

IO-Link Parameter Datasheet

RFID read/write devices

IUT-F191-IO-V1-FR2-02

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General Information

Device Identification	
Vendor ID	1 (0x0001)
Device ID	4194818 (0x400202)

Features	
Data Storage	Yes
Block Parameterization	Yes

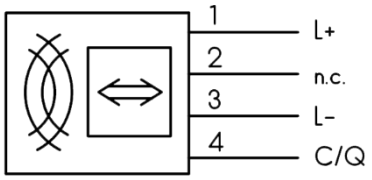
Communication Characteristics	
IO-Link revision	V1.1 (specification V1.1.5)
IO-Link backward compatibility	n/a
Data transmission rate	COM3 (230.4 kbit/s)
Min. cycle time	4.0 ms
Process data input	32 byte
Process data output	32 byte
SIO mode support	no
Compatible master port type	Class A, Class B

Profile	
Identification and Diagnosis - I&D	16384 (0x4000)
Function Class – Locator	33025 (0x8101)
Function Class – Product URI	33026 (0x8102)

Supported Product Variants

Product ID	*Product Name*	*Description*	*Connector*
70113811	IUT-F191-IO-V1-FR2-02	RFID read/write device, housing F191, UHF frequency, USA, Canada and Mexico, M12 4-pin	Plug, M12, 4-pin

Connection

Connection Diagram	*Description*
	**Plug, M12, 4-pin** 1: Brown +24V 2: White n.c. 3: Blue 0V 4: Black C/Q

Process Data – Easy Mode

Process Data valid for Operation Mode: “Easy Mode” (Index 64, value 128), see *Parameterization & Configuration – Operation Mode*.

Process Data Input

Octet	Bitoffs.	Name	Data type	Length	Value	Unit	Description
4 .. 31	0	Read Data	Octetstr	28 byte			Contains the data of a read operation or an error information.
3	224	Transmission Power	UInteger	8 bit		dBm	Indicates the transmission power in dBm at which the tag was identified.
2	232	RSSI	UInteger	8 bit	0 .. 100	%	The RSSI value indicates the signal strength of the tag response in percent. A value of 0 means weak signal and 100 means strong signal.
1	240	Data Length	UInteger	8 bit	0 .. 28		Indicates the number of bytes that have been read when a read task is active. If an error occurs during the execution of a task, i.e. error has the value 'true', the byte contains the length of the error information.
0	248	Read Valid	Boolean	1 bit	*0* *1*		The value 'true' indicates that a read access to tag data has been executed successfully. If several tags are in the detection range at the same time, the successful reading of a further tag is signaled by a positive edge change. *false* *true*
	249	Write Valid	Boolean	1 bit	*0* *1*		The value 'true' indicates that a write access to tag data has been executed successfully. If several tags are in the detection range at the same time, the successful writing of a further tag is signaled by a positive edge change. *false* *true*
	250	Task Active	Boolean	1 bit	*0* *1*		The value 'true' indicates that a read or write task is being executed. As soon as a task is canceled, the value is 'false'. *false* *true*
	251	Error	Boolean	1 bit	*0* *1*		The value 'true' indicates that an error has occurred during a read or write task or that the setting of a parameter is incorrect. At the same time, the process data contains additional error information in form of an error code and an error description. *false* *true*
	252	Tag Present	Boolean	1 bit	*0* *1*		The value 'true' indicates that one or more tags are in the detection range. If there is no tag in the detection range, the value is 'false'. *false* *true*
	253	Reserved		3 bit			Reserved

Process Data Output

Octet	Bitoffs.	Name	Data type	Length	Value	Unit	Description
4 .. 31	0	Write Data	Octetstr	28 byte			Contains the data for a write operation.
1 .. 3	224	Reserved		3 byte			Reserved
0	248	Start Read	Boolean	1 bit	*0* *1*		The value 'true' initiates a task to read tag data according to the configuration by the parameters. The read task is executed continuously. Set the value to 'false' to cancel the read task. *false* *true*
	249	Start Write	Boolean	1 bit	*0* *1*		The value 'true' initiates a task to write tag data according to the configuration by the parameters. The write task is executed continuously. Set the value to 'false' to cancel the write task. *false* *true*
	250	Reserved		6 bit			Reserved

NOTE: The process data input content can also be read via parameter ‘Process Data Input’ at index 40 (0x28).
The process data output content can also be read via parameter ‘Process Data Output’ at index 41 (0x29).

Process Data – Expert Mode

Process Data valid for Operation Mode: “Expert Mode” (Index 64, value 0), see *Parameterization & Configuration – Operation Mode*.

Process Data Input

Octet	*Bitoffs.*	*Name*	*Data type*	*Length*	*Value*	*Unit*	*Description*
3 .. 31	0	Data	Octetstr	29 byte			Contains the data of a read or write operation.
2	232	Fragmentation Counter	UInteger	8 bit			Shows the remaining number of fragments of the frame to be transmitted.
0 .. 1	240	Frame Length	UInteger	12 bit			Shows the total number of valid bytes inside the current process data frame.
	252	Reserved		1 bit			Reserved
	253	Handshake – UD	Boolean	1 bit	*0* *1*		Control bits for realization of the handshake procedure or clearing the device memory. *Handshake bit not set* *Handshake bit set*
	254	Handshake – UM	Boolean	1 bit			*See Bitoffset 253*
	255	Handshake – D	Boolean	1 bit			*See Bitoffset 253*

Process Data Output

Structure and content are identical to Process Data Input

NOTE: The process data input content can also be read via parameter ‘Process Data Input’ at index 40 (0x28).
The process data output content can also be read via parameter ‘Process Data Output’ at index 41 (0x29).

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	8 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	22 byte	RFID read/write device	Additional product information for the device.		
21 (0x15)	Serial Number	ro	String	14 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	30 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

Parameterization & Configuration											
Index .sub	***Parameter***	***Access***	***Data type***	***Length***	***Bitoffs.***	***Default***	***Value***	***Unit***	***Description***	***DS***	***R***
64 (0x40)	Operation Mode	rw	UInteger	8 bit		128	*0* *128*		Defines the operation mode with which the RFID read/write device is operated. For standard applications, the Easy Mode is to be preferred. *Expert Mode* *Easy Mode*	Y	FA
65 (0x41)	Read Task	rw	Record	5 byte					Easy Mode only: Defines the parameter and memory location for read access to the tag data.	Y	FA
.1	Memory Area	rw	UInteger	8 bit	32	0	*0* *64* *128*		Defines the memory location for read access to the tag data. *UII/EPC + User Memory* *UII/EPC* *UII/EPC + TID*	Y	FA
.2	Number Of Bytes	rw	UInteger	8 bit	24	8	1 .. 28		Defines the number of bytes for read access to the user memory of the tag. The value must be a multiple of 4. Maximum length of data is 28 bytes.	Y	FA
.3	Start Address	rw	UInteger	16 bit	8	0x0000	0x0000 .. 0xFFFF		Defines the start address for read access to the user memory of the tag. The value must be a multiple of 4.	Y	FA
.4	Autostart	rw	UInteger	8 bit	0	128	*0* *128*		Defines whether a read task is started automatically according to the parameter settings. The value must be 'disabled' so that a manual read task (or also write task) can be started via the process data. *Disabled* *Enabled*	Y	FA
66 (0x42)	Write Task	rw	Record	4 byte					Easy Mode only: Defines the parameter and memory location for write access to the tag data.	Y	FA
.1	Memory Area	rw	UInteger	8 bit	24	0	*0* *32* *64*		Defines the memory location for write access to the tag data. *User Memory* *UII/EPC (incl. PC)* *EPC (excl. PC)*	Y	FA
.2	Number Of Bytes	rw	UInteger	8 bit	16	8	1 .. 28		Defines the number of bytes for write access to the tag data. The value must be a multiple of 4 if user memory is selected and a multiple of 2 if UII/EPC is selected. Maximum length of data is 28 bytes.	Y	FA
.3	Start Address	rw	UInteger	16 bit	0	0x0000	0x0000 .. 0xFFFF		Defines the start address for write access to the user memory of the tag. The value must be a multiple of 4.	Y	FA
67 (0x43)	Input Representation	rw	UInteger	8 bit		0	*0* *128*		Defines the content of the read data. If the long form representation is used, a read access to the user memory or the TID is always preceded by the UII/EPC and additional length information. *Long form* *Short form*	Y	FA
96 (0x60)	Transmission Powers (PT)	rw	Record	10 byte					Defines the set of different power levels, which the RFID read/write device will use when accessing a tag. This allows to define a ramp for a continuous increase of the transmission power.	Y	FA

Parameterization & Configuration											
Index .sub	**Parameter**	**Access**	**Data type**	**Length**	**Bitoffs.**	**Default**	**Value**	**Unit**	**Description**	**DS**	**R**
.1	Power 1	rw	UInteger	16 bit	64	150	*3* *4* *5* *6* *8* *10* *13* *15* *20* *25* *30* *40* *50* *60* *80* *100* *125* *150*	mW	Defines the transmission power, which the RFID read/write device will use when accessing a tag. *3 mW (5 dBm)* *4 mW (6 dBm)* *5 mW (7 dBm)* *6 mW (8 dBm)* *8 mW (9 dBm)* *10 mW (10 dBm)* *13 mW (11 dBm)* *15 mW (12 dBm)* *20 mW (13 dBm)* *25 mW (14 dBm)* *30 mW (15 dBm)* *40 mW (16 dBm)* *50 mW (17 dBm)* *60 mW (18 dBm)* *80 mW (19 dBm)* *100 mW (20 dBm)* *125 mW (21 dBm)* *150 mW (22 dBm)*	Y	FA
.2	Power 2	rw	UInteger	16 bit	48	0	*0* *3* *4* *5* *6* *8* *10* *13* *15* *20* *25* *30* *40* *50* *60* *80* *100* *125* *150*	mW	Defines the transmission power, which the RFID read/write device will use when accessing a tag. *Disabled* *3 mW (5 dBm)* *4 mW (6 dBm)* *5 mW (7 dBm)* *6 mW (8 dBm)* *8 mW (9 dBm)* *10 mW (10 dBm)* *13 mW (11 dBm)* *15 mW (12 dBm)* *20 mW (13 dBm)* *25 mW (14 dBm)* *30 mW (15 dBm)* *40 mW (16 dBm)* *50 mW (17 dBm)* *60 mW (18 dBm)* *80 mW (19 dBm)* *100 mW (20 dBm)* *125 mW (21 dBm)* *150 mW (22 dBm)*	Y	FA
.3	Power 3	rw	UInteger	16 bit	32	0		mW	See subindex 2.	Y	FA
.4	Power 4	rw	UInteger	16 bit	16	0		mW	See subindex 2.	Y	FA
.5	Power 5	rw	UInteger	16 bit	0	0		mW	See subindex 2.	Y	FA
97 (0x61)	Number Of Tags To Find (NT)	rw	UInteger	8 bit		255	*255* *1 .. 20*		Expert Mode only: Defines the number of tags that are searched for in the detection range. If the number of found tags reaches or exceeds the value, the current command is terminated and the data is output. This parameter has no effect on 'Enhanced' commands. *Off* *Number Of Tags To Find*	Y	FA
98 (0x62)	Tries Allowed (TA)	rw	UInteger	8 bit		2	1 .. 10		Defines the number of access attempts during the execution of a read/write operation to a tag.	Y	FA
99 (0x63)	Expected Number Of Tags (QW)	rw	UInteger	8 bit		2	*0* *1* *2* *3* *4*		Defines the number of tags, which are expected in the detection range. This setting affects the time slot when communicating with a tag to avoid collisions caused by simultaneous communication of several tags. *exactly 1 Tag* *approx. 2 Tags* *approx. 4 Tags* *approx. 8 Tags* *approx. 16 Tags*	Y	FA
100 (0x64)	Tag Lost Smoothing (E5)	rw	UInteger	8 bit		5	0 .. 10		Defines the number of unsuccessful read/write attempts before the device signals that a	Y	FA

Parameterization & Configuration											
Index .sub	***Parameter***	***Access***	***Data type***	***Length***	***Bitoffs.***	***Default***	***Value***	***Unit***	***Description***	***DS***	***R***
									tag has left the detection range or could no longer be identified. This parameter has no effect on 'Single' commands.		
104 (0x68)	Number of Channels (NC)	rw	UInteger	8 bit		4	1 .. 50		Defines the number of transmission channels with which a single read or write attempt is made.	Y	FA

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

Diagnosis								
Index .sub	***Parameter***	***Access***	***Data type***	***Length***	***Bitoffs.***	***Value***	***Unit***	***Description***
36 (0x24)	Device Status	ro	UInteger	8 bit		*0 1 2 3 4*		Indicator for the current device condition and diagnosis state. *Device is OK Maintenance required Out of specification Functional check Failure*
37 (0x25)	Detailed Device Status	ro	Array [S0]	15 byte				List of all currently pending events in the device.
.1	Element 1		Octetstr	3 byte	96			
.2	Element 2		Octetstr	3 byte	72			
.3	Element 3		Octetstr	3 byte	48			
.4	Element 4		Octetstr	3 byte	24			
.5	Element 5		Octetstr	3 byte	0			
176 (0xB0)	Device Characteristics	ro	Record [S0]	3 byte				Shows relevant key characteristics of the device for use in applications.
.1	Region Code	ro	UInteger	8 bit	16			Shows the code for the region, where operation of the device according to certifications is permitted.
.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		*0 1 2 3 4*		Indicates the operation at ambient temperatures close to or in excess of specification limits. *Operating condition OK Close to upper limit Upper limit exceeded Close to lower limit Lower limit exceeded*
226 (0xE2)	Temperature Monitor	ro	Record [S0]	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 .. 65535		Shows the number of transitions to operating temperatures above the specified limit in powered operation since initial commissioning.
.3	Maximum Operating Temperature	ro	Integer	8 bit	16	-40 .. 125	°C	Shows the maximum observed temperature in powered operation since initial commissioning.
.4	Minimum Operating Temperature	ro	Integer	8 bit	8	-40 .. 125	°C	Shows the minimum observed temperature in powered operation since initial commissioning.
.5	Device Operating Temperature	ro	Integer	8 bit	0	-40 .. 125	°C	Shows the currently observed operating temperature of the device.
227 (0xE3)	Power Monitor	ro	Record [S0]	16 byte				Contains parameters showing the power cycle and uptime statistics since initial commissioning.
.1	Power Cycle Count	ro	UInteger	32 bit	96			Shows the number of power cycles since initial commissioning.
.2	Maximum Uptime	ro	UInteger	32 bit	64		s	Shows the maximum observed powered operating time between power cycles in seconds since initial commissioning.
.3	Average Uptime	ro	UInteger	32 bit	32		s	Shows the average observed powered operating time between power cycles in seconds since initial commissioning.
.4	Uptime	ro	UInteger	32 bit	0		s	Shows the current operating time since the last power cycle in seconds.

Observation								
Index .sub	***Parameter***	***Access***	***Data type***	***Length***	***Bitoffs.***	***Value***	***Unit***	***Description***
36 (0x24)	Device Status	ro	UInteger	8 bit				Indicator for the current device condition and diagnosis state. *See Diagnosis – Device Status.*
40 (0x28)	PD Input	ro	Record [S0]	32 byte				Last valid process input data of the device. *See Process Data Input.*
41 (0x29)	PD Output	ro	Record [S0]	32 byte				Last valid process output data written to the device. *See Process Data Output.*
64 (0x40)	Operation Mode	ro	UInteger	8 bit				Indicator for the current operation mode of the device. *See Parameterization & Configuration – Operation Mode.*

NOTE: Parameters with datatype Record or Array, which are marked with 'S0' can only be accessed via 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*
126 (0x7E)	Locator Start	Starts the Locator indication (double flashing every second) with all green and yellow LEDs.
127 (0x7F)	Locator Stop	Stops the Locator indication.
129 (0x81)	Application Reset	The parameters of the technology-specific application are set to default values. Identification parameters 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.
129 (0x81)	1 (0x01)	Transmission channels must be unique	It is not allowed to select the same channel more than once.

Event Codes

Code	*Type*	*Name*	*Description*
20480 (0x5000)	Error	Hardware error.	Device hardware fault – Device exchange
36163 (0x8D43)	Warning	Ambient temperature outside specified temperature range.	Check sensor environment for heat sources.
36176 (0x8D50)	Warning	Data buffer overflow.	An overflow of data in the buffer occurs due to excess of targets in range. Check or remove targets in range.
36177 (0x8D51)	Warning	Parser error.	An error occurs while parsing the data, some telegrams might be missing.
36304 (0x8DD0)	Error	Software error.	An assertion occurs in the RFID part.