

## IO-Link Data Map

This document refers to the following IODD file: Banner\_Engineering-DF-G2-20170222-IODD1.1.xm. The IODD file and support files can be found on [www.bannerengineering.com](http://www.bannerengineering.com) under the download section of the product family page.

## Communication Parameters

The following communication parameters are used.

Parameter	Value	Parameter	Value
IO-Link revision	V1.1	Port class	A
Process Data In length	16-bit	SIO mode	Yes
Process Data Out length	N/A	Smart sensor profile	Yes
Bit Rate	38400 bps	Block parameterization	Yes
Minimum cycle time	2.3 ms	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 IO-Link Process Data is 16 bits in size and includes the measurement distance and the output states for outputs 1 and 2. This information is sent to the IO-Link master every 2.3 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	Measurement	14	Signal Value

Octet 0								
Subindex	3	3	3	3	3	3	3	3
Bit offset	15	14	13	12	11	10	9	8
Value	0	0	0	0	1	1	1	1

Octet 1								
Subindex	3	3	3	3	3	3	2	1
Bit offset	7	6	5	4	3	2	1	0
Value	1	0	1	0	0	0	0	1
Example	Measurement = 1000						Output 2 = Inactive	Output 1 = Active

## 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 DF-G2 series 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	1-15	Direct Parameter Page 1 (incl. Vendor ID & Device ID)			ro				
1	1-15	Direct Parameters Page 2				rw			
2		Standard Command	8-bit Unsigned	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 = S1 Exit Teach 130 = Restore Factory Settings 160 = Disable Emitter 161 = Enable Emitter 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		<b>Device Access Locks</b>							
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		unused				ro			
16		Vendor Name string		Banner Engineering Corp		ro			
17		Vendor Text string		More Sensors, More Solutions		ro			
18		Product Name string				ro			
19		Product ID string				ro			
20		Product Text string				ro		y	
21		Serial Number				ro			
22		Hardware Revision				ro			
23		Firmware Version				ro		y	
24		App Specific Tag (user defined)				rw	y	y	
25-35		reserved							

Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile	AOI
36		Device Status	8-bit UInteger	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							
58		Teach Channel	8-bit UInteger	0 = Default, 1 = BDC1, 2 = BDC2	0	rw			y
<b>59</b>		<b>Teach-In Status</b>							
59	1	Teach State: 4-bit Integer	4-bit UInteger	0 = Idle 1 = SP1 Success 2 = SP2 Success 3 = SP12 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
59	4	SP2 TP1	1-bit integer	0 = not taught or unsuccessful 1 = successfully taught		ro		y	y
59	6	SP2 TP2	1-bit integer	0 = not taught or unsuccessful 1 = successfully taught		ro		y	y
<b>60</b>		<b>BDC1 Setpoints</b>							
60	1	BDC1 Setpoint SP1 (SP1 switch point)	16-bit integer		2011	rw	y	y	y
60	2	BDC1 Setpoint SP2 (unused)	16-bit integer		0	rw	y	y	y
61		BDC1 Configuration							
61	1	BDC1 Switchpoint Logic	8-bit UInteger	0 = Light Operate, 1 = Dark Operate	0	rw	y	y	y
61	2	BDC1 Mode	8-bit UInteger	1 = Single Point 128 = Banner Window SET 129 = Banner Light SET 130 = Banner Dark SET	1	rw	y	y	y
61	3	Hysteresis	16-bit UInteger	0 = 1.0x, 1 = 1.5x, 2 = 2.5x	0	rw	y	y	y
<b>62</b>		<b>BDC2 Setpoints</b>							
62	1	BDC2 Setpoint SP1 (SP1 switch point)	16-bit integer		2011	rw	y	y	y
62	2	BDC2 Setpoint SP2 (unused)	16-bit integer		0	rw	y	y	y
<b>63</b>		<b>BDC2 Configuration</b>							
63	1	BDC2 Switchpoint Logic	8-bit UInteger	0 = Light Operate, 1 = Dark Operate	0	rw	y	y	y

Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile	AOI
63	2	BDC2 Mode	8-bit Unsigned	1 = Single Point 128 = Banner Window SET 129 = Banner Light SET 130 = Banner Dark SET	1	rw	y	y	y
63	3	Hysteresis	16-bit Unsigned	0 = 1.0x, 1 = 1.5x, 2 = 2.5x	0	rw	y	y	y
<b>64</b>		<b>Configuration</b>							
64	1	Response Speed	8-bit Unsigned	0 = 50 $\mu$ s 1 = 250 $\mu$ s 2 = 500 $\mu$ s 3 = 1000 $\mu$ s 4 = 2000 $\mu$ s	1	rw	y		y
64	2	Gain Mode	8-bit Unsigned	0 = Fixed Gain, 1 = Auto Gain	1	rw	y		y
64	3	Gain Level	8-bit Unsigned	0 = Gain 1 1 = Gain 2 2 = Gain 3 3 = Gain 4 4 = Gain 5 5 = Gain 6 6 = Gain 7 7 = Gain 8 8 = Gain 9 9 = Gain 10 10 = Gain 11 11 = Gain 12 12 = Gain 13 13 = Gain 14 14 = Gain 15 15 = Gain 16 16 = Gain 17 17 = Gain 18 18 = Gain 19 19 = Gain 20 20 = Gain 21 21 = Gain 22 22 = Gain 23 23 = Gain 24 24 = Gain 25 25 = Gain 26 26 = Gain 27 27 = Gain 28 28 = Gain 29 29 = Gain 30 30 = Gain 31 31 = Gain 32	31	rw	y		y
64	4	Auto-Threshold Response Time	8-bit Unsigned	14 = 2.5 s, 15 = 5.0 s, 16 = 10.0 s, 17 = 20.0 s	17	rw	y		y
64	5	Process Data Filter Update Time	16-bit Unsigned		0	rw	y		y
64	6	Signal/Threshold Readout	8-bit Unsigned	0 = Numeric, 1 = Percentage	0	rw	y		y
64	7	ECO Mode	8-bit Unsigned	0 = Disabled, 1 = Enabled	0	rw	y		y
64	8	Display Orientation	8-bit Unsigned	0 = Normal, 1 = Flipped	0	rw	y		y

Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile	AOI
64	9	Secondary Output Function	8-bit UInteger	0 = Independent Output 1 = Complimentary Output 2 = Health Output 3 = Remote Set Input 4 = Master 5 = Slave 6 = LED Off 7 = LED On 8 = Gate	0	rw	y		y
64	10	Slave Number	8-bit UInteger	1 - 6	1	rw	y		y
<b>65</b>		<b>BDC1 Vendor Specific Configuration</b>							
65	1	BDC1 Delay Mode	8-bit UInteger	0 = Disabled, 1 = Off-On Delay, 2 = Off Oneshot, 3 = On Oneshot	0	rw	y		y
65	2	BDC1 Delay Timer 1	16-bit UInteger	0-9999	0	rw	y		y
65	3	BDC1 Delay Timer 2	16-bit UInteger	0-9999	0	rw	y		y
65	4	BDC1 TEACH Selection	8-bit UInteger	0 = Two-Point TEACH 1 = Dynamic TEACH 2 = Banner Window SET 3 = Banner Light SET 4 = Banner Dark SET 5 = Cal SET	0	rw	y		y
65	5	BDC1 Offset Percent	16-bit UInteger	0 - 100	100	rw	y		y
65	6	BDC1 Auto Threshold	8-bit UInteger	0 = Disabled, 1 = Enabled	0	rw	y		y
<b>66</b>		<b>BDC2 Vendor Specific Configuration</b>							
66	1	BDC2 Delay Mode	8-bit UInteger	0 = Disabled, 1 = Off-On Delay, 2 = Off Oneshot, 3 = On Oneshot	0	rw	y		y
66	2	BDC2 Delay Timer 1	16-bit UInteger	0 - 9999	0	rw	y		y
66	3	BDC2 Delay Timer 2	16-bit UInteger	0 - 9999	0	rw	y		y
66	4	BDC2 TEACH Selection	8-bit UInteger	0 = Two-Point TEACH 1 = Dynamic TEACH 2 = Banner Window SET 3 = Banner Light SET 4 = Banner Dark SET 5 = Cal SET	0	rw	y		y
66	5	BDC2 Offset Percent	16-bit UInteger	0 - 100	100	rw	y		y
66	6	BDC2 Auto Threshold	8-bit UInteger	0 = Disabled, 1 = Enabled	0	rw	y		y
<b>68</b>		<b>Statistics</b>							
68	1	Number of Samples	16-bit integer			ro			
68	2	Sum	32-bit integer			ro			
68	4	Min	16-bit integer			ro			
68	5	Max	16-bit integer			ro			

Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile	AOI
68	6	BDC1 Light -> Dark Transition Count	16-bit Unsigned			ro			
68	7	BDC1 Dark-> Light Transition Count	16-bit Unsigned			ro			
68	8	BDC2 Light -> Dark Transition Count	16-bit Unsigned			ro			
68	9	BDC2 Dark -> Light Transition Count	16-bit integer			ro			
69		All-Time Run Time	32-bit Unsigned			ro			
70		Resetable Run Time	32-bit Unsigned			rw			
<b>71</b>		<b>BDC1 Status</b>							
71	1	Lower Hysteresis	16-bit Unsigned			ro			y
71	2	Lower Threshold	16-bit Unsigned			ro			y
71	3	Reference	16-bit Unsigned			ro			y
71	4	Upper Threshold	16-bit Unsigned			ro			y
71	5	Upper Hysteresis	16-bit Unsigned			ro			y
71	6	Output State	8-bit Unsigned	0 = Inactive, 1 = Active		ro			y
71	7	Alarm State	8-bit Unsigned	0 = No alarm present 1 = Threshold Warning 2 = Threshold Error		ro			y
<b>72</b>		<b>BDC2 Status</b>							
72	1	Lower Hysteresis	16-bit Unsigned			ro			y
72	2	Lower Threshold	16-bit Unsigned			ro			y
72	3	Reference	16-bit Unsigned			ro			y
72	4	Upper Threshold	16-bit Unsigned			ro			y
72	5	Upper Hysteresis	16-bit Unsigned			ro			y
72	6	Output State	8-bit Unsigned	0 = Inactive, 1 = Active		ro			y
72	7	Alarm State	8-bit Unsigned	0 = No alarm present 1 = Threshold Warning 2 = Threshold Error		ro			y

## IO-Links Events

Events are acyclic transmissions from the IO-Link device to the IO-Link master. In general events can be error messages and/or warning or maintenance data. The DF-G1 has a single warning event and three error events defined.

Code	Type	Description
39096 (0x8d00)	Warning	The threshold(s) cannot be optimized, but sensor output will continue to function
36097 (0x8d01)	Error	The threshold(s) cannot be optimized, and sensor output will stop functioning
36098 (0x8d02)	Error	The latest Teach/Set method failed
36112 (0x8d10)	Error	The sensor's internal eeprom had a critical failure