IO-Link Data Reference Guide: LTF Series

IO-Link Data Map

This document refers to the following IODD file: Banner_Engineering-LTFXXK-20190227-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 LTF display (listed in the Process Data in tenths of a millimeter), the state of the stability indicator, and the state of both LTF output channels. This information is sent to the IO-Link master every 4 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, 1=target present
4	Measurement Value	29	Value in tenths of a millimeter (0.1 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	0	0	0	0	0

Octet 2								
Subindex	4	4	4	4	4	4	4	4
Bit offset	15	14	13	12	11	10	9	8
Value	0	0	1	1	1	0	1	1

Octet 3								
Subindex	4	4	4	4	4	3	2	1
Bit offset	7	6	5	4	3	2	1	0
Value	1	0	0	1	1	1	0	1

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Octet 3								
Example	Measured Value (uses bit offset 3 to 15)					Stability State	Channel 2 Output	Channel 1 Output
	190.7 mm					Stable	Inactive	Active

Based on the values in the example tables:

- Channel 1 Output: Active
- Channel 2 Output: Inactive
- Stability State: Stable
- Measurement Value: 190.7 mm

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 LTF 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	Length	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				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	rw	y		y
12	2	Data Storage Lock		0 = off 1 = on	0	rw	y		y
12	3	Local Parameterization Lock		0 = off 1 = on	0	rw	y		y
12	4	Local User Interface Lock		0 = off 1 = on	0	rw	y		y
13		Profile Characteristic				ro		y	
14		PDInput Descriptor				ro		y	
15		unused				ro			
16		Vendor Name string		Banner Engineering Corp		ro			
17		Vendor Text string				ro			
18		Product Name string				ro			
19		Product ID string				ro			
20		Product Text string				ro		y	
21		Serial Number				ro			

Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile	AOI
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	8-bit unsigned integer	0 = Default 1 = BDC1 2 = BDC2	0	rw		y	y
59		Teach-In Status						y	
59	1	Teach State: 4-bit Integer	4-bit unsigned integer	0 = Idle 1 = SP1 Success 4 = Wait for Command 5 = Busy 7 = Error		ro		y	
59	2	SP1 TP1	1-bit integer	0 = not taught or unsuccessful 1 = successfully taught		ro		y	y
59	3	SP1 TP2	1-bit integer	0 = not taught or unsuccessful 1 = successfully taught		ro		y	y
60		BDC1 Setpoints							
60	1	BDC1 Setpoint SP1 (SP1 switch point in Switch or Window mode)	32-bit integer	500–120000 (50–12000 mm)	500 (50mm)	rw	y	y	y
60	2	BDC1 Setpoint SP2 (SP2 switch point in Window Mode only)	32-bit integer		120000 (12000mm)	rw	y	y	y
61		BDC1 Configuration							
61	1	BDC1 Switchpoint Logic	8-bit unsigned integer	0 = LO 1 = DO	0	rw	y	y	y
61	2	BDC1 Mode	8-bit unsigned integer	1=Switch Mode/Single Point Mode 2=Window Mode 132=Health/Alarm Mode	2	rw	y	y	y
61	3	Hysteresis	16-bit unsigned integer	0=Automatically set by sensor 2–12000 = Manual (2–12000 mm)	0	rw	y	y	y
62		BDC2 Setpoints							
62	1	BDC2 Setpoint SP1 (SP1 switch point in Switch or Window mode)	32-bit integer	500–120000 (50–12000 mm)	500 (50mm)	rw	y	y	y
62	2	BDC2 Setpoint SP2 (SP2 switch point in Window Mode only)	32-bit integer		120000 (12000mm)	rw	y	y	y
63		BDC2 Configuration							
63	1	BDC2 Switchpoint Logic	8-bit unsigned integer	0 = LO 1 = DO	0	rw	y	y	y
63	2	BDC2 Mode	8-bit unsigned integer	1=Switch Mode/Single Point Mode 2=Window Mode 132=Health/Alarm Mode 133=PFM Mode	2	rw	y	y	y
63	3	Hysteresis	16-bit unsigned integer	0=Automatically set by sensor 2–12000 = Manual (2–12000 mm)	0	rw	y	y	y
64		Configuration							
64	1	Response Speed	8-bit unsigned integer	0=Fast 1=Standard 2=Medium 3=Slow	2	rw	y		y

Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile	AOI
64	2	Zero Reference Location	8-bit unsigned integer	0 = Near 1 = Far	0	rw	y		y
64	3	Shift Zero Reference After Teach	8-bit unsigned integer	0=Off 1=AutoSet 2=SetZero	1	rw	y		y
64	4	Sensor Lockout	8-bit unsigned integer	0=No Lockout 1=Sensor Locked	0	rw	y		y
64	5	Output Polarity	8-bit unsigned integer	0=PNP 1=NPN	0	rw	y		y
64	6	IOL Filter Time	16-bit unsigned integer	0–65535 ms	0	rw	y		y
64	7	Display Read	2-bit integer	0=Normal 1=Inverted	0	rw	y		y
64	8	Display Units	2-bit unsigned integer	0=mm 1=inches	0	rw	y		y
64	9	Display Sleep	4-bit unsigned integer	0=1 min 1=5 min 2=15 min 3=60 min 4=Disable	4	rw	y		y
64	10	Remote Input Type	4-bit unsigned integer	0=Teach 1=Laser Enable 2=Sync Master 3=Sync Slave 4=Disabled	4	rw	y		y
65		BDC1 Vendor Specific Configuration							
65	1	BDC1 Delay Mode	8-bit unsigned integer	0=Delay Timer Disabled 1=On + Off Delay 2=Off One-Shot Timer 3=On One-Shot Timer	0	rw	y		y
65	2	BDC1 Delay On/One-Shot Delay	32-bit unsigned integer	0–9999 ms	0	rw	y		y
65	3	BDC1 Delay Off/One-Shot Timer	32-bit unsigned integer	0–9999 ms	0	rw	y		y
65	4	BDC1 Switch Point Reference	8-bit unsigned integer	0=Object 1=Background 2=Custom	0	rw	y		y
65	5	BDC1 User Teach Offset	32-bit integer	–119500–+119500 (–11950–+11950 mm)	0mm	rw	y		y
65	6	BDC1 Midpoint Teach Window Size	32-bit integer	0–119500 (0–11950 mm)	20mm	rw	y		y
65	7	BDC1 Midpoint Teach Offset Size	32-bit integer	–119500–+119500 (–11950–+11950 mm)	0mm	rw	y		y
66		BDC2 Vendor Specific Configuration							
66	1	BDC2 Delay Mode	8-bit unsigned integer	0=Delay Timer Disabled 1=On + Off Delay 2=Off One-Shot Timer 3=On One-Shot Timer	0	rw	y		y
66	2	BDC2 Delay On/One-Shot Delay	32-bit unsigned integer	0–9999 ms	0	rw	y		y

Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile	AOI
66	3	BDC2 Delay Off/One-Shot Timer	32-bit unsigned integer	0–9999 ms	0	rw	y		y
66	4	BDC2 Switch Point Reference	8-bit unsigned integer	0=Object 1=Background 2=Custom	0	rw	y		y
66	5	BDC2 User Teach Offset	32-bit integer	–119500–+119500 (–11950–+11950 mm)	0mm	rw	y		y
66	6	BDC2 Midpoint Teach Window Size	32-bit integer	0–119500 (0–11950 mm)	20mm	rw	y		y
66	7	BDC2 Midpoint Teach Offset Size	32-bit integer	–119500–+119500 (–11950–+11950 mm)	0mm	rw	y		y
67		Status							
67	1	Measurement Value (distance in 0.1mm)	16-bit integer			ro			y
67	2	Excess Gain Percent	32-bit integer	0–4294967295		ro			y
67	3	Stability	8-bit unsigned integer	0=No target 1=Target present		ro			y
68		Statistics							
68	1	Number of Samples	16-bit integer	0–65535	0	ro			
68	2	Sum	32-bit integer	0–4294967295	0	ro			
68	3	Sum Squared	64-bit integer	0–65535	0	ro			
68	4	Minimum	16-bit integer	0–65535	0	ro			
68	5	Maximum	16-bit integer	0–65535	0	ro			
68	6	Offset	64-bit integer	0–9223372036854775807	0	ro			
69		All Time Run Time (0.25 hr)	32-bit integer	0–4294967295	0	ro			
70		Resettable Run Time (0.25 hr)	32-bit integer	0–4294967295	0	rw			
71		Pulse Frequency Configuration							
71	1	Near Frequency	16-bit unsigned integer	100–10000 Hz	100	rw			y
71	2	Far Frequency	16-bit unsigned integer	100–10000 Hz	600	rw			y
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)
36003 (0x8CA3)	Notification	Teach Completed Event (Event indicating a teach has been completed.)
36004 (0x8CA4)	Notification	Factory Settings Restored Event (Event indicating that the factory settings have been restored.)
36005 (0x8CA5)	Notification	Teach Coerced Event (Event indicating a taught condition resulting in a setpoint being coerced. Taught setpoint was updated.)
36007 (0x8CA7)	Notification	Teach Failed Event (Event indicating an invalid target condition was attempted to be taught. Taught setpoint was not updated.)

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