



IO-Link Parameters for Q2XKLAF Models

This document refers to the following IODD file: Banner_Engineering-q2xtof-20230529-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.

IO-Link Parameters

Parameter	Value	Parameter	Value
IO-Link revision	V1.1.2	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	2.6 ms	Data Storage	Yes
Device ID	0x0B0002		

IO-Link Process Data In (Device to Master) for the Q2XKLAF

Index 64, Subindex 4 = 0

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 parameter values:

- Channel 1 Output = Active
- Channel 2 Output = Inactive



- Stability State = Stable
- Measurement 1 Value = 8191
- Measurement 2 Value = 694

Index 64, Subindex 4 = 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	2	2	2
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 parameter values:

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

Index 64, Subindex 4=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 2 Output State	1	0=inactive, 1=active
5	Channel 1 Output State	1	0=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

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Value	1	1	1	1	1	1	0	1
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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	0	1

Octet 3

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

Example parameter values:

- Measurement Value = 509
- Measurement Scale = -3
- Stability State = no target/marginal
- Channel 2 Output State = Active
- Channel 1 Output State = Inactive

IO-Link Process Data Out (Master to Device) for the Q2XKLAF Models

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	NA	NA	NA	NA	NA	NA	NA	1

Example parameter values:

- Emitter Disable = 1 (Inactive)

Parameters Set Using IO-Link for the Q2XKLAF Models

These parameters can be read from and/or written to an IO-Link model of the Q2X ToF 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.

IO-Link Parameters

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		

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Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile
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		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		PDOOut Descriptor				ro		
16		Vendor Name string		Banner Engineering Corporation		ro		
17		Vendor Text string		More Sensors. More Solutions.		ro		
18		Product Name string		Q2X		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	
25-35		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						

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Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile
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	20 to 3000 mm		rw	y	y
60	2	BDC1 Setpoint SP2	32-bit integer	20 to 3000 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 Object SET, 128 = Two-Point static BGS, 129 = Two-Point Window (FGS), 130 = One-Point Window (FGS), 131 = Dual Mode	128	rw	y	y
61	3	BDC1 Hysteresis	16-bit integer	-3000 to +3000 mm	0	rw	y	y
62		BDC2 Setpoints						
62	1	BDC2 Setpoint SP1	32-bit integer	20 to 3000 mm		rw	y	y
62	2	BDC2 Setpoint SP2	32-bit integer	20 to 3000 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 Object SET, 128 = Two-Point static BGS, 129 = Two-Point Window (FGS), 130 = One-Point Window (FGS), 131 = Dual Mode	128	rw	y	y
63	3	BDC2 Hysteresis	16-bit integer	-3000 to +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	2	rw	y	
	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	0	rw	y	
64	3	IOL Filter Time	16-bit Uinteger	0 to 65535	0	rw	y	

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Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile
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 to 90000 ms	0ms	rw	y	
65	3	BDC1 Delay Time 2	32-bit Uinteger	0 to 90000 ms	0ms	rw	y	
65	4	BDC1 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 to +2980 mm	0mm	rw	y	
65	7	BDC1 FGS User Window Size	32-bit integer	20 to 2980 mm	0mm	rw	y	
65	8	BDC1 Auto-Thresholding	8-bit Uinteger	0 = Slow, 1 = Medium, 2 = Fast	3	rw	y	
66		BDC2 Vendor Specific Configuration						
66	1	BDC2 Delay Mode	8-bit Uinteger	0 = Disabled, 1 = On-Off Delay, 2 = Oneshot	0	rw	y	
66	2	BDC2 Delay Time 1	32-bit Uinteger	0 to 90000 ms	0ms	rw	y	
66	3	BDC2 Delay Time 2	32-bit Uinteger	0 to 90000 ms	0ms	rw	y	
66	4	BDC2 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 to +2980 mm	0mm	rw	y	
66	7	BDC2 FGS User Window Size	32-bit integer	20 to 2980 mm	0mm	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 (distance in mm)	32-bit integer			ro		
67	2	Excess Gain	32-bit integer			ro		

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Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile
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 (in 0.1 °C)	16-bit integer			ro		
67	6	Last Taught Temperature (in 0.1 °C)	16-bit integer			ro		
71		Pulse Frequency Configuration						
71	1	Near Frequency	32-bit integer	1 to 100000 Hz	100Hz	rw	y	
71	2	Far Frequency	32-bit integer	1 to 100000 Hz	600Hz	rw	y	
78		Pulse Frequency Setpoints						
78	1	Setpoint SP1	32-bit integer	20 to 3000 mm		rw	y	
	2	Setpoint SP2	32-bit integer	20 to 3000 mm		rw	y	
79	1	Pulse Frequency LOS Frequency	32-bit Uinteger	1 to 100000 Hz	50Hz	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		

IO-Link Events for the Q2XKLAF Model

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.

IO-Link events

Code	Type	Name	Description
25376 (0x6320)	Error	Parameter error	Check datasheet 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.