IO-Link Data Reference Guide: QS18 Expert Receiver

IO-Link Data Map

This document refers to the following IODD file: Banner_Engineering-QS18EK6R-20190831-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 bits
Process Data Out length	N/A
Bit Rate	38400 bps
Minimum cycle time	3.6 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 QS18 Expert IO-Link Process Data is 32 bits in size and includes the state of the output channel and the health state of the sensor. This information is sent to the IO-Link master every 3.6 ms.

Process Data Input			
Subindex	**Name**	**Number of Bits**	**Data Values**
1	Output State	1	0=Inactive, 1=Active
2	Health State	1	0=Inactive, 1=Active
3	Marginal Light State	1	0=Inactive, 1=Marginal Light
4	Marginal Dark State	1	0=Inactive, 1=Marginal Dark
5	Normalized Signal Strength	10	NSS Value 0-990, 999
6	Process Data Input Configuration	16	Value depends on "Vendor Specific Configuration.Process Data Input Configuration" Selection Choice 1 - Signal Choice 2 - Count Choice 3 - Duration Choice 4 - Events per Minute

Octet 0								
Subindex	6	6	6	6	6	6	6	6
Bit offset	31	30	29	28	27	26	25	24
Value	0	0	0	0	0	1	1	0

Octet 1								
Subindex	6	6	6	6	6	6	6	6
Bit offset	23	22	21	20	19	18	17	16
Value	0	1	0	0	1	0	1	1

Octet 2								
Subindex	////	////	5	5	5	5	5	5

ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

Octet 2								
Bit offset	15	14	13	12	11	10	9	8
Value	N/A	N/A	1	1	1	1	0	1

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

Based on the values in the example tables:

- Output State: Active
- Health State: Not healthy
- Marginal Light State: Inactive
- Marginal Dark State: Marginal dark
- Normalized Signal Strength: 990
- Process Data Input Configuration (Signal): 1611

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 QS18EK6R/RV 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	Sub-index	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile	AOI
0	1-15	Direct Parameter Page 1 (incl. Vendor ID & Device ID)				ro			y
0	16	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 = Dynamic Teach Stop 79 = S1 Exit Teach 130 = Restore Factory Settings 162 = Discovery Start 163 = Discovery Stop 164 = Reset Output Event		wo			
1	1-16	Direct Parameters Page 2				rw			
2		Standard Command	8-bit uinteger	65 = SP1 Single Value Teach 67 = SP1 Two Value Teach TP1 68 = SP1 Two Value Teach TP2 71 = SP1 Dynamic Teach Start 72 = Dynamic Teach Stop 79 = S1 Exit Teach 130 = Restore Factory Settings 162 = Discovery Start 163 = Discovery Stop 164 = Reset Output Event		wo		y	y
3		Data Storage Index (device-specific list of parameters to be stored)							

Index	Sub-index	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile	AOI
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
13-15		*unused*				ro			
16		Vendor Name string		Banner Engineering Corporation		ro			
17		Vendor Text string		More Sensors. More Solutions		ro			
18		Product Name string		QS18 Expert IO-Link series		ro			
19		Product ID string				ro			
20		Product Text string		More Sensors. More Solutions		ro		y	
21		Serial Number				ro			y
22		*unused*				ro			
23		Firmware Version				ro		y	
24		App Specific Tag (user defined)				rw	y	y	
25-35		*reserved*							
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		*reserved*							
40		Process Data Input				ro			
41-58		*unused/reserved*							
59		**Teach-In Status**							y
59	1	Teach State	4-bit integer	0 = Idle 1 = SP1 Success 4 = Wait for Command 5 = Busy 7 = Error		ro		y	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		*unused*							
61		**BDC1 Configuration**							
61	1	BDC1 Switchpoint Logic	8-bit uninteger	0 = LO 1 = DO	0	rw	y	y	y

Index	Sub-index	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile	AOI
61	2	BDC1 Mode	8-bit uninteger	128 = Light Set 129 = Dark Set 130 = Window Set 131 = Two Point Teach 132 = Dynamic Teach 133 = Opaque Mode	131	rw	y	y	y
61	3	Hysteresis	16-bit uninteger	0 = Unused	0	rw	y	y	y
62-64		*unused*							
65		**BDC1 Vendor Specific Configuration**							
65	1	BDC1 Delay Mode	8-bit uinteger	0 = Disabled 1 = On-Off Delay 2 = Oneshot	0	rw	y		y
65	2	BDC1 Delay Time 1 (Off Delay/One-Shot Delay) (ms)	32-bit integer	0-90000	0	rw	y		y
65	3	BDC1 Delay Time 2 (On Delay Time) (ms)	32-bit integer	0-90000	0	rw	y		y
65	4	BDC1 Auto Compensation	8-bit uinteger	0 = Disabled 1 = Enabled	0	rw	y		y
65	5	BDC1 Offset Percentage	8-bit uinteger	0 = 30% 1 = 40% 2 = 50% 3 = 100% 4 = 200%	2	rw	y		y
65	6	*Reserved*	8-bit uinteger		0	rw	y		y
65	7	BDC1 User Health Setting	8-bit uinteger	0..90	50	rw	y		y
65	8	BDC1 Marginal Signal Delay (ms)	16-bit uinteger	0..60000	3000	rw	y		y
66-68		*unused*							
69		All Time Run Time (hrs)	32-bit integer			ro			y
70		Resettable Run Time (hrs)	32-bit integer			ro			y
71		Quality of Health (The current adapted switching threshold normalized to original taught signal)	8-bit uinteger	0-200		ro			y
72		Normalized Signal Strength (The current signal strength normalized to the current switching threshold)	16-bit uinteger	0-990 = non-saturated 999 = saturated signal		ro			y
73		Quality of Teach The original taught signal normalized to 1.5 times the minimally acceptable teach value. A value of 100 or higher is a reliable teach condition. Less than 100 means that the sensor has less than a 50% signal strength reserve. The quality of teach is a snapshot of the teach process and does not change until the sensor is taught again. Optimizing sensor to target alignment can result in higher values.	8-bit uinteger	0-200		ro			y
74		**Health Thresholds**							

Index	Sub-index	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile	AOI
74	1	Upper Limit	8-bit uinteger			ro			y
74	2	Lower Limit	8-bit uinteger			ro			y
75		**Sensing Thresholds**							
75	1	SP1 Upper Threshold	16-bit uinteger			ro			y
75	2	SP1 Lower Threshold	16-bit uinteger			ro			y
75	3	SP2 Upper Threshold	16-bit uinteger			ro			y
75	4	SP2 Lower Threshold	16-bit uinteger			ro			y
76		**Vendor Specific Configuration**							
76	1	Polarity of Pins 2 and 4 **Note:** If Push/Pull, the polarity of Pin 2 will be PNP.	8-bit uinteger	0 = Push/Pull 1 = PNP 2 = NPN	0	rw	y		y
76	2	Pin 2 Configuration	8-bit uinteger	0 = Disabled 1 = Remote Input 2 = Detection Output 3 = Complimentary Output 4 = Normally Open Health 5 = Normally Closed Health 6 = Normally Open Marginal 7 = Normally Closed Marginal	0	rw	y		y
76	3	Process Data Input Configuration	8-bit uinteger	0 = Output/Health/NSS/Marginal Light/ Marginal High/Signal 1 = Output/Health/NSS/Marginal Light/ Marginal High/Count 2 = Output/Health/NSS/Marginal Light/ Marginal High/ Duration 3 = Output/Health/NSS/Marginal Light/ Marginal High/ Events Per Minute	0	rw	y		y
76	4	Marginal Mode	8-bit uinteger	0 = Marginal Disable 1 = Marginal Auto 2 = Marginal User	1	rw	y		y
76	5	User Marginal Light Threshold (% of current switching threshold)	16-bit uinteger	0..1000	108	rw	y		y
76	6	User Marginal Dark Threshold (% of current switching threshold)	16-bit uinteger	0..1000	92	rw	y		y
76	7	Frequency Selection	8-bit uinteger	0 = High Speed 1 = Frequency A 2 = Frequency B 3 = Frequency C	1	rw	y		y
76	8	IOL Filter Time	16-bit uinteger	0..65535	200	rw	y		y
76	9	Gain	8-bit uinteger	0 = Auto 1 = Low Gain 2 = Mid Gain 3 = High Gain	0	rw	y		y

Index	Sub-index	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile	AOI
76	10	Pushbutton Lockout	8-bit uinteger	0 = Unlocked 1 = Locked	0	rw	y		y
77		Sensor Operational Mode	8-bit uinteger	128 = Light Set 129 = Dark Set 130 = Window Set 131 = Two Point Teach 132 = Dynamic Teach 133 = Opaque Mode		ro			y
78		All Time Run Time Event	32-bit uinteger	0..2147483647	0	rw	y		y
79		Resetable Run Time Event Time	32-bit uinteger	0..2147483647	0	rw	y		y
80		Output Event Count	16-bit uinteger	0..65535		ro			y
81		Output Event Duration	16-bit uinteger	0..65535		ro			y
82		Output Events Frequency	16-bit uinteger	0..65535		ro			y
83		**Active Marginal Thresholds**							
83	1	Active Marginal Light Threshold	16-bit uinteger	0..65535		ro			y
83	2	Active Marginal Dark Thresholds	16-bit uinteger	0..65535		ro			y
84		Raw ADC Signal	16-bit uinteger	0..65535		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	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
36005 (0x8ca5)	Notification	Teach Point Coerced Event	One or more taught positions were outside the sensing range of the device
36006 (0x8ca6)	Notification	Teach Offset Causes Coercion Event	Applying the configured teach offset would place the setpoint outside the range of the device
36006 (0x8ca7)	Notification	Teach Cancel Event	Event indicating a teach has been canceled

© Banner Engineering Corp. All rights reserved