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**TURCK**

# LUS211-40...-LI2UPN8 Ultrasonic Level Sensors

IO-Link Parameters – IO-Link Version 1.1



# Contents

1	About This Manual .....	5
1.1	Target groups.....	5
1.2	Explanation of symbols used .....	5
1.3	Other documents .....	5
1.4	Feedback about these instructions.....	5
2	Notes on the Product .....	6
2.1	Product identification.....	6
2.2	Turck service.....	6
3	Software-Supported IO-Link Parameterization.....	7
4	IO-Link Parameters.....	8
4.1	General parameters .....	8
4.2	Process input data.....	9
4.3	Standard parameters.....	10
4.4	Parameters.....	12
4.5	Events .....	40
5	Turck Subsidiaries - Contact Information .....	41



# 1 About This Manual

This manual describes the parameterization of devices using IO-Link. The manual contains general information on IO-Link and a list of the available parameters.

## 1.1 Target groups

These instructions are aimed at qualified personal and must be carefully read by anyone mounting, commissioning, operating, maintaining, dismantling or disposing of the device.

## 1.2 Explanation of symbols used

The following symbols are used in these instructions:



### **DANGER**

DANGER indicates a dangerous situation with high risk of death or severe injury if not avoided.



### **WARNING**

WARNING indicates a dangerous situation with medium risk of death or severe injury if not avoided.



### **CAUTION**

CAUTION indicates a dangerous situation of medium risk which may result in minor or moderate injury if not avoided.



### **NOTICE**

NOTICE indicates a situation which may lead to property damage if not avoided.



### **NOTE**

NOTE indicates tips, recommendations and useful information on specific actions and facts. The notes simplify your work and help you to avoid additional work.



### **CALL TO ACTION**

This symbol denotes actions that the user must carry out.



### **RESULTS OF ACTION**

This symbol denotes relevant results of actions.

## 1.3 Other documents

Besides this document the following material can be found on the Internet at [www.turck.com](http://www.turck.com):

- Data sheet
- Quick Start Guide
- Instructions for use

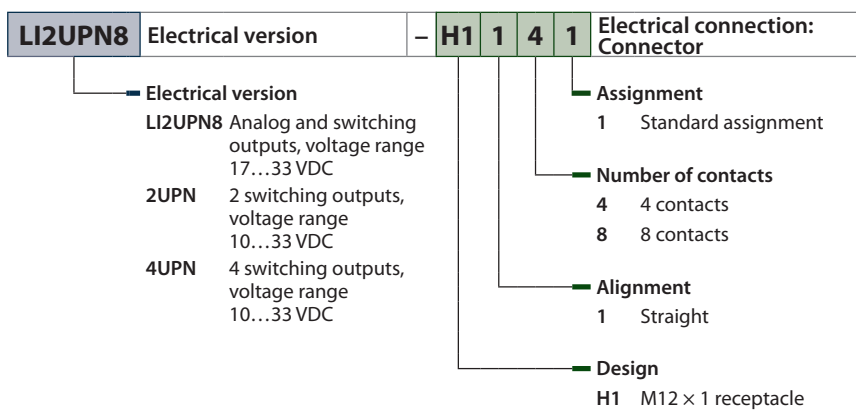
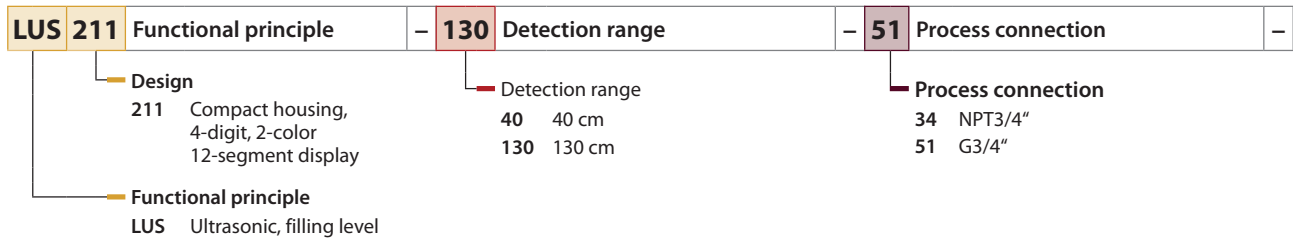
## 1.4 Feedback about these instructions

We make every effort to ensure that these instructions are as informative and as clear as possible. If you have any suggestions for improving the design or if some information is missing in the document, please send your suggestions to [techdoc@turck.com](mailto:techdoc@turck.com).

## 2 Notes on the Product

### 2.1 Product identification

**LUS211 - 130 - 51 - LI2UPN8 - H1141**



### 2.2 Turck service

Turck supports you with your projects, from initial analysis to the commissioning of your application. The Turck product database under [www.turck.com](http://www.turck.com) contains software tools for programming, configuration or commissioning, data sheets and CAD files in numerous export formats.

The contact details of Turck subsidiaries worldwide can be found on p. [▶ 41].

### 3 Software-Supported IO-Link Parameterization

The ports of the IO-Link master can be configured in IO-Link mode (IOL) or in standard IO mode (SIO).

If a port is configured in SIO mode, the IO-Link master behaves at this port like a normal digital input. The connected IO-Link device transfers its conventional switching output to the IO-Link master – there is no communication between the device and the master.

If a port is configured in IOL mode, the IO-Link master tries to wake up the connected IO-Link device via the "Wake-up Request". If the master receives a response from the IO-Link device, both devices start to communicate with each other. The communication parameters are exchanged first of all; the cyclic data exchange of the process data (process data objects) then starts.

When IO-Link communication (IOL mode) is active, both a cyclic and acyclic communication service is available.

There are two ways of setting the parameters via IO-Link:

- via on-request data objects (e.g. close to the PLC via the IO-Link function block)
- via tool-based engineering using FDT/DTM (e.g. PACTware with the use of DTM or the IODD or the web demo and Turck configuration tool)

#### Device parameters (on-request data objects)

Device parameters are exchanged acyclically and on request of the IO-Link master. The IO-Link master always sends a request to the device first, then the device responds. This applies when the data is written into the device and also when data is read from the device. On-request data objects (ORDO) enable parameter values to be written into the device (write) or device states to be read from the device (read).

#### IO-Link configuration in PROFINET

SIDI (Simple IO-Link Device Integration) enables IO-Link devices in PROFINET applications to be configured directly in the programming environment (e.g. TIA Portal). The Turck IO-Link devices are integrated in the GSDML file of the TBEN, TBPN and FEN20 series IO-Link masters and can be set in the programming environment as submodules of a modular I/O system. The user has access here to all device properties and parameters.

## 4 IO-Link Parameters

### 4.1 General parameters

Parameter	Content
Vendor ID	317 (0x13D)
Device ID	327680 (0x50000)
IO-Link version	1.1
Bitrate	COM2 (38.4 kbit/s)
Minimum cycle time	5 ms
SIO supported	True
M-Sequence Capability	PREOPERATE = TYPE_1_2 with 2 octets on-request data OPERATE = TYPE_2_V with 8 octets on-request data ISDU supported
Block Parameter	True
Data Storage	True
ProfileCharacteristic	Device Profile: Smart Sensor (0x0001) Function class: Device Identification (0x8000)



## 4.2 Process input data

The internal process data can be multiplied by a factor of 0.0001 to calculate the distance value, level value and volume value. The conversion does not depend on the unit.

Process value in the set unit =  $\text{ProcessDataIn} \times 0.0001$

The internal process data must be multiplied by a factor of 0.1 for the signal strength.

Signal strength in % =  $\text{SignalStrength} \times 0.1$

Name	Byte.Bit-Offset	Bit length	Subindex access supported	Data Type	Value	Description
Process data	0.4	28	False	Integer	-19999999... +134217727	
					134217721	Measurement value is filtered.
					134217722	Sensor muted
					134217723	Value underrun
					134217724	Value overrun
					134217725	Geometry error
					134217726	No target detected.
134217727	Internal Error					
Process data 1	0.1	1	False	Boolean	False/true	
Process data 2	0.0	1	False	Boolean	False/true	

## 4.3 Standard parameters

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit-Offset	Bit length	Data Type	Value	Default	Description
Min Cycle Time	0	0x0	3	0x3	True	Read	2.0	8	UInteger			
IO-Link Version ID	0	0x0	5	0x5	True	Read	4.0	8	UInteger		17	
Vendor ID 1	0	0x0	8	0x8	True	Read	7.0	8	UInteger			
Vendor ID 2	0	0x0	9	0x9	True	Read	8.0	8	UInteger			
Device ID 1	0	0x0	10	0xA	True	Read	9.0	8	UInteger			
Device ID 2	0	0x0	11	0xB	True	Read	10.0	8	UInteger			
Device ID 3	0	0x0	12	0xC	True	Read	11.0	8	UInteger			
Standard Command	2	0x2	0	0x0	True	Write	0.0	8	UInteger	0...		System command
										177		Device Reset
										128		Application Reset
										129		Restore Factory Settings
										130		Reset lowest recorded level
										160		Reset highest recorded level
										161		Mute Sensor
										176		Unmute Sensor
Parameter (write) Access Lock	12	0xC	1	0x1	False	Read/write	0.0	1	Boolean	False/true		Device access locks
Data Storage Lock	12	0xC	2	0x2	False	Read/write	0.1	1	Boolean	False/true		Device access locks
Local Parameterization Lock	12	0xC	3	0x3	False	Read/write	0.2	1	Boolean	False/true		Device access locks
Local User Interface Lock	12	0xC	4	0x4	False	Read/write	0.3	1	Boolean	False/true		Device access locks
Vendor Name	16	0x10	0	0x0	True	Read	0.0	512	String		Turck	Vendor name
Vendor Text	17	0x11	0	0x0	True	Read	0.0	512	String		www.turck.com	Additional manufacturer information
Product Name	18	0x12	0	0x0	True	Read	0.0	512	String			Manufacturer's device designation
Product ID	19	0x13	0	0x0	True	Read	0.0	512	String			ID

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit-Offset	Bit length	Data Type	Value	Default	Description
Product Text	20	0x14	0	0x0	True	Read	0.0	512	String		ultra-sonic level sensor	Device category
Serial Number	21	0x15	0	0x0	True	Read	0.0	128	String			Device serial number
Hardware Version	22	0x16	0	0x0	True	Read	0.0	512	String			Hardware revision
Firmware Version	23	0x17	0	0x0	True	Read	0.0	512	String			Firmware revision
Application Specific Tag	24	0x18	0	0x0	True	Read/write	0.0	256	String	***		Any user generated content
Error Count	32	0x20	0	0x0	True	Read	0.0	16	UInteger			
Device Status	36	0x24	0	0x0	True	Read	0.0	8	UInteger	0...255		
										0		Device is OK.
										1		Maintenance required
										2		Out of specification
										3		Functional check
										4		Failure
Detailed Device Status	37	0x25	0	0x0	False	Read	0.0	152	Array			
Process Data Input	40	0x28	0	0x0	True	Read	0.0	32	Process-DataIn Union			

## 4.4 Parameters

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
Function specific tag	25	0x19	0	0x0	True	Read/write	0.0	256	String	NaN ... NaN	***	
Location specific tag	26	0x1A	0	0x0	True	Read/write	0.0	256	String	NaN ... NaN	***	
Operating hours	72	0x48	0	0x0	True	Read	0.0	32	UInteger	NaN ... NaN		Total number of operating hours
Switching counter	73	0x49	0	0x0	True	Read	0.0	32	UInteger	NaN ... NaN		Total number of switching cycles
Operating hours limit	74	0x4A	0	0x0	True	Read/write	0.0	32	UInteger	NaN ... NaN	10000 00	Operating hours alert limit
Switching counter limit	75	0x4B	0	0x0	True	Read/write	0.0	32	UInteger	NaN ... NaN	10000 00000	Alert limit for number of switching cycles
Output configuration 1	81	0x51	0	0x0	True	Read/write	0.0	8	UInteger	0...3	0	Output function and switching logic
										0		Hysteresis mode, normally open
										1		Hysteresis mode, normally closed
										2		Windows mode, normally open
										3		Windows mode, normally closed

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
Output configuration 2	82	0x52	0	0x0	True	Read/write	0.0	8	UInteger	0...15	4	Output function and switching logic
										0	Hysteresis mode, normally open	
										1	Hysteresis mode, normally closed	
										2	Windows mode, normally open	
										3	Windows mode, normally closed	
										4	Auto (4...20 mA/ 0...10 V)	
										5	4...20 mA	
										6	0...20 mA	
										7	20...4 mA	
										8	20...0 mA	
										9	0...10 V	
										10	0...5 V	
										11	1...6 V	
										12	10...0 V	
										13	5...0 V	
										14	6...1 V	
15	0.5...4.5 V											
PNP/NPN auto-detection	83	0x53	0	0x0	True	Read/write	0.0	8	UInteger	0...2	2	Switch polarity will be set according to connected load.
										0	PNP	
										1	NPN	
										2	Auto	

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
Measurement quantity	84	0x54	1	0x1	False	Read/write	0.0	8	UInteger	0...5	0	
										0	Distance	
										1	Distance %	
										2	Level	
										3	Level %	
										4	Volume	
5	Volume %											
Length unit	84	0x54	2	0x2	False	Read/write	1.0	8	UInteger	0...3	0	
										0	Millimeters	
										1	Meters	
										2	Inches	
3	Feet											
Volume unit	84	0x54	3	0x3	False	Read/write	2.0	8	UInteger	0...4	0	
										0	Liters	
										1	Cubic meters	
										2	Cubic inches	
										3	Cubic feet	
4	Gallons											
Display actualization rate	85	0x55	0	0x0	True	Read/write	0.0	8	UInteger	0...3	0	Display update period
										0	50 ms	
										1	200 ms	
										2	600 ms	
3	Display off											
Output 1: Errorstate	86	0x56	0	0x0	True	Read/write	0.0	8	UInteger	0...1	0	State of output switch 1 in case of error
										0	Switch inactive	
										1	Switch active	
Output 2: Errorstate	87	0x57	0	0x0	True	Read/write	0.0	8	UInteger	0...1	0	State of output switch 2 in case of error
										0	Switch inactive	
										1	Switch active	

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description	
Virtual FH	89	0x59	1	0x1	False	Read/write	0.0	28	Integer	-1999	20000	Measured value ÷ 10000 = Value in unit The values change if the unit is adjusted.	
										9999	00		
										...			
										+1342			
										17727			
										13421			Value underrun
										7723			
13421		Value overrun											
7724													
13421		Geometry error											
7725													
13421		No target detected.											
7726													
13421		Internal Error											
7727													
Virtual FL	89	0x59	2	0x2	False	Read/write	4.0	28	Integer	-1999	30000	Measured value ÷ 10000 = Value in unit The values change if the unit is adjusted.	
										9999	00		
										...			
										+1342			
										17727			
										13421			Value underrun
										7723			
13421		Value overrun											
7724													
13421		Geometry error											
7725													
13421		No target detected.											
7726													
13421		Internal Error											
7727													

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
Display color	90	0x5A	0	0x0	True	Read/write	0.0	8	UInteger	0...7	0	Defines the display color and whether it should depend on switching states or levels.
										0	Green	
										1	Red	
										2	Green Out 1	
										3	Red Out 1	
										4	Green Out 2	
										5	Red Out 2	
										6	Green Virtual	
7	Red Virtual											
Rotation of display	91	0x5B	0	0x0	True	Read/write	0.0	8	UInteger	0...1	0	Rotate the display to be readable from above.
										0	0°	
SP/FH	96	0x60	1	0x1	False	Read/write	0.0	28	Integer	-1999	20000	Measured value ÷ 10000 = Value in unit
										9999	00	The values change if the unit is adjusted.
										...		
										+1342		
										17727		
										13421	7723	Value underrun
										13421	7724	Value overrun
13421	7725	Geometry error										
13421	7726	No target detected.										
13421	7727	Internal Error										



Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description	
rP/FL	96	0x60	2	0x2	False	Read/write	4.0	28	Integer	-1999	30000	Measured value ÷ 10000 = Value in unit The values change if the unit is adjusted.	
										9999	00		
										...			
										+1342			
										17727			
										13421			Value underrun
										7723			
13421		Value overrun											
7724													
13421		Geometry error											
7725													
13421		No target detected.											
7726													
13421		Internal Error											
7727													
SP/FH	97	0x61	1	0x1	False	Read/write	0.0	28	Integer	-1999	20000	Measured value ÷ 10000 = Value in unit The values change if the unit is adjusted.	
										9999	00		
										...			
										+1342			
										17727			
										13421			Value underrun
										7723			
13421		Value overrun											
7724													
13421		Geometry error											
7725													
13421		No target detected.											
7726													
13421		Internal Error											
7727													

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description	
rP/FL	97	0x61	2	0x2	False	Read/ write	4.0	28	Integer	-1999	30000	Measured value ÷ 10000 = Value in unit The values change if the unit is adjusted.	
										9999	00		
										...			
										+1342			
										17727			
										13421	7723		Value underrun
										13421	7724		Value overrun
13421	7725	Geometry error											
13421	7726	No target detected.											
13421	7727	Internal Error											
Startpoint	98	0x62	1	0x1	False	Read/ write	0.0	28	Integer	-1999	50000	Measured value ÷ 10000 = Value in unit The values change if the unit is adjusted.	
										9999			
										...			
										+1342			
										17727			
										13421	7723		Value underrun
										13421	7724		Value overrun
13421	7725	Geometry error											
13421	7726	No target detected.											
13421	7727	Internal Error											

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
Endpoint	98	0x62	2	0x2	False	Read/write	4.0	28	Integer	-1999	40000	Measured value ÷ 10000 = Value in unit The values change if the unit is adjusted.
										9999	00	
										...		
										+1342		
										17727		
										13421		
										7723		
13421												
7724												
13421												
7725												
13421												
7726												
13421												
7727												
Value at highest level	105	0x69	0	0x0	True	Read	0.0	28	Integer	-1999		Measurement value at highest filling level
										9999		
										...		
										+1342		
										17727		
										13421		
										7723		
13421												
7724												
13421												
7725												
13421												
7726												
13421												
7727												
Value at lowest level	106	0x6A	0	0x0	True	Read	0.0	28	Integer	-1999		Measurement value at lowest filling level
										9999		
										...		
										+1342		
										17727		
										13421		
										7723		
13421												
7724												
13421												
7725												
13421												
7726												
13421												
7727												

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
Damping (analog out)	112	0x70	0	0x0	True	Read/write	0.0	16	UInteger	0...800	0	Risetime and falltime (0%/90%) of analog output signal (suppress oscillation in control loops) Stepwise: 10 ms
Damping (switching)	113	0x71	0	0x0	True	Read/write	0.0	16	UInteger	0...800	0	Risetime and falltime (0%/90%) of analog output signal (suppress oscillation in control loops) Stepwise: 10 ms
Temperature compensation mode	114	0x72	0	0x0	True	Read/write	0.0	8	UInteger	0...1	0	Use internal temperature sensor or externally set temperature value.
										0		Internal temperature compensation
										1		External Temperature compensation
Temperature compensation value	115	0x73	0	0x0	True	Read/write	0.0	16	Integer	-250...+700	250	Temperature value for external temperature compensation
Internal temperature value	116	0x74	0	0x0	True	Read	0.0	16	Integer	NaN...NaN	0	Internally measured temperature for temperature compensation.

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
Filter	118	0x76	0	0x0	True	Read/write	0.0	8	UInteger	0...5	0	Set length of moving average filter to 2 <sup>n</sup>
										0	n = 1	
										1	n = 2	
										2	n = 4	
										3	n = 8	
										4	n = 16	
5	n = 32											
Output 1: dSP/dFH	120	0x78	0	0x0	True	Read/write	0.0	16	UInteger	0...600	0	On switching delay/switching delay at FH Stepwise: 100 ms
Output 1: dRP/dFL	121	0x79	0	0x0	True	Read/write	0.0	16	UInteger	0...600	0	Off switching delay/switching delay at FL Stepwise: 100 ms
Output 2: dSP/dFH	122	0x7A	0	0x0	True	Read/write	0.0	16	UInteger	0...600	0	On switching delay/switching delay at FH Stepwise: 100 ms
Output 2: dRP/dFL	123	0x7B	0	0x0	True	Read/write	0.0	16	UInteger	0...600	0	Off switching delay/switching delay at FL Stepwise: 100 ms
Update cycle time	130	0x82	0	0x0	True	Read	0.0	16	UInteger	NaN ... NaN		Time between consecutive output updates
Tank geometry	136	0x88	1	0x1	False	Read/write	0.0	8	UInteger	0...4	0	
										0	Vertical cylinder	
										1	Horizontal cylinder	
										2	Cone	
										3	Sphere	
4	Volume/distance defined by user table											

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
Diameter	136	0x88	2	0x2	False	Read/write	1.0	32	UInteger	NaN ... NaN	56418 95	Measured value ÷ 10000 = Value in unit The values change if the unit is adjusted.
Dished bottoms	136	0x88	3	0x3	False	Read/write	5.0	8	UInteger	0...1 0 1	0	Flat ends Dished bottoms at both ends
Lowest filling level	136	0x88	4	0x4	False	Read/write	6.0	28	Integer	-1999 9999 ... +1342 17727	0	Value underrun Value overrun Geometry error No target detected. Internal Error
Highest filling level	136	0x88	5	0x5	False	Read/write	10.0	28	Integer	-1999 9999 ... +1342 17727	39500 00	Measured value ÷ 10000 = Value in unit The values change if the unit is adjusted. Value underrun Value overrun Geometry error No target detected. Internal Error

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description	
Sensor position	136	0x88	6	0x6	False	Read/write	14.0	28	Integer	-1999	40000	Measured value ÷ 10000 = Value in unit The values change if the unit is adjusted.	
										9999	00		
										...			
										+1342			
										17727			
										13421	7723		Value underrun
										13421	7724		Value overrun
13421	7725	Geometry error											
13421	7726	No target detected.											
13421	7727	Internal Error											
Length of cylindrical tank	136	0x88	7	0x7	False	Read/write	18.0	28	Integer	-1999	39500	Measured value ÷ 10000 = Value in unit The values change if the unit is adjusted.	
										9999	00		
										...			
										+1342			
										17727			
										13421	7723		Value underrun
										13421	7724		Value overrun
13421	7725	Geometry error											
13421	7726	No target detected.											
13421	7727	Internal Error											

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
Upper edge of cone	136	0x88	8	0x8	False	Read/write	22.0	28	Integer	-1999	0	
										9999		
										...		
										+1342		
										17727		
										13421		Value underrun
										7723		
13421		Value overrun										
7724												
13421		Geometry error										
7725												
13421		No target detected.										
7726												
13421		Internal Error										
7727												
Lower edge of cone	136	0x88	9	0x9	False	Read/write	26.0	28	Integer	-1999	0	
										9999		
										...		
										+1342		
										17727		
										13421		Value underrun
										7723		
13421		Value overrun										
7724												
13421		Geometry error										
7725												
13421		No target detected.										
7726												
13421		Internal Error										
7727												
Diameter at upper edge of cone	136	0x88	10	0xA	False	Read/write	30.0	28	Integer	-1999	0	
										9999		
										...		
										+1342		
										17727		
										13421		Value underrun
										7723		
13421		Value overrun										
7724												
13421		Geometry error										
7725												
13421		No target detected.										
7726												
13421		Internal Error										
7727												



Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
Diameter at lower edge of cone	136	0x88	11	0xB	False	Read/write	34.0	28	Integer	-1999	0	
										9999		
										...		
										+1342		
										17727		
										13421	7723	Value underrun
										13421	7724	Value overrun
13421	7725	Geometry error										
13421	7726	No target detected.										
13421	7727	Internal Error										
Signal strength	137	0x89	0	0x0	True	Read	0.0	16	UInteger	NaN		Signal strength in relation to standard target.
Display unit	138	0x8A	0	0x0	True	Read/write	0.0	8	UInteger	0...1	1	
										0		Unit not displayed
										1		Unit displayed for 1 s after 4 s value.
Custom geometry height nodes	139	0x8B	0	0x0	False	Read/write	60.0	32	UInteger	0...		
										13421		
										7724		
13421	7723	Value underrun										
13421	7724	Value overrun										
Custom geometry height nodes	139	0x8B	1	0x1	False	Read/write	56.0	32	UInteger	0...		
										13421		
										7724		
13421	7723	Value underrun										
13421	7724	Value overrun										
Custom geometry height nodes	139	0x8B	2	0x2	False	Read/write	52.0	32	UInteger	0...		
										13421		
										7724		
13421	7723	Value underrun										
13421	7724	Value overrun										

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
Custom geometry height nodes	139	0x8B	3	0x3	False	Read/write	48.0	32	UInteger	0...		
										13421		
										7724		
Custom geometry height nodes	139	0x8B	4	0x4	False	Read/write	44.0	32	UInteger	0...		
										13421		Value underrun
										7723		Value overrun
Custom geometry height nodes	139	0x8B	5	0x5	False	Read/write	40.0	32	UInteger	0...		
										13421		Value underrun
										7723		Value overrun
Custom geometry height nodes	139	0x8B	6	0x6	False	Read/write	36.0	32	UInteger	0...		
										13421		Value underrun
										7723		Value overrun
Custom geometry height nodes	139	0x8B	7	0x7	False	Read/write	32.0	32	UInteger	0...		
										13421		Value underrun
										7723		Value overrun
Custom geometry height nodes	139	0x8B	8	0x8	False	Read/write	28.0	32	UInteger	0...		
										13421		Value underrun
										7723		Value overrun

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
Custom geometry height nodes	139	0x8B	9	0x9	False	Read/write	24.0	32	UInteger	0...		
										13421		
										7724		
Custom geometry height nodes	139	0x8B	10	0xA	False	Read/write	20.0	32	UInteger	0...		
										13421		Value underrun
										7723		
Custom geometry height nodes	139	0x8B	11	0xB	False	Read/write	16.0	32	UInteger	0...		
										13421		Value underrun
										7723		
Custom geometry height nodes	139	0x8B	12	0xC	False	Read/write	12.0	32	UInteger	0...		
										13421		Value underrun
										7723		
Custom geometry height nodes	139	0x8B	13	0xD	False	Read/write	8.0	32	UInteger	0...		
										13421		Value underrun
										7723		
Custom geometry height nodes	139	0x8B	14	0xE	False	Read/write	4.0	32	UInteger	0...		
										13421		Value underrun
										7723		

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
Custom geometry height nodes	139	0x8B	15	0xF	False	Read/write	0.0	32	UInteger	0...		
										13421		
										7724		
Custom geometry height nodes	140	0x8C	0	0x0	False	Read/write	60.0	32	UInteger	0...		
										13421		
										7724		
Custom geometry height nodes	140	0x8C	1	0x1	False	Read/write	56.0	32	UInteger	0...		
										13421		
										7724		
Custom geometry height nodes	140	0x8C	2	0x2	False	Read/write	52.0	32	UInteger	0...		
										13421		
										7724		
Custom geometry height nodes	140	0x8C	3	0x3	False	Read/write	48.0	32	UInteger	0...		
										13421		
										7724		
Custom geometry height nodes	140	0x8C	4	0x4	False	Read/write	44.0	32	UInteger	0...		
										13421		
										7724		
Custom geometry height nodes	140	0x8C	4	0x4	False	Read/write	44.0	32	UInteger	0...		
										13421		
										7724		
Custom geometry height nodes	140	0x8C	4	0x4	False	Read/write	44.0	32	UInteger	0...		
										13421		
										7724		

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
Custom geometry height nodes	140	0x8C	5	0x5	False	Read/write	40.0	32	UInteger	0...		
										13421		
										7724		
Custom geometry height nodes	140	0x8C	6	0x6	False	Read/write	36.0	32	UInteger	0...		
										13421		Value underrun
										7723		
Custom geometry height nodes	140	0x8C	7	0x7	False	Read/write	32.0	32	UInteger	0...		
										13421		Value underrun
										7724		Value overrun
Custom geometry height nodes	140	0x8C	8	0x8	False	Read/write	28.0	32	UInteger	0...		
										13421		Value underrun
										7723		Value overrun
Custom geometry height nodes	140	0x8C	9	0x9	False	Read/write	24.0	32	UInteger	0...		
										13421		Value underrun
										7724		Value overrun
Custom geometry height nodes	140	0x8C	10	0xA	False	Read/write	20.0	32	UInteger	0...		
										13421		Value underrun
										7723		Value overrun
Custom geometry height nodes	140	0x8C	10	0xA	False	Read/write	20.0	32	UInteger	0...		
										13421		Value underrun
										7724		Value overrun

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
Custom geometry height nodes	140	0x8C	11	0xB	False	Read/write	16.0	32	UInteger	0... 13421 7724		
										13421 7723	Value underrun	
										13421 7724	Value overrun	
Custom geometry height nodes	140	0x8C	12	0xC	False	Read/write	12.0	32	UInteger	0... 13421 7724		
										13421 7723	Value underrun	
										13421 7724	Value overrun	
Custom geometry height nodes	140	0x8C	13	0xD	False	Read/write	8.0	32	UInteger	0... 13421 7724		
										13421 7723	Value underrun	
										13421 7724	Value overrun	
Custom geometry height nodes	140	0x8C	14	0xE	False	Read/write	4.0	32	UInteger	0... 13421 7724		
										13421 7723	Value underrun	
										13421 7724	Value overrun	
Custom geometry height nodes	140	0x8C	15	0xF	False	Read/write	0.0	32	UInteger	0... 13421 7724		
										13421 7723	Value underrun	
										13421 7724	Value overrun	
Dynamic blind zone	142	0x8E	0	0x0	True	Read/write	0.0	8	UInteger	0... 255	0	Increases the blindzone automatically up to nearly the last target position (0 = off).

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
Type of local menu	143	0x8F	0	0x0	True	Read/write	0.0	8	UInteger	0...1	0	Select the type of the sensors menu structure.
										0		Turck standard menue
										1		VDMA menue
Distance	167	0xA7	1	0x1	False	Read	0.0	16	UInteger	NaN ... NaN	0	Raw distance measurement value
Signal strength	167	0xA7	2	0x2	False	Read	2.0	16	UInteger	NaN ... NaN	0	Raw distance measurement value
IO-Link-Index	168	0xA8	1	0x1	True	Read	0.0	16	UInteger	0...193	0	Block transfer error details
										0		No error
										81		Configuration output 1
										82		Configuration output 2
										83		Polarity of switching outputs
										84		Units
										86		Errorstate output 1
										87		Errorstate output 2
										89		Display color setpoints
										90		Display color
										91		Rotation of display
										96		Setpoints output 1
										97		Setpoints output 2
98		Analog start-point/end-point										
112		Damping (analog)										
113		Damping (switching)										
114		Temperature compensation mode										

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
										115		Temperature compensation value
										118		Filter
										120		On switching delay/switching delay at FH1
										121		Off switching delay/switching delay at FL1
										122		On switching delay/switching delay at FH1
										123		Off switching delay/switching delay at FL2
										128		Configuration output 3
										129		Configuration output 4
										131		Setpoints output 3
										132		Setpoints output 4
										133		Errorstate output 3
										134		Errorstate output 4
										136		Geometry
										138		Display unit
										139		Custom geometry: Height nodes
										140		Custom geometry: Volume nodes
										142		Dynamic blindzone
										143		Menu mode
										144		Intensity filter mode
										145		Filter: max. amplitude



Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
										146		Filter: min. amplitude
										148		Frontground suppression
										149		Background suppression
										177		Filter window
										178		Filter window mode
										179		On switching delay/switching delay at FH3
										180		Off switching delay/switching delay at FL3
										181		On switching delay/switching delay at FH4
										182		Off switching delay/switching delay at FL4
										192		Analog error delay (on)
										193		Analog error delay (off)
Error message	168	0xA8	2	0x2	True	Read	2.0	16	UInteger	0...180	0	Block transfer error details
										0		No error
										1		Display brightness is to low.
										2		Display brightness is to high.
										3		Unknown display update rate
										4		Unknown display rotation setting
										5		Unknown display color setting

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
										6		Unknown value in the entry whether the unit of measurement should be displayed (DUNI).
										7		Unknown length unit
										8		Unknown volume unit
										9		Unknown measurement mode
										30		Unknown polarity setting
										31		Unknown output 1 switch mode
										32		Unknown output error state
										33		Output delay is to high.
										34		Unknown output 2 mode
										35		Unknown output 2 mode
										36		Unknown output 2 mode
										37		Unknown output 2 mode
										38		A geometry error occurred at the switching point (SP).
										39		A geometry error occurred at the switching point (rP).
										40		The switching point rP is beyond the detection range limit.
										41		The distance between rP and SP to small.

Name	Index (dec.)	Index (hex.)	Sub- index (dec.)	Sub- index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
										42		The switching point SP is to close to the sensor.
										43		The distance between ASP and AEP is to small.
										44		The switching point ASP is to close to the sensor.
										45		The switching point AEP is beyond the detection range limit.
										47		Output damping value is to large.
										60		Unknown menu type (Turck/VDMA)
										90		Lowest filling level is outside of detection range.
										91		Highest filling level is outside of detection range.
										92		The distance between highest and lowest filling level is to small.
										93		Tank diameter is smaller than highest filling level.
										95		Tank length is smaller than highest filling level.
										96		Unknown value for tank bottom

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
										97		Unknown value for tank shape
										98		Upper edge of conical tank is below lower edge (hTop < hBot).
										99		Height node in custom tank geometry is to small.
										120		Frontground suppression is to low.
										121		Frontground suppression is to high.
										122		Background suppression is to low.
										123		Background suppression is to high.
										124		Unknown signal amplitude filter mode
										125		Minimum value for signal amplitude filter is to small.
										127		Minimum value for signal amplitude filter is to large.
										128		Minimum value for signal amplitude filter is to close the maximum filter value.
										129		Maximum value for signal amplitude filter is to small.

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
										130		Maximum value for signal amplitude filter is to large.
										131		Maximum value for signal amplitude filter is to close the minimum filter value.
										150		Unknown value for access locks
										151		Unknown IO-Link entry
										180		Frontend refused value
far point	177	0xB1	1	0x1	False	Read/write	0.0	28	Integer	-1999 9999	40000 00	Filter window
										...		
										+1342 17727		
										13421 7723		Value underrun
										13421 7724		Value overrun
										13421 7725		Geometry error
										13421 7726		No target detected.
										13421 7727		Internal Error

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description	
near point	177	0xB1	2	0x2	False	Read/write	4.0	28	Integer	-1999	50000	Filter window	
										9999			
										...			
										+1342			
										17727			
										13421		Value underrun	
										7723			
13421	Value overrun												
7724													
13421	Geometry error												
7725													
13421	No target detected.												
7726													
13421	Internal Error												
7727													
Filter window mode	178	0xB2	0	0x0	True	Read/write	0.0	8	UInteger	0...2	0	Switch to error state for targets inside (bad) or outside the filter window (good).	
												0	Off
												1	Filter Window "bad"
												2	Filter Window "good"

Name	Index (dec.)	Index (hex.)	Sub-index (dec.)	Sub-index (hex.)	Subindex access supported	Access	Byte. Bit Offset	Bit length	Data Type	Value	Default	Description
Analog error delay	190	0xBE	1	0x1	False	Read	1.0	1	Boolean	False/true	False	
	190	0xBE	2	0x2	False	Read	1.1	1	Boolean	False/true	False	
	190	0xBE	3	0x3	False	Read	1.2	1	Boolean	False/true	False	
	190	0xBE	4	0x4	False	Read	1.3	1	Boolean	False/true	False	
	190	0xBE	5	0x5	False	Read	1.4	1	Boolean	False/true	False	
	190	0xBE	6	0x6	False	Read	1.5	1	Boolean	False/true	False	
	190	0xBE	7	0x7	False	Read	1.6	1	Boolean	False/true	False	
	190	0xBE	8	0x8	False	Read	1.7	1	Boolean	False/true	False	
	190	0xBE	9	0x9	False	Read	0.0	1	Boolean	False/true	False	
	190	0xBE	10	0xA	False	Read	0.1	1	Boolean	False/true	False	
	190	0xBE	11	0xB	False	Read	0.2	1	Boolean	False/true	False	
	190	0xBE	12	0xC	False	Read	0.3	1	Boolean	False/true	False	
	190	0xBE	13	0xD	False	Read	0.4	1	Boolean	False/true	False	
	190	0xBE	14	0xE	False	Read	0.5	1	Boolean	False/true	False	
	190	0xBE	15	0xF	False	Read	0.6	1	Boolean	False/true	False	
	190	0xBE	16	0x10	False	Read	0.7	1	Boolean	False/true	False	
Analog error delay (on)	192	0xC0	0	0x0	True	Read/write	0.0	16	UInteger	0...600	0	On switching delay/switching delay at FH
Analog error delay (off)	193	0xC1	0	0x0	True	Read/write	0.0	16	UInteger	0...600	0	On switching delay/switching delay at FH
Menu lock password	2397	0x95D	0	0x0	True	Write	0.0	16	UInteger	NaN...NaN	0	Password to unlock sensor menu

## 4.5 Events

Code	Type	Name	Description
16384	Error	Temperature fault	Overload
16912	Warning	Device temperature over-run	Clear source of heat.
20480	Error	Device hardware fault	Device Exchange
20736	Error	General power supply fault	Check availability.
20752	Warning	Primary supply voltage over-run	Check tolerance.
20753	Warning	Primary supply voltage under-run	Check tolerance.
30480	Error	Short circuit	Check installation.
35856	Warning	Process variable range over-run	Process data uncertain
35888	Warning	Process variable range under-run	Process data uncertain
36001	Error	Overload	
36002	Error	Underload	
36003	Error	The sensor was unable to perform autodetection at output 2.	
36006	Notification	New maximum value recorded	
36007	Notification	New minimum value recorded	
36009	Error	Test event	
36011	Error	Test Event Error 1	
36015	Error	Critical error	The sensor encountered a critical error and needs to be replaced.
36016	Warning	Operating hours limit was reached.	
36017	Warning	Switching counter limit was reached.	
36048	Warning	Display is unlocked.	



## 5 Turck Subsidiaries - Contact Information

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