

# IO-Link Parameter Datasheet



Analog converter

ICA-AI-I/U-IO-V1



Support: fa-info@pepperl-fuchs.com  
Internet: www.pepperl-fuchs.com

DOCT-7251B - Version 1.01.000 / 2023-12-14

## General Information

### Device Identification

Vendor ID	1 (0x0001)
Device ID	984321 (0x0F0501)

### Features

Data Storage	Yes
Block Parameterization	Yes

### Communication Characteristics

IO-Link revision	V1.1 (specification V1.1.2)
IO-Link backward compatibility	n/a
Data transmission rate	COM2 (38.4 kbit/s)
Min. cycle time	2.3 ms
Process data input	2 byte
Process data output	n/a
SIO mode support	no
Compatible master port type	Class A, Class B

### Profile

Not available	

## Supported Product Variants

Product ID	Product Name	Description	Connector
70128166	ICA-AI-I/U-IO-V1	Analog to IO-Link converter, analog input, configurable: 4 .. 20 mA, 0 .. 20 mA, 0 .. 10 V, -10 .. 10 V, M12 4-pin.	Plug, M12, 4-pin
70153267	ICA-AI-I/U-IO-V1	Analog to IO-Link converter, analog input, configurable: 4 .. 20 mA, 0 .. 20 mA, 0 .. 10 V, -10 .. 10 V, M12 4-pin	Plug, M12, 4-pin

## Connection

Connection Diagram	Description
<p>1: +24V (L+) 2: n.c. 3: GND (L-) 4: C/Q</p>	<p><b>Plug, M12, 4-pin</b></p> <p>1: Brown - +24V 2: White - n.c. 3: Blue - 0V 4: Black - C/Q</p>
<p>1: +24V (L+) 2: AI 3: GND (L-) 4: n.c.</p>	

## Process Data

### Process Data Input

Sub	Name	Data type	Length	Bitoffs.	Value	Unit	Description
<i>Condition: Analog Input Type = 1 (0 .. 10 V)</i>							
	Analog Input 0 .. 10 V	Integer	16 bit	0	-1.76 .. 11.76 (-4864 .. 32511) -32768 32767	V	Calculation: gradient 0.0003617, offset 0.00  <i>AI underrun</i> <i>AI overrun</i>
<i>Condition: Analog Input Type = 2 (-10 .. 10 V)</i>							
	Analog Input -10 .. 10 V	Integer	16 bit	0	-11.76 .. 11.76 (-32512 .. 32511) -32768 32767	V	Calculation: gradient 0.0003617, offset 0.00  <i>AI underrun</i> <i>AI overrun</i>
<i>Condition: Analog Input Type = 3 (0 .. 20 mA)</i>							
	Analog Input 0 .. 20 mA	Integer	16 bit	0	-3,52 .. 23.52 (-4864 .. 32511) -32768 32767	mA	Calculation: gradient 0.0007234, offset 0.00  <i>AI underrun</i> <i>AI overrun</i>
<i>Condition: Analog Input Type = 4 (4 .. 20 mA)</i>							
	Analog Input 4 .. 20 mA	Integer	16 bit	0	1.19 .. 22.81 (-4864 .. 32511) -32768 32767	mA	Calculation: gradient 0.0005787, offset 4.00  <i>AI underrun</i> <i>AI overrun</i>

NOTE: The process data input content can be accessed in addition over 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. 30 byte	See table <i>Supported Product Variants</i>	Complete product name.		
19 (0x13)	Product ID	ro	String	13 byte	See table <i>Supported Product Variants</i>	Vendor-specific product or type identification (e.g., item number or model number).		
20 (0x14)	Product Text	ro	String	max. 30 byte	I/U analog input to IO-Link converter	Additional product information for the device.		
21 (0x15)	Serial Number	ro	String	14 byte		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

Diagnosis											
Index .sub	Parameter	Access	Data type	Length	Bitoffs.	Default	Value	Unit	Description	DS	R
36 (0x24)	Device Status	ro	UInteger	8 bit		0	0 1 2 3 4		Indicator for the current device condition and diagnosis state. <i>Device is OK</i> <i>Maintenance required</i> <i>Out of specification</i> <i>Functional check</i> <i>Failure</i>		F
37 (0x25)	Detailed Device Status	ro	Array <sup>50</sup>	18 byte 6 items					List of all currently pending events in the device.		F
	.1 Element 1		Octetstr	3 byte	120	0					
	.. ..		..	..	..	0					
	.6 Element 6		Octetstr	3 byte	0	0					
69 (0x45)	Event Status	ro	Record <sup>50</sup>	4 byte					Shows which event sources indicate a currently active event status.		F
	.2 Warning Threshold Underrun	ro	Boolean	1 bit	1	false	false true		Active: the process data value is below the configured lower value of the warning threshold.  <i>Inactive</i> <i>Active</i>		F
	.3 Warning Threshold Overrun	ro	Boolean	1 bit	2	false	false true		Active: the process data value is above the configured upper value of the warning threshold.  <i>Inactive</i> <i>Active</i>		F
	.4 Temperature Overrun	ro	Boolean	1 bit	3	false	false true		Active: the device ambient temperature is above the specified temperature range.  <i>Inactive</i> <i>Active</i>		F
	.5 Supply Voltage Overrun	ro	Boolean	1 bit	4	false	false true		Active: the supply voltage is $U_b > 30V$ .  <i>Inactive</i> <i>Active</i>		F
	.6 Supply Voltage Underrun	ro	Boolean	1 bit	5	false	false true		Active: the supply voltage is $U_b < 18V$ .  <i>Inactive</i> <i>Active</i>		F
	.12 Supply Current Overload	ro	Boolean	1 bit	11	false	false true		Active: the current consumption of the connected device is too high.  <i>Inactive</i> <i>Active</i>		F
	.15 Analog Input Underrun	ro	Boolean	1 bit	14	false	false true		Active: the analog input value is below the nominal range.  <i>Inactive</i> <i>Active</i>		F
.16 Analog Input Overrun	ro	Boolean	1 bit	15	false	false true		Active: the analog input value is above the nominal range.  <i>Inactive</i> <i>Active</i>		F	
151 (0x97)	Operating Temperature	ro	Integer	8 bit			-50 .. 125	°C	Shows the current internal temperature of the device.		

Parameterization & Configuration												
Index .sub	Parameter	Access	Data type	Length	Bitoffs.	Default	Value	Unit	Description	DS	R	
64 (0x40)	Event Config	rw	Record <sup>50</sup>	2 byte					Defines which event sources can trigger events.	Y	F	
	.2 Warning Threshold Underrun	rw	Boolean	1 bit	1	true	false true		Enabled: an event is generated if the process data value is below the configured lower value of the warning threshold.  Disabled Enabled	Y	F	
	.3 Warning Threshold Overrun	rw	Boolean	1 bit	2	true	false true		Enabled: an event is generated if the process data value is above the configured upper value of the warning threshold.  Disabled Enabled	Y	F	
	.4 Temperature Overrun	rw	Boolean	1 bit	3	true	false true		Enabled: an event is generated if the device ambient temperature is above the specified temperature range.  Disabled Enabled	Y	F	
	.5 Supply Voltage Overrun	rw	Boolean	1 bit	4	true	false true		Enabled: an event is generated if the supply voltage is $U_b > 30V$ .  Inactive Active	Y	F	
	.6 Supply Voltage Underrun	rw	Boolean	1 bit	5	true	false true		Enabled: an event is generated if the supply voltage is $U_b < 18V$ .  Disabled Enabled	Y	F	
	.12 Supply Current Overload	rw	Boolean	1 bit	11	true	false true		Enabled: an event is generated if the current consumption of the connected device is too high.  Disabled Enabled	Y	F	
	.15 Analog Input Underrun	rw	Boolean	1 bit	14	true	false true		Enabled: an event is generated if the analog input value is below the nominal range.  Disabled Enabled	Y	F	
	.16 Analog Input Overrun	rw	Boolean	1 bit	15	true	false true		Enabled: an event is generated if the analog input value is above the nominal range.  Disabled Enabled	Y	F	
65 (0x41)	Warning Threshold - Lower Value	rw	Integer	16 bit		-32768	-32768 .. 32767		Defines the lower threshold for the process data value. If the process data value drops below this threshold, an event 'Warning threshold underrun' is triggered.	Y	F	
	<i>Condition: Analog Input Type = 1 (0 .. 10 V)</i>											
							-11.85	-11.85 .. 11.85	V	Calculation: gradient 0.0003617, offset 0.00		
	<i>Condition: Analog Input Type = 2 (-10 .. 10 V)</i>											
							-11.85	-11.85 .. 11.85	V	Calculation: gradient 0.0003617, offset 0.00		
	<i>Condition: Analog Input Type = 3 (0 .. 20 mA)</i>											
							-23.70	-23.70 .. 23.70	mA	Calculation: gradient 0.0007234, offset 0.00		
<i>Condition: Analog Input Type = 4 (4 .. 20 mA)</i>												
						-14.96	-14.96 .. 22.96	mA	Calculation: gradient 0.0005787, offset 4.00			

Parameterization & Configuration											
Index .sub	Parameter	Access	Data type	Length	Bitoffs.	Default	Value	Unit	Description	DS	R
66 (0x42)	Warning Threshold - Upper Value	rw	Integer	16 bit		32767	-32768 .. 32767		Defines the upper threshold for the process data value. If the process data value exceeds this threshold, an event 'Warning threshold overrun' is triggered.	Y	F
	<i>Condition: Analog Input Type = 1 (0 .. 10 V)</i>										
						11.85	-11.85 .. 11.85	V	Calculation: gradient 0.0003617, offset 0.00		
	<i>Condition: Analog Input Type = 2 (-10 .. 10 V)</i>										
						11.85	-11.85 .. 11.85	V	Calculation: gradient 0.0003617, offset 0.00		
	<i>Condition: Analog Input Type = 3 (0 .. 20 mA)</i>										
						23.70	-23.70 .. 23.70	mA	Calculation: gradient 0.0007234, offset 0.00		
<i>Condition: Analog Input Type = 4 (4 .. 20 mA)</i>											
					22.96	-14.96 .. 22.96	mA	Calculation: gradient 0.0005787, offset 4.00			
67 (0x43)	Average Filter	rw	UInteger	8 bit		0	1 .. 64  0		Defines the averaging depth of the process data in IO-Link process data cycles. <i>Disabled</i>	Y	F
68 (0x44)	Analog Input Type	rw	UInteger	8 bit		1	1 2 3 4		Defines the type (current or voltage) of the analog input and the range of input values. <i>0 .. 10 V</i> <i>-10 .. 10 V</i> <i>0 .. 20 mA</i> <i>4 .. 20 mA</i>	Y	F
12 (0x0C)	Device Access Locks	rw	Record <sub>S0</sub>	2 byte					The access to the device parameters can be restricted by setting appropriate flags within this parameter.	Y	F
.2	Data Storage	rw	Boolean	1 bit	1	0	0  1		This lock prevents the write access to the device parameters via the data storage mechanism. <b>Note: This feature is implemented only for compatibility reasons. Do not set this flag to 'Locked', as this will inhibit the function Data Storage between master and device and lead to an unintended system behavior.</b> <i>Unlocked</i> <i>Locked</i>	Y	F

Observation											
Index .sub	Parameter	Access	Data type	Length	Bitoffs.	Default	Value	Unit	Description	DS	R
36 (0x24)	Device Status	ro	UInteger	8 bit		0			Indicator for the current device condition and diagnosis state. <i>See Diagnosis – Device Status</i>		F
40 (0x28)	PD Input	ro	Integer	16 bit					Last valid process input data of the device. <i>See Process Data Input</i>		

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 default value upon reception of the command 'Restore Factory Settings'.

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
128 (0x80)	Device Reset	A warm start is triggered and the device will be set to an initial state. The communication will be interrupted by the device and then reinitiated by the master.
130 (0x82)	Restore Factory Settings	The parameter of the device are reset to factory settings. Note: A download of the data storage may be executed on the next power cycle and overwrite the factory default settings!

## 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
6144 (0x1800)	Error	Invalid factory data	Device error - Exchange device.
6145 (0x1801)	Error	Invalid parameter data	Device error - Exchange device.
6146 (0x1802)	Warning	Warning threshold underrun	Application warning - The process data value is below the configured lower value of the warning threshold. Take according actions specific to the application setup.
6147 (0x1803)	Warning	Warning threshold overrun	Application warning - The process data value is above the configured upper value of the warning threshold. Take according actions specific to the application setup.
6148 (0x1804)	Error	Supply current overload	Application error - The supply current for the connected device has exceeded the specification limits. Check installation or connected device.
6149 (0x1805)	Warning	Analog input overrun	Application warning - The analog input signal is above the nominal range. Check boundaries of nominal range.
6150 (0x1806)	Warning	Analog input underrun	Application warning - The analog input signal is below the nominal range. Check boundaries of nominal range.
16912 (0x4210)	Warning	Device temperature overrun	Clear source of heat
20752 (0x5110)	Warning	Primary supply voltage overrun	Check valid voltage range
20753 (0x5111)	Warning	Primary supply voltage underrun	Check valid voltage range
25376 (0x6320)	Error	Parameter error	Check data sheet and values