

## CPA-P-331i-RS



- precision screw-in transmitter
- nominal pressure: from 0...400 mbar up to 0...40 bar
- output signals: digital RS-485 / Modbus RTU or HART
- stainless steel sensor
- accuracy 0.1 % / 0.2 % span
- thermal error in compensated range -20...80°C: 0.2 % span
- communication interface for adjusting of offset, span and damping

The precision screw-in transmitters **CPA-P-331i-RS** demonstrate further development of our industrial pressure/level transmitters of CPA series. Transmitters can handle both protocols HART® and Modbus RTU simultaneously. The signal processing of sensors signal is done by digital electronics with 24-bit analog digital converter. Consequently it is possible to conduct an active compensation and the transmitters with excellent measurements and exceptionally attractive price to offer on the market.

## PREFERRED AREAS OF USE ARE



Chemical / Petrochemical industry



Energy production (gas consumption and thermal energy measurement)

## TECHNICAL DATA

Pressure ranges CPA-P-331i-RS <sup>1</sup>									
Nominal pressure gauge / absolute	[bar]	0,4	1	2	4	10	20	40	
Level gauge	[mH <sub>2</sub> O]	4	10	20	40	100	200	400	
Overpressure	[bar]	2	5	10	20	40	80	105	
Burst pressure	[bar]	3	7,5	15	25	50	120	210	
<sup>1</sup> On customer request we adjust the device within the turn-down-possibility by software on the required pressure range.									
Output signal / Supply									
Output signal RS 485		Digital output (communication RS 485 / HART® protocol)					1D		
		Digital output (communication RS 485 / ModBus RTU protocol)					2D		
Supply		Standard 10 ... 36 V DC; options: 3,3 ... 5 V DC (stabilized); 8... 15 V DC							
Performance									
Accuracy <sup>2</sup>		± 0,1 % span							
Long term stability		± 0,1 % span / year							
Measurement speed		80/s							
<sup>2</sup> accuracy according to EN IEC 62828-2 – limit point adjustment (non-linearity, hysteresis, repeatability)									
Thermal effects (Offset and Span) / Permissible temperatures									
Tolerance band	[% span]	± 0,2 in compensated range			-20 ... 80 °C				
TC, average	[% span / 10 K]	± 0,02 in compensated range			-20 ... 80 °C				
Permissible temperatures		medium: -25 ... 125 °C		electronics / environment: -25 ... 85 °C		storage: -40 ... 100 °C			
Electrical protection									
Short-circuit protection		permanent							
Reverse polarity protection		no damage, but also no function							
Electromagnetic compatibility		emission and immunity according to EN 61326							
Materials									
Pressure port		stainless steel 1.4404 (316 L)							
Housing		stainless steel 1.4404 (316 L)							
Seals		FKM option: EPDM ; other on request							
Diaphragm		stainless steel 1.4435 (316L)							
Media wetted parts		pressure port, seal, diaphragm							
Mechanical stability									
Vibration		10 g RMS (20 ... 2000 Hz)							
Shock		100 g / 11 ms							



Transmission baud rate			
HART®	1200 Bd	4800 Bd	19200 Bd
	2400 Bd	9600 Bd	38400 Bd
ModbusRTU	1200 Bd	4800 Bd	19200 Bd
	2400 Bd	9600 Bd	38400 Bd

\* Unless otherwise specified by the customer, the communication is set as follows after delivery by the manufacturer: 8 dat. bit, 1 stop bit, 9600 Bd, even parity, address 1

Miscellaneous	
Current consumption	power supply 3,3 ... 36 V: 3,2 mA power supply 3 ... 5 V: 6 mA
Weight	approx. 200 g
Installation position	any <sup>4</sup>
Operational life	100 million load cycles
CE-conformity	EMC Directive: 2014/30/EU    Pressure Equipment Directive: 2014/68/EU (module A) <sup>5</sup>

<sup>4</sup> Pressure transmitters are calibrated in a vertical position with the pressure connection down. If this position is changed on installation there can be slight deviations in the zero point for pressure ranges  $P_N \leq 1$  bar.  
<sup>5</sup> This directive is only valid for devices with maximum permissible overpressure > 200 bar

Map of Input registers MODBUS (read only, function #4 – Read input registers)					
Address	Register	Description	Data type	Example	
0x0000	SerialNr	Serial Number	UInt32	0x0012	123456
0x0001				0xd687	
0x0002	CalDate	Date of last calibration	Date	0x07de	2014
0x0003				0x051b	27.5.
0x0004	PressUpperRange	Upper range of pressure channel	Float, IEEE754	0x4120	10,0
0x0005				0x0000	
0x0006	PressLowerRange	Lower range of pressure channel	Float, IEEE754	0x0000	0,0
0x0007				0x0000	
0x0008	Pressure	Actual pressure	Float, IEEE754	0x3f9e	1,2345
0x0009				0x0419	
0x000A	MaxPress	Maximal Pressure	Float, IEEE754	0x3f00	1,5
0x000B				0x0000	
0x000C	MinPress	Minimal Pressure	Float, IEEE754	0x3f00	0,5
0x000D				0x0000	
0x000E	TempUpperRange	Upper range of temperature channel	Float, IEEE754	0x42a0	80,0
0x000F				0x0000	
0x0010	TempLowerRange	Lower range of temperature channel	Float, IEEE754	0xc1a0	-20,0
0x0011				0x0000	
0x0012	Temperature	Actual temperature	Float, IEEE754	0x41a0	20,0
0x0013				0x0000	
0x0014	MaxTemp	Maximal temperature	Float, IEEE754	0x4270	60,0
0x0015				0x0000	
0x0016	MinTemp	Minimal temperature	Float, IEEE754	0x4170	15,0
0x0017				0x0000	

Map of Holding registers MODBUS (read and write, function #3 - Read Holding Registers , fce #6 - Write Single Register)					
Address	Register	Description	Data type	Example	
0x0000	PressUnitsCode	Unit of pressure channel	UInt16	0x0006	bar
0x0001	TempUnitsCode	Unit of temperature channel	UInt16	0x0000	°C
0x0002	DeviceAddress	Device address (1...247)	UInt16	0x0001	1
0x0003	Baudrate	Baud rate	UInt16	0x0005	9600
0x0004	Parity	Parity	UInt16	0x0000	PA_none
0x0005	PressZero	Value for zeroing the pressure	Float, IEEE754	0,0001	bar
0x0007	TempZero	Value for zeroing the temperature	Float, IEEE754	0,1	°C
0x0010	PressDamping	Pressure damping	Float, IEEE754	0,1	s
0x0012	ClearMinMaxValues	Resetting of maximum and minimum values	Unit16	0x0000	Writing 0x0000 will reset all max. and min. values

When resetting the pressure channel, the value in the selected pressure unit is written (according to the setting in reg. 0). The permissible limit for pressure zeroing is  $\pm 10\%$  span.  
When resetting the temperature channel, the value in °C is written. The permissible limit for temperature reset is  $\pm 10$  °C.



Pressure unit enumeration MODBUS													
Code (Unit16)	0x0003	0x0004	0x0005	0x0006	0x0007	0x0008	0x0009	0x000A	0x000B	0x000C	0x000D	0x000E	0x000F
Unit	mmH2O @4*	mmHG @0**	psi	bar	mbar	g/cm <sup>2</sup>	kg/cm <sup>2</sup>	Pa	kPa	torr	atm	mH2O @4*	MPa
*millimeter of water column (4 °C)													
**millimeter of Hg column (0 °C)													

Temperature unit enumeration MODBUS				
Code (Unit16)	0x0000		0x0001	0x0002
Unit	°C		°K	°F

Baud rate enumeration MODBUS						
Code (Unit16)	0x0002	0x0003	0x0004	0x0005	0x0006	0x0007
Baud rate [Bd]	1200	2400	4800	9600	19200	38400

Parity enumeration MODBUS			
Code (Unit16)	0x0000	0x0001	0x0002
Parity	None	Odd	Even

*It is necessary to make device reset (Power supply on and on) after changing Address, Baud rate or Parity (command #6).*

*If reset is not performed, device uses old communication parameters.*

*When working with registers that are longer than 16 bits, it is necessary to read and write these registers at once, otherwise a response with the error code "Illegal data address" is returned.*

Following commands are implemented in HART protocol:	
Command #0	Read Unique Identifier
Command #1	Read Primary Variable
Command #2	Read Loop Current and Percent of Range
Command #3	Read Dynamic Variables and Loop Current
Command #3 gives back 4 variables	<ul style="list-style-type: none"> <li>- Primary Variable: Pressure [units below pt. 2]</li> <li>- Secondary Variable: PT1000 temperature unit is given by Modbus hold. register #1 (via HART only the primary variable unit can be set)</li> <li>- Tertiary Variable: Conductivity [mS/cm] (Temperature compensated value)</li> <li>- Quaternary Variable: Conductivity [mS/cm]</li> </ul>
Command #6	Write Polling Address
Command #7	Read Polling Address
Command #11	Read Unique Identifier Associated with Tag
Command #12	Read Message
Command #13	Read Tag, Descriptor, Date
Command #14	Read Primary Variable Transducer Information
Command #15	Read Device Information
Command #16	Read Final Assembly number
Command #17	Write Message
Command #18	Write Tag, Descriptor, Date
Command #19	Write Final Assembly Number
Command #34	Write Primary Variable Damping Value
Command #35	Write Primary Variable Range Values
Command #43	Set Primary Variable Zero
Command #44	Write Primary Variable Units

HART protocol is described in the HART standard.

The following units of measured quantities are implemented in the HART protocol:	
HART pressure units	
Unit	Code (h)
mmH2O@4°C	0xEF
mmHg@0°C	0x05
psi	0x06
bar	0x07
mbar	0x08
g/cm <sup>2</sup>	0x09
kg/cm <sup>2</sup>	0x0A
Pa	0x0B
kPa	0x0C
torr	0x0D
atm	0x0E
mH2O@4°C	0xAB
MPa	0xED



The following units of measured quantities are implemented in the HART protocol:

**HART pressure units**

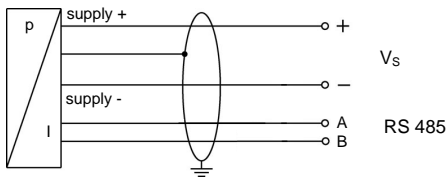
Unit	Code (h)
mH <sub>2</sub> O@4°C	0xAB
MPa	0xED

**HART temperature units**

Unit	Code (h)
Degree °C	0x20
Degree °F	0x21
Degree °K	0x23

**ELECTRICAL CONNECTION**

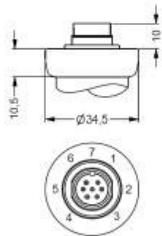
Wiring diagrams



Pin configuration

Electrical connections	Binder 723 (7-pin)	cable colours (DIN 47100)
supply +	3	wh (white)
supply -	1	bn (brown)
shield	2	gn/ye (green / yellow)
Communication interface A	4	ye (yellow)
Communication interface B	5	pk (pink)

Electrical connections (dimensions in mm / inch)

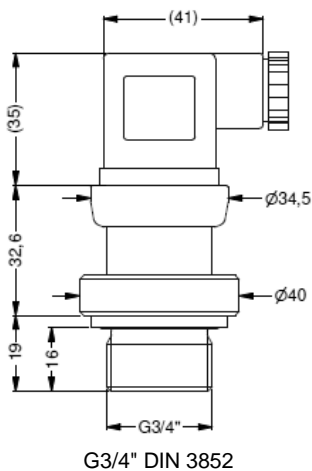


Binder serie 723 7-pin (IP 67)

<sup>6</sup> different cable types and lengths available, permissible temperature depends on kind of cable

<sup>7</sup> standard: 2 m PVC cable (without ventilation tube, permissible temperature: -5 ... 70 °C)

**DIMENSION DRAWINGS**



G3/4" DIN 3852

## ORDER CODE

CPA-P-331i-RS-    -    - 1 - 1 -  -  -    -    -    -    -    -    -

<b>Pressure</b>												
in bar	4	3	0									
in m H <sub>2</sub> O	4	3	1									
<b>Input</b>		[mH <sub>2</sub> O]		[bar]								
0 ... 0,4			4	0	0	0						
0 ... 1			1	0	0	1						
0 ... 2			2	0	0	1						
0 ... 4			4	0	0	1						
0 ... 10			1	0	0	2						
0 ... 20			2	0	0	2						
0 ... 40			4	0	0	2						
-0,4 ... 0,4			S	4	0	0						
-1 ... 1			S	1	0	2						
-1 ... 2			V	2	0	2						
-1 ... 4			V	4	0	2						
-1 ... 10			V	1	0	3						
Customer			9	9	9	9						
Customer - underpressure			X	X	X	X						
<b>Housing material</b>												
Stainless steel 1.4404 (316 L)												1
<b>Diaphragm material</b>												
Stainless steel 1.4435 (316 L)												1
<b>Output</b>												
Digital output (communication RS 485 / HART protocol)												1D
Digital output (communication RS 485 / ModBus RTU protocol)												2D
Customer												9
<b>Accuracy</b>												
0,1 %												1
0,2 % (P <sub>N</sub> < 0,1 bar)												B
Customer												9
<b>Electrical connection</b>												
Connector Binder 723 7-pin (IP 67)												A 0 0
Customer												9 9 9
<b>Mechanical connection</b>												
G 3/4" DIN 3852												K 0 0
Customer												9 9 9
<b>Seals</b>												
Viton (FKM)												1
EPDM												3
Customer												9
<b>Special version</b>												
Interface RS 485, power supply 8 ... 15 V DC												1 4 1
Interface RS 485, power supply 10 ... 36 V DC												1 4 2
Interface RS 485, power supply 3,3...5 V DC												1 4 3
Customer												9 9 9
<b>Additional informations for communication "1D" RS 485 / HART protocol and for "2D" RS 485 / ModBus RTU protocol parity</b>												
Even												2
Odd												1
No parity												0
<b>Baud rate</b>												
4800 Bd												0
9600 Bd (standard)												1
19200 Bd												2
38400 Bd												3
1200 Bd												4
2400 Bd												5
<b>Temperature compensation</b>												
0 ... 70 °C (standard)												1
-20 ... +80 °C												3

Manufacturer reserves the right to change sensor specifications without further notice.

