IO-Link Data Map

This document refers to the following IODD file: Banner_Engineering-Q5X-JAM-20230315-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.

Parameter	Value	Parameter	Value
IO-Link revision	V1.1	Port class	A
Process Data In length	32 bits	SIO mode	Yes
Process Data Out length	8 bits	Smart Sensor Profile	Yes
Bit Rate	38400 bps	Block parameterization	Yes
Minimum cycle time	3.6 ms	Data Storage	Yes
Device ID	0x090003		

IO-Link Process Data In (Device to Master)

V_Configuration.10 = 0 => Process Data In

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	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 previous values:

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

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ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

V_Configuration.10 = 1 => Process Data In without Binary

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 previous values:

- Measurement 1 Value = 26511
- Measurement 2 Value = 843

IO-Link Process Data Out (Master to Device)

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

Octet 0

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

Example based on the previous values:

- Transducer Disable = 1 (Inactive)

Parameters Set Using IO-Link

These parameters can be read from and/or written to an IO-Link model of the Q5X Jam Detection 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		

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Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile
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; 71 = SP1 Dynamic Teach Start; 72 = SP1 Dynamic Teach Stop; 79 = SP1 Teach Exit; 130 = Restore Factory Settings; 160 = Laser Off; 161 = Laser On; 162 = Start discovery; 163 = Stop discovery		wo		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	
12	2	Data Storage Lock		0 = off, 1 = on	0	rw	y	
12	3	Local Parameterization Lock		0 = off, 1 = on	0	rw	y	
12	4	Local User Interface Lock		0 = 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		Q5X		ro		
19		Product ID string		Q5XKLAF2000-Q8-JAM		ro		
20		Product Text string		Laser Measurement Sensor		ro		
21		Serial Number				ro		
22		Hardware Versopm				ro		
23		Firmware Version				ro		
24		App Specific Tag (user defined)				rw	y	
25		Function Tag				rw	y	
26		Location Tag				rw	y	
27-35		reserved						
36		Device Status	8-bit integer	0=Device is OK, 1=Maintainance 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		reserved						
40		Process Data Input		see Process Data In		ro		
41		Process Data Output		see Process Data Out		ro		
42-57		unused/reserved						
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	0 = not taught or unsuccessful, 1 = successfully taught		ro		y
60		BDC1 Setpoints						
60	1	BDC1 Setpoint SP1	32-bit integer	95 mm..2000 mm	2000 mm	rw	y	y
60	2	BDC1 Setpoint SP2 (FGS mode only)	32-bit integer	95 mm..2000 mm	2000 mm	rw	y	y
61		BDC1 Configuration						
61	1	BDC1 Switchpoint Logic	8-bit integer	0 = Light Operate (LO), 1 = Dark Operate (DO)	0	rw	y	y

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Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile
61	2	BDC1 Mode	8-bit integer	132 = Jam Retroreflective 133 =Jam Background Suppression	132	rw	y	y
61	3	BDC1 Hysteresis	16-bit integer	0 mm	0 mm	rw	y	y
62		BDC2 Setpoints						
62	1	BDC2 Setpoint SP1	32-bit integer	95 mm..2000 mm	2000 mm	rw	y	y
62	2	BDC2 Setpoint SP2 (FGS mode only)	32-bit integer	95 mm..2000 mm	2000 mm	rw	y	y
63		BDC2 Configuration						
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, 129 = Dynamic BGS, 130 = One-Point Window (FGS), 131 = Dual Teach, 132 = Jam Retroreflective 133 =Jam Background Suppression	133	rw	y	y
63	3	BDC2 Hysteresis	16-bit integer	-2000 mm..+2000 mm	0 mm	rw	y	y
64		Configuration						
64	1	Response Speed	8-bit Uinteger	2 = 15ms, 3 = 25ms, 4 = 50ms	4	rw	y	
64	2	Gain	8-bit Uinteger	0 = High excess gain mode; 1 = Standard excess gain mode	0	rw	y	
	3	Secondary Output Function	8-bit Uinteger	0 = Remote Teach Input; 1 = Laser On; 2 = Master; 3 = Slave; 4 = Complementary Output; 5 = Laser Off; 6 = Pulse Frequency Modulation; 7 = Independent Output	7	rw	y	
64	4	Zero Reference Location	8-bit Uinteger	0 = Near; 1 = Far	0	rw	y	
64	5	Shift Zero Reference After Teach	8-bit Uinteger	0=Off; 1=Off	0	rw	y	
64	6	Display Read	8-bit Uinteger	0 = On; 1 = On; Inverted; 2 = Off; 3 = Off; Inverted	0	rw	y	
64	7	Pushbutton Lockout	8-bit Uinteger	0 = No Lock-out; 1 = Pushbuttons Locked; 2 = Operator Lockout	0	rw	y	
64	8	Output Polarity	8-bit Uinteger	0 = Default; 1 = PNP; 2 = NPN	0	rw	y	
64	9	IOL Filter Time	16-bit Uinteger	0..65535	0	rw	y	
64	10	Include Binary Data in Process Data	8-bit Uinteger	0 = Include, 1 = Don't Include	0	rw	y	
64	11	Process Data Measurement 1 Selection	8-bit Uinteger	0 = Disabled, 1 = Excess Gain, 2 = Excess Gain / 10	1	rw	y	
64	12	Process Data Measurement 2 Selection	8-bit Uinteger	0 = Disabled, 1 = Distance Measurement Value, 2 = Displayed Distance Measurement Value, 3 = 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, 3 = Totalizer	0	rw	y	
65	2	BDC1 Delay Time 1	32-bit Uinteger	0..90000	0ms	rw	y	
65	3	BDC1 Delay Time 2	32-bit Uinteger	0..90000	0ms	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	-1910 mm..+1910 mm	0mm	rw	y	
65	7	BDC1 FGS User Window Size	32-bit integer	1 mm..1910 mm	1mm	rw	y	
65	8	BDC1 Teach Minimum Moving Range	32-bit integer		0mm	rw	y	

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Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile
65	9	BDC1 Teach Jam Detection Response Time	32-bit integer		0ms	rw	y	
65	10	BDC Auto-Thresholding (dual teach mode only)	8-bit Uinteger	0 = On, 1 = Off, 2 = High Speed	1	rw	y	
66		BDCD Vendor Specific Configuration						
66	1	BDC2 Delay Mode	8-bit Uinteger	0 = Disabled, 1 = On-Off Delay, 2 = Oneshot, 3 = Totalizer	0	rw	y	
66	2	BDC2 Delay Time 1	32-bit Uinteger	0..90000	0ms	rw	y	
66	3	BDC2 Delay Time 2	32-bit Uinteger	0..90000	0ms	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	-1910 mm..+1910 mm	0mm	rw	y	
66	7	BDC2 FGS User Window Size	32-bit integer	1 mm..1910 mm	1mm	rw	y	
66	8	BDC2 Teach Minimum Moving Range	32-bit integer		0mm	rw	y	
66	9	BDC2 Teach Jam Detection Response Time	32-bit integer		0ms	rw	y	
66	10	BDC2 Auto-Thresholding (dual teach mode only)	8-bit Uinteger	0 = On, 1 = Off, 2 = High Speed	1	rw	y	
67		Status						
67	1	Measurement Distance: (distance in um)	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	Multiple Peak State	8-bit Uinteger	0 = Multiple peaks not preset, 1 = Multiple peaks present		ro		
67	5	Emitter Status	8-bit Uinteger	0 = Active, 1 = Inactive		ro		
67	6	Laser Fault Status	8-bit Uinteger	0 = Not present, 1 = Laser fault present		ro		
67	7	BDC1 Totalizer Counts	16-bit Uinteger			ro		
67	8	BDC2 Totalizer Counts	16-bit Uinteger			ro		
69		All-Time Run Time						
69	1	Run counter	32-bit Uinteger			ro		
70		Resettable Run Time						
70	1	Run counter	32-bit Uinteger		0	rw		
71		Pulse Frequency Configuration						
71	1	Near Frequency	32-bit integer	100..45000	100Hz	rw	y	
71	2	Far Frequency	32-bit integer	100..45000	600Hz	rw	y	
72		Display String						
72	1	Line 1	5-octet String US_ASCII			ro		
76		All-Time Run Time Event Time						
76	1	Event Time	32-bit Uinteger	0..2147483647	0	rw	y	
77		Resettable Run Time Event Time						
77	1	Event Time	32-bit Uinteger	0..2147483647	0	rw	y	

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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 datasheet and values
36000 (0x8CA0)	Warning	All-time Run Time Event	Event indicating the corresponding configured running time has elapsed.
36001 (0x8CA1)	Warning	Resettable Run Time Event	Event indicating the corresponding configured running time has elapsed.
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.
36096 (0x8d00)	Error	Laser fault event	Indicate that the laser drive has been shut down due to a safety fault.
36097 (0x8D01)	Error	System Fault Event	Contact Banner Engineering to resolve.

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