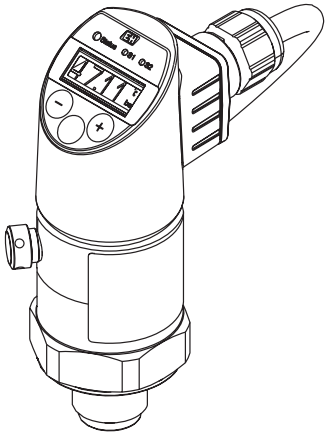
Endress+Hauser Ceraphant PTP31B and PTP33B

Process pressure measurement



IO-Link

IO-Link PTP3xB

1 General Specifications

- Vendor ID: 0x0011
- Device ID: 0x000700
- IO-Link specification: Version 1.1
- SIO mode: Yes
- Speed: COM2; 38.4 kBaud
- Minimum cycle time: 2.5 msec.
- Process data width: 32 bit (Input)
- IO-Link data storage: Yes
- Block configuration: Yes
- ISDU: Yes

2 Process data

The measuring device has one current output and one or two switch outputs (depending on the version ordered). The status of the switch outputs and the pressure value are 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.
- If the “with current output” option is ordered, the current output at pin 2 of the M12 plug is always active or can optionally be deactivated via IO-Link or at the display or configured as DC-PMP.

The device’s process data are transmitted cyclically in 32-bit chunks.

Bit	0 (LSB)	1	...	28	29 (MSB)	30	31
Measuring device	Pressure value					OU1	res.

Bit 31 is reserved. Bit 30 provides the status of the switch output.

Here, 1 or DC 24 V corresponds to the logical “closed” state on the switch output. The remaining bits 0-29 contain the analog raw measured value of the device. This value must be scaled by the target system to match the nominal operating range of the measuring device.

Bit	Process value	Value range
30	OU1	0 = open 1 = closed
0 - 29	Raw value	Integer

The pressure value is provided by the measuring device as int30. The decimal separator must be set with a multiplier. The number of decimal places displayed is based on the display format of the device. The multipliers depend on the unit in question. The following units are available:

- bar: 0.0001
- kPa: 0.01
- MPa: 0.00001
- psi: 0.001

Examples:

Pressure value	Transmitted	Scaled with gradient
-320 mbar	-3200	-0.32
22 bar	220000	22
133 kPa	13300	133
665 psi	665000	665
399.5 bar	3995000	399.5

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
66	Simulation Current Output (OU2)	0x0042	1	uint	r/w	off	4 ~ 4 mA, 5 ~ 8 mA, 6 ~ 12 mA, 7 ~16 mA, 8 ~ 20 mA, 9 ~ 21.95 mA, otherwise 3.5 mA		No
67	Unit changeover (UNI)	0x0043	1	uint	r/w		0 ~ bar, 1 ~ kPa, 2~ psi, 3~ MPa		Yes
68	Zero point configuration (ZRO)	0x0044	4	int	r/w	0	in 00.00%, default 0.00%		Yes
69	Zero point adoption (GTZ)	0x0045	1	uint	-/w				No
70	Damping (TAU)	0x0046	2	uint	r/w	20	in 000.0 sec, default 2.0 sec	0 / 0.1	Yes

ISDU (dec)	Name	ISDU (hex)	Size (byte)	Data type	Access	Default value	Value range	Offset/ gradient	Data storage
71	Lower Range Value for 4 mA (STL)	0x0047	4	int	r/w	0	in 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	int	r/w	10000	in 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 4mA (GTL)	0x0049	1	uint	-/w				No
74	Pressure applied for 20mA (GTU)	0x004A	1	uint	-/w				No
75	Alarm current (FCU)	0x004B	1	uint	r/w	MAX	0 ~ MIN, 1 ~ MAX, 2~ HOLD		Yes
82	Hi Max value (maximum indicator)	0x0052	4	int	r/-				No
83	Lo Min value (minimum indicator)	0x0053	4	int	r/-				No
84	Revisioncounter (RVC)	0x0054	2	uint	r/-				No
85	Simulation Switch Output (OU1)	0x0055	1	uint	r/w	off	0 ~ off, 1 ~ low, 2 ~ high,		No
86	Simulation Switch Output (OU2)	0x0056	1	uint	r/w	off	0 ~ off, 1 ~ low, 2 ~ high		No
87	Device search	0x0057	1	uint	r/w	off	0 ~ off 1 ~ on		No
88	Operating Mode (FUNC)	0x0058	1	uint	r/w	1	0 ~ off, 1 ~ I, 2 ~ PNP		Yes
94	Unlocking code (LCK)	0x005E	2	uint	-/w	0			No
95	Locking code (COD)	0x005F	2	uint	-/w	0			No
96	Measured value display (DVA)	0x0060	1	uint	r/w	0	0~ PV for device with non-active current output 1~ PV% only for devices with active current output 2~display set switch point SP		Yes
97	Display measured value rotated by 180° (DRO)	0x0061	1	uint	r/w	NO	0 ~ NO, 1 ~ YES		Yes
98	Switch display on or off (DOF)	0x0062	1	uint	r/w	NO	0 ~ NO, 1 ~ YES		Yes
256	Device Type	0x0100	2	Uinteger16	r/-	0x92FE			
257	ENP_VERSION	0x0101	16	String	r/-	36587			
259	Extended order code	0x0103	60	String	r/-				

ISDU (dec)	Name	ISDU (hex)	Size (byte)	Data type	Access	Default value	Value range	Offset/gradient	Data storage
77	Switch point value/Upper value for pressure window, output 1 (SP1/FH1)	0x004D	4	int	r/w	9000	in 00.00%, default 90.00%	bar: 0 / 0.001 kPa: 0 / 0.1 MPa: 0 / 0.0001 psi: 0 / 0.01	Yes
78	Switchback point value/Lower value for pressure window, output 1 (rP1/FL1)	0x004E	4	int	r/w	1000	in 00.00%, default 10.00%	bar: 0 / 0.001 kPa: 0 / 0.1 MPa: 0 / 0.0001 psi: 0 / 0.01	Yes
79	Switching delay time, output 1 (dS1)	0x004F	2	uint	r/w	0	in 00.00 sec	0 / 0.01	Yes
80	Switchback delay time, output 1 (dR1)	0x0050	2	uint	r/w	0	in 00.00 sec	0 / 0.01	Yes
81	Output 1 (OU1)	0x0051	1	uint	r/w	HNO	0 ~ HNO[1)], 1 ~ HNC[1)], 2 ~ FNO[1)], 3 ~ FNC[1)]		Yes
89	Switch point value / Upper value for pressure window, output 2 (SP2 / FH2)	0x0059	4	int	r/w	9500	in 00.00%, default 95.00%	bar: 0 / 0.001 kPa: 0 / 0.1 MPa: 0 / 0.0001 psi: 0 / 0.01	Yes
90	Switchback point value / Lower value for pressure window, output 2 (rP2 / FL2)	0x005A	4	int	r/w	1500	in 00.00%, default 15.00%	bar: 0 / 0.001 kPa: 0 / 0.1 MPa: 0 / 0.0001 psi: 0 / 0.01	Yes
91	Switching delay time, output 2 (dS2)	0x005B	2	uint	r/w	0	in 00.00 sec	0 / 0.01	Yes
92	Switchback delay time, output 2 (dR2)	0x005C	2	uint	r/w	0	in 00.00 sec	0 / 0.01	Yes
93	Output 2 (OU2)	0x005D	1	uint	r/w	HNC	0 ~ HNO[1)], 1 ~ HNC[1)], 2 ~ FNO[1)], 3 ~ FNC[1)]		Yes

1) Refer to the parameter description for an explanation on abbreviations

3.2 IO-Link-specific device data

ISDU (dec)	Name	ISDU (hex)	Size (byte)	Data type	Access	Default value
7 … 8	VendorId	0x0007 to 0x0008			r/-	17
9 … 11	DeviceId	0x0009 to 0x000B			r/-	0x0007xx
16	VendorName	0x0010	max. 64	String	r/-	Endress+Hauser
17	VendorText	0x0011	max. 64	String	r/-	People for Process Automation
18	ProductName	0x0012	max. 64	String	r/-	Ceraphant
19	ProductID	0x0013	max. 64	String	r/-	PTx3xB
20	ProductText	0x0014	max. 64	String	r/-	Absolute and gauge pressure
21	Serial number	0x0015	max. 16	String	r/-	
22	Hardware Version	0x0016	max. 64	String	r/-	
23	Firmware version	0x0017	max. 64	String	r/-	
24	Application Specific Tag	0x0018	32	String	r/w	

ISDU (dec)	Name	ISDU (hex)	Size (byte)	Data type	Access	Default value
260	Actual Diagnostics (STA)	0x0104	4	String	r/-	
261	Last Diagnostic (LST)	0x0105	4	String	r/-	

3.3 System commands

ISDU (dec)	Subindex	Name	ISDU (hex)	Value range	Access
2	130	Reset to factory settings (RES)	0x0002	130	w
12	1	Device Access Locks.Data Storage Lock	0x000C	0 ~ False 2 ~ True	rw

4 Overview of diagnostic events

Status signal/ Diagnostic event	Diagnostic behavior	IO-Link EventQualifier	EventCode	Event text	Cause	Remedial measure
S140	Warning	IO-Link warning	0x180F	Sensor signal outside of permitted ranges	Overpressure or low pressure present	Operate device in the specified measuring range
F270 [1)]	Fault	IO-Link error	0x1800	Overpressure/low pressure	Overpressure or low pressure present	• Check the process pressure • Check the sensor range • Restart device
F270 [1)]	Fault	IO-Link error	0x1800	Defect in electronics/sensor	Defect in electronics/sensor	Replace device
C431 [2)]	Warning	IO-Link warning	0x1805	Invalid position adjustment (Current output)	The adjustment performed would cause the nominal sensor range to be exceeded or undershot.	Position adjustment + parameter of the current output must be within the sensor nominal range • 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	IO-Link warning	0x1806	Invalid position adjustment (Switching Output 1)	The adjustment performed leads to switch points being outside the sensor nominal range.	Position adjustment + parameter of the hysteresis and window function must be within the sensor nominal range • Check position adjustment (see Zero point configuration (ZRO) parameter) • Check the switch point, switchback point for hysteresis and window function
C432	Warning	IO-Link warning	0x1807	Invalid position adjustment (Switching Output 2)	The adjustment performed leads to switch points being outside the sensor nominal range.	Position adjustment + parameter of the hysteresis and window function must be within the sensor nominal range • Check position adjustment (see Zero point configuration (ZRO) parameter) • Check the switch point, switchback point for hysteresis and window function
F437	Fault	IO-Link error	0x1810	Incompatible configuration	Invalid device configuration	• Restart device • Reset device • Replace device
C469 Without Smart Sensor Profile	Fault	IO-Link error	0x1803	Switch points for output 1 violated	Switch point ≤ switchback point	Check switch points at output
C469 Without Smart Sensor Profile	Fault	IO-Link error	0x1809	Switch points for output 2 violated	Switch point ≤ switchback point	Check switch points at output
C485	Warning	IO-Link warning	0x8C01 [3)]	Simulation active	During simulation of the switch output or current output, the device issues a warning message.	Switch off simulation

Status signal/ Diagnostic event	Diagnostic behavior	IO-Link EventQualifier	EventCode	Event text	Cause	Remedial measure
S510	Fault	IO-Link error	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	• Operate device in the specified measuring range • Check the measuring range
S803	Fault	IO-Link error	0x1804	Current loop	Impedance of load resistance at analog output is too high	• Check the cabling and load at the current output. • If the current output is not required, switch it off via the configuration. • Connect current output with load. • If the current output is not required, switch it off via the configuration.
F804	Fault	IO-Link error	0x1808	Overload at switch output 1 or 2	Load current too high	• Increase load resistance at switch output • Check output circuit
F804	Fault	IO-Link error	0x1808	Overload at switch output 1 or 2	Switch output defective	Replace device
S971	Warning	IO-Link warning	0x1811	Measured value is outside sensor range	The current is outside the permitted range of 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

1) The switch output is open and the current output adopts the configured alarm current. Errors concerning the switch output are not displayed because the switch output is in a safe state.
2) 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 > URL + 10 % or < LRL + 5 % and with an absolute pressure device and readings are > URL + 10% or < LRL.
3) EventCode as per IO-Link standard 1.1