

# S15S IO-Link Temperature, Humidity, and Dew Point Sensor - IO-Link Data Reference Guide



Original Instructions

p/n: 242289 Rev. A

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# Chapter 1 IO-Link Data Map

This document refers to the following IODD file: Banner\_Engineering-S15S-TH-KQ-20240615-IODD1.1.xml. 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	120 bits	SIO mode	No
Process Data Out length	N/A	Smart Sensor Profile	Yes
Bit Rate	38400 bps	Block parameterization	Yes
Minimum cycle time	4 ms	Data Storage	Yes
Device ID	663553 (0x0a2001)		

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

## Process Data Mode (1): Smart Sensor Fahrenheit

Subindex	Name	Number of Bits
1	Temperature Value	16
2	Temperature Scale	8
3	Temperature Over Threshold	1
4	Temperature Under Threshold	1
5	Dew Point Value	16
6	Dew Point Scale	8
7	Dew Point Over Threshold	1
8	Dew Point Under Threshold	1
9	Relative Humidity Value	16
10	Relative Humidity Scale	8
11	Relative Humidity Over Threshold	1
12	Relative Humidity Under Threshold	1

Octet 0								
Subindex	-	-	-	-	-	-	-	-
Bit offset	119	118	117	116	115	114	113	112
Value	0	0	0	0	0	0	0	1

Octet 1								
Subindex	-	-	-	-	-	-	-	-
Bit offset	111	110	109	108	107	106	105	104
Value	1	1	1	1	1	1	0	1

Octet 2								
Subindex	-	-	-	-	-	-	-	-
Bit offset	103	102	101	100	99	98	97	96
Value	1	1	1	1	1	1	1	0

Octet 3								
Subindex	1	1	1	1	1	1	1	1
Bit offset	95	94	93	92	91	90	89	88
Value	0	0	0	0	1	1	1	1

Octet 4								
Subindex	1	1	1	1	1	1	1	1
Bit offset	87	86	85	84	83	82	81	80
Value	1	1	1	1	1	1	1	1

Octet 5								
Subindex	2	2	2	2	2	2	2	2
Bit offset	79	78	77	76	75	74	73	72
Value	1	1	1	1	1	1	1	0

Octet 6								
Subindex	-	-	-	-	-	-	3	4
Bit offset	71	70	69	68	67	66	65	64
Value	1	1	1	1	1	1	1	0

Octet 7								
Subindex	5	5	5	5	5	5	5	5
Bit offset	63	62	61	60	59	58	57	56
Value	0	0	0	1	0	0	1	1

Octet 8								
Subindex	5	5	5	5	5	5	5	5
Bit offset	55	54	53	52	51	50	49	48
Value	1	1	1	0	1	1	0	0

Octet 9								
Subindex	6	6	6	6	6	6	6	6
Bit offset	47	46	45	44	43	42	41	40
Value	1	1	1	1	1	1	1	0

Octet 10								
Subindex	-	-	-	-	-	-	7	8
Bit offset	39	38	37	36	35	34	33	32
Value	1	1	1	1	1	1	0	0

Octet 11								
Subindex	9	9	9	9	9	9	9	9
Bit offset	31	30	29	28	27	26	25	24
Value	1	1	1	1	1	1	1	0

Octet 12								
Subindex	9	9	9	9	9	9	9	9
Bit offset	23	22	21	20	19	18	17	16
Value	1	1	0	1	0	0	0	0

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

Octet 14								
Subindex	-	-	-	-	-	-	11	12
Bit offset	7	6	5	4	3	2	1	0
Value	1	1	1	1	1	1	0	0

**Examples Based Upon The Values Above**

**Temperature**

Temperature Value = 4095  
 Temperature Scale = -2  
 Scaled Temperature Value = 40.95 °F  
 Temperature Over Threshold = True  
 Temperature Under Threshold = False

**Dew Point**

Dew Point Value = 5100  
 Dew Point Scale = -2  
 Scaled Dew Point Value = 51.00 °F  
 Dew Point Over Threshold = False  
 Dew Point Under Threshold = False

**Relative Humidity**

Relative Humidity Value = 6523  
 Relative Humidity Scale = -2  
 Scaled Relative Humidity Value = 65.23%  
 Relative Humidity Over Threshold = False  
 Relative Humidity Under Threshold = False

## Process Data Mode (2): Smart Sensor Celsius

Subindex	Name							Number of Bits
1	Temperature Value							16
2	Temperature Scale							8
3	Temperature Over Threshold							1
4	Temperature Under Threshold							1
5	Dew Point Value							16
6	Dew Point Scale							8
7	Dew Point Over Threshold							1
8	Dew Point Under Threshold							1
9	Relative Humidity Value							16
10	Relative Humidity Scale							8
11	Relative Humidity Over Threshold							1
12	Relative Humidity Under Threshold							1

Octet 0								
Subindex	-	-	-	-	-	-	-	-
Bit offset	119	118	117	116	115	114	113	112
Value	0	0	0	0	0	0	0	1

Octet 1								
Subindex	-	-	-	-	-	-	-	-
Bit offset	111	110	109	108	107	106	105	104
Value	1	1	1	1	1	1	0	1

Octet 2								
Subindex	-	-	-	-	-	-	-	-
Bit offset	103	102	101	100	99	98	97	96
Value	1	1	1	1	1	1	1	0

Octet 3								
Subindex	1	1	1	1	1	1	1	1
Bit offset	95	94	93	92	91	90	89	88
Value	1	1	0	0	0	0	1	1

Octet 4								
Subindex	1	1	1	1	1	1	1	1
Bit offset	87	86	85	84	83	82	81	80
Value	0	1	1	1	0	0	1	0

Octet 5								
Subindex	2	2	2	2	2	2	2	2
Bit offset	79	78	77	76	75	74	73	72
Value	1	1	1	1	1	1	1	0

Octet 6								
Subindex	-	-	-	-	-	-	3	4
Bit offset	71	70	69	68	67	66	65	64
Value	1	1	1	1	1	1	1	0

Octet 7								
Subindex	5	5	5	5	5	5	5	5
Bit offset	63	62	61	60	59	58	57	56
Value	1	0	1	0	1	1	1	1

Octet 8								
Subindex	5	5	5	5	5	5	5	5
Bit offset	55	54	53	52	51	50	49	48
Value	1	0	0	0	0	1	0	0

Octet 9								
Subindex	6	6	6	6	6	6	6	6
Bit offset	47	46	45	44	43	42	41	40
Value	1	1	1	1	1	1	1	0

Octet 10								
Subindex	-	-	-	-	-	-	7	8
Bit offset	39	38	37	36	35	34	33	32
Value	1	1	1	1	1	1	0	0

Octet 11								
Subindex	9	9	9	9	9	9	9	9
Bit offset	31	30	29	28	27	26	25	24
Value	1	1	1	1	1	1	1	0

Octet 12								
Subindex	9	9	9	9	9	9	9	9
Bit offset	23	22	21	20	19	18	17	16
Value	1	1	0	1	0	0	0	0

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

Octet 14								
Subindex	-	-	-	-	-	-	11	12
Bit offset	7	6	5	4	3	2	1	0
Value	1	1	1	1	1	1	0	0

**Examples Based Upon The Values Above**

**Temperature**

Temperature Value = -1552  
 Temperature Scale = -2  
 Scaled Temperature Value = -15.52 °C  
 Temperature Over Threshold = True  
 Temperature Under Threshold = False

**Dew Point**

Dew Point Value = 913  
 Dew Point Scale = -2  
 Scaled Dew Point Value = 9.13 °C  
 Dew Point Over Threshold = False  
 Dew Point Under Threshold = False

**Relative Humidity**

Relative Humidity Value = 3513  
 Relative Humidity Scale = -2  
 Scaled Relative Humidity Value = 35.13%  
 Relative Humidity Over Threshold = False  
 Relative Humidity Under Threshold = False

## Process Data Mode (3): Floating Point Fahrenheit

Subindex	Name	Number of Bits
1	Temperature Value	32
2	Temperature Over Threshold	1
3	Temperature Under Threshold	1

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Subindex	Name	Number of Bits
4	Dew Point Value	32
5	Dew Point Over Threshold	1
6	Dew Point Under Threshold	1
7	Relative Humidity Value	32
8	Relative Humidity Over Threshold	1
9	Relative Humidity Under Threshold	1

Octet 0								
Subindex	1	1	1	1	1	1	1	1
Bit offset	119	118	117	116	115	114	113	112
Value	0	1	0	0	0	0	0	0

Octet 1								
Subindex	1	1	1	1	1	1	1	1
Bit offset	111	110	109	108	107	106	105	104
Value	1	0	0	0	0	0	1	1

Octet 2								
Subindex	1	1	1	1	1	1	1	1
Bit offset	103	102	101	100	99	98	97	96
Value	0	0	0	0	1	0	1	0

Octet 3								
Subindex	1	1	1	1	1	1	1	1
Bit offset	95	94	93	92	91	90	89	88
Value	0	0	1	1	1	1	0	1

Octet 4								
Subindex	-	-	-	-	-	-	2	3
Bit offset	87	86	85	84	83	82	81	80
Value	0	0	0	0	0	0	0	1

Octet 5								
Subindex	4	4	4	4	4	4	4	4
Bit offset	79	78	77	76	75	74	73	72
Value	0	1	0	0	0	0	0	0

Octet 6								
Subindex	4	4	4	4	4	4	4	4
Bit offset	71	70	69	68	67	66	65	64
Value	1	0	1	0	0	0	1	1

Octet 7								
Subindex	4	4	4	4	4	4	4	4

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Bit offset	63	62	61	60	59	58	57	56
Value	0	0	1	1	0	0	1	1

Octet 8								
Subindex	4	4	4	4	4	4	4	4
Bit offset	55	54	53	52	51	50	49	48
Value	0	0	1	1	0	0	1	1

Octet 9								
Subindex	-	-	-	-	-	-	5	6
Bit offset	47	46	45	44	43	42	41	40
Value	1	1	1	1	1	1	0	1

Octet 10								
Subindex	7	7	7	7	7	7	7	7
Bit offset	39	38	37	36	35	34	33	32
Value	0	1	0	0	0	0	1	0

Octet 11								
Subindex	7	7	7	7	7	7	7	7
Bit offset	31	30	29	28	27	26	25	24
Value	1	0	0	0	0	0	1	0

Octet 12								
Subindex	7	7	7	7	7	7	7	7
Bit offset	23	22	21	20	19	18	17	16
Value	0	1	1	1	0	1	1	0

Octet 13								
Subindex	7	7	7	7	7	7	7	7
Bit offset	15	14	13	12	11	10	9	8
Value	1	1	0	0	1	0	0	1

Octet 14								
Subindex	-	-	-	-	-	-	8	9
Bit offset	7	6	5	4	3	2	1	0
Value	1	1	1	1	1	1	1	0

**Examples Based Upon The Values Above  
Temperature**

Temperature Value = 40.95 °F  
 Temperature Over Threshold = True  
 Temperature Under Threshold = False

**Dew Point**

Dew Point Value = 51.00 °F  
 Dew Point Over Threshold = False  
 Dew Point Under Threshold = False

**Relative Humidity**

Relative Humidity Value = 65.23%  
 Relative Humidity Over Threshold = False  
 Relative Humidity Under Threshold = False

## Process Data Mode (4): Floating Point Celsius

Subindex	Name	Number of Bits
1	Temperature Value	32
2	Temperature Over Threshold	1
3	Temperature Under Threshold	1
4	Dew Point Value	32
5	Dew Point Over Threshold	1
6	Dew Point Under Threshold	1
7	Relative Humidity Value	32
8	Relative Humidity Over Threshold	1
9	Relative Humidity Under Threshold	1

Octet 0								
Subindex	1	1	1	1	1	1	1	1
Bit offset	119	118	117	116	115	114	113	112
Value	1	1	0	0	0	0	0	1

Octet 1								
Subindex	1	1	1	1	1	1	1	1
Bit offset	111	110	109	108	107	106	105	104
Value	0	1	1	1	1	0	0	0

Octet 2								
Subindex	1	1	1	1	1	1	1	1
Bit offset	103	102	101	100	99	98	97	96
Value	0	0	0	0	1	0	0	0

Octet 3								
Subindex	1	1	1	1	1	1	1	1
Bit offset	95	94	93	92	91	90	89	88
Value	0	0	1	1	0	0	0	1

Octet 4								
Subindex	-	-	-	-	-	-	2	3
Bit offset	87	86	85	84	83	82	81	80
Value	0	0	0	0	0	0	0	1

Octet 5								
Subindex	4	4	4	4	4	4	4	4
Bit offset	79	78	77	76	75	74	73	72
Value	1	1	0	0	0	0	0	1

Octet 6								
Subindex	4	4	4	4	4	4	4	4
Bit offset	71	70	69	68	67	66	65	64
Value	1	0	1	0	0	1	0	0

Octet 7								
Subindex	4	4	4	4	4	4	4	4
Bit offset	63	62	61	60	59	58	57	56
Value	1	1	0	0	1	1	0	0

Octet 8								
Subindex	4	4	4	4	4	4	4	4
Bit offset	55	54	53	52	51	50	49	48
Value	1	1	0	0	1	1	0	1

Octet 9								
Subindex	-	-	-	-	-	-	5	6
Bit offset	47	46	45	44	43	42	41	40
Value	1	1	1	1	1	1	0	1

Octet 10								
Subindex	7	7	7	7	7	7	7	7
Bit offset	39	38	37	36	35	34	33	32
Value	0	1	0	0	0	0	1	0

Octet 11								
Subindex	7	7	7	7	7	7	7	7
Bit offset	31	30	29	28	27	26	25	24
Value	1	0	0	0	0	0	1	0

Octet 12								
Subindex	7	7	7	7	7	7	7	7
Bit offset	23	22	21	20	19	18	17	16
Value	0	1	1	1	0	1	1	0

Octet 13								
Subindex	7	7	7	7	7	7	7	7
Bit offset	15	14	13	12	11	10	9	8
Value	1	1	0	0	1	0	0	1

Octet 14								
Subindex	-	-	-	-	-	-	8	9
Bit offset	7	6	5	4	3	2	1	0
Value	1	1	1	1	1	1	1	0

**Examples Based Upon The Values Above  
Temperature**

Temperature Value = -15.52 °C  
Temperature Over Threshold = True  
Temperature Under Threshold = False

**Dew Point**

Dew Point Value = 9.13 °C  
Dew Point Over Threshold = False  
Dew Point Under Threshold = False

**Relative Humidity**

Relative Humidity Value = 35.13%  
Relative Humidity Over Threshold = False  
Relative Humidity Under Threshold = False

Chapter Contents

## Chapter 3

# IO-Link Process Data Out (Master to Device)

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Not applicable.

## Chapter Contents

# Chapter 4 Parameters Set Using IO-Link

These parameters can be read from and/or written to an S15S-TH-KQ 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		
16		Vendor Name string		Banner Engineering Corporation		RO		
17		Vendor Text string		More Sensors. More Solutions.		RO		
18		Product Name string		S15S-TH-KQ		RO		
19		Product ID string		S15S-TH-KQ		RO		
20		Product Text string		S15S-TH-KQ		RO		Y
21		Serial Number				RO		
22		Hardware Versopm				RO		
23		Firmware Version		V1.1		RO		Y
24		App Specific Tag (user defined)		More Sensors. More Solutions.		RW	Y	Y
25		Function Tag		More Sensors. More Solutions.		RW	Y	Y
26		Location Tag		More Sensors. More Solutions.		RW	Y	Y
32		Error Count	16-bit Uinteger			RO		
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[4] of 3-octet			RO		
<b>69</b>		<b>All-Time Run Time</b>						
69	1	Run counter (0.25hr)	32-bit Uinteger	0..2147483647		RO	Y	
<b>70</b>		<b>Resettable Run Time</b>						
70	1	Run counter (0.25hr)	32-bit Uinteger	0..2147483647	0	RW		
<b>71</b>		<b>Alarm Configuration</b>						
71	1	Temperature Low Threshold	Float32		32	RW	Y	
71	2	Temperature High Threshold	Float32		120	RW	Y	
71	3	Relative Humidity Low Threshold	Float32		0	RW	Y	

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Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile
71	4	Relative Humidity High Threshold	Float32		100	RW	Y	
71	5	Dew Point Low Threshold	Float32		32	RW	Y	
71	6	Dew Point High Threshold	Float32		120	RW	Y	
71	7	Temperature On Delay	Float32		0	RW	Y	
71	8	Temperature Off Delay	Float32		0	RW	Y	
71	9	Relative Humidity On Delay	Float32		0	RW	Y	
71	10	Relative Humidity Off Delay	Float32		0	RW	Y	
71	11	Dew Point On Delay	Float32		0	RW	Y	
71	12	Dew Point Off Delay	Float32		0	RW	Y	
<b>72</b>		<b>Alarm Counter</b>						
72	1	Temperature Low Counter	Float32		0	RW	Y	
72	2	Temperature High Counter	Float32		0	RW	Y	
72	3	Relative Humidity Low Counter	Float32		0	RW	Y	
72	4	Relative Humidity High Counter	Float32		0	RW	Y	
72	5	Dew Point Low Counter	Float32		0	RW	Y	
72	6	Dew Point High Counter	Float32		0	RW	Y	
<b>80</b>		<b>Process Data Mode</b>						
80	1	Defines the formatting of the Process Data	8-bit Uinteger	1 = Smart Sensor Profile, Fahrenheit 2 = Smart Sensor Profile, Celsius 3 = Floating Point, Fahrenheit 4 = Floating Point, Celsius	1	RW	Y	
<b>81</b>		<b>Wire Mode</b>						
81	1	Output Configuration	8-bit Uinteger	0 = BannerBus, 1 = Discrete Output	0	RW	Y	



Chapter Contents

# Chapter 5 IO-Link Events

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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
0 (0x0000)	Notification	No Malfunction	-
20480 (0x5000)	Error	Device hardware fault	Device Exchange

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