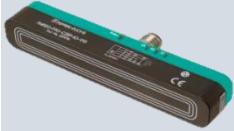


IO-Link Parameter Datasheet



Inductive positioning system



PMI120-F90-3EP-IO-V15

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

DOCT-7528 - Version 1.00.000 / 2021-08-15

General Information

Device Identification

| | |
|-----------|--------------------|
| Vendor ID | 1 (0x0001) |
| Device ID | 2098178 (0x200402) |

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.

Features

| | |
|------------------------|-----|
| Data Storage | Yes |
| Block Parameterization | Yes |

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 |
|------------|-----------------------|---|------------------|
| 231922 | PMI120-F90-3EP-IO-V15 | Position range 120 mm, resolution 0.05 mm, 3 x switching output, push-pull, configurable, M12 plug, 5-pin | Plug, M12, 5-pin |

Connection

| Connection Diagram | Description |
|--------------------|--|
| | <p>Plug, M12, 5-pin</p> <p>1: L+ 2: Q2 3: L- 4: C/Q 5: Q3</p> |

Process Data

| Process Data Input | | | | | | | |
|--------------------|--------------------------|-----------|--------|----------|---|------|---|
| Sub | Name | Data type | Length | Bitoffs. | Value | Unit | Description |
| .1 | MDC – Measurement Value | UInteger | 12 bit | 4 | 0 .. 120.0 (0 .. 2400) 4092 4093 4094 4095 | mm | Shows the current measurement value. Calculation: gradient 0.05, offset 0.00 <i>Insufficient signal</i> <i>Out of range (-)</i> <i>Out of range (+)</i> <i>No measurement data</i> |
| .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. <i>Low</i> <i>High</i> |
| .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. <i>Low</i> <i>High</i> |
| .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. <i>Low</i> <i>High</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 | max. 16 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 |
| 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. <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 ^{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. <i>Disabled</i> <i>Enabled</i> | | 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 | 120.0 (2400) | | 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 | 30.0 (600) | 0 .. 120.0 (0 .. 2400) | 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 | 120.00 (2400) | 0 .. 120.0 (0 .. 2400) | 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. <i>High active</i> <i>Low active</i> | Y | F |
| | .2 Mode | rw | UInteger | 8 bit | 16 | 128 | 1 2 3 128 | | Defines the evaluation mode for the switching signal SSC. <i>Single point</i> <i>Window</i> <i>Two point</i> <i>Centered window</i> | 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. <i>Low</i> <i>Medium</i> <i>High</i> | 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 | 90.0 (1800) | 0 .. 120.0 (0 .. 2400) | 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 | 120.00 (2400) | 0 .. 120.0 (0 .. 2400) | 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. <i>High active</i> <i>Low active</i> | Y | F |
| | .2 Mode | rw | UInteger | 8 bit | 16 | 128 | 1 2 3 128 | | Defines the evaluation mode for the switching signal SSC. <i>Single point</i> <i>Window</i> <i>Two point</i> <i>Centered window</i> | 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. <i>Low</i> <i>Medium</i> <i>High</i> | 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 |
| | SP1 | rw | Integer | 16 bit | 16 | 60.0 (1200) | 0 .. 120.0 (0 .. 2400) | mm | Defines the setpoint 1 value for the switching signal channel. Calculation: gradient 0.05, offset 0.00 | Y | F |
| | SP2 | rw | Integer | 16 bit | 0 | 120.0 (2400) | 0 .. 120.0 (0 .. 2400) | 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 |
| | Logic | rw | UInteger | 8 bit | 24 | 0 | 0 1 | | Defines the logical representation of the switching signal SSC in the process data. <i>High active</i> <i>Low active</i> | Y | F |
| | Mode | rw | UInteger | 8 bit | 16 | 128 | 1 2 3 128 | | Defines the evaluation mode for the switching signal SSC. <i>Single point</i> <i>Window</i> <i>Two point</i> <i>Centered window</i> | Y | F |
| | 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 | F |
| 64 (0x40) | SSC.1 Config Ext | rw | Record | 7 byte | | | | | Defines extended configuration options for switching signal channel 1. | Y | F |
| | SP Offset | rw | Integer | 16 bit | 40 | 1.00 (20) | 0.05 .. 120.0 (1 .. 2400) | 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 |
| | 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. <i>Disabled</i> | Y | F |
| | 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. <i>Disabled</i> | Y | F |
| | 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. <i>Hold</i> <i>Max. value</i> <i>High</i> <i>Low</i> | 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 .. 120.0 (1 .. 2400) | 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. <i>Disabled</i> | 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. <i>Disabled</i> | 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. <i>Hold</i> <i>Max. value</i> <i>High</i> <i>Low</i> | 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 .. 120.0 (1 .. 2400) | 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. <i>Disabled</i> | 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. <i>Disabled</i> | 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. <i>Hold</i> <i>Max. value</i> <i>High</i> <i>Low</i> | 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'. <i>Output - Push-pull</i> <i>Output - PNP</i> <i>Output - NPN</i> | 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. <i>Output - Push-pull</i> <i>Output - PNP</i> <i>Output - NPN</i> | Y | F |

| Parameterization & Configuration | | | | | | | | | | | |
|----------------------------------|----------------------------------|--------|----------------------|--------|----------|---------|-------------|------|--|----|---|
| Index .sub | Parameter | Access | Data type | Length | Bitoffs. | Default | Value | Unit | Description | DS | R |
| 115 (0x73) | I/O Config – Q3 Type | rw | UInteger | 8 bit | | 0 | 0 1 2 | | Configures the output type at pin 5 or grey wire. <i>Output - Push-pull</i> <i>Output - PNP</i> <i>Output - NPN</i> | Y | F |
| 120 (0x78) | Event Config | rw | Record ^{SO} | 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. <i>Disabled</i> <i>Enabled</i> | 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. <i>Disabled</i> <i>Enabled</i> | 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. <i>One element – absolute measurement</i> <i>Two elements – relative measurement</i> | Y | F |
| 12 (0x0C) | Device Access Locks | rw | Record ^{SO} | 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. <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 | | | | | 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> | | |
| 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 .. 120.0 (0 .. 2400) 4092 4093 4094 4095 | mm | Shows the current measurement value. Calculation: gradient 0.05, offset 0.00 <i>Insufficient signal</i> <i>Out of range (-)</i> <i>Out of range (+)</i> <i>No measurement data</i> | | |
| | .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. <i>Insufficient</i> <i>Acceptable</i> <i>Good</i> <i>Excellent</i> | | |
| | .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. <i>Low</i> <i>High</i> | | |
| | .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. <i>Low</i> <i>High</i> | | |
| .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. <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 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

| <i>Index</i> | <i>Parameter</i> | <i>Access</i> | <i>Data type</i> | <i>Length</i> | <i>Value</i> | <i>Description</i> |
|--------------|------------------|---------------|------------------|---------------|-------------------|---|
| 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. |

| <i>Command Value</i> | <i>Command</i> | <i>Description</i> |
|----------------------|--------------------------|---|
| 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

| <i>Code</i> | <i>Additional code</i> | <i>Name</i> | <i>Description</i> |
|-------------|------------------------|--|---|
| 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

| <i>Code</i> | <i>Type</i> | <i>Name</i> | <i>Description</i> |
|----------------|-------------|---|---|
| 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. |