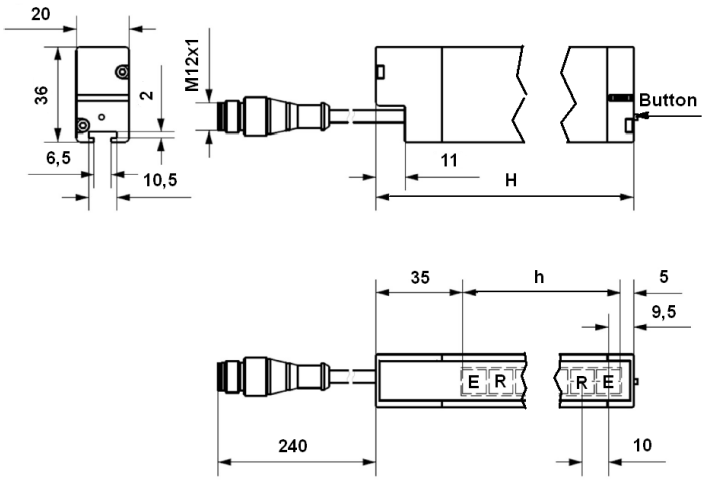
DESCRIPTION OF THE IO_LINK FUNCTIONS FOR THE CR SERIES

Foreword

The intent of this document is to describe the structure and the operation mode of the CR sensor with the aim to clarify the constraints that determine the possible functions and availability of data.

The CR IO-Link series is currently made up of three models: CR0, CR1, CR2, whose main characteristics are described below, but for complete information please also consult the User Manual of the specific model:



Pc.:1

MODEL	OPTICAL PITCH	OPTICAL HEIGHT	BODY HEIGTH	EMITTERS	RECEIVERS	OPTICS	BEAM PAIRS	REFLECTOR RANGE	RESPONSE TIME LIGHT / DARK DARK / LIGHT	SWITCHING FREQUENCY
CODE ARTICLE	P	h	H	En	Rn	On	Bp	Rr	Tr	f max
	mm	mm	mm	N°	N°	N°	N°	m	ms	Hz
CR0/0I-1V	10	69	109	4	3	7	6	0.2 … 4.5	1,97 / 2,30 (Jitter)	IO-Link 240 SIO 269
CR1/0I-1V	10	149	187	8	7	15	14	0.2 … 4.5	2,40 / 3,85 (Jitter)	IO-Link 220 SIO 260
CR2/0I-1V	10	309	347	16	15	31	30	0,2 … 4,5	3,48 / 5,94 (Jitter)	IO-Link 140 SIO 160

Tbl.:1

PIG TAIL CONNECTOR	POLES	PIN	INTERFACE Only programmable via IO-Link	
Type	No	No	I/O	MODE C: comunication Q: (SIO)
M12 M	4	4	Output	C
				Q: PNP or NPN; DO or LO
		2	Output	Q: PNP or NPN; DO or LO
			Input	Remote Teach-in
		1	Supply	18…30V_{DC}
		3	Common	0V

Tbl.:2

The sensors have an optics made up of a **9x9mm lens** in a linear array with a pitch of **P (10mm).** The optical window has a height of **h.**

Emitter and Receiver are alternate with the following sequence: **E1, R1, Ex, Rx, Ex, Rn, En,** referring to the cable side. This allows to realize a continuous succession of **Bp beam pairs** of emitted and receiving beams.

To minimize the scan time, the pulses emitted are only equal to the number of emitters **En,** but receivers signal are equal to **Bp.**

For these reasons, the set point variables are only **En** for the transmitter current and **Bp** for the detection thresholds.

To optimize sensor performance under all conditions we provide a very large part of the dynamics of the amplifiers and drive currents to equalize the **Bp** different sensitivities. With a good equalization it is possible to obtain a uniform behaviour over the entire height of the optics and a great tolerance to misalignment.

Equalization is performed each time the Teach-in functions are activated.

Below we describe IODD in detail, referring to a generic CR model for simplicity.
The models differ only in the number of optics, therefore in the following data:
 # Process Data Input, in which the number of bits of which the "Beam Status" is formed varies.
 # Parameter, in which the number of Emitter Set Points and Receiver Set Point Threshold varies.
 # Beam Mode, the number of configurations varies.
See details in the specific chapter.

A	PROCESS DATA		N	(P)ag / (T)bl
a	**Process data input**	**Data Mapping Configuration, 5 item displayed: 3 fixed (#); 2 of 9 config, 6 can determine alarms (A)**		**p,8,13**
1	**Triggered # A**	**Pin 4** Output State, **True** (ON); **False** (OFF)		p8,13; t14,22
2	**Proximity Alarm # A**	In Light condition the ratio signals/light thresholds, is not over the Margin Level High Multiplier. **Light status critical**		p8,7; t14,22
3	**Margin Low Alarm # A**	In Dark condition the ratio signals/dark thresholds, is not lower the Margin Level Low Multiplier. **Dark status critical**		p7,8,13; t14,22
4	**Excess Gain A**	Average ratio between Light signals and Light thresholds		p6,9,16; t16,22
5	**Received Signal Strength A**	Strength of the received signals		p8,13; t14,22
6	**Contrast Level A**	Ratio of levels received at calibration (on reflector) to current levels (usually ≥1, a 0 means <1)		p8,9,16; t14,16,22
7	**Temperature**	Current internal temperature of the device.		p8,11,16; t14,20,22
8	**Beam Status (Dark Bit=1)**	Status of active beams. Sum of the binary weight. Different Byte length and Byte number for CR0, 1, 2.		p8,16; t14,22
9	**Speed**	Number of **Light/Dark** switches per second (Hz)		p8,11,16; t14,20,22
10	**Counter Value**	Count of the number of transitions **Light/Dark (0 to 4095)**		p7,8,11; t13,14,22
11	**Off Duration**	Duration of the last **Dark** state (in ms, max 4095). **Timer** and **Timer ON Duration** must be enabled		p7,8,16; t13,14,22
12	**On Duration**	Duration of the last **Light** state (in ms, max 4095). **Timer** and **Timer ON Duration** must be enabled		p7,8,16; t13,14,22
b	**Process data output**	**Command sent to the sensor**		**p5,8,13; t15,22**
1	**Pin 2 Output**	Command to set the **ON** or **OFF** state (if enabled, see **Cb6**)		p5,8,13; t15,22
2	**Green LED**	Command to set the **ON** or **OFF** state (if enabled, see **Db5**)		p8,10,13; t15,19,22
3	**Red LED**	Command to set the **ON** or **OFF** state (if enabled, see **Db5**)		p8,10,13; t15,19,22
B	OBSERVATION			(P)ag / (T)bl
a	**Device monitoring**	**Optical parameter coming from the sensor**		**p9**
1	**Received Signal On**	Average of the signals received by the active optics in Light		p9,16; t16,22
2	**Received Signal Off**	Average of the signals received by the active optics in Dark		p9,16; t16,22
3	**Contrast Level**	Average Ratio between taught Light signal levels (on reflector) and the current Dark signals.		p8,9,16; t14,16,22
4	**Excess Gain**	Average Ratio between the current Light signal levels and the Light Thresholds.		p6,9,16; t16,22
C	PARAMETER			(P)ag / (T)bl
a	**User Interface Config.**	**Local Parametrization**		**p3,4,12**
1	**Device Access Locks**	Unlock/Lock: Local and remote: Teach.in; Sensing Configuration; excluding Work Frequency.		p4,12; t7,22
b	**Operation Configuration**	**Define optical and I/O parameter**		**p4,5**
1	**Set point emitter**	Allows you to change the power of the **4 (CR0), 8 (CR1), 16 (CR2) emitters**		p1,4,6,13,14; t9,22
2	**Set Point Thresh. Receiver**	Allows you to change the threshold level of **6 (CR0), 14 (CR1), 30 (CR2) receivers**		p1,5,13;14; t9,22
3	**Polarity**	Allows you to change the function of **pin 4** output: **Light or Dark operate**		p5,14; t10,22
4	**Output Mode**	Allows you to change the type of **pin 4** output: **PNP** or **NPN**		p5,8,14; t10,22
5	**Hysteresis**	Reports the actual value (%)		p5,6,14; t10,22
6	**Pin 2 Mode**	Pin 2 functions: **Disable**; **PNP/NPN**; **LO/DO**; **Remote Teach-in input**; **ON/OFF command** (see **Ab1**)		p5,8,14; t10,22
c	**Sensor Configuration**	**Define the optical structure, the detection parameter, command of various automatic calibrations**		**p6,16**
1	**Working Frequency**	Define working frequency **1** or **2** to avoid mutual interference between two sensors.		p6, t11,22
2	**Beam Mode**	Select the number of enabled optic (**Blanking**) and the Beam logic **AND** or **OR** (Object or Hole detection)		p1,4,6,14,15; t11,22
3	**Teach Background**	**1° step:** Sets emitters to receive the maximum signal from the reflector	**1**	p6,12; t12,22
4	**Teach Target**	**2° step**: Set the threshold of the receivers to ½ of the difference, if it is not possible, apply a **Teach Precision**	**2**	p6,12; t12,22
5	**Teach Standard**	Set a margin of **1.5** and a hysteresis of **20%.**		p6,12; t12,22
6	**Teach Precision**	Set a margin of **1.1** and a hysteresis of **12%.**		p5,6,12; t12,22
7	**Margin Booster Proposed**	After a teach-in it is possible to apply a proportional incr. of the margin (proportional increase of the LED current)	**1**	p6,16; t12,22
8	**Apply Margin Multiplier**	Command that applies the proposed margin, if this is too high it applies the maximum possible.	**2**	p4,6,12; t12,22
9	**Applied Margin**	Displays the margin applied.	**3**	p4,6,12; t12,22
10	**Margin Level Low Multiplier**	Used to define the level of the dark signal which, if not reached, generates an alarm (see **Aa3**)		p6,12; t12,22
11	**Margin Level High Multiplier**	Used to define the level of the light signal which, if not reached, generates an alarm (see **Aa2**)		P6,7,16; T12,22
d	**Counter and Timer**	**Define the Counter and Timer function**		**p7,8,11,12,16**
1	**Counter Enable**	Enable or disable the **Light/Dark** transaction counting function		p,7,16; t13,22
2	**Counter Reset**	Set the Counter Value to 0.		p7,12; t13,22
3	**Counter Value**	On request display the reached count of **Light / Dark** transitions (**from 0 to 4095**)		p7,8,16; t13,14,22
4	**Timer**	Enable/Disable timer function		p7,16; t13,22
5	**Timer Mode**	Delays switch. from Light/Dark or Dark/Light, or Pulse on a Light/Dark transition, or Display last Light and Dark duration		p7,16; t13,22
6	**Timer Value**	Defines the duration of the actual timer functions, accepts value **from 0 to 50000ms**		p7,16; t13,22
7	**Timer Reset**	Set to 0 the following **Timer On Duration** and **Timer Off Duration**		p7,12; t13,22
8	**Timer On Duration**	Display the duration of the last Light state (values **from 0 to 4095ms**)		p7,8,16; t13,14,22
9	**Timer Off Duration**	Display the duration of the last Dark state (values **from 0 to 4095ms**)		p7,8,16; t13,14,22
e	**Data Mapping Configuration**	**Defines the data display mode in the Process Data window (see A)**		p7,8; t14,15
1	**Process Data In Mode**	You can choose five different combinations of data to display (See **Aa**)		p8,16; t14,22
2	**Process Data Output**	It is possible to directly control Output 2 and the signaling LEDs (See **Ab**)		p5,8,13; t15,22
D	DIAGNOSIS			(P)ag / (T)bl
a	**Diagnosis**	**Display error events**		**p8,9,10,11; t17,18,20**
1	**Error Count**	Shows the Total Error Counter		p9; t17
2	**Device Status**	Shows the Device Status		p9,13; t17,22
3	**Detailed Device Status [1]**	Shows, in circular list, the first event happened		p9,13; t17,22
4	**Detailed Device Status [2]**	Shows, in circular list, the second event happened		p9,13; t17,22
5	**Detailed Device Status [3]**	Shows, in circular list, the third event happened		p9,13; t17,22
6	**Detailed Device Status [4]**	Shows, in circular list, the fourth event happened		p9,13; t17,22
b	**Service Function**	**Enable Disable Service Function**		
1	**Restore Factory Setting**	Restore a standard config. that allows you to work in the most extreme conditions		p4,10,11,12; t7,18,22
2	**Local Indicator**	Enables/disables the Red and Green LEDs to flash at a frequency of 1Hz to help locate the sensor	**III**	p10,16; t18,19,22
3	**LEDs Operation**	Enables/disables all LED functions	**IV**	p10,16; t18,19,22
4	**Alignment Mode**	Enable/Disable the Green/Red LEDs to have a direct/inverse proportional intensity to the received signal	**II**	p10,16; t18,19,22
5	**LEDs contr. Fr. Proc. data**	Enables/Disables the Green and Red LEDs to be driven by a Process Data command (see **Ab2,3**)	**I**	p10,16; t18,19,22
c	**Operation Information**	**Enable Disable Operation Information**		**p11,16; t20,22**
1	**Oper. Hours since Inception**	Shows total operating hours since manufacture.		P11,16; t20,22
2	**Oper. Hours since Pow-Up**	Shows the hours of operation since the last power up.		P11,16; t20,22
d	**Temperature**	**Enable Disable temperature Information**		**p8,11,16; t14,20,22**
1	**Temperature Actual**	Shows the current internal temperature of the sensor		p8,11,16; t14,20,22
2	**Temp. Max since Power-Up**	Shows the maximum internal temperature reached by the sensor since the last power up		p11,16; 20,22
3	**Temp. Max since Inception**	Shows the maximum internal temperature reached by the sensor since manufacture		p11,16; 20,22
4	**Temp. Min since Power-Up**	Shows the minimum internal temperature reached by the sensor since the last power up		p11,16; 20,22
5	**Temp. Min since Inception**	Shows the minimum internal temperature reached by the sensor since manufacture		p11,16; 20,22
e	**Speed**			**p8,11,16; t14,20,22**
1	**Actual speed**	Shows the actual frequency of the changing status of the C/Q output in Hz		p8,11,16; t14,20,22
2	**Max Speed since Power-Up**	Shows the maximum frequency of the changing status of the C/Q output in Hz since the power-up		p8,11,16; t14,20,22
f	**Event Configuration**	**Enable/Disable message generation and event display**		**p11; t20**
1	**Ev on local theresh. change**	Enables/Disables the indication that a local Teach-in has been performed		p11,16; t20,22
2	**Event on Low Margin**	Enables/Disables the indication that a low margin **Light/Dark** switching has occurred (see **Aa3**)		p6,7,11,16; t20,22
3	**Event on Teach Error**	Enables/Disables the indication that a Teach-in has not been successful		p6,7,11,16; t20,22
4	**Event on Temperature**	Enables/Disables the indication that a temperature limit has been reached		p11,16; t20,22
5	**Temp. Event Trigger Low**	Set the Temperature at which the Event "Device temperature under-run" is generated.		p11,16; t20,22
6	**Temp. Event Trigger High**	Set the Temperature at which the Event "Device temperature over-run" is generated		p11,16; t20,22
7	**Event on Counter**	Enables/Disables the indication that the counter has reached the expected figure		p11,16; t20,22
8	**Event Counter Count**	Set the count value which, when reached, generates the Event		p11,16; t20,22

Tbl.:3 (N)OTES: Commands to be executed in sequence; 1, 2. 3, …; The function from grade I to IV prevails.

PHYSICAL LAYER DESCRIPTION	
IO-Link Revision	1.1
SIO Mode	YES
Min Cycle Time	1.2 ms
Transmission Rate	COM3 (230.4 kbit/s)
Process Data Length	PDInput: 5 Bytes PDOutput: 8 Bits
M-Sequence Capability	PREOPERATE = TYPE_1_V with 8 octets on-request data OPERATE = TYPE_2_V with 2 octets on-request data ISDU supported

Tbl.:4

FEATURE DESCRIPTION	
Data Storage	YES
Supported Access Locks	Parameter: YES, Data Storage: yes, Local Parametrization: yes, Local User Interface: no
Profile Characteristic	Device Profile: Smart Sensor Function Class: Device Identification Function Class: Switching Signal Channel Function Class: Device Diagnosis Function Class: Teach Channel

Tbl.:5

IDENTIFICATION PARAMETER								
Parameter Name	**Index**	**Index dec**	**Subindex**	**Length B/b**	**Access**	**Data Type**	**Value/Range**	**Description**
Device Information								
Vendor Name	0x0010	16		64B	ro	StringT	Datasensing S.r.l.	Informative
Vendor Text	0x0011	17		64B	ro	StringT	Easing automation challenges	
Product Name	0x0012	18		64B	ro	StringT	It differs depending on the series or model	Detailed product name
							CR0/0I-1V	Beam pairs: 6
							CR1/0I-1V	Beam pairs: 14
							CR2/0I-1V	Beam pairs: 30
Product ID	0x0013	19		64B	ro	StringT	**It differs by model**	Specific model
							CR0/0I-1V;	Device ID: 0x0007D1
							CR1/0I-1V;	Device ID: 0x0007D2
							CR2/0I-1V;	Device ID: 0x0007D4
Product Text	0x0014	20		64B	ro	StringT	Retroreflective Area Sensor	Sensing Technologies
Serial Number	0x0015	21		16B	ro	StringT	00000000	None
User Specific Information								
Application Specific Tag	0x0016	24		32B	rw	StringT	***	Available to the operator (application)
User Tag 1	0x0017	120		16B	rw	StringT_16		Available to the operator (where installed)
User Tag 2	0x0018	121		16B	rw	StringT_16		Available to the operator (where installed)
Revision Information								
Hardware Version	0x0019	22		64B	ro	StringT	1.0	It may depend on the model
Firmware Version	0x001A	23		64B	ro	StringT	1.1	It may depend on the model

Tbl.:6

DEVICE SPECIFIC PARAMETER

Variable ID	Name	Index	SubIndex	BitOffset	DataType	Values Ranges	Single values	Access	Default Value	M	D	E
User Interface Configuratios												
V_DeviceAccessLocks	Device Access Locks	12	0		RecordT			rw				
	Local Parameterization	12	3*	2	BooleanT		Locked (true) 00 04, Unlocked (false) 00 00		00 00			

Tbl.:7

- **User Interface Configuration**
- **Device Access Locks. Local Parameterization:**
- **[00]: UnLocked**: Teach button, Remote Teach Input (if selected), all other teach-in mode, **Apply Margin Multiplier**, Beam Mode are enabled.
- **[04]: Locked**: Teach button, all other teach mode, **Apply Margin Multiplier**, and Beam Mode are disabled.
  An activation of the Remote Teach Input is indicated by the signaling LEDs, but not performed.
  Restore Factory Setting remain active and, if done, unlocks everything, and deselect Remote Teach Input.

DEVICE SPECIFIC PARAMETER

Variable ID	Name	Index	SubIndex	BitOffset	DataType	Values Ranges	Single values	Access	Default Value	M	D	E
Operation Configuratios												
					CR0							
V_SetPointEmitter1	Set Point Emitter 1	64	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter2	Set Point Emitter 2	65	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter3	Set Point Emitter 3	66	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter4	Set Point Emitter 4	67	0		UIntegerT_16	0 to 1023		rw	767			
					Added for CR1 model							
V_SetPointEmitter5	Set Point Emitter 5	68	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter6	Set Point Emitter 6	69	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter7	Set Point Emitter 7	131	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter8	Set Point Emitter 8	132	0		UIntegerT_16	0 to 1023		rw	767			
					Added for CR2 model							
V_SetPointEmitter9	Set Point Emitter 9	150	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter10	Set Point Emitter 10	151	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter11	Set Point Emitter 11	152	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter12	Set Point Emitter 12	153	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter13	Set Point Emitter 13	154	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter14	Set Point Emitter 14	155	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter15	Set Point Emitter 15	156	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter16	Set Point Emitter 16	157	0		UIntegerT_16	0 to 1023		rw	767			

Tbl.:8

- **Operation Configuration (Set Point Emitter)**

The setpoints of the emitters are automatically updated as best as possible with the Teach-in command, therefore, the Set Point values should only be modified for well-defined and non-standard performances.
The emitter set points are factory set to **767**. The available range is between **0 and 1023**. This data defines the emission LED currents. By setting the emission currents to 0, the LEDs do not dim completely because a test current remains active (this is a separate function from the emission current). Setting the current too high or too low would not allow automatic variations thereof which have the purpose of compensating the emission following variations in the ambient temperature. When performing Teach-in, the value 767 is never exceeded. Manually modifying the current value also alters the sensitivity equalization obtained automatically with Teach-in.

DEVICE SPECIFIC PARAMETER

Variable ID	Name	Index	SubIndex	BitOffset	DataType	Values Ranges	Single values	Access	Default Value	M	D	E
Operation Configuratios												
					CR0							
V_SetPointThreshold Receiver1_1	Set Point Threshold Receiver 1_1	70	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThreshold Receiver1_2	Set Point Threshold Receiver 1_2	71	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThreshold Receiver2_2	Set Point Threshold Receiver 2_2	72	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThreshold Receiver2_3	Set Point Threshold Receiver 2_3	73	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThreshold Receiver3_3	Set Point Threshold Receiver 3_3	74	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThreshold Receiver3_4	Set Point Threshold Receiver 3_4	75	0		UIntegerT_16	0 to 4095		rw	900			
					Added for CR1 model							
V_SetPointThresholdReceiver4_4	Set Point Threshold Receiver 4_4	123	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver4_5	Set Point Threshold Receiver 4_5	124	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver5_5	Set Point Threshold Receiver 5_5	125	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver5_6	Set Point Threshold Receiver 5_6	126	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver6_6	Set Point Threshold Receiver 6_6	127	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver6_7	Set Point Threshold Receiver 6_7	128	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver7_7	Set Point Threshold Receiver 7_7	129	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver7_8	Set Point Threshold Receiver 7_8	130	0		UIntegerT_16	0 to 4095		rw	900			
					Added for CR2 model							
V_SetPointThresholdReceiver8_8	Set Point Threshold Receiver 8_8	133	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver8_9	Set Point Threshold Receiver 8_9	134	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver9_9	Set Point Threshold Receiver 9_9	135	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver9_10	Set Point Threshold Receiver 9_10	136	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver10_10	Set Point Threshold Receiver 10_10	137	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver10_11	Set Point Threshold Receiver 10_11	138	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver11_11	Set Point Threshold Receiver 11_11	139	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver11_12	Set Point Threshold Receiver 11_12	140	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver12_12	Set Point Threshold Receiver 12_12	141	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver12_13	Set Point Threshold Receiver 12_13	142	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver13_13	Set Point Threshold Receiver 13_13	143	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver13_14	Set Point Threshold Receiver 13_14	144	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver14_14	Set Point Threshold Receiver 14_14	145	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver14_15	Set Point Threshold Receiver 14_15	146	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver15_15	Set Point Threshold Receiver 15_15	147	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver15_16	Set Point Threshold Receiver 15_16	148	0		UIntegerT_16	0 to 4095		rw	900			

Tbl.:9

- **Operation Configuration (Set Point Threshold Receivers)**

The Set Point Threshold Receivers are automatically updated as best as possible with the Teach-in command; therefore, the Set Point values should only be modified for well-defined and non-standard performances.
The Set Point Threshold Receivers are factory set to **900**. The available range is between **0 to 4095** this is the Dark threshold; the Light threshold is calculated from the actual Hysteresis. The user can set the dark threshold level from 0 to 3000, higher values may not leave space for the Light threshold.

DEVICE SPECIFIC PARAMETER

Variable ID	Name	Index	SubIndex	BitOffset	DataType	Values Ranges	Single values	Access	Default Value	M	D	E
Operation Configuration												
V_SetPointPolarity	Polarity	76	0		UIntegerT_8		Not Inverted (LO) (0), Inverted (DO) (1)	rw	0			
_OutputMode	Output Mode	77	0		UIntegerT_8		PNP (0), NPN (1)	rw	0			
V_SetPointHysteresis	Hysteresis	78	0		UIntegerT_16			ro				
V_Pin2Mode	Pin 2 Mode	79	0		UIntegerT_8		Disable (0), PNP (LO) (1), PNP (DO) (2), NPN (LO) (3), NPN (DO) (4), Remote Teach Input (5), IndependentOuput PNP (6), IndependentOuput NPN (7)	rw	0			

Tbl.:10

- **Polarity:** It defines the behavior of the output C/**Q** on **pin 4** (obviously usable only in **SIO mode**):
  - **[0]: Not Inverted:** (LO): means closed in Light (Not inverted). Factory Setting.
  - **[1]: Inverted:** (DO): means closed in the Dark (Inverted).
- **Output Mode**: It defines the type of output C/**Q** on **pin 4**:
  - **[0]: PNP** (output closes towards the positive): Factory Setting.
  - **[1]: NPN** (output closes towards the negative).
- **Hysteresis**: return value. Difference between Light threshold and Dark threshold expressed as %, depends on the type of Teach:
  - **20%** Automatically selected with Tech Standard (factory setting) or **12%** with **Teach Precision**.
- **Pin 2 Mode**: drop down menu. It defines the complex functions of Pin 2:
  - **[0]: Disable**: Clears any selection. Pin 2 is not internally connected, Factory Setting.
  - **[1]: PNP** (**LO**): Pin 2 as output, closes towards the positive in Light.
  - **[2]: PNP** (**DO**): Pin 2 as output, closes towards the positive in Dark.
  - **[3]: NPN** (**LO**): Pin 2 as output, closes towards the negative in Light.
  - **[4]: NPN** (**DO**): Pin 2 as output, closes towards the negative in Dark.
  - **[5]: Remote Teach Input**: Pin 2 as input. if connected to the positive, it works like pressing the Teach button (that is not excluded).
  - **[6]: IndependentOutput PNP**: Selects pin 2 as **PNP** output and enable the **Master** to switch it ON / OFF. selecting the state in **Process Data Output** Pin 2 Output as **[1]** True / **[0]** False.
  - **[7]: IndependentOutput NPN**: Selects pin 2 as **NPN** output and enable the **Master** to switch it ON / OFF selecting the state in **Process Data Output:** Pin 2 Output as **[1]** True / **[0]** False.

DEVICE SPECIFIC PARAMETER														
Variable ID	Name	Index	SubIndex	BitOffset	DataType	Values Ranges	Single values			Access	Default Value	M	D	E
Sensorn Configuratios														
V_WorkingFrequency	Working Frequency	87	0		UIntegerT_8		1 (0), 2 (1)			rw	0			
Only for the CR0 model														
V_BeamMode	Beam Mode	80	0		UIntegerT_8		**AND**	From **6** Beams	To **1** Beam	rw	0	X		
								From **Data [0]**	To **Data [5]**					
							OR	From **6** Beams	To **1** Beam					
								From **Data [8]**	To **Data [13]**					
Only for the CR1 model														
V_BeamMode	Beam Mode	80	0		UIntegerT_8		**AND**	From **14** Beams	To **1** Beam	rw	0	X		
								From **Data [0]**	To **Data [13]**					
							OR	From **14** Beams	To **One** Beam					
								From **Data [16]**	To **Data [29]**					
Only for the CR2 model														
V_BeamMode	Beam Mode	80	0		UIntegerT_8		**AND**	From **30** Beams	To **1** Beam	rw	0	X		
								From **Data [0]**	To **Data [29]**					
							OR	From **30** Beams	To **1** Beam					
								From **Data [32]**	To **Data [61]**					

Tbl.:11

- **Sensor Configuration**
- **Working Frequency:** In some applications, where it is necessary to place two sensors very close together, they could interfere with each other (the emission of one could interfere with the receivers of the other). To counteract this, two different program cycle times (1) and (2) can be selected to avoid synchronization of the detection.
- **Beam Mode**: It defines the number of active beams and the logic function applied to the state of these, considering the Light status as 1 and the Dark as 0. Selecting the **AND** function allows the **detection of objects**, selecting the **OR** function allows the **detection of holes**.
  Factory Set to: **AND, 6 pair (CR0), 14 pair (CR1), 30 pair (CR2)**.
  After a **Beam Mode** change (**AND/OR/Blanking**), a partial reset of the factory settings is automatically performed, which only affects the set points of the emitters and all the receivers, the set of the excluded emitters goes to **0**, that of the non-excluded ones goes to the value of **767**; all receiver threshold sets go to **900**. It is recommended to perform a Teach-in and possibly reset the parameters for the specific application. Now, following the Teach-in, the set of excluded receivers also goes to **0**. **From the button menu** it is not possible to modify the set logic (AND or OR), you can only deactivate the optics (**Blanking**) consecutively, starting from the first (cable side), after having deactivated the penultimate pair (only one optic remains active), in the next step, all pairs are reactivated. By exiting the Blanking button menu, even without having made any changes, a partial factory calibration is performed which only concerns the set points of the active emitters and receivers, for which it is advisable to carry out a Teach-in and possibly set the parameters for the specific application.

DEVICE SPECIFIC PARAMETER											
Variable ID	Name	Index	SubIndex	BitOffset	DataType	Values Ranges	Single values	Access	Default Value	M	D	E
Sensorn Configuratios												
Standard Command	Teach Background	2	0		UIntegerT_8	160	160	wo		X		
Standard Command	Teach Target	2	0		UIntegerT_8	161	161	wo		X		
Standard Command	Teach Standard	2	0		UIntegerT_8	162	162	wo		X		
Standard Command	Teach Precision	2	0		UIntegerT_8	163	163	wo		X		
V_MarginBoosterProposed	Margin Booster Proposed	81	0		UIntegerT_8	10-100		rw	10	X		
Standard Command	Apply Margin Multiplier	2	0		UIntegerT_8	166	166	wo				
V_MarginBoosterApplied	Applied Margin	82	0		UIntegerT_8	10-200		ro		X		
V_MarginLevelLowMultiplier	Margin Level Low Multiplier	83	0		UIntegerT_8	0-3	0.8(0), 0.7(1), 0.6(2), 0.5(3)	rw	0	X		
V_MarginLevelHighMultiplier	Margin Level High Multiplier	84	0		UIntegerT_8	10-150	1.0(10), 1.1(11), 1.2 (12),1.5(15), 2.0(20), 5.0(50), 10.0(100), 15.0(150)	rw	12	X		

Tbl.:12

- **Teach Background**, command. **First step** of a two-step teach-in; see also **Teach Target**. Teach on reflector, the optical path must be free. If the alignment is enough, this command adjusts the LED currents to obtain the maximum signal received by the reflector.
- **Teach Target** command. **Second step** of a two-step teach-in. The optical path can be occupied by a completely opaque or semitransparent medium. This is the second phase and you do not have to run an alignment. This command sets the Dark threshold to 1/2 of the difference between the currently read value and the one previously read in Teach Background; **hysteresis** is set to **12%.** If there is no signal change from that seen in Teach Background, set the same value as the **Teach Precision** command. If it is not possible to detect the target with certainty using the double command, re-execute the double command without introducing the target to the second, the result will be the maximum sensitivity equivalent to a **Teach Precision**.
- **Teach Standard** command. First this command adjusts the LED currents to obtain the maximum signal received by the reflector, then sets the thresholds of the active receivers to have a **margin of 1.5 and a hysteresis of 20%.**
- **Teach Precision** command. First this command adjusts the LED currents to obtain the maximum signal received by the reflector, then sets the thresholds of the active receivers to have a **margin of 1.1 and a hysteresis of 12%.**
- **Margin Booster Proposed** value to enter. This variable is expressed in tenths, it indicates the multiplier factor that will be applied to the present value of the LEDs current, enter a value and then run the **Apply Margin Multiplier** command.
- **Apply Margin Multiplier** command. This command increases the LEDs current by multiplying the present values for the **Margin Booster Proposed**. (**e.g**. with a value of 12, the factor is 1.2 times) then the new **"Set Point Emitter n"** value are displayed, if the calculated current value is greater than the maximum applicable value (767), even for just one of the LEDs, a smaller multiplication factor is applied to maintain sensitivity equalization.
  It is advisable to execute this command after performing a Teach so that the LED currents and receiver thresholds have already been adapted to obtain sensitivity equalization. This command works effectively if the LED current values are low, i.e. the reflector is not close to the minimum or maximum distance, where the response of the reflector is low therefore the LED current may have already reached a value equal to or close to the maximum possible.
  This command is useful for increasing the **Excess Gain** obtained automatically with a Teach-in, it is suitable to use a greater signal margin if the environment is subject to the presence of dust, or if the detection of semi-transparent objects must be excluded.
- **Applied Margin**; return value. It indicates the multiplier factor that has been applied. If the user run multiple commands, a cumulative value is not indicated, but only that applied to the last command. If you want to have the true margin applied, you should first run a Teach-in and then re-execute the command with a different value.
- **Margin Level Low Multiplier**. Values can be selected from **0.5, 0.6, 0.7, 0.8**; Factory Set to: **0.8**. If the signal received from the beams in Dark does not reaches a value below the indicated fraction of the Dark Threshold, this means that the detection of the Dark condition is becoming critical. To determine an alarm condition, the condition must remain for one hundred program cycles. If "**Event on Low Margin"** is enabled (on), in IO-Link mode the event is indicated with a message

"0x1820 : Low Margin : Event occurs when a Margin Low Alarm (Process Data) is issued" This data is displayed in all combinations of the **Process Data Input window as "Margin Low Alarm"**. Note: Currently, only when the device is in Dark, this condition is calculated, by the ratio between the sum of the signals of the beams in Dark and the sum of the Dark thresholds of the same beams.

- **Margin Level High Multiplier**. Values can be selected from **1.0, 1.1, 1.2, 1.5, 2.0, 5.0, 10.0, 15.0;** Factory Set to: **1.0.** If the signal received from the beams in Light does not reach a higher value of the factor indicated than the Light Threshold, this means that the light state detection is becoming critical. To determine an alarm condition, the condition must remain for one hundred program cycles. This alarm condition does not cause an "**Event on Low Margin**". This data is displayed in all combinations of the **Process Data Input window as "Proximity Alarm"**. Note: Currently, only when the device is in Light, this condition is calculated, by the ratio between the sum of the signals of the beams in Light (in this case all the active beams) and the sum of the Light thresholds of the same beams.

DEVICE SPECIFIC PARAMETER

Variable ID	Name	Index	SubIndex	BitOffset	DataType	Values Ranges	Single values	Access	Default Value	M	D	E
Counter / Timer												
V_CounterEnable	Counter Enable	85	0		UIntegerT_8	0; 1	Disable (0), Enabled (1)	rw	0			
V_SystemCommand	Counter Reset	2	0		UIntegerT_8	164	164	wo		X		
V_CounterValue	Counter Value	86	0		UIntegerT_16	0-4095		ro				
V_TimerEnable	Timer	88	0		UIntegerT_8	0; 1	Disable (0), Enabled (1)	rw	0	X		
V_TimerMode	Timer Mode	89	0		UIntegerT_8	0, 1, 3, 4	On Delay (0); Off Delay (1); One Shot (3); Timer Duration (4)	rw	0			
V_TimerValue	Timer Value	90	0		UIntegerT_16	0 to 50000		rw	0			
V_SystemCommand	Timer Reset	2	0		UIntegerT_8	165	165	wo		X		
V_TimerOnDuration	Timer On Duration	91	0		UIntegerT_16	0 to 4095		ro				
V_TimerOffDuration	Timer Off Duration	92	0		UIntegerT_16	0 to 4095		ro				

Tbl.:13

- **Counter / Timer**
- **Counter Enable**:
  [0]: Disable the count function. Factory set condition.
  [1]: Enable counting **Light to Dark transitions**.
- **Standard command: Counter Reset** command. Set the Counter Value to 0.
  Restoring the factory-set conditions **does not reset the count** but **disable the counter**.
- **Counter Value**: return value. On request display the reached count. Factory set to 0.
- **Timer**.
  [0]: Disabled: Disables the Timer functions. Factory set condition.
  [1]: Enabled: Enables Timer functions.
- **Timer Mode**. The timings act on both outputs C (2) and (4) and on the status transmitted by IO-Link.
  [0] ON Delay: Delays switching from **Light to Dark** state (re-triggerable). Factory set condition. Not interrupted by timer reset.
  [1] OFF Delay: Delays switching from **Dark to Light** state (re-triggerable). Not interrupted by timer reset.
  [3] One Shot: Transition from Light to Dark State generates a Dark Pulse (not re-triggerable). Not interrupted by timer reset.
  [4] Timer Duration: Enables display of the duration of the last Light and Dark state.
- **Timer Value:** Value to enter. Accepts values from **0 to 50,000ms.**
  It defines the duration of the functions: ON Delay; OFF Delay; One Shot.
- **Timer Reset**: Command. Set to 0 Timer On Duration and Timer Off Duration.
  Timer On Duration; return value. Display the duration of the last Light state (values from 0 to 4095ms). It is also displayed in **Process Data Input** if selected in **Data Mapping Configuration.**
- **Timer Off Duration**; return value. Display the duration of the last Dark state (values from 0 to 4095ms). It is also displayed in the **Process Data Input** if selected in **Data Mapping Configuration.**

See also Tbl.:23 Pag.:17.

DATA MAPPING CONFIGURATION

PROCESS DATA INPUT (You can choose between five display modes)

Variable ID	Name	Index	SubIndex	BitOffset	DataType	Values Ranges	Single values	Access	Value	M	D	E
V_ProcessDataInMode	**Process Data In Mode**	**93**	**0**		**UIntegerT_8**	**0,1,2,3,4**	**0**	**rw**	**Default 0**			
V_ProcessDataInput		**40**	**0***		**RecordT**			**ro**			**X**	
	Triggered	40	1*	32	BooleanT	0, 1	false (false), true (true)	ro				
	Proximity Alarm	40	2*	33	BooleanT	0, 1	false (false), true (true)	ro				
	Margin Low Alarm	40	3*	34	BooleanT	0, 1	false (false), true (true)	ro				
	Excess Gain	40	4*	16	UIntegerT_8			ro				
	Received Signal Strength	40	5*	0	UIntegerT_16			ro				
V_ProcessDataInMode	**Process Data In Mode**	**93**	**0**		**UIntegerT_8**	**0,1,2,3,4**	**1**	**rw**	**Selection 1**			
V_ProcessDataInput		**40**	**0***		**RecordT**			**ro**			**X**	
	Triggered	40	1*	32	BooleanT	0, 1	false (false), true (true)	ro				
	Proximity Alarm	40	2*	33	BooleanT	0, 1	false (false), true (true)	ro				
	Margin Low Alarm	40	3*	34	BooleanT	0, 1	false (false), true (true)	ro				
	Excess Gain	40	4*	16	UIntegerT_8			ro				
	Contrast Level	40	5*	8	UIntegerT_8			ro				
	Temperature (Actual)	40	6*	0	UIntegerT_16	-128 to 127		ro				
V_ProcessDataInMode	**Process Data In Mode**	**93**	**0**		**UIntegerT_8**	**0,1,2,3,4**	**2**	**rw**	**Selection 2**			
V_ProcessDataInput		**40**	**0***		**RecordT**			**ro**			**X**	
Note: CR0, CR1, CR2	**Triggered**	40	1*	32	BooleanT	0, 1	false (false), true (true)	ro				
Note: CR0, CR1, CR2	**Proximity Alarm**	40	2*	33	BooleanT	0, 1	false (false), true (true)	ro				
Note: CR0, CR1, CR2	**Margin Low Alarm**	40	3*	34	BooleanT	0, 1	false (false), true (true)	ro				
Note: CR0, CR1	Beam Status *	40	4*	16	IntegerT_8	0-63, 0-16383	**Note: One Byte for CR0, CR1**	ro				
Note: CR0, CR1	Speed	40	5*	0	UIntegerT_16	0 to 833		ro				
Note: CR2	Beam Status High *	40	4*	16		0-16383	**Note: Two Byte for CR2**	ro				
Note: CR2	Beam Status Low *	40	5*	0		0-65535		ro				
V_ProcessDataInMode	**Process Data In Mode**	**93**	**0**		**UIntegerT_8**	**0,1,2,3,4**	**3**	**rw**	**Selection 3**			
V_ProcessDataInput		**40**	**0**		**RecordT**			**ro**			**X**	
Note: CR0, CR1, CR2	**Triggered**	40	**0***	32	BooleanT	0, 1	false (false), true (true)	ro				
Note: CR0, CR1, CR2	**Proximity Alarm**	40	1*	33	BooleanT	0, 1	false (false), true (true)	ro				
Note: CR0, CR1, CR2	**Margin Low Alarm**	40	2*	34	BooleanT	0, 1	false (false), true (true)	ro				
Note: CR0, CR1	Excess Gain	40	3*	16	UIntegerT_8			ro				
Note: CR2	Speed	40	4*	16	UIntegerT_16	0 to 833		ro				
Note: CR0, CR1, CR2	Counter Value	40	5*	0		0 to 4095		ro				
V_ProcessDataInMode	**Process Data In Mode**	**93**	**0**		**UIntegerT_8**	**0,1,2,3,4**	**4**	**rw**	**Selection 4**			
V_ProcessDataInput		**40**	**0***		**RecordT**			**ro**			**X**	
	Triggered	40	1*	32	BooleanT	0, 1	false (false), true (true)	ro				
	Proximity Alarm	40	2*	33	BooleanT	0, 1	false (false), true (true)	ro				
	Margin Low Alarm	40	3*	34	BooleanT	0, 1	false (false), true (true)	ro				
	Timer Off Duration	40	4*	16	UIntegerT_8	0 to 4095		ro				
	Timer On Duration	40	5*	0	UIntegerT_16	0 to 4095		ro				

Tbl.:14 * The status of the receivers is expressed in Bits: Light=0, Dark=1; CR0 and CR1 use one Byte, CR2 uses two Bytes; the Low Byte expresses the receivers from 1 to 16, the High Byte expresses the receivers from 17 to 30. CR0 uses 6 Bits, CR1 uses 14 Bits, CR2 uses 30 Bits. Bit 0 of the low byte corresponds to receiver 1.

Process Data Input, this sector displays in real time selected data coming from the device. To get a description and how to change the selected data go to:

- **Parameter window.**
- **Data Mapping Configuration**
- **Process Data In Mode (select one of five). The selected mode remains active at Power OFF/On. Factory Reset condition: [0].**
  - **[0]; [1]; [2]; [3]; [4]**

DATA MAPPING CONFIGURATION

PROCESS DATA OUPUT (Take control of Output 2 and the signaling LEDs)

Variable ID	Name	Index	SubIndex	BitOffset	DataType	Values Ranges	Single values	Access	Default Value	M	D	E
V_ProcessDataOutput	**Process Data Output**	**41**	**0**		**RecordT**			**ro**			**X**	
	Pin 2 Output	41	1	2	BooleanT	0, 1	false (false), true (true)					
	Green LED	41	2	1	BooleanT	0, 1	false (false), true (true)					
	Red LED	41	3	0	BooleanT	0, 1	false (false), true (true)					

Tbl.:15

To run the Pin 2 Output commands,
you must already have or make the relevant selections in:

- **Parameter window**
- **Operation Configuration**
- **Pin 2 Mode (select one)**
- **[6]** "IndependentOutput PNP"
- **[7]** "IndependentOutput NPN"

Now you can run the command:

- **Process Data Output**
- **Pin 2 Output (select)**
- **[0]** False: Switch OFF Pin 2 output.
- **[1]** True: Switch ON Pin 2 output.

To run the Green LED/Red LED commands from Master,
you must already have or make the relevant selections in:

- **Diagnosis window**
- **Service Function**
- **LEDs control from Process Data (select True)**
- **[0]** False "Disabled."
- **[1]** True "Enabled"

Now you can run the command:

- **Process Data Output**
- **Green LED (select)**
- **[0]** False: Switch OFF
- **[1]** True: Switch ON
- **Red LED (select)**
- **[0]** False: Switch OFF
- **[1]** True: Switch ON

OBSERVATION (Displays selected data on request)												
Variable ID	Name	Index	SubIndex	BitOffset	DataType	Values Ranges	Single values	Access	Default Value	M	D	E
Device Monitoring												
V_ReceivedSignalOn	Received Signal On	94	0		UIntegerT_16			ro				
V_ReceivedSignalOff	Received Signal Off	95	0		UIntegerT_16			ro				
V_ContrastLevel	Contrast Level	96	0		UIntegerT_8			ro				
V_ExcessGain	Excess Gain	97	0		UIntegerT_8			ro				
V_ExcessGainResolution	Excess Gain Resolution	98	0		UIntegerT_8		1.0 (0), 0.1 (1)	rw	0			

Tbl.:16

- **Observation.**
- **Device Monitoring**, data coming from the device.
- **Received Signal On:** when the device is in Light status, it displays the average of the signals received by the active optics.
  When the device is in Dark status, it displays the last average of the signals received by the active optics before the assumption of the Dark state.
- **Received Signal Off:** when the device is in the Dark status, it displays the average of the signals received by the active optics.
  When the device is in Light status, it displays the last average of the signals received by the active optics before the assumption of the Light state.
- **Contrast Level:** ratio between taught Light signal level (on reflector) and the current Dark signal.
- **Excess Gain:** ratio between the current Light signal and the Light threshold.
- **Excess Gain Resolution:** allows you to choose the data format.
  [0]: Displays the Excess Gain in units, factory set condition.
  [1]: Displays the Excess Gain in tenths.

DIAGNOSIS												
Variable ID	Name	Index	SubIndex	BitOffset	DataType	Values Ranges	Single values	Access	Default Value	M	D	E
Diagnosis (Displays Device Status)												
V_ErrorCount	Error Count	32	0		UIntegerT_16			ro			X	
V_DeviceStatus	Device Status	36	0		UIntegerT_8	0-255	Device is OK (0), Maintenance required (1), Out of specification (2), Functional check (3), Failure (4) Reserved (5-255)	ro				
V_DetailedDeviceStatus	Detailed Device Status	37	0		ArrayT			ro			X	
	Detailed Device Status [1]	37	1	72	OctetStringT [3]		0x00,0x00,0x00					
	Detailed Device Status [2]	37	2	48	OctetStringT [3]		0x00,0x00,0x00					
	Detailed Device Status [3]	37	3	24	OctetStringT [3]		0x00,0x00,0x00					
	Detailed Device Status [4]	37	4	0	OctetStringT [3]		0x00,0x00,0x00					

Tbl.:17

- **Diagnosis**

- **Error Count**: Return value. Displays communication errors.

- **Device Status**: Return value. Messages displayed:
  [0]: Device is OK (Device is operating properly)
  [1]: Maintenance required (Component undergoing degradation or failure)
  [2]: Out of specification (-10°C>Device Temperature out of range >80°C)
  [3]: Functional check (Teach-in error, calibration failed due to poor signal level)
  [4]: Failure

DIAGNOSIS												
Variable ID	Name	Index	SubIndex	BitOffset	DataType	Values Ranges	Single values	Access	Default Value	M	D	E
Service Function												
V_ Standard Command	Restore Factory Setting	2	0		UIntegerT_8	130	130	wo		X		
V_LocalIndicator	Local Indicator	99	0		UIntegerT_8	0, 1	Disabled (0), Enabled (1)	rw	0			
V_LEDOperation	LEDs Operation	100	0		UIntegerT_8	0, 1	Disabled (0), Enabled (1)	rw	0			
V_AlignmentMode	Alignment Mode	101	0		UIntegerT_8	0, 1	Disabled (0), Enabled (1)	rw	0			
V_LEDFromPD	LEDs control from Process Data	102	0		UIntegerT_8	0, 1	Disabled (0), Enabled (1)	rw	0			

Tbl.:18

- **Service Function**
- **Standard Command**: Command, **Restore Factory Settings (load the Default Values, see table(s)).**

In the subsequent functions, the behavior is defined by the highest priority* (I*, II, III, IV); see also the table below.

- **(III) Local Indicator**: Active only if the highest priorities (**I**, **II**) are disabled:
  [0]: Disabled: Not active. Factory set condition.
  [1]: Enabled: The Green and Red LEDs flash together with a duration of 0.5s and a period of 1s, with the aim of identifying the position of the device.

- **(IV) LEDs Operation** (rw); Drop down menu. Active only if the highest priorities (**I**, **II, III**) are disabled.
  [0]: Disabled: Not active.
  [1]: Enabled: Factory set condition. All standard device functions enabled. The Green LED shows the IO-Link (SDCI) communication integrity flashing with a sequence of 0.9s ON and 0.1s OFF, or if not connected is ON steady. The Red LED lights up in the Dark state with an intensity directly proportional to the percentage of the optics in the Dark.

- **(II) Alignment Mode**: Active only if the highest priorities (**I**) are disabled.
  [0]: Disabled: Not active. Factory set condition.
  [1]: Enabled: The Green LED shows a brightness proportional to the signal strength. The Red LED displays brightness inversely proportional to signal strength and simultaneously indicates IO-Link communication integrity (SDCI) by flashing ON or OFF, reversing steady state, with a duration of 0.1s and a period of 1s.

- **[I] LEDs control from Process Data**. drop down menu. **Highest priority**.
  [0]: Disabled: Not active. Factory set condition.
  [1]: Enabled: The Green LED operates ON/OFF as specified in menu.
  The Red LED operates ON/OFF as specified in menu.

Diagnosis Service Function				Process Data Output		
→--HI---Priority---LO→				LEDs		
I	II	III	IV			
LED control from process data	Alignment mode	Local indicator	LED Operation	Green	Red	
Dis.	Dis.	Dis.	Dis.	OFF	OFF	Function performed
En.	En.	En.	En.	ON	ON	
Dis.	Dis.	Dis.	Dis.	OFF	OFF	No indication, Green and Red LED OFF
En.	x	x	x	OFF	OFF	Full control of LEDs from Master (Data Process Output ON/OFF)
				ON	ON	
Dis.	En.	x	x	↑ Light	↑ Dark	Green LED is proportional to the Light; Red LED is proportional to Dark. The Red LED is also flashing indicating Device Connected.
Dis.	Dis.	En.	x	Flashing	Flashing	The Green and Red LED flash together to pinpoint the location of the device.
Dis.	Dis.	Dis.	En.	Flashing	↑ Dark	Factory setting. The Green LED flashes to indicate connection. The red LED lights up in the Dark state with an intensity proportional to the optics in Dark.

Tbl.:19

DIAGNOSIS

Variable ID	Name	Index	SubIndex	BitOffset	DataType	Values Ranges	Single values	Access	Default Value	M	D	E
Operation Information												
V_OperationHoursInception	Operation Hours since Inception	104	0		UIntegerT_32	0 - 71582788		ro				
V_OperationHoursPowerUp	Operation Hours since Power-Up	105	0		UIntegerT_32	0 - 71582788		ro				
Temperature												
V_Temperature	Temperarture	106	0		RecordT			ro			X	
dynamic parameter	Actual	106	1*		IntegerT_8	-128 to 127						
dynamic parameter	Max since Power-Up	106	2*		IntegerT_8	-128 to 127						
dynamic parameter	Max since Inception	106	3*		IntegerT_8	-128 to 127						
dynamic parameter	Min since Power-Up	106	4*		IntegerT_8	-128 to 127						
dynamic parameter	Min since Inception	106	5*		IntegerT_8	-128 to 127						
Speed												
V_SpeedActual	Actual	107	0		UIntegerT_16	0 to 833		ro				
V_SpeedMax	Max (since Power-Up)	108	0		UIntegerT_16	0 to 833		ro				
Event Configuration												
V_EventLocalThresholdEnable	Event on Local Threshold Change	109	0		UIntegerT_8	0, 1	Off (0), On (1)	rw				
V_EventLowMarginEnable	Event on Low Margin	110	0		UIntegerT_8	0, 1	Off (0), On (1)	rw				
V_EventTeachError	Event on Teach Error	116	0		UIntegerT_8	0, 1	Off (0), On (1)	rw				
V_EventTemperature	Event on Temperature	111	0		UIntegerT_8	0, 1	Off (0), On (1)	rw				
V_EventTemperatureLow	Temperature Event Trigger Low	112	0		IntegerT_8	-128 to 127		rw				
V_EventTemperatureHigh	Temperature Event Trigger High	113	0		IntegerT_8	-128 to 127		rw				
V_EventCounterEnable	Event on Counter	114	0		UIntegerT_8	0, 1	Off (0), On (1)	rw				
V_EventCounterCount	Event Counter Count	115	0		UIntegerT_16	0 to 4095		rw				

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- **Operation Information**
  - **Operation Hours since Inception**: Return value.
  - **Operation Hours since Power-Up**: Return value.

- **Temperature (internal device temperature).**
  - **Temperature Actual**: Return value.
  - **Temperature Max since Power-Up**: return value.
  - **Temperature Max since Inception**: return value.
  - **Temperature Min since Power-Up**: return value.
  - **Temperature Min since Inception**: return value.

- **Speed**
  - **Actual:** return value. It indicates the number of Light/Dark switching occurred in the last second (Hz).
  - **Max since Power-Up**: return value. The maximum occurrence of the above from the Power-UP.

- **Event Configuration:** all disabled in factory set condition.

  - **Event on Local Threshold Change**.
    [0]: OFF. Disabled.
    [1]: ON. Activate an event if the Teach-in button or the Remote teach Input is used.

  - **Event on Low Margin**.
    [0]: OFF Disabled.
    1]: ON.. Enabled: Triggers an event when the Margin Level crosses the indicated limit, see also “Margin Level Low Multiplier”.

  - **Event on Teach Error**.
    [0]: OFF Disabled.
    [1]: ON.. Enabled: Triggers an event when the Teach-in function does not finish correctly (the signal is not enough).

  - **Event on Temperature**.
    [0]: OFF. Disabled
    [1]: ON. Enabled: Triggers an event when the sensor temperature crosses the indicated temperature limits below.
    - **Temperature Event Trigger Low (entered value of the minimum temperature allowed).**
    - **Temperature Event Trigger High (entered value of the maximum temperature allowed).**

    The Restore Factory Setting command sets these two values to 0, it is therefore advisable to introduce plausible values before activating the "Event on Temperature".

  - **Event on Counter**:
    [0]: OFF. Disabled
    [1]: ON. Enabled: Triggers an event if the count reaches the value entered below:
    - **Event Counter Count**

EVENTS

Code dec.	Code	Type	>> On << Off	Name	Description
6144	0x1800	Notification		Threshold Changed Locally	Threshold Changed Locally: Event occurs when the threshold is changed at the sensor (buttons or wire)
6176	0x1820	Warning	>>or<<	Low Margin	Event occurs when a Margin Low Alarm (Process Data) is issued
6192	0x1830	Notification		Teaching Error	Teaching Error: Event occurs upon teaching error
6208	0x1840	Notification		Count Reached	Event occurs when a set count is reached
16.928	0x4220	Warning	>>or<<	Temperature underrun	Device temperature underrun: Insulate device
16.912	0x4210	Warning	>>or<<	Temperature overrun	Device temperature overrun: Clear source of heat

Tbl.:21 **Note: >> Means a Warning has appeared; << Means the Warning has disappeared.**

COMPLETE IODD (CR0, CR1, CR2)

Variable ID	Name	Index	SubIndex	BitOffset	DataType	Values Ranges	Single values	Access	Default value	M	D	E
V_DirectParameters_1	Direct Parameters - Page 1	0	0		RecordT		00 0C 2B 11 C4 08 03 05 00 07 D2 00 00 00 00B	rw				
	Reserved	0	1	120	UIntegerT_8							
	Master Cycle Time	0	2	112	UIntegerT_8		1200us					
	Min Cycle Time	0	3	104	UIntegerT_8		1200us					
	M-Sequence Capability	0	4	96	UIntegerT_8		0x2B					
	IO-Link Revision ID	0	5	88	UIntegerT_8		1.1					
	Process Data Input Length	0	6	80	UIntegerT_8		5 B					
	Process Data Output Length	0	7	72	UIntegerT_8		8 b					
	Vendor ID 1	0	8	64	UIntegerT_8		0x0305					
	Vendor ID 2	0	9	56	UIntegerT_8							
	Device ID 1	0	10	48	UIntegerT_8							
	Device ID 2	0	11	40	UIntegerT_8							
	Device ID 3	0	12	32	UIntegerT_8							
	Reserved	0	13	24	UIntegerT_8							
	Reserved	0	14	16	UIntegerT_8							
	Reserved	0	15	8	UIntegerT_8							
	System Command	0	16	0	UIntegerT_8	0 to 63, 132 to 159	Device Reset (128), Application Reset (129), Restore Factory Settings (130), Back-to-box (131)			X		
V_DirectParameters_2	Direct Parameters - Page 2	1	0		RecordT			rw				
	Device-specific Parameter 1	1	1	120	UIntegerT_8							
	Device-specific Parameter 2	1	2	112	UIntegerT_8							
	Device-specific Parameter 3	1	3	104	UIntegerT_8							
	Device-specific Parameter 4	1	4	96	UIntegerT_8							
	Device-specific Parameter 5	1	5	88	UIntegerT_8							
	Device-specific Parameter 6	1	6	80	UIntegerT_8							
	Device-specific Parameter 7	1	7	72	UIntegerT_8							
	Device-specific Parameter 8	1	8	64	UIntegerT_8							
	Device-specific Parameter 9	1	9	56	UIntegerT_8							
	Device-specific Parameter 10	1	10	48	UIntegerT_8							
	Device-specific Parameter 11	1	11	40	UIntegerT_8							
	Device-specific Parameter 12	1	12	32	UIntegerT_8							
	Device-specific Parameter 13	1	13	24	UIntegerT_8							
	Device-specific Parameter 14	1	14	16	UIntegerT_8							
	Device-specific Parameter 15	1	15	8	UIntegerT_8							
	Device-specific Parameter 16	1	16	0	UIntegerT_8							
V_SystemCommand	System Command	2	0		UIntegerT_8	0 to 63, 132 to 159	Restore Factory Settings (130), Teach Background (160), Teach Target (161), Teach Standard (162), Teach Precision (163), Counter Reset (164), Timer Reset (165), Apply Margin Multiplier (166)	wo		X		
V_DeviceAccessLocks	Device Access Locks	12	0		RecordT			rw				
	Local Parameterization	12	3	2	BooleanT		Locked (true), Unlocked (false)					
V_VendorName	Vendor Name	16	0		StringT [64]			ro	DATASENSING S.R.L.			
V_VendorText	Vendor Text	17	0		StringT [64]			ro	Easing automation challenges			
V_ProductName	Product Name	18	0		StringT [64]			ro	CR0/0I-1V CR1/0I-1V CR2/0I-1V			
V_ProductID	Product ID	19	0		StringT [64]			ro				
V_ProductText	Product Text	20	0		StringT [64]			ro	Retroreflective Area Sensor			
V_SerialNumber	Serial Number	21	0		StringT [16]			ro				

V_HardwareRevision	Hardware Revision	22	0		StringT [64]			ro				
V_FirmwareRevision	Firmware Revision	23	0		StringT [64]			ro				
V_ApplicationSpecificTag	Application-specific Tag	24	0		StringT [32]			rw	***			
V_DeviceStatus	Device Status	36	0		UIntegerT_8		Device is OK (0), Maintenance required (1), Out of specification (2), Functional check (3), Failure (4)	ro			X	
V_ErrorCount		32	0		UIntegerT_16			ro			X	
V_DetailedDeviceStatus	Detailed Device Status	37	0		ArrayT			ro			X	
	Detailed Device Status [1]	37	1	72	OctetStringT [3]							
	Detailed Device Status [2]	37	2	48	OctetStringT [3]							
	Detailed Device Status [3]	37	3	24	OctetStringT [3]							
	Detailed Device Status [4]	37	4	0	OctetStringT [3]							
V_ProcessDataInput	Process Data Input: Triggered, Proximity Alarm, Margin, Excess Gain, Received Signal	40	0		RecordT			ro			X	
	Triggered	40	1*	32	BooleanT		false (false), true (true)					
	Proximity Alarm	40	2*	33	BooleanT		false (false), true (true)					
	Margin Low Alarm	40	3*	34	BooleanT		false (false), true (true)					
	Excess Gain	40	4*	16	UIntegerT_8							
	Received Signal Strength	40	5*	0	UIntegerT_16							
V_ProcessDataOutput	Process Data Output	41	0		RecordT			ro			X	
	Pin 2 Output	41	1*	2	BooleanT		false (false), true (true)					
	Green LED	41	2*	1	BooleanT		false (false), true (true)					
	Red LED	41	3*	0	BooleanT		false (false), true (true)					
CR0 model												
V_SetPointEmitter1	Set Point Emitter 1	64	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter2	Set Point Emitter 2	65	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter3	Set Point Emitter 3	66	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter4	Set Point Emitter 4	67	0		UIntegerT_16	0 to 1023		rw	767			
Added for CR1 model												
V_SetPointEmitter5	Set Point Emitter 5	68	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter6	Set Point Emitter 6	69	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter7	Set Point Emitter 7	131	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter8	Set Point Emitter 8	132	0		UIntegerT_16	0 to 1023		rw	767			
Added for CR2 model												
V_SetPointEmitter9	Set Point Emitter 9	150	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter10	Set Point Emitter 10	151	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter11	Set Point Emitter 11	152	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter12	Set Point Emitter 12	153	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter13	Set Point Emitter 13	154	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter14	Set Point Emitter 14	155	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter15	Set Point Emitter 15	156	0		UIntegerT_16	0 to 1023		rw	767			
V_SetPointEmitter16	Set Point Emitter 16	157	0		UIntegerT_16	0 to 1023		rw	767			
CR0 model												
V_SetPointThreshold Receiver1_1	Set Point Threshold Receiver 1_1	70	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThreshold Receiver1_2	Set Point Threshold Receiver 1_2	71	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThreshold Receiver2_2	Set Point Threshold Receiver 2_2	72	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThreshold Receiver2_3	Set Point Threshold Receiver 2_3	73	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThreshold Receiver3_3	Set Point Threshold Receiver 3_3	74	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThreshold Receiver3_4	Set Point Threshold Receiver 3_4	75	0		UIntegerT_16	0 to 4095		rw	900			
Added for CR1 model												
V_SetPointThresholdReceiver4_4	Set Point Threshold Receiver 4_4	123	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver4_5	Set Point Threshold Receiver 4_5	124	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver5_5	Set Point Threshold Receiver 5_5	125	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver5_6	Set Point Threshold Receiver 5_6	126	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver6_6	Set Point Threshold Receiver 6_6	127	0		UIntegerT_16	0 to 4095		rw	900			

V_SetPointThresholdReceiver6_7	Set Point Threshold Receiver 6_7	128	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver7_7	Set Point Threshold Receiver 7_7	129	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver7_8	Set Point Threshold Receiver 7_8	130	0		UIntegerT_16	0 to 4095		rw	900			
Added for CR2 model												
V_SetPointThresholdReceiver8_8	Set Point Threshold Receiver 8_8	133	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver8_9	Set Point Threshold Receiver 8_9	134	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver9_9	Set Point Threshold Receiver 9_9	135	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver9_10	Set Point Threshold Receiver 9_10	136	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver10_10	Set Point Threshold Receiver 10_10	137	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver10_11	Set Point Threshold Receiver 10_11	138	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver11_11	Set Point Threshold Receiver 11_11	139	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver11_12	Set Point Threshold Receiver 11_12	140	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver12_12	Set Point Threshold Receiver 12_12	141	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver12_13	Set Point Threshold Receiver 12_13	142	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver13_13	Set Point Threshold Receiver 13_13	143	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver13_14	Set Point Threshold Receiver 13_14	144	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver14_14	Set Point Threshold Receiver 14_14	145	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver14_15	Set Point Threshold Receiver 14_15	146	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver15_15	Set Point Threshold Receiver 15_15	147	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointThresholdReceiver15_16	Set Point Threshold Receiver 15_16	148	0		UIntegerT_16	0 to 4095		rw	900			
V_SetPointPolarity	Polarity	76	0		UIntegerT_8		Not Inverted (LO) (0), Inverted (DO) (1)	rw	0			
V_OutputMode	Output Mode	77	0		UIntegerT_8		PNP (0), NPN (1)	rw	0			
V_SetPointHysteresis	Hysteresis	78	0		UIntegerT_16			ro				
V_Pin2Mode	Pin 2 Mode	79	0		UIntegerT_8		Disable (0), PNP (LO) (1), PNP (DO) (2), NPN (LO) (3), NPN (DO) (4), Remote Teach Input (5), IndependentOuput PNP (6), IndependentOuput NPN (7)	rw	0			
Only for the CR0 model												
V_BeamMode	Beam Mode	80	0		UIntegerT_8		AND SixBeam (0), AND FiveBeam (1), AND FourBeam (2), AND ThreeBeam (3), AND TwoBeam (4), AND OneBeam (5), OR SixBeam (8), OR FiveBeam (9), OR FourBeam (10), OR ThreeBeam (11), OR TwoBeam (12), OR OneBeam (13)	rw	0	X		
Only for the CR1 model												
V_BeamMode	Beam Mode	80	0		UIntegerT_8		AND FourteenBeam (0), AND ThirteenBeam (1), AND TwelveBeam (2), AND ElevenBeam (3), AND TenBeam (4), And NineBeam (5), AND EightBeam (6), AND SevenBeam (7), AND SixBeam (8), AND FiveBeam (9), AND FourBeam (10), AND ThreeBeam (11), AND TwoBeam (12), AND OneBeam (13), OR FourteenBeam (16), OR TirteenBeam (17), OR TwelveBeam (18), OR ElevenBeam (19), OR TenBeam (20), OR NineBeam (21), OR	rw	0	X		

							EightBeam (22), OR SevenBeam (23), OR SixBeam (24), OR FiveBeam (25), OR FourBeam (26), OR ThreeBeam (27), OR TwoBeam (28), OR OneBeam (29)					
Only for the CR2 model												
V_BeamMode	Beam Mode	80	0		UIntegerT_8		AND ThirtyBeam (0), AND TwentynineBeam (1), AND TwentyeightBeam (2), AND TwentysevenBeam (3), AND TwentysixBeam (4), AND TwentyfiveBeam (5), AND TwentyfourBeam (6), AND TwentythreeBeam (7), AND TwentytwoBeam (8), AND TwentyoneBeam (9), AND TwentyBeam (10), AND NineteenBeam (11), AND EighteenBeam (12), AND SeventeenBeam (13), AND SixteenBeam (14), AND FifteenBeam (15), AND FourteenBeam (16), AND ThirteenBeam (17), AND TwelveBeam (18), AND ElevenBeam (19), AND TenBeam (20), AND NineBeam (21), AND EightBeam (22), AND SevenBeam (23), AND SixBeam (24), AND FiveBeam (25), AND FourBeam (26), AND ThreeBeam (27), AND TwoBeam (28), AND OneBeam (29), OR ThirtyBeam (32), OR TwentynineBeam (33), OR TwentyeightBeam (34), OR TwentysevenBeam (35), OR TwentysixBeam (36), OR TwentyfiveBeam (37), OR TwentyfourBeam (38), OR TwentythreeBeam (39), OR TwentytwoBeam (40), OR TwentyoneBeam (41), OR TwentyBeam (42), OR NineteenBeam (43), OR EighteenBeam (44), OR SeventeenBeam (45), OR SixteenBeam (46), OR FifteenBeam (47), OR FourteenBeam (48), OR TirteenBeam (49), OR TwelveBeam (50), OR ElevenBeam (51), OR TenBeam (52), OR NineBeam (53), OR EightBeam (54), OR SevenBeam (55), OR SixBeam (56), OR FiveBeam (57), OR	rw	0	X		

							FourBeam (58), OR ThreeBeam (59), OR TwoBeam (60), OR OneBeam (61)					
V_MarginBoosterProposed	Margin Booster Proposed	81	0		UIntegerT_8	10 to 100		rw	10	X		
V_MarginBoosterApplied	Applied Margin	82	0		UIntegerT_8	10 to 200		ro				
V_MarginLevelLowMultiplier	Margin Level Low Multiplier	83	0		UIntegerT_8		0.8 (0), 0.7 (1), 0.6 (2), 0.5 (3)	rw	0			
V_MarginLevelHighMultiplier	Margin Level High Multiplier	84	0		UIntegerT_8		1.0 (10), 1.1 (11), 1.2 (12), 1.5 (15), 2.0 (20), 5.0 (50), 10.0 (100), 15.0 (150)	rw	12			
V_CounterEnable	Counter Enable	85	0		UIntegerT_8		Disabled (0), Enabled (1)	rw	0			
V_CounterValue	Counter Value	86	0		UIntegerT_16	0 to 4095		ro				
V_WorkingFrequency	Working Frequency	87	0		UIntegerT_8		1 (0), 2 (1)	rw	0			
V_TimerEnable	Timer	88	0		UIntegerT_8		Disabled (0), Enabled (1)	rw	0			
V_TimerMode	Timer Mode	89	0		UIntegerT_8		On Delay (0), Off Delay (1), One Shot (3), Timer Duration (4)	rw	0			
V_TimerValue	Timer Value	90	0		UIntegerT_16	0 to 50000		rw	0			
V_TimerOnDuration	Timer On Duration	91	0		UIntegerT_16	0 to 4095		ro				
V_TimerOffDuration	Timer Off Duration	92	0		UIntegerT_16	0 to 4095		ro				
V_ProcessDataInMode	Process Data In Mode	93	0		UIntegerT_8		**CR0, CR1, CR2** **Output, Proximity Alarm, Margin, (0, 1, 2, 3, 4).** Excess Gain, **(0, 1).** Received Signal **(0).** Contrast Level, Temperature **(1).** Counter **(3).** Timer Off Duration, Timer On Duration **(4).** **CR0, CR1** Beam status, Speed **(2).** Excess Gain **(3).** **CR2** Beam status High, Beam status Low **(2).** Speed **(3).**	rw	0			
V_ReceivedSignalOn	Received Signal On	94	0		UIntegerT_16			ro				
V_ReceivedSignalOff	Received Signal Off	95	0		UIntegerT_16			ro				
V_ContrastLevel	Contrast Level	96	0		UIntegerT_8			ro				
V_ExcessGain	Excess Gain	97	0		UIntegerT_8			ro				
V_ExcessGainResolution	Excess Gain Resolution	98	0		UIntegerT_8		1.0 (0), 0.1 (1)	rw	0			
V_LocalIndicator	Local Indicator	99	0		UIntegerT_8		Disabled (0), Enabled (1)	rw	0			
V_LEDOperation	LEDs Operation	100	0		UIntegerT_8		Enabled (0), Disabled (1)	rw	0			
V_AlignmentMode	Alignment Mode	101	0		UIntegerT_8		Disabled (0), Enabled (1)	rw	0			
V_LEDFromPD	LEDs control from Process Data	102	0		UIntegerT_8		Disabled (0), Enabled (1)	rw	0			
V_OperationHoursInception	Operation Hours since Inception	104	0		UIntegerT_32	0 to 71582788		ro				
V_OperationHoursPowerUp	Operation Hours since Power-Up	105	0		UIntegerT_32	0 to 71582788		ro				
V_Temperature	Temperarture	106	0		RecordT			ro			X	
	Actual	106	1*	32	IntegerT_8	-128 to 127						
	Max since Power-Up	106	2*	24	IntegerT_8	-128 to 127						
	Max since Inception	106	3*	16	IntegerT_8	-128 to 127						
	Min since Power-Up	106	4*	8	IntegerT_8	-128 to 127						
	Min since Inception	106	5*	0	IntegerT_8	-128 to 127						
V_SpeedActual	Actual	107	0		UIntegerT_16	0 to 833		ro				
V_SpeedMax	Max (since Power-Up)	108	0		UIntegerT_16	0 to 833		ro				
V_EventLocalThresholdEnable	Event on Local Threshold Change	109	0		UIntegerT_8		Off (0), On (1)	rw	0			
V_EventLowMarginEnable	Event on Low Margin	110	0		UIntegerT_8		Off (0), On (1)	rw	0			
V_EventTemperature	Event on Temperature	111	0		UIntegerT_8		Off (0), On (1)	rw	0			
V_EventTemperatureLow	Temperature Event Trigger Low	112	0		IntegerT_8	-128 to 127		rw	0			
V_EventTemperatureHigh	Temperature Event Trigger High	113	0		IntegerT_8	-128 to 127		rw	0			
V_EventCounterEnable	Event on Counter	114	0		UIntegerT_8		Off (0), On (1)	rw	0			
V_EventCounterCount	Event Counter Count	115	0		UIntegerT_16			rw	0			
V_EventTeachError	Event on Teach Error	116	0		UIntegerT_8		Off (0), On (1)	rw	0			
V_UserTag1	User Tag 1	120	0		StringT [16]			rw				
V_UserTag2	User Tag 2	121	0		StringT [16]			rw				

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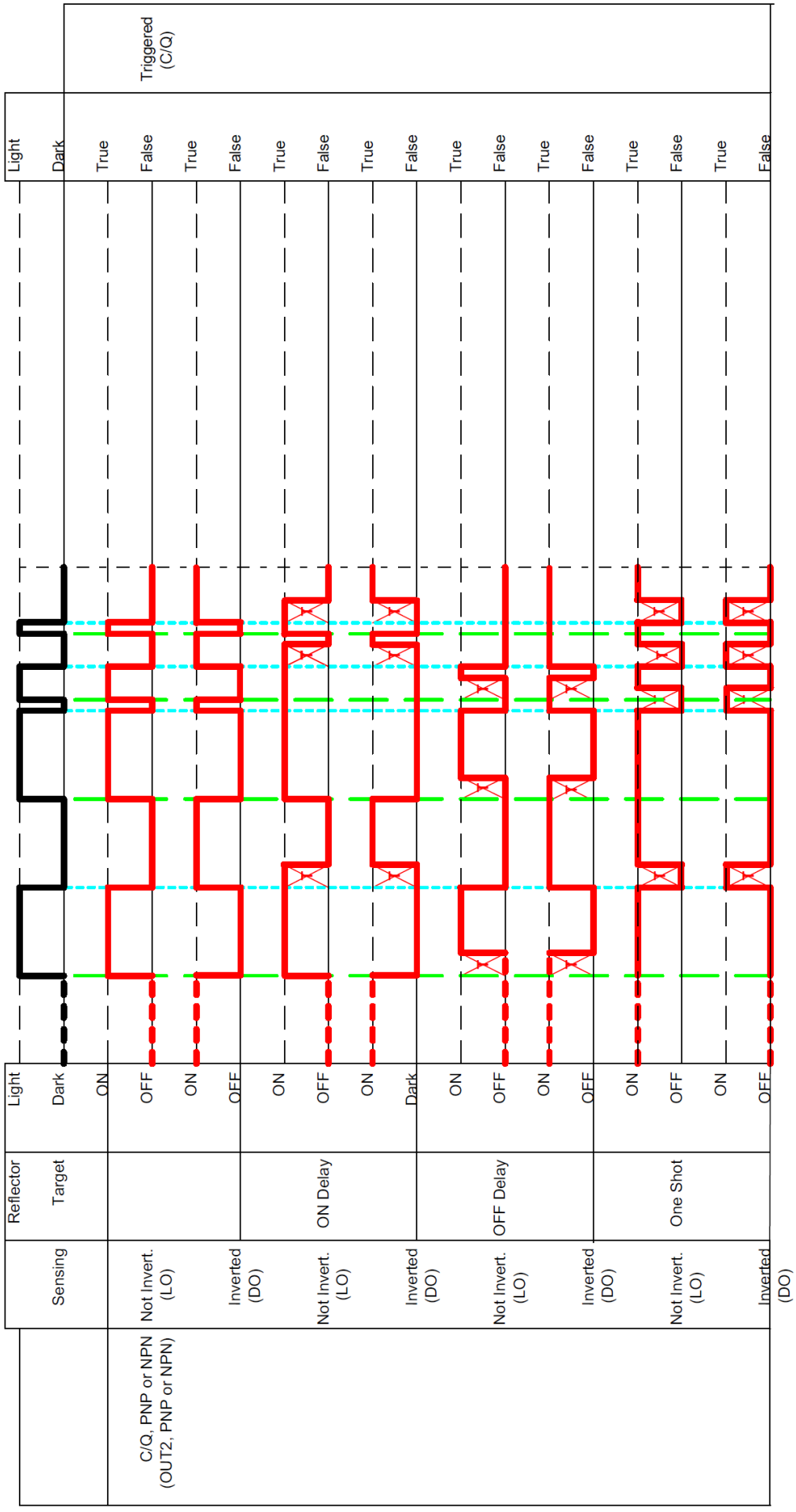
Timer functions

Behavior of outputs



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