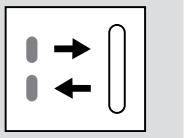
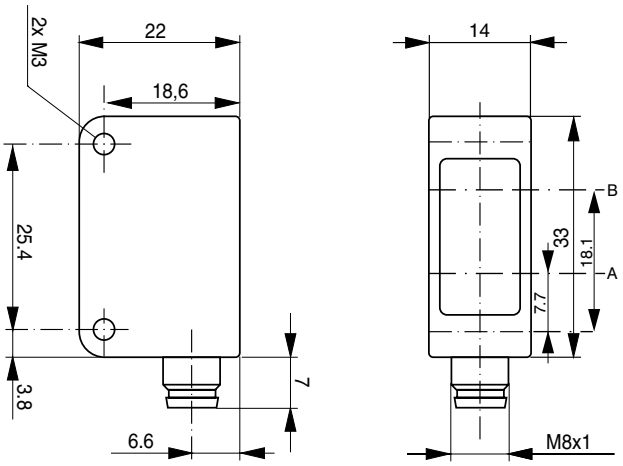
CONTRINEX

PHOTOELECTRIC SENSOR
SMART
ISTR-C23MP-NMS-A0



1200 mm

- ✓ C23 Metal housing
- ✓ IO-Link
- ✓ Immunity to mutual interferences



A: emitter axis B: receiver axis

OPTICAL DATA	
Sensing distance	110% S_d
Operating distance (S_d)	5…1200 mm[1]
Sensitivity adjustment	Depend on teach domain
Light source	LED, red 630 nm
Light spot size (distance)	Ø 11 mm (500 mm) / Ø 21 mm (1 m)

INTERFACE	
Output on pin 4	SIO Selectable / IO-Link
Output on pin 2	SIO Selectable
Output Polarity	PNP
IO-Link	✓

[1] Object with 90% reflectance (standard white paper)

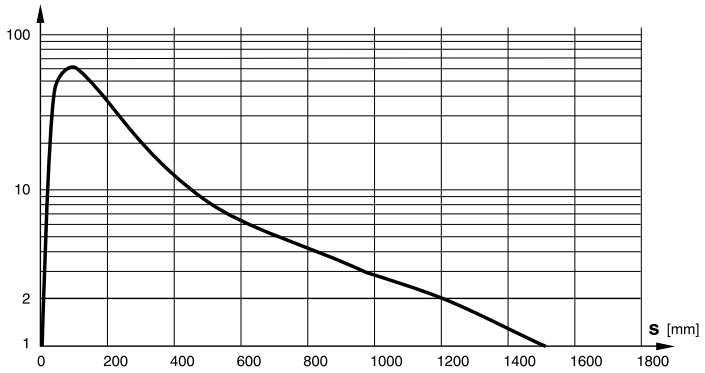
ELECTRICAL DATA	
Supply voltage range (U_B)	10…30 VDC
Residual ripple	≤ 10% Vpp
Output current	≤ 100 mA
Signal PNP high/low	≤ (U_B-2.0 V)/approx. 0 V
Power consumption (no load)	≤ 25 mA
Response time	≤ 0.5 ms
SIO Switching frequency	≤ 1000 Hz
Short circuit protection	✓
Voltage reversal protection	✓
Cable length max.	≤ 20 m (IO-Link) / ≤ 300 m (SIO)

MECHANICAL DATA	
Enclosure rating	IP67 / 68 / 69K
Ambient temperature operation	-25…+65°C
Shock and vibration	IEC 60947-5-2
Weight (connector version)	20 g
Housing material	Stainless steel V2A
Window material	PMMA
Connector type	M8 4-pin
Max tightening torque	2Nm

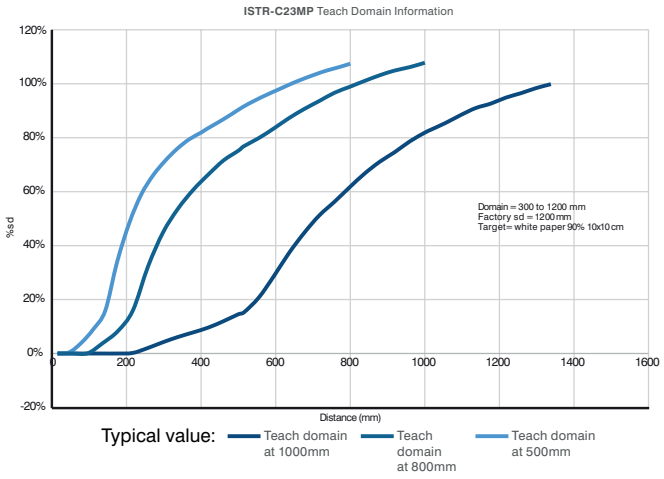
SENSING RANGE

Target	Operating range
90%	5…1200 mm
18%	15…500 mm
6%	40…300 mm

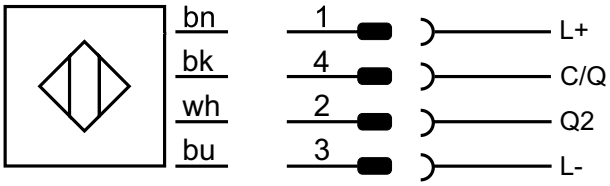
EXCESS GAIN



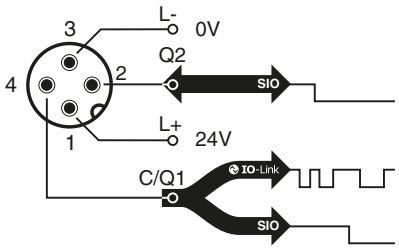
TEACH DOMAIN INFORMATION



WIRING DIAGRAM



PIN ASSIGNMENT



IO-LINK CHARACTERISTICS	VALUE FOR ISTR-M18MP-NMS-A0
Vendor ID	0156_h
Device ID	$A0301_h$
IO-Link Protocol	1.1
SIO-Mode	Supported
Process data	1 byte input / 1 byte output
Baudrate	COM2 (38.4 kBaud)
Minimum cycle time	4 ms

IODD files may be downloaded from

https://www.contrinex.com/en-ch/collections/smart-photoelectric-basic

Select the product name to display the product page with corresponding downloads.

Alternatively, just click/scan the QR code on the left.

AVAILABLE TYPES

Part number	Part reference	Operating range	Switching Frequency SIO	
620-600-621	ISTR-C23MP-NMS-A0	5...1200mm	≤ 1000 Hz	

Note: additional suffix can appear to indicate a revision version or a special version.

CONFIGURATION PARAMETER (IO-LINK / SIO MODE)

Index	Sub Hex	Name	Access	Data Type	Value	Default
SYSTEM						
02_h	00_h	System Command[1]	W	uint8	80_h = Device Reset 81_h = Application Reset 83_h = Back-To-Box AA_h = Unsat Domain $7E_h$ = Locator Start $7F_h$ = Locator Stop 05_h = ParamDownloadStore 40_h = Teach Apply 41_h = Single Value Teach SP1 42_h = Single Value Teach SP2 43_h = Two Value Teach SP1 TP1 44_h = Two Value Teach SP1 TP2 45_h = Two Value Teach SP2 TP1 46_h = Two Value Teach SP2 TP2 47_h = Dynamic Teach SP1 Start 48_h = Dynamic Teach SP1 Stop 49_h = Dynamic Teach SP2 Start $4A_h$ = Dynamic Teach SP2 Stop $4F_h$ = Teach Cancel Abort	N/A
DATA STORAGE						
03_h	01_h	DS_Command[1]	R/W	uint8	00_h: Reserved 01_h: DS_UploadStart 02_h: DS_UploadEnd 03_h:DS_DownloadStart 04_h: DS_DownloadEnd 05_h: DS_Break 06_h – FF_h: Reserved	N/A
	02_h	State_Property[1]	R	uint8	Bit 0: Reserved Bit 1 and 2: State of Data Storage (00_h: Inactive, 01_h: Upload, 02h: Download, 03_h: Data Storage Locked) Bit 3 to 6: Reserved Bit 7: DS_UPLOAD_FLAG (00_h: no DS_UPLOAD_FLAG, 01_h: DS_UPLOAD_REQ pending)	N/A
	03_h	Data_Storage_Size	R	uint32	–	N/A
	04_h	Parameter_Checksum	R	uint32	–	N/A
	05_h	Index_List	R	array of byte	–	N/A
PROFILE PARAMETER						
$0D_h$	–	Profile Characteristic	R	array	<ProfileID1>, <ProfileID2>, .. <FCID> (Type 2.7) (AdSS), 0x000E, 0x4000, 0x800C, 0x8011, 0x8012, 0x8101	–
PD DESCRIPTOR						
$0E_h$	–	PD Input Descriptor	R	array	(Type 2.7) (AdSS) <DataType><TypeLength><Bit offset> – $[01]_h$ $[08]_h$ $[00]_h$	–
$0F_h$	–	PD Output Descriptor	R	array	(Type 2.7) (AdSS) <DataType><TypeLength><Bit offset> $[01]_h$ $[01]_h$ $[00]_h$ $[02]_h$ $[07]_h$ $[01]_h$	–
FUNCTION CLASS – IDENTIFICATION (8000_h)						
10_h	–	Vendor Name	R	char [16]	“Contrinex AG”	–
11_h	–	Vendor Text	R	char [32]	“www.contrinex.com”	–
12_h	–	Product Name	R	char [32]	ISTR-C23MP-NMS-A0	–
13_h	–	Product ID	R	char [16]	620-600-621	–
14_h	–	Product Text	R	char [32]	AdSS photoelectric sensor	–
15_h	–	Serial Number	R	char [16]	123456	–
16_h	–	Hardware Revision	R	char [16]	1.0.0	–
17_h	–	Firmware Revision	R	char [16]	1.0.0	–
18_h	–	Application Specific Tag	R/W	char [32]	<user string, 32 bytes (variable length)>	<vendor specific>

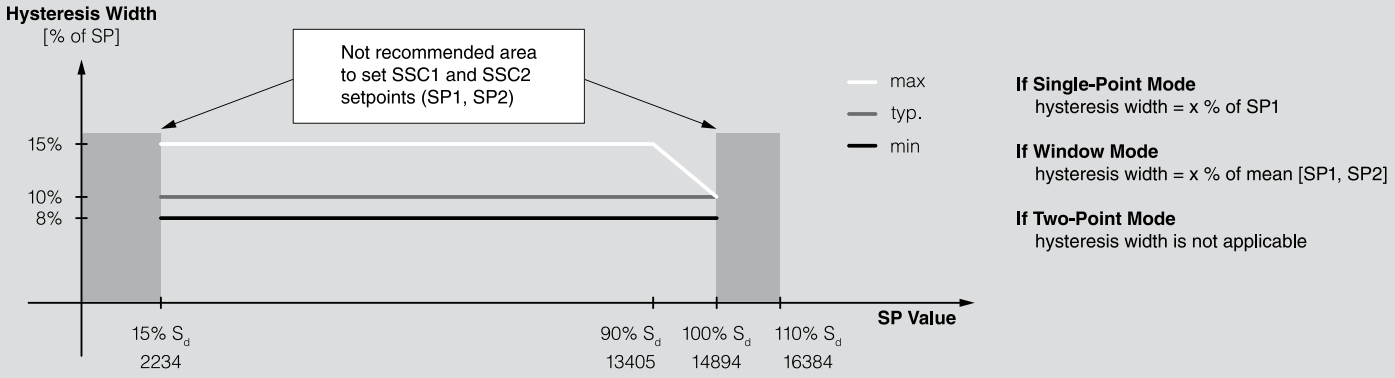
[1] This parameter is stored in a volatile memory

FUNCTION & LOCATION TAG						
19_h	–	Function Tag	R/W	char [32]	<user string, 32 bytes (variable length)>	***
$1A_h$	–	Location Tag	R/W	char [32]	<user string, 32 bytes (variable length)>	***
FUNCTION CLASS – DIAGNOSIS (8003_h)						
24_h	00_h	Device Status[1]	R	uint8	0 = Device is OK, 1 = Maintenance required, 2 = Out of specification, 3 = Functional check, 4 = Failure, 5…255 Reserved	–
25_h	00_h	Detailed Device Status[1]	R	array	1800_h / EMC disturbance 1801_h / Under IOL voltage 1803_h / Short circuit 1804_h / Under voltage 1805_h / Disturbances on receiver 1806_h / LED regulation limit $180C_h$ / Temperature limit	–
FUNCTION CLASS – TEACH-IN CHANNEL SELECT (8004_h)						
$3A_h$	–	Teach Select[1]	R/W	uint8	00_h: Default (SSC1) 01_h: SSC1 02_h: SSC2 FF_h: ALL	00_h
FUNCTION CLASS – TEACH STATUS (8007_h TO 8009_h)						
$3B_h$	01_h	Teach State[1]	R	bool[4]	0_h = IDLE 1_h = SP1 SUCCESS 2_h = SP2 SUCCESS 3_h = SP12 SUCCESS 4_h = WAIT FOR COMMAND 5_h = BUSY 6_h = Reserved 7_h = ERROR 8_h...11_h = Reserved 12_h...15_h = Vendor specific	00_h
	02_h	Flag SP1 → TP1[1]	R	bool	00_h: Teach point not taught or not successful 01_h: Teach point successfully taught	00_h
	03_h	Flag SP1 → TP2[1]	R	bool	00_h: Teach point not taught or not successful 01_h: Teach point successfully taught	00_h
	04_h	Flag SP2 → TP1[1]	R	bool	00_h: Teach point not taught or not successful 01_h: Teach point successfully taught	00_h
	05_h	Flag SP2 → TP2[1]	R	bool	00_h: Teach point not taught or not successful 01_h: Teach point successfully taught	00_h
SCU – SENSOR CONFIGURATION UNIT						
40_h	01_h	Sensor Startup Time	R/W	uint16	0…65535 ms	0000_h
	02_h	Sensor Mode	R/W	uint8	00_h: Fast 02_h: Medium 24_h: Fine	00_h
	03_h	Gain Value	R	uint16	–	–
	$0C_h$	Domain Teach Status	R	uint8_t	0 = Teach Domain Ok 1 = Saturation of Domain Detected	00_h
SSC1 PARAMETER						
$3C_h$	01_h	Setpoint 1	R/W	uint32	Recommended value: (2234…14894 = 15% S_d to 100% S_d)	100% S_d
	02_h	Setpoint 2	R/W	uint32	Recommended value: (2234…14894 = 15% S_d to 100% S_d), but must be lower than Setpoint 1. N/A if Single-Point mode is selected.	0% S_d
SSC1 CONFIGURATION						
$3D_h$	01_h	Logic	R/W	uint8	00_h: High active 01_h: Low active	00_h
	02_h	Mode	R/W	uint8	00_h: Deactivated 01_h: Single Point 02_h: Window Mode 03_h: Two Points	01_h

[1] This parameter is stored in a volatile memory

	03_h	Hysteresis Width	R/W	uint32	0…16383 (e.g. If SSC1 Configuration Mode = Single Point, SP1 = 50% S_d = 7447, Hysteresis Width = 10% of SP = 745)	8% of S_d
	04_h	Hysteresis Selection	R/W	uint8	0 = User Hysteresis 1 = Internal Hysteresis	
SSC2 PARAMETER						
$3E_h$	01_h	Setpoint 1	R/W	uint32	Recommended value: (2234…14894 = 15% S_d to 100% S_d)	80% S_d
	02_h	Setpoint 2	R/W	uint32	Recommended value: (2234…14894 = 15% S_d to 100% S_d), but must be lower than Setpoint 1. N/A if Single-Point mode is selected.	0% S_d
SSC2 CONFIGURATION						
$3F_h$	01_h	Logic	R/W	uint8	00_h: High active 01_h: Low active	00_h
	02_h	Mode	R/W	uint8	00_h: Deactivated 01_h: Single Point 02_h: Window Mode 03_h: Two Points	01_h
	03_h	Hysteresis Width	R/W	uint32	0…16383 (e.g. If SSC1 Configuration Mode = Single Point, SP1 = 50% S_d = 7447, Hysteresis Width = 10% of SP = 745)	8% of S_d
	04_h	Hysteresis Selection	R/W	uint8	0 = User Hysteresis 1 = Internal Hysteresis	

HYSTERESIS WIDTH RECOMMENDED BY CONTRINEX



If Single-Point Mode
hysteresis width = x % of SP1

If Window Mode
hysteresis width = x % of mean [SP1, SP2]

If Two-Point Mode
hysteresis width is not applicable

OSS CONFIGURATION						
42_h	01_h	OSS1 Logic – Sensor Physical Output 1 Logic (PIN4) when used in SIO mode	R/W	uint8	0 = OUTPUT: High active (NO) 1 = OUTPUT: Low active (NC) 2 = OUTPUT: ON 3 = OUTPUT: OFF	00_h
	02_h	OSS2 Logic – Sensor Physical Output 2 Logic (PIN2) when used in SIO mode	R/W	uint8	0 = OUTPUT: High active (NO) 1 = OUTPUT: Low active (NC) 2 = OUTPUT: ON 3 = OUTPUT: OFF 4 = INPUT 5 = INPUT-TRIGGER Single Value Teach	00_h
	03_h	OSS1 Condition – Sensor Physical Output 1 Condition (PIN4) when used in SIO mode	R/W	uint8	0 = OSS1_A1 1 = OSS1_A1 AND OSS1_A2 2 = OSS1_A1 OR OSS1_A2 3 = OSS1_A1 XOR OSS1_A2	00_h
	04_h	OSS2 Condition – Sensor Physical Output 2 Condition (PIN2) when used in SIO mode	R/W	uint8	0 = OSS2_A1 1 = OSS2_A1 AND OSS2_A2 2 = OSS2_A1 OR OSS2_A2 3 = OSS2_A1 XOR OSS2_A2	00_h

	05_h	OSS1 Source A1 – Sensor Physical Output 1 Souce A1 (PIN4) when used in SIO mode	R/W	uint8	0 = SSC1 1 = SSC2 2 = TSSP 3 = ALR1 4 = ALR2 5 = ALR3 6 = INPUT(1) 7 = Not INPUT(1)	00_h
	06_h	OSS1 Source A2 – Sensor Physical Output 1 Source A2 (PIN4) when used in SIO mode	R/W	uint8	0 = SSC1 1 = SSC2 2 = TSSP 3 = ALR1 4 = ALR2 5 = ALR3 6 = INPUT(1) 7 = Not INPUT(1)	00_h
	07_h	OSS2 Source A1 – Sensor Physical Output 2 Source A2 (PIN2) when used in SIO mode	R/W	uint8	0 = SSC1 1 = SSC2 2 = TSSP 3 = ALR1 4 = ALR2 5 = ALR3	00_h
	08_h	OSS2 Source A2 – Sensor Physical Output 2 Source A2 (PIN2) when used in SIO mode	R/W	uint8	0 = SSC1 1 = SSC2 2 = TSSP 3 = ALR1 4 = ALR2 5 = ALR3	00_h
TMU – SENSOR TIMER UNIT						
43_h	01_h	Timer Mode	R/W	uint8	0 = No Timer 1 = Stretch ON 2 = Delay ON 3 = Delay and Stretch ON 4 = One Shot	00_h
	02_h	Timer Value	R/W	uint16	0…65535 ms	0000_h
	03_h	Timer Source	R/W	uint8	0 = SSC1 1 = SSC2 2 = ALR1 3 = ALR2 4 = ALR3	00_h
CTU – SENSOR COUNTER UNIT						
44_h	01_h	Counter Mode	R/W	uint8	0 = Falling Edge 1 = Rising Edge 2 = Both	00_h
	02_h	Counter Value(2)	R/W	uint16	0…65535	0000_h
	03_h	Counter Source	R/W	uint8	0 = SSC1 1 = SSC2 2 = TSSP 3 = ALR1 4 = ALR2 5 = ALR3	00_h
	04_h	Counter Reset Source	R/W	uint8	0 = ALR1 1 = ALR2 2 = ALR3	01h
SMU – SENSOR MONITOR UNIT						
46_h	01_h	Current Temperature(1)	R	uint16	–	0000_h
	02_h	Max. Lifetime Temperature	R	uint16	–	0000_h
	03_h	Min. Lifetime Temperature	R	uint16	–	0000_h
	04_h	Lifetime Temperature Cycle Count	R	uint8	–	00_h
	05_h	Lifetime Operating Hours	R	uint32	–	00000000_h
	06_h	Lifetime Power-On Cycles	R	uint32	–	00000000_h
	07_h	Lifetime EMC Disturbances	R	uint32	–	00000000_h

(1) Only available if OSS2 Logic = 4 = INPUT

(2) This parameter is stored in a volatile memory

	08_h	EVENT FLAG[1][2]	R	uint8	B1 Short circuit on output B2 EMC disturbances B3 Disturbances on receiver B4 LED regulation limit B5 Under voltage B6 Over temperature B7 Under temperature	00_h
SMAU – SENSOR MEASUREMENT ALARM UNIT						
47_h	01_h	Sensor Alarm 1 Threshold	R/W	uint16	0…110% S_d	10% S_d
	02_h	Sensor Alarm 1 Hysteresis	R/W	uint16	–	5%
	03_h	Sensor Alarm 1 Configuration	R/W	uint8	0 = Always OFF 1 = High Active 2 = High Active / IO-Link event generation	00_h
	04_h	Sensor Alarm 1 Source	R/W	uint8	0 = Distance 1 = Counter 2 = Temperature	00_h
	05_h	Sensor Alarm 2 Threshold	R/W	uint16	0…65535	100
	06_h	Sensor Alarm 2 Hysteresis	R/W	uint16	–	0000_h
	07_h	Sensor Alarm 2 Configuration	R/W	uint8	0 = Always OFF 1 = High Active 2 = High Active / IO-Link event generation	00_h
	08_h	Sensor Alarm 2 Source	R/W	uint8	0 = Distance 1 = Counter 2 = Temperature	01_h
	09_h	Sensor Alarm 3 Threshold	R/W	uint16	–25…65°C	65°C
	10_h	Sensor Alarm 3 Hysteresis	R/W	uint16	–	0000_h
	11_h	Sensor Alarm 3 Configuration	R/W	uint8	0 = Always OFF 1 = High Active 2 = High Active / IO-Link event generation	00_h
	12_h	Sensor Alarm 3 Source	R/W	uint8	0 = Distance 1 = Counter 2 = Temperature	02_h
DEVICE CHARACTERISTIC						
49_h	01_h	Profile Compatibility	R	char []	SSP 2.7 AdSS	–
	02_h	Detection Range Max.	R	char []	Depends on sensor type	–
	03_h	Supply Voltage Range (U_b)	R	char []	"10…30 VDC"	–
	04_h	Max. Output Current	R	char []	"≤ 200 mA"	–
	05_h	Ambient Temperature Range (T_A)	R	char []	"–25…+65°C"	–
	06_h	Storage Temperature Range (T_S)	R	char []	"–25…+65°C"	–
	07_h	Enclosure Rating	R	char []	IP67/IP68/IP69K	–
LEDC - LED CONFIGURATION						
$4B_h$	01_h	Yellow ON - SIO	R/W	uint8	0 = OSS1 1 = OSS2 2 = OSS1 or OSS2 3 = OFF	0
	02_h	Green ON - SIO	R/W	uint8	0 = POWER 1 = OFF	0
	03_h	Blinking Alarm - SIO	R/W	uint8	0 = ALR1 or ALR2 or ALR3 1 = OFF	0
	04_h	LED IO-Link	R/W	uint8	0 = Green STD IO-Link 1Hz 1 = Id mode Green 5Hz 2 = Same as SIO	0
		Blinking Alarm Short-circuit				
SEM - SENSOR ECO MODE						
$4C_h$	01_h	SEM - selection	R/W	uint8	0 = Always OFF 1 = Active - state LED	1

[1] This parameter is stored in a volatile memory

[2] A read on this subindex clear all flags

	02_h	SEM - yellow LED	R/W	uint8	0 = Disabled 1 = Enabled	1
	03_h	SEM - green LED	R/W	uint8	0 = Disabled 1 = Enabled	1
	04_h	SEM - Emission Frequency	R/W	uint8	0 = Normal 1 = Middle 2 = Low	0
FUNCTION CLASS – MDC DESCRIPTION PARAMETER (8005_h)						
4080_h	01_h	Lower Limit	R	int32	Lower value measurement range, see range definition in table A.5. According to SSP[1], Table D.14 page 78.	0
	02_h	Upper Limit	R	int32	Upper value measurement range, see range definition in table A.5. According to SSP[1], Table D.14 page 78.	0
	03_h	Unit Code	R	uint16	See Unit table defined in table A.7. According to SSP[1], Table D.14 page 78.	0
	04_h	Scale	R	int8	See Table B.2. According to SSP[1], Table D.14 page 78.	0

[1] https://io-link.com/share/Downloads/Smart-Sensor-Profile/IOL-Smart-Sensor-Profile-2ndEd_V1.1_Sep2021.zip

PROCESS DATA REPRESENTATION

PROCESS DATA STRUCTURE

PROCESS DATA INPUT

Bitoffset

Byte	7	6	5	4	3	2	1	0
0	ALR3	ALR2	ALR1	OSSC2	OSSC1	TSSP	SSC2	SSC1

Name	Value	Description
ALR3	0	Alarm 3 is OFF
	1	Alarm 3 is ON
ALR2	0	Alarm 2 is OFF
	1	Alarm 2 is ON
ALR1	0	Alarm 1 is OFF
	1	Alarm 1 is ON
OSS2	0	Output switching signal 2 is OFF
	1	Output switching signal 2 is ON
OSS1	0	Output switching signal 1 is OFF
	1	Output switching signal 1 is ON
TSSP	0	Timered selected signal is OFF
	1	Timered selected signal is ON
SSC2	0	Switching signal 2 is OFF
	1	Switching signal 2 is ON
SSC1	0	Switching signal 1 is OFF
	1	Switching signal 1 is ON

PROCESS DATA OUTPUT

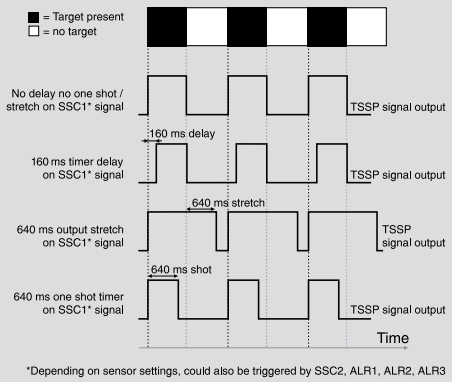
Bitoffset

Byte	7	6	5	4	3	2	1	0
0	RFU							DIS

Name	Value	Description
DIS	0	Sensor is enabled
	1	Sensor is disabled

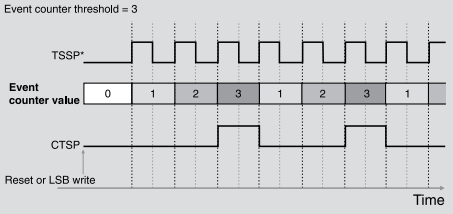
SMART SENSOR SIGNAL FLOWS

Sensor timer unit (TMU) parameter examples



*Depending on sensor settings, could also be triggered by SSC2, ALR1, ALR2, ALR3

Event counter (pulse divider) example



*Depending on sensor settings, could also be triggered by SSC1, SSC2, ALR1, ALR2, ALR3

ERROR TYPES

Code	Additional code	Name	Description
80_h	11_h	Index Not Available	Access occurs to a not existing index
80_h	12_h	Subindex Not Available	Access occurs to a not existing subindex
80_h	20_h	Service Temporarily Not Available	Parameter is not accessible due to the current state of the device application
80_h	21_h	Service Temporarily Not Available – Local Control	Parameter is not accessible due to an ongoing local operation at the device
80_h	22_h	Service Temporarily Not Available – Device Control	Parameter is not accessible due to a remote triggered state of the device application
80_h	23_h	Access Denied	Write access on a read-only parameter
80_h	30_h	Parameter Value Out Of Range	Written parameter value is outside its permitted value range
80_h	31_h	Parameter Value Above Limit	Written parameter value is above its specified value range
80_h	32_h	Parameter Value Below Limit	Written parameter value is below its specified value range
80_h	33_h	Parameter Length Overrun	Written parameter length is above its predefined length
80_h	34_h	Parameter Length Underrun	Written parameter length is below its predefined length
80_h	35_h	Function Not Available	Written command is not supported by the device application
80_h	36_h	Function temporarily Not Available	Written command is not available due to the current state of the device
80_h	40_h	Invalid Parameter Set	Written single parameter collides with other actual parameter settings
80_h	41_h	Inconsistent Parameter Set	Parameter inconsistencies were found at the end of the block parameter transfer, device plausibility check failed
81_h	02_h	OSS1 source not available	First select OSS2 Logic = INPUT

EVENTS

Code	Type	Name	Description
1800_h	Warning	EMC Disturbances	EMC Disturbances detected by sensor
1801_h	Warning	Under IOL Voltage	Under IOL Voltage detected by sensor
1803_h	Warning	Short Circuit	Short Circuit detected by sensor
1804_h	Error	Under Voltage	Under Voltage detected by sensor
1805_h	Warning	Disturbances on Receiver	Disturbances on Receiver detected by sensor
1806_h	Warning	LED Regulation Limit	LED Regulation Limit detected by sensor
1808_h	Notification	Alarm 1	Alarm 1 Threshold reached
1809_h	Notification	Alarm 2	Alarm 2 Threshold reached
$180A_h$	Notification	Alarm 3	Alarm 3 Threshold reached
$180B_h$	Notification	Trigger Teach	New SSC value is taught
$180C_h$	Warning	Temperature Limit	Temperature limit reached