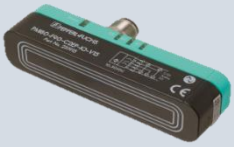


IO-Link Parameter Datasheet

Inductive positioning system

PMI80-F90-IU2EP-IO-V15-3G-3D

Support: fa-info@pepperl-fuchs.com
Internet: www.pepperl-fuchs.com
DOCT-7526 - Version 1.00.000 / 2021-08-15

General Information

Device Identification	
Vendor ID	1 (0x0001)
Device ID	2097924 (0x200304)

Features	
Data Storage	Yes
Block Parameterization	Yes

Communication Characteristics	
IO-Link revision	V1.1 (specification V1.1.2)
IO-Link backward compatibility	V1.0
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	yes
Compatible master port type	Class A, Class B (see NOTE)

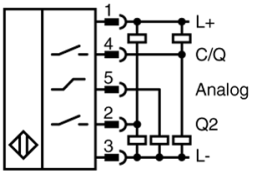
NOTE: For use at master with port class B, use 3-pole adapter or 3-wire cable.

Profile	
Smart Sensor - SSP 0	1 (0x0001)
Function Class - Device identification	32766 (0x8000)
Function Class - Multiple switching signal	32769 (0x8001)
Function Class - Process data variable	32770 (0x8002)
Function Class - Device diagnosis	32771 (0x8003)

Supported Product Variants

Product ID	*Product Name*	*Description*	*Connector*
315194	PMI80-F90-IU2EP-IO-V15-3G-3D	Position range 80 mm, resolution 0.05 mm, 2 x switching output, push-pull, analog output, current / voltage, ATEX 3G/3D, M12 plug, 5-pin	Plug, M12, 5-pin
70126069	PMI80-F90-IU2EP-IO-V15-3G-3D	Position range 80 mm, resolution 0.05 mm, 2 x switching output, push-pull, analog output, current / voltage, ATEX 3G/3D, M12 plug, 5-pin	Plug, M12, 5-pin

Connection

Connection Diagram	*Description*
	**Plug, M12, 5-pin** 1: L+ 2: Q2 3: L- 4: C/Q 5: Analog

Process Data

Process Data Input

Sub	Name	Data type	Length	Bitoffs.	Value	Unit	Description
.1	MDC – Measurement Value	UInteger	12 bit	4	0 .. 80.0 (0 .. 1600) *4092* *4093* *4094* *4095*	mm	Shows the current measurement value. Calculation: gradient 0.05, offset 0.00 *Insufficient signal* *Out of range (-)* *Out of range (+)* *No measurement data*
.2	SSC.1 – Switching Signal	Boolean	1 bit	0	*0* *1*		Indicates the detection status of an object or measurement value below/above a threshold. *Low* *High*
.3	SSC.2 – Switching Signal	Boolean	1 bit	1	*0* *1*		Indicates the detection status of an object or measurement value below/above a threshold. *Low* *High*
.4	SSC.3 – Switching Signal	Boolean	1 bit	2	*0* *1*		Indicates the detection status of an object or measurement value below/above a threshold. *Low* *High*

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 Supported Product Variants*	Complete product name.		
19 (0x13)	Product ID	ro	String	max. 16 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. 30 byte	Inductive Positioning System	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
192 (0xC0)	User Tag	rw	String	max. 32 byte	***	Possibility to mark a device with user-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. *Device is OK* *Maintenance required* *Out of specification* *Functional check* *Failure*		F
37 (0x25)	Detailed Device Status	ro	Array [S0]	6 byte					List of all currently pending events in the device.		F
.1	Element 1		Octetstr	3 byte	48	0					
.2	Element 2		Octetstr	3 byte	24	0					
.3	Element 3		Octetstr	3 byte	0	0					
127 (0x7F)	Indication Control	rw	Record [S0]	8 bit					Provides control functions for diagnosis purposes for indicators or display.		F
.1	Locator Indication	rw	Boolean	1 bit	0	0	*0* *1*		Enables a defined flashing pattern of the indicator LEDs for better spotting a sensor in field application. *Disabled* *Enabled*		F
224 (0xE0)	Operating Hours	ro	UInteger	32 bit			0 .. 2^{30} (0 .. 2^{32}-1)	h	Shows the overall hours of operation since initial commissioning in resolution of 15 minutes. Calculation: gradient 0.25, offset 0.00		
232 (0xE8)	Device Characteristic	ro	Record [S0]	6 byte					Shows relevant key characteristics of the device for use in applications.		
.1	Measurement Range	ro	Integer	16 bit	16	80.0 (1600)		mm	Shows the value of the specified measurement range. Calculation: gradient 0.05, offset 0.00		
.2	Measurement Resolution	ro	Integer	16 bit	0	50 (50)		um	Shows the measurement resolution within the specified measurement range. Calculation: gradient 1.00, offset 0.00		

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	F
.1	SP1	rw	Integer	16 bit	16	20.0 (400)	0 .. 80.0 (0 .. 1600)	mm	Defines the setpoint 1 value for the switching signal channel. Calculation: gradient 0.05, offset 0.00	Y	F
.2	SP2	rw	Integer	16 bit	0	80.0 (1600)	0 .. 80.0 (0 .. 1600)	mm	Defines the setpoint 2 value for the switching signal channel. Calculation: gradient 0.05, offset 0.00	Y	F
61 (0x3D)	SSC.1 Config	rw	Record	4 byte					Defines the configuration parameter for switching signal channel 1.	Y	F
.1	Logic	rw	UInteger	8 bit	24	0	*0* *1*		Defines the logical representation of the switching signal SSC in the process data. *High active* *Low active*	Y	F
.2	Mode	rw	UInteger	8 bit	16	128	*1* *2* *3* *128*		Defines the evaluation mode for the switching signal SSC. *Single point* *Window* *Two point* *Centered window*	Y	F
.3	Hyst	rw	Integer	16 bit	0	0	*0* *1* *2*		Defines the hysteresis at the switchpoint. A higher hysteresis may help to improve the stability in critical applications. *Low* *Medium* *High*	Y	F
62 (0x3E)	SSC.2 Param	rw	Record	4 byte					Defines the setpoint values for switching signal channel 2.	Y	F
.1	SP1	rw	Integer	16 bit	16	60.0 (1200)	0 .. 80.0 (0 .. 1600)	mm	Defines the setpoint 1 value for the switching signal channel. Calculation: gradient 0.05, offset 0.00	Y	F
.2	SP2	rw	Integer	16 bit	0	80.0 (1600)	0 .. 80.0 (0 .. 1600)	mm	Defines the setpoint 2 value for the switching signal channel. Calculation: gradient 0.05, offset 0.00	Y	F
63 (0x3F)	SSC.2 Config	rw	Record	4 byte					Defines the configuration parameter for switching signal channel 2.	Y	F
.1	Logic	rw	UInteger	8 bit	24	0	*0* *1*		Defines the logical representation of the switching signal SSC in the process data. *High active* *Low active*	Y	F
.2	Mode	rw	UInteger	8 bit	16	128	*1* *2* *3* *128*		Defines the evaluation mode for the switching signal SSC. *Single point* *Window* *Two point* *Centered window*	Y	F
.3	Hyst	rw	Integer	16 bit	0	0	*0* *1* *2*		Defines the hysteresis at the switchpoint. A higher hysteresis may help to improve the stability in critical applications. *Low* *Medium* *High*	Y	F

Parameterization & Configuration

Index .sub	Parameter	Access	Data type	Length	Bitoffs.	Default	Value	Unit	Description	DS	R
16384 (0x4000)	SSC.3 Param	rw	Record	4 byte					Defines the setpoint values for switching signal channel 2.	Y	F
.1	SP1	rw	Integer	16 bit	16	40.0 (800)	0 .. 80.0 (0 .. 1600)	mm	Defines the setpoint 1 value for the switching signal channel. Calculation: gradient 0.05, offset 0.00	Y	F
.2	SP2	rw	Integer	16 bit	0	80.0 (1600)	0 .. 80.0 (0 .. 1600)	mm	Defines the setpoint 2 value for the switching signal channel. Calculation: gradient 0.05, offset 0.00	Y	F
16385 (0x4001)	SSC.3 Config	rw	Record	4 byte					Defines the configuration parameter for switching signal channel 2.	Y	F
.1	Logic	rw	UInteger	8 bit	24	0	 *0* *1*		Defines the logical representation of the switching signal SSC in the process data. *High active* *Low active*	Y	F
.2	Mode	rw	UInteger	8 bit	16	128	 *1* *2* *3* *128*		Defines the evaluation mode for the switching signal SSC. *Single point* *Window* *Two point* *Centered window*	Y	F
.3	Hyst	rw	Integer	16 bit	0	0	 *0* *1* *2*		Defines the hysteresis at the switchpoint. A higher hysteresis may help to improve the stability in critical applications. *Low* *Medium* *High*	Y	F
64 (0x40)	SSC.1 Config Ext	rw	Record	7 byte					Defines extended configuration options for switching signal channel 1.	Y	F
.1	SP Offset	rw	Integer	16 bit	40	1.00 (20)	0.05 .. 80.0 (1 .. 1600)	mm	The setpoint offset defines the switchpoint of the sensor relative to the setpoint 1 in unit and resolution of the setpoint. Calculation: gradient 0.05, offset 0.00	Y	F
.2	Off Delay	rw	UInteger	16 bit	24	0	1 .. 60000 *0*	ms	Defines the switching delay for an on-to-off transition of the switching signal. *Disabled*	Y	F
.3	On Delay	rw	UInteger	16 bit	8	0	1 .. 60000 *0*	ms	Defines the switching delay for an off-to-on transition of the switching signal. *Disabled*	Y	F
.4	Substitute Behavior	rw	UInteger	8 bit	0	3	 *0* *1* *2* *3*		Defines the behavior of the switching signal if the measurement value is 'out-of-range' or measurement is not possible. *Hold* *Max. value* *High* *Low*	Y	F

Parameterization & Configuration

Index .sub	Parameter	Access	Data type	Length	Bitoffs.	Default	Value	Unit	Description	DS	R
65 (0x41)	SSC.2 Config Ext	rw	Record	7 byte					Defines extended configuration options for switching signal channel 1.	Y	F
.1	SP Offset	rw	Integer	16 bit	40	1.00 (20)	0.05 .. 80.0 (1 .. 1600)	mm	The setpoint offset defines the switchpoint of the sensor relative to the setpoint 1 in unit and resolution of the setpoint. Calculation: gradient 0.05, offset 0.00	Y	F
.2	Off Delay	rw	UInteger	16 bit	24	0	1 .. 60000 *0*	ms	Defines the switching delay for an on-to-off transition of the switching signal. *Disabled*	Y	F
.3	On Delay	rw	UInteger	16 bit	8	0	1 .. 60000 *0*	ms	Defines the switching delay for an off-to-on transition of the switching signal. *Disabled*	Y	F
.4	Substitute Behavior	rw	UInteger	8 bit	0	3	*0* *1* *2* *3*		Defines the behavior of the switching signal if the measurement value is 'out-of-range' or measurement is not possible. *Hold* *Max. value* *High* *Low*	Y	F
67 (0x43)	SSC.3 Config Ext	rw	Record	7 byte					Defines extended configuration options for switching signal channel 1.	Y	F
.1	SP Offset	rw	Integer	16 bit	40	1.00 (20)	0.05 .. 80.0 (1 .. 1600)	mm	The setpoint offset defines the switchpoint of the sensor relative to the setpoint 1 in unit and resolution of the setpoint. Calculation: gradient 0.05, offset 0.00	Y	F
.2	Off Delay	rw	UInteger	16 bit	24	0	1 .. 60000 *0*	ms	Defines the switching delay for an on-to-off transition of the switching signal. *Disabled*	Y	F
.3	On Delay	rw	UInteger	16 bit	8	0	1 .. 60000 *0*	ms	Defines the switching delay for an off-to-on transition of the switching signal. *Disabled*	Y	F
.4	Substitute Behavior	rw	UInteger	8 bit	0	3	*0* *1* *2* *3*		Defines the behavior of the switching signal if the measurement value is 'out-of-range' or measurement is not possible. *Hold* *Max. value* *High* *Low*	Y	F
112 (0x70)	I/O Config – C/Q (Q1) Type	rw	UInteger	8 bit		0	*0* *1* *2*		Configures the output type at pin 4 or black wire. Note: For operation with an IO-Link Master in field applications, please set the output type either to 'Push-pull' or 'PNP'. *Output - Push-pull* *Output - PNP* *Output - NPN*	Y	F
113 (0x71)	I/O Config – Q2 Type	rw	UInteger	8 bit		0	*0* *1* *2*		Configures the output type at pin 2 or white wire. *Output - Push-pull* *Output - PNP* *Output - NPN*	Y	F

Parameterization & Configuration

Index .sub	Parameter	Access	Data type	Length	Bitoffs.	Default	Value	Unit	Description	DS	R
66 (0x42)	Analog Out Param	rw	Record	4 byte					Defines the limits for the ramp characteristic of the analog output.	Y	F
.1	SP1	rw	Integer	16 bit	16	0.0 (0)	0 .. 80.0 (0 .. 1600)	mm	Defines the setpoint 1 value for the analog output ramp. Calculation: gradient 0.05, offset 0.00	Y	F
.2	SP2	rw	Integer	16 bit	0	80.0 (1600)	0 .. 80.0 (0 .. 1600)	mm	Defines the setpoint 2 value for the analog output ramp. Calculation: gradient 0.05, offset 0.00	Y	F
114 (0x72)	Analog Out Config	rw	Record	9 byte					Defines the configuration parameter for the analog output behavior.	Y	F
.1	Type	rw	UInteger	8 bit	64	0	*0* *1*		Defines the analog output type. *Current* *Voltage*	Y	F
.2	Mode	rw	UInteger	8 bit	56	0	*0* *1*		Defines the characteristic of the analog output ramp. *Rising ramp* *Falling ramp*	Y	F
.3	Lower Output Value Current	rw	UInteger	8 bit	48	40	0 .. 20.0 (0 .. 200)	mA	Defines the lower output value of the analog current output. Calculation: gradient 0.10, offset 0.00	Y	F
.4	Upper Output Value Current	rw	UInteger	8 bit	40	200	0 .. 20.0 (0 .. 200)	mA	Defines the upper output value of the analog current output. Calculation: gradient 0.10, offset 0.00	Y	F
.5	Lower Output Value Voltage	rw	UInteger	8 bit	32	0	0 .. 10.0 (0 .. 100)	V	Defines the lower output value of the analog voltage output. Calculation: gradient 0.10, offset 0.00	Y	F
.6	Upper Output Value Voltage	rw	UInteger	8 bit	24	100	0 .. 100 (0 .. 100)	V	Defines the upper output value of the analog voltage output. Calculation: gradient 0.10, offset 0.00	Y	F
.7	Substitute Behavior	rw	UInteger	8 bit	16	1	*0* *1* *2*		Defines the behavior of the analog output, if the measurement value is 'out-of-range' or measurement is not possible. *Hold* *Max. value* *Substitute value*	Y	F
.8	Substitute Value Current	rw	UInteger	8 bit	8	36	0 .. 20.0 (0 .. 200)	mA	Defines the substitute value for the analog current output, if substitute value is selected as substitute behavior. Calculation: gradient 0.10, offset 0.00	Y	F
.9	Substitute Value Voltage	rw	UInteger	8 bit	0	0	0 .. 100 (0 .. 100)	V	Defines the substitute value for the analog voltage output, if substitute value is selected as substitute behavior. Calculation: gradient 0.10, offset 0.00	Y	F

Parameterization & Configuration											
Index .sub	***Parameter***	***Access***	***Data type***	***Length***	***Bitoffs.***	***Default***	***Value***	***Unit***	***Description***	***DS***	***R***
120 (0x78)	Event Config	rw	Record [S0]	2 byte					Defines which event sources can trigger events.	Y	F
.1	Warning - Invalid Measurement	rw	UInteger	8 bit	8	0	*0* *1*		Enabled: An event is generated if sensor signals do not allow a valid processing of measurement values or data are not available. *Disabled* *Enabled*	Y	F
.2	Warning - Insufficient Signal	rw	UInteger	8 bit	0	0	*0* *1*		Enabled: An event is generated if sensor signals are too weak or insufficient. *Disabled* *Enabled*	Y	F
97 (0x61)	Eval Config – Damping Element	rw	UInteger	8 bit		0	*0* *1*		Defines the operating mode for damping element evaluation. Absolute position values are measured with one damping element. With selection of two damping elements the position difference between the two targets is measured. *One element – absolute measurement* *Two elements – relative measurement*	Y	F
12 (0x0C)	Device Access Locks	rw	Record [S0]	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. **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.** *Unlocked* *Locked*	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					Indicator for the current device condition and diagnosis state. *See Diagnosis – Device Status*		F
40 (0x28)	PD Input	ro	Integer	16 bit					Last valid process input data of the device. *See Process Data Input*		
236 (0xEC)	Observation Data	ro	Record S0	6 byte					Provides a set of relevant data suitable for observation purposes.		
.1	MDC – Measurement Value	ro	UInteger	16 bit	32		0 .. 80.0 (0 .. 1600) *4092* *4093* *4094* *4095*	mm	Shows the current measurement value. Calculation: gradient 0.05, offset 0.00 *Insufficient signal* *Out of range (-)* *Out of range (+)* *No measurement data*		
.2	DSC – Signal Quality Indicator	ro	UInteger	8 bit	24		*0* *1* *2* *3*		Shows the quality of the evaluated sensor signal. Quality drops with weak signal or interference. *Insufficient* *Acceptable* *Good* *Excellent*		
.3	SSC.1 – Switching Signal	ro	UInteger	8 bit	16		*0* *1*		Indicates the detection status of an object or measurement value below/above a threshold. *Low* *High*		
.4	SSC.2 – Switching Signal	ro	UInteger	8 bit	8		*0* *1*		Indicates the detection status of an object or measurement value below/above a threshold. *Low* *High*		
.5	SSC.3 – Switching Signal	ro	UInteger	8 bit	0		*0* *1*		Indicates the detection status of an object or measurement value below/above a threshold. *Low* *High*		

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*
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*
36160 (0x8D40)	Warning	Insufficient signal	Check damping element distance from sensor.
36161 (0x8D41)	Warning	Measurement not possible, no data available	Check sensor adjustment or target position.