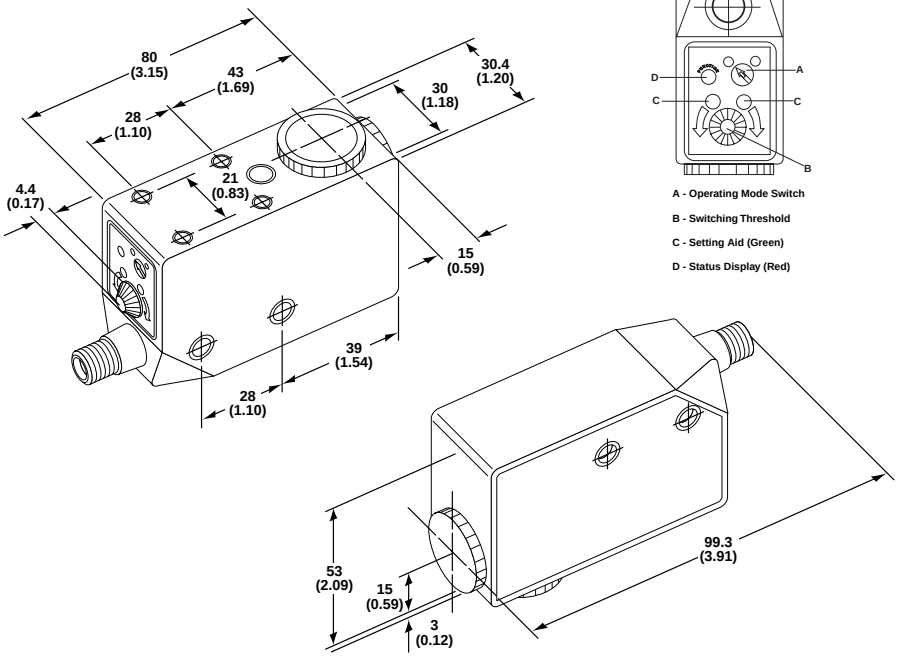
laser contrast sensor

PRODUCT HIGHLIGHTS

- ▶ Rugged diecast metal housing
- ▶ Laser class 2
- ▶ High resolution for long sensing distances
- ▶ Insensitive to ambient light
- ▶ Switching frequency up to 10 kHz
- ▶ Fast response time
- ▶ Analog output current
- ▶ Reverse polarity protected
- ▶ Selectable light or dark switching
- ▶ Status indicator
- ▶ Rotatable M12 quick disconnect
- ▶ Indicator LEDs for easy setup

CE

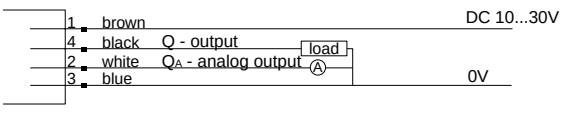
150 mm (5.9 in)



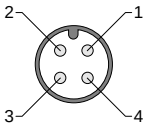
Dimensions in mm (in)

connection diagram

PNP Models



M12 Connector



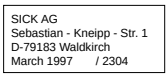
wire colors refer to standard cable, not included

KT 5L

laser contrast sensor

KT 5L

Part Number	for model and part numbers please see page 354
Connector	M12 4-pin plug
Sensing Distance	150 mm (5.91 in)
Sensing Range	140...160 mm (5.51...6.30 in)
Light Spot at 150 mm	≤ 0.3 mm (0.01 in)
Supply Voltage (limit values)	10...30 V DC
Current Consumption (no load)	≤ 80 mA
Ripple (within V_S tolerance)	≤ 5 V peak-to-peak
Light Source	Laser, Red 670 nm
Laser Protection Class	2 (IEC 825 / VDE 08375)
Switching Output	Light or dark switching selectable via switch
Type	PNP
Output Voltage High	V_S - (≤ 2 V)
Output Voltage Low	approx. 0 V
Output Current Max.	100 mA
Response Time / Switching Frequency	≤ 50 µs / 10 kHz
Analog Output ($R_{L\ max}$ = 800 Ω)	0.3...10 mA
Enclosure Rating	IP 67 / NEMA 6
Ambient Operating Temperature	-10...40°C (14...104°F)
Storage Temperature	-25...75°C (-13...167°F)
EMC	IEC 801
Circuit Protection	Outputs short circuit protected, V_S reverse polarity protected
Shock / Vibration	IEC 68
VDE Protection Class	II Double Insulated
Weight	approx. 400 g (14 oz.)



Emission Indicator

In order to meet the safety requirements for Class II laser products, a visible emission indicator must be located within 2 meters (6.7 ft) of the sensor. We suggest using a switching amplifier with a power-ON indicator (the EN2 or EN3, for example) or a connector cable with a power-ON LED located on the connector.

Beam Attenuator

The KT 5L sensor is equipped with an M12 style quick disconnect. The cable can quickly and easily be removed in the event that personnel require access to the area where the sensor is mounted.

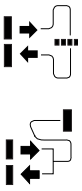
KTL 5-2

fiber optic contrast sensor

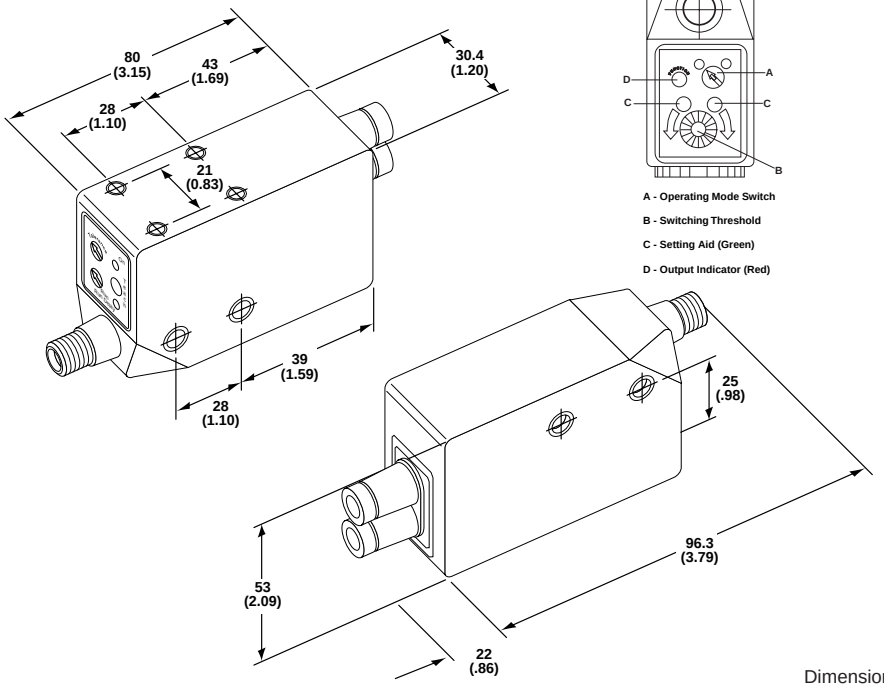
PRODUCT HIGHLIGHTS

- ▶ Rugged diecast metal housing
- ▶ Uses industry standard fibers
- ▶ Insensitive to ambient light
- ▶ Switching frequency up to 10 kHz
- ▶ Fast response time
- ▶ Reverse polarity protected
- ▶ Selectable light or dark switching
- ▶ Status indicator
- ▶ Rotatable M12 quick disconnect
- ▶ Indicator LEDs for easy setup

CE



Range dependent
on selected fibers

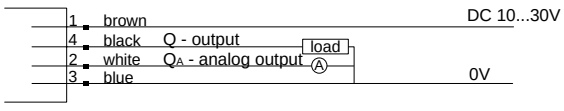


A - Operating Mode Switch
B - Switching Threshold
C - Setting Aid (Green)
D - Output Indicator (Red)

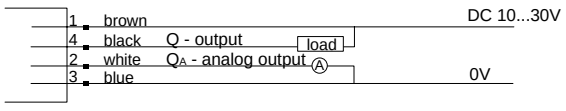
Dimensions in mm (in)

connection diagram

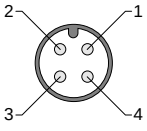
PNP Models



NPN Models



M12 Connector



wire colors refer to standard cable, not included

KTL 5-2

fiber optic contrast sensor

KTL 5

Part Number	for model and part numbers please see page 414	
Connector	M12 4-pin plug	
Sensing Range	Depends on fiber optic cable used	
Supply Voltage (limit values)	10...30 V DC	
Current Consumption (no load)	≤ 80 mA	
Ripple (within V_S tolerance)	≤5 V peak-to-peak	
Light Source	LED Blue-Green, average service life 100,000 hours @ 25°C (77°F)	
Operation Mode	Light or dark switching selectable via switch	
Type	PNP	NPN
Output Voltage High	V_S - (≤ 2 V)	approx. V_S
Output Voltage Low	approx. 0 V	≤ 2 V
Output Current Max.	100 mA	
Response Time / Switching Frequency	≤ 50 µs / 10 kHz	
Enclosure Rating	IP 67 / NEMA 6	
Ambient Operating Temperature	-10...55°C (14...131°F)	
Storage Temperature	-25...75°C (-13...167°F)	
EMC	IEC 801	
Circuit Protection	Outputs short circuit protected, V_S reverse polarity protected	
Shock / Vibration	IEC 68	
VDE Protection Class	II Double Insulated	
Weight	approx. 400 g (14 oz)	

KT

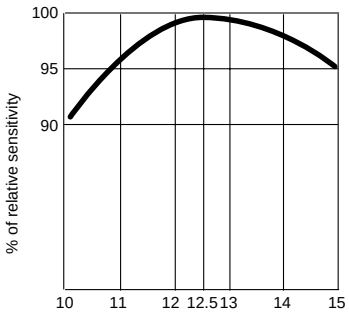
KT10

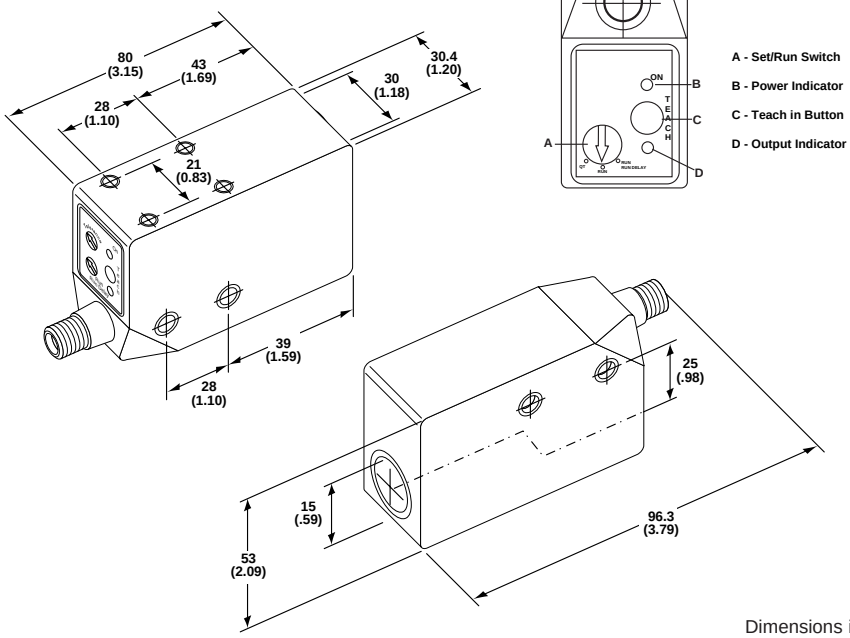
teach-in contrast sensor

PRODUCT HIGHLIGHTS

- Advanced “on the fly” teach-in of settings that automatically selects the proper light source
- Rugged metal housing
- Red, green, and blue LEDs provide the ability to read any color mark
- Insensitive to ambient light
- Switching rate up to 25 kHz
- Rotatable M12 quick disconnect

150 mm (5.9 in)

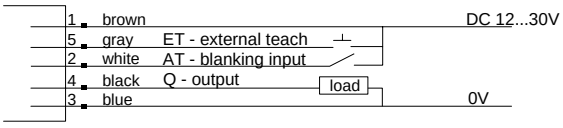




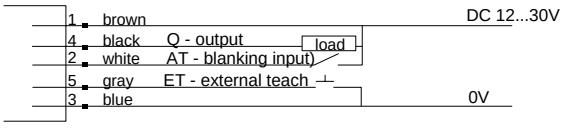
Dimensions in mm (in)

connection diagram

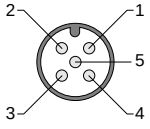
PNP Models



NPN Models



M12 Connector



wire colors refer to standard cable, not included

KT10

teach-in contrast sensor

KT 10W

Part Number	for model and part numbers please see page 355	
Sensing Distance	12.5 mm (0.49 in)	
Sensing Distance Tolerance	± 2 mm (0.08 in)	
Light Spot	0.8 x 4 mm (0.03 x 0.16 in)	
Supply Voltage (limit values)	12...30 V DC	
Current Consumption (no load)	≤ 150 mA	
Ripple (within V_S tolerance)	≤ 5 V peak-to-peak	
Light Source	LED Red, Green, and Blue, average service life 100,000 hours @ 25°C (77°F)	
Operation Mode	Light or dark switching based on teach-in	
Type	PNP	NPN
Output Voltage High	V_S - (≤ 2 V)	V_S
Output Voltage Low	approx. 0 V	≤ 2 V
Output Current Max.	100 mA	
Response Time / Switching Frequency	≤ 20 µs / 25 kHz	
Enclosure Rating	IP 67 / NEMA 6	
Ambient Operating Temperature	-10...60°C (14...°F)	
Storage Temperature	-25...75°C (-13...167°F)	
EMC	IEC 801	
Circuit Protection	Outputs short circuit protected, V_S reverse polarity protected	
Shock / Vibration	IEC 68	
VDE Protection Class	II Double Insulated	
Timing Options	None, Off delay	
Time Settings	20 ms fixed	
Weight	approx. 400 g (14 oz.)	

KT

Teach-In Procedure

1. Turn the selector switch to the “Q” setting.
2. Place the light spot on the material just before the mark.
3. Activate the teach signal with the teach button or via the “ET” cable and hold.
4. Move the material with the print mark through the light spot at the sensing distance.
5. Deactivate the teach signal.
6. The switching threshold is set in the middle between the received signals from the background and the mark and is stored permanently. The optimal sender light color is selected automatically.
7. Turning the selector switch to “Run” will disable the teach button.

Notes:

- The material speed during the teach-in procedure for small marks must by slower than 10 m/min.
- Only teach-in one mark if possible.
- If the teach-in procedure was not successful, the output switched with approx. 5 Hz and the LED signal strength indicator will flash.

model and part numbers

KT 5

Model Number	Part Number	Light Source	Output	Light Spot	Sensing Distance	Special Features	Teach-In
KT 5G-2N1111	1 015 981	Green (520 nm)	NPN	Vertical	10 mm	None	None
KT 5G-2N1211	1 015 985	Green (520 nm)	NPN	Vertical	20 mm	None	None
KT 5G-2N1311	1 015 988	Green (520 nm)	NPN	Vertical	40 mm	None	None
KT 5G-2N2111	1 015 990	Green (520 nm)	NPN	Horizontal	10 mm	None	None
KT 5G-2N2211	1 015 991	Green (520 nm)	NPN	Horizontal	20 mm	None	None
KT 5G-2N2311	1 015 992	Green (520 nm)	NPN	Horizontal	40 mm	None	None
KT 5G-2P1111	1 015 993	Green (520 nm)	PNP	Vertical	10 mm	None	None
KT 5G-2P1211	1 015 999	Green (520 nm)	PNP	Vertical	20 mm	None	None
KT 5G-2P1311	1 016 003	Green (520 nm)	PNP	Vertical	40 mm	None	None
KT 5G-2P2111	1 016 008	Green (520 nm)	PNP	Horizontal	10 mm	None	None
KT 5G-2P2211	1 016 010	Green (520 nm)	PNP	Horizontal	20 mm	None	None
KT 5G-2P2311	1 016 012	Green (520 nm)	PNP	Horizontal	40 mm	None	None
KT 5G-2P1121	1 015 997	Green (520 nm)	PNP	Vertical	10 mm	20 ms Off Delay	None
KT 5G-2P1221	1 016 001	Green (520 nm)	PNP	Vertical	20 mm	20 ms Off Delay	None
KT 5G-2P1151	1 016 195	Green (520 nm)	PNP	Vertical	10 mm	Analog	None
KT 5G-2P1251	1 016 196	Green (520 nm)	PNP	Vertical	20 mm	Analog	None
KT 5G-2P1351	1 016 197	Green (565 nm)	PNP	Vertical	40 mm	Analog	None
KT 5-P1112	1 013 490	Green (565 nm)	PNP	Vertical	10 mm	None	Static
KT 5-P1212	1 013 271	Green (565 nm)	PNP	Vertical	20 mm	None	Static
KT 5-N1112	1 013 256	Green (565 nm)	NPN	Vertical	10 mm	None	Static
KT 5-P1113	1 013 259	Green (565 nm)	PNP	Vertical	10 mm	None	Dynamic
KT 5-P1114	1 014 384	Green (565 nm)	PNP	Vertical	10 mm	None	Automatic
KT 5-N1114	1 015 385	Green (565 nm)	NPN	Vertical	10 mm	None	Automatic
KT 5-N1113	1 014 055	Green (565 nm)	NPN	Vertical	10 mm	None	Dynamic
KT 5-P2112	1 013 252	Green (565 nm)	PNP	Horizontal	10 mm	None	Static
KT 5-P1122	1 013 253	Green (565 nm)	PNP	Vertical	10 mm	20 ms Off Delay	Static
KT 5-P2212	1 013 265	Green (565 nm)	PNP	Horizontal	20 mm	None	Static
KT 5-P1142	1 015 051	Green (565 nm)	PNP	Vertical	10 mm	20 ms One Shot	Static
KT 5-P1123	1 015 322	Green (565 nm)	PNP	Vertical	10 mm	20 ms Off Delay	Dynamic
KT 5-P1323	1 016 165	Green (565 nm)	PNP	Vertical	40 mm	20 ms Off Delay	Dynamic
KT 5-P2113	1 016 178	Green (565 nm)	PNP	Horizontal	10 mm	None	Dynamic
KT 5L-P3611S01	1 015 155	Red Laser (670 nm)	PNP	Round	150 mm	None	None

KT 2

Model Number	Part Number	Light Source	Output	Light Source	Sensing Distance	Special Features
KT 2G-2B3711	1 016 112	Green (520 nm)	PNP / NPN	Round	13.5 mm	None
KT 2R-2B3721	1 016 114	Red	PNP / NPN	Round	13.5 mm	20 ms Off Delay
KT 2R-2B3711	1 016 115	Red	PNP / NPN	Round	13.5 mm	None

KTL 5

Model Number	Part Number	Light Source	Output	Special Features	Teach-In
KTL 5G-2P11	1 016 294	Green (520 nm)	PNP	None	None
KTL 5G-N11	1 016 295	Green (520 nm)	NPN	None	None

KT 10

Model Number	Part Number	Light Source	Output	Light Spot	Sensing Distance	Special Features	Teach-In
KT 10W-P1115	1 016 169	RGB	PNP	Vertical	12.5 mm	None	Dynamic with light selection
KT 10W-N1115	1 016 192	RGB	NPN	Vertical	12.5 mm	None	Dynamic with light selection