Leuze

IO-Link interface description

ODT53C, ODT55C

Distance diffuse sensor with background suppression

The Sensor People

We reserve the right to make technical changes
EN • 2023-07-11 • 50150271

Leuze electronic GmbH + Co. KG
In der Braike 1
73277 Owen / Germany
Phone: +49 7021 573-0
Fax: +49 7021 573-199
www.leuze.com
info@leuze.com

1 IO-Link interface

Sensors in the ODT53C and ODT55C variant have a dual channel architecture. Available on pin 4 is the IO-Link interface in accordance with specification 1.1.3 (June 2019) with support of Smart Sensor Profile **2nd Ed 1.1 (Sept 2021)** with profile type SSP 4.1.1 (Measuring and Switching Sensor, 1 Channel). You can easily, quickly and economically configure the devices via the IO-Link interface. Furthermore, the sensor transmits the process data via the IO-Link interface and makes diagnostic information available through it.

In parallel with the IO-Link communication, the sensor can output the continuous switching signal for object detection on pin 2 (SSC2 by default) by means of the dual channel architecture. The IO-Link communication does not interrupt this signal.

1.1 IO-Link identification

VendorID dec/hex	DeviceID dec/hex	Device
338/0x152	2210/0x8A2	ODT53C.3/L6-M8
	2210/0x8A2	ODT55C.3/L6-M8
	2211/0x8A3	ODT53C.S3/L6-M8
	2211/0x8A3	ODT55C.S3/L6-M8

Please refer to the respective product data sheet for the identification data of other IO-Link devices.

1.2 IO-Link process data

Device input data (PDOut – 1-bit data length)

Bit offset	Data width in bits	Assignment	Meaning
0	1	CSC - Sensor Control	0: Transmitter active 1: Transmitter not active

Byte 0	x	x	x	x	x	x	x	CSC
	7	6	5	4	3	2	1	0

Device output data (PDIn - 32-bit data length)

Bit offset	Data width in bits	Assignment	Meaning
16	16	MDC - Measurement Value	Display of the sensor's current measurement value -32760: Outside measurement range (-) 32760: Outside measurement range (+) 0, 32764: No measurement value available 30...165: Measurement value
8	8	MDC - Scale	Display of the multiplier associated with the measurement value as a power of ten
0	1	SSC.1 - Switching Signal	0: Switching output 1 not active 1: Switching output 1 active
1	1	SSC.2 - Switching Signal	0: Switching output 2 not active 1: Switching output 2 active

Bit offset	Data width in bits	Assignment	Meaning
3	1	Measure	Sensor operation off when detection is not possible (e.g if deactivated or during the teach event) 0: Measurement not active 1: Measurement active
4	1	Signal	Signal strength as indicator for object detection 0: No valid reception signal 1: Reception signal available
5	1	Warning	Warning output autoControl (object-clocked) 0: No warning 1:Warning
6	2	Quality	0: Too low 1: Low 2: Sufficient 3: Good

Byte 0

MDC - Measurement Value							
15	14	13	12	11	10	9	8

Byte 1

MDC - Measurement Value							
7	6	5	4	3	2	1	0

Byte 2

MDC - Scale							
7	6	5	4	3	2	1	0

Byte 3

Quality		Warning	Signal	Measure	x	SSC.2	SSC.1
7	6	5	4	3	2	1	0

1.3 Device-specific IODD

At **www.leuze.com** in the download area for IO-Link sensors you will find the IODD zip file with all files required for the installation.

On the IODDfinder platform (https://ioddfinder.io-link.com/), a central cross-manufacturer database, you can also find the description files (IODDs) of the IO-Link sensors.

1.4 IO-Link parameters documentation

The complete description of the IO-Link parameters can be found in the *.html files. Double-click on a language variant in the directory containing the extracted files:

- German: *IODD*-de.html
- English: *IODD*-en.html

If the html file within the ZIP archive is opened, the image files are not displayed.

↳ Extract the ZIP file first.

1.5 Device-specific information

- This is a device of data storage class 1 (automatic DS), i.e., device exchange is possible without additional measures (such as teaching).
- In the PREOPERATE state, this device uses TYPE_0.
- Because this device is not an actuator, no special failsafe behavior in the event of failure of PDOut is necessary. In the context of deactivation, there are, however, the following special situations:
  - Changes to the transferred PDOut information are ignored if they are marked as invalid. On the sensor side, the replacement value 0 (= activation) is assumed: If the device was previously activated, it thus remains activated. If the device was previously deactivated, it changes to the activated state.
  - If there is a lack of communication, the last setting (activation or deactivation) remains unchanged.

Fundamentals:

- IO-Link Interface and System Specification Version 1.1.3, June 2019
- IO-Link Test Specification Version 1.1.3 January 2021

2 Functions configurable via IO-Link

PC configuration and visualization is performed comfortably with the USB-IO-Link Master SET MD12-US2-IL1.1 (part no. 50121098) and the *Sensor Studio* configuration software (in the download area of the sensor at **www.leuze.com**).

System commands

NOTICE

The system commands trigger an action in the device.

Parameter	Index	Sub-index	Data type, octets	Access	Value range	Default	Explanation
System command	2	0	UIntegerT, 1	WO	65, 66, 128, 129, 130, 131, 176, 177, 178		65: Teach SP1 66: Teach SP2 128: Reset device 129: Reset application 130: Reset factory settings 131: Back-to-box 176: Activate transmitter (has priority over PDOut) 177: Deactivate transmitter (has priority over PDOut) 178: Reset priority (PDOut has priority)

General configuration

Parameter	Index	Sub-index	Data type, octets	Access	Value range	Default	Explanation
Device Access Locks	12	0	UIntegerT, 2	RW	0, 8	0	0: teach button not locked 8: teach button locked
Application Specific Tag	24	0	String, max. 32	RW		***	Application-specific marking
Function Tag	25	0	String, max. 32	RW		***	Function identifier
Location Tag	26	0	String, max. 32	RW		***	Location indicator
Teach Select	58	0	UIntegerT, 1	RW	0, 1, 2, 255	1	0: Default channel (SSC.1) 1: SSC.1 2: SSC.2 255: All channels

Parameter	Index	Sub-index	Data type, octets	Access	Value range	Default	Explanation
Teach Result	59	1	UInte-gerT, 4 bit	RO	0, 1, 2, 3, 4, 5, 7		Status of the teach event: 0: Inactive 1: SP1 successful 2: SP2 successful 3: SP1, SP2 successful 4: Waiting for command 5: Running 7: Error
		2	Boolean	RO	0, 1		Teach-in-ok-Signal SP1: 0: Teach point 1 not Ok 1: Teach point 1 Ok
		3	Boolean	RO	0, 1		Teach-in-ok-Signal SP1: 0: Teach point 2 not Ok 1: Teach point 2 Ok
		4	Boolean	RO	0, 1		Teach-in-ok-Signal SP2: 0: Teach point 1 not Ok 1: Teach point 1 Ok
		5	Boolean	RO	0, 1		Teach-in-ok-Signal SP2: 0: Teach point 2 not Ok 1: Teach point 2 Ok
SSC.1 parameter	60	1	UInte-gerT, 4	RW	30 .. 165	155	Numerical input of switching point SP1 in mm **(Device ID 2210)**
		2	UInte-gerT, 4	RW	30 .. 165	70	Numerical input of switching point SP2 in mm **(Device ID 2210)**
SSC.1 parameter	60	1	UInte-gerT, 4	RW	30 … 88	83	Numerical input of switching point SP1 in mm **(Device ID 2211)**
		2	UInte-gerT, 4	RW	30 … 88	42	Numerical input of switching point SP2 in mm **(Device ID 2211)**
SSC.1 Configu-ration	61	1	UInte-gerT, 1	RW	0, 1	0	Logic: 0: SSC.1 not inverted (high active, light switching) 1: SSC.1 inverted (low active, dark switching)
		2	UInte-gerT, 1	RW	0 … 3	1	Defines the evaluation mode for the switching output: 0: Deactivated 1: Single-point mode 2: Window mode 3: Two-point mode
		3	UInte-gerT, 4	RW		0	Determines the hysteresis at the switching point. A higher hysteresis can help increase the stability in critical applications. 0: Automatic
SSC.2 parameter	62	1	UInte-gerT, 4	RW	30 … 165	155	Numerical input of switching point SP1 in mm **(Device ID 2210)**
		2	UInte-gerT, 4	RW	30 .. 165	70	Numerical input of switching point SP2 in mm **(Device ID 2210)**

Parameter	Index	Sub-index	Data type, octets	Access	Value range	Default	Explanation
SSC.2 parameter	62	1	UIntegerT, 4	RW	30 … 88	83	Numerical input of switching point SP1 in mm **(Device ID 2211)**
		2	UIntegerT, 4	RW	30 … 88	42	Numerical input of switching point SP2 in mm **(Device ID 2211)**
SSC.2 Configuration	63	1	UIntegerT, 1	RW	0, 1	0	Logic: 0: SSC.1 not inverted (high active, light switching) 1: SSC.1 inverted (low active, dark switching)
		2	UIntegerT, 1	RW	0 … 3	1	Defines the evaluation mode for the switching output: 0: Deactivated 1: Single-point mode 2: Window mode 3: Two-point mode
		3	UIntegerT, 4	RW		0	Determines the hysteresis at the switching point. A higher hysteresis can help increase the stability in critical applications. 0: Automatic
Teaching Reserve Factor SSC.2	82	0	UIntegerT, 1	RW	-1 … 2	0	Reserve during teach: -1: No reserve 0: Minimum reserve 1: Medium reserve (approx. 5%) 2: Large reserve (approx. 10%) This configuration only applies when performing a teach for SP1 in single-point mode.
Teaching Reserve Factor SSC.1	92	0	UIntegerT, 1	RW	-1 … 2	0	Reserve during teach: -1: No reserve 0: Minimum reserve 1: Medium reserve (approx. 5%) 2: Large reserve (approx. 10%) This configuration only applies when performing a teach for SP1 in single-point mode.
Distance value averaging	130	0	UIntegerT, 1	RW	0 … 100	30	Averaging of distance value: Adjustable value of a sliding average value for stabilizing the distance value. 0: Off
Analysis Depth SSC.2	180	0	UIntegerT, 1	RW	1 … 100	2	Analysis depth: to suppress interference, changing of the switching output is delayed by this number of identical measurement results. The default setting in the factory settings refers to the specified response time in the device data sheet.
Timer Unit SSC.2	182	0	UIntegerT, 1	RW	0, 255	0	0: time module not active 255: time module active Time module: *On* (255) activates the internal time function.

Parameter	Index	Sub-index	Data type, octets	Access	Value range	Default	Explanation
Function of Timer Unit SSC.2	183	0	UIntegerT, 1	RW	0 … 3	0	Function selection of switching delay SSC.2: 0: Switch-on delay 1: Switch-off delay 2: Pulse stretching 3: Pulse suppression Function selection of the switching delay: activation of a suitable switching delay is possible. It is not possible to combine switching delays.
Time SSC.2	184	0	UIntegerT, 2	RW	1 … 50000	200	Definition of the time basis in 100 µs increments, configurable from 100 µs to 5000 ms.
Number of Objects SSC.2	185	0	UIntegerT, 4	RW	0 … 4294967295		Object counter: The device has an internal, volatile object counter. This counts the switching events and can be freely read out, edited and reset. This function enables a simple validation of the process. As soon as the object counter has reached the maximum end value, the count process starts over again at 0.
Analysis Depth SSC.1	190	0	UIntegerT, 1	RW	1 … 100	2	Analysis depth: to suppress interference, changing of the switching output is delayed by this number of identical measurement results. The default setting in the factory settings refers to the specified response time in the device data sheet.
Timer Unit SSC.1	192	0	UIntegerT, 1	RW	0, 255	0	0: time module not active 255: time module active Time module: *On* (255) activates the internal time function.
Function of Timer Unit SSC.1	193	0	UIntegerT, 1	RW	0 … 3	0	Function selection of switching delay SSC.1: 0: Switch-on delay 1: Switch-off delay 2: Pulse stretching 3: Pulse suppression Function selection of the switching delay: activation of a suitable switching delay is possible. It is not possible to combine switching delays.
Time SSC.1	194	0	UIntegerT, 2	RW	1 … 50000	200	Definition of the time basis in 100 µs increments, configurable from 100 µs to 5000 ms.
Number of Objects SSC.1	195	0	UIntegerT, 4	RW	0 … 4294967295		Object counter: The device has an internal, volatile object counter. This counts the switching events and can be freely read out, edited and reset. This function enables a simple validation of the process. As soon as the object counter has reached the maximum end value, the count process starts over again at 0.

Parameter	Index	Subindex	Data type, octets	Access	Value range	Default	Explanation
Temperature	220	0	UIntegerT, 2	RO			The device is equipped with an integrated temperature sensor for transmitting the internal temperature in 1/10 °C.
Operation Hour Counter	234	0	UIntegerT, 4	RO	0 … 4294967295		Non-volatile counting of completed operating hours.
Button function level 1	241	0	UIntegerT, 1	RW	0, 2, 3, 4, 5, 6, 7, 19, 20, 21, 22, 23, 24, 31, 32, 33, 34, 35, 36, 43, 44, 45	2	Assignment of teach level 1 (2 … 7 s) via the teach button: 0: No button function 2: Teach SP1 of SSC.1 (minimum reserve) 3: Teach SP1 of SSC.2 (minimum reserve) 4: Teach SP1 of SSC.1 (medium reserve) 5: Teach SP1 of SSC.2 (medium reserve) 6: Teach SP1 of SSC.1 (large reserve) 7: Teach SP1 of SSC.2 (large reserve) 19: SSC.1 not inverted 20: SSC.1 inverted 21: Toggle SSC.1 logic 22: Time module SSC.1 activated 23: Time module SSC.1 deactivated 24: Toggle time module SSC.1 (on/off) 31: SSC.2 not inverted 32: SSC.2 inverted 33: Toggle SSC.2 logic 34: Time module SSC.2 activated 35: Time module SSC.2 deactivated 36: Toggle time module SSC.2 (on/off) 43: SSC.1 and SSC.2 not inverted 44: SSC.1 and SSC.2 inverted 45: Toggle SSC.1 and SSC.2 logic

Parameter	Index	Sub-index	Data type, octets	Access	Value range	Default	Explanation
Button function level 2	242	0	UIntegerT, 1	RW	0, 2, 3, 4, 5, 6, 7, 19, 20, 21, 22, 23, 24, 31, 32, 33, 34, 35, 36, 43, 44, 45	3	Assignment of teach level 2 (7 … 12 s) via the teach button: 0: No button function 2: Teach SP1 of SSC.1 (minimum reserve) 3: Teach SP1 of SSC.2 (minimum reserve) 4: Teach SP1 of SSC.1 (medium reserve) 5: Teach SP1 of SSC.2 (medium reserve) 6: Teach SP1 of SSC.1 (large reserve) 7: Teach SP1 of SSC.2 (large reserve) 19: SSC.1 not inverted 20: SSC.1 inverted 21: Toggle SSC.1 logic 22: Time module SSC.1 activated 23: Time module SSC.1 deactivated 24: Toggle time module SSC.1 (on/off) 31: SSC.2 not inverted 32: SSC.2 inverted 33: Toggle SSC.2 logic 34: Time module SSC.2 activated 35: Time module SSC.2 deactivated 36: Toggle time module SSC.2 (on/off) 43: SSC.1 and SSC.2 not inverted 44: SSC.1 and SSC.2 inverted 45: Toggle SSC.1 and SSC.2 logic
Button function level 3	243	0	UIntegerT, 1	RW	0, 2, 3, 4, 5, 6, 7, 19, 20, 21, 22, 23, 24, 31, 32, 33, 34, 35, 36, 43, 44, 45	45	Assignment of teach level 3 (> 12 s) via the teach button: 0: No button function 2: Teach SP1 of SSC.1 (minimum reserve) 3: Teach SP1 of SSC.2 (minimum reserve) 4: Teach SP1 of SSC.1 (medium reserve) 5: Teach SP1 of SSC.2 (medium reserve) 6: Teach SP1 of SSC.1 (large reserve) 7: Teach SP1 of SSC.2 (large reserve) 19: SSC.1 not inverted 20: SSC.1 inverted 21: Toggle SSC.1 logic 22: Time module SSC.1 activated 23: Time module SSC.1 deactivated 24: Toggle time module SSC.1 (on/off) 31: SSC.2 not inverted 32: SSC.2 inverted 33: Toggle SSC.2 logic 34: Time module SSC.2 activated 35: Time module SSC.2 deactivated 36: Toggle time module SSC.2 (on/off) 43: SSC.1 and SSC.2 not inverted 44: SSC.1 and SSC.2 inverted 45: Toggle SSC.1 and SSC.2 logic

Parameter	Index	Sub-index	Data type, octets	Access	Value range	Default	Explanation
Pin 4 function	251	0	UIntegerT, 1	RW	0, 1, 2, 3, 4, 7, 8	1	Setting the functionality of pin 4. 0: PIN without function 1: PIN as SSC.1 2: PIN as SSC.1 inverted 3: PIN as SSC.2 4: PIN as SSC.2 inverted 7: PIN as warning output 8: PIN as warning output inverted
Pin 2 function	252	0	UIntegerT, 1	RW	0, 1, 2, 3, 4, 7, 8	3	Setting the functionality of pin 2. 0: PIN without function 1: PIN as SSC.1 2: PIN as SSC.1 inverted 3: PIN as SSC.2 4: PIN as SSC.2 inverted 7: PIN as warning output 8: PIN as warning output inverted