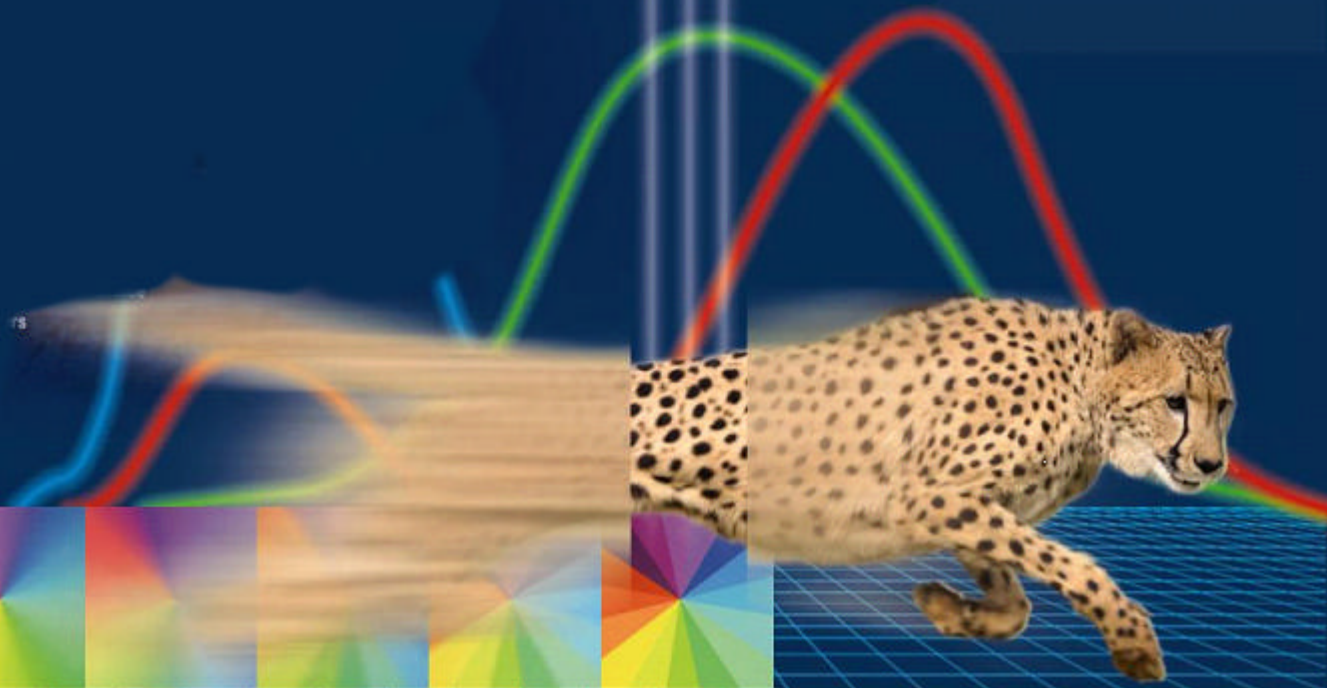


Human vision and recognition – but a thousand times faster

SPECTRO-3 Serie/Series/Séries

Color Sensors "True Color"

Let's make sensors more individual



Sensor

Let's make sensors more individual



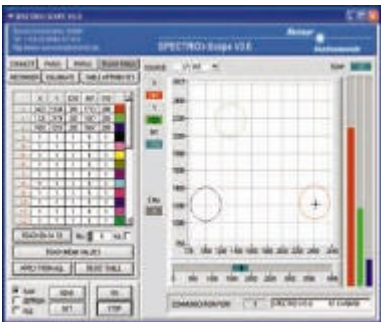
SPECTRO-3 Series - Color sensors "True Color"

With the SPECTRO-3 series there now is a family of color sensors that has been specifically designed for "true-color" detection ("human color reception") and high switching frequency. The sensors can be operated both in AC and in DC mode, with integrated external light source. With the included SPECTRO3-Scope software illumination can also be turned off with a simple mouse-click which then also allows the color and brightness inspection of self-luminous objects such as LEDs, automobile tail lights, halogen lamps, or fluorescent lamps. Up to 31 colors can be provided through the 5 digital outputs, the maximum switching frequency is 3 kHz. Apart from a super-bright white-light source, a high-performance UV light source also is available, which allows a color and brightness differentiation of fluorescent colors without any problems. Different optical front ends make it possible to implement operating distances of almost 0 mm up to 500 mm, with detection areas of Ø 0.5 mm to approx. Ø 100 mm. The use of an optical fiber version allows applications in Ex areas.

Windows® user interface SPECTRO3-Scope

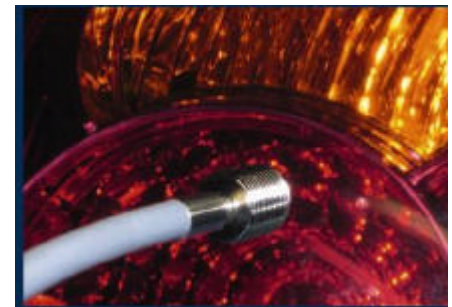
The SPECTRO3-Scope software was developed specifically for the parameterization and data monitoring of color sensors of the SPECTRO-3 series. The software allows the selection of different lighting modes such as AC (modulated light), DC (constant light), PULSE (pulsed operation), or OFF (self-luminous object). In AC, DC, and PULSE mode the intensity of the light source can be adjusted. In all four modes the gain of the color detector can be set in 8 stages. The software furthermore allows the setting of a trigger type (external trigger, self-triggering, or continuous), and the selection of various color evaluation methods (x,y,INT, s,i,M evaluation acc. to L*a*b* and L*u*v* for self-luminous objects), and color modes (BEST HIT, FIRST HIT, MINIMAL DISTANCE, COL5).

SPECTRO-3 Serie/Serie/Series/Series



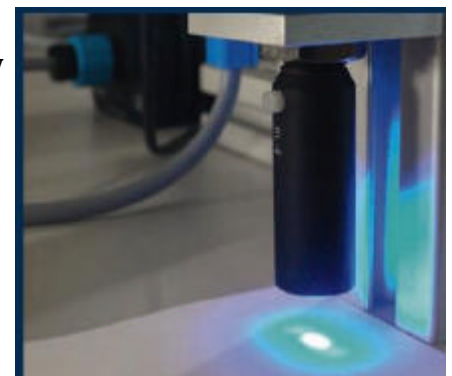
Color measurement of self-luminous

In combination with a reflected-light optical fiber and a neutral-absorber attachment unit the SPECTRO-3-FIO makes it possible to perform a color inspection of different self-luminous objects.



Fluorescent color mark detection

In combination with the super-bright UV light source SI-ELS-UV the SPECTRO-3-FIO-UV evaluation unit performs high-speed detection of fluorescent color marks. The sensor not only detects the brightness of the fluorescent mark, but also its color.



Color inspection of structured and inhomogeneous surfaces

With many objects requiring color inspection an inhomogeneous surface causes problems in color determination. A structured surface, for example, leads to gloss rate fluctuations that cause difficulties for conventional color sensors because depending on the gloss rate the color is sometimes detected more intensively and sometimes less intensively. The actual color is brightened or "softened" by direct reflection that depends on the respective gloss rate of the surface. With the color sensors of the SPECTRO-3-...-DIL series diffuse lighting considerably reduces this gloss effect. Furthermore, the large detection range (approx. 10 mm to 30 mm) allows an optical integration of structural fluctuations, and the color is thus reliably detected with great stability. The true-color color detector ("human color perception") and the evaluation software ("human color assessment") furthermore guarantee that even smallest color differences of objects are reliably detected.

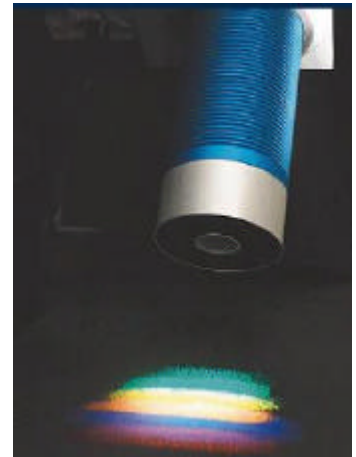
High-speed color detection of small objects



Color inspection of glossy objects

SPECTRO-3 Serie/ Series/ Series

High-speed color detection of fluorescent objects

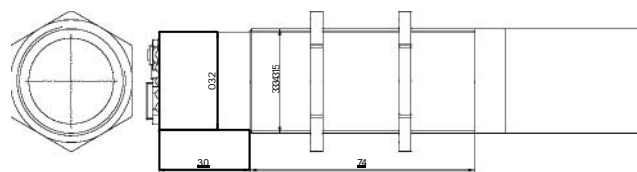


SPECTRO-3-...-COF Series SI COLO Color Sensors

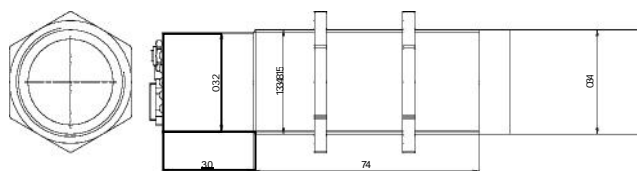
Color sensors with confocal optics (transmitter optics unit at the center of the receiver optics unit)

MODEL	OBJECT DISTANCE	SIZE OF LIGHT SPOT (TYP.)	LIGHT SOURCE	RECEIVER	SWITCHING FREQUENCY	NO. OF COLORS	SWITCHING	SWITCHING CURRENT	SOFTWARE/
SPECTRO-3-20-COF-D1.0	15 mm ... 30 mm	Ø 1.0 mm at distance 20 mm	White light LED, AC, DC operation, can be switched under Windows®	RGB detector (True Color detector, "human color reception") Color filter curves acc. to CIE 1931	max. 30 kHz	max. 31	5 (npn and pnp able) Output polarity adjustable under Windows®	max. 100 mA, short circuit proof	SPECTRO 3-Scope RS232 (USB or Ethernet adapter available)
SPECTRO-3-20-COF-D1.5	15 mm ... 30 mm	Ø 1.5 mm at distance 20 mm							
SPECTRO-3-20-COF-D2.5	15 mm ... 30 mm	Ø 2.5 mm at distance 20 mm							
SPECTRO-3-20-COF-D3.5	15 mm ... 30 mm	Ø 3.5 mm at distance 20 mm							
SPECTRO-3-20-COF-5.5X1.5	15 mm ... 30 mm	5.5 mm x 1.5 mm at 20 mm							
SPECTRO-3-30-COF-D1.3	25 mm ... 55 mm	Ø 1.3 mm at distance 30 mm							
SPECTRO-3-30-COF-D2.0	25 mm ... 55 mm	Ø 2.0 mm at distance 30 mm							
SPECTRO-3-30-COF-D3.0	25 mm ... 55 mm	Ø 3.0 mm at distance 30 mm							
SPECTRO-3-30-COF-D4.5	25 mm ... 55 mm	Ø 4.5 mm at distance 30 mm							
SPECTRO-3-30-COF-5X1	25 mm ... 55 mm	mm x 1 mm at 30 mm							
SPECTRO-3-50-COF-D3.5	30 mm ... 70 mm	Ø 3.5 mm at distance 50 mm							
SPECTRO-3-50-COF-D5.5	30 mm ... 70 mm	Ø 5.5 mm at distance 50 mm							
SPECTRO-3-50-COF-D8.0	30 mm ... 70 mm	Ø 8.0 mm at distance 50 mm							
SPECTRO-3-50-COF-13X3	30 mm ... 70 mm	mm x 3 mm at 50 mm							

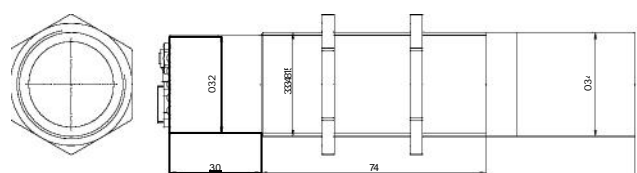
SPECTRO-3-20-COF-...



SPECTRO-3-30-COF-...



SPECTRO-3-50-COF-...



SPECTRO-3-30-UV	10 mm ... 40 mm	10 mm at distance 15 mm	UV LED ring (380 nm) with black light cover	RGB detector (True Color detector, "human color reception") + UV block filter					
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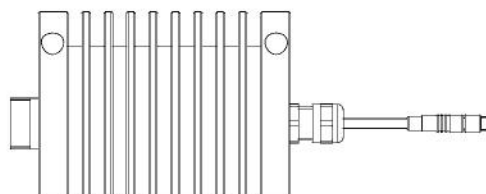
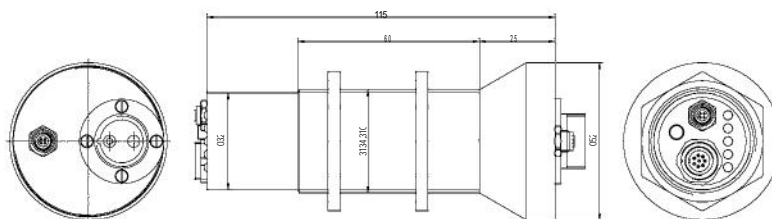
SPECTRO-3-...-FIO Series Color sensors for operation with optical fibers

MODEL	OBJECT DISTANCE	DETECTION RANGE (TYP.)	LIGHT SOURCE	RECEIVER	SWITCHING	NO. OF TEACH	SWITCHING	SWITCHING	SOFTWARE
SPECTRO-3-FIO	1 mm ... 150 mm (depends on optical fiber, light source and front end)	Ø 0.6 mm ... Ø 20 mm 2 mm x 0.3 mm ... 12 mm x 2 mm (depends on optical fiber and front end)	White light LED integrated in the fiber optics adapter, or external white light source SPECTRO-3-ELS	RGB detector (True Color detector, "human color reception")	max. 30 kHz	max. 31	5 (nnp and pnp able) Output polarity adjustable under Windows®	max. 100 mA, short circuit proof	SPECTRO 3-Scope RS232 (USB or Ethernet adapter available)
SPECTRO-3-FIO-UV	1 mm ... 50 mm (depends on optical fiber, light source and front end)	Ø 20 mm 2 mm x 0.3 mm ... 12 mm x 2 mm (depends on optical fiber and front end)	SPECTRO-3-ELS-UV UV-LED (380 nm) integrated in the fiber optics adapter, or external UV light source	RGB detector (True Color detector, "human color reception") + UV block filter					

SPECTRO-3-FIO SPECTRO-



SPECTRO-3-ELS SPECTRO-



und SPECTRO-3-ELS-UV:
Suitable optical fibers for SPECTRO-3-ELS
and SPECTRO-3-ELS-UV:

**R-S-A1.1-(1.5)-Y-1200-22"157"-
UV R-S-A2.0-(2.5)-Y-1200-
22"157"-UV R-S-R1.1-(3x0.5)-Y-
1200-22"157"-UV R-S-R2.1-
(0x1)-Y-1200-22"157"-UV**

Optical fibers are in Y-shape for connection with color sensor SPECTRO-3-FIO (or SPECTRO-3-FIO-UV) as well as with external light source SPECTRO-3-ELS (or SPECTRO-3-ELS-UV).

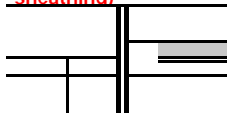
.WL Series

Optical fiber accessories and sensor head versions

MODEL	OBJECT DISTANCE (Typ.)	DETECTION RANGE (Typ.)	FOR USE WITH OPTICAL FIBER (SENSOR HEAD)
ADD-ON OPTICS			
kl-3	8 mm ... 20 mm	1 mm ... 5 mm	R-S-A2.0-(2.5)-600-67° R-S-A2.0-(2.5)-1200-67° R-S-A2.0-(2.5)-1200-22°-UV
kl-M1B-A2.0	15 mm ... 50 mm	3 mm ... 10 mm	
kl-M34	80 mm ... 150 mm	10 mm ... 20 mm	
kl-M34/62	80 mm ... 150 mm	2 mm ... 5 mm	
kl-90	Sender (distance transmitter/receiver)	10 mm	D-S-A2.0-(2.5)-600-67° D-S-A2.0-(2.5)-1200-67°
kl-40	15 mm ... 25 mm	3 mm ... 5 mm	
kl-2B	20 mm ... 30 mm	5 mm ... 8 mm	
kl-20	20 mm ... 40 mm	4 mm ... 10 mm	
kl-17	30 mm ... 80 mm	8 mm ... 25 mm	
kl-14	60 mm ... 120 mm	10 mm ... 20 mm	
kl-6	100 mm ... 200 mm	15 mm ... 30 mm	
Neutral ABSORBERS			
kl-M12-A2.0-NG5	5 mm ... 5000 mm (depending on light source)	Ø 2.5 mm	R-S-A2.0-(2.5)-1200-67°
kl-M12-A2.0-NG9			
kl-M12-A2.0-NG9x2			
kl-M12-A2.0-NG11			

R Reflective light operation
D = Transmitted light operation
S = Silicone-metal sheathing
600/1200 / Length of optical fiber
67°/22° = Beam angle

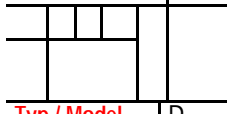
Sensor head model A (end sleeve stainless steel, silicone-metal sheathing)



Dimensions in mm

Typ / Model	A	B	C	D	E	F	J
A1.1	6.6	8	2	1	2	1	4.4
A2.0	6.6	1	2	1	4	2	5.8
A3.0	8.5	1	2	1	6	3	7.5

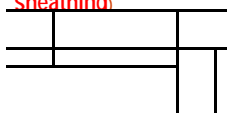
Sensor head model C (end sleeve stainless steel, silicone-metal sheathing)



Dimensions in mm

Typ / Model	D	E	F	G	H	J
C1.0	3	M4	1	6	1	4.4
C2.0	3	M6	2	8	1	5.8
C3.0	3	M10	3	1	1	7.5

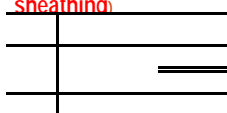
Sensor head model D (end sleeve stainless steel, silicone-metal sheathing)



Dimensions in mm

Typ / Model	A	B	D	E	F	G	r	J
D1.1	2	1	2	1	0.6	6	1.5	4.4
D2.0	6	1	2	2	1.5	6	4	4.4
D3.0	15	1	2	5	2.5	9	10	6.5

Sensor head model R (end sleeve aluminum, silicone-metal sheathing)



Dimensions in mm

Typ / Model	D	E	F	G	J
R1.1	30	7	3	0.5	5.8
R2.1	30	10	6	1	7.5

kl-3 kl-4 kl-5 kl-B	Dimensions: LxØ approx. 60 mm x Ø 15	kl-M1B-A1.1 kl-M1B-A2.0	Dimensions: LxØ approx. 51 mm x M18x1	kl-M34	Dimensions: LxØ approx. 71 mm x M34x1.5
kl-90	Dimensions: LxWxH approx. 24 mm x 18 mm x 13 mm	kl-6	Dimensions: LxWxH approx. 31.1 mm x 45.1 mm x 20 mm	kl-14	Dimensions: LxWxH approx. 37 mm x 50 mm x 20 mm

kL-17	Dimensions: LxWxH approx. 36.5 mm x 25.5 mm x 15 mm	kL-20	Dimensions: LxWxH approx. 54 mm x 33 mm x 12 mm	kL-2B	Dimensions: LxWxH approx. 31.7 mm x 40.5 mm x 15 mm
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