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TURCK

DR15S-...-IOL8X2...

Radar Distance Sensors

IO-Link Parameters – IO-Link Version 1.1

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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:

- 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.

2 Notes on the Product

2.1 Product identification

These instructions apply to the following radar distance sensors:

DR	15	S	-	M30	E	-	IOL	8	X2	-	H1	1	4	1
----	----	---	---	-----	---	---	-----	---	----	---	----	---	---	---

DR	15	S	Series	-	M30	E	Design	-	IOL	8	X2	Electrical version	-
			Aperture angle, radar wave S 7°				Housing length E Long					Indication X2 Multicolor LED	
			Sensing range ... Max. range in m				Housing M... Threaded barrel, stain- less steel Ø in [mm]					Voltage range 8 17...33 VDC	
			Functional principle DR Radar, Distance									Output function 2UPN Switching outputs IOL IO-Link	

H1	1	4	1	Electrical connection: Connector
				Assignment 1 Standard assignment
				Number of contacts 4 4 contacts
				Connector type 1 Straight
				Connector type H1 M12 × 1 connector

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 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. [► 21].

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	557072 (0x88010)
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	0x000B: SSP 3.2, includes 0x800B 0x4000: Identification and diagnosis, includes 0x8000, 0x8002, 0x8003, 0x8100 0x800D: Switching signal channel 0x8001: Binary data channel 0x8004: Teach channel 0x8007: Teach-in single value 0x8101: Locator

4.2 Process input data

The internal process data is output in 0.1 mm increments. The conversion is carried out according to the unit.

Process value in millimeters = $\text{ProcessDataIn} \times 0.1$

Process value in meters = $\text{ProcessDataIn} \times 0.001$

Process value in inches = $\text{ProcessDataIn} \times 0.003937008$

Process value in feet = $\text{ProcessDataIn} \times 0.000328084$

Process value in yards = $\text{ProcessDataIn} \times 0.0001093613$

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
Switching state of output 1	5.0	1	False	Boolean	False/true	
					False	Off
					True	On
Switching state of output 2	5.1	1	False	Boolean	False/true	
					False	Off
					True	On
Scaling exponent	4.0	8	False	Integer		
Process data	0.0	32	False	Integer	-2147483640... +2147483644	
					-2147483640	Out of range (-)
					2147483640	Out of range (+)
					2147483644	No measurement data

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... 255		System command
										65		Teach far point
										66		Teach near point
										126		Start blinking
										127		Stop blinking
										128		Device reset
										129		Application reset
										130		Restore factory settings
										160		Reset largest distance value
										161		Reset smallest distance value
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

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 Name	18	0x12	0	0x0	True	Read	0.0	512	String		DR...- M30E- ...8X2- H1141	Manufacturer's device designation
Product ID	19	0x13	0	0x0	True	Read	0.0	512	String			ID
Product Text	20	0x14	0	0x0	True	Read	0.0	512	String		Radar dis- tance 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	88	Array			
Process Data Input	40	0x28	0	0x0	True	Read	0.0	48	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	***	User text to describe function
Location specific tag	26	0x1A	0	0x0	True	Read/ write	0.0	256	String	NaN... NaN	***	User text to describe location
Teach channel	58	0x3A	0	0x0	True	Read/ write	0.0	8	UInteger	0...2	0	Select the output to teach
										0		Output 1 (default)
										1		Output 1
										2		Output 2
Teach state	59	0x3B	1	0x1	False	Read	0.0	4	UInteger	0...15	0	
										0		Idle
										1		SP1 success
										2		SP2 success
										3		SP12 success
										4		Wait for command.
										5		Busy
										6		
										7		Error
										8		
										9		
										10		
										11		
										12		
										13		
										14		
										15		
Far point (SP1, TP1)	59	0x3B	2	0x2	False	Read	0.4	1	Boolean	False/ true	False	
										False		Not acquired or not OK
										True		OK
Far point (SP1, TP2)	59	0x3B	3	0x3	False	Read	0.5	1	Boolean	False/ true	False	
										False		Not acquired or not OK
										True		OK

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 (SP2, TP1)	59	0x3B	4	0x4	False	Read	0.6	1	Boolean	False/ true	False	
										False		Not acquired or not OK
										True		OK
Near point (SP2, TP2)	59	0x3B	5	0x5	False	Read	0.7	1	Boolean	False/ true	False	
										False		Not acquired or not OK
										True		OK
Far (SP1)	60	0x3C	1	0x1	False	Read/ write	0.0	32	Integer	4000... 150000	75000	SP1 output 1 Measured value ÷ 10000 = Value in meters
Near (SP2)	60	0x3C	2	0x2	False	Read/ write	4.0	32	Integer	3500... 149500	37500	SP2 output 1 Measured value ÷ 10000 = Value in meters
Logic	61	0x3D	1	0x1	True	Read/ write	0.0	8	UInteger	0...1	0	Switching logic output 1
										0		Normally off (high active)
										1		Normally on (low active)
Switching mode	61	0x3D	2	0x2	True	Read/ write	1.0	8	UInteger	0...3	3	
										0		Inactive
										2		Window mode
										3		Two point mode
Hysteresis	61	0x3D	3	0x3	True	Read/ write	2.0	16	UInteger	500... 65535	500	Hysteresis output 1 Measured value ÷ 10000 = Value in meters
Far (SP1)	62	0x3E	1	0x1	False	Read/ write	0.0	32	Integer	4000... 150000	75000	SP1 output 2 Measured value ÷ 10000 = Value in meters

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 (SP2)	62	0x3E	2	0x2	False	Read/ write	4.0	32	Integer	3500... 149500	37500	SP2 output 2 Measured value ÷ 10000 = Value in meters
Logic	63	0x3F	1	0x1	True	Read/ write	0.0	8	UInteger	0...1	0	Switching logic output 1
										0		Normally off (high active)
										1		Normally on (low active)
Switching mode	63	0x3F	2	0x2	True	Read/ write	1.0	8	UInteger	0...3	3	
										0		Inactive
										2		Window mode
Hysteresis	63	0x3F	3	0x3	True	Read/ write	2.0	16	UInteger	500... 65535	500	Hysteresis output 1 Measured value ÷ 10000 = Value in meters
Operating hours	72	0x48	0	0x0	True	Read	0.0	32	UInteger	NaN... NaN		Total number of operating hours
Output 1	73	0x49	1	0x1	True	Read	0.0	32	UInteger	NaN... NaN	0	Total number of switching cycles
Output 2	73	0x49	2	0x2	True	Read	4.0	32	UInteger	NaN... NaN	0	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
Output 1	75	0x4B	1	0x1	True	Read/ write	0.0	32	UInteger	NaN... NaN	10000 00000	Alert limit for number of switching cycles
Output 2	75	0x4B	2	0x2	True	Read/ write	4.0	32	UInteger	NaN... NaN	10000 00000	Alert limit for number of switching cycles

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 2 type	80	0x50	0	0x0	True	Read/ write	0.0	8	UInteger	0...1	0	Type of output 2
										0		Analog output
										1		Switching output
Configuration	82	0x52	0	0x0	True	Read/ write	0.0	8	UInteger	4...18	4	Configuration
										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
										16		4.5...0.5 V
										17		600...3000 Hz
										18		3000...600 Hz
Polarity	83	0x53	0	0x0	True	Read/ write	0.0	8	UInteger	0...2	2	Select between PNP (switching to U _B) or NPN (switching to GND) for output 1
										0		PNP output (switching to U _B)
										1		NPN output (switching to GND)
										2		Auto detection

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
Distance unit	84	0x54	0	0x0	True	Read/ write	0.0	8	UInteger	0...4	0	Measurement unit for dis- tance values
										0		Millimeter
										1		Meter
										2		Inch
										3		Foot
										4		Yard
Error behavior	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
Error behavior	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
Polarity	95	0x5F	0	0x0	True	Read/ write	0.0	8	UInteger	0...2	2	Select between PNP (switching to U _B) or NPN (switching to GND) for out- put 2
										0		PNP output (switching to U _B)
										1		NPN output (switching to GND)
										2		Auto detection
Start point	98	0x62	1	0x1	False	Read/ write	0.0	32	Integer	3500... 145000	3500	Analog range
End point	98	0x62	2	0x2	False	Read/ write	4.0	32	Integer	8500... 150000	150000	Analog range
Largest distance	105	0x69	0	0x0	True	Read	0.0	32	UInteger	NaN... NaN		Largest measured distance
Smallest distance	106	0x6A	0	0x0	True	Read	0.0	32	UInteger	NaN... NaN		Smallest measured distance

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)	112	0x70	0	0x0	True	Read/ write	0.0	16	UInteger	0...800	0	Risetime and falltime (0 %/90 %) of analog out- put signal (suppress os- cillation in control loops)
Damping (switching)	113	0x71	0	0x0	True	Read/ write	0.0	16	UInteger	0...800	0	Risetime and falltime (0 %/90 %) of the internal measurement value, which is used to control switching outputs.
On-Delay	120	0x78	0	0x0	True	Read/ write	0.0	16	UInteger	0...600	0	On switching delay for output 1
Off-Delay	121	0x79	0	0x0	True	Read/ write	0.0	16	UInteger	0...600	0	Off switching delay for output 1
On-Delay	122	0x7A	0	0x0	True	Read/ write	0.0	16	UInteger	0...600	0	On switching delay for output 2
Off-Delay	123	0x7B	0	0x0	True	Read/ write	0.0	16	UInteger	0...600	0	Off switching delay for output 2
Signal strength indication	124	0x7C	0	0x0	True	Read/ write	0.0	8	UInteger	0...1	0	The yellow LED can be used to indic- ate the signal intensity.
										0		Off
										1		On
Configure teach functionality	128	0x80	0	0x0	True	Read/ write	0.0	8	UInteger	0...1	0	Activate or deactivate teach func- tionality.
										0		Deactivate teach functionality.
										1		Activate teach func- tionality.
Signal strength	137	0x89	0	0x0	True	Read	0.0	16	UInteger	NaN... NaN	0	Signal strength

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
Signal amplitude filter mode	144	0x90	0	0x0	True	Read	0.0	8	UInteger	0...3	0	Filter signals with amp- litudes above max. or be- low min. amplitude
										0		Disabled
										1		Max. enabled
										2		Min. enabled
										3		Min. and max. enabled
Max. signal amplitude	145	0x91	0	0x0	True	Read/ write	0.0	16	UInteger	100... 9999	1000	Signals with higher amplitude are ignored.
Min. signal amplitude	146	0x92	0	0x0	True	Read/ write	0.0	16	UInteger	100... 9999	100	Signals with lower amplitude are ignored.
Frontground suppression	148	0x94	0	0x0	True	Read/ write	0.0	32	Integer	3000... 149500	3000	Signals in front of this distance limit are ignored.
Background suppression	149	0x95	0	0x0	True	Read/ write	0.0	32	Integer	4000... 150500	150500	Signals behind this distance limit are ignored.
Signal amplification	167	0xA7	0	0x0	True	Read/ write	0.0	8	UInteger	0...2	0	Setting of input amplifier
										0		Normal
										1		Low
										2		High
Analog error delay (on)	192	0xC0	0	0x0	True	Read/ write	0.0	16	UInteger	0...600	0	Transition delay from analog nor- mal level to error level
Analog error delay (off)	193	0xC1	0	0x0	True	Read/ write	0.0	16	UInteger	0...600	0	Transition delay from analog error level to normal level
Lower Value Range	16512	0x4080	1	0x1	False	Read	0.0	32	Integer	3500	3500	Measured value ÷ 10000 = Value in meters

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 Value Range	16512	0x 4080	2	0x2	False	Read	4.0	32	Integer	150000	150000	Measured value ÷ 10000 = Value in meters
Unitcode for Meter	16512	0x 4080	3	0x3	False	Read	8.0	16	UInteger	1010	1010	The process value is out- put in meters.
Scaling Factor	16512	0x 4080	4	0x4	False	Read	10.0	8	Integer	-4	-4	Measured value ÷ 10000 = Value in meters

4.5 Events

Code	Type	Name	Description
16384	Error	Temperature fault	Overload
16912	Warning	Device temperature over-run	Clear source of heat.
16928	Warning	Device temperature under-run	Insulate device.
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.
25376	Error	Parameter error	Check data sheet and values.
30480	Error	Short circuit	Check installation.
35841	Warning	Simulation active	Check operational mode.
35856	Warning	Process variable range over-run	Process data uncertain
35872	Error	Measurement range over-run	Check application.
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.	
36004	Error	Wire break	
36011	Error	Test Event Error 1	
36012	Error	Test error 2	
36013	Warning	Testwarning	
36016	Warning	Operating hours limit was reached	
36017	Warning	Switching counter limit was reached	

5 Turck Subsidiaries - Contact Information

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