IO-Link Data Reference Guide: LE Series

IO-Link Data Map

This document refers to the following IODD file: Banner_Engineering-LExxxK-20160621-IODD1.1.xml. The IODD file and support files can be found on *www.bannerengineering.com* under the download section of the product family page.

Communication Parameters

The following communication parameters are used.

Parameter	Value
IO-Link revision	V1.1
Process Data In length	32-bit
Process Data Out length	N/A
Bit Rate	38400 bps
Minimum cycle time	4 ms

Parameter	Value
Port class	A
SIO mode	Yes
Smart sensor profile	Yes
Block parameterization	Yes
Data Storage	Yes

IO-Link Process Data In (Device to Master)

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

The LE IO-Link Process Data is 32 bits in size and includes the measurement distance as shown on the LE display (listed in the Process Data in micrometers), the state of the stability indicator, and the state of both LE output channels. This information is sent to the IO-Link master every 2.3 ms.

Process Data Input			
Subindex	Name	Number of Bits	Data Values
1	Channel 1 Output State	1	0=inactive, 1=active
2	Channel 2 Output State	1	0=inactive, 1=active
3	Stability State	1	0=no target/marginal, 1=stable
4	Measured Value	29	Value in micrometers (0.001 mm)

Octet 0								
Subindex	4	4	4	4	4	4	4	4
Bit offset	31	30	29	28	27	26	25	24
Value	0	0	0	0	0	0	0	0

Octet 1								
Subindex	4	4	4	4	4	4	4	4
Bit offset	23	22	21	20	19	18	17	16
Value	0	0	0	1	0	1	1	1

Octet 2								
Subindex	4	4	4	4	4	4	4	4
Bit offset	15	14	13	12	11	10	9	8

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Octet 2								
Value	0	1	0	0	0	1	1	1

Octet 3								
Subindex	4	4	4	4	4	3	2	1
Bit offset	7	6	5	4	3	2	1	0
Value	0	1	1	0	0	1	0	1
Example	Measured Value (uses bit offset 3 to 31)					Stability State	Channel 2 Output	Channel 1 Output
	190.700 mm					Stable	Inactive	Active

IO-Link Process Data Out (Master to Device)

Not applicable.

Parameters Set Using IO-Link

These parameters can be read from and/or written to an IO-Link model of the LE Series Laser sensor. Also included is information about whether the variable in question is saved during Data Storage and whether the variable came from the IO-Link Smart Sensor Profile.

Unlike Process Data In, which is transmitted from the IO-Link device to the IO-Link master cyclically, these parameters are read or written acyclically as needed.

Index	Subindex	Name	Value Range	Default	Access Rights	Data Storage	Smart Sensor Profile	AOI
0	1-16	Direct Parameter Page 1 (incl. Vendor ID & Device ID)			ro			
1	1-16	Direct Parameters Page 2			rw			
2		Standard Command (65 = SP1 Single Value Teach, 66 = SP2 Single Value Teach, 75 = Teach Midpoint, 130 = Restore Factory Settings, 160 = Laser Off, 161 = Laser On, 162 = Start discovery, 163 = Stop discovery)			wo		y	y
3		Data Storage Index (device-specific list of parameters to be stored)			rw			
4-11		*reserved by IO-Link Specification*						
12		**Device Access Locks**						
12	1	Parameter Write Access Lock (0 = off 1 = on)	0, 1	0	rw	y		y
12	2	Data Storage Lock (0 = off, 1 = on)	0, 1	0	rw	y		y
12	3	Local Parameterization Lock (0 = off, 1 = on)	0, 1	0	rw	y		y
12	4	Local User Interface Lock (0 = off, 1 = on)	0, 1	0	rw	y		y
13		Profile Characteristic			ro		y	
14		PDInput Descriptor			ro		y	
15		*unused*						
16		Vendor Name string		Banner Engineering Corp	ro			
17		Vendor Text string			ro			
18		Product Name string			ro			
19		Product ID string			ro			

Index	Subindex	Name	Value Range	Default	Access Rights	Data Storage	Smart Sensor Profile	AOI
20		Product Text string			ro		y	
21		Serial Number			ro			
22		Hardware Revision			ro			
23		Firmware Version			ro		y	
24		App Specific Tag (user defined)			rw	y	y	
25-39		*reserved*						
40		Process Data Input			ro			
41-57		*unused/reserved*						
58		Teach-in Channel (0 = Default, 1 = BDC1, 2=BDC2)	0–2	0	rw		y	y
59		**Teach-In Status**						
59	1	Teach State: 4-bit Integer: (0 = Idle, 1 = SP1 Success, 4 = Wait for Command, 5 = Busy, 7 = Error)	0, 1, 4, 5, 7		ro		y	
59	2	SPt TP1 (1-bit integer)	0 = not taught or unsuccessful 1 = successfully taught		ro		y	y
59	3	SPt TP2 (1-bit integer)	0 = not taught or unsuccessful 1 = successfully taught		ro		y	y
60		**BDC1 Setpoints**						
60	1	BDC1 Setpoint SP1: 16-bit integer: (SP1 switch point in Switch or Window mode.)		100mm	rw	y	y	y
60	2	BDC1 Setpoint SP2: 16-bit integer: (SP2 switch point in Window Mode only.)		LE250: 400mm LE550: 1000mm	rw	y	y	y
61		**BDC1 Configuration**						
61	1	BDC1 Switchpoint Logic: 8-bit integer: (0 = LO, 1 = DO)	0, 1	0	rw	y	y	y
61	2	BDC1 Mode: 8-bit integer: (1=Switch Mode/ Single Point Mode, 2=Window Mode, 132=Health/Alarm Mode)	1, 2, 132	2	rw	y	y	y
61	3	Hysteresis:16-bit integer	0	0	rw	y	y	y
62		**BDC2 Setpoints**						
62	1	BDC2 Setpoint SP1: 16-bit integer: (SP1 switch point in Switch or Window mode)		100mm	rw	y	y	y
62	2	BDC2 Setpoint SP2: 16-bit integer: (SP2 switch point in Window Mode only)		LE250: 400mm LE550: 1000mm	rw	y	y	y
63		**BDC2 Configuration**						
63	1	BDC2 Switchpoint Logic: 8-bit integer: (0 = LO, 1 = DO)	0, 1	0	rw	y	y	y
63	2	BDC2 Mode: 8-bit integer: (1=Switch Mode/ Single Point Mode, 2=Window Mode, 132=Health/Alarm Mode)	1, 2, 132	2	rw	y	y	y
63	3	Hysteresis:16-bit integer	0	0	rw	y	y	y
64		**Configuration**						

Index	Subindex	Name	Value Range	Default	Access Rights	Data Storage	Smart Sensor Profile	AOI
64	1	Response Speed: 8-bit integer: (0=Fast, 1=Standard, 2=Medium, 3=Slow)	0, 1, 2, 3	1	rw	y		y
64	2	Zero Reference Location: 8-bit integer: (0 = Near, 1 = Far)	0, 1	0	rw	y		y
64	3	Shift Zero Reference After Teach: 8-bit integer: (0=Off, 1=AutoSet, 2=SetZero)	0, 1, 2	0	rw	y		y
64	4	Sensor Lockout: : 8-bit integer: (0=No Lockout, 1=Sensor Locked)	0, 1	0	rw	y		y
64	5	IOL Filter Time: 16-bit integer	0–65535	0	rw	y		y
64	6	Display Read: 2-bit integer: (0=Normal, 1=Inverted)	0, 1	0	rw	y		y
64	7	Display Units: 2-bit integer: (0=mm, 1=inches)	0, 1	0	rw	y		y
64	8	Display Sleep: 4-bit integer: (0=1 min, 1=5min, 2=15 min, 3=60 min, 4=Disable)	0–4	4	rw	y		y
64	9	Remote Input Type: 4-bit integer: (0=Teach, 1=Laser Enable, 2=Sync Master, 3=Sync Slave, 4=Disabled)	0–4	4	rw	y		y
65		**BDC1 Vendor Specific Configuration**						
65	1	BDC1 Delay Mode: 8-bit integer: (0=Delay Timer Disabled, 1=On + Off Delay, 2=Off One-Shot Timer, 3=On One-Shot Timer)	0–3	0	rw	y		y
65	2	BDC1 Delay On/One-Shot Delay: 32-bit integer	0–9999	0	rw	y		y
65	3	BDC1 Delay Off/One-Shot Timer: 32-bit integer	0–9999	0	rw	y		y
65	4	BDC1 Switch Point Reference: 8-bit integer: (0=Object, 1=Background, 2=Custom)	0-2	0	rw	y		y
65	5	BDC1 User Teach Offset: 16-bit integer	0–3276.7	0	rw	y		y
65	6	BDC1 Midpoint Teach Window Size: 16-bit integer	0–3276.7	LE250: 50mm LE550: 300mm	rw	y		y
65	7	BDC1 Midpoint Teach Offset Size: 16-bit integer	0–3276.7	0	rw	y		y
66		**BDC2 Vendor Specific Configuration**			rw			
66	1	BDC2 Delay Mode: 8-bit integer: (0=Delay Timer Disabled, 1=On + Off Delay, 2=Off One-Shot Timer, 3=On One-Shot Timer)	0-3	0	rw	y		y
66	2	BDC2 Delay On/One-Shot Delay: 32-bit integer	0-9999	0	rw	y		y
66	3	BDC2 Delay Off/One-Shot Timer: 32-bit integer	0-9999	0	rw	y		y
66	4	BDC2 Switch Point Reference: 8-bit integer: (0=Object, 1=Background, 2=Custom)	0-2	0	rw	y		y
66	5	BDC2 User Teach Offset: 16-bit integer	0–3276.7	0	rw	y		y
66	6	BDC2 Midpoint Teach Window Size: 16-bit integer	0–3276.7	LE250: 50mm LE550: 300mm	rw	y		y
66	7	BDC2 Midpoint Teach Offset Size: 16-bit integer	0–3276.7	0	rw	y		y
67		**Status**						
67	1	Measurement Value: 16-bit integer: (distance in 0.001mm)			ro			y
67	2	Excess Gain Percent: 64-bit integer:			ro			y
67	3	Stability: 8-bit integer: (0=No target, 2=Stable/ target present)	0, 2		ro			y

Index	Subindex	Name	Value Range	Default	Access Rights	Data Storage	Smart Sensor Profile	AOI
67	4	Laser Fault Status: 8-bit integer: (0=No Fault, 1=Fault Present)	0, 1		ro			y
68		**Statistics**						
68	1	Number of Samples: 16-bit integer:			ro			
68	2	Sum: 32-bit integer:			ro			
68	3	Sum Squared: 16-bit integer:			ro			
68	4	Min: 16-bit integer:			ro			
68	5	Max: 16-bit integer:			ro			
72		Display String: 8-octet String US_ASCII			ro			y

IO-Link Events

Events are acyclic transmissions from the IO-Link device to the IO-Link master. Events can be error messages and/or warning or maintenance data.

Code	Type	Description
25376 (0x6320)	Error	Parameter error (verify inputs are valid)
36096 (0x8d00)	Error	Laser fault event (laser shut down for safety)

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