Installation Instructions

Original Instructions

# ColorSight Sensor

Catalog Numbers 46CLR-D5LAC1-D5, 46CLR-D5LAC2-D5, 46CLR-D5LAC3-D5

**IMPORTANT** Save these instructions for future use.



## Description

Bulletin 46CLR ColorSight™ sensor is a self-contained true color sensor with a built-in LCD display that can detect and measure slight color variations with high precision in typical packaging applications. The ColorSight sensor allows for the concurrent detection of up to seven internally stored colors and the ability to communicate RGB and intensity values for remote processing of additional colors with the PLC.

The ColorSight sensor also can be programmed to detect and store multiple colors in up to seven different color channels with the help of the local teach button. Upon recognition of the taught colors, up to three discrete outputs can be activated locally in standard IO mode. An additional four virtual outputs can be configured when connected using IO-Link.

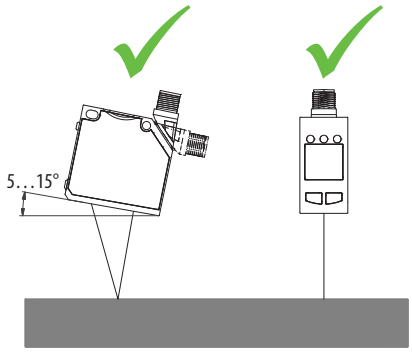
## Features

- Wide range of sensing models to address customer needs, including:
  - Glare suppression [18...32 mm (0.71...1.26 in.)]
  - Small spot size [18...60 mm (0.71...2.36 in.)]
  - Long range [20...150 mm (0.79...5.9 in.)]
- Large intuitive LCD display facilitates setup and operation.
- Built-in distance correction technology confirms consistent color detection up to a 65 mm (2.56 in.) range.
- Color Mode and Best Fit allows operators to optimize the sensor for their application.
- Internal storage of up to seven colors when operating in color match mode and unlimited colors by using the IO-Link when connected to the Logix platform.
- True RGB color value is offered as process data using IO-Link for remote processing of color information.
- Nine adjustable tolerance levels provide additional flexibility for application setup.
- Three discrete outputs and IO-Link.
- IP67 and IP69 zinc die-cast enclosure.

## Sensor Mounting Recommendations

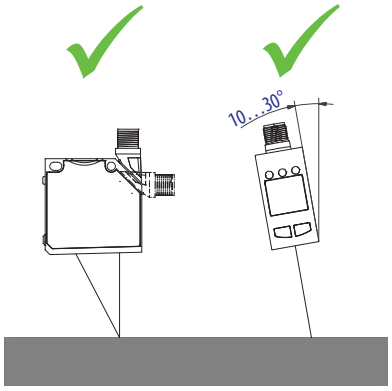
Position the ColorSight sensor so that the distance from the object to the sensor is within the sensing range.

**Figure 1 - Glare Suppression Model (46CLR-D5LAC1-D5)**




Shiny or reflective surfaces can distort the color detection. Mount the sensor at a 10...30° angle, as shown in Figure 2.

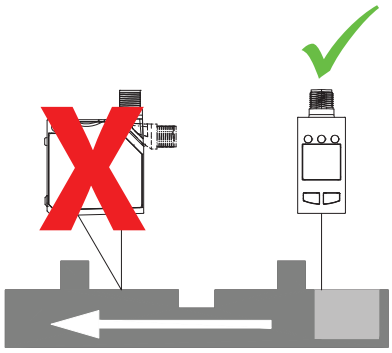
**Figure 2 - Small Spot Size and Long Range Models (46CLR-D5LAC2-D5 and 46CLR-D5LAC3-D5)**



## Recommended Orientation (All Models)

To be sure of reliable color detection, mount all models perpendicular to the target.

**Figure 3 - Preferred Direction**



The direct incidence of high frequency external lighting can impact the reliability of the sensor. We recommend that you change the angle of the sensor to reduce the possibility of external light interference.

**Figure 4 - Sensor User Interface**

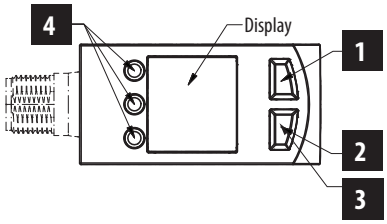



Table 1 provides indicator status in the RUN mode, during operation. The sensor is always in run mode except when being taught.

**Table 1 - Standard I/O (Auto PNP/NPN) Operating Mode Indication**

| Color | State | Description |
|---|---|---|
| Green (2) | OFF | Power is off |
| | ON | Power is on |
| Orange (1) | OFF | Output de-energized |
| | ON | Output energized |

**Table 2 - IO-Link Operation Mode Indication**

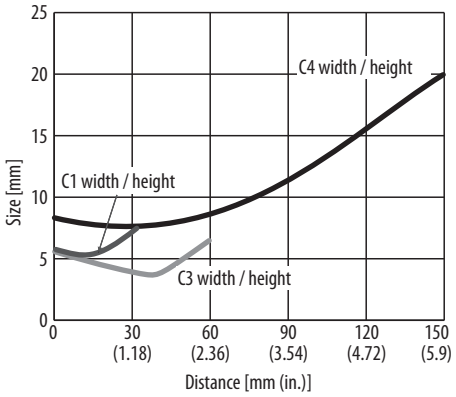
| Color | State | Description |
|---|---|---|
| Green | OFF | Power is off |
| | Flash (1 Hz) | Power is on |
| Orange | OFF | Output de-energized |
| | ON | Output energized |

See www.ab.rockwellautomation.com for additional details about the operation of the ColorSight IO-Link sensor.

**Table 3 - User Interface**

| Label | Color | Description |
|---|---|---|
| 1 | Orange | Output Indication LED |
| 2 and 3 | Green or Red | Power and Status Operation LED |
| 4 | — | Teach Buttons |

**Figure 5 - Sensor Spot Size**




The quick-disconnect connector is shown in Figure 6. The pin numbers correspond to the male connectors on the sensor.

**Figure 6 - Wiring Diagrams**

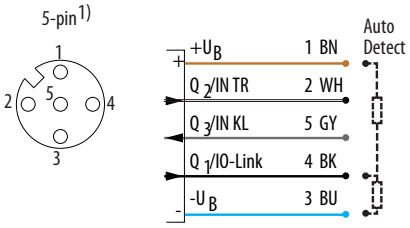
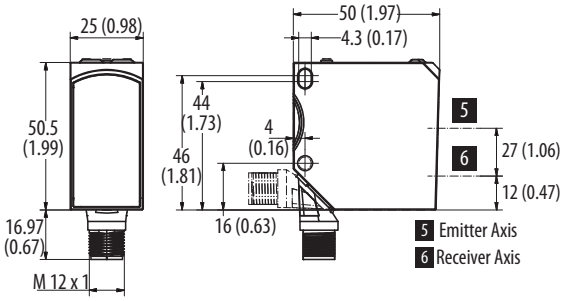
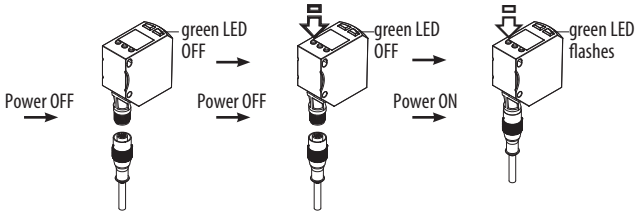



**Figure 7 - Approximate Dimensions [mm (in.)]**

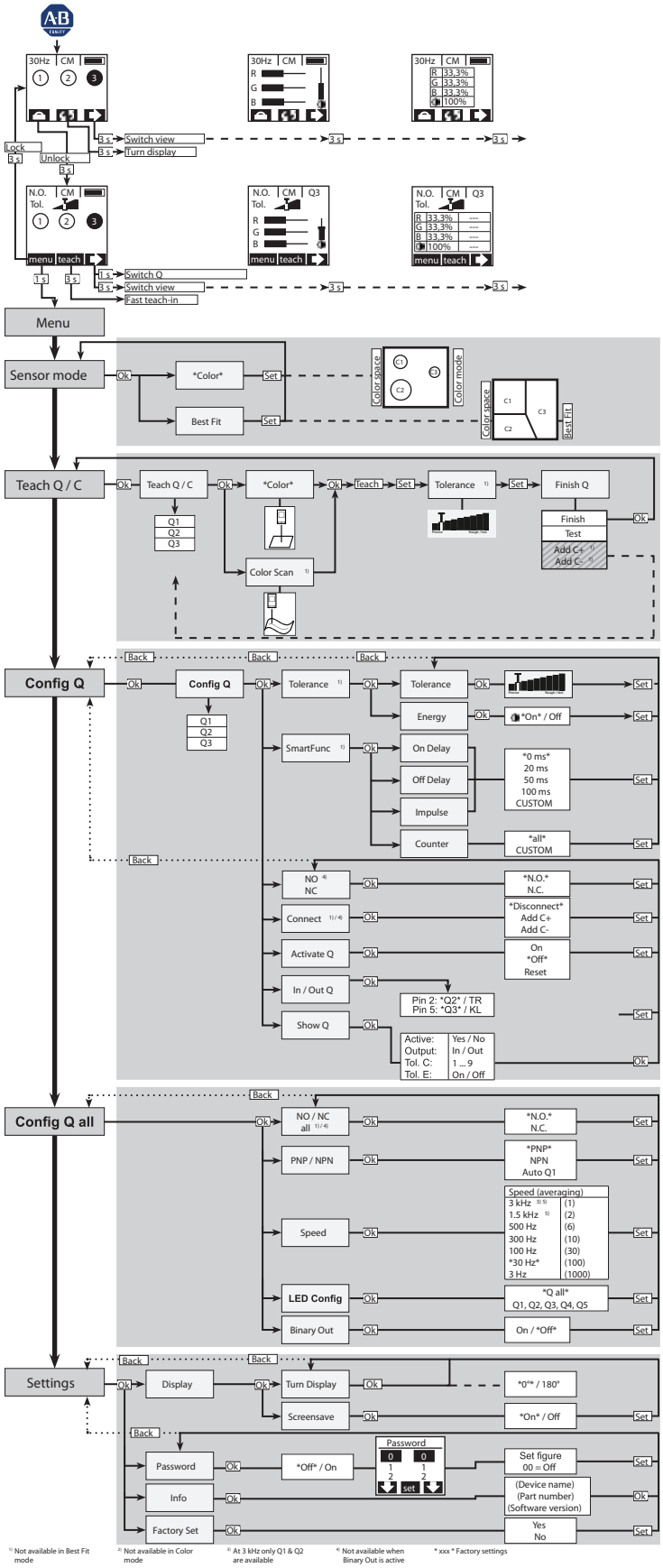



The sensor can be set to factory default by performing the operation in Figure 8.

**Figure 8 - Reset Factory Settings**



# Sensor Settings and Configurations




1) Not available in Best Fit mode
2) Not available in Color mode
3) At 3 kHz only Q1 & Q2 are available
4) Not available when Binary Out is active
* xxx * Factory settings

## Views

| | | | |
|---|---|---|---|
| N.O. / N.C. (per Q) | CM = Color Mode<br>BF = Best Fit Mode | Tol. | Tolerance (1-9) |
| 1 ... 5 switching output Q | ○ Off<br>● On<br>◌ Selected<br>⊗ Deactivated | RGB = red / green / blue<br>◑ = energy / brightness (normalized values) | Q1: selected switching output |
| Signal quality<br>Flashing = too weak<br>Flashing filled = signal overload | | taught-in color values<br>Live color values | |

## Fact teach-in

| | |
|---|---|
| Teach-in<br>Tolerance 1) | Teach ↔ 1 s ↔ Tol.<br>3 s → color taught<br>By pressing Teach or Tol. for 1 s, the sensor switches between the two.<br>By pressing Teach for 3 s, the selected channel is taught. |

## Sensor Operating Mode

| | |
|---|---|
| Color | Indicates the taught color. Required colors >/= 1.<br>Application = color detection / color evaluation.<br>Is used when the false colors are not known. |
| Best Fit | Switches the closest bright color. Required colors >/= 2.<br>⇨ One channel of the sensor always switches.<br>⇨ To prevent unwanted switching, teaching of the background is recommended.<br>Applications = Sorting of known objects.<br>Is used when it should be distinguished between known colors.<br>⇨ C+ und C- is not possible in BF mode.<br>⇨ N.O. / N.C. settings & smart functions are deactivated in BF mode. When returning to color mode they are restored.<br>⇨ N.O. / N.C. settings can in BF mode only be adjusted for all Q at once via Config Q all. |

⇨ Changing the sensor operating mode disables all of the outputs. Stored colors are preserved.

## Teach over menu (Teach Q / C)

| | |
|---|---|
| Teach Q / C | Teaching of a color (C) on a switching output (Q). |
| Color | Teaching of a color point. |
| Color Scan | Teaching of a color space (for example, teaches colors until stop is pressed).<br>⇨ Scanning can be paused. |
| Tolerance | Setting of the tolerance in 9 levels. |
| Finish Q | Finish: Save and close.<br>Test: Checks whether a deduction will be reliable: 3x green LED = OK, 3x red LED = not OK<br>C+: Add an additional color (C) to the matching output (Q) that will be detected as well.<br>C-: Add an additional color (C) to the matching output (Q) that must not be detected. |

## Config Q

| | |
|---|---|
| Tolerance / Energy | Only available in Color mode (Color): Tolerance adjustable in 9 levels. Energy evaluation can be turned off. This may be helpful in applications with object distances larger than 65 mm (2.56 in.). From here on the energy decreases with increasing object distance. The color values remain the same. |

Smart functions (SmartFunc)

| | |
|---|---|
| On Delay | Input H/L<br>Output H/L (Delay)<br>adjustable in 1 ms steps. |
| Off Delay | Input H/L<br>Output H/L<br>adjustable in 1 ms steps. |
| One-shot | Input H/L<br>Output H/L<br>adjustable in 1 ms steps. |
| Counter | Input H/L (1 2 3 4 1 2 3 4 1 2)<br>Output H/L |
| Connect C+ / C- | The sensor can store more colors than it has outputs. Thus, colors C and switching outputs Q are distinguished.<br>The colors that can be connected are preset. |
| Activate Q | Activate/Deactivate<br>⇨ The stored colors C remain in the sensor.<br>Reset<br>⇨ Resets switching output to factory settings. Stored colors on this Q will be deleted. |
| In / Out Q | Some switching outputs can be set as input or output.<br>⇨ TR = Trigger (high = lamp on, low = lamp off)<br>⇨ KL = Keylock (high = keys are locked, low = keys are unlocked)<br>⇨ = Low signal </= 0.8 V, high signal >/= 3V |


## Config Q all

| | |
|---|---|
| PNP / NPN | Setting for all Q.<br>Autodetect (Auto Q1) is not based on switching output Q1. |
| Speed | Speed (Averaging)<br>Laser speed results with more precise color recognition. Additional averaging also helps if ambient light disturbs the measurement. |
| Binary Out | Logically combines the switching outputs in order to be able to detect up to 7 (5-pin models) colors. The combination is shown in the figures below. Thereby:<br>⇨ Connected colors will be disconnected.<br>⇨ Only one color switches only. The priority is C1> C2> C3...<br>⇨ Smart functions are not available in this mode.<br>⇨ All switching outputs will be set to N.O. |




## Settings

| | | |
|---|---|---|
| Display | Turn Display | Display is rotated 180°. |
| | Screensave | ON = Display turns off after 3 minutes.<br>OFF = Display stays on. |
| Password | Definition of unlock password. This has to be entered each time when unlocking the sensors. If password is forgotten, a master password can be obtained at Rockwell Automation support. | |
| Factory Set | Deletes all modifications that are done since set up of the sensor, all settings are reset to original factory settings. | |

Table lists the settings for the sensor defaults.

**Table 4 - Sensor Defaults**

| Settings | Description |
|---|---|
| Output | Switching outputs deactivated |
| Output function | N.O. |
| Switching output | PNP, auto-detect |
| LED orange configuration | Q all |
| Response frequency | 30 Hz |

## Specifications

| Attribute | 46CLR-D5LAC1-D5, 46CLR-D5LAC2-D5, 46CLR-D5LAC3-D5 |
|---|---|
| Certifications | c-UL-us and CE marked for all applicable directives |
| **User Interface** | |
| Status indicators | Green and orange light-emitting diodes 75 x 71 pixels — LCD Display |
| **Performance** | |
| Sensing range | 46CLR-5LAC1-D5: 18…32 mm (1.26 in.)<br>46CLR-5LAC2-D5: 18…60 mm (2.36 in.)<br>46CLR-5LAC3-D5: 20…150 mm (5.9 in.) |
| Spot size | 46CLR-5LAC1-D5: 6 x 6 mm (0.24 x 0.24 in.) @ 25 mm (0.98 in.)<br>46CLR-5LAC2-D5: 3.5 x 3.5 mm (0.14 x 0.14 in.) @40 mm (1.57 in.)<br>46CLR-5LAC3-D5: 8 x 8 mm (0.31 x 0.31 in.) @ 60 mm (2.36 in.) |
| Light source | White LED<br>LED risk group 2 (EN 62471:2008) |
| **Electrical** | |
| Adjustments | Push buttons |
| Voltage | 18…30V DC |
| Current consumption | 60 mA max |
| Sensor protection | Reverse polarity and short circuit |
| Response time | 46CLR-D5LAC1-D5 – 540 µS max<br>46CLR-D5LAC2-D5 – 180 µS max<br>46CLR-D5LAC3-D5 – 180 µS max |
| Output type | Pin 4: Auto PNP/NPN and IO-Link –Q1<br>Pin 2: PNP/NPN, Trigger – Q2<br>Pin 5: PNP/NPN, Key lock – Q3 |
| Load current | 100 mA max |
| **IO-Link** | |
| Communications mode | COM2 |
| Vendor ID | 2 |
| Device ID | 46CLR-D5LAC1-D5 – 294<br>46CLR-D5LAC2-D5 – 295<br>46CLR-D5LAC3-D5 – 296 |
| Cycle time | 4 ms, min |
| Process data bit length | 48 bits (6 bytes) |
| Specifications | 1.1 |
| **Mechanical** | |
| Dimensions | 50 x 25 x 50.5 mm (1.97 x 0.98 x 1.99 in.) |
| Housing Material | Zinc die-cast, matt chrome |
| Lens Material | PMMA |
| Display Material | PMMA |
| **Environmental** | |
| Enclosure Type Rating | IP67 and IP69 rated enclosure |
| Operating Temperature | -20…+55 °C (-4…+131 °F) |

## Rockwell Automation Support

For technical support, visit http://www.rockwellautomation.com/support/overview.page.

### Waste Electrical and Electronic Equipment (WEEE)

At the end of life, this equipment should be collected separately from any unsorted municipal waste.

Rockwell Automation maintains current product environmental information on its website at http://www.rockwellautomation.com/rockwellautomation/about-us/sustainability-ethics/product-environmental-compliance.page.



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