Quick Reference

Original Instructions

ColorSight IO-Link

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

Summary of Changes

This publication contains updated steps in Standard Teach Parameter Tab Definitions and Color Scan Teach Definitions on page 2.

Description

The Bulletin 46CLR ColorSight™ Process Data sensor offers 48 bits and includes red, green, blue, intensity, signal strength, and the state of each of the color channel outputs.

This quick reference includes IO-Link parameters that are offered in our 46CLR ColorSight sensors. These parameters can be accessed from any IO-Link 1.1 compliant master.

IO-Link Features

- The sensor heartbeat function indicates to the PLC that a sensor lost connectivity due to failure or faulty wiring.
- Access to red, green, blue, and color intensity information.
- Seven color channels can be taught when operating in IO-Link.
- Signal strength indicates the reflectivity level of the reflector. This function is ideal for continuous monitoring and solving challenging applications.
- Location indication helps you to identify the sensor that must be readjusted or taught in the application quickly.
- Counter, timers, and monitoring frequency parameters enable operators to add ON delay and OFF delay on the output behavior.
- User interface lock helps prevent unintentional or undesired changes to the sensor setup parameters.
- Two process data maps allow operators to use the continuous parameters best suited for the application.

Communication Parameters

Table 1 - Specifications

Specifications	Attributes
IO-Link revision	V1.1
Process data in length	48 bits (6 bytes)
Process data out length	Not available
Communication mode	COM2 (38.4 kbps)
Cycle time, min	4 ms
Vendor ID	2 (0x02)
Device ID	294: 46CLR-D5LAC1-D5 295: 46CLR-D5LAC2-D5 296: 46CLR-D5LAC3-D5
SIO mode	Supported
Data storage	Not supported

Process Data In (Continuous Data)

Process Data In is transmitted cyclically to the IO-Link master from the IO-Link device.

Process Data-in Parameter Definitions

Parameter	Definition
Triggered1…7	Performs the same operation as the discrete output for all seven color channels.
SignalQualityScore	Can be used to indicate if the signal strength is higher or lower than a defined threshold in index 196 (0xC4). It also helps you detect a reflectivity of a target that can affect the performance of the sensor.
Signal Quality	Reflects the strength of the return signal reflected from the target. The range is 0…100%. Darker targets reflect a value closer to zero while highly reflective targets reflect a number closer to 100%.
Red	Displays the red component of the color under detection. The parameter can be a value between 0…4095.
Green	Displays the green component of the color under detection. The parameter can be a value between 0…4095.
Blue	Displays the red component of the color under detection. The parameter can be a value between 0…4095. This value is calculated by subtracting the green and red component from the total value of 4095.
Intensity	Displays the intensity of the color under detection. The parameter can be a value of 0…4095.

Process Data Out (Continuous Data)

Not applicable.

Parameter Data (Asynchronous Data)

These parameters can be read from and/or written to an IO-Link device. Unlike Process Data In, which is transmitted from the IO-Link device to the IO-Link master cyclically, these parameters are read or written on-request with the use of message instructions.

Identification Tab Definitions

Tab	Definition
Vendor Name	The vendor name of the product.
Product Name	The product catalog number.
Product Text	A brief description of the sensor.
Product ID	The ordering part number of the sensor.
Serial Number	The serial number of the unit.
Application Specific Tag	Allows you to assign a value to describe the sensor in the application. For example, “roll level.
Sensor	When used in the Add-on Profile (AOP), this value must not be empty as it could cause a loss in communications.
Hardware Revision	The hardware revision of the sensor.
Firmware Revision	The firmware revision of the sensor.

Standard Teach Parameter Tab Definitions

This section captures the standard teach procedure of 46CLR sensor. These steps show you how to teach the sensor in standard teach mode.

1. Select the desired color channel to teach using the “Teach Channel” (index: 203) parameter.
2. Click Apply in the AOP to set the desired color channel.
3. Place the target in front of the sensor. Send the command “Standard Teach – Show Color” (index: 65) to start the teach process.
4. Send the command “Teach – Apply” (index: 64) to finalize the teach process.
5. The teach process is complete.

When using the AOP for 46CLR sensor, you must click the Refresh button for the color setpoints to be updated in the AOP. After you click Refresh in the AOP, the sensor correlation window opens and asks you to validate the settings. Select “Use Device Values” and then click OK. Click Apply in the AOP to save these settings.

Color Scan Teach Definitions

This section captures the color scan teach process of 46CLR sensor. The Color Scan feature enables you to teach and detect objects with various colors and individual colors to each channel. These steps show you how to teach the sensor in color scan mode.

1. Select the desired color channel to teach using the “Teach Channel” (index: 203) parameter.
2. Click Apply in the AOP to set the desired color channel.
3. Place the target in front of the field of view of the sensor and send the command “Color Scan – Start” (index: 71). Move the color targets that you want to teach as needed until all desired colors are presented in the field of view of the sensor.
4. Send the command “Color Scan – Stop” (index: 72) to stop the color scan process.
5. Send the command “Teach – Apply” (index: 64) to finalize the teach process.
6. The teach process in complete.

When using the AOP for 46CLR sensor, you must click Refresh for the color setpoints to be updated in the AOP. After you click Refresh in the AOP, the sensor correlation window opens and asks you to validate the settings. Select “Use Device Values” and then click OK. Click Apply in the AOP to save these settings.

Teach (Standard, Color Scan)

Parameter	Definition
Teach Channel (203/0xCB)	Selects the desired teach channel for the target in front of the field of view of the sensor. The sensor has a total of seven color channels, three of which are discrete and the remaining four are virtual channels. The default value for this parameter is Channel 1 and must be changed to the desired color channel during the Standard or Color Scan Teach Process.
Detection Mode (177/0xB1)	Selects the desired color detection mode. The 46CLR ColorSight sensor uses these main methods of color evaluation: • Color Mode: This mode is optimized for the precise evaluation of several colors or gradient of colors within a given tolerance (up to nine tolerance levels). In this color inspection and evaluation mode, at least one color must be taught and there's no need to teach the background to be sure of reliable operation. This method of operation is the most common. • Best Fit Mode: This parameter value enables the sensor to operate as a color sorting and assignment mode. In this mode, the sensor assigns the color that is measured into the color channel that is closest to the internal set color. Multiple colors must be taught and the background must also be taught using one of the available color channels. This mode is uncommon and is only recommended for advanced special applications. • Teach Apply: Finalizes the standard teach and color scan teach process. • Teach Cancel: Cancels the standard teach and color scan teach process without completing the teach process. • Reset – Color Channel: Resets the currently selected color channel to the factory default settings.
Teach Status (204/0xCC)	Indicates the status of the teach process.

Operation Configuration

Triggered1 – Color Channel 1

Parameter	Definition
• Channel 1. Red • Channel 1. Green	Sets the color threshold for the respective color. The parameter can be a value between 0…4095.
Channel 1. Intensity	Sets the color threshold for the Intensity. The parameter can be a value between 0…4095.
• Channel 1. Red Tolerance • Channel 1. Green Tolerance	Sets the color threshold tolerance for the respective color. The parameter can be a value between 0…4095.
Channel 1. Intensity Tolerance	Sets the color threshold tolerance for the intensity. The parameter can be a value between 0…4095.
Channel 1. Tolerance	Sets the color tolerance levels for Channel 1. The operator can set zero as the finest tolerance while level nine is the widest tolerance.
Channel 1. Polarity	Sets the polarity of the Color Channel 1. The polarity could be either not inverted or inverted
Channel 1. Operation	Enables or disables the operation of Channel 1.
Channel 1. Intensity Evaluation	Enables or disables the sensor to consider evaluating the intensity of the color as part of the color detection.
Channel 1. Counter	Defines the desired number of counts for the discrete output to turn ON. For example, if the counter value is set to 3, the output turns ON after the third detection has occurred.
Channel 1. On Delay	Defines the desired delay for the output to turn ON once a target has been detected. For example, if the ON Delay value is 5000 ms (5 s), the sensor output turns ON after 5 seconds have passed.
Channel 1. Off Delay	Defines the desired delay for the output to turn OFF once a target has left the detection area. For example, if the OFF Delay value is 5000 ms (5 s), the sensor output turns ON immediately and then it turns OFF after 5 seconds have passed.
Channel 1. One Shot	The One Shot defines the width of the pulse of the output. For example, if the One Shot value is set to 5000 ms (5 s), the output turns ON immediately after the target has been detected and remains on for 5 seconds. This value cannot be reset when a new target is detected. And if a target is detected while the pulse is active, it does not extend the output pulse.
Channel 1. Combine Color Channel	Enables you to perform logic functions such as AND /OR with Color Channel 4.

Triggered2 – Color Channel 2

Parameter	Definition
• Channel 2. Red • Channel 2. Green	Sets the color threshold for the respective color. The parameter can be a value between 0…4095.
Channel 2. Intensity	Sets the color threshold for the Intensity. The parameter can be a value between 0…4095.
• Channel 2. Red Tolerance • Channel 2. Green Tolerance	Sets the color threshold tolerance for the respective color. The parameter can be a value between 0…4095.
Channel 2. Intensity Tolerance	Sets the color threshold tolerance for the Intensity. The parameter can be a value between 0…4095.
Channel 2. Tolerance	Sets the color tolerance levels for Channel 2. The operator can set zero as the finest tolerance while level nine is the widest tolerance.
Channel 2. Polarity	Sets the polarity of the Color Channel 2. The polarity could be either inverted or not inverted.
Channel 2. Operation	Enables or disables the operation of Channel 2.
Channel 2. Intensity Evaluation	Enables or disables the sensor to consider evaluating the intensity of the color as part of the color detection.
Channel 2. Counter	Defines the desired number of counts for the discrete output to turn ON. For example, if the counter value is set to 3, the output turns ON after the third detection has occurred.
Channel 2. On Delay	Defines the desired delay for the output to turn ON once a target has been detected. For example, if the ON Delay value is 5000 ms (5 s), the sensor output turns ON after 5 seconds have passed.
Channel 2. Off Delay	Defines the desired delay for the output to turn OFF once a target has left the detection area. For example, if the OFF Delay value is 5000 ms (5 s), the sensor output turns ON immediately and then it turns OFF after 5 seconds have passed.
Channel 2. One Shot	The One Shot defines the width of the pulse of the output. For example, if the One Shot value is set to 5000 ms (5 s), the output turns ON immediately after the target has been detected and remains on for 5 seconds. This value cannot be reset when a new target is detected. And if a target is detected while the pulse is active, it does not extend the output pulse.
Channel 2. Combine Color Channel	Enables you to perform logic functions such as AND /OR with Color Channel 5.

Triggered3 – Color Channel 3

Parameter	Definition
• Channel 3. Red • Channel 3. Green	Sets the color threshold for the respective color. The parameter can be a value between 0…4095.
Channel 3. Intensity	Sets the color threshold for the Intensity. The parameter can be a value between 0…4095.
• Channel 3. Red Tolerance • Channel 3. Green Tolerance	Sets the color threshold tolerance for the respective color. The parameter can be a value between 0…4095.
Channel 3. Intensity Tolerance	Sets the color threshold tolerance for the Intensity. The parameter can be a value between 0…4095.
Channel 3. Tolerance	Sets the color tolerance levels for Channel 3. The operator can set zero as the finest tolerance while level nine is the widest tolerance.
Channel 3. Polarity	Sets the polarity of the Color Channel 3. It can be either inverted or not inverted.
Channel 3. Operation	Enables or disables the operation of Channel 3.
Channel 3. Intensity Evaluation	Enables or disables the sensor to consider evaluating the intensity of the color as part of the color detection.
Channel 3. Counter	Defines the desired number of counts for the discrete output to turn ON. For example, if the counter value is set to 3, the output turns ON after the third detection has occurred.
Channel 3. On Delay	Defines the desired delay for the output to turn ON once a target has been detected. For example, if the ON Delay value is 5000 ms (5 s), the sensor output turns ON after 5 seconds have passed.
Channel 3. Off Delay	Defines the desired delay for the output to turn OFF once a target has left the detection area. For example, if the OFF Delay value is 5000 ms (5 s), the sensor output turns ON immediately and then it turns OFF after 5 seconds have passed.
Channel 3. One Shot	Defines the width of the pulse of the output. For example, if the One Shot value is set to 5000 ms (5 s), the output turns ON immediately after the target has been detected and remains on for 5 seconds. This value cannot be reset when a new target is detected. And if a target is detected while the pulse is active, it does not extend the output pulse.
Channel 3. Combine Color Channel	Enables you to perform logic functions such as AND/OR with Color Channel 6.

Triggered4 – Color Channel 4

Parameter	Definition
• Channel 4. Red • Channel 4. Green	Sets the color threshold for the respective color. The parameter can be a value between 0…4095.
Channel 4. Intensity	Sets the color threshold for the Intensity. The parameter can be a value between 0…4095.
• Channel 4. Red Tolerance • Channel 4. Green Tolerance	Sets the color threshold tolerance for the respective color. The parameter can be a value between 0…4095.
Channel 4. Intensity Tolerance	Sets the color threshold tolerance for the Intensity. The parameter can be a value between 0…4095.
Channel 4. Tolerance	Sets the color tolerance levels for Channel 3. The operator can set zero as the finest tolerance while level nine is the widest tolerance.
Channel 4. Polarity	Sets the polarity of the Color Channel 3. The polarity could be either inverted or not inverted
Channel 4. Operation	Enables or disables the operation of Channel 3.
Channel 4. Intensity Evaluation	Enables or disables the sensor to consider evaluating the intensity of the color as part of the color detection.

Triggered5 – Color Channel 5

Parameter	Definition
• Channel 5. Red • Channel 5. Green	Sets the color threshold for the respective color. The parameter can be a value between 0…4095.
Channel 5. Intensity	This parameter sets the color threshold for the Intensity. The parameter can be a value between 0…4095.
• Channel 5. Red Tolerance • Channel 5. Green Tolerance	Sets the color threshold tolerance for the respective color. The parameter can be a value between 0…4095.
Channel 5. Intensity Tolerance	Sets the color threshold tolerance for the Intensity. The parameter can be a value between 0…4095.
Channel 5. Tolerance	Sets the color tolerance levels for Channel 3. The operator can set zero as the finest tolerance while level nine is the widest tolerance.
Channel 5. Polarity	Sets the polarity of color channel 3. The polarity could be either inverted or not inverted.
Channel 5. Operation	Enables or disables the operation of Channel 3.
Channel 5. Intensity Evaluation	Enables or disables the sensor to consider evaluating the intensity of the color as part of the color detection.

Triggered6 – Color Channel 6

Parameter	Definition
• Channel 6. Red • Channel 6. Green	Sets the color threshold for the respective color. The parameter can be a value between 0…4095.
Channel 6. Intensity	Sets the color threshold for the Intensity. The parameter can be a value between 0…4095.
• Channel 6. Red Tolerance • Channel 6. Green Tolerance	Sets the color threshold tolerance for the respective color. The parameter can be a value between 0…4095.
Channel 6. Intensity Tolerance	Sets the color threshold tolerance for the Intensity. The parameter can be a value between 0…4095.
Channel 6. Tolerance	Sets the color tolerance levels for Channel 3. The operator can set zero as the finest tolerance while level nine is the widest tolerance.
Channel 6. Polarity	Sets the polarity of the Color Channel 3. The polarity could be either inverted or not inverted
Channel 6. Operation	Enables or disables the operation of Channel 3.
Channel 6. Intensity Evaluation	Enables or disables the sensor to consider evaluating the intensity of the color as part of the color detection.

Triggered7 – Color Channel 7

Parameter	Definition
• Channel 7. Red • Channel 7. Green	Sets the color threshold for the respective color. The parameter can be a value between 0…4095.
Channel 7. Intensity	Sets the color threshold for the Intensity. The parameter can be a value between 0…4095.
• Channel 7. Red Tolerance • Channel 7. Green Tolerance	Sets the color threshold tolerance for the respective color. The parameter can be a value between 0…4095.
Channel 7. Intensity Tolerance	Sets the color threshold tolerance for the Intensity. The parameter can be a value between 0…4095.
Channel 7. Tolerance	Sets the color tolerance levels for Channel 3. The operator can set zero as the finest tolerance while level nine is the widest tolerance.
Channel 7. Polarity	Sets the polarity of the Color Channel 3. The polarity could be either inverted or not inverted
Channel 7. Operation	Enables or disables the operation of Channel 3.
Channel 7. Intensity Evaluation	Enables or disables the sensor to consider evaluating the intensity of the color as part of the color detection.

Trigger

Parameter	Definition
Trigger OFF	Simulates that the trigger is OFF or disabled, which means that the sensor stops measuring the sensor under detection. For this parameter to operate, pin 2 operation from Channel 2 should be changed to Input (Trigger) that the sensor operates as an input.
Trigger ON	Simulates that the trigger is ON or enabled, which means that the sensor stops measuring the sensor under detection. For this parameter to operate, pin 2 operation from Channel 2 should be changed to Input (Trigger) that the sensor operates as an input.
Trigger Input	Enables the input of an external sensor that is connected to pin 2 sensor to enable or disable sensor measurement. When the pin is connected to high, the color sensor measurement occurs as long as the Trigger sensor output is high.

Sensor Configuration

Parameter	Definition
Discrete Output Type	Changes the output type to operate either as PNP, NPN, or Auto PNP/NPN only on pin 4 (Triggered1).
Averaging Filter	Parameter allows operators to average multiple measurements inside of the sensor with the goal of providing a more stable color evaluation. You can choose between 1…100 measurements to average the measured signal. The higher the measurement the more stable the measured output.
Binary Outputs	Disables or enables the logical combination of several channels. The default value for this parameter is disabled.
Display Screensaver	Enables or disables the LCD display screensaver function. The default value for this parameter is enabled.
Display Indication	Controls the rotation of the LCD display on the sensor. A value of 0 rotates the display 180°.
Data Mapping Configuration	In this section, the operator is able to configure the combination of parameters that must be displayed as process data. 46CLR sensor process data consists of 5 bytes of data with multiple parameters to be presented to the operator.

These process data maps are offered in the 46CLR sensor:

- Data Map 0 (Default): Triggered, Quality Score, Signal
- Data Map 1: Red, Green, Blue, Intensity

Diagnosis Tab Definitions — Device Access Locks

Parameter	Definition
Data Storage Lock	Enables or disables the data storage functionality that is tied to the sensor.
Local User Interface Lock	Locks the local push button on the sensor. The push button can be unlocked locally following the unlock procedure.

Service Function

Parameter	Definition
Device Reset	Performs a soft reset of the sensor. This reset is similar to powering the sensor ON or OFF.
Restore Factory Settings	This setting is a write-only command and sets the current sensor settings to their factory default values.
Location Indication	Allows you to set the Local User Interface on 46CLRF sensor to perform the location indication function. If this command is only sent once in a period of 1 second, the indicator remains ON for up to 60 seconds. If this command is sent twice in less than 1 second, the sensor flashes permanently until you send the command three times in less than 1 second to stop the intermittent location indication flashing.
Emitter OFF	Enables you to turn OFF the white light-emitting diode (LED) light source. This setting may be a desirable feature in some applications where you want to disable the light source due to concerns with the light source.
Emitter ON	Enables operators to turn ON the white LED light source.
Event Enable. Event Enable	Enables or disables sensor events.
Operating Hours – Since Inception	Displays the number of hours that the sensor has been continuously in operation. This parameter is valuable as it can serve as a diagnostic parameter for troubleshooting applications if there are repeated failures.
Detection Counter – Since Inception	Displays the number of targets that have been detected since the sensor has been in operation.
Internal Temperature	Displays the internal temperature information available in the sensor. These parameters do not reflect the ambient temperature, however, it can be used to infer if the environment in the application is getting either too cold or too hot. This information could be used for application troubleshooting purposes.
Actual - Since Power Up	Reflects the current temperature inside of the microprocessor die of the sensor.
Maximum/Minimum — Since Power Up	Reflects the maximum/minimum temperature inside of the microprocessor die of the sensor since the last power up.
Maximum/Minimum — Since Inception	Reflects the maximum/minimum temperature inside of the microprocessor die of the sensor since inception.
Maximum/Minimum – Temperature Limit	Reflects the maximum/minimum temperature limit before enabling a high/low temperature event.

Table 2 - Process Data Map 0 — Triggered, Quality Score, Signal Quality

Byte 0								Byte 1								Byte 2								Byte 3								Byte 1								Byte 1							
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	23	22	21	20	19	18	17	16	23	22	21	20	19	18	17	16
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
MSB D7	D6	D5	D4	D3	D2	D1	LSB D0	MSB D7	D6	D5	D4	D3	D2	D1	LSB D0	MSB D7	D6	D5	D4	D3	D2	D1	LSB D0	MSB D7	D6	D5	D4	D3	D2	D1	LSB D0	MSB D7	D6	D5	D4	D3	D2	D1	LSB D0	MSB D7	D6	D5	D4	D3	D2	D1	LSB D0
																SignalQuality															SignalQualityScore									Triggered7	Triggered6	Triggered5	Triggered4	Triggered3	Triggered2	Triggered1	

Table 3 - Process Data Map 1 — Red, Green, Blue, and Intensity

Byte 0								Byte 1								Byte 2								Byte 3								Byte 4								Byte 5							
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	23	22	21	20	19	18	17	16	23	22	21	20	19	18	17	16
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
MSB D7	D6	D5	D4	D3	D2	D1	LSB D0	MSB D7	D6	D5	D4	D3	D2	D1	LSB D0	MSB D7	D6	D5	D4	D3	D2	D1	LSB D0	MSB D7	D6	D5	D4	D3	D2	D1	LSB D0	MSB D7	D6	D5	D4	D3	D2	D1	LSB D0	MSB D7	D6	D5	D4	D3	D2	D1	LSB D0
Intensity												Blue								Green								Red																	

Table 4 - Identification Tab

Index (Dec/Hex)	Access	Data	Length	Sub-Index	Description	Information
Device Information						
16/ 0x10	Read-only	String	64 bytes		Vendor Name	Allen-Bradley
17/ 0x11	Read-only	String	64 bytes		Vendor Text	Visit rockwellautomation.com/en-us/products/hardware/allen-bradley/sensors-and-switches.html
18/ 0x12	Read-only	String	64 bytes		Product Name	46CLR-D5LACx-D5 Ser. A
19/ 0x13	Read-only	String	64 bytes		Product Text	Photo Sensor, True Color, ...
21/ 0x15	Read-only	String	64 bytes		Serial Number	701781-000011
User Specific Information						
24/ 0x18	Read/write	String	32 bytes		Application-specific Tag	46CLR sensor
Revision Information						
22/x016	Read/write	String	32 bytes		Hardware Revision	1.0
23/0x17	Read/write	String	32 bytes		Firmware Revision	1.0

Table 5 - Parameter Tab

Index (Dec/Hex)	Access	Data	Length	Sub-Index	Description	Range	Default Value/ Description
Teach-In Operation — Standard Teach							
2/0x02	Write-only	UInteger	8 bits		Standard Teach - Show Color	65/0x41	
Teach-In Operation — Color Scan Teach							
2/0x02	Write-only	UInteger	8 bits		Color Scan - Start	71/0x47	
2/0x02	Write-only	UInteger	8 bits		Color Scan - Stop	72/0x48	
Teach-In Operation — Teach (Standard, Color Scan)							
203/0xCB	Read/write	UInteger	8 bits		Teach Channel	1...7	1 - Color Channel 1 2 - Color Channel 2 3 - Color Channel 3 4 - Color Channel 4 5 - Color Channel 5 6 - Color Channel 6 7 - Color Channel 7
177/0xB1	Read/write	UInteger	8 bits		Detection Mode	0 or 1	0 - Color Mode (Default) 1 - Best Fit Mode
2/0x02	Read/write	UInteger	8 bits		Teach - Apply	64/0x40	
2/0x02	Read/write	UInteger	8 bits		Teach - Cancel	79/0x4F	
2/0x02	Read/write	UInteger	8 bits		Reset - Color Channel	162/0xA2	
204/0xCC	Read-only	UInteger	4 bits		Teach Status	0...7	0 - Teach Status Idle 1 - Teach Status Successful 2 - Teach Status Successful 4 - Waiting for Teach 5 - Busy 6 - Teach Error

Table 5 - Parameter Tab (Continued)

Index (Dec/Hex)	Access	Data	Length	Sub-Index	Description	Range	Default Value/ Description
Operation Configuration — Triggered1 - Color Channel 1							
128/0x80	Read/write	RecordT	96 Bits				
Offset: 80	Read/write	UInteger	16 bits	1	Channel 1. Red	0...4095	1365 (33.33 expressed as percentage)
Offset: 64	Read/write	UInteger	16 bits	2	Channel 1. Green	0...4095	1365 (33.33 expressed as percentage)
Offset: 48	Read/write	UInteger	16 bits	3	Channel 1. Intensity	0...4095	4095 (100 expressed as percentage)
Offset: 32	Read/write	UInteger	16 bits	4	Channel 1. Red Tolerance	0...4095	65 (1.59 expressed as percentage)
Offset: 16	Read/write	UInteger	16 bits	5	Channel 1. Green Tolerance	0...4095	65 (1.59 expressed as percentage)
Offset: 0	Read/write	UInteger	16 bits	6	Channel 1. Intensity Tolerance	0...4095	75 (1.83 expressed as percentage)
96/0x60	Read/write	RecordT	104 bits				
Offset: 96	Read/write	UInteger	8 bits	1	Channel 1. Tolerance	0...8	0 – Tolerance Level 1 – Finest Tolerance 3 – Tolerance Level 4 (Default) 8 – Tolerance Level 9 – Widest Tolerance
Offset: 88	Read/write	UInteger	8 bits	2	Channel 1. Polarity	0...1	0 – Not Inverted (Default) 1 – Inverted
Offset: 80	Read/write	UInteger	8 bits	3	Channel 1. Operation	0...1	0 – Disabled (Default) 1 – Enabled
Offset: 72	Read/write	UInteger	8 bits	4	Channel 1. Intensity Evaluation	0...1	0 – Off 1 – On (Default)
Offset: 56	Read/write	UInteger	16 bits	5	Channel 1. Counter	0...65535	0 in ms
Offset: 40	Read/write	UInteger	16 bits	6	Channel 1. On Delay	0...65535	0 in ms
Offset: 24	Read/write	UInteger	16 bits	7	Channel 1. Off Delay	0...65535	
Offset: 8	Read/write	UInteger	16 bits	8	Channel 1. One Shot	0...65535	
Offset: 0	Read/write	UInteger	8 bits	9	Channel 1. Combine Color Channel	0...2	0 – Not Connected 1 – Combine with Color C4 (AND Logic) 2 – Exclude Color C4 (OR Logic)
Operation Configuration — Triggered2 - Color Channel 2							
129/0x81	Read/write	RecordT	96 Bits				
Offset: 80	Read/write	UInteger	16 bits	1	Channel 2. Red	0...4095	1365 (33.33 expressed as percentage)
Offset: 64	Read/write	UInteger	16 bits	2	Channel 2. Green	0...4095	1365 (33.33 expressed as percentage)
Offset: 48	Read/write	UInteger	16 bits	3	Channel 2. Intensity	0...4095	4095 (100 expressed as percentage)
Offset: 32	Read/write	UInteger	16 bits	4	Channel 2. Red Tolerance	0...4095	65 (1.59 expressed as percentage)
Offset: 16	Read/write	UInteger	16 bits	5	Channel 2. Green Tolerance	0...4095	65 (1.59 expressed as percentage)
Offset: 0	Read/write	UInteger	16 bits	6	Channel 2. Intensity Tolerance	0...4095	75 (1.83 expressed as percentage)
97/0x61	Read/write	RecordT	104 bits				
Offset: 96	Read/write	UInteger	8 bits	1	Channel 2. Tolerance	0...8	0 – Tolerance Level 1 – Finest Tolerance 3 – Tolerance Level 4 (Default) 8 – Tolerance Level 9 – Widest Tolerance
Offset: 88	Read/write	UInteger	8 bits	2	Channel 2. Polarity	0 or 1	0 – Not Inverted (Default) 1 – Inverted
Offset: 80	Read/write	UInteger	8 bits	3	Channel 2. Operation	0 or 1	0 – Disabled (Default) 1 – Enabled
Offset: 72	Read/write	UInteger	8 bits	4	Channel 2. Intensity Evaluation	0 or 1	0 – Off 1 – On (Default)
Offset: 56	Read/write	UInteger	16 bits	5	Channel 2. Counter	0...65535	0 in ms
Offset: 40	Read/write	UInteger	16 bits	6	Channel 2. On Delay	0...65535	0 in ms
Offset: 24	Read/write	UInteger	16 bits	7	Channel 2. Off Delay	0...65535	0 in ms
Offset: 8	Read/write	UInteger	16 bits	8	Channel 2. One Shot	0...65535	0 in ms
Offset: 0	Read/write	UInteger	8 bits	9	Channel 2. Combine Color Channel	0...2	0 – Not Connected 1 – Combine with Color C5 (AND Logic) 2 – Exclude Color C5 (OR Logic)

Table 5 - Parameter Tab (Continued)

Index (Dec/Hex)	Access	Data	Length	Sub-Index	Description	Range	Default Value/ Description
Operation Configuration — Triggered3 - Color Channel 3							
130/x082	Read/write	RecordT	96 bits				
Offset: 80	Read/write	UInteger	16 bits	1	Channel 3. Red	0...4095	1365 (33.33 expressed as percentage)
Offset: 64	Read/write	UInteger	16 bits	2	Channel 3. Green	0...4095	1365 (33.33 expressed as percentage)
Offset: 48	Read/write	UInteger	16 bits	3	Channel 3. Intensity	0...4095	4095 (100 expressed as percentage)
Offset: 32	Read/write	UInteger	16 bits	4	Channel 3. Red Tolerance	0...4095	65 (1.59 expressed as percentage)
Offset: 16	Read/write	UInteger	16 bits	5	Channel 3. Green Tolerance	0...4095	65 (1.59 expressed as percentage)
Offset: 0	Read/write	UInteger	16 bits	6	Chanel 3. Intensity Tolerance	0...4095	75 (1.83 expressed as percentage)
98/0x62	Read/write	RecordT	104 bits				
Offset: 96	Read/write	UInteger	8 bits	1	Channel 3. Tolerance	0...8	0 – Tolerance Level 1 – Finest Tolerance 3 – Tolerance Level 4 (Default) 8 – Tolerance Level 9 – Widest Tolerance
Offset: 88	Read/write	UInteger	8 bits	2	Channel 3. Polarity	0 or 1	0 – Not Inverted 1 – Inverted
Offset: 80	Read/write	UInteger	8 bits	3	Channel 3. Operation	0 or 1	0 – Disabled (Default) 1 – Enabled
Offset: 72	Read/write	UInteger	8 bits	4	Chanel 3. Intensity Evaluation	0 or 1	0 – Off 1 – On (Default)
Offset: 56	Read/write	UInteger	16 bits	5	Channel 3. Counter	0...65535	0 in ms
Offset: 40	Read/write	UInteger	16 bits	6	Channel 3. On Delay	0...65535	0 in ms
Offset: 24	Read/write	UInteger	16 bits	7	Channel 3. Off Delay	0...65535	0 in ms
Offset: 8	Read/write	UInteger	16 bits	8	Channel 3. One Shot	0...65535	0 in ms
Offset: 0	Read/write	UInteger	8 bits	9	Channel 3. Combine Color Channel	0...2	0 – Not Connected 1 – Combine with Color C6 (AND Logic) 2 – Exclude Color C6 (OR Logic)
Operation Configuration — Triggered4 - Color Channel 4							
131/0x83	Read/write	RecordT	96 bits				
Offset: 80	Read/write	UInteger	16 bits	1	Channel 4. Red	0...4095	1365 (33.33 expressed as percentage)
Offset: 64	Read/write	UInteger	16 bits	2	Channel 4. Green	0...4095	1365 (33.33 expressed as percentage)
Offset: 48	Read/write	UInteger	16 bits	3	Channel 4. Intensity	0...4095	4095 (100 expressed as percentage)
Offset: 32	Read/write	UInteger	16 bits	4	Channel 4. Red Tolerance	0...4095	65 (1.59 expressed as percentage)
Offset: 16	Read/write	UInteger	16 bits	5	Channel 4. Green Tolerance	0...4095	65 (1.59 expressed as percentage)
Offset: 0	Read/write	UInteger	16 bits	6	Channel 4. Intensity Tolerance	0...4095	75 (1.83 expressed as percentage)
99/0x83	Read/write	RecordT	32 bits				
Offset: 24	Read/write	UInteger	8 bits	1	Channel 4. Tolerance	0...8	0 – Tolerance Level 1 – Finest Tolerance 3 – Tolerance Level 4 (Default) 8 – Tolerance Level 9 – Widest Tolerance
Offset: 16	Read/write	UInteger	8 bits	2	Channel 4. Polarity	0 or 1	0 – Not Inverted 1 – Inverted
Offset: 8	Read/write	UInteger	8 bits	3	Channel 4. Operation	0 or 1	0 – Disabled (Default) 1 – Enabled
Offset: 0	Read/write	UInteger	8 bits	4	Channel 4. Intensity Evaluation	0 or 1	0 –Off 1 – On (Default)
Operation Configuration — Triggered5 - Color Channel 5							
132/0x84	Read/write	RecordT	96 Bits				
Offset: 80	Read/write	UInteger	16 bits	1	Channel 5. Red	0...4095	1365 (33.33 expressed as percentage)
Offset: 64	Read/write	UInteger	16 bits	2	Channel 5. Green	0...4095	1365 (33.33 expressed as percentage)
Offset: 48	Read/write	UInteger	16 bits	3	Channel 5. Intensity	0...4095	4095 (100 expressed as percentage)
Offset: 32	Read/write	UInteger	16 bits	4	Channel 5. Red Tolerance	0...4095	65 (1.59 expressed as percentage)
Offset: 16	Read/write	UInteger	16 bits	5	Channel 5. Green Tolerance	0...4095	65 (1.59 expressed as percentage)
Offset: 0	Read/write	UInteger	16 bits	6	Channel 5. Intensity Tolerance	0...4095	75 (1.83 expressed as percentage)
100/0x64	Read/write	RecordT	32 bits				
Offset: 24	Read/write	UInteger	8 bits	1	Chanel 5. Tolerance	0...8	0 – Tolerance Level 1 – Finest Tolerance 3 – Tolerance Level 4 (Default) 8 – Tolerance Level 9 – Widest Tolerance
Offset: 16	Read/write	UInteger	8 bits	2	Channel 5. Polarity	0 or 1	0 – Not Inverted (Default) 1 – Inverted
Offset: 8	Read/write	UInteger	8 bits	3	Chanel 5. Operation	0 or 1	0 – Disabled (Default) 1 – Enabled
Offset: 0	Read/write	UInteger	8 bits	4	Channel 5. Intensity Evaluation	0 or 1	0 – Off 1 – On (Default)

Table 5 - Parameter Tab (Continued)

Index (Dec/Hex)	Access	Data	Length	Sub-Index	Description	Range	Default Value/ Description
Operation Configuration — Triggered6 - Color Channel 6							
133/0x85	Read/write	RecordT	96 Bits				
Offset: 80	Read/write	UInteger	16 bits	1	Channel 6. Red	0...4095	1365 (33.33 expressed as percentage)
Offset: 64	Read/write	UInteger	16 bits	2	Channel 6. Green	0...4095	1365 (33.33 expressed as percentage)
Offset: 48	Read/write	UInteger	16 bits	3	Channel 6. Intensity	0...4095	4095 (100 expressed as percentage)
Offset: 32	Read/write	UInteger	16 bits	4	Channel 6. Red Tolerance	0...4095	65 (1.59 expressed as percentage)
Offset: 16	Read/write	UInteger	16 bits	5	Channel 6. Green Tolerance	0...4095	65 (1.59 expressed as percentage)
Offset: 0	Read/write	UInteger	16 bits	6	Channel 6. Intensity Tolerance	0...4095	75 (1.83 expressed as percentage)
101/0x65	Read/write	RecordT	32 bits				
Offset: 24	Read/write	UInteger	8 bits	1	Channel 6. Tolerance		0 – Tolerance Level 1 – Finest Tolerance 3 – Tolerance Level 4 (Default) 8 – Tolerance Level 9 – Widest Tolerance
Offset: 16	Read/write	UInteger	8 bits	2	Channel 6. Polarity	0 or 1	0 – Not Inverted (Default) 1 – Inverted
Offset: 8	Read/write	UInteger	8 bits	3	Channel 6. Operation	0 or 1	0 – Disabled (Default) 1 – Enabled
Offset: 0	Read/write	UInteger	8 bits	4	Channel 6. Intensity Evaluation	0 or 1	0 – Off 1 – On (Default)
Operation Configuration — Triggered7 - Color Channel 7							
134/0x86	Read/write	RecordT	96 Bits				
Offset: 80	Read/write	UInteger	16 bits	1	Channel 7. Red	0...4095	1365 (33.33 expressed as percentage)
Offset: 64	Read/write	UInteger	16 bits	2	Channel 7. Green	0...4095	1365 (33.33 expressed as percentage)
Offset: 48	Read/write	UInteger	16 bits	3	Channel 7. Intensity	0...4095	4095 (100 expressed as percentage)
Offset: 32	Read/write	UInteger	16 bits	4	Channel 7. Red Tolerance	0...4095	65 (1.59 expressed as percentage)
Offset: 16	Read/write	UInteger	16 bits	5	Channel 7. Green Tolerance	0...4095	65 (1.59 expressed as percentage)
Offset: 0	Read/write	UInteger	16 bits	6	Channel 7. Intensity Tolerance	0...4095	75 (1.83 expressed as percentage)
102/0x66	Read/write	RecordT	32 bits				
Offset: 24	Read/write	UInteger	8 bits	1	Channel 7. Tolerance	0...8	0 – Tolerance Level 1 – Finest Tolerance 3 – Tolerance Level 4 (Default) 8 – Tolerance Level 9 – Widest Tolerance
Offset: 16	Read/write	UInteger	8 bits	2	Channel 7. Polarity	0 or 1	0 – Not Inverted (Default) 1 – Inverted
Offset: 8	Read/write	UInteger	8 bits	3	Channel 7. Operation	0 or 1	0 – Disabled (Default) 1 – Enabled
Offset: 0	Read/write	UInteger	8 bits	4	Channel 7. Intensity Evaluation	0 or 1	0 – Off 1 – On (Default)
Operation Configuration — Trigger							
2/0x02	Write-only	UInteger	8 bits		Trigger OFF	171/0xAB	Simulates that the trigger is OFF or disabled, which means that the sensor stops measuring the color under detection.
2/0x02	Write-only	UInteger	8 bits		Trigger ON	170/0xAA	Simulates that the trigger is ON or enabled, which means the sensor measures the color
2/x02	Write-only	UInteger	8 bits		Trigger Input Pin	169/0xA9	This parameter enables pin 2 to operate as a Trigger
Sensor Configuration							
176/0xB0	Read/write	RecordT	24 bits				
Offset: 16	Read/write	UInteger	8 bits	1	Discrete Output Type	0...2	0 – NPN Output 1- PNP Output (Default) 2 – Auto Detect on Triggered1
Offset: 8	Read/write	UInteger	8 bits	2	Averaging Filter	0...6	0 – 1000 Measurement 1 – 100 Measurements (Default) 2 – 30 Measurements 3 – 10 Measurements 4 – 6 Measurements 5 – 2 Measurements 6 – 1 Measurement
Offset: 0	Read/write	UInteger	8 bits	3	Binary Outputs	0 or 1	0 – Disabled (Default) 1 – Enabled
224/0xE0	RecordT	UInteger	16 bits				
Offset: 8	Read/write	UInteger	8 bits	1	Display Screensaver	0 or 1	0 – Off 1 – On (Default)
Offset: 0	Read/write	UInteger	8 bits	2	Display Indication	0 or 1	0 – Rotate 180° 1- Default (Default)
Data Mapping Configuration							
202/0xCA	Read/write	UInteger	8 bits		Mode	0...1	0 – Triggered, Quality Score, Signal 1 – Red, Green, Blue, Intensity

Table 6 - Diagnosis Tab

Index (Dec/Hex)	Access	Data	Length	Sub-Index	Description	Range	Default Value/ Description
Device Access Locks							
12/0x0C	Read-only	Boolean	1 bit	3	Device Access Locks. Data Storage Lock	0 or 1	0x00
12/0x0C	Read/write	Boolean	1 bit	4	Device Access Locks. Local User Interface Lock	0 or 1	0x00
Service Function							
2/x0x02	Write-only	UInteger	8 bits		Device Reset	128/0x80	
2/0x02	Write-only	UInteger	8 bits		Restore Factory Settings	130/0x82	
2/0x02	Write-only	UInteger	8 bits		Location Indication	175/0xAF	
2/0x02	Write-only	UInteger	8 bits		Emitter OFF	160/0xA0	
2/0x02	Write-only	UInteger	8 bits		Emitter ON	161/0xA1	
81/0x51	Read/write	UInteger	8 bits		Event Enable. Event Enable	0...31	See Table 7
Operation Information							
88/0x67	Read-only	RecordT	64 bits				
Offset: 32	Read-only	UInteger	32 bits	1	Operating Hours – Since Inception		
Offset: 0	Read-only	UInteger	32 bits	2	Detection Counter – Since Inception		
196/0xC4	Read/write	UInteger	8 bits		Signal Quality Level	0...90	10
Internal Temperature							
104/0x68	Read-only	RecordT	40 bits				
Offset: 32	Read-only	Integer	8 bits	1	Actual – Since Power Up	-400...+100	
Offset: 24	Read-only	Integer	8 bits	2	Maximum – Since Power Up	-400...+100	
Offset: 16	Read-only	Integer	8 bits	3	Minimum – Since Power Up	-400...+100	
Offset: 8	Read-only	Integer	8 bits	4	Maximum – Since Inception	-400...+100	
Offset: 0	Read-only	Integer	8 bits	5	Minimum – Since Inception	-400...+100	
83/0x53	Read/write	RecordT	16 bits				
Offset: 16	Read/write	Integer	8 bits	1	Maximum Temperature Limit	-400...+100	
Offset: 0	Read/write	Integer	8 bits	2	Minimum Temperature Limit	-400...+100	
Communications Characteristics							
0/0x00	RecordT	RecordT	128 bits				
Offset: 104	Read-only	UInteger	8 bits	3	Direct Parameters. Min Cycle Time		ms
Offset: 112	Read-only	UInteger	8 bits	2	Direct Parameters. Master Cycle Time		ms
Offset: 88	Read-only	UInteger	8 bits	5	Direct Parameters.IO-Link Version ID		

Table 7 - Events

Event(Dec/Hex)	Value	Event Type	Description	Range
20480/0x5000		Error	Device Hardware Fault	
20497/0x5011		Notification	Nonvolatile memory loss	
65425/0xFF91		Error	Data storage – upload request	
16384/0x4000		Error	Temperature Fault	

Notes:

Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, and product notification updates.	rok.auto/support
Knowledgebase	Access Knowledgebase articles.	rok.auto/knowledgebase
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
Literature Library	Find installation instructions, manuals, brochures, and technical data publications.	rok.auto/literature
Product Compatibility and Download Center (PCDC)	Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes.	rok.auto/pcdc

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