

IO-Link Parameter Datasheet

Ultrasonic sensor

UB500-F42(S)-2EP-IO-V15

PEPPERL+FUCHS

IO-Link

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DOCT-9684 - Version 01.00.000 / 2025-03-21

General Information

Device Identification	
Vendor ID	1 (0x0001)
Device ID	3147522 (0x300702)

Features	
Data Storage	Yes
Block Parameterization	Yes

Communication Characteristics	
IO-Link revision	V1.1 (specification V1.1.4)
IO-Link backward compatibility	n/a
Data transmission rate	COM2 (38.4 kbit/s)
Min. cycle time	3.3 ms
Process data input	4 byte
Process data output	no
SIO mode support	no
Compatible master port type	Class A, Class B (see NOTE)

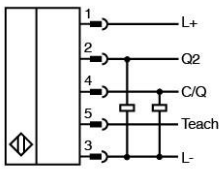
NOTE: For use at IO-Link master port Class B, use 3-pole adapter or 3-wire cable.

Profile	
Smart Sensor – SSP 4.1.1	16 (0x0010)
Identification and Diagnosis - I&D	16384 (0x4000)
Function Class – Object Detection	32787 (0x8013)
Function Class – Locator	33025 (0x8101)
Function Class – Product URI	33026 (0x8102)

Supported Product Variants

Product ID	*Product Name*	*Description*	*Connector*
70165295-100001 70165295-100005	UB500-F42-2EP-IO-V15 UB500-F42S-2EP-IO-V15	Sensing range 30 ... 500 mm, 2x switching output, push-pull, configurable, M12 plug, 5-pin	Plug, M12, 5-pin

Connection

Connection Diagram	*Description*
	**Plug, M12, 5-pin** 1: Brown L+ 2: White Q2 3: Blue L- 4: Black C/Q 5: Gray Teach

Process Data

Process Data Input

Octet	*Bitoffs.*	*Name*	*Data type*	*Length*	*Value*	*Unit*	*Description*
3	0	SSC.1 - Switching Signal	Boolean	1 bit	*0* *1*		Indicates the detection status of a switching signal channel depending on SSC.1 Param and SSC.1 Config. *Low* *High*
	1	SSC.2 - Switching Signal	Boolean	1 bit	*0* *1*		Indicates the detection status of a switching signal channel depending on SSC.2 Param and SSC.2 Config. *Low* *High*
	2	DSC - Signal Quality Indicator	UInteger	2 bit	*0* *1* *2* *3*		Shows the quality of the evaluated sensor signal. Quality drops with weak signal or interference. *Insufficient - no target or measurement not possible* *Acceptable - measurement possible with restricted precision* *Good - measurement possible with good quality* *Excellent - measurement possible with very good quality*
	4	Reserved		4 bit			Reserved
2	8	MDC - Scale	Integer	8 bit	*-3*		Shows the multiplier for the measurement value of the sensor - 10exp(scale).
0…1	16	MDC - Measurement Value	Integer	16 bit	*0 … 32000* *32764*	mm	Shows the current measurement value of the sensing element. *No Measurement Data / No Target*

NOTE: The process data input content can also be read via parameter ‘Process Data Input’ at index 40 (0x28).

Parameter Data

Identification

Index	*Parameter*	*Access*	*Data type*	*Length*	*Default*	*Description*	*DS*	*R*
16 (0x10)	Vendor Name	ro	String	13 byte	Pepperl+Fuchs	The vendor name that is assigned to a Vendor ID.		
17 (0x11)	Vendor Text	ro	String	29 byte	www.pepperl-fuchs.com/io-link	Additional information about the vendor.		
18 (0x12)	Product Name	ro	String	max. 32 byte	*See table Supported Product Variants*	Complete product name.		
19 (0x13)	Product ID	ro	String	14 byte	*See table Supported Product Variants*	Vendor-specific product or type identification (e.g., item number or model number).		
20 (0x14)	Product Text	ro	String	max. 32 byte	Ultrasonic Sensor	Additional product information for the device.		
21 (0x15)	Serial Number	ro	String	max. 16 byte	<serial number>	Unique, vendor-specific identifier of the individual device.		
22 (0x16)	Hardware Revision	ro	String	7 byte	HW**.**	Unique, vendor-specific identifier of the hardware revision of the individual device.		
23 (0x17)	Firmware Revision	ro	String	7 byte	FW**.**	Unique, vendor-specific identifier of the firmware revision of the individual device.		
24 (0x18)	Application Specific Tag	rw	String	max. 32 byte	Your automation, our passion.	Possibility to mark a device with user- or application-specific information.	Y	F
25 (0x19)	Function Tag	rw	String	max. 32 byte	***	Possibility to mark a device with function-specific information.	Y	F
26 (0x1A)	Location Tag	rw	String	max. 32 byte	***	Possibility to mark a device with location-specific information.	Y	F
27 (0x1B)	Product URI	ro	String	max. 128 byte	https://pefu.de/<serial number>	Provides a unique instance identification compliant to DIN-SPEC 91406.		
192 (0xC0)	Installation Tag	rw	String	max. 32 byte	***	Provides the possibility to mark the device with the installation or initial commissioning data or date. Note: this entry will not be transferred to a new device on replacement.		F

Diagnosis										
Index .sub	***Parameter***	***Access***	***Data type***	***Length***	***Bitoffs.***	***Value***	***Unit***	***Description***	***DS***	***R***
36 (0x24)	Device Status	ro	UInteger	8 bit				Indicator for the current device condition and diagnosis state.		F
						0 *1* *2* *3* *4*		*Device is OK* *Maintenance required* *Out of specification* *Functional check* *Failure*		
37 (0x25)	Detailed Device Status	ro	Array S0	12 byte				List of all currently pending events in the device.		F
.1	Element 1		Octetstr	3 byte	72					F
.2	Element 2		Octetstr	3 byte	48					F
.3	Element 3		Octetstr	3 byte	24					F
.4	Element 4		Octetstr	3 byte	0					F
176 (0xB0)	Device Characteristics	ro	Record	10 byte				Shows relevant key characteristics of the device for use in applications.		
.1	Min. Sensing Range	ro	Integer	32 bit	48	*30*	mm	Shows the value of the minimum specified sensing range.		
.2	Max. Sensing Range	ro	Integer	32 bit	16	*500*	mm	Shows the value of the maximum specified sensing range.		
.3	Supply Current Requirement	ro	UInteger	16 bit	0		mA	Shows the maximum specified supply current for the device excluding load.		
224 (0xE0)	Operating Hours	ro	UInteger	32 bit		*0 .. 2^{32}-1*	h	Shows the overall hours of operation since initial commissioning.		
225 (0xE1)	Temperature Indicator	ro	UInteger	8 bit				Indicates operation at critical ambient temperatures or excess of specification limits.		
						0 *1* *2* *3* *4*		*Operating condition OK* *Close to upper limit* *Upper limit exceeded* *Close to lower limit* *Lower limit exceeded*		
226 (0xE2)	Temperature Monitor	ro	Record	9 byte				Contains parameters showing current and past conditions of temperature exposure since initial commissioning.		
.1	Overtemperature Operating Hours	ro	UInteger	32 bit	40	*0 .. 2^{32}-1*	h	Shows the overall hours of powered operation above the specified temperature limit since initial commissioning.		
.2	Overtemperature Exceeded Counter	ro	UInteger	16 bit	24	*0 .. 2^{16}-1*		Shows the increment of overruns of the specified temperature range in powered operation since initial commissioning.		
.3	Maximum Operating Temperature	ro	Integer	8 bit	16	*-128 .. +127*	°C	Shows the maximum observed temperature in powered operation since initial commissioning.		
.4	Minimum Operating Temperature	ro	Integer	8 bit	8	*-128 .. +127*	°C	Shows the minimum observed temperature in powered operation since initial commissioning.		
.5	Device Operating Temperature	ro	Integer	8 bit	0	*-128 .. +127*	°C	Shows the currently observed operating temperature of the device.		
16512 (0x4080)	MDC Descriptor	ro	Record S0	11 byte				Descriptor for the characteristic of the measurement data channel (process data MV).		
.1	Lower Value	ro	Integer	32 bit	56	*50*	mm	Shows the lower value of measurement range.		
.2	Upper Value	ro	Integer	32 bit	24	*500*	mm	Shows the upper value of measurement range.		
.3	Unit Code	ro	UInteger	16 bit	8	*1010*		Shows the physical unit.		
.4	Scale	ro	Integer	8 bit	0	*-3*		Shows the multiplier for measurement value - 10exp(scale).		

Parameterization & Configuration											
Index .sub	***Parameter***	***Access***	***Data type***	***Length***	***Bitoffs.***	***Default***	***Value***	***Unit***	***Description***	***DS***	***R***
58 (0x3A)	TI Select	*rw*	*UInteger*	*8 bit*		*1*	*1* *2*		*Selects the switching signal channel for which a teach procedure will be applied.* *teach-in on channel SSC.1* *teach-in on channel SSC.2*		FA
59 (0x3B)	Teach Result	ro	*Record* S0	1 byte					Shows the complete result information of the teach procedure including current state and result flags.		FA
.1	State	ro	*UInteger*	4 bit	0	0		*0* *1* *2* *3* *4* *5* *6* *7*	Indicates the current state of the teach procedure. *Idle* *SP1 success* *SP2 success* *SP1, SP2 success* *Wait for command* *Busy* *Reserved* *Error*		FA
.2 .. .5	Reserved			4 bit	4				Reserved		

Parameterization & Configuration											
Index .sub	***Parameter***	***Access***	***Data type***	***Length***	***Bitoffs.***	***Default***	***Value***	***Unit***	***Description***	***DS***	***R***
60 (0x3C)	SSC.1 Param	rw	Record	4 byte					Defines the setpoint values for switching signal channel 1.	Y	FA
.1	SP1	rw	Integer	32 bit	32	50	*30 ... 850*	mm	Defines the setpoint 1 value for the switching signal channel. Note: Please see datasheet for specified sensing range	Y	FA
.2	SP2	rw	Integer	32 bit	0	500	*30 ... 850*	mm	Defines the setpoint 2 value for the switching signal channel. Note: Please see datasheet for specified sensing range	Y	FA
61 (0x3D)	SSC.1 Config	rw	Record	4 byte					Defines the configuration parameter for switching signal channel 1.	Y	FA
.1	Logic	rw	UInteger	8 bit	40	0	*0* *1*		Defines the logical representation of the switching signal SSC in the process data. *High active - Normally-open* *Low active - Normally-closed*	Y	FA
.2	Mode	rw	UInteger	8 bit	32	1	*0* *1* *2* *3* *128*		Defines the evaluation mode for the switching signal SSC. *Deactivated* *Single point* *Window* *Two point – Hysteresis Mode* *Centered window – Retroreflective mode*	Y	FA
.3	Hysteresis	rw	Integer	32 bit	0	0	*0* *1* *2*		Defines the hysteresis at the switchpoint. A higher hysteresis may help to increase stability in critical applications. *Default (Low) – 1 %* *Medium – 2 %* *High – 5 %*	Y	FA

Parameterization & Configuration											
Index .sub	***Parameter***	***Access***	***Data type***	***Length***	***Bitoffs.***	***Default***	***Value***	***Unit***	***Description***	***DS***	***R***
62 (0x3E)	SSC.2 Param	rw	Record	4 byte					Defines the setpoint values for switching signal channel 2.	Y	FA
.1	SP1	rw	Integer	32 bit	32	500	*30 ... 850*	mm	Defines the setpoint 1 value for the switching signal channel. Note: Please see datasheet for specified sensing range	Y	FA
.2	SP2	rw	Integer	32 bit	0	500	*30 ... 850*	mm	Defines the setpoint 2 value for the switching signal channel. Note: Please see datasheet for specified sensing range	Y	FA
63 (0x3F)	SSC.2 Config	rw	Record	6 byte					Defines the configuration parameter for switching signal channel 2.	Y	FA
.1	Logic	rw	UInteger	8 bit	40	0	*0* *1*		Defines the logical representation of the switching signal SSC in the process data. *High active - Normally-open* *Low active - Normally-closed*	Y	FA
.2	Mode	rw	UInteger	8 bit	32	1	*0* *1* *2* *3* *128*		Defines the evaluation mode for the switching signal SSC. *Deactivated* *Single point* *Window* *Two point – Hysteresis Mode* *Centered window – Retroreflective mode*	Y	FA
.3	Hysteresis	rw	Integer	32 bit	0	0	*0* *1* *2*		Defines the hysteresis at the switchpoint. A higher hysteresis may help to increase stability in critical applications. *Default (Low) – 1 %* *Medium – 2 %* *High – 5 %*	Y	FA

Parameterization & Configuration											
Index .sub	***Parameter***	***Access***	***Data type***	***Length***	***Bitoffs.***	***Default***	***Value***	***Unit***	***Description***	***DS***	***R***
97 (0x61)	Measurement Config - Sound Beam Width	rw	UInteger	8 bit		2	*0* *2*		Selects the configured sound beam width: small or wide. *Small* *Wide*	Y	FA
117 (0x75)	Local Parameterization	rw	UInteger	8 bit		0	*0* *1* *2*		This lock prevents the device settings from being changed via local operating elements on the device. In the mode 'Time locked' the local parametrization is only possible for the first 5 minutes after power-on. *Unlocked* *Time locked* *Locked*	Y	FA

Observation										
Index .sub	***Parameter***	***Access***	***Data type***	***Length***	***Bitoffs.***	***Value***	***Unit***	***Description***	***DS***	***R***
36 (0x24)	Device Status	ro	UInteger	8 bit				Indicator for the current device condition and diagnosis state. *See Diagnosis – Device Status.*		F
40 (0x28)	PD Input	ro	Record S0	4 byte				Last valid process input data of the device. *See Process Data Input.*		F
236 (0xEC)	Observation Data	ro	Record	5 byte				Provides a set of relevant data suitable for observation purposes.		F
.1	Measurement Value	ro	Integer	16 bit	24	*0 … 32000* *32764*	mm	Shows the current measurement value of the sensing element. *No measurement data / No Target*		F
.2	Signal Quality	ro	UInteger	8 bit	16	 *0* *1* *2* *3*		Shows the quality of the evaluated sensor signal. Quality drops with weak signal or interference. *Insufficient - no target or measurement not possible* *Acceptable - measurement possible with restricted precision* *Good - measurement possible with good quality* *Excellent - measurement possible with very good quality*		F
.3	SSC.1 – Switching Signal 1	ro	UInteger	8 bit	8	 *0* *1*		Indicates the detection status of a switching signal channel depending on process data and SSC.1 Param and SSC.1 Config. *Low* *High*		F
.4	SSC.2 – Switching Signal 2	ro	UInteger	8 bit	0	 *0* *1*		Indicates the detection status of a switching signal channel depending on process data and SSC.2 Param and SSC.2 Config. *Low* *High*		F

NOTE 1: The parameter data provide the attributes DS (Data Storage) and R (Reset behavior). The following rules apply:
DS: Parameter marked with 'Y' (yes) are exchanged with the master via the data storage mechanism.
R: Parameter marked with 'F' are reset to the factory default value upon reception of the command 'Back-to-box'.
Parameter marked with 'A' are reset to the factory default value upon reception of the command 'Application Reset'.

NOTE 2: Parameter with datatype Record or Array, which are marked with 'S0' can only be accessed over subindex 0 (whole parameter object). Subindex access to single items is not possible.

Command Interface

Index	*Parameter*	*Access*	*Data type*	*Length*	*Value*	*Description*
2 (0x02)	System Command	wo	UInteger	8 bit	See command value	Command interface for applications. A positive acknowledge indicates the complete and correct finalization of the requested function.

Command Value	*Command*	*Description*
66 (0x41)	Teach SP1	Determine setpoint 1 in a single value teach procedure
67 (0x42)	Teach SP2	Determine setpoint 2 in a single value teach procedure
126 (0x7E)	Locator Start	The visual indicators of the device are switched to the localization display pattern, which makes it easier to spot a device in an application. The localization indication is started and is active for 10 minutes. Press the 'Locator Stop' button to end this display mode or press the 'Locator Start' button again to extend the duration of the display by further 10 minutes.
127 (0x7F)	Locator Stop	The localization indication pattern is stopped. The optical indicators of the device will show again the device specific states of operation. The localization indication has been stopped. Press the 'Locator Start' button to restart the localization indication.
129 (0x81)	Application Reset	The parameter of the technology-specific application are set to default values. Identification parameter remain unchanged. An upload to the data storage of the master will be executed, if activated in the port configuration of the master.
131 (0x83)	Back-to-box	The parameters of the device are set to factory default values and communication will be inhibited until the next power cycle. Note: Directly detach the device from the master port!

Error Codes

Code	*Additional code*	*Name*	*Description*
128 (0x80)	17 (0x11)	Index not available	Read or write access attempt to a non-existing index.
128 (0x80)	18 (0x12)	Subindex not available	Read or write access attempt to a non-existing subindex of an existing index.
128 (0x80)	32 (0x20)	Service temporarily not available	Parameter not accessible due to the current state of the technology-specific application.
128 (0x80)	33 (0x21)	Service temporarily not available - local control	Parameter not accessible. The device is currently in an ongoing, locally controlled operation.
128 (0x80)	34 (0x22)	Service temporarily not available - device control	Parameter not accessible. The technology-specific application is currently in a remotely triggered operation.
128 (0x80)	35 (0x23)	Access denied	Write access to a read-only parameter or read access to write-only parameter.
128 (0x80)	48 (0x30)	Parameter value out of range	Written parameter value is outside of the permitted value range.
128 (0x80)	49 (0x31)	Parameter value above limit	Written parameter value is above its specified value range.
128 (0x80)	50 (0x32)	Parameter value below limit	Written parameter value is below its specified value range.
128 (0x80)	51 (0x33)	Parameter length overrun	Written parameter is longer than specified.
128 (0x80)	52 (0x34)	Parameter length underrun	Written parameter is shorter than specified.
128 (0x80)	53 (0x35)	Function not available	Written command is not supported by the technology-specific application.
128 (0x80)	54 (0x36)	Function temporarily unavailable	Written command is unavailable due to the current state of the technology-specific application.
128 (0x80)	64 (0x40)	Invalid parameter set	Written single parameter value collides with other existing parameter settings.
128 (0x80)	65 (0x41)	Inconsistent parameter set	Parameter set inconsistencies at the end of block parameter transfer. Device plausibility check failed.

Event Codes

Code	*Type*	*Name*	*Description*
20496 (0x5010)	Error	Hardware error	Device hardware fault – Device exchange
36162 (0x8D42)	Warning	Signal acquisition disturbed	Check for excessive interference in sensor environment.
36163 (0x8D43)	Warning	Ambient temperature above specified temperature range	Check sensor environment for heat sources.