



ENDRESS+HAUSER CERABAR PMP23

Process pressure measurement



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IO-Link PMP23

1 General Specifications

- Vendor ID: 0x0011
- Device ID: 0x000102
- IO-Link specification: Version 1.1
- IO-Link Smart Sensor Profile: 2nd Edition
- SIO mode: Yes
- Speed: COM2; 38.4 kBaud
- Minimum cycle time: 2.5 msec.
- Process data width: 48 bit (float32 + 14-bit vendor spec. + 2 bits SSC) (Input)
- IO-Link data storage: Yes
- Block configuration: Yes
- ISDU: Yes

2 Process data

The measuring device has a current output and a switch output. The status of the switch output is transmitted in the form of process data via IO-Link.

- In the SIO mode, the switch output is switched at pin 4 of the M12 plug. In the IO-Link communication mode, this pin is reserved exclusively for communication.
- The current output at pin 2 of the M12 plug is always active or can be optionally deactivated via IO-Link.

The measuring device's process data are transmitted cyclically as per SSP 4.3.1

Bit-offset	Name	Data type	Permitted values	Offset/gradient	Description
0	Process Data Input.Switching Signal Channel 1.1 Pressure	1-bit Uinteger	0 = False 1 = True	-	Switching signal status SSC 1.1
1	Process Data Input.Switching Signal Channel 1.2 Pressure	1-bit Uinteger	0 = False 1 = True	-	Switching signal status SSC 1.2
8	Summary status (Condensed)	8-bit Uinteger	<ul style="list-style-type: none"> • 36 = Error • 60 = Function check • 120 = Outside specifications • 128 = Good • 129 = Simulation • 164 = Maintenance required 	-	Summary status as per PI specification
16	Pressure	Float32	-	psi: 0/0.0001450326 bar: 0/0.00001 kPa: 0/0.001 MPa: 0/0.000001	Current pressure

Process Value Pressure [Float32]		
[47...16 bit]		
Condensed status [15...8 bit]	N/A [7...2 bit]	SSC 1.1-1.2 [1.0 bit]

3 Reading out and writing device data (ISDU – Indexed Service Data Unit)

Device data are always exchanged acyclically and at the request of the IO-Link master. Using the device data, the following parameter values or device statuses can be read:

3.1 Endress+Hauser-specific device data

ISDU (dec)	Name	ISDU (hex)	Size (byte)	Data type	Access	Default value	Value range	Offset/gradient	Data storage	Range limits
66	Sim. current	0x0042	1	UintegerT	r/w		0 ~ off 3 ~ 3.5 mA 4 ~ 4 mA 5 ~ 8 mA 6 ~ 12 mA 7 ~16 mA 8 ~ 20 mA 9 ~ 21.95 mA		No	
67	Unit changeover	0x0043	1	UintegerT	r/w	0 = bar	0 ~ bar 1 ~ kPa 2 ~ psi 3 ~ MPa		Yes	
68	Zero point configuration (ZRO)	0x0044	4	IntegerT	r/w	0	as 00.00% Default 0.00%		Yes	
69	Zero point adoption (GTZ)	0x0045	1	UintegerT	w				No	
70	Damping (TAU)	0x0046	2	UintegerT	r/w	20	in 000.0 sec Default 2.0 sec	-	Yes	0 - 9999

ISDU (dec)	Name	ISDU (hex)	Size (byte)	Data type	Access	Default value	Value range	Offset/gradient	Data storage	Range limits
71	Lower Range Value for 4 mA (STL)	0x0047	4	IntegerT	r/w	0	as 00.00% Default 0.00%	bar: 0/0.001 kPa: 0/0.1 MPa: 0/0.0001 psi: 0/0.01	Yes	-
72	Upper Range Value for 20 mA (STU)	0x0048	4	IntegerT	r/w	10000	as 00.00% Default 100.00%	bar: 0/0.001 kPa: 0/0.1 MPa: 0/0.0001 psi: 0/0.01	Yes	-
73	Pressure applied for 4 mA(GTL)	0x0049	1	UIntegerT	w	-	-	-	No	-
74	Pressure applied for 20 mA (GTU)	0x004A	1	UIntegerT	w	-	-	-	No	-
75	Alarm current (FCU)	0x004B	1	UInteger	r/w	1 ~ MAX	0 ~ MIN 1 ~ MAX 2 ~ HOLD	-	Yes	-
82	Hi Max value (maximum indicator)	0x0052	4	IntegerT	r	0	-	-	No	-
83	Lo Min value (minimum indicator)	0x0053	4	IntegerT	r	0	-	-	No	-
84	Revisioncounter (RVC)	0x0054	2	UIntegerT	r	0	-	-	No	-
85	Simulation Switch Output (OU1)	0x0055	1	UIntegerT	r/w	0 = OFF	0 ~ OFF 1 ~ OU1 = low (OPN) 2 ~ OU1 = high (CLS)	-	No	-
88	FUNC	0x0058	1	UIntegerT	r/w	1 = 4 to 20 mA(I)	0 ~ OFF 1 ~ 4 to 20 mA	-	Yes	-
256	Device Type	0x0100	2	UIntegerT	r	0x92FD	-	-	No	-
257	ENP_VERSION	0x0101	16	StringT	r	02.03.00	-	-	No	-
259	Extended order code	0x0103	60	StringT	r	-	-	-	No	-

3.2 IO-Link-specific device data

ISDU (dec)	Name	ISDU (hex)	Size (byte)	Data type	Access	Default value	Data storage
7...8	VendorID	0x0007... 0x0008	-	-	r	17	No
9...11	DeviceID	0x0009... 0x000B	-	-	r	0x000102	No
21	Serial number	0x0015	max. 16	String	ro		
23	Firmware version	0x0017	max. 64	String	ro		
19	ProductID	0x0013	max. 64	String	ro	PMP23	
18	ProductName	0x0012	max. 64	String	ro	Cerabar	
20	ProductText	0x0014	max. 64	String	ro	Absolute and gauge pressure	
16	VendorName	0x0010	max. 64	String	ro	Endress+Hauser	
17	VendorText	0x0011	max. 64	String	ro	People for Process Automation	
22	Hardware revision	0x0016	max. 64	String	ro		
24	Application Specific Tag	0x0018	32	String	r/w		Yes
260	Actual Diagnostics (STA)	0x0104	4	String	ro		No
261	Last Diagnostic (LST)	0x0105	4	String	ro		No

With Smart Sensor Profile

ISDU (dec)	Name	ISDU (hex)	Size (byte)	Data type	Access	Default value	Value range	Data storage
25	Function Tag	0x0019	32	StringT	r/w	***	-	Yes
26	Location Tag	0x001A	32	StringT	r/w	***	-	Yes
36	Device Status	0x0024	1	Integer T	r	0	0 ~ Device is OK 1 ~ Maintenance required 2 ~ Out of specification 3 ~ Functional check 4 ~ Failure	No
37	Detailed Device Status	0x0025	15	OctetStringT		-	-	No

Teach - Single Value

ISDU (dec)	Name	ISDU (hex)	Size (byte)	Data type	Access	Default value	Value range	Data storage
58	Teach Select	0x003A	1	UIntegerT	r/w	1	0 ~ Default Channel = SSC1.1 Pressure 1 ~ SSC1.1 Pressure 2 ~ SSC1.2 success 255 ~ All SSC	No
59	Teach Result State	0x003B	1	UIntegerT	r	0	0 ~ Idle 1 ~ SP1 success 2 ~ SP2 success 3 ~ SP1, SP2 success 4 ~ Wait for command 5 ~ Busy 7 ~ Error	No

Switching Signal Channel 1.1 Pressure

ISDU (dec)	Subindex	Name	ISDU (hex)	Size (byte)	Data type	Access	Default value	Value range	Data storage
60	24	SSC1.1 Param.SP1	0x003C	4	Float32T	r/w	9000.0	-	No
60	23	SSC1.1 Param.SP2	0x003C	4	Float32T	r/w	1000.0	-	No
61	01	SSC1.1 Config.Logic	0x003D	1	UIntegerT	r/w	0	0 ~ High active 1 ~ Low active	Yes
61	02	SSC1.1 Config.Mode	0x003D	1	UIntegerT	r/w	0	0 ~ Deactivation 1 ~ Single point 2 ~ Window 3 ~ Two-point	Yes
61	03	SSC1.1 Config.Hyst	0x003D	4	Float32T	r/w	10.0	-	Yes

Switching Signal Channel 1.2 Pressure

ISDU (dec)	Subindex	Name	ISDU (hex)	Size (byte)	Data type	Access	Default value	Value range	Data storage
60	24	SSC1.2 Param.SP1	0x003C	4	Float32T	r/w	9500.0	-	Yes
60	23	SSC1.2 Param.SP2	0x003C	4	Float32T	r/w	1500.0	-	Yes
61	01	SSC1.2 Config.Logic	0x003D	1	UIntegerT	r/w	0	0 ~ High active 1 ~ Low active	Yes
61	02	SSC1.2 Config.Mode	0x003D	1	UIntegerT	r/w	0	0 ~ Deactivation 1 ~ Single point 2 ~ Window 3 ~ Two-point	Yes
61	03	SSC1.2 Config.Hyst	0x003D	4	Float32T	r/w	10.0	-	Yes

Measurement Data Information

ISDU (dec)	Subindex	Name	ISDU (hex)	Size (byte)	Data type	Access	Default value	Value range	Data storage
16512	1	MDC Descriptor - Pressure.Lower Value	0x4080	4	Float32T	r	0	-	No
16512	2	MDC Descriptor - Pressure.Upper Value	0x4080	4	Float32T	r	0	-	No
16512	3	MDC Descriptor - Pressure.Unit Code	0x4080	2	UIntegerT	r	1130 (Pa)	-	No
16512	4	MDC Descriptor - Pressure.Scale	0x4080	1	IntegerT	r	0	-	No

3.3 System commands

ISDU (dec)	Subindex	Name	ISDU (hex)	Access
2	65	Teach SP1	0x0002	w
2	66	Teach SP2	0x0002	w
2	130	Reset to factory settings (RES)	0x0002	w
2	131	Back-To-Box	0x0002	w

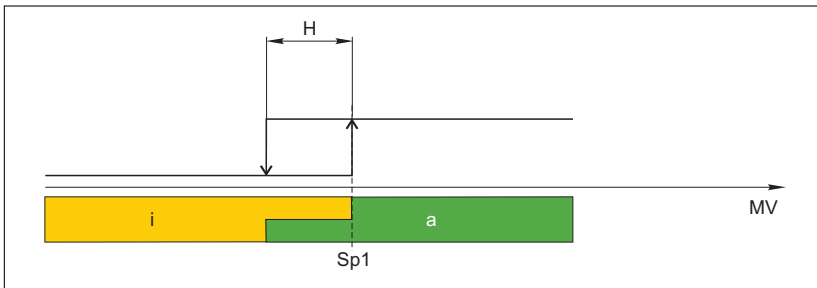
3.4 Switching signals (with Smart Sensor Profile)

The switching signals offer a simple way of monitoring the measured values for limit violations.

Each switching signal is clearly assigned to a process value and provides a status. This status is transmitted with the process data (process data link). Its switching behavior must be configured using the configuration parameters of a “Switching Signal Channel” (SSC). In addition to manual configuration for switch points SP1 and SP2, a teach mechanism is available in the “Teach” menu. This mechanism writes the current process value to the selected SSC via a system command. The following section illustrates the different behaviors of the modes available for selection. The “Logic” parameter is always “High active” in these cases. If the logic is supposed to be inverted, the “Logic” parameter can be set to “Low active”().

Single Point Mode

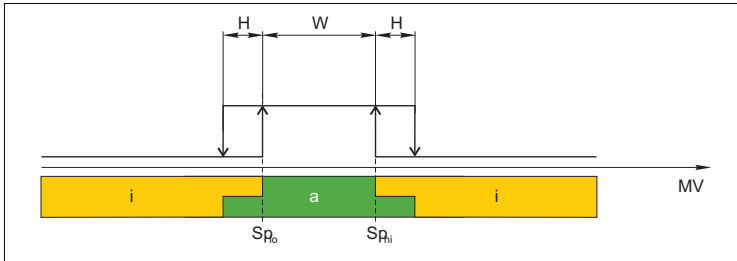
SP2 is not used in this mode.



- H Hysteresis
- Sp1 Switch point 1
- MV Measured value
- i inactive (orange)
- a active (green)

Window Mode

SP_{hi} always corresponds to whichever value is higher, SP1 or SP2, and SP_{lo} always corresponds to whichever value is lower, SP1 or SP2.

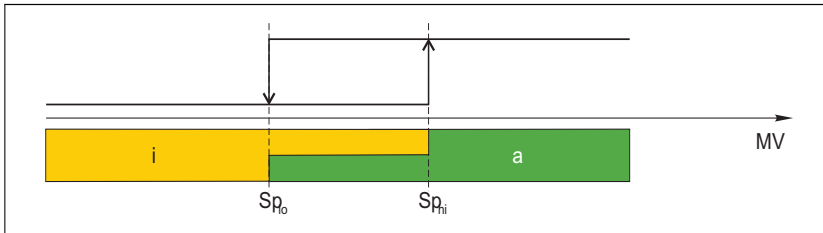


- H Hysteresis
- W Window
- SP_{lo} Switch point with lower measured value
- SP_{hi} Switch point with higher measured value
- MV Measured value
- i inactive (orange)
- a active (green)

Two-point mode

SP_{hi} always corresponds to whichever value is higher, SP1 or SP2 and SP_{lo} always corresponds to whichever value is lower value, SP1 or SP2.

Hysteresis is not used.



- SP_{lo} Switch point with lower measured value
- SP_{hi} Switch point with higher measured value
- MV Measurement value
- i Inactive (orange)
- a Active (green)

4 Overview of diagnostic events

Status signal/ Diagnostic event	Diagnostic behavior	EventCode	Event text	Cause	Remedial measure
S140	Warning	0x180F	Sensor signal outside of permitted ranges	Overpressure or low pressure present	Operate device in the specified measuring range
S140	Warning	0x180F	Sensor signal outside of permitted ranges	Sensor defective	Replace device
F270 ¹⁾²⁾	Fault	0x1800	Overpressure/low pressure	Overpressure or low pressure present	<ul style="list-style-type: none"> • Check the process pressure • Check the sensor range • Restart device
F270 ¹⁾²⁾	Fault	0x1800	Defect in electronics/sensor	Defect in electronics/sensor	Replace device
C431 ³⁾	Warning	0x1805	Invalid position adjustment (Current output)	The adjustment performed would cause the sensor nominal range to be exceeded or undershot.	Position adjustment + parameter of the current output must be within the sensor nominal range <ul style="list-style-type: none"> • Check position adjustment (see Zero point configuration (ZRO) parameter) • Check measuring range (see Value for 20 mA (STU) and Value for 4 mA (STL) parameters)
C432	Warning	0x1806	Invalid position adjustment (Switching output)	The adjustment performed causes switch points to be outside the sensor nominal range.	Position adjustment + parameter of the hysteresis and window function must be within the sensor nominal range <ul style="list-style-type: none"> • Check position adjustment (see Zero point configuration (ZRO) parameter) • Check the switch point, switchback point for hysteresis and window function
F437	Fault	0x1810	Incompatible configuration	Invalid device configuration	<ul style="list-style-type: none"> • Restart device • Reset device • Replace device
C469 Without Smart Sensor Profile	Fault	0x1803	Switch points output violated	Switch point ≤ switchback point	Check switch points at output
C485	Warning	0x8C01 ⁴⁾	Simulation active	During simulation of the switch output or current output, the device issues a warning message.	Switch off simulation
S510	Fault	0x1802	Turn down violated	A change in the span results in a violation of the turn down (max. TD 5:1) Values for adjustment (lower range value and upper range value) are too close together	<ul style="list-style-type: none"> • Operate device in the specified measuring range • Check the measuring range
S803	Fault	0x1804	Current loop	Impedance of load resistance at analog output is too high	<ul style="list-style-type: none"> • Check the cabling and load at the current output. • If the current output is not required, switch it off via the configuration.
S803	Fault	0x1804	Current output not connected	Current output not connected	<ul style="list-style-type: none"> • Connect current output with load. • If the current output is not required, switch it off via the configuration.
F804	Fault	-	Overload at switch output	Load current too high	Increase load resistance at switch output
F804	Fault	-	Overload at switch output	Switch output defective	<ul style="list-style-type: none"> • Check output circuit • Replace device

Status signal/ Diagnostic event	Diagnostic behavior	EventCode	Event text	Cause	Remedial measure
S971	Warning	0x1811	Measured value is outside sensor range	The current is outside the permitted range from 3.8 to 20.5 mA. The pressure value is outside the configured measuring range (but may be within the sensor range).	Operate the device within the set span
F419 with Smart Sensor Profile	Fault	-	Back-2-Box command has been executed.	IO-Link communication no longer available.	Manual restart is necessary

- 1) The switch output is open and the current output adopts the configured alarm current. Therefore, errors affecting the switch output are not displayed because the switch output is in the safe state.
- 2) The device indicates a failure current of 0 mA if an internal communication error occurs. In all other cases the device returns the configured error current.
- 3) If no remedial measures are taken, the warning messages are displayed following a device restart if configuration (span, switch points and offset) is performed with a gauge pressure device and readings are $> \text{URL} + 10\%$ or $< \text{LRL} + 5\%$ and with an absolute pressure device and readings are $> \text{URL} + 10\%$ or $< \text{LRL}$.
- 4) EventCode as per IO-Link standard 1.1