



More Precision

colorSENSOR // Color sensors, LED Analyzers





- 256 colors can be saved
- Repeatability ≤ 0.5
- Easy key operation
- Automatic LED control
- Fiber optics with focus lenses
- Multi-teach function

Features:

- Color memory: 256 colors in 6 color groups can be saved using keys
- Max. 3 color channels (6 with binary coding)
- Ethernet interface
- White light LED
- Color inspection in the $L^*a^*b^*$ / $L^*u^*v^*$ color space
- Different evaluation algorithms can be activated
- 6 color groups
- Adaptable fiber optics and focus lenses
- Robust aluminum housing
- Measurement frequency up to 10 kHz

Application examples:

- Detection of color rings on metal and plastic sleeves
- Color values can be read and statistically evaluated
- Color mark recognition in printing industry
- Color and gray-scale detection
- Packaging control
- Color sorting tasks (e.g., O-ring control, closures, crown caps, labels)
- Color recognition on interior parts (e.g., head supports)

The colorSENSOR CFO100 is a new sensor for precise color recognition in industrial measurement tasks. The controller is distinguished by high color accuracy, state-of-the-art interfaces and intuitive operation. Fiber optics which can be adapted for various measuring tasks, are connected to the controller.

Using a modulated high-power white light LED, a white light spot is projected via the fiber optics onto the surface to be detected. Part of the light that is back scattered from the target is directed onto a perceptive True Color detector via the same optical fiber, separated into long-, medium- and short-wave light components (X=long, Y=medium, Z=short) and transformed into $L^*a^*b^*$ color values.

Intuitive key operation enables the user to easily teach-in up to 256 colors in 6 color groups. One function alone adapts the illumination, averaging and signal amplification to the current measurement situation. Furthermore, tolerance models and tolerance values can be adjusted individually.

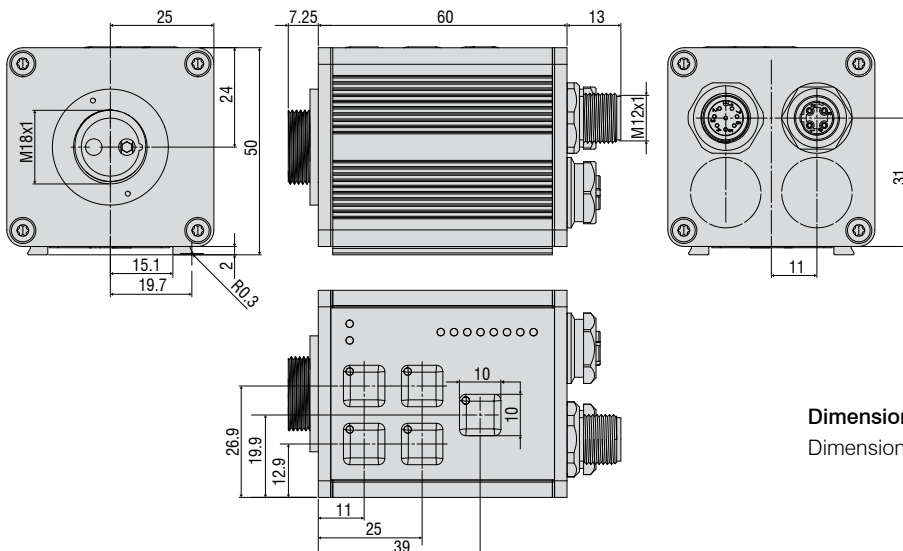
If the sensor recognizes one of the taught colors, the switching state changes via three digital outputs. Binary output switching ensures reliable test performance in the face of a discontinuity while providing output of up to 6 color groups.

Equipped with optical fibers, the sensor can also be used in restricted areas as the sensor head requires a minimum of space.

Model	CFO100
Article number	10234670
Object distance	depends on the fiber optics and the ancillary lens used reflected-light optical fiber typ. 2 mm - 25 mm with lens typ. 5 mm - 100 mm ²⁾
Light spot diameter	depending on the fiber optics used as well as front lens attachment reflected-light optical fiber typ. dia. 0.6 mm - 20 mm ²⁾
Repeatability ¹⁾	$\Delta E \leq 0.5$
Color distance	$\Delta E \leq 1.0$
Color spaces	XYZ, xyY, L*a*b*, L*u*v*, u'vL*
Averaging	automatic adaption depending on the measurement frequency over max. 200 values
Size of color memory	max. 256 colors in non-volatile EEPROM with parameter sets
Measurement frequency	standard 1 kHz; max. 10 kHz (number of colors being taught and the setting for the averaging depend on this)
Temperature drift X,Y	0.1 % / K
Light source	white light LED, AC mode (adjustable or OFF for self-luminous objects, software-switchable)
Type of illumination	via fiber optics
Effect from illumination	automatically adjustable
Ambient light	up to 5000 lux
Alternating light operation	AC: typ. 1 kHz; max. 10 kHz
Power supply	+18 ... 28 VDC
Power consumption	typ. 500 mA
Max. switching current	100 mA
TEACH key/inputs	5 keys and IN0 for externally teaching color reference, tolerance stage and configuring sensor; triggering, key lock, clearing memory
Outputs	OUT0 - OUT2, digital (0V/+Ub), 100 mA max. switching current
Switching state display	Visualization with 13 white LEDs
Interface	Ethernet and RS232 process interface
Type of connector	to power/PLC: 8-pole flange connector (M12A) to PC: 4-pole flange socket (M12D) (Ethernet DHCP-capable)
Connection cable	to power/PLC: art. no. 11234717 / to PC: art. no. 11234735 (Ethernet)
Receiver	3-color filter detector (XYZ TRUE COLOR detector, color curve according to CIE1931)
Pulse extension	off by default, typ. 10ms, adjustable > 30 μ s
Signal amplification	2 stages, automatic
Housing material	Aluminum, anodized black
Operating temperature	-10 ... +55 °C
Storage temperature	-10 ... +85 °C
Protection class	IP65

¹⁾ Maximum color distance ΔE of 1000 successive measurements of the color value of a red and a dark gray reference tile (R = 5%), measured with sensor FAR-TA2.0-2,5-1200-67° at 1000 Hz and brightness adjustment with a white standard (R=95%)

²⁾ Model: FAR - T - A 2.0 - 2,5 - 1200 - 67° Reflex; Model: FAD - T - A 2.0 - 2,5 - 1200 - 67° Transmitted light



Dimensions:
Dimensions in mm, not to scale



- *More than 320 colors can be saved*
- *Repeatability ≤ 0.3*
- *Easy key operation*
- *Automatic LED control*
- *Fiber optics with focus lenses*
- *Multi-teach function*

Features:

- Color memory: > 320 colors in 254 color groups can be saved using keys
- Max. 8 color channels (254 with binary coding)
- Ethernet interface
- White light LED
- Color inspection in the $L^*a^*b^*$ / $L^*u^*v^*$ color space
- Different evaluation algorithms can be activated
- 254 color groups
- Adaptable fiber optics and focus lenses
- Robust aluminum housing
- Measurement frequency up to 30 kHz

Application examples:

- Detection of color rings on metal and plastic sleeves
- Color values can be read and statistically evaluated
- Color mark recognition in printing industry
- Color and gray-scale detection
- Packaging control
- Color sorting tasks (e.g., O-ring control, closures, crown caps, labels)
- Color recognition on interior parts (e.g., head supports)
- Color recognition of exterior parts (e.g., parking sensors, exterior mirrors, etc.)
- Coloring of liquids (e.g., oil, apple juice, etc.)
- Gray shades of concrete blocks and paving stones
- Internal coating of cans
- Distinction of materials and coatings (stainless steel/tin or brass/gold)

The colorSENSOR CFO200 is a new sensor for precise color recognition in industrial measurement tasks. The controller is distinguished by high color accuracy, state-of-the-art interfaces and intuitive operation. Fiber optics which can be adapted for various measuring tasks, are connected to the controller.

Using a modulated high-power white light LED, a white light spot is projected via the fiber optics onto the surface to be detected. Part of the light that is back scattered from the target is directed onto a perceptive True Color detector via the same optical fiber, separated into long-, medium- and short-wave light components (X=long, Y=medium, Z=short) and transformed into $L^*a^*b^*$ color values.

Intuitive key operation enables the user to easily teach-in more than 320 colors in 254 color groups. One function alone adapts the illumination, averaging and signal amplification to the current measurement situation. Furthermore, tolerance models and tolerance values can be adjusted individually.

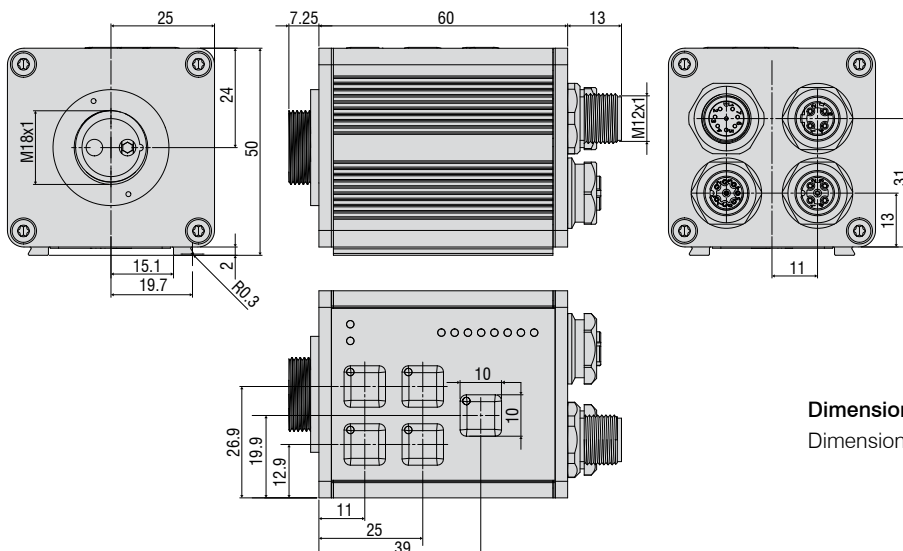
If the sensor recognizes one of the taught colors, the switching state changes via 8 digital outputs. Binary output switching ensures reliable test performance in the face of a discontinuity while providing output of up to 254 color groups.

Equipped with optical fibers, the sensor can also be used in restricted areas as the sensor head requires a minimum of space.

Model	CFO200
Article number	10234671
Object distance	depends on the fiber optics and the ancillary lens used reflected-light optical fiber typ. 2 mm - 25 mm with lens typ. 5 mm- 200 mm ²⁾
Light spot diameter	depending on the fiber optics used as well as front lens attachment reflected-light optical fiber typ. dia. 0.6 mm - 20 mm ²⁾
Repeatability ¹⁾	$\Delta E \leq 0.3$
Color distance	$\Delta E \leq 0.6$
Color spaces	XYZ, xyY, L*a*b*, L*u*v*, u'vL*
Averaging	automatic adaption depending on the measurement frequency over max. 200 values
Size of color memory	> 320 colors in non-volatile EEPROM with parameter sets
Measurement frequency	standard 1 kHz; max. 30 kHz (number of colors being taught and the setting for the averaging depend on this)
Temperature drift X,Y	0.1 % / K
Light source	white light LED, AC mode (adjustable or OFF for self-luminous objects, software-switchable)
Type of illumination	via fiber optics
Effect from illumination	automatically adjustable
Ambient light	up to 5000 lux
Alternating light operation	AC: typ. 1 kHz; max. 30 kHz
Power supply	+18 ... 28 VDC
Power consumption	typ. 500 mA
Max. switching current	100 mA
TEACH key/inputs	5 keys and IN0 - IN3 for externally teaching color reference, tolerance stage and configuring sensor; triggering, key lock, clearing memory
Outputs	OUT0 - OUT7, digital (0V/+Ub), 100 mA max. switching current
Switching state display	Visualization with 13 white LEDs
Interface	Ethernet, RS232 and USB process interfaces
Type of connector	to power/PLC: 8-pole flange connector; PLC: 8-pole flange socket (M12A) to PC: 4-pole flange socket (M12D) (Ethernet DHCP-capable)
Connection cable	to power/PLC: art. no. 11234717 / 11234722; to PC: art. no. 11234735 (Ethernet)
Receiver	3-color filter detector (XYZ TRUE COLOR detector, color curve according to CIE1931)
Pulse extension	off by default, typ. 10 ms, adjustable > 30 μ s
Signal amplification	5 stages, automatic
Housing material	Aluminum, anodized black
Operating temperature	-10 ... +55 °C
Storage temperature	-10 ... +85 °C
Protection class	IP65

¹⁾ Maximum color distance ΔE of 1000 successive measurements of the color value of a red and a dark gray reference tile ($R = 5\%$), measured with sensor FAR-TA2.0-2,5-1200-67° at 1000 Hz and brightness adjustment with a white standard ($R=95\%$)

²⁾ Model: FAR - T - A 2.0 - 2,5 - 1200 - 67° Reflex; Model: FAD - T - A 2.0 - 2,5 - 1200 - 67° Transmitted light



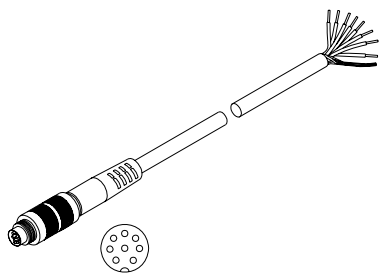
Dimensions:
Dimensions in mm, not to scale

colorSENSOR Accessory		
Art. No.	Description	suitable for:
11234717	CAB-M12-8P-fm-co-straight; 2m-PUR; open ends	colorSENSOR CFO (SYS; power and PLC)
11234718	CAB-M12-8P-fm-co-straight; 5m-PUR; open ends	colorSENSOR CFO (SYS; power and PLC)
11234722	CAB-M12-8P-co-straight; 2m-PUR; open ends	colorSENSOR CFO200 (digital I/O; PLC)
11234723	CAB-M12-8P-co-straight; 5m-PUR; open ends	colorSENSOR CFO200 (digital I/O; PLC)
11234735	CAB-M12-4P-co-straight; 2m-PUR-Cat5e; RJ45-Eth	colorSENSOR CFO (Ethernet)
11234736	CAB-M12-4P-co-straight; 5m-PUR-Cat5e; RJ45-Eth	colorSENSOR CFO (Ethernet)
11234713	CFO mounting adapter	colorSENSOR CFO
11234762	CFO DIN rail mounting kit	colorSENSOR CFO
11234763	CFO DIN rail mounting adapter	colorSENSOR CFO
11234091	CAB-M9-8P-co-straight; 2m-PUR; open ends	colorSENSOR OT (power and PLC)
11234099	CAB-M9-8P-co-straight; 5m-PUR; open ends	colorSENSOR OT (power and PLC)
11234095	CAB-M5-4P-co-straight; 2m-PUR; RS232	colorSENSOR OT (RS232)
11234103	CAB-M5-4P-co-straight; 5m-PUR; RS232	colorSENSOR OT (RS232)
11234096	CAB-M5-4P-co-straight; 2m-PVC; USB	incl. RS232/USB converter suitable for: colorSENSOR OT (USB)
11234104	CAB-M5-4P-co-straight; 5m-PVC; USB	incl. RS232/USB converter suitable for: colorSENSOR OT (USB)
11234368	CAB-M5-4P-co-straight; 2m-PVC; RJ45-fm-Eth	incl. RS232/Ethernet converter suitable for: colorSENSOR OT (Ethernet)
11234694	White standard 30 mm zenith	colorSENSOR and colorCONTROL
11234695	White standard 30 mm zenith calibrated	colorSENSOR and colorCONTROL
2420065	PS2030 power supply 24V/24W/ 1A; 2m-PVC; terminal-2P-co-fm-straight	Power supply of all sensors with 24 VDC

colorCONTROL MFA Accessory		
Art. No.	Description	suitable for:
10814105	POF-2.2 mm fiber optics	colorCONTROL MFA
11251112	Fiber-optic thread fitting; M4	POF-2,2
11251113	Mountable lens 6 mm	Fiber-optic thread fitting; M4
11253931	Fiber-optic thread fitting; 3 mm lens; M4	POF-2,2
11254108	Fiber-optic thread fitting; 90° lens; M5	POF-2,2
11253959	Reducing adapter 2.2/1 mm POF; 2 pc.	colorCONTROL MFA for use of POF-1 mm
10813842	POF-1mm fiber optics	colorCONTROL MFA in connection with the reducing adapter 2.2/1 mm POF
11253906	Guide sleeve 1 mm	POF-1 mm
10824431	Guide sleeve 1 mm x 50 mm	POF-1 mm
11234305	CAB-M8-4P-fm-co-straight; 2m-PUR; open ends	colorCONTROL MFA-1 (power and PLC)
11234306	CAB-M8-4P-fm-co-straight; 5m-PUR; open ends	colorCONTROL MFA-1 (power and PLC)
11294205	CAB-M9-2P-fm-co-straight; 2m-PUR; open ends	colorCONTROL MFA-5 (power)
11294206	CAB-M9-2P-fm-co-straight; 5m-PUR; open ends	colorCONTROL MFA-5 (power)
11234094	CAB-M9-4P-co-straight; 2m-PVC; USB	colorCONTROL MFA-5 (USB)
11234102	CAB-M9-4P-co-straight; 5m-PVC; USB	colorCONTROL MFA-5 (USB)
11234095	CAB-M5-4P-co-straight; 2m-PUR; RS232	colorCONTROL MFA-5 (RS232)
11234103	CAB-M5-4P-co-straight; 5m-PUR; RS232	colorCONTROL MFA-5 (RS232)
11294243	Assembly kit MFA-10	colorCONTROL MFA-5 + MFA-5-M
11294244	Assembly kit MFA-15	colorCONTROL MFA-5 + 2 x MFA-5-M
11294245	Assembly kit MFA-20	colorCONTROL MFA-5 + 3 x MFA-5-M
11294203	CAB-socket board-6P-co-fm-straight; 2m-PVC; 2P-open ends	colorCONTROL MFA-5-P (power)
11294054	CAB-socket board-6P-co-fm-straight; 1m-PVC; USB	colorCONTROL MFA-5-P (USB and power)
11294204	CAB-socket board-4P-co-fm-straight; 2.5m-PVC; RS232	colorCONTROL MFA-5-P (RS232)

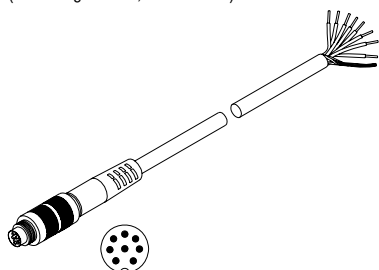
Pin assignment

CAB-M12-8P-co-fm-straight; Xm-PUR; open ends
 (Art.-No.: 11234717; 11234718)
 Connection cable SYS; Power and PLC
 (max. length 10 m, PUR sheath)



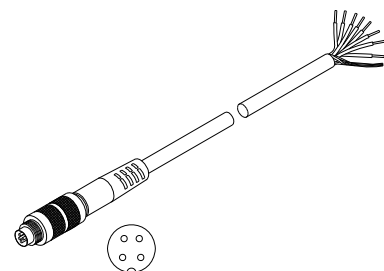
Pin	Color	CFO100/200
1	white	IN0
2	brown	+UB
3	green	TX
4	yellow	RX
5	gray	OUT0
6	pink	OUT1
7	blue	GND
8	red	OUT2

CAB-M9-8P-co-straight; Xm-PUR; open ends
 (Art.-No.: 11234091; 11234098)
 Connection cable to power/PLC or digital I/O
 (max. length 10 m, PUR sheath)



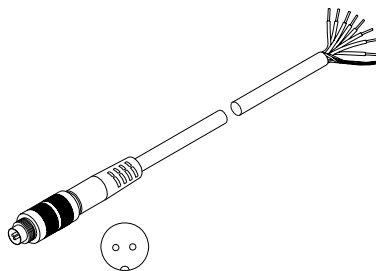
Pin	Color	OT-3-LD
1	white	GND (0V)
2	brown	+24 VDC ($\pm 10\%$)
3	green	IN0
4	yellow	OUT0
5	gray	OUT1
6	pink	OUT2
7	blue	OUT3
8	red	OUT4

CAB-M8-4P-fm-co-straight; Xm-PUR; open ends
 (Art.-No.: 11234305; 11234306)
 Connection cable to Power/PLC
 (max. length. 5 m, PUR sheath)



Pin	Color	MFA-1
1	brown	+ 24VDC
2	white	External Teach
3	blue	GND
4	black	NPN/PNP

CAB-M9-2P-co-fm-Straight; Xm-PUR; open ends
 (Art.-No.: 11294205; 11294206)
 Connection cable Power
 (max. length 10 m, PUR sheath)



Pin	Color	MFA-5
1	white	+24 VDC
2	brown	GND

High performance sensors made by Micro-Epsilon



Sensors and systems for displacement and position



Sensors and measurement devices for non-contact temperature measurement



2D/3D profile sensors (laser scanner)



Optical micrometers, fiber optic sensors and fiber optics



Color recognition sensors, LED analyzers and color inline spectrometer



Measurement and inspection systems

