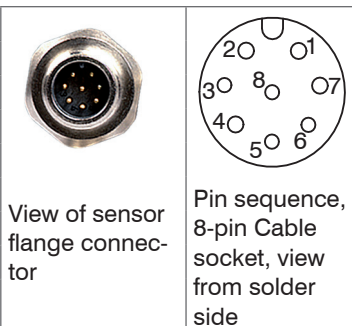


System, Power and PLC (SYS)

For connection of the power supply, one digital input, process RS232 interface and three digital outputs directly to a PLC.

- 8-pin Male connector
- 24 VDC \pm 15%, $I_{max} < 500$ mA
- not electrically separated, polarity reversal protection, GND is electrically connected to GND for switching outputs.

Pin	Color ¹	Function	Description
1	White	IN0	Trigger input
2	Brown	V ₊	Operating voltage (10 - 28 VDC)
3	Green	TX	Terminal (RS 232 transmit)
4	Yellow	RX	Terminal (RS 232 receive)
5	Gray	OUT0	Switching output (NPN/PNP/PP)
6	Pink	OUT1	Switching output (NPN/PNP/PP)
7	Blue	GND	Ground connection
8	Red	OUT2	Switching output (NPN/PNP/PP)



The three switching outputs are switchable push-pull outputs. The switching output logic level depends on the supply voltage V₊ connected.

Use: Direct for 3 individual colors or binary for 7 color groups

The switching state zero is not used to ensure reliable test performance in the face of a discontinuity. The switching state all switched is recommended as the standard color not detected output.

➔ Use shielded cable with a length < 30 m.

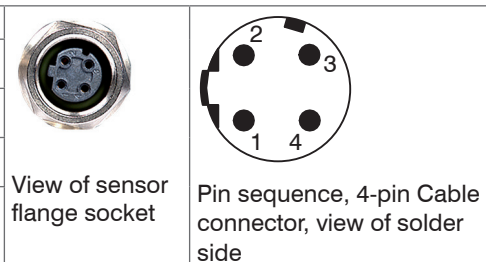
Ethernet (ETH)

For data transmission connection to an RJ45 Ethernet connector

- 4-pin female connector
- with Ethernet network (PC)

➔ Connect the sensor to the network using a shielded Ethernet cable (Cat5E) with a length < 100 m. Micro-Epsilon recommends use of the optionally available cable CAB-M12-4P-St-ge ... RJ45-Eth.

Pin	Color ²	Function	Description ²
1	Orange/white	TX+	Ethernet
2	Blue/white	RX+	Ethernet
3	Orange	TX-	Ethernet
4	Blue	RX-	Ethernet



The sensor can be configured using the HTTP-API commands.

- 1) Conductor color CAB-M12-8P-Bu-ge 2) Conductor color CAB-M12-4P-St-ge ... RJ45-Eth2
- 3) Specification pursuant to 100BASE-TX

Digital I/O

The five push-pull switching outputs on the 8-pin connector I/O ¹ are electrically connected to the power supply. The switching output logic level depends on the supply voltage V₊ connected.

Use: Direct for a total of 8 individual colors or binary for 254 color groups.

The switching state zero is not used to ensure reliable test performance in the face of a discontinuity. The switching state all switched is recommended as the standard color not detected output.

The cable shield is connected to the housing.

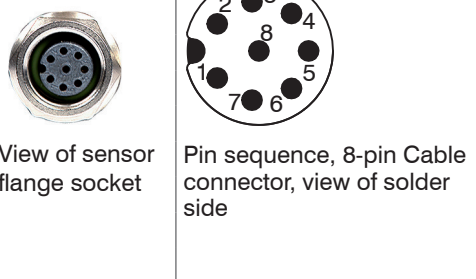
➔ Connect the cable shield to the evaluation unit.

All GND conductors are interconnected with one another and to operating voltage ground.

➔ Use shielded cable with a length < 30 m.

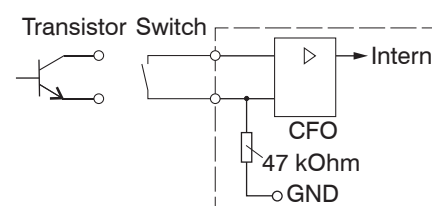
Micro-Epsilon recommends use of the optionally available cable CAB-M12-8P-St-ge.

Pin	Color ²	Function	Description
1	White	IN1	Trigger input
2	Brown	IN2	
3	Green	IN3	
4	Yellow	OUT3	Switching output (NPN/PNP/PP)
5	Gray	OUT4	
6	Pink	OUT5	
7	Blue	OUT6	
8	Red	OUT7	



1) Applies only for colorSENSOR CFO200. 2) Conductor color CAB-M12-8P-St-ge

Switching Input Circuit

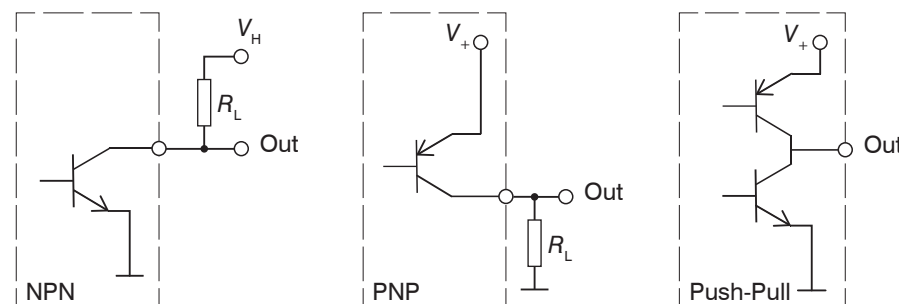


The switching input IN can be connected to the operating voltage potential V₊ as follows.

Model-specific Pin assignments, functions, descriptions and notes about this are available in the operating instructions.

Switching Output Circuit

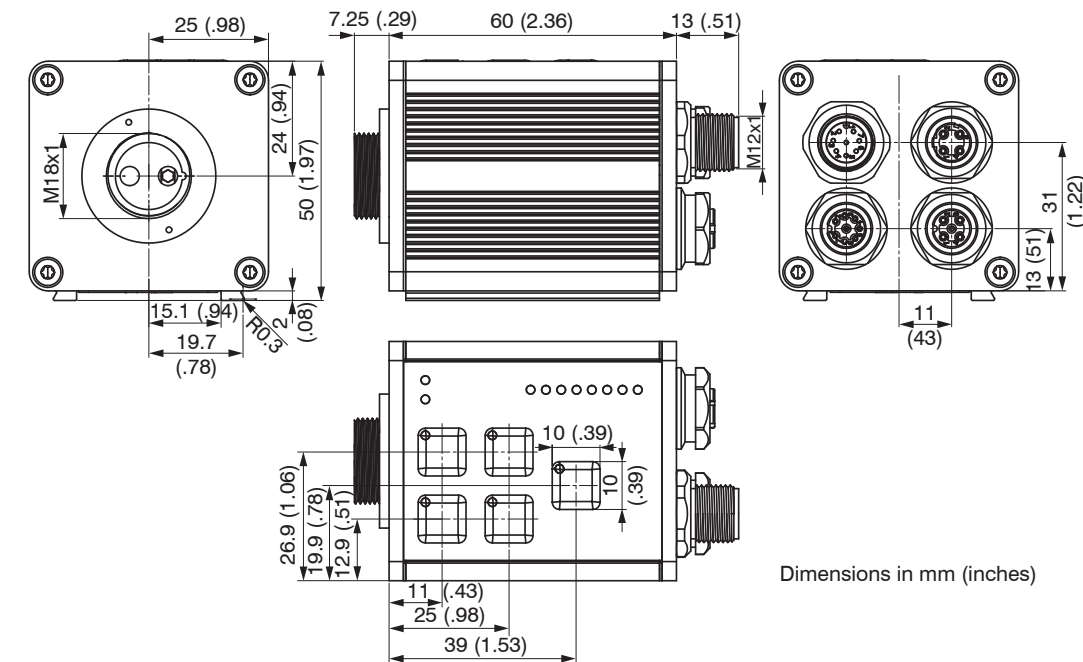
The switching outputs are connected as follows:



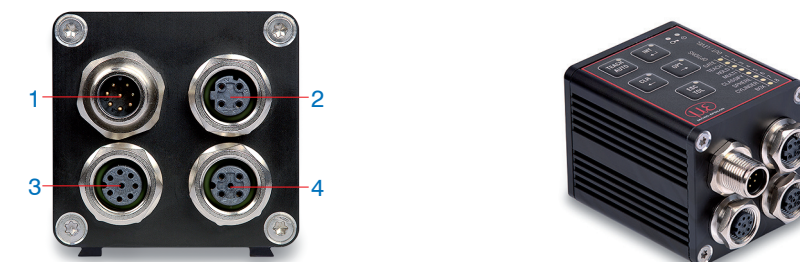
The switching behavior (NPN, PNP, Push-Pull) is programmable. The NPN output is, for example, suitable for adaptation to a local TTL logic circuit with auxiliary voltage of V_H = 5 V.

The switching outputs are protected against polarity reversal, overload (< 100 mA), excessive temperature and have an integrated self-induction recuperation diode for inductive loads. Not electrically separated, 24 V logic (HTL), low level GND, high level V₊ (max 28 V)

Dimensional Drawing



Electrical Connections



Connector location on colorSENSOR CFO200 Electrical connections on colorSENSOR CFO200

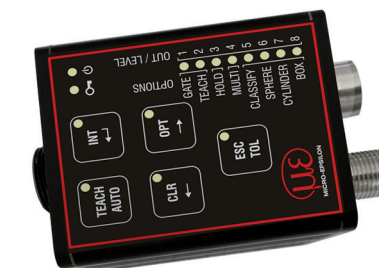
1	SYS = System (Power/PLC)	Power supply, switching outputs, switching input, RS232
2	ETH = Ethernet	Connection to PC
3	I/O = Digital I/O (PLC), CFO200 only	Switching inputs and outputs
4	USB, CFO200 only	USB process interface



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Assembly instructions
 colorSENSOR CFO



Warnings

Connect the power supply in accordance with the safety regulations for electrical equipment. Ensure that power supply does not exceed specified limits.

> Risk of injury, damage to or destruction of the sensor.

Protect the ends of the optical fibers against contamination, protect the cable against damage.

> Failure of the measuring device

Avoid shocks and impacts to the controller or the sensor.

> Damage to or destruction of the system

Proper Environment

- Protection class: IP65
- Temperature range:
 - Operation: -10 °C ... +55 °C (+14 ... +131 °F)
 - Storage: -10 °C ... +85 °C (+14 ... +185 °F)
- Humidity: 20 ... 80 % r. H. (non-condensing)
- Ambient pressure: Atmospheric pressure

You can find more information about the sensor in the operating instructions and the interface instructions. They are online at:

www.micro-epsilon.com/download/manuals/man--colorSENSOR-CFO--en.pdf

www.micro-epsilon.com/download/manuals/man--colorSENSOR-CFO-Interfaces-en.pdf

or with the QR codes at right.

Installation

• The supply voltage must not exceed the specified limits.

The colorSENSOR CFO can be placed on a level surface or fastened with the dovetail on the rear of the sensor.

• Position the sensor so that the connections, controls and displays are not concealed. We recommend maintaining a clearance of 2 - 3 cm at the cooling ribs on the left and right sides.

A mounting adapter is available separately for mounting with screws or with a mounting rail (TS35 top-hat rail) according to DIN EN 60715 (DIN rail).

Operation Using Foil Keyboard

The starting point is the main menu = operating mode/measuring mode: Display of the color group identified/selected setting for No color detected/all LEDs flash - sensor is overmodulated.

Default IP: 169.254.168.150

Submenu	Options / settings				Display / visualization			
 Press and hold > 2 sec.	Intensity menu		Automatic setting to about 80 %	While the settings are performed, the LEDs flash. Duration: about 5 seconds		Number of illuminated LEDs matches intensity All LEDs flash: sensor is overmodulated		
			Intensity higher/lower about 10 %/key press					
 Press and hold > 2 sec.	Color teach menu		Select color group CFO100 1 - 6 CFO200 1 - 254	Teaching color: Press < 2 sec.: 1 color Press and hold > 2 sec.: Multi-teach		Flashing Medium-fast ¹ = no color Fast ² = at least 1 color Slow ³ = color within a group is detected.		
			LED of the group flashes.	Delete color group Press and hold > 2 sec.				
 Press and hold > 2 sec.	Delete entire color table	Back to main menu		Tolerance submenu		Tolerance stage higher/lower Tolerance setting, see table at right		Tolerance stage is displayed (1- 8) higher/lower Back to Color teach menu
 Press and hold > 2 sec.	Options menu		Four option groups are possible: Switching input In0: Triggered color evaluation (GATE) or triggered teaching (TEACH) Switching output hold time: 0 ms (LED off), 10 ms (LED flashes briefly), 1000 ms (LED flashes long) Teaching behavior of color groups: Multi-teach on/off Tolerance mode for color detection: CLASSIFY, SPHERE, CYLINDER, BOX	Function: switch on/off/scroll		Flashing Fast = On Slow flashing = Off Or speed of flashing Tolerance mode is displayed directly.		

Back to main menu	
 Press and hold > 2 sec.	Save
 Press and hold > 2 sec.	Cancel

Controls and LEDs

The operating concept, as well as the function of the foil keyboard, are described in the Chapter Foil Keyboard, see operating instructions.

LED/key	Color	Meaning	Location
	Green	Operating voltage present	
	Red	Key lock active	
TEACH AUTO	White	Color teach menu Set level automatically	
INT	White	Automatic illumination adjustment Enter/save	
CLR	White	Delete memory menu Arrow pointing left	
OPT	White	Option selection menu Arrow pointing right	
ESC TOL	White	Escape/quit without saving Tolerance adaptation menu	

Tolerance Setting

Tolerance is subdivided into the following stages:

Tolerance stage	Tolerance space					
	Sphere	Cylinder		Box		
	ΔE_{rel}	ΔL	Δab	ΔL	Δa	Δb
1	0.3	0.6	0.3	0.6	0.3	0.3
2	0.5	1.0	0.5	1.0	0.5	0.5
3	1.0	2.0	1.0	2.0	1.0	1.0
4	2.0	4.0	2.0	4.0	2.0	2.0
5	4.0	8.0	4.0	8.0	4.0	4.0
6	6.0	12.0	6.0	12.0	6.0	6.0
7	8.0	16.0	8.0	16.0	8.0	8.0
8	12.0	24.0	12.0	24.0	12.0	12.0

1) 100 ms on/900 ms off

2) 2 periods:
1.50 ms on/50 ms off
2.50 ms on/850 ms off

3) 900 ms on/100 ms off

Before	After	Action
Operating mode	Menu mode	Press and hold one of the keys > 2 sec. to change from operating mode to various menus.
Menu mode	Submenu	With the exception of the ESC/TOL key, all keys call a separate menu, see key label. Pressing the TOL key in the TEACH menu calls the submenu for Tolerance adaptation.
Change-over within menu		Press one of the / keys CLR/OPT for < 2 sec. to change over between colors, options, etc. within a menu.
Menu mode	Start action	Press the TEACH/AUTO key for < 2 sec. to start an action.
Menu mode	Operating mode	Press and hold the INT/ENTER key > 2 sec. to save or the ESC/TOL key to cancel and leave menu mode.

Key lock

