



Q20-2KLAF Laser Measurement Sensor IO-Link Data Reference Guide

Original Instructions

p/n: 240594 Rev. B

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Chapter 1 IO-Link Data Map

This document refers to the following IODD file: Banner_Engineering-Q20-2-TOF-20231230-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

Parameter	Value
IO-Link revision	V1.1.2
Process Data In length	32 bits
Process Data Out length	8 bits
Bit Rate	38400 bps
Minimum cycle time	2.6 ms
Device ID	0x070007
Port class	A
SIO mode	Yes
Smart Sensor Profile	Yes
Block parameterization	Yes
Data Storage	Yes

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Index 64, Subindex 5 = 0	4
Index 64, Subindex 5 = 1	5
Index 64, Subindex 5 = 2	5

Chapter 2 IO-Link Process Data In (Device to Master)

Index 64, Subindex 5 = 0

Subindex	Name	Number of Bits	Data Values
1	Channel 1 Output State	1	0 = Inactive, 1 = Active
2	Channel 2 Output State	1	1 = Inactive, 1 = Active
3	Stability State	1	0 = No target/marginal, 1 = Stable
4	Measurement 1 Value	13	Value depends on "Configuration.Measurement 1 Selection"
5	Measurement 2 Value	16	Value depends on "Configuration.Measurement 2 Selection"

Octet 0

Subindex	5	5	5	5	5	5	5	5
Bit offset	31	30	29	28	27	26	25	24
Value	0	0	0	0	0	0	1	0

Octet 1

Subindex	5	5	5	5	5	5	5	5
Bit offset	23	22	21	20	19	18	17	16
Value	1	0	1	1	0	1	1	0

Octet 2

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

Example Based on the Value Above

Channel 1 Output State = Active
 Channel 2 Output State = Inactive
 Stability State = Stable
 Measurement 1 Value = 8191
 Measurement 2 Value = 694

Index 64, Subindex 5 = 1

Subindex	Name	Number of Bits	Data Values
1	Measurement 1 Value	16	Value depends on "Configuration.Measurement 1 Selection"
2	Measurement 2 Value	16	Value depends on "Configuration.Measurement 2 Selection"

Octet 0

Subindex	2	2	2	2	2	2	2	2
Bit offset	31	30	29	28	27	26	25	24
Value	0	0	0	0	0	0	1	1

Octet 1

Subindex	2	2	2	2	2	1	1	1
Bit offset	23	22	21	20	19	18	17	16
Value	0	1	0	0	1	0	1	1

Octet 2

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

Octet 3

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

Example Based on the Value Above

Measurement 1 Value = 26511

Measurement 2 Value = 843

Index 64, Subindex 5 = 2

Subindex	Name	Number of Bits	Data Values
1	Measurement Value	16	The measurement device value
2	Measurement Scale	8	The measurement device scale
3	Stability State	1	0 = No target/marginal, 1 = Stable
4	Channel 1 Output State	1	0 = Inactive, 1 = Active
5	Channel 2 Output State	1	1 = Inactive, 1 = Active

Octet 0

Subindex	1	1	1	1	1	1	1	1
Bit offset	31	30	29	28	27	26	25	24
Value	0	0	0	0	0	0	0	1

Octet 1

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

Octet 2

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

Octet 3

Subindex	//	//	//	//	//	3	4	5
Bit offset	7	6	5	4	3	2	1	0
Value	N/A	N/A	N/A	N/A	N/A	0	1	0

Example Based on the Value Above

Measurement Value = 509
 Measurement Scale = -2
 Stability State = No target/marginal
 Channel 2 Output State = Active
 Channel 1 Output State = Inactive

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Chapter 3

IO-Link Process Data Out (Master to Device)

Subindex	Name	Number of Bits	Data Values
1	Emitter Disable	1	0 = Active, 1 = Inactive

Octet 0

Subindex	//	//	//	//	//	//	//	1
Bit offset	7	6	5	4	3	2	1	0
Value	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1

Example Based on the Value Above

Emitter Disable = 1 (Inactive)

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Chapter 4 Parameters Set Using IO-Link

These parameters can be read from and/or written to an IO-Link model of the Q20-2KLAF 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
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 67 = SP1 Two Value Teach TP1 68 = SP1 Two Value Teach TP2 79 = SP1 Teach Exit 130 = Restore Factory Settings 162 = Start discovery 163 = Stop discovery 164 = Indicator On 165 = Indicator Off		WO		Y
3		Data Storage Index (device-specific list of parameters to be stored)				RW		
4-11		<i>reserved by IO-Link Specification</i>						
12		Device Access Locks						
12	1	Parameter Write Access Lock		0 = Off, 1 = On	0	RW	Y	
12	2	Data Storage Lock		1 = Off, 1 = On	0	RW	Y	
12	3	Local Parameterization Lock		2 = Off, 1 = On	0	RW	Y	
12	4	Local User Interface Lock		3 = Off, 1 = On	0	RW	Y	
13		Profile Characteristic				RO		
14		PDInput Descriptor				RO		
15		PDOutput Descriptor				RO		
16		Vendor Name string		Banner Engineering Corporation		RO		
17		Vendor Text string		More Sensors. More Solutions.		RO		
18		Product Name string		Q20-2		RO		
19		Product ID string				RO		
20		Product Text string				RO		
21		Serial Number				RO		
22		Hardware Version				RO		
23		Firmware Version				RO		
24		App Specific Tag (user defined)				RW	Y	

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Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile
25		Function Tag				RW	Y	
26		Location Tag				RW	Y	
27-35		<i>reserved</i>						
36		Device Status	8-bit integer	0 = Device is OK 1 = Maintenance required 2 = Out of specification 3 = Functional check 4 = Failure 5..255 Reserved		RO		
37		Detailed Device Status	Array[6] of 3-octet			RO		
38-39		<i>reserved</i>				RO		
40		Process Data Input		see Process Data In		RO		
41		Process Data Output		see Process Data Out		RO		
42-57		<i>unused/reserved</i>						
58		Teach-in Channel		0 = Default, 1 = BDC1, 2 = BDC2	0	RW		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		RO		Y
59	2	SP1 TP1	1-bit integer	0 = Not taught or unsuccessful, 1 = Successfully taught		RO		Y
59	3	SP1 TP2	1-bit integer	1 = Not taught or unsuccessful, 1 = Successfully taught		RO		Y
60		BDC1 Setpoints						
60	1	BDC1 Setpoint SP1	32-bit integer	20 mm..3000 mm	250 mm	RW	Y	Y
60	2	BDC1 Setpoint SP2 (FGS mode only)	32-bit integer	20 mm..3000 mm	0 mm	RW	Y	Y
61		BDC1 Configuration						
61	1	BDC1 Switchpoint Logic	8-bit integer	0 = LO, 1 = DO	0	RW	Y	Y
61	2	BDC1 Mode	8-bit integer	1 = One-Point BGS 128 = Two-Point static BGS 130 = One-Point Window (FGS) 131 = Dual Teach	128	RW	Y	Y
61	3	BDC1 Hysteresis	16-bit integer	-3000 mm..+3000 mm	0	RW	Y	Y
62		BDC2 Setpoints						
62	1	BDC2 Setpoint SP1	32-bit integer	20 mm..3000 mm	500 mm	RW	Y	Y
62	2	BDC2 Setpoint SP2 (FGS mode only)	32-bit integer	20 mm..3000 mm	0 mm	RW	Y	Y
63		BDC2 Configuration						

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Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile
63	1	BDC2 Switchpoint Logic	8-bit integer	0 = LO, 1 = DO	0	RW	Y	Y
63	2	BDC2 Mode	8-bit integer	1 = One-Point BGS 128 = Two-Point static BGS 130 = One-Point Window (FGS) 131 = Dual Teach	128	RW	Y	Y
63	3	BDC2 Hysteresis	16-bit integer	-3000 mm..+3000 mm	0	RW	Y	Y
64		Configuration						
64	1	Response Speed	8-bit Uinteger	0 = High Speed 2 = Default 3 = Robust 4 = Clear Object	3	RW	Y	
64	2	Secondary Output Function	8-bit Uinteger	0 = Remote Teach Input 1 = Laser On 4 = Complementary Output 5 = Laser Off 6 = Pulse Frequency Modulation 7 = Independent Output	7	RW	Y	
64	3	IOL Filter Time	16-bit Uinteger	0-65535	0	RW	Y	
64	4	Include Binary Data in Process Data	8-bit Uinteger	0 = Include, 1 = Don't include, 2 = Measurement device	0	RW	Y	
64	5	Process Data Measurement 1 Selection	8-bit Uinteger	0 = Disabled 1 = Excess Gain 2 = Excess Gain / 10 3 = Channel 1 Dual Mode Percent	1	RW	Y	
64	6	Process Data Measurement 2 Selection	8-bit Uinteger	0 = Disabled, 1 = Distance Measurement Value, 2 = Channel 2 Dual Mode Percent	1	RW	Y	
65		BDC1 Vendor Specific Configuration						
65	1	BDC1 Delay Mode	8-bit Uinteger	0 = Disabled, 1 = On-Off Delay, 2 = Oneshot	0	RW	Y	
65	2	BDC1 Delay Time 1	32-bit Uinteger	0..90000	0 ms	RW	Y	
65	3	BDC1 Delay Time 2	32-bit Uinteger	0..90000	0 ms	RW	Y	
65	4	BDC1 BGS Teach Offset Mode	8-bit Uinteger	0 = Auto, 1 = User Selected	0	RW	Y	
65	5	BDC1 FGS Window Size Mode	8-bit Uinteger	0 = Auto, 1 = User Selected	0	RW	Y	
65	6	BDC1 User Teach Offset	32-bit integer	-2980 mm..+2980 mm	0 mm	RW	Y	
65	7	BDC1 FGS User Window Size	32-bit integer	20 mm..2980 mm	0 mm	RW	Y	
65	8	BDC1 Auto-Thresholding	8-bit Uinteger	0 = Slow, 1 = Medium, 2 = Fast	3	RW	Y	
66		BDCD Vendor Specific Configuration						
66	1	BDC2 Delay Mode	8-bit Uinteger	0 = Disabled, 1 = On-Off Delay, 2 = Oneshot	0	RW	Y	

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Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile
66	2	BDC2 Delay Time 1	32-bit Uinteger	0..90000	0 ms	RW	Y	
66	3	BDC2 Delay Time 2	32-bit Uinteger	0..90000	0 ms	RW	Y	
66	4	BDC2 BGS Teach Offset Mode	8-bit Uinteger	0 = Auto, 1 = User Selected	0	RW	Y	
66	5	BDC2 FGS Window Size Mode	8-bit Uinteger	0 = Auto, 1 = User Selected	0	RW	Y	
66	6	BDC2 User Teach Offset	32-bit integer	-2980 mm..+2980 mm	0 mm	RW	Y	
66	7	BDC2 FGS User Window Size	32-bit integer	20 mm..2980 mm	0 mm	RW	Y	
66	8	BDC2 Auto-Thresholding	8-bit Uinteger	0 = Slow, 1 = Medium, 2 = Fast	1	RW	Y	
67		Status						
67	1	Measurement 1 Value	32-bit integer			RO		
67	2	Excess Gain	32-bit integer			RO		
67	3	Stability	8-bit Uinteger	0 = No target, 1 = Marginal/multiple peaks, 2 = Stable		RO		
67	4	Emitter Status	8-bit Uinteger	0 = Active, 1 = Inactive		RO		
67	5	Temperature	16-bit integer			RO		
67	6	Last Taught Temperature	16-bit integer			RO		
71		Pulse Frequency Configuration						
71	1	Near Frequency	32-bit integer	1..100000	100 Hz	RW	Y	
71	2	Far Frequency	32-bit integer	1..100000	600 Hz	RW	Y	
78		Pulse Frequency Setpoints						
78	1	Setpoint SP1	32-bit integer	20..3000	20	RW	Y	
	2	Setpoint SP2	32-bit integer	20..3000	3000	RW	Y	
79	1	Pulse Frequency LOS Frequency	32-bit Uinteger	1..100000	50	RW	Y	
16512		MDC Descriptor		Measuring Data Channel Descriptor - Smart Sensor Profile 2nd Edition				
16512	1	Lower Limit	32-bit integer			RO		
16512	2	Upper Limit	32-bit integer			RO		
16512	3	Unit	16-bit uinteger	1010 = m		RO		
16512	4	Scale	8-bit integer	-3 = Range shift of (10) ⁻³		RO		

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Chapter 5 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	Name	Description
25376 (0x6320)	Error	Parameter error	Check data sheet and values
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 was updated.
36007 (0x8CA7)	Notification	Teach Failed Event	Event indicating an invalid target condition was attempted to be taught. Taught setpoint was not updated.
36097 (0x8D01)	Error	System Fault Event	Contact Banner Engineering to resolve.

