

SI-COLO Series

► Color Sensors

SI-COLO1 (3 primary colors RED, GREEN, BLUE)

SI-COLO2 (15 colors, 8-bit A/D conversion)

SI-COLO3 (15 colors, 12-bit A/D conversion)

SI-COLO4 (31 colors, 12-bit A/D conversion)

SI-COLO84 (100 colors, 12-bit A/D conversion)

The color sensors of SI-COLO Series operate according to the 3-color-range principle, with a white-light LED as a light source.

Except of the sensors of SI-COLO1 series, the color sensors can be parameterized under Windows® through the serial RS232 interface.



Characteristics

Measuring principle of SI-COLO2, SI-COLO3, SI-COLO4

Through an optical transmission unit (SI-COLO2 ... SI-COLO4) or through a glass fiber bundle (SI-COLO2-LWL ... SI-COLO4-LWL) a modulated white-light LED projects a white-light spot onto a surface to be checked.

Through an optical receiver unit respectively through the glass fiber bundle part of the light that is reflected from the target is then directed onto a color-sensitive detector element. The received light is separated according to the 3-color-range process (RED, GREEN, BLUE).

The color sensors are parameterized under Windows®. Up to 15 colors respectively 31 colors can be taught and stored in the sensor. If the sensor detects one of the taught colors, a change of switching state is performed through 4 respectively 5 encoded digital outputs (visual display by means of 4 respectively 5 yellow LEDs at the housing).

Measuring principle of SI-COLO84

The SI-COLO84 color sensor system is a combination of a SI-COLO2-...-ANA 84 color sensor that acts as a frontend, and a SI-COLO84 control unit that evaluates the three analog outputs (RED, GREEN, BLUE) of the SI-COLO2-...-ANA 84 color sensor with 12-bit accuracy. The SI-COLO2-...-ANA 84 color sensor detects the radiation that is diffusely reflected from the object to be measured.

As a standard, a white-light LED with adjustable output is used as a light source at the SI-COLO2-...-ANA 84 color sensor. An integrated 3-fold receiver for the RED, GREEN, and BLUE content of the light reflected from the object to be measured is used as a receiver.

The SI-COLO84 color sensor system can be taught up to 100 colors; 5 different color detection modes and 3 contrast detection modes are available for the respective primary color. Evaluation always is performed with 12-bit accuracy.

Color detection either operates continuously, or is started by way of an external PLC trigger signal. The respective detected color is either provided as a binary code at the 8 digital outputs, or can be sent directly to the outputs if only up to 8 colors are to be detected. The detected color code is simultaneously visualised by means of 8 LEDs at the SI-COLO84 housing.

Parameterization under Windows®

The color sensors SI-COLO2 and SI-COLO3 are parameterized with Windows® with software „COLOR2-Scope“ or „COLOR3-Scope“ (SI-COLO2-LWL-HAMP-COL4 is parameterized with „COLOR2-4-Scope“). The color sensor control unit SI-COLO84 is parameterized with software „COLOR84-Scope“.

The RS232 interface is used for setting parameters such as

- Averaging over a maximum of 32768 values
- Number of colors to be checked
- Light power of the white-light LED
- Automatic light power control ON/OFF
- Pulse lengthening up to 100ms max.
- External or continuous trigger
- Minimum intensity required for color evaluation

When parameterization is finished the color sensor continues to operate with the current parameters in „stand alone“ mode without PC.

Visualization

Under Windows® representation of the color value on a PC in numeric form and in a color chart, and representation of RGB values in a time chart. In addition the current RGB values are displayed as a bar chart. The following evaluation algorithms can also be selected:

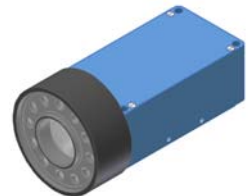
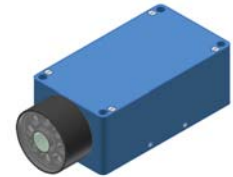
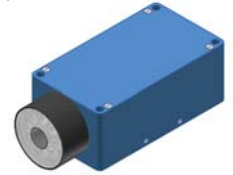
- Target lies within the color tolerance circle of a taught color and within an intensity window (FIRST HIT)
- Determination of the taught color that is most similar to the target (minimum distance between target color and reference color in the color chart) (MINIMAL DIST)
- Checking of the target's color series with a taught color sequence (COLOR SERIES)
- Contrast check of the target. In this case only one primary color (freely selectable) is used for evaluation (CONTRAST)
Advantage: Possibility of using a very high scanning rate of up to 28 kHz.



SI-COLO1

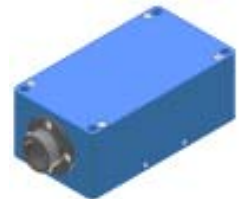
Analog color sensors with ring illumination,
the 3 primary colors RED, GREEN, BLUE are output as analog signals (0V...+10V):

Product name	Reference distance	Measuring range (typ.)	Detection range (typ.)
▶ SI-COLO1-30-DIL (8x white-light LED, diffuse)	30 mm	10 mm ... 60 mm	12 mm at 20 mm distance 20 mm at 40 mm distance
SI-COLO1-30-FCL (8x white-light LED, focused)	30 mm	10 mm ... 60 mm	12 mm at 20 mm distance 31 mm at 100 mm distance
▶ SI-COLO1-50-DIL (8x white-light LED, diffuse)	50 mm	20 mm ... 80 mm	20 mm at 60 mm distance 40 mm at 100 mm distance
SI-COLO1-50-FCL (8x white-light LED, focused)	50 mm	20 mm ... 80 mm	20 mm at 50 mm distance 31 mm at 100 mm distance
▶ SI-COLO1-80-DIL (12x white-light LED, diffuse)	80 mm	40 mm ... 200 mm	25 mm at 80 mm distance
SI-COLO1-80-FCL (12x white-light LED, focused)	80 mm	40 mm ... 200 mm	25 mm at 80 mm distance



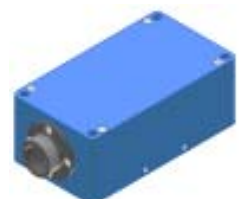
Analog color sensors with integrated optics (reflective light operation),
the 3 primary colors RED, GREEN, BLUE are output as analog signals (0V...+10V):

Product name	Suitable fiber optics (operating mode)
▶ SI-COLO1-200-d1	200 mm 100 mm ... 350 mm Ø 12 mm
SI-COLO1-200-d2	200 mm 100 mm ... 400 mm Ø 25 mm



Analog color sensors for use with fiber optics,
the 3 primary colors RED, GREEN, BLUE are output as analog signals (0V...+10V):

Product name	Suitable fiber optics (operating mode)
▶ SI-COLO1-LWL-SP	Reflected light / transmitted light fiber optics





SI-COLO2





Color sensors with integrated optics (reflected light operation), 8-bit A/D conversion, up to 15 colors can be taught with software COLOR2-Scope:

	Product name	Reference distance	Measuring range (typ.)	Spot size at reference distance (typ.)	
▶	SI-COLO2-20-d0	20 mm	18 mm ... 24 mm	Ø 0.8 mm	
	SI-COLO2-20-LUMI	20 mm	18 mm ... 24 mm	2 mm x 1 mm	
▶	SI-COLO2-30-d0	30 mm	25 mm ... 55 mm	Ø 1.5 mm	
	SI-COLO2-30-d1	30 mm	25 mm ... 55 mm	Ø 2.0 mm	
	SI-COLO2-30-d2	30 mm	25 mm ... 55 mm	Ø 3.0 mm	
	SI-COLO2-30-d3	30 mm	25 mm ... 55 mm	Ø 4.5 mm	
▶	SI-COLO2-50-d1	50 mm	30 mm ... 90 mm	Ø 3.5 mm	
	SI-COLO2-50-d2	50 mm	30 mm ... 90 mm	Ø 5.5 mm	
	SI-COLO2-50-d3	50 mm	30 mm ... 90 mm	Ø 8.0 mm	
▶	SI-COLO2-80-d1	80 mm	50 mm ... 150 mm	Ø 6.5 mm	
	SI-COLO2-80-d2	80 mm	50 mm ... 150 mm	Ø 9.0 mm	
	SI-COLO2-80-d3	80 mm	50 mm ... 150 mm	Ø 13.0 mm	
▶	SI-COLO2-200-d1	200 mm	100 mm ... 350 mm	Ø 12 mm	
	SI-COLO2-200-d2	200 mm	100 mm ... 400 mm	Ø 25 mm	
▶	SI-COLO2-500-d2	500 mm	100 mm ... 600 mm	Ø 23 mm	
	SI-COLO2-500-d3	500 mm	50 mm ... 800 mm	Ø 50 mm	



SI-COLO2

Color sensors with ring illumination, 8-bit A/D conversion, up to 15 colors can be taught with software COLOR2-Scope:



	Product name	Reference distance	Measuring range (typ.)	Detection range (typ.)	
▶	SI-COLO2-30-DIL (4x white-light LED, diffuse)	30 mm	10 mm ... 60 mm	12 mm at 20 mm distance 20 mm at 40 mm distance	
▶	SI-COLO2-30/90-DIL (4x white-light LED, diffuse)	30 mm	10 mm ... 60 mm	12 mm at 20 mm distance 20 mm at 40 mm distance	
▶	SI-COLO2-80-DIL (12x white-light LED, diffuse)	80 mm	20 mm ... 200 mm	13 mm at 20 mm distance 31 mm at 100 mm distance	
▶	SI-COLO2-200-DIL (28x white-light LED, diffuse)	200 mm	50 mm ... 350 mm	15 mm at 150 mm distance 30 mm at 350 mm distance	







SI-COLO2

Color sensors with opto electronic frontend, 8-bit A/D conversion, up to 15 colors can be taught with software COLOR2-Scope:

Product name	Operating mode	Measuring range (typ.)	Spot size at reference distance (typ.)
▶ SI-COLO2-M18 (Color sensor)	Reflected light operation	20 mm ... 200 mm	Ø 5 mm at 100 mm distance
	Transmitted light operation	100 mm ... 2000 mm	Ø 5 mm at 100 mm distance
▶ SI-COLO2-CON1 (Electronic control unit)			

Color sensors for use with fiber optics, 8-bit A/D conversion, up to 15 colors can be taught with software COLOR2-Scope:

Product name	Suitable fiber optics (operating mode)	
▶ SI-COLO2-LWL	Reflected light / transmitted light fiber optics	 SI-COLO2-LWL
SI-COLO2-LWL-SP	Reflected light / transmitted light fiber optics	
SI-COLO2-LWL-SP-RA	Reflected light / transmitted light fiber optics	
SI-COLO2-LWL-8X	Reflected light fiber optics (up to zu 8 fiber optics)	
▶ <i>ACL = Active Light (for detection of luminous objects, e.g. LED)</i>		 SI-COLO2-LWL-ACL-4X
SI-COLO2-LWL-ACL-4X	Reflected light fiber optics R-P-AP1.0-800-4X-Ms for checking of up to 4 LEDs	
SI-COLO2-LWL-ACL-MUX08	Reflected light fiber optics R-P-AP1.0-1000-1X-Ms for checking of up to 8 LEDs (multiplex)	 SI-COLO2-LWL-ACL-MUX08
▶ <i>MTO = Moved Transparent Objects (for detection of e.g. PET blank bottles)</i>		 SI-COLO2-LWL-HAMP-COL4
SI-COLO2-LWL-MTO (incl. software MTO-COLOR-Scope)	Transmitted light fiber optics D-S-A2.0-(2.5)-1200-67° D-S-A2.0-(2.5)-1200-22°	
▶ <i>HAMP = High Amplification (for detection of max. 4 colors)</i>		
SI-COLO2-LWL-HAMP-COL4 (incl. software COLOR2-4-Scope)	Transmitted light fiber optics: D-S-A2.0-(2.5)-1200-67° D-S-A2.0-(2.5)-1200-22°	



SI-COLO3





Color sensors with integrated optics (reflected light operation) or luminescence color sensors, 12-bit A/D conversion, up to 15 colors can be taught with software COLOR2-Scope:

	Product name	Reference distance	Measuring range (typ.)	Spot size at reference distance (typ.)	
▶	SI-COLO3-20-d0	20 mm	18 mm ... 24 mm	Ø 0.8 mm	
	SI-COLO3-20-LUMI	20 mm	18 mm ... 24 mm	1mm x 2 mm	
▶	SI-COLO3-30-d0	30 mm	25 mm ... 55 mm	Ø 1.5 mm	
	SI-COLO3-30-d1	30 mm	25 mm ... 55 mm	Ø 2.0 mm	
	SI-COLO3-30-d2	30 mm	25 mm ... 55 mm	Ø 3.0 mm	
	SI-COLO3-30-d3	30 mm	25 mm ... 55 mm	Ø 4.5 mm	
▶	SI-COLO3-50-d1	50 mm	30 mm ... 90 mm	Ø 3.5 mm	
	SI-COLO3-50-d2	50 mm	30 mm ... 90 mm	Ø 5.5 mm	
	SI-COLO3-50-d3	50 mm	30 mm ... 90 mm	Ø 8.0 mm	
▶	SI-COLO3-80-d1	80 mm	50 mm ... 150 mm	Ø 6.5 mm	
	SI-COLO3-80-d2	80 mm	50 mm ... 150 mm	Ø 9.0 mm	
	SI-COLO3-80-d3	80 mm	50 mm ... 150 mm	Ø 13.0 mm	
▶	SI-COLO3-200-d1	200 mm	100 mm ... 350 mm	Ø 12 mm	
	SI-COLO3-200-d2	200 mm	100 mm ... 400 mm	Ø 25 mm	
	SI-COLO3-200-SLU	200 mm	100 mm ... 350 mm	(depends on position)	
▶	SI-COLO3-500-d2	500 mm	100 mm ... 600 mm	Ø 23 mm	
	SI-COLO3-500-d3	500 mm	50 mm ... 800 mm	Ø 50 mm	






SI-COLO3

Color sensors with ring illumination, 12-bit A/D conversion, up to 15 colors can be taught with software COLOR3-Scope:

Product name	Reference distance	Measuring range (typ.)	Detection range (typ.)	
<p>▶ SI-COLO3-30-DIL SI-COLO3-30/90-DIL (8x white light LED, diffuse)</p>	30 mm	10 mm ... 60 mm	12 mm at distance 20 mm 20 mm at distance 40 mm	
<p>SI-COLO3-30-FCL SI-COLO3-30/90-FCL (8x white light LED, focused)</p>	30 mm	10 mm ... 150 mm	12 mm at distance 20 mm 31 mm at distance 100 mm	
<p>▶ SI-COLO3-50-DIL (8x white light LED, diffuse)</p>	50 mm	20 mm ... 80 mm	20 mm at distance 60 mm 40 mm at distance 100 mm	
<p>SI-COLO3-50-FCL (8x white light LED, focused)</p>	50 mm	20 mm ... 200 mm	20 mm at distance 50 mm 31 mm at distance 100 mm	
<p>▶ SI-COLO3-200-DIL (28x white light LED, diffuse)</p>	200 mm	50 mm ... 350 mm	15 mm at distance 150 mm 30 mm at distance 350 mm	

Color sensors for use with optical fiber, 12-bit A/D conversion, up to 15 colors can be taught with software COLOR3-Scope:

Product name	Suitable fiber optics (operating mode)	
<p>▶ SI-COLO3-LWL-SP SI-COLO3-LWL-SP-HAMP</p>	<p>Reflected light / transmitted light fiber optics Reflected light / transmitted light fiber optics (high amplification)</p>	
<p>▶ SI-COLO3-LWL-8X</p>	<p>Reflected light / transmitted light fiber optics for connection of up to 8 fiber optics (multiplex)</p>	
<p>▶ <i>ACL = Active Light (for detection of luminous objects e.g. LEDs)</i> SI-COLO3-LWL-ACL SI-COLO3-LWL-ACL-RA</p>	<p>Reflected light fiber optics Reflected light fiber optics (reduced amplification)</p>	
<p>SI-COLO3-LWL-ACL-MUX08</p>	<p>Reflected light fiber optics R-P-AP1.0-1000-1X-Ms (max. 8x) for checking of up to 8 LEDs (multiplex)</p>	




SI-COLO4

Color sensors with ring illumination, 12-bit A/D conversion, up to 31 colors can be taught with software COLOR4-Scope:

Product name	Reference distance	Measuring range (typ.)	Detection range (typ.)	
▶ SI-COLO4-30-DIL (8x white-light LED, diffuse)	30 mm	10 mm ... 60 mm	12 mm at 20 mm distance 20 mm at 40 mm distance	
SI-COLO4-30-FCL (8x white-light LED, focused)	30 mm	10 mm ... 60 mm	12 mm at 20 mm distance 31 mm at 100 mm distance	
▶ SI-COLO4-30/90-DIL (8x white-light LED, diffuse)	30 mm	10 mm ... 60 mm	12 mm at 20 mm distance 20 mm at 40 mm distance	
SI-COLO4-30/90-FCL (8x white-light LED, focused)	30 mm	10 mm ... 60 mm	12 mm at 20 mm distance 20 mm at 40 mm distance	
▶ SI-COLO4-50-DIL (8x white-light LED, diffuse)	50 mm	20 mm ... 80 mm	20 mm at 60 mm distance 40 mm at 100 mm distance	
SI-COLO4-50-FCL (8x white-light LED, focused)	50 mm	20 mm ... 80 mm	20 mm at 50 mm distance 31 mm at 100 mm distance	
▶ SI-COLO4-80-DIL (12x white-light LED, diffuse)	80 mm	40 mm ... 200 mm	25 mm at 80 mm distance	
SI-COLO4-80-FCL (12x white-light LED, focused)	80 mm	40 mm ... 200 mm	25 mm at 80 mm distance	
▶ SI-COLO4-200-DIL (10x white-light LED, diffuse)	200 mm	50 mm ... 400 mm	25 mm at 80 mm distance	
SI-COLO4-200-FCL (10x white-light LED, focused)	200 mm	50 mm ... 400 mm	20 mm at 200 mm distance	

Color sensors for use with optical fiber, 12-bit A/D conversion, up to 15 colors can be taught with software COLOR3-Scope:

Product name	Suitable fiber optics (operating mode)	
▶ SI-COLO4-LWL (diffuse illumination)	Reflected light / transmitted light fiber optics	
SI-COLO4-LWL-SP	Reflected light / transmitted light fiber optics	



SI-COLO84

Color sensor control unit for use with SI-COLO2-... sensor frontend, 12-bit A/D conversion, up to 100 colors can be taught with software COLOR84-Scope:

Product name	Reference distance	Measuring range (typ.)	Spot size at reference distance (typ.)	
▶ SI-COLO84 (color sensor control unit)				
for use with sensor frontends:				
▶ SI-COLO2-20-d0-ANA 84	20 mm	18 mm ... 24 mm	Ø 0.8 mm	
▶ SI-COLO2-30-d0-ANA 84	30 mm	25 mm ... 55 mm	Ø 1.5 mm	
SI-COLO2-30-d1-ANA 84	30 mm	25 mm ... 55 mm	Ø 2.0 mm	
SI-COLO2-30-d2-ANA 84	30 mm	25 mm ... 55 mm	Ø 3.0 mm	
SI-COLO2-30-d3-ANA 84	30 mm	25 mm ... 55 mm	Ø 4.5 mm	
▶ SI-COLO2-50-d1-ANA 84	50 mm	30 mm ... 90 mm	Ø 3.5 mm	
SI-COLO2-50-d2-ANA 84	50 mm	30 mm ... 90 mm	Ø 5.5 mm	
SI-COLO2-50-d3-ANA 84	50 mm	30 mm ... 90 mm	Ø 8.0 mm	
▶ SI-COLO2-80-d1-ANA 84	80 mm	50 mm ... 150 mm	Ø 6.5 mm	
SI-COLO2-80-d2-ANA 84	80 mm	50 mm ... 150 mm	Ø 9.0 mm	
SI-COLO2-80-d3-ANA 84	80 mm	50 mm ... 150 mm	Ø 13.0 mm	
▶ SI-COLO2-200-d1-ANA 84	200 mm	100 mm ... 350 mm	Ø 12 mm	
SI-COLO2-200-d2-ANA 84	200 mm	100 mm ... 400 mm	Ø 25 mm	
▶ SI-COLO2-500-d2-ANA 84	500 mm	100 mm ... 600 mm	Ø 23 mm	
SI-COLO2-500-d3-ANA 84	500 mm	50 mm ... 800 mm	Ø 50 mm	
▶ SI-COLO2-LWL-ANA 84 SI-COLO2-LWL-SP-ANA 84	Reflected light / transmitted light fiber optics, (cf. catalog <i>LWL Series</i>)			



Fiber Optics

LWL Series:

Fiber optics for use with color sensors of type SI-COLO2-LWL-... and SI-COLO3-LWL-...

LWL Series
Fiber optics with reflected light or transmitted light operation

▶ **Fiber optics**

Product overview and technical data:
cf. catalog *LWL Series*



▶ **Accessories**

Attachment optics for fiber optics:
(cf. catalog *LWL Series*)

- | | |
|---------|-------------|
| KL-1 | KL-M18 |
| KL-2 | KL-M34-A1.1 |
| KL-3 | KL-M34-A2.0 |
| KL-3/30 | KL-M34/42 |
| KL-4 | KL-M34/62 |
| KL-14 | |
| KL-17 | |
| KL-20 | |
| KL-28 | |
| KL-40 | |
| KL-90 | |



KL-1



KL-2



KL-3



KL-3/30



KL-14



KL-17



KL-20



KL-40



KL-90



KL-M18



KL-M34



KL-M34/42



Application Examples

SI-COLO2-20
SI-COLO2-LWL-SP

Color check of insulated cable strands

In cable processing, for example during connector assembly, the correct cable colors might get mixed up. It must be taken into consideration here that meanwhile cable diameters inclusive of insulation of only a few tenths of a millimeter are absolutely not rare any more today, and it must furthermore be considered that due to the assembly device minimum distance to the object has to be observed (distance > 10 mm).

Two sensors of the SI-COLO family are ideal for such applications: On the one hand, the version with integrated optical unit, **type SI-COLO2-20-d0**, with an object/sensor distance of typ. 20 mm and a light spot of typ. 0.8 mm diameter. On the other hand, the optical fiber version **type SI-COLO2-LWL-SP** with a reflected light optical fiber **type R-P-A2.0-(2.5)-1200-67°** with supplementary optical unit **type KL-3**. In combination with the mounted optical unit KL-3 an operating distance of typ. 10 mm ... 15 mm can be realised, with a light spot diameter of typ. 1 mm. These sensors of course also feature 15 memory locations for storing the respective cable colors.



SI-COLO2-20
SI-COLO2-LWL-SP

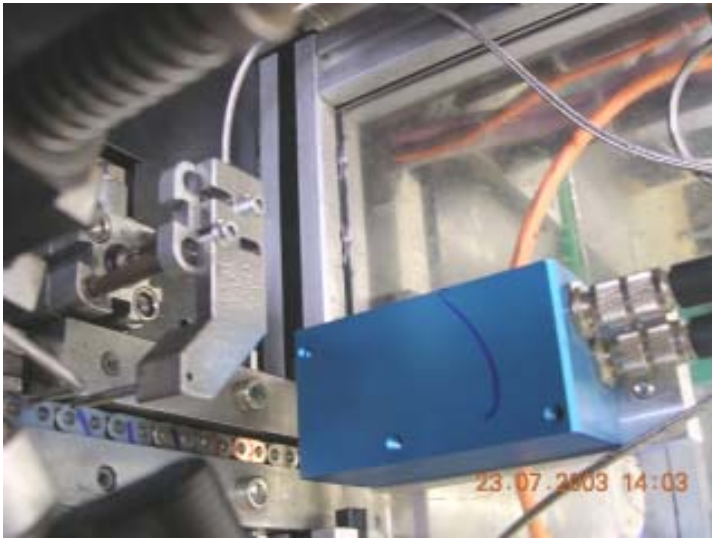


Application Examples

SI-COLO2-30

Detection of defective parts

At an automobile sub-supplier's plant, defective chains must be separated out. Such defective chains are marked with a color (e.g. blue or red), detected by the SI-COLO2-30 color sensor, and reliably sorted out from the system. Furthermore, the copper-colored chain links must also be detected.



SI-COLO2-30



**Application Examples****SI-COLO2-30-DIL****Checking of color of painted components or of imitation leather, plastic, and textiles in the interior of cars with color sensor SI-COLO2-30-DIL (or SI-COLO2-200-DIL)**

In the assembly of car interior components it happens again and again that parts are mismatched because the human eye is not able to perfectly distinguish individual color nuances. It is therefore very well possible that components of different color shades are integrated in a side door, for example.

SI-COLO2-...-DIL color sensors can considerably reduce the probability of mismatching. For this purpose, all the respective possible components are checked with respect to the reference color (predefined color). What is decisive for reliable color detection here is diffuse white light illumination which, especially with the SI-COLO2-200-DIL, allows a relatively large distance variation range with an average object distance of approx. 200 mm. Up to 15 colors can be stored in the color memory, and the detected color is digitally output in a binary code (4 digital outputs).



SI-COLO2-30-DIL



Application Examples

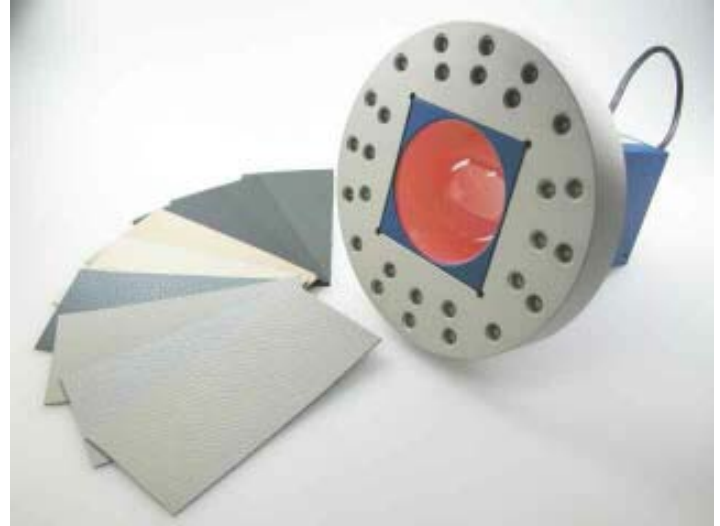
SI-COLO2-200-DIL

Checking of color of painted components or of imitation leather, plastic, and textiles in the interior of cars with color sensors SI-COLO2-200-DIL

In the assembly of car interior components it happens again and again that parts are mismatched because the human eye is not able to perfectly distinguish individual color nuances. It is therefore very well possible that components of different color shades are integrated in a side door, for example.

SI-COLO2-200-DIL color sensors can considerably reduce the probability of mismatching. For this purpose, all the respective possible components are checked with respect to the reference color (predefined color). What is decisive for reliable color detection here is diffuse white light illumination which, especially with the SI-COLO2-200-DIL, allows a relatively large distance variation range with an average object distance of approx. 200 mm. Up to 15 colors can be stored in the color memory, and the detected color is digitally output in a binary code (4 digital outputs).

Furthermore, the SI-COLO2-200-DIL sensor also is suitable for the detection of different car paints; for example, it can be checked whether the painted side of a rearview mirror matches the paint of the door. This task is made even more difficult by the fact that the door with the rearview mirror can only be positioned with an accuracy of approx. 10 mm. The relatively strong gloss effect is suppressed to a large extent by diffuse illumination.



SI-COLO2-200-DIL



Application Examples

SI-COLO2-LWL-SP

Checking of the color sequence of the cables at a connector assembly machine. A reflex optical fiber in combination with a mounted optical unit KL-3 is linearly moved across the cables.

The mounted optical unit KL-3 makes it possible to generate a light spot with a diameter < 1 mm at a distance of approx. 15 mm from the mounted optical unit. Up to 15 colors can be stored in the color memory of the color sensor.

Because of the coaxial arrangement of transmitter and receiver fibers, a distance fluctuation of up to several mm is tolerated; furthermore, this sensor type is to a large extent insensitive to angular changes of the object (cable).



Detection of a color mark on cosmetics pencils during rotation (alignment aid) with rectangularly shaped optical fiber front-end.



Checking the color of packings. Differently printed packings must be reliably detected in this application.



Checking whether the correct plain bearing half shell type is inserted during engine assembly. The parts are identified by different colors. A reflex optical fiber with a front area of 6 mm x 1 mm is used in this application.



**Application Examples****SI-COLO2-LWL-HAMP-COL4****Detection of painted components in the ex-area with the SI-COLO2-LWL-HAMP-COL4 and mounted optical unit KL-14**

In a spraying system, components must be checked with respect to color and grey content; a distinction has to be made between 3 states: Raw part (no paint applied yet), primed parts (1st layer of paint applied), and completely painted parts (2nd layer of paint applied).

The task is made more difficult by the fact that the parts have to be checked in the ex-area and therefore with the help of an optical fiber front-end, with a minimum distance from front-end to object of approx. 100 mm.

An external teach-box, which is connected to the color sensor by way of a 3 m cable, is used to facilitate the teach process; during the teach process the teach-box can therefore be positioned in the ex-area. A special software indicates whether the sensor is in its dynamic range (red/green/red LEDs).



SI-COLO2-LWL-HAMP-COL4

**Application Examples****SI-COLO2-LWL-ACL-4X****Checking of luminous objects (LEDs)**

With the special optical fiber head, the color sensor SI-COLO2-LWL-ACL-4X makes it possible to check up to 4 LEDs that are arranged at different locations. It must be taken into consideration, however, that only one LED may be operating at the same time.

It is also possible to check bi-color or tri-color LEDs, because up to 15 color values can be stored in the control unit of the color sensor.



SI-COLO2-LWL-ACL-4X



R-P-AP1.0-800-4X-Ms