



# IO-Link Parameter Datasheet

Inductive positioning system

PMI15V-F166-EP-IO\* series

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## General Information

Device Identification		Features	
Vendor ID	1 (0x0001)	Data Storage	Yes
Device ID	2098433 (0x200501)	Block Parameterization	Yes

  

Communication Characteristics		Profile	
IO-Link revision	V1.1 (specification V1.1.3)	Smart Sensor - SSP 0	1 (0x0001)
IO-Link backward compatibility	n/a	Smart Sensor - SSP 3.1	10 (0x000A)
Data transmission rate	COM2 (38.4 kbit/s)	Identification & Diagnosis - I&D	16384 (0x4000)
Min. cycle time	3.0 ms	Function Class - Multiple switching signal	32769 (0x8001)
Process data input	4 byte	Function Class - Product URI	33026 (0x8102)
Process data output	n/a		
SIO mode support	yes		
Compatible master port type	Class A, Class B		

## Supported Product Variants

Product ID	Product Name	Description	Connector
70105594	PMI15V-F166-EP-IO-1M-V1	Position range 15 mm, resolution 10 um, switching output, push-pull, M12 plug, 3-pin.	Plug, M12, 3-pin
70105595	PMI15V-F166-EP-IO	Position range 15 mm, resolution 10 um, switching output, push-pull, cable, 3-pole (with shield).	Cable, 3-pole
70105596	PMI15V-F166-EP-IO-1M-Y70105596	Position range 15 mm, resolution 10 um, switching output, push-pull, cable, 3-pole.	Cable, 3-pole

## Connection

Connection Diagram	Description
	<p><b>Plug, M12, 3-pin</b> 1: Brown - +24V 3: Blue - 0V 4: Black - C/Q</p>
	<p><b>Cable, 3-pole</b> Brown - +24V Blue - 0V Black - C/Q</p>

## Process Data

### Process Data Input

Sub	Name	Data type	Length	Bitoffs.	Value	Unit	Description
.1	Measurement Value	Integer	16 bit	16	0 .. 15.00 (0 .. 1500) -32760 32760 32764	mm	Shows the current measurement value.  <i>Out of Range (-)</i> <i>Out of Range (+)</i> <i>No measurement data</i>
.2	Scale	Integer	8 bit	8	-5		Shows the multiplier for the measurement value - 10exp(scale). <i>Resolution 0.01 mm</i>
.3	SSC.1 – Switching Signal	Bool	1 bit	0	0 1		Shows the current status of the switching signal 1.  <i>Low</i> <i>High</i>
.4	SSC.2 – Switching Signal	Bool	1 bit	1	0 1		Shows the current status of the switching signal 2.  <i>Low</i> <i>High</i>
.5	Signal Quality Indicator	UInteger	2 bit	2	0 1 2 3		Shows the quality of the evaluated sensor signal. Quality drops with weak signal or interference.  <i>Insufficient</i> <i>Acceptable</i> <i>Good</i> <i>Excellent</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	8 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	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
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. 64 byte	https://pefu.de/<serial number>	Provides a unique instance identification compliant to DIN-SPEC 91406.		

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>		FA
37 (0x25)	Detailed Device Status	ro	Array <sup>SO</sup>	6 byte					List of all currently pending events in the device.		FA
.1	Element 1		Octetstr	3 byte	24	0					
.2	Element 2		Octetstr	3 byte	0	0					
224 (0xE0)	Operating Hours	ro	UInteger	32 bit			0 .. 2 <sup>32</sup> -1	h	Shows the overall hours of operation since initial commissioning.		
225 (0xE1)	Temperature Indicator	ro	UInteger	8 bit		0	0 1 2 3 4		Indicates the operation at ambient temperatures close to or in excess of specification limits. <i>Operating condition OK</i> <i>Close to upper limit</i> <i>Upper limit exceeded</i> <i>Close to lower limit</i> <i>Lower limit exceeded</i>		
226 (0xE2)	Temperature Monitor	ro	Record <sup>SO</sup>	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 <sup>32</sup> -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		-50 .. 125	°C	Shows the maximum observed temperature in powered operation since initial commissioning.		
.4	Minimum Operating Temperature	ro	Integer	8 bit	8		-50 .. 125	°C	Shows the minimum observed temperature in powered operation since initial commissioning.		
.5	Device Operating Temperature	ro	Integer	8 bit	0		-50 .. 125	°C	Shows the currently observed operating temperature of the device.		
176 (0xB0)	Device Characteristic	ro	Record <sup>SO</sup>	6 byte					Shows relevant key characteristics of the device for use in applications.		
.1	Measurement Range	ro	Integer	16 bit	32	15.00 (1500)		mm	Shows the value of the specified measurement range.		
.2	Measurement Resolution	ro	Integer	16 bit	16	0.01 (1)		mm	Shows the measurement resolution within the specified measurement range.		
.3	Supply Current Requirement	ro	UInteger	16 bit	0			mA	Shows the maximum specified supply current for the device excluding load.		
16512 (0x4080)	Measurement Data Channel Descriptor	ro	Record <sup>SO</sup>	11 byte					Descriptor containing characteristic data of the measurement data channel (process data MV).		
.1	Lower Limit	ro	Integer	32 bit	56				Shows the lower value of the measurement range.		
.2	Upper Limit	ro	Integer	32 bit	24				Shows the upper value of the measurement range.		
.3	Unit Code	ro	UInteger	16 bit	8				Shows the unique code for the physical unit.		
.4	Scale	ro	Integer	8 bit	0				Shows the multiplier for measurement value - 10exp(scale).		

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	16 bit	16	3.75 (375)	0 .. 15.00 (0 .. 1500)	mm	Defines the setpoint 1 value for the switching signal channel.	Y	FA
	.2 SP2	rw	Integer	16 bit	0	15.00 (1500)	0 .. 15.00 (0 .. 1500)	mm	Defines the setpoint 2 value for the switching signal channel.	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	24	0	0 1		Defines the logical behavior of the switching signal.  <i>High active</i> <i>Low active</i>	Y	FA
	.2 Mode	rw	UInteger	8 bit	16	128	0 1 2 3 128		Defines the evaluation mode for the switching signal.  <i>Deactivated</i> <i>Single point</i> <i>Window</i> <i>Two point</i> <i>Centered window</i>	Y	FA
	.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.  <i>Low</i> <i>Medium</i> <i>High</i>	Y	FA
62 (0x3E)	SSC.2 Param	rw	Record	4 byte					Defines the setpoint values for switching signal channel 2.	Y	FA
	.1 SP1	rw	Integer	16 bit	16	11.25 (1125)	0 .. 15.00 (0 .. 1500)	mm	Defines the setpoint 1 value for the switching signal channel.	Y	FA
	.2 SP2	rw	Integer	16 bit	0	15.00 (1500)	0 .. 15.00 (0 .. 1500)	mm	Defines the setpoint 2 value for the switching signal channel.	Y	FA
63 (0x3F)	SSC.2 Config	rw	Record	4 byte					Defines the configuration parameter for switching signal channel 2.	Y	FA
	.1 Logic	rw	UInteger	8 bit	24	0	0 1		Defines the logical behavior of the switching signal.  <i>High active</i> <i>Low active</i>	Y	FA
	.2 Mode	rw	UInteger	8 bit	16	128	0 1 2 3 128		Defines the evaluation mode for the switching signal.  <i>Deactivated</i> <i>Single point</i> <i>Window</i> <i>Two point</i> <i>Centered window</i>	Y	FA
	.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.  <i>Low</i> <i>Medium</i> <i>High</i>	Y	FA

Parameterization & Configuration											
Index .sub	Parameter	Access	Data type	Length	Bitoffs.	Default	Value	Unit	Description	DS	R
64 (0x40)	SSC.1 Config Ext	rw	Record	4 byte					Defines extended configuration options for switching signal channel 1.	Y	FA
	.1 SP Offset	rw	Integer	16 bit	40	1.00 (100)	0.01 .. 15.00 (1 .. 1500)	mm	The setpoint offset defines the switchpoint of the sensor relative to the setpoint 1 in unit and resolution of the setpoint.	Y	FA
	.2 Pulse Extension	rw	UInteger	8 bit	8	0	0 1 2 3 4		Extends the active state of the switching signal by the selected time. Auto: pulse extension based on master cycle time.  <i>Off</i> <i>Auto</i> <i>Time 1 - 10 ms</i> <i>Time 2 - 100 ms</i> <i>Time 3 - 1 s</i>	Y	FA
	.3 Substitute Behavior	rw	UInteger	8 bit	0	3	0 2 3		Defines the behavior of the switching signal if the measurement value is 'out-of-range' or measurement is not possible.  <i>Hold</i> <i>Active</i> <i>Inactive</i>	Y	FA
65 (0x41)	SSC.2 Config Ext	rw	Record	4 byte					Defines extended configuration options for switching signal channel 2.	Y	FA
	.1 SP Offset	rw	Integer	16 bit	1.00 (100)	1.00 (100)	0.01 .. 15.00 (1 .. 1500)	mm	The setpoint offset defines the switchpoint of the sensor relative to the setpoint 1 in unit and resolution of the setpoint.	Y	FA
	.2 Pulse Extension	rw	UInteger	8 bit	8	0	0 1 2 3 4		Extends the active state of the switching signal by the selected time. Auto: pulse extension based on master cycle time.  <i>Off</i> <i>Auto</i> <i>Time 1 - 10 ms</i> <i>Time 2 - 100 ms</i> <i>Time 3 - 1 s</i>	Y	FA
	.3 Substitute Behavior	rw	UInteger	8 bit	0	3	0 2 3		Defines the behavior of the switching signal if the measurement value is 'out-of-range' or measurement is not possible.  <i>Hold</i> <i>Active</i> <i>Inactive</i>	Y	FA
120 (0x78)	Event Config	rw	Record <sup>SO</sup>	2 byte					Defines which event sources can trigger events.	Y	FA
.2	Warning - Invalid Measurement	rw	Boolean	1 bit	1	0	0 1		Enabled: an event is generated if sensor signals do not allow a valid evaluation or no measurement data are available.  <i>Disabled</i> <i>Enabled</i>	Y	FA

Observation											
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>		FA
236 (0xEC)	Measurement Data	ro	Record <sup>S0</sup>	5 byte					Collection of measurement data relevant for observation of device operational state.		
.1	Measurement Value	ro	Integer	16 bit	24	0	0 .. 15.00 (0 .. 1500) -32760 32760 32764	mm	Shows the current measurement value.  <i>Out of Range (-)</i> <i>Out of Range (+)</i> <i>No measurement data</i>		
.2	Signal Quality Indicator	ro	UInteger	8 bit	8	0	0 1 2 3		Shows the quality of the evaluated sensor signal. Quality drops with weak signal or interference.  <i>Insufficient</i> <i>Acceptable</i> <i>Good</i> <i>Excellent</i>		
.3	SSC.1 – Switching Signal 1	ro	UInteger	8 bit	8	0	0 1		Shows the current status of the switching signal 1.  <i>Low</i> <i>High</i>		
.4	SSC.2 – Switching Signal 2	ro	UInteger	8 bit	0	0	0 1		Shows the current status of the switching signal 2.  <i>Low</i> <i>High</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 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
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 parameter 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
36161 (0x8D41)	Warning	Measurement not possible, no measurement data available	Check sensor adjustment or target position.
36163 (0x8D43)	Warning	Ambient temperature outside specified temperature range	Check sensor environment for heat sources.