S3N-B03

IO-Link® parameters

v1.9

PHYSICAL LAYER

Description	
IO-Link Revision	1.1
SIO Modus	YES
Min Cycle Time	2.3 ms
Transmission Rate	38,4 kbit/s (COM2)
Process Data Length	PDInput: 8 Bit configurable
M-Sequence Capability	PREOPERATE: TYPE_0 OPERATE: TYPE_2_1 ISDU: supported

FEATURES

Description	
Block Parameter	YES
Data Storage	YES
Supported Access Locks	Data Storage
Profile Characteristic	Device Profile: Smart Sensor Function Class: Device Identification Function Class: Switching Signal Channel Function Class: Process Data Variable Function Class: Device Diagnosis Function Class: Teach Channel Function Class: Teach-in Single Value

SERVICE DATA

The following ISDUs will not be saved via Data Storage: Device Access Locks (index 0xC), TISelect (index 0x3A)

System Parameters							
Index (dec)	**Parameter Object Name**	**Length**	**Subindex (offset)**	**Value/Range**	**Description**	**Data Type**	**Access***
0x000C (12)	Device Access Locks	2 octets		Bit 1: Data Storage (0=unlocked, 1=locked)	Standardized Device locking functions: Bit 0: Parameter (write) access (Not used) Bit 1: Data Storage Bit 2: Local parameterization (Not used) Bit 3: Local user interface (Not used) Bit 4-15: Reserved	RecordT	R/W
0x000D (13)	Profile Characteristic	2 octets 2 octets 2 octets 2 octets 2 octets 2 octets 2 octets		0x0001 0x8000 0x8001 0x8002 0x8003 0x8004 0x8007	Smart Sensor Profile Device Identification Switching Signal Channel (SSC) Process Data Variable (PDV) Device Diagnosis Teach Channel Teach-in single value	ArrayT of UIntegerT16	RO
0x000E (14)	Process Data Input Descriptor	3 octets 3 octets 3 octets 3 octets 3 octets 3 octets		0x01.0x01.0x00 0x01.0x01.0x01 0x01.0x01.0x02 0x01.0x01.0x03 0x01.0x01.0x04 0x01.0x01.0x05	SSC1 (OUT0, C/Q pin) SSC2 (OUT1, DO pin) PDV1 (STABILITY) PDV2 (NOISE LEVEL) PDV3 (COUNTER EXCEDEED THRESHOLD) PDV4 (TIME STAMP BIT)	ArrayT of OctetStringT3	RO

Identification Parameters								
Index (dec)	**Parameter Object Name**	**Length**	**Subindex (offset)**	**Value/Range**	**Description**	**Data Type**	**Access***	**Remark**
0x0010 (16)	Vendor Name	18 octets		Datasensing S.r.l.	Informative	StringT	RO	
0x0011 (17)	Vendor Text	28 octets		Easing automation challenges	Informative	StringT	RO	
0x0012 (18)	Product Name	15 octets		S3N-PR-5-B03-OZ (**B03 LED**) S3N-PH-5-B03-OZ (**B03 Laser**)	Detailed product name	StringT	RO	
0x0013 (19)	Product ID	5 octets		10780 (**B03 LED**) 10880 (**B03 Laser**)	Product identification	StringT	RO	
0x0014 (20)	Product Text	16 octets 22 octets		Reflex polarized (**B03 LED**) Reflex polarized laser (**B03 Laser**)	Optical function	StringT	RO	
0x0015 (21)	Serial Number	9 octets			Unique serial number	StringT	RO	
0x0016 (22)	Hardware Version	5 octets		RevAE		StringT	RO	
0x0017 (23)	Firmware Version	5 octets		e.g. 1.1.0		StringT	RO	
0x0018 (24)	Application Specific Tag	32 octets		*** (default)	Tag application defined by user	StringT	RW	Saved in non-volatile memory
0x0019 (25)	Function Tag	32 octets		*** (default)	Additional tag for device function identification	StringT	RW	Saved in non-volatile memory
0x001A (26)	Location Tag	32 octets		*** (default)	Additional tag for device function identification	StringT	RW	Saved in non-volatile memory

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Observation/Diagnostic								
Index (dec)	**Parameter Object Name**	**Length**	**Subindex (offset)**	**Value/Range**	**Description**	**Data Type**	**Access***	**Remark**
0x0024 (36)	Device Status	1 octet		0x00 → Device is ok 0x01 → Maintenance Required 0x02 → Out of specification 0x03 → Functional Check 0x04 → Failure	Contains current status of device	UIntegerT	RO	
0x0025 (37)	Detailed Device Status	3 octets			Information about currently pending Event. Implemented as dynamic list	ArrayT	RO	
0x0028(40)	Process Data (configurable)	1 octet			Read last valid Process Data Input from PDin channel	Device specific	RO	
0x0041(65)	Light Received	2 octets		0-4095	Normalized value of received light	UIntegerT	RO	
0x0043(67)	Active teach	1 octet		0x01: Standard Teach active (Maximum Sensitivity) 0x02: Fine Teach active		UIntegerT	RO	
0x0051(81)	Emission Status	1 octet		0x00: Emission OFF 0x01: Emission ON	Read emission status	Boolean	RO	
0x0052 (82)	Device Temperature	2 octets 2 octets 2 octets 2 octets 2 octets	1(64) 2(48) 3(32) 4(16) 5(0)	[°C] [°C] [°C] [°C] [°C]	Temperature actual Temperature minimum Power Up Temperature maximum Power Up Temperature minimum during lifetime Temperature maximum during lifetime	IntegerT IntegerT IntegerT IntegerT IntegerT	RO RO RO RO RO	Max and min temperature during lifetime are saved in non-volatile memory every hour.
0x0053 (83)	Device Temperature Threshold	2 octets 2 octets	1(16) 2(0)	-40 [°C] (default) 130 [°C] (default)	Temperature minimum threshold Temperature maximum threshold	IntegerT IntegerT	RW RW	Saved in non-volatile memory every hour. Events are generated if the device temperature exceeds the thresholds
0x0057 (87)	Operating Hours counter	4 octets 4 octets 4 octets	1(64) 2(32) 3(0)	0…(2^32)-1	Operating Hours: device operating hours. Not resettable by user. Operating Hours Maintenance: device operating hours, reset on system command “Confirm Maintenance”. Operating Hours Power Up: Time in hours since power up.	UIntegerT UIntegerT UIntegerT	RO RO RO	 Saved in non-volatile memory Saved in non-volatile memory
0x00BE (190)	Excess gain	2 octets		100…900	Excess gain (EG) = 0 if signal is under threshold	UIntegerT	RO	

Teach-in Parameters								
Index (dec)	**Parameter Object Name**	**Length**	**Subindex (offset)**	**Value/Range**	**Description**	**Data Type**	**Access***	**Remark**
0x003A (58)	TI Select	1 octet		0x00 = SSC1 (default, C/Q pin and DO pin)	Selection for Teach-in channel (volatile)	UIntegerT	R/W	C/Q and DO outputs are antivalent. Teach SSC1 equals to teach SSC2
0x003B (59)	TI Result	1 octet	1(0) 2(4)	Teach-in State Teach-in Flags SP	See IO-Link Smart Sensor Profile	UIntegerT4 BooleanT	RO	
0x003C(60)	SSC1 Param	2 octets 2 octets	1 (16) 2(0)	113-3983 Not Used	Sensitivity, default value 3983.	UIntegerT UIntegerT	R/W R/W	Saved in non-volatile memory.
0x003D(61)	SSC1 Config	1 octet 1 octet 2 octets	1(24) 2(16) 3(0)	0x00: High Active 0x01: Low Active (default) 0x01: Single Point (default) 0x00: Hysteresis min (default)	C/Q pin configuration	UIntegerT UIntegerT UIntegerT	R/W	Saved in non-volatile memory.
0x003E (62)	SSC2 Param	2 octets 2 octets	1 (16) 2(0)	113-3983 Not Used	Sensitivity, default value 3983.	UIntegerT UIntegerT	R/W R/W	Saved in non-volatile memory
0x003F (63)	SSC2 Config	1 octet 1 octet 2 octets	1(24) 2(16) 3(0)	0x00: High Active (default) 0x01: Low Active 0x01: Single Point (default) 0x00: Hysteresis min (default)	DO pin configuration	UIntegerT UIntegerT UIntegerT	R/W	Saved in non-volatile memory.

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Device Specific Parameters								
Index (dec)	**Parameter Object Name**	**Length**	**Subindex (offset)**	**Value/Range**	**Description**	**Data Type**	**Access***	**Remark**
0x0048 (72)	Delay Settings	1 octet 4 octets	1 (32) 2(0)	0x0 = no delay (default) 0x2= Delay ON 0x3 = One Shot 0x4= Delay OFF 0…(2^32)-1	Select Delay mode (ON / OFF/ ONE SHOT) Delay value [ms]	UIntegerT UIntegerT	R/W R/W	Saved in non-volatile memory
0x0049(73)	PDInput configuration	1 octet 1 octet 1 octet 1 octet	1(24) 2(16) 3(8) 4(0)	0x00: disabled (default) 0x01: enabled	STABILITY bit NOISE LEVEL bit COUNTER bit TIME STAMP bit	UIntegerT UIntegerT UIntegerT UIntegerT	R/W	Saved in non-volatile memory
0x0058 (88)	Keylock	1 octet		0x00: Inactive (default) 0x01: Active	Enable/disable push button	UIntegerT	R/W	Saved in non-volatile memory
0x00B4 (180)	Output type	1 octet 1 octet	1 (8) 2(0)	0x1 = PNP (default) 0x3= Push Pull 0x1 = PNP (default) 0x2 = NPN 0x3= Push Pull	Output type of C/Q pin when in SIO mode Output type of DO pin	UIntegerT UIntegerT	R/W R/W	Saved in non-volatile memory

Standard Command					
Index (dec)	**Command Name**	**Length**	**Value (dec)**	**Description**	**Access***
0x0002 (2)	Standard Teach	1 octet	0x41 (65)	Teach Set Point with maximum sensitivity	WO
0x0002 (2)	Fine Teach	1 octet	0x4B (75)	Teach to detect small object (Transmitter and receiver shall be aligned)	WO
0x0002 (2)	Teach CANCEL	1 octet	0x4F (79)	Exit from FAIL condition	WO
0x0002 (2)	Restore Factory Settings	1 octet	0x82 (130)	Restore factory settings (Device Access Locks, Application Specific Tag, Function Tag, Location Tag, Device Temperature Threshold, TI Result, SSC1 Param, SSC2 Param, SSC1 Config, SSC2 Config, Delay Settings, Output Type, Keylock, Process Data configuration, Switch counter settings, Switch counter value, Time stamp trigger, Time stamp List, Time Stamp Synch Value)	WO
0x0002 (2)	Confirm Maintenance	1 octet	0xA5 (165)	Reset Maintenance parameters (Operating Hours Maintenance, Minimum device temperature since power up, Maximum device temperature since power up, Device Status, Detailed Device Status)	WO
0x0002 (2)	Start / Stop Ping	1 octet	0xAF (175)	Feature to identify the sensor by yellow led blinking	WO
0x0002 (2)	Emission Toggle	1 octet	0xB0(176)	Toggle emission (see Emitter Status parameter to check the current status) (**B03 LED**)	WO

Events					
Event code (dec)	**Event name**	**Event mode**	**Event type**	**Device status**	**Remarks**
0x4220 (16928)	Temperature underrun	Appears / Disappears	Warning	Out of specification	
0x4210 (16912)	Temperature overrun	Appears / Disappears	Warning	Out of specification	
0x5100 (20736)	General power supply fault	Appears / Disappears	Error	Failure	
0x8C40 (35904)	Maintenance required – Cleaning	Single shot	Notification	Maintenance required	Clean lens and power cycle.
0x7710 (30480)	Short circuit - Check installation	Appears / Disappears	Error	Failure	
0x8CA0 (36000)	Laser fault	Appears / Disappears	Error	Failure	(**B03 Laser**)

PROCESS DATA INPUT

Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
		TIME STAMP EVENT	COUNTER EXCEED THRESHOLDS	NOISE LEVEL	STABILITY	SSC2 (DO Pin)	SSC1 (C/Q Pin)

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EXTENDED PARAMETERS (ADVANCED FUNCTIONS)

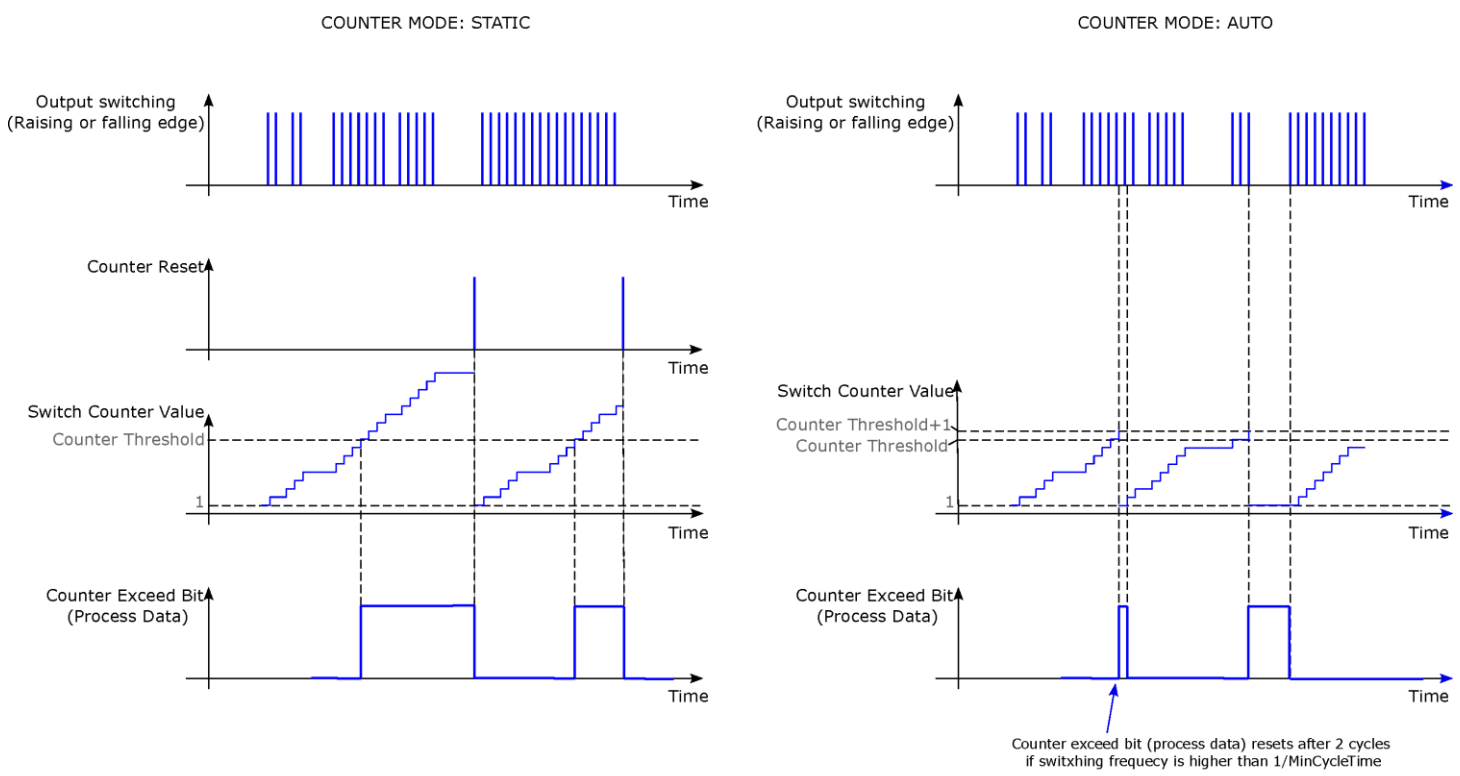
COUNTER								
Index (dec)	**Parameter Object Name**	**Length**	**Subindex (offset)**	**Value/Range**	**Description**	**Data Type**	**Access**	**Remark**
0x00B6 (182)	Switch counter settings	1 octet	1(24)	0: Counter OFF (default) 1: Counter STATIC 2: Counter AUTO	Mode	UIntegerT	RW	Saved in non-volatile memory. Stop or reset the running counter before change configuration and then re-enable the counter with Set counter commands. *Rising and falling edge are referred to DO pin
		1 octet	2(16)	0: Output Rising edge 1: Output Falling edge	Trigger counter	UIntegerT	RW	
		2 octets	3(0)	0-32767	Threshold counter	UIntegerT	RW	
0x00B7 (183)	Switch counter value	1 octet	1(16)	0: counting UP 1: counting DOWN 2: counting INACTIVE	Counting direction	UIntegerT	RO	
		2 octets	2(0)	-32768 ... 32767	Value of switch counter	IntegerT	RO	

Standard Command

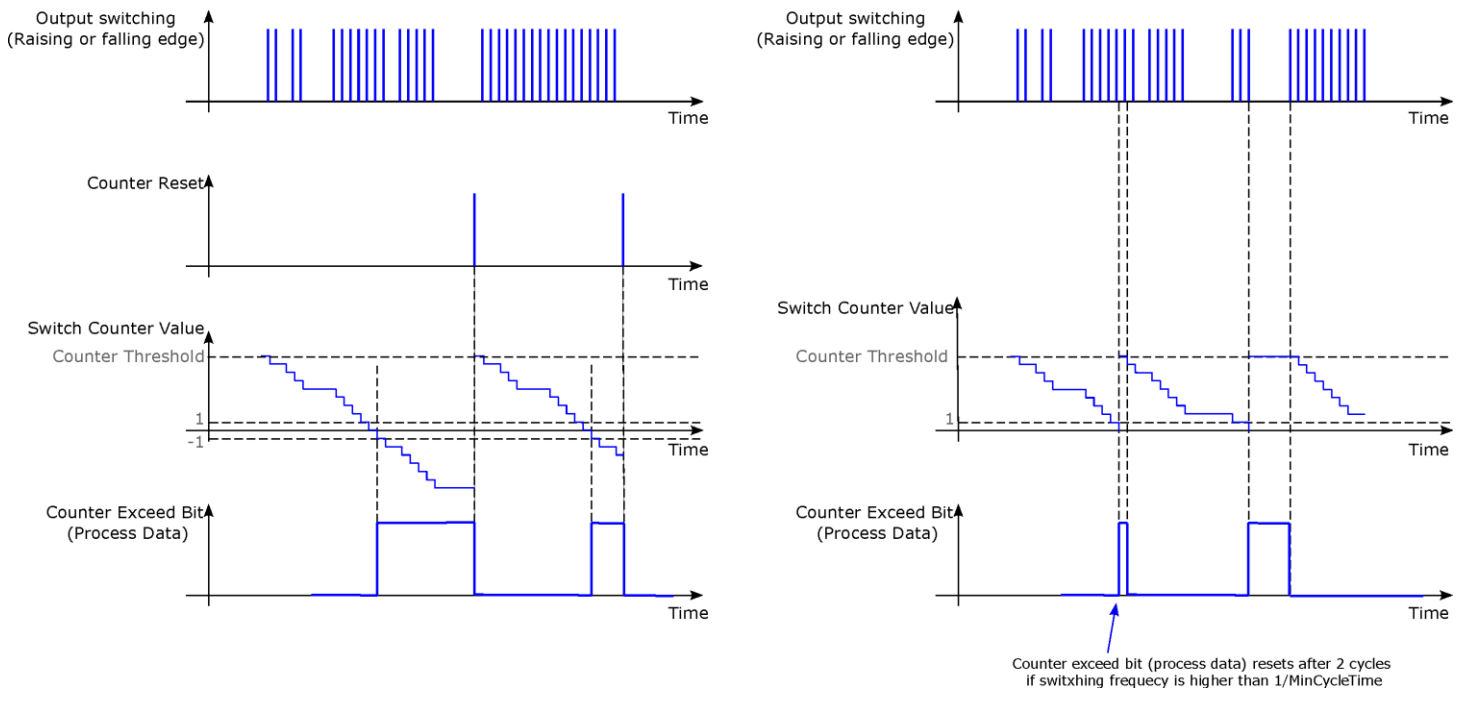
Index (dec)	Command Name	Length	Value (dec)	Description	Access
0x0002 (2)	Reset Counter	1 octet	0xA0(160)	Reset counter value (only if STATIC counter mode is selected) and PD bit	WO
0x0002 (2)	Set Counter Direction UP	1 octet	0xA1(161)	Enable counter and start count UP (counter value is reset unless if Stop Counter command is sent)*	WO
0x0002 (2)	Set Counter Direction DOWN	1 octet	0xA2(162)	Enable counter and start count DOWN (counter value is not reset unless if Stop Counter command is sent)*	WO
0x0002 (2)	Stop Counter	1 octet	0xA3(163)	Freeze the counting functions (all commutations are neglected, counting INACTIVE). Enable counter to restart the counting function from the last value before freezing.*	WO

* It is recommended not to switch between Counter UP and counter DOWN. It is not possible to switch from Counter UP to DOWN keeping the value of the switch counter and maintain PD bit consistency.

COUNTING DIRECTION: UP



COUNTING DIRECTION: DOWN



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TIMESTAMP								
Index (dec)	**Parameter Object Name**	**Length**	**Subindex (offset)**	**Value/Range**	**Description**	**Data Type**	**Access**	**Remark**
0x00B8 (184)	Time stamp trigger	1 octet 1 octet 1 octet 1 octet 1 octet	1(32) 2(24) 3(16) 4(8) 5(0)	0x00: disabled (default) 0x01: enabled	EVENT_1 (ID=0x01):Counter Threshold Exceeded EVENT_2 (ID=0x02): Temperature underrun (Event mode APPEARS) EVENT_3 (ID=0x03): Temperature overrun (Event mode APPEARS) EVENT_4 (ID=0x04): Short circuit EVENT_5 (ID=5): Power fault	UIntegerT UIntegerT UIntegerT UIntegerT UIntegerT	RW	Event that generates a time stamp
0x00B9 (185)	Time Stamp settings	1 octet 1 octet	1(8) 2(0)	3 [ms] 1 [ms]	Maximum time stamp latency time Time stamp resolution	UIntegerT UIntegerT	RO RO	Latency between event and time stamp (hardware dependent). Typically 3ms.
0x00BA (186)	Time Stamp List	70 octets		*see format in Time Stamp Table		UIntegerT	RO	Last time stamp trigger starts counting from Power Up, from Time Stamp Synch Value or from 0 (after Restore Factory Settings)
0x00BB (187)	Time Stamp Synch Value	2 octets 1 octet 1 octet 1 octet 1 octet	1(32) 2(24) 3(16) 4(8) 5(0)	0…999 0..59 0...59 0..23 0…255	milliseconds seconds minutes hours days	UIntegerT	RW	Reset value for time stamp synchronization

Index (dec)	**Command Name**	**Length**	**Value (dec)**	**Description**	**Access**
0x0002 (2)	Reset Time Stamp Application	1 octet	0xB1(177)	Reset Time Stamp application (Time Stamp trigger, Time Stamp List and Time Stamp PD bit)	WO
0x0002 (2)	Reset Time Stamp	1 octet	0xB2(178)	Reset clock counter	WO
0x0002 (2)	Time Stamp Synchronization	1 octet	0xB3(179)	Start counting from the Time Stamp Synch Value (index 187). This command clear the Time Stamp List and reset the Time Stamp PD bit.	WO
0x0002 (2)	Reset Time Stamp PD bit	1 octet	0xB4(180)	Reset the Time Stamp PD bit	WO

Time Stamp Table

	ID event	*day*	*hours*	*minutes*	*seconds*	*milliseconds*	
Last EVENT_X occurred	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14
	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20	Byte21
	…	…	…	…	…	…	…
	…	…	…	…	…	…	…
	…	…	…	…	…	…	…
First EVENT_X occurred	Byte64	Byte65	Byte66	Byte67	Byte68	Byte69	Byte70

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