ColorSight

Self-Teach Color Recognition

Description

The ColorSight photoelectric sensor is a true RGB color recognition sensor designed for industrial use. Unlike sensors which measure only grayscale contrast between the target and background, ColorSight provides true color measurement capability. Using red, green, and blue LED light sources, an accurate color match can be made.

ColorSight is also easy to use. The sensor has the ability to learn the target color through the use of a single pushbutton. This self-teach feature may also be activated remotely from a PLC or OI terminal. Levels of color discrimination can be "dialed in" with the precision knob. One of two distinct operating modes can be selected for measuring either proportional or absolute RGB values.

ColorSight is based on the industry standard photoelectric sensor package. The use of fiber optics offers a more flexible means of sensing targets where limited space is available. When used with the Allen-Bradley #60–2694 lensed fiber optic cable, a small 5mm spot size can be achieved.

To increase application flexibility, ColorSight can be configured to accept a "gated" input from a second source, thereby creating a logical AND function. A 50ms OFF time delay (pulse stretcher) can also be activated on the output.

For applications where there is significant contrast between the target and background, a more economical solution would be the Allen-Bradley 42FT Self-Teach fiber optic sensor. These sensors are available with either red, green, or blue light sources for increased detection capability.

General Specifications

Models	2m Cable	42QA–G5LE–A2
	5-pin DC Micro	42QA–G5LE–D5
	5 pin DC Mini	42QA–G5LE–N5
Optical	Sensing Mode	Fixed Focus
	Sensing Distance	27mm (with AB #60–2694 FO cable) nominal
	Spot Size	5mm (with AB #60–2694 FO cable) nominal
	Transmitting LED	Tri-color red, green, blue
	Color Discrimination Operating Mode	Color only, color plus intensity (selectable via DIP switch)
	Precision Adjustment	8 position rotary switch
	Color Sampling Operating Mode	Single, average (selectable via DIP switch)
Electrical	Supply Voltage	10 to 30V DC
	Current Consumption	50mA nominal
	Response Time	(Single mode) 1.3ms; (average mode) 10ms (C+I mode) (Single mode) 2.6ms; (average mode) 10ms (C only mode)
	Protection	False pulse, reverse polarity on all leads, output short-circuit protected (100mA), transient/burst
	Output Type	Transistor
	Output Load Voltage/Current	30V DC, 100mA
	Output Energized	Match/no match operate (selectable via DIP switch)
Mechanical	Housing Material	Valox®
	Housing Cover Material	Radel R5000
	Indicators	See User Interface on page 1–98
Environmental	HF Ambient Light Rejection	25ft candles
	Incandescent Light Rejection	500ft candles
	Operating Temperature	0° to +55°C (32° to +131°F)
	Temperature Drift	+/– 10°C from learned temperature
	Operating Environment	Sensor body: NEMA 4, IP54 Optics assembly: IP40
	Vibration	10–55Hz, 1mm amplitude, Meets or exceeds IEC 60947–5–2
	Shock	30g with 1ms pulse duration, Meets or exceeds IEC 60947–5–2
	Relative Humidity	Up to 95% noncondensing
	Approvals	UL, cUL, CE (applied for) marked for all applicable directives

Features

- Fiber optic sensing design
- True RGB color discrimination
- Color only (C) and color plus intensity (C+I) operating modes
- Eight precision settings
- Local and remote self-teach
- Adjustable sampling rates
- Selectable gated input
- Selectable 50ms pulse stretcher
- Cable, micro or mini QD connection

General Information

Sensing Mode

Accessories

ColorSight

Self-Teach Color Recognition

Operation

The ColorSight photoelectric sensor can be configured to meet a wide variety of industrial applications. Numerous degrees of color discrimination can be selected along with match/no-match, time delay, gating input, and remote learn options.

The sensor is factory configured as indicated in the table the below. These settings place ColorSight in a mode of operation which will suit most applications. If the application requires a different arrangement the sensor should be configured according to this table.

Since not all applications will require the same level of color discrimination, ColorSight offers two distinctly different modes of operation—color only (C) and color plus intensity (C+I). In color only mode, ColorSight will measure proportions of the RGB values (hue and chroma), received by the sensor. This mode is useful in applications where the moderate changes in target color are expected. When the color plus intensity mode is selected, the absolute values of hue, chroma, and value will be measured. This mode is intended for applications where a high level of color discrimination is required.

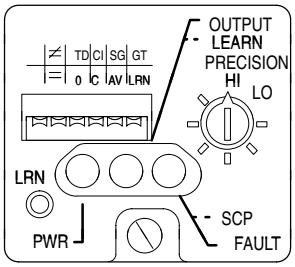
Along with these two operating modes, ColorSight also provides the user with the ability to adjust the sampling rate. The factory default places the sensor in the Averaging Mode, which will cause the sensor to take multiple samples of the target being sensed. This setting is intended for use on textured target surfaces such as fabric. The Single mode takes a single sample and is best suited for targets with a smooth surface.

ColorSight is self-teach. That is, the target color is “learned” when the LEARN button is depressed. This function can also be activated from a remote location using a 24VDC output from a PLC or OI terminal. ColorSight provides an acknowledgement of a successful learn by providing an output over a separate lead.

Provisions are made for connection to a second sensor, which is intended to serve as a gate for the ColorSight output. When selected, the ColorSight output will only activate when both the gate AND target match are made.

ColorSight is intended to be used with the Allen-Bradley #60–2694 lensed fiber optic cable. This cable provides the best performance for applications which require high levels of color discrimination. ColorSight is also compatible with other glass fiber optic cables, although sensing distance and spot size will vary.

User Interface Panel



Switch	Label	Function	Switch Up	Switch Down
S1	None	Not used	—	—
S2	≠ / =	Select target match/no match	Output inactive	Output active ❶
S3	TD/0	Enable/disable time delay	50ms time delay active	No time delay ❶
S4	CI/C	Select color + intensity mode/color only mode	Color + intensity mode active ❶	Color only mode active
S5	SG/AV	Select single/average mode	Single sample mode active	Average sample mode active ❶
S6	GT/LRN	Select gate/remote learn mode	Input functions as gating input	Input functions as remote learn ❶

❶ Factory default

Indicators

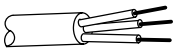
Three LED indicators are provided to indicate a variety of conditions making it easy for installation and troubleshooting. The function of each is described in this table.

Label	Color	State	Condition
PWR	Green	OFF	Sensor power not present
		Steady	Sensor power present
OUTPUT/LEARN	Yellow	OFF	Output inactive
		Steady	Output active
		Flash	Learn mode activated
FAULT/SCP	Red	OFF	Sensor operating normally ❷
		Steady	Marginal detection of target ❸
		Flash	Output SCP active

❷ LED also OFF when LEARN pushbutton depressed.

❸ Includes failure to learn color during LEARN process.

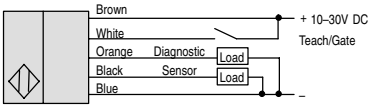
Wiring Diagrams

Designation	Lead Color	Pin Assignment	
	2m Cable	5-pin Micro QD	5-pin Mini QD
			
V+ or V– ❶	Brown	1	4
V– or V+ ❶	Blue	3	2
Signal output ❷	Black	4	1
Fault output ❷	Orange	5	3
Learn/Gate input	White	2	5

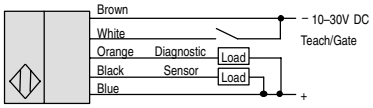
❶ Polarity of supply voltage defines sensor output type –i.e. PNP or NPN

❷ PNP when brown lead connected to V+ and blue lead connected to V–
NPN when brown lead connected to V– and blue lead connected to V+

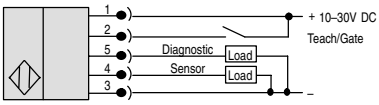
Cable version wired with PNP outputs



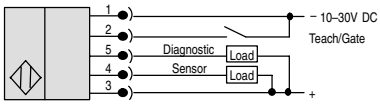
Cable version wired with NPN outputs



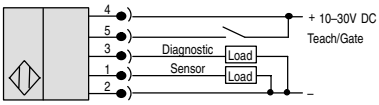
Micro QD wired with PNP outputs



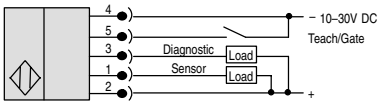
Micro QD wired with NPN outputs



Mini QD wired with PNP outputs

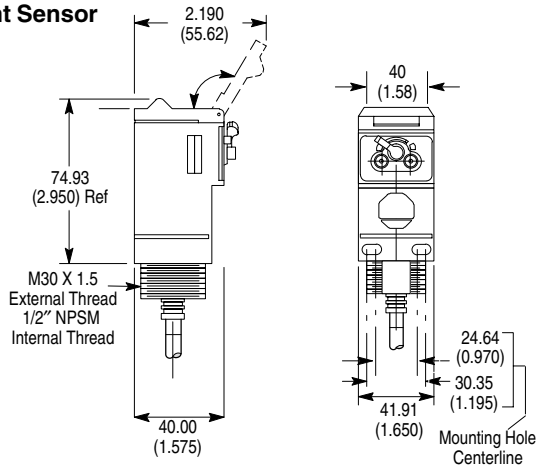


Mini QD wired with NPN outputs

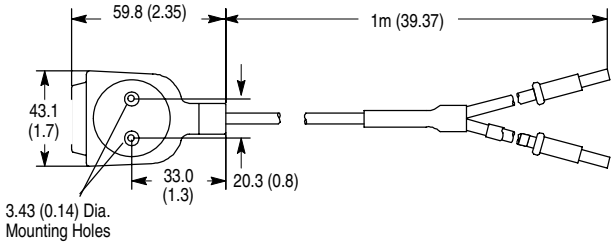


Dimensions—mm (inches)

ColorSight Sensor

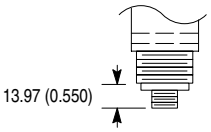


#60–2694 Fiber Optic Cable

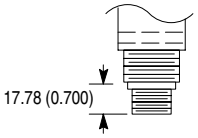


Connector Version

Micro Style



Mini Style



Thread Size

	DC
Micro Style	M12 x 1 1 Keyway
Mini Style	7/8–16 UN 1 Keyway

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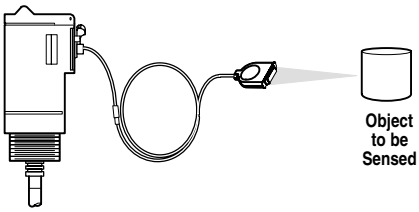

Specifications

Spot Size	5mm (0.20in) with A-B #60–2694 FO cable
Emitter LED	Tri-color red, green, blue
Indicators	Yellow: Output/Learn Green: Power Red: Fault/SCP

QD Cordsets and Accessories

Description	Catalog Number
1.8m (6ft) 5-pin Mini QD Cordset	**889N–F5AF–6F**
2m (6.5ft) 5-pin Micro QD Cordset	**889D–F5AC–2**
Tilt/Swivel Bracket	**60–2439**
360° Rotation Mounting Bracket	**60–2513**
Universal Mounting Assembly	**60–2421**
Universal Mounting Assembly (for #60–2694 fiber optic cable)	**60–2008**

Selection Guide

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type/ Capacity Response Time	Maximum Leakage Current	Connection Type	Catalog Number
10…30V DC 50mA	27mm (1 1/16") with A-B #60–2694 FO cable	Selectable match/no-match	PNP or NPN 30V DC @ 100mA 1.3 to 10ms	10uA	2m 300V cable	**42QA–G5LE–A2**
					5-pin DC micro QD	**42QA–G5LE–D5**
					5-pin DC mini QD	**42QA–G5LE–N5**