

## Warnings

Connect the power supply according to the safety regulations for electrical equipment. The supply voltage must not exceed the specified limits.

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

Protect the ends of the sensors (optical fiber) against contamination, protect the cable against damage.

> Failure of the measuring device

Avoid shocks and impacts to the controller or the sensors.

> Damage to or destruction of the system

## Proper Environment

- Protection class: IP20
- Temperature range:
  - Operation: 0 °C ... +50 °C (+32 ... +122 °F)
  - Storage: -10 °C ... +55 °C (+14 ... +131 °F)
- Humidity: 20 ... 80% RH (non-condensing)
- Ambient pressure: Atmospheric pressure

## Assembly

Ensure careful handling during installation and operation.

Make sure that the sensors can move freely and that no sharp curves or corners are formed when installing the colorCONTROL MFA-7/14/21/28.

> Damage to or destruction or failure of the sensor

> Distortion of test results

The smallest bending radius of the sensor (optical fiber) is 50 mm (permanent) or 10 mm (short-term).

Make sure that all the light from the LEDs is guided from the sensor to the color chip in the colorCONTROL MFA-7/14/21/28.

## Electrical Connections



Pin assignment for colorCONTROL MFA-7/14/21/28:

- 1 4-pin male connector M12 for power supply
- 2 8-pin female connector M12 for RS232, RS422 or USB

The power supply and communication connections of the controller are accessible using standardized male and female connectors M12. All connection cables with the features required for the application (e.g. drag chain compatibility or resistance to oil) and the matching coding can be used with the controllers.

## Supply Voltage

To connect the supply voltage:

- 4-pin male connector
- 24 VDC  $\pm$  10 %,  $I_{max} < 500$  mA

Pin	Color <sup>1</sup>	Function	Description
1	Brown	V+	Supply voltage (10...28 VDC)
2	White	-	-
3	Blue	GND	Ground
4	Black	-	-
Shield			The cable shield is connected to the housing.

View of controller flange connector

Pin sequence, 4-pin cable socket, viewed from solder side

1) Wire colors CAB-M12-4P-co-fm-straight

Use a shielded cable with a length < 30 m.

MICRO-EPSILON recommends using the optionally available CAB-M12-4P-co-fm-straight cable.

## Data Transmission for RS422, RS232 or USB

8-pin female connector for connecting the RS422, RS232 or USB interface. Depending on the interface, there is a separate connection line, with the same data protocol being output via each of the three interfaces. The interfaces may be operated separately but not simultaneously. The cable shield is connected to the housing.

Connect the cable shield to the evaluation unit.

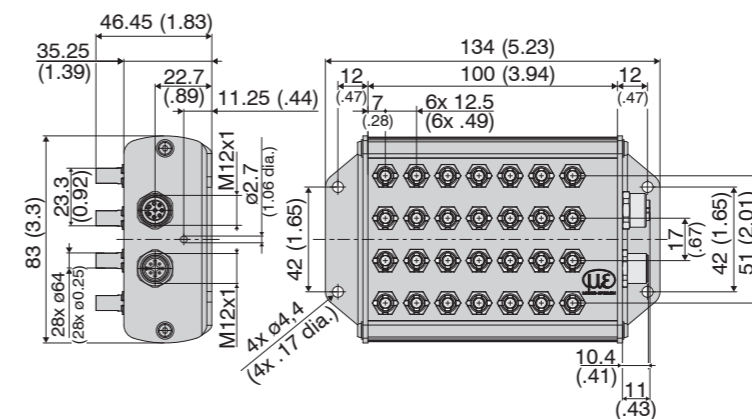
Use a shielded cable with a length of:

- USB  $\leq$  3m
- RS232  $\leq$  10m
- RS422  $\leq$  15m

Micro-Epsilon recommends use of the optionally available cable CAB-M12-8P-co-straight.

Pin assignment for M12 8-pin female connector (RS422/RS232/USB)				Pin assignment for cable:		
Pin	Color	Function		USB	RS232	RS422
1	White	GND		GND	GND	GND
2	Brown	VUSB		VUSB	-	-
3	Green	D+		D+	-	-
4	Yellow	D-		D-	-	-
5	Gray	RI+		-	GND	RI+
6	Pink	RI-		-	RxD	RI-
7	Blue	DO-		-	TxD	DO-
8	Red	DO+		-	-	DO+
Shield	The cable shield is connected to the housing.			Shield		

## Dimensional Drawing



colorSENSOR MFA-28 dimensional drawing, dimensions in mm

## Status LED

Color	Meaning	Position of the LED
Green	Controller ready to use	
Orange	Error (as soon as a channel is not working correctly, the LED lights up orange)	
Blue	Overflow (as soon as overflow has occurred in a channel, the LED lights up blue)	



Assembly Instructions  
colorCONTROL  
MFA-7/14/21/28

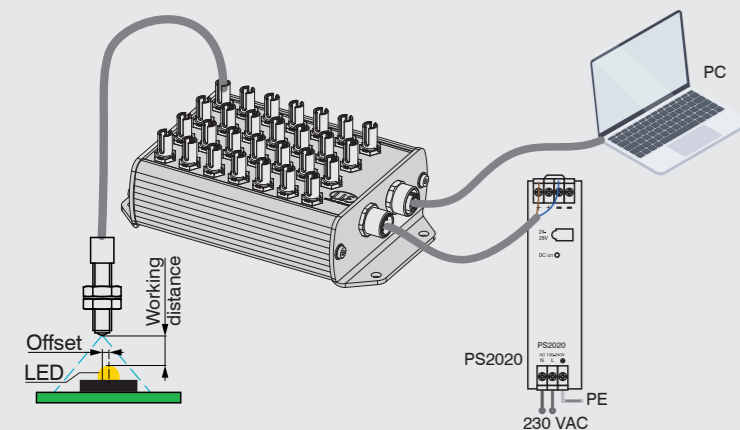


## Quick Guide

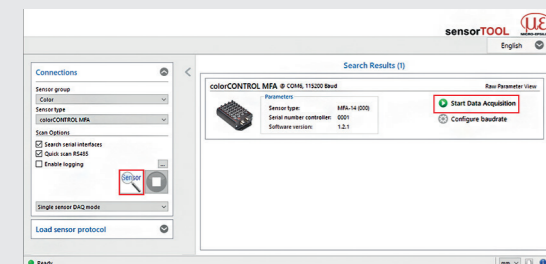
### Structure of the Components

- MFA-7/14/21/28
  - MFS sensors
  - Power supply unit, laptop / PC + USB / RS232
- ▶ Connect the components with one another.
- ▶ Position the fiber optics over the optical center of the LEDs.

The intensity of a test depends on the working distance and the offset of the LED with respect to the fiber optics.



## Initial Operation



The sensorTOOL program is available online at

<https://www.micro-epsilon.com/service/download/software/>

You need an HTML5-compatible web browser on a PC/notebook.

## Initial Operation

- ▶ Connect the controller via the RS232 or USB to a PC/notebook.
- ▶ Start the program `sensorTOOL`.
- ▶ Select the sensor group `Color` and sensor type `colorSENSOR MFA` from the drop-down menus.
- ▶ Click the `Sensor` button.

The program searches the available interfaces for connected MFA-7/14/21/28 controllers.

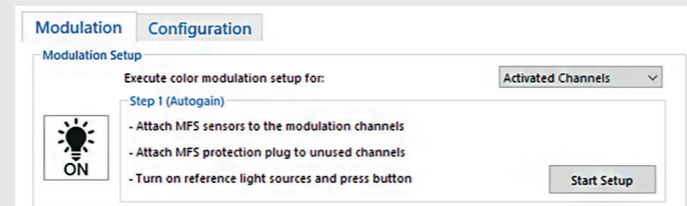
- ▶ Select a desired sensor. Click the `Start Data Acquisition` button.

## Modulation Setup

- ▶ Select the `Settings/Modulation` menu.

Before the MFA-7/14/21/28 can deliver meaningful measurement results, its dynamic range must be adjusted to the measurement situation. This is done with the intensity adjustment (modulation).

Via the drop-down menu, it is possible to select whether the dynamic range adjustment (modulation) takes place for all activated channels, for all channels, or for a single channel only.

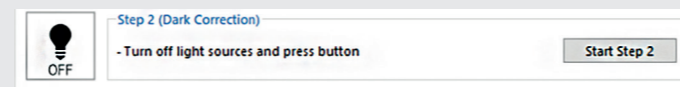


The dynamic range is adjusted (modulation) in three successive steps in the `Settings/Modulation` menu.

- ▶ Follow the instructions listed under `Step 1 (Autogain)` and click on the `Start Setup` button.

After this step has been completed, a green check mark appears, which indicates that it was successful.

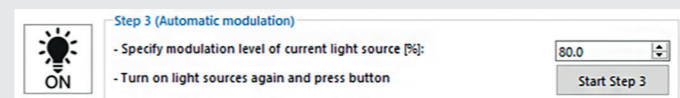
**i** All channels selected for modulation must be illuminated. For this purpose, it is advisable to select the brightest possible lighting situation such that no underflow or overflow occurs in the receiving detectors. The actual light color is not important, because only the dynamic range in the received brightness (Ix) is adjusted.



- ▶ Switch the light source off and click on the `Start Step 2` button.

After this step has been completed, a green arrow mark appears, which indicates that it was successful.

**i** In `Step 2 (Dark Correction)`, a dark correction is carried out. None of the channels selected for adjustment may be illuminated during this process.



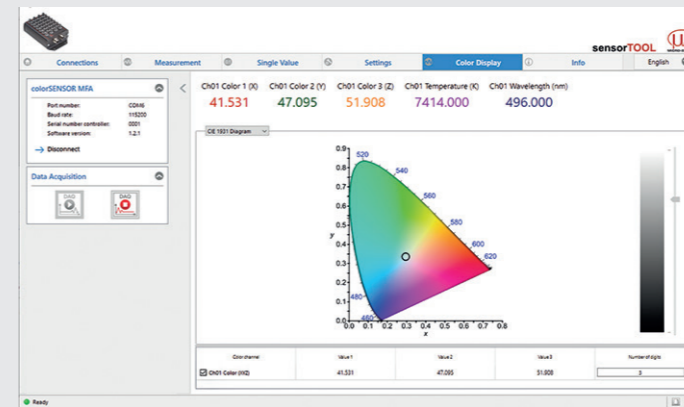
- ▶ Enter a percentage value, switch the light source on again and click on the `Start Step 3` button.

**i** Because there are always fluctuations in the production of light sources or because you might not have the correct light source with maximum brightness for the adjustment, you can set a control level (in %) for the receiver here. If, for example, it is set to 80 %, the light source to be measured can still be 20 % brighter before overflow occurs in the receiver.

## Color Display Menu

- ▶ Launch the `Color Display` menu.

In this menu, you can select from various representation options of the measured values and the associated color values.

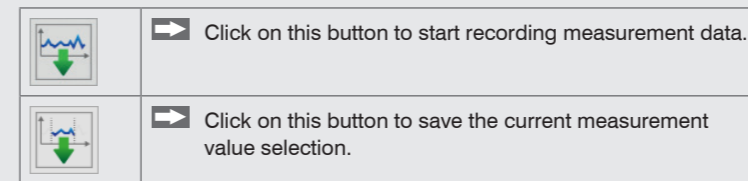


You can use the drop-down menu to switch between the four types of graph: CIE 1931 color display, rectangular color display, circular color display and MFA color channels.

## Measurement Menu

The data is recorded in a simple manner so that you can review your measurements.

During data acquisition, the measurement data is only displayed in the `measurement` menu and not automatically saved on the PC. However, in the CSV output, you can start transmitting data into a \*.CSV file or save just the current visible region of the time graph.



For further information about the system read the operating instructions. They are available online at:

[www.micro-epsilon.com/download/manuals/man-colorCONTROL-MFA-7--en.pdf](http://www.micro-epsilon.com/download/manuals/man-colorCONTROL-MFA-7--en.pdf)

or with the QR code at right.



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