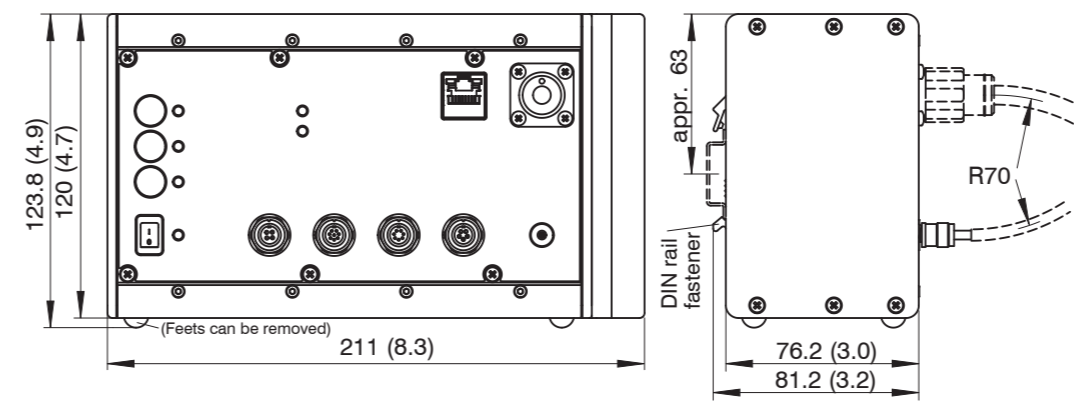




Dimensional Drawing Controller



Functions

- Non contact online color measurement
- Color recognition from a taught reference list
- Triggering, Synchronization
- Ethernet/EtherCAT, RS422, Digital I/O
- Measurement frequency up to 2000 Hz

Warnings

Connect the power supply in accordance to the safety regulations for electrical equipment. The power supply may not exceed the specified limits.
> Danger of injury, damage to or destruction of the system

Protect the optical fiber ends from dirt and contamination, protect the cables from damage.
> Failure of the measurement device

Avoid shock and vibration to the controller or the sensor.
> Damage to or destruction of the system

Proper Environment

- Protection class: IP40 (Controller), IP64 (Sensor)
- Temperature range:
 - Operating: 0 ... +45 °C (+32 ... +113 °F)
 - Storage: -20 ... 70 °C (-4 ... +158 °F)

Assembly

Place the controller on a level surface, or install it for example in a switch cabinet using a DIN EN 60715 mounting rail (DIN rail TS35).

When attaching the controller, ensure that no connections, operating or display elements are covered. Free space adjacent to the heat sink on the right side of the controller: min. 3 cm.

To remove the controller, push it upwards, and pull it forwards.

You can find more information about the sensor in the operating instructions. They are available online at: www.micro-epsilon.de/download/manuals/man--colorCONTROL-ACS7000--en.pdf or with the QR code at right:



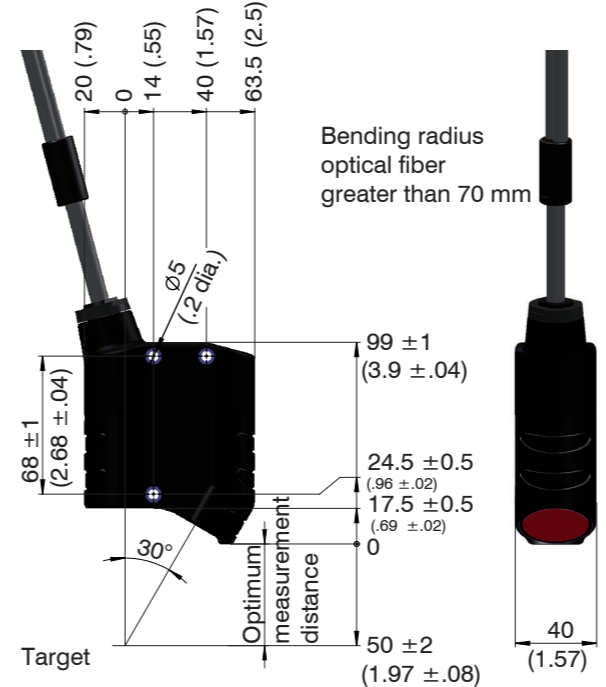
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Your local contact: www.micro-epsilon.com/contact/worldwide/

Connecting Sensor Cable to the Controller

- When connecting the optical fiber connector, you need to ensure that the end points do not touch any edges or surfaces to avoid damage.
- Connect the sensor cable (thick strand, larger connector) to the controller.
- Guide the coding keys upwards along the fiber connectors, until they fit into the controller's grooves. Carefully tighten the union nut by hand.
- Connect the signal connector to the controller.

Angle Sensor Mounting ACS1 30°/0°

- Mount the sensor to the three mounting holes. Use three cylinder-head screws M4x45.



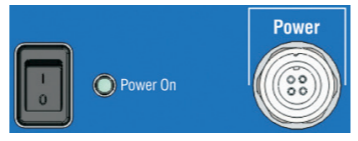
Dimensions in mm (inches)

Ethernet, EtherCAT

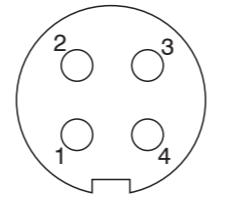
Potential isolated RJ 45 standard connector for connecting the controller to an Ethernet network (PC) or the EtherCAT bus system. The controller is connected with a PC or generally with a network via the Ethernet interface. The internal websites can be accessed in the controller with a web browser and so the controller can be operated.

Supply Voltage (Power)

Power connector, switch and LED on the controller
Use separate 24 V power supplies in automation systems for measuring devices in drive units. MICRO-EPSILON recommends using an optional available power supply unit PS2020.



Pin	Wire color CAB-M9-4P-St-ge	Function
1	white	n.c.
2	brown	+ 24 VDC, ± 15 %, I _{max} < 1 A
3	black	n.c.
4	blue	GND (0V)
-	gray	n.c.



4-pol. male cable connector, view: solder-pin side

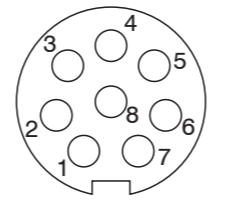
Digital I/O

A bridge between the pins 7 and 8 defines the logic levels for all signals on the Digital I/O connector.
- Pin 7 and 8 connected: HLL (High logic level)
- Pin 7 and 8 open: LLL (Low logic level).



Digital I/O on the controller

Pin	Wire color CAB-M9-8P-St-ge	Function
1	white	Error
2	brown	GND Error
3	green	Sync. Out
4	yellow	GND Sync. Out
5	grey	Sync. In / Trig.
6	pink	GND Sync In / Trig.
7	blue	LLL / HLL
8	red	LLL/ HLL



8-pol. male cable connector, view: solder-pin side

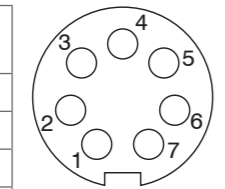
Color Switching Outputs (Color)

A bridge between the pins 7 and 8 of the Digital I/O connector defines the logic level for the switching outputs.
- Pin 7 and 8 connected: HLL (High logic level)
- Pin 7 and 8 open: LLL (Low logic level).



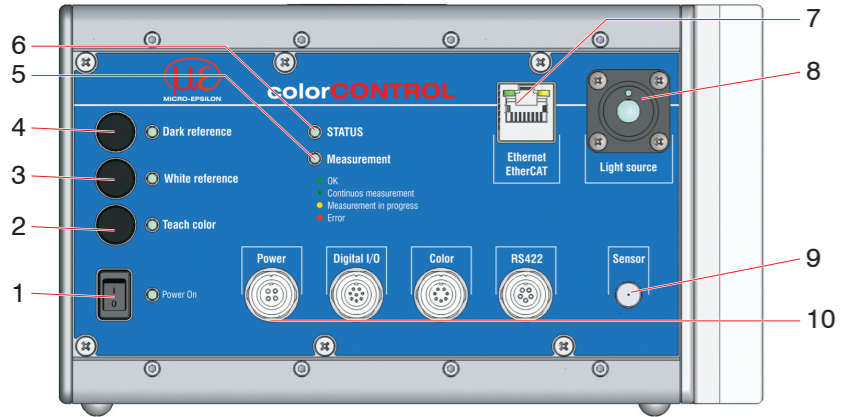
Color switching outputs on the controller

Pin	Wire color CAB-M9-7P-St-ge	Function
1	white	Out 1
2	brown	Out 2
3	green	Out 3
4	yellow	Out 4
5	grey	GND



7-pol. male cable connector, view: solder-pin side

Control Elements



1	On/off switch	7	Ethernet / EtherCAT
2	Pushbutton, LED Teach color	8	Light source
3	Pushbutton, LED White reference	9	Sensor connector
4	Pushbutton, LED Dark reference ¹⁾	10	RS422, color, digital I/O and supply connectors
5	LED Measurement	¹⁾ Set to factory setting: Press the pushbuttons Dark reference and Teach color appr. 10 s.	
6	LED Status		

LED's

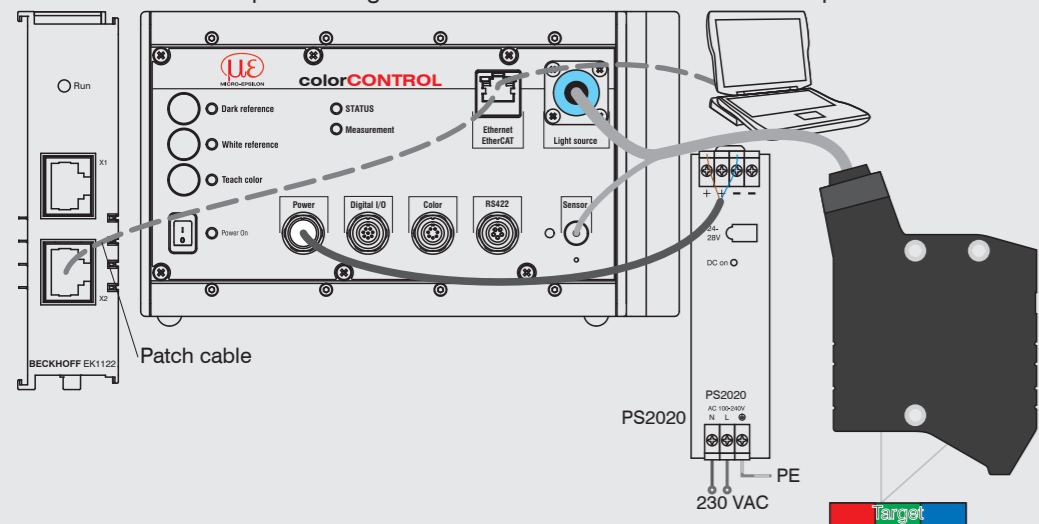
Power on	Green	Supply voltage OK
Status (Ethernet)	Green	No error, system ready
	Red	Error
Status (EtherCAT)	If the EtherCAT interface is active, then the meaning of the Status-LED is conform with the EtherCAT guidelines.	
	Off	No data transmission
Measurement	Green	Active data transmission
	Red	Error
Dark reference, White reference, Teach color	Green	Action was successfully
	Green, flashing	Action is currently running
	Red	Action canceled incorrectly
	Red	When pushbuttons are pressed and the pushbuttons are locked

Quick Guide

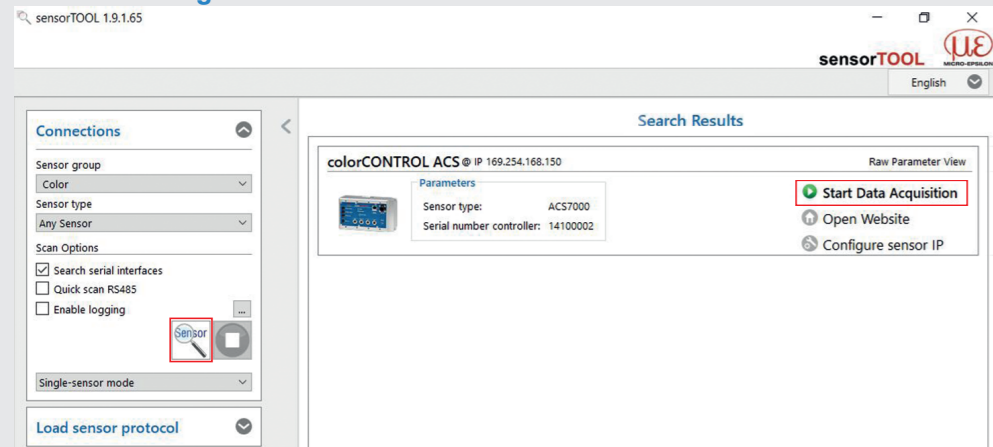
Structure of the Components

- Controller
- Power supply
- Laptop / PC + USB -> Ethernet-Adapter + Ethernet cable
- Sensor and clamp

➔ Connect the components together and mount the sensor into the clamp.



Commissioning



The controller is shipped with the factory-set IP address 169.254.168.150.

You can query the IP addresses of the controllers that are connected to a PC or network by using the sensorTOOL.exe program. You can find this program online at <https://www.micro-epsilon.com/service/download/software/>. You need an HTML5-compatible web browser on a PC/notebook.

➔ Start the sensorTOOL program. Click the button.

➔ Select the controller from the list.

➔ Click on the Start Data Acquisition button to connect the controller to your standard browser.

The program searches the available interfaces for connected colorSENSOR ACS controllers. The start screen of the controller software should now be displayed in the web browser.

Operator Level, Pushbutton Lock

The factory setting is the Professional user level, which means that all menus and parameters can be accessed. After you have configured your controller, activate the password protection. The default password for the Professional level is "000". See menu Preferences > Login.

To operate the controller using pushbuttons, Professional user level must be enabled. The pushbuttons will be locked after a specified period of time, if they haven't been used after a restart. See System Settings menu.

➔ Press the Dark Reference and White Reference pushbuttons simultaneously for 3 to 5 seconds to enable or disable the pushbutton lock.

Dark Referencing

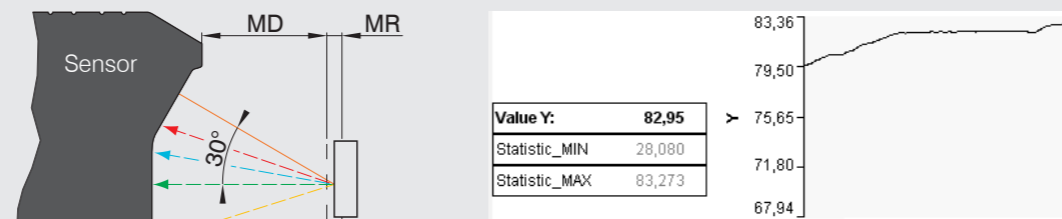
Dark referencing is used to compensate dark signal drift for the receiving array in the controller. Controller warm-up time is approx. 40 minutes.

➔ Cover the sensor with a piece of dark paper, and press the Dark Reference pushbutton on the controller or click the Dark correction button on the website. Menu Preferences > Corrections, Referencing.

No external light must reach the sensor during dark referencing. Any light source LEDs are automatically switched off for the duration of the correction process.

Fine Positioning the Sensor, Placing the Target

➔ Switch to the Measurement program, and select XYZ as your color space. Place a bright measurement object as close as possible to the center of the working range.



MD = measurement distance, MR = measuring range

➔ Loosen the mounting of the sensor and move the sensor until the signal Y is on its maximum. Attach the sensor.

Select Measuring Rate

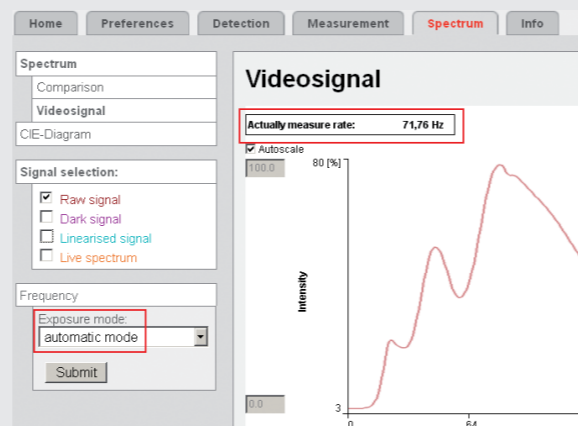
The optimum measuring rate depends on the brightness of light source and the used sensor.

➔ Place a white target inside the working range.

➔ Select the program Spectrum and select Video signal.

➔ Select the exposure mode Automatic mode.

The video signal displays the optimum measuring rate.



Optimum measuring rate is less than required measuring rate:

- If possible, select a higher light source brightness (Settings menu) and then refresh the optimum measuring rate.
- Set the required measuring rate. Exposure mode: Manual mode > Measuring rate.

Optimum measuring rate is greater than required measuring rate:

- Operate the controller with exposure mode Measurement or Automatic mode.
- Reduce the brightness of the light source (Settings menu).
- Use the spectra and / or signal averaging, may select data reduction.

White Balance

This calibration references the controller on the spectrum of a white standard. The white balance is required after replacement of a sensor or a changed measurement environment.

➔ Place a white reference object from the optional accessories within the working range.

➔ Press the pushbutton White reference on the controller or the White balance button in the web interface. Menu Settings > Corrections, referencing.

Do not change the brightness of the LED after a white balance.

Standard Observer, Standard Illuminant

➔ Select the viewing angle and the standard illuminant. Menu Settings > Standard observer, Illuminant.

Teach New Color

➔ Place a target within the working range.

➔ Go to the Settings menu and select Color table.

➔ Click on the button New color.

Color table					
ColorOut	Color	Properties	Color space: L*a*b*		
Mode: BINARY		Observer, Illuminant, spectrum stored	L*	a*	b*
1.	Red	2°, D65, Spectrum	23.807	45.060	35.221
2.	Green	2°, D65, Spectrum	68.329	-68.991	41.086
3.	Blue	2°, D65, Spectrum	36.815	-16.976	-43.735
4.	New color				

Create/Edit Color

Color name:	Apple
Color description:	Production 2012-06-04
Description by:	teach via spectrum
	Measure and teach color
L*:	66.1
a*:	-40.2
b*:	43.8
R:	100.0

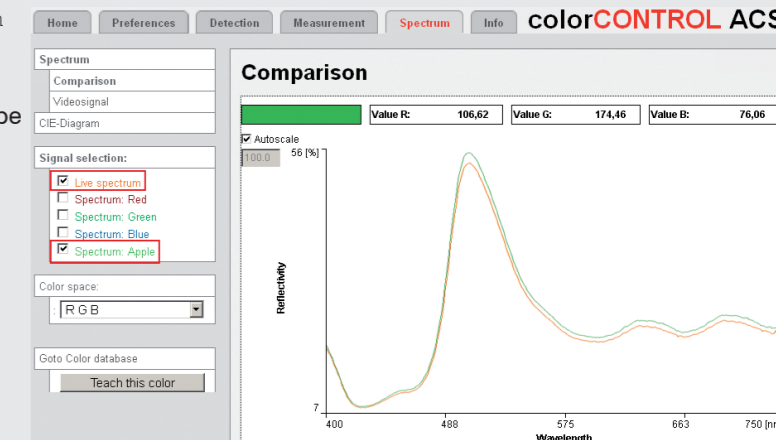
➔ Click Apply to confirm the settings.

When data are transmitted via Ethernet or RS422, measurement results cannot be simultaneously displayed through the web interface. First use the web interface diagrams to adjust settings, and then specify the required data transfer interface to start the measuring process.

Spectrum Program

➔ Go to the Spectrum program and select Comparison.

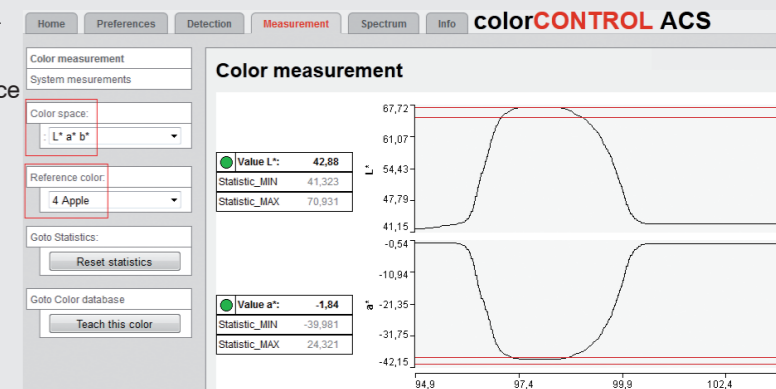
➔ Select the colors to be compared.



Measurement Program

➔ Go to the Measurement program.

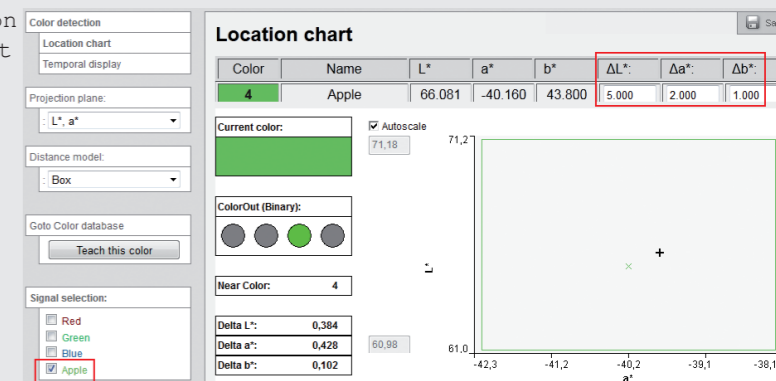
➔ Select the color space and the reference color.



Detection Program

➔ Go to the Detection > Location chart program.

➔ Select the signal, enter the limits.



Save Setup

➔ Select a setup and click on the button Save setup.

Not saved settings will be lost, if you switch off the controller.