Quick Reference

Original Instructions

45PLA Polarized Light Array IO-Link

Catalog Number 45PLA-P2LPT1-F4

Specifications

Attribute	Value
Communication Parameters	
IO-Link Revision	V1.1
Process Data In Length	40 bits (5 bytes)
Process Data Out Length	Not available
Communication Mode	COM3 (230 KBps)
Minimum Cycle Time	1.2 ms
Vendor ID	2 (0x02)
Device ID	301: 45PLA-P2LAT1-F4
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.

The Bulletin 45PLA Polarized Light Array Process Data offers 40 bits and includes the measurement distance, the signal strength, and the state of the sensor outputs.

Description

This publication includes IO-Link parameters that are offered in our Bulletin 45PLA light array sensors. These parameters can be accessed from any IO-Link 1.1 compliant master.

IO-Link Features

- A sensor heart beat feature that helps to improve operation by indicating to the PLC if a sensor has lost connectivity due to failure or faulty wiring.
- Beam blanking that allows operators to select the amount of beams to reduce the detection field of view.
- Beam status indication to inform operators of the individual beams that the target blocks.
- An object- and gap-detection beam logic enables operators to select when the output should trigger all beams or only when a gap between beams can trigger the sensor output.
- Signal strength indicates the reflectivity level of the reflector, which makes this feature ideal for continuous monitoring.
- Virtual output available only using IO-Link. This feature enables operators to control additional parameters of the application without the need of an additional sensor.
- Counter, timers, and monitor frequency parameters enable operators to add ON delay, Off delay on the output behavior.
- Five process data maps enable operators to use the continuous parameters best suited for the application.
- Bin pick mode enables individual control of the sensor LEDs suitable for pick to light applications.

Table 1 - Process Data Map 0 — Triggered, Margin, Proximity, Gain, Signal

Byte 0								Byte 1								Byte 2								Byte 3								Byte 4							
39	38	37	36	35	34	33	32	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
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
																Gain								Signal Strength															
					Margin Low Alarm	ProximityAlarm	Triggered																																		

Table 2 - Process Data Map 1 — Triggered, Margin, Proximity, Gain, Contrast, Temp

Byte 0								Byte 1								Byte 2								Byte 3								Byte 4							
39	38	37	36	35	34	33	32	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
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
																Gain								Contrast								Temperature Internal							
					Margin Low Alarm	ProximityAlarm	Triggered																																		

Table 3 - Process Data Map 2 — Triggered, Margin, Proximity, Beam Status, Speed

Byte 0								Byte 1								Byte 2								Byte 3								Byte 4							
39	38	37	36	35	34	33	32	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
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
																								Speed															
					Margin Low	ProximityAlarm	Triggered									Beam6	Beam5	Beam4	Beam3	Beam2	Beam1																					

Table 4 - Process Data Map 3 — Triggered, Margin, Proximity, Gain, Count

Byte 0								Byte 1								Byte 2								Byte 3								Byte 4							
39	38	37	36	35	34	33	32	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
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
																Gain								Counter															
					Margin Low	ProximityAlarm	Triggered																																		

Table 5 - Process Data Map 4 — Triggered, Margin, Proximity, Duration

Byte 0								Byte 1								Byte 2								Byte 3								Byte 4							
39	38	37	36	35	34	33	32	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
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
								Duration Not Triggered																Duration Triggered															
					Margin Low	ProximityAlarm	Triggered																																		

Process Data-In Parameter Definitions

The triggered parameter performs the same operation as the discrete output when operating in IO-Link.

In Light Operate (L.O.) mode, the ProximityAlarm parameter is ON when the average amount of light that's received by all active light sources is lower than the Margin Level High Multiplier.

In Dark Operate (D.O.) mode, the MarginLowAlarm parameter is ON when the average amount of light that's received by all active light sources is higher than the Margin Level Low Multiplier.

The Gain mode displays the excess gain above the sensor threshold to be sure there's reliable detection of the target. This gain is calculated as signal strength divided by the set threshold. The defined threshold for Bulletin 45PLA light array is 1000.

SignalStrength provides the raw measurement value of the amount of light that is reflected from the reflector.

Contrast displays the difference between the light signal levels that the sensor read the last time that the output was ON versus the last time the output was OFF.

Speed

The Duration Triggered displays the amount of time the target was detected. The maximum value that this parameter display is 4095 ms.

The DurationNotTriggered displays the amount of time the target was not detected. The maximum value that this parameter displays is 4095 ms.

The Beam Status (1...6) displays the individual state of the beams that are blocked by the target that's between the sensor and the reflector.

Process Data Out (Continuous Data)

Table 6 - Process Data Map 0 — Red LED Control, Green LED Control Pin 2 Output

Byte 4							
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
					Pin 2 Output	Green LED	Red LED

Process Data-Out Parameter Definitions

The red LED parameter controls the status of the red LED on the top cover of the sensor. For this parameter to operate, it must first be enabled in the Process Data LED Control Asynchronous parameter.

The green LED parameter controls the status of the green LED on the top cover of the sensor. For this parameter to operate, it must first be enabled in the Process Data LED Control Asynchronous parameter.

The pin 2 output parameter individually controls the state of the pin 2 output that uses the process data. For this parameter to operate, it must first be enabled in the pin 2 mode under independent control PNP or independent control NPN.

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.

Table 7 - 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	www.ab.com/sensors
18/ 0x12	Read-only	String	64 Bytes		Product Name	45PLA-P2LAT1-F4
19/ 0x13	Read-only	String	64 Bytes		Product Text	Polarized Retroreflective Array
21/ 0x15	Read-only	String	64 Bytes		Serial Number	01SC_10000000021
User-specific Information						
24/ 0x18	Read/write	String	32 Bytes		Application-specific Tag	
120 / 0x78	Read/write	String	32 Bytes		User Tag 1	
121 / 0x79	Read/write	String	32 Bytes		User Tag 2	
Revision Information						
22/x016	Read/write	String	32 Bytes		Hardware Revision	1.0
23/0x17	Read/write	String	32 Bytes		Firmware Revision	1.0

Identification Tab Definitions

The Vendor Name provides the vendor name of the product.

The Vendor Text provides the vendor-specific text of the product.

The Product Name displays the product catalog number. Product Text provides a brief description of the sensor Product ID and provides the ordering part number of the sensor

The Serial Number displays the serial number of the unit.

The Application Specific Tag parameter allows operators to assign a value to describe the sensor in the application. For example, “roll level sensor.”

The User Tag One parameter allows operators to assign a value to describe additional information about the application where the sensor is installed.

The User Tag Two parameter allows operators to assign a value to describe additional information about the application where the sensor is installed.

The Hardware Revision defines the hardware revision of the sensor. The Firmware Revision defines the firmware revision of the sensor.

The Firmware Revision defines the firmware revision of the sensor.

Table 8 – Observation Tab

Index (Dec/Hex)	Access	Data	Length	Sub-Index	Description	Range	Default Value
Device Monitoring							
94/0x5E	Read-only	UInteger	16 bits		SignalStrength On	0…65535	
95/0x5F	Read-only	UInteger	16 bits		SignalStrength Off	0…65535	
96/0x60	Read-only	UInteger	8 bits		Contrast	0…255	
970x61	Read-only	UInteger	8 bits		Gain	0…255	
980x62	Read/write	UInteger	8 bits		Excess Gain Resolution	0…1	0 – 1x Resolution 1 – 10x Resolution

Observation Tab Definitions

SignalStrength On displays the amount of light that was reflected back to the sensor the last time a target was detected.

SignalStrength Off displays the amount of light that was reflected back to the sensor the last time a target was not detected.

Contrast displays the difference between the light signal levels that the sensor read the last time that the output was ON versus the last time the output was OFF. The IO-Link parameter contrast levels help identify enough difference between the target and the background.

Gain displays the excess gain above the sensor threshold to confirm reliable detection of the target.

Excess Gain Resolution allows operators to change the display range of the resolution of the Gain parameter. If the excess gain is selected to be 1.0x Resolution, the gain parameter range goes from 0...255. If the excess gain is selected as 10 x Resolution, the gain parameter range operates from 0...25.

Table 9 – Parameter Tab

Index (Dec/Hex)	Access	Data	Length	Sub-index	Description	Range	Default Value
Teach-In Operation							
Static Teach							
2/0x02	Write-only	UInteger	8 bits		Static Teach – Show Target	161/0xA1	
2/0x02	Write-only	UInteger	8 bits		Static Teach – Show Reflector	160/0xA0	
Standard Teach							
2/0x02	Write-only	UInteger	8 bits		Standard Teach – Show Reflector	162/0xA2	
Precision Teach							
2/0x02	Write-only	UInteger	8 bits		Precision Teach – Show Reflector	163/0xA3	
Operation Configuration							
Beam One							
64/0x40	Read/write	UInteger	16 bits		Emitter 1 – LED Intensity	0 –1023	767
70/0x46	Read/write	UInteger	16 bits		Receiver 1 – Threshold for Emitter 1	0...4095	900
Beam Two							
65/0x41	Read/write	UInteger	16 bits		Emitter 2 – LED Intensity	0 –1023	767
71/0x47	Read/write	UInteger	16 bits		Receiver 1 – Threshold for Emitter 2	0...4095	900
Beam Three							
65/0x41	Read/write	UInteger	16 bits		Emitter 2 – LED Intensity	0 –1023	767
72/0x48	Read/write	UInteger	16 bits		Receiver 2 – Threshold for Emitter 2	0...4095	900
Beam Four							
66/0x41	Read/write	UInteger	16 bits		Emitter 3 – LED Intensity	0 –1023	767
73/0x49	Read/write	UInteger	16 bits		Receiver 2 – Threshold for Emitter 3	0...4095	900
Beam Five							
66/0x41	Read/write	UInteger	16 bits		Emitter 3 – LED Intensity	0 –1023	767
74/0x4A	Read/write	UInteger	16 bits		Receiver 3 – Threshold for Emitter 3	0...4095	900
Beam Six							
67/0x43	Read/write	UInteger	16 bits		Emitter 4 – LED Intensity	0 –1023	767
75/0x4B	Read/write	UInteger	16 bits		Receiver 3 – Threshold for Emitter 4	0...4095	900
Triggered							
76/0x4C	Read/write	UInteger	8 bits		Polarity	0...1	0 – Not Inverted 1 – Inverted (Default)
77/0x4D	Read/write	UInteger	8 bits		Mode	0...1	0 – PNP (Default) 1 – NPN
78/0x4E	Read-only	UInteger	16 bits		Hysteresis	12% or 20%	20% – Standard Hysteresis 12% – Precision Hysteresis
Sensor Configuration							
83/0x53	Read/write	UInteger	8 bits		Margin Level – Low Multiplier	0...3	0...0.8 (Default) 1...0.7 2...0.6 3...0.5
84/0x54	Read/write	UInteger	8 bits		Margin Level – High Multiplier	10, 11, 12, 15, 20, 50, 100, 150	10...1.0 11– 1.1 12...1.2 15...1.3 20...2.0 50...5.0 100...10.0 150...15.0
87/0x57	Read/write	UInteger	8 bits		Operating Frequency	0, 1	0 – Operating Frequency 1...800 uS period 1 – Operating Frequency 2...860 uS period

Index (Dec/Hex)	Access	Data	Length	Sub-index	Description	Range	Default Value
80/0x50	Read/write	UInteger	8 bits		Beam Mode	0, 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13	0 – Object Detection – Six Beams (Default) 1 – Object Detection – Five Beams 2 – Object Detection – Four Beams 3 – Object Detection – Three Beams 4 – Object Detection – Two Beams 5 – Object Detection – One Beam 8 – Gap Detection – Six Beams 9 – Gap Detection – Five Beams 10 – Gap Detection – Four Beams 11 – Gap Detection – Three Beams 12 – Gap Detection – Two Beams 13 – Gap Detection – One Beam
79/0x4F	Read/write	UInteger	8 bits		Pin 2 Mode	0...7	0 – Pin 2 mode disable (Default 1 – PNP - Not Inverted 2 – PNP - Inverted 3 – NPN – Not Inverted 4 – NPN - Inverted 5 – Remote Teach Input 6 – Independent Control PNP 7 – Independent Control NPN
81/0x51	Read/write	UInteger	8 bits		Margin Booster	10...100	10...10 (Default)
2/0x02	Write-only	UInteger	8 bits		Apply Margin Multiplier	166/0xA6	
82/0x52	Read-only	UInteger	8 bits		Applied Margin	10...200	
Counter / Timer							
Counter							
85/0x55	Read/write	UInteger	8 bits		Counter Enable	0...1	0 – Disabled 1 – Enabled
2/0x02	Write-only	UInteger	8 bits		Counter Reset	164 / 0xA4	
86/0x56	Read-only	UInteger	16 bits		Counter Value	0...65535	
Timer							
88/0x58	Read/write	UInteger	8 bits		Timer Enable	0...1	0 - Disabled
89/0x59	Read/write	UInteger	8 bits		Timer Mode	0...4	0 – On Delay 1 – Off Delay 3 – One Shot 4 – Timer Duration
2/0x02	Write-only	UInteger	8 bits		Timer Reset	165/0xA5	
90/0x5A	Read/write	UInteger	16 bits		Timer Value	0...50000	0
91/0x5B	Read-only	UInteger	16 bits		DurationTriggered	0...4095	0
92/0x5C	Read-only	UInteger	16 bits		DurationNotTriggered	0...4095	0
Data-mapping Configuration							
93/0x5D	Read/write	UInteger	8 bits		Mode	0 – Data Map 0 1 – Data Map 1 2 – Data Map 2 3 – Data Map 3 4 – Data Map 4	0 – Triggered, Margin, Proximity, Gain, Signal 1 – Triggered, Margin, Proximity, Gain Contrast, Temp 2 – Triggered, Proximity, Margin, Beam Status, Speed, 3 – Triggered, Margin, Proximity, Gain, Count 4 –Triggered, Margin, Proximity, Duration

Parameter Tab Definitions

Static Teach Parameter Definitions

This section captures the static teach procedure of Bulletin 45PLA light array. These steps show you how to teach the sensor in static teach mode. This mode sets the sensor hysteresis to 20% when the teach process is complete. This hysteresis value can be verified by reviewing the Hysteresis parameter (Index: 78).

1. Place the target in front of the sensor and between the reflector. Send the command to "Static Teach – Show Target" (index: 161). Remove the target from blocking the reflector.
2. Show the reflector where the target is present and then send the command "Static Teach – Show Reflector" (index: 160).
3. The teach process is complete.

When using the Allen-Bradley Add-on Profile (AOP) for Bulletin 45PLA light array, you must click the refresh for the Beam setpoints to be updated in the AOP. Press Apply in the AOP to save these settings.

Standard Teach Parameter Definitions

This section captures the precision teach procedure of Bulletin 45PLA light array. The steps show you how to teach the sensor in precision mode. This mode sets the sensor hysteresis to 20% when the teach process is complete. This hysteresis value can be verified by reviewing the Hysteresis parameter (Index: 78).

1. Place the reflector in front of the field of view of the sensor and send the command to "Precision Teach – Show Reflector" (index: 162). If the teach procedure is initiated without the reflector in the field of view of the sensor, the sensor emits an error and does not teach the new setpoints.
2. The teach process in complete.

When using the Allen-Bradley Add-on Profile (AOP) for Bulletin 45PLA light array, you must click on Refresh for the Beam setpoints to be updated in the AOP. Click Apply in the AOP to save these settings before closing the Add-on Profile.

Precision Teach Parameter Definitions

This section captures the precision teach procedure of Bulletin 45PLA light array. These steps show you how to teach the sensor in precision mode. This mode sets the hysteresis of the sensor to 12% when the teach process is complete and is recommended for clear object teach. This hysteresis value can be verified by reviewing the Hysteresis parameter (Index: 78).

1. Place the reflector in front of the field of view of the sensor and send the command to "Precision Teach – Show Reflector" (index: 163). If the teach procedure is initiated without the reflector in the field of view of the sensor, the sensor will emit an error the new setpoints are not taught.
2. The teach process in complete.

When using the Allen-Bradley Add-on Profile (AOP) for Bulletin 45PLA light array, you must click the Refresh for the Beam setpoints to be updated in the AOP. Press Apply in the AOP to save these settings before closing the Add-on Profile.

Operation Configuration Parameter Definitions

These parameters describe critical setpoints for each of the beams that are used in Bulletin 45PLA light array.

Beam One

The Emitter 1 – LED Intensity (64 /0x40) parameter sets the LED intensity for Emitter 1 for Beam One. The value can be between 0...1023. This parameter is updated when a standard or precision teach procedure is executed. The default value for this parameter is 767.

The Receiver 1 – Threshold for Emitter 1(70 /0x46) parameter sets the LED intensity for Emitter 1 for Beam One. The value can be between 0...4095. This parameter is updated when a standard or precision teach procedure is executed. The default value for this parameter is 900.

Beam Two

The Emitter 2 – LED Intensity (65/0x41) parameter sets the LED intensity for Emitter 2 for Beam Two. The value can be between 0...1023. This parameter is updated when a standard or precision teach procedure is executed. The default value for this parameter is 767.

The Receiver 2 – Threshold for Emitter 1 (71 /0x47) parameter sets the LED intensity for Emitter 1 for Beam Two. The value can be between 0...4095. This parameter is updated when a standard or precision teach procedure is executed. The default value for this parameter is 900.

Beam Three

The Emitter 2 – LED Intensity (65/0x41) parameter sets the LED intensity for Emitter 2 for Beam Three. The value can be between 0...1023. This parameter is updated when a standard or precision teach procedure is executed. The default value for this parameter is 767.

The Receiver 2 – Threshold for Emitter 2 (72 /0x48) parameter sets the LED intensity for Emitter 2 for Beam Three. The value can be between 0...4095. This parameter is updated when a standard or precision teach procedure is executed. The default value for this parameter is 900.

Beam Four

The Emitter 3 – LED Intensity (66/0x41) parameter sets the LED intensity for Emitter 3 for Beam Four. The value can be between 0...1023. This parameter is updated when a standard or precision teach procedure is executed. The default value for this parameter is 767.

The Receiver 2 – Threshold for Emitter 3 (73/0x49) parameter sets the LED intensity for Emitter 3 for Beam Four. The value can be between 0...4095. This parameter is updated when a standard or precision teach procedure is executed. The default value for this parameter is 900.

Beam Five

The Emitter 3 – LED Intensity (66/0x41) parameter sets the LED intensity for Emitter 3 for Beam Five. The value can be between 0...1023. This parameter is updated when a standard or precision teach procedure is executed. The default value for this parameter is 767.

The Receiver 2 – Threshold for Emitter 3 (74/0x4A) parameter sets the LED intensity for Emitter 1 for Beam One. The value can be between 0...4095. This parameter is updated when a standard or precision teach procedure is executed. The default value for this parameter is 900.

Beam Six

The Emitter 4 – LED Intensity (67/0x43) parameter sets the LED intensity for Emitter 4 for Beam Six. The value can be between 0...1023. This parameter is updated when a standard or precision teach procedure is executed. The default value for this parameter is 767.

The Receiver 3 – Threshold for Emitter 4 (75/0x4B) parameter sets the LED intensity for Emitter 4 for Beam Six. The value can be between 0...4095. This parameter is updated when a standard or precision teach procedure is executed. The default value for this parameter is 900.

Triggered

The Polarity (76/0x4C) parameter changes the sensor output to operate as Light Operate (Non-Inverted) and Dark Operate (Inverted) in relation to pin 4. The default setting is Inverted (1) when using the Add-on Profile (AOP).

The Mode (77/0x4D) parameter changes the output mode to operate as PNP or NPN. The default value for this parameter is PNP (0).

The Hysteresis (78/0x4E) parameter displays the sensor output hysteresis value.

The Margin Level – Low Multiplier (83/0x53) allows you to define when the green LED starts flashing to reflect a signal level that is below the threshold. The default value for this parameter is 0.8 with multiple selection options from 0.5 to 0.8 in increments of 0.1X.

The Margin Level – High Multiplier (84/0x54) allows you to define when the green LED can stop flashing to reflect a signal level that is higher than the threshold. The default value for this parameter is 1.5 with multiple selections that could reach a maximum of 20X. This value means that the sensor must have at least 20 times the amount of light for the Green LED to stop flashing.

The Operating Frequency (87/0x57) in certain applications, where it is necessary to place two Bulletin 45PLA light arrays in close proximity, could interfere with each other (the emission of one interferes with the receivers of the other). The period of an entire scan is 800 µs in SIO mode, in IO-Link mode some scans are of 900 µs. Operating frequency 1 uses a default period of 800 µs.

The Beam Mode (80/0x50): Defines the number of active beams and operation logic that is applied to the state of the beams. There are two basic modes of operation that can be selected:

- The Object Detection: This mode changes the state of the triggered bit when any single beam is blocked in the normal operating mode. For example, if the six beams are enabled, and an object blocks any of the beams, the output changes state. This operation follows the behavior of a logic OR function.
- The Gap Detection: This mode changes the state of the triggered bit when all selected beams are blocked simultaneously. For example, if six beams are enabled and one of the beams is not blocked, the output does not change state. This operation follows the behavior of a logic AND function.

The Object Detection – Six Beams is the default setting for the sensor.

The Pin 2 mode (79/0x4F) enables the operation of the output on pin 2 in IO-Link Mode. When connecting the sensor in IO-Link mode, pin 2 is disabled by default and could be changed to either operate as Light Operate or Dark Operate. This parameter is ideal for applications where the response time is critical for the application as IO-Link response time must not be fast enough to address the application needs.

The Margin Booster (81/0x51) parameter indicates the multiplier that multiplier factor that applies to the LEDs current value.

The Applied Margin (82/0x52) parameter indicates the multiplier factor that has been applied to the LEDs.

Counter/Timer

The Counter Enable (85/0x55) parameter enables the counter feature of the sensor. The default value of this parameter is disabled.

The Counter Reset parameter resets the count that is already stored under index 86(0x56).

When the Counter Value (86/0x56) is enabled, the parameter reflects the sensor count amount. This value resets to zero when the counter reset command is executed.

The Timer Enable (88/0x58) parameter enables the counter feature of the sensor. The default value of this parameter is disabled.

The Timer Mode (89/0x59) parameter enables operators to select the desired operation for the timer. The following selections are available:

- The 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 seconds), the sensor output turns ON after 5 seconds have passed.
- The 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 seconds), the sensor output turns ON immediately and then it turns OFF after 5 seconds have passed.
- 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 seconds), the output turns ON immediately after the target has been detected. The output remains on for five seconds. This value cannot be reset when a new target is detected. And if a target is detected while the pulse is active, it doesn't extend the output pulse.

The Timer Duration measures the amount of time the output is present and absent up to a maximum period of four seconds.

The Timer Reset parameter resets the timer.

When the Timer Value (90/0x5A) counter is enabled, this parameter reflects the sensor count amount. This value resets to zero when the counter reset command is executed.

The Duration Triggered (91/0x5B) displays the amount of time the target was detected. The maximum value that this parameter displays is 4095 ms.

The Duration Not Triggered (92/05C) displays the amount of time the target was not detected. The maximum value that this parameter displays is 4095 ms.

In this section, the Data Mapping Configuration is able to configure the combination of parameters that must be displayed as process data. Bulletin 45PLA light array process data consists of five bytes of data with multiple parameters to be presented to the operator.

The following process data maps are offered in Bulletin 45PLA light array:

- Data Map 0 (Default): Triggered, Margin, Proximity, Gain, Signal
- Data Map 1: Triggered, Margin, Proximity, Gain, Contrast, Temp
- Data Map 2: Triggered, Margin, Proximity, Beam Status, Speed
- Data Map 3: Triggered, Margin, Proximity, Gain, Count
- Data Map 4: Triggered, Margin, Proximity, Duration

Table 10 – Diagnosis Tab

Index (Dec/Hex)	Access	Data	Length	Subindex	Description	Range	Default Value
Device Access Locks							
12/0x0C	Read/write	UInteger	16 bits	3	Device Access Locks. Local Parameterization Lock	0 or 1	0x00
Service Function							
2/0x02	Write-only	UInteger	8 bits		Restore Factory Settings	130/0x	
99/0x63	Read/write	UInteger	8 bits		Location Indication	0 or 1	0 – Disabled 1 - Enabled
100/0x64	Read/write	UInteger	8 bits		LEDs Enable	0 or 1	0 – Enabled 1 – Disabled
101/0x65	Read/write	UInteger	8 bits		Alignment Mode	0 or 1	
102/0x66	Read/write	UInteger	8 bits		Process Data LED Control	0 or 1	
36/0x24	Read-only	UInteger	8 bits		Device Status		
32/0x20	Read-only	UInteger	8 bits		Error Count		
Operation Information							
104/0x68	Read Only	UInteger	32 bits		Operation Hours – Since Inception	71582788	
105/0x69	Read-only	UInteger	32 bits		Operation Hours – Since Power-Up	71582788	
Internal Temperature							
106/0x6A	Read-only	RecordT	40 bits				
Offset: 32	Read-only	Integer	8 bits	1	Actual – Since Power Up	-128…+127	
Offset: 24	Read-only	Integer	8 bits	2	Maximum – Since Power Up	-128…+127	
Offset: 16	Read-only	Integer	8 bits	3	Maximum – Since Inception	-128…+127	
Offset: 8	Read-only	Integer	8 bits	4	Minimum – Since Power-Up	-128…+127	
Offset: 0	Read-only	Integer	8 bits	5	Minimum – Since Inception	-128…+127	
Speed							
107/0x6B	Read-only	UInteger	16 bits		Actual – Since Power Up	0…833	
108/0x6C	Read-only	UInteger	16 bits		Maximum – Since Power Up	0…833	
Event Configuration							
109/0x6D	Read/write	UInteger	8 bits		Local Threshold Change – Event Enable	0 or 1	0 – Disabled 1 – Enabled
110/0x6E	Read/write	UInteger	8 bits		Low Margin-Event Enable	0 or 1	0 – Disabled 1 – Enabled
116/0x74	Read/write	UInteger	8 bits		Teach Error – Event Enable	0 or 1	0 – Disabled 1 – Enabled

Index (Dec/Hex)	Access	Data	Length	Subindex	Description	Range	Default Value
Internal Temperature Event							
111/0x6F	Read/write	UInteger	8 bits		Temperature – Event Enable	0 or 1	0 – Disabled 1 – Enabled
112/0x70	Read/write	Integer	8 bits		Low Temperature	-128 to 127	
113/0x71	Read/write	Integer	8 bits		High Temperature	-128 to 127	
Counter Event							
114/0x72	Read/write	UInteger	8 bits		Counter – Event	0 or 1	0 – Disabled 1 – Enabled
115/0x73	Read/write	UInteger	16 bits		Target Count		
Communications Characteristics							
	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		

Diagnosis Tab Definitions — Device Access Locks

The Local Parameterization Lock locks the local Push on the sensor.

Diagnosis Tab Definitions — Service Function

Restore Factory Settings is a write-only command and sets the current sensor settings to their factory default values.

Location Indication (99/0x63) parameter activates the location indication sensor functionality. When enabled, the sensor user interface (green and orange LEDs) starts flashing synchronously until the operator disables this function. This parameter is ideal for applications where the operator must locate a sensor in the application where there must be multiple sensors in close proximity.

LEDs Enabled (100/0x64) parameter allows operators to turn OFF or turn ON the User Interface LEDs (green and orange LEDs). This parameter is ideal for applications where turning OFF the LEDs is desired to accommodate the application.

Alignment Mode (101/0x65) parameter changes the sensor user interface to operate in alignment mode. The alignment mode uses the green and orange LEDs of the sensor to visually indicate the strength of the light signal that is reflected back from the reflector. A higher the intensity of the green LED indicates best alignment possible while a dim green LED indicates poor alignment.

Process Data LED Control (102/0x66) parameter enables individual control of the sensor LEDs using the Process Data Out in the PLC. When enabling this feature, the sensor can operate as a Pick-to-Light or a Put-to-Light device with the PLC controlling when to turn the Green LED and Red LED On or OFF.

Device Status indicates the status of the device.

Error Count displays the number of errors.

Operating Hours since Inception (104/0x68) displays the total operating hours that the sensor has been running since the first time it was powered ON. This value is not lost during factory reset. The information that is displayed in this parameter is represented in hours.

Operating Hours Since Power-Up(105/0x69) displays the total operating hours that the sensor has been running since the last time the sensor power was cycled. This value is reset to zero every time that the sensor loses power.

Internal Temperature

In this section, the operator is able to monitor the actual, minimum, and maximum internal temperature of the sensor.

Actual – Since Power Up displays the current internal temperature of the sensor.

Maximum – Since Power Up displays the maximum sensor internal temperature since the last time the sensor was power that is cycled.

Maximum – Since Inception displays the maximum internal temperature of the sensor since the first time the sensor was ever powered ON. This value is retained and not lost during default factory reset.

Minimum – Since Power Up displays the minimum internal temperature of the sensor since the last time the sensor was power that is cycled.

Minimum – Since Inception displays the maximum internal temperature of the sensor since the first time the sensor was ever powered ON. This value is retained and not lost during default factory reset.

Speed

In this section, the operator is able to monitor the actual and maximum switches per second.

Actual – Since Power Up shows the actual frequency of detection in Hertz.

Maximum – Since Power Up shows the maximum frequency for detection in Hertz.

Event Configuration

The Local Threshold Change Event Enabled (109/0x6D) parameter enables or disables the local threshold change event on the sensor. This event is a notification with the value 0x1800.

The Low Margin Event Enable (110/0x6E) parameter enables or disables the low margin event on the sensor. This event is a warning with the value of 0x1820 and it appears if the low margin indication is present.

The Teach Error Event Enable (116/0x74) parameter enables or disables the teach error event enable. This event is a notification with the value of 0x1830 and it appears if the teach process is incomplete or interrupted.

Internal Temperature Event

The Temperature Event Enable (111/0x6F) parameter enables or disables the internal temperature event. This event is a warning with the values 0x4220 (low temperature) or 0x4210 (high temperature).

The Low Temperature (112/0x70) parameter sets the low temperature threshold that triggers a low temperature event.

The High Temperature (113/0x71) parameter sets the high temperature threshold that triggers a high temperature event.

Counter Event

The Counter Event (114 / 0x72) parameter enables or disables the event to indicate that the target count has been reached. This event is a notification with the value 0x1840.

The Target Count (115/0x73) parameter sets the target count that triggers the counter event. The value can be anywhere between 0...65535

Communication Characteristics: In this section of the Diagnosis Tab, you can see read-only (ro) values for the Minimum Cycle Time (response time of the sensor). You can also visualize the IO-Link Revision of the sensor in this section.

Events

Event(Dec/Hex)	Value	EventType	Description	Range
6144/ 0x1800		Error	Notification	
6176 / 0x1820		Notification	Low Margin	
6192 / 0x1830		Notification	Teach Error	
16928 / 0x4220		Warning	Low Temperature	
16912/0x4210		Warning	High Temperature	
6208 / 0x1840		Notification	Target Count Reached	

Rockwell Automation Support

Use the following resources to access support information.

Technical Support Center	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	https://rockwellautomation.custhelp.com/
Local Technical Support Phone Numbers	Locate the phone number for your country.	http://www.rockwellautomation.com/global/support/get-support-now.page
Direct Dial Codes	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	http://www.rockwellautomation.com/global/support/direct-dial.page
Literature Library	Installation Instructions, Manuals, Brochures, and Technical Data.	http://www.rockwellautomation.com/global/literature-library/overview.page
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	http://www.rockwellautomation.com/global/support/pcdc.page

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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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