simex

CPA-P-307i-RS

- hydrostatic level transmitter
- submersible probe, diameter 27 mm
- nominal range: from 0...4 mH$_2$O up to 0...200 mH$_2$O
- output signals: digital RS-485 / Modbus RTU or HART
- stainless steel probe and sensor
- accuracy 0.1 % span
- small thermal effect, excellent accuracy and long term stability
- optional: different kinds of cables and seals

CE

The precision stainless steel probe **CPA-P-307i-RS** is designed for continuous fill level and level measurement of water and liquid mediums. Housing material is 1.4044; the sensor diaphragm is made od 1.4435. Standard sealing material is FKM; other materials are available on request. The CPA-P-307i-RS features high accuracy of 0.1 % span and a very small thermal error. Basic element is a high quality stainless steel sensor with a digital electronics with microprocessor and 16-bit analog/digital converter. Thus it's possible to compensate the sensor specific errors as non-linearity and thermal errors actively resulting in a level transmitter with excellent measuring properties at an unusual competitive price.

PREFERRED AREAS OF USE ARE

Water / filtrated sewage
environmental enigeering: water supply, sewage treatment
depth or level measurement in wells
ground water level measurement
level measurement in open tanks

TECHNICAL DATA

Input pressure range															
Nominal pressure gauge	[bar]	0.06	0.1	0.16	0.25	0.4	0.6	1	1.6	2.5	4	6	10	16	25
Level	[mH$_2$O]	0.6	1	1.6	2.5	4	6	10	16	25	40	60	100	160	250
Permissible overpressure	[bar]	0.2	0.5	0.5	1	1	3	3	6	6	20	20	20	60	60

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: 3,3… 36 V$_{DC}$, option 3 … 5 V$_{DC}$

Performance	
Accuracy[1]	± 0.1 % span
Long term stability	± 0.1 % span / year
Measurement speed	80/s

[1] accuracy according to EN IEC 62828-2– limit point adjustment (non-linearity, hysteresis, repeatability; temperature range -10 … 50 °C including thermal effects)

Thermal effects (Offset and Span)	
Tolerance band [% span]	± 0.2 in compensated range -20 ... 80 °C
TC [% span / 10 K]	± 0.02 in compensated range -20 ... 80 °C
Permissible temperatures	Medium/ electronics/ environment/ storage: -20 … 80 °C *

*If the cable is intended for use in a smaller temperature range, the use of the probe is limited by this range.

Electrical protection [2]	
Insulation resistance	> 100 MW
Short-circuit protection	permanent
Reverse polarity protection	no damage, but also no function
Electromagnetic compatibility	emission and immunity according to EN 61326

[2] additional external overvoltage protection unit in terminal box KL 1 or KL 2 with atmospheric pressure reference available on request

Electrical connection					
Cable with sheath material [3]	PVC	(-5 … 70 °C)	grey	(-25 … 70 °C in fixed condition)	Ø 7,4 mm
	PUR	(-25 … 80 °C)	black	(with drinking water certificate)	Ø 7,4 mm
	FEP [4]	(-25 … 75 °C)	black		Ø 7,4 mm
	others on request				

[3] cable with integrated air tube for atmospheric pressure reference
[4] do not use freely suspended probes with an FEP cable if effects due to highly charging processes are expected

Materials (media wetted)	
Housing	stainless steel 1.4404 (316L)
Diaphragm	stainless steel 1.4435 (316L)
Seals	FKM, others on request
Protection cap	POM
Connecting cables (by factory)	cable capacitance: signal line/shield also signal line/signal line: 160 pF/m cable inductance:signal line/shield also signal line/signal line: 1µH/m
Miscellaneous	
Current consumption	Power supply 3,3 … 36 V: 3,2 mA Power supply 3 … 5 V: 6 mA
Weight	approx. 200 g (without cable)
Ingress protection	IP 68
CE-conformity	EMC Directive: 2004/108/EC

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	
Mechanical stability	
Vibration	10 g RMS (20 ... 2000 Hz)
Shock	100 g / 11 ms

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 zerioing the temperature	Float, IEEE754	0,1	°C
0x0010	PressDamping	Pressure damping	Float, IEEE754	0,1	s

0x0012	ClearMinMaxValues	Resetting of maximum and minimum values	Uint16	0x0000	Writing 0x0000 will reset all max. and min. values
0x0014	DecPointPosPressure	Decimal point position for pressure register dPpres (0x0019)	Uint16	0x0002	2
0x0015	DecPointPosTemper	Decimal point position for temperature register dpTemper (0x001A)	Uint16	0x0001	1
0x0019	PressureInt	Current measured pressure integer *)	Sint16	0x04D2	Read 1234 value 12,34
0x001A	TemperatureInt	Current measured temperature *)	Sint16	0x07D0	Read 214 value 21,4

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 ± 10% span.
When resetting the temperature channel, the value in ° C is written. The permissible limit for temperature reset is ± 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^2	kg/cm^2	Pa	kPa	torr	atm	mH2O @4**	MPa

* to obtain the current value, the current value must be divided by 10 by dp (dpPres or dpTemper)

**millimeter of water column (4 °C)

***millimeter of Hg column (0 °C)

Temperature unit enumeration MODBUS

Code (Uint16)	0x0000	0x0001	0x0002
Unit	°C	°K	°F

Baud rate enumeration MODBUS

Code (Uint16)	0x0002	0x0003	0x0004	0x0005	0x0006	0x0007
Baud rate [Bd]	1200	2400	4800	9600	19200	38400

Parity enumeration MODBUS

Code (Uint16)	0x0000	0x0001	0x0002
Parity	None	Odd	Even

It is necessary to make device reset (Power supply off 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 Command #3 gives back 4 variables	Read Dynamic Variables and Loop Current - Primary Variable: Pressure [units below pt. 2] - Secondary Variable: PT1000 temperature unit is given by Modbus hold. register #1 (via HART only the primary variable unit can be set) - Tertiary Variable: Conductivity [mS/cm] (Temperature compensated value) - Quaternary Variable: Conductivity [mS/cm]
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.	

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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/cm2	0x09
kg/cm2	0x0A
Pa	0x0B
kPa	0x0C
torr	0x0D
atm	0x0E
mH2O@4°C	0xAB
MPa	0xED

HART temperature units

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

ELECTRICAL CONNECTION

Wiring diagram / connector
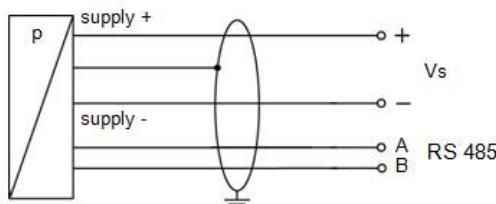
Pin configuration

Electrical connection		cable colours (DIN 47100)
	Supply +	wh (white)
	Supply –	bn (brown)
	Shield	gn/ye (green / yellow)
Communication protocol	A	ye (yellow)
	B	pk (pink)

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CPA-P-307i-RS.4

Level transmitters

DIMENSION DRAWINGS

standard   **option**

Ø7,4

Ø7,4

SW36

Ø68

20

20

G2"

115

Ø26,5

L

Ø26,5

12

version with
corrugated pipe (max length 20 m)
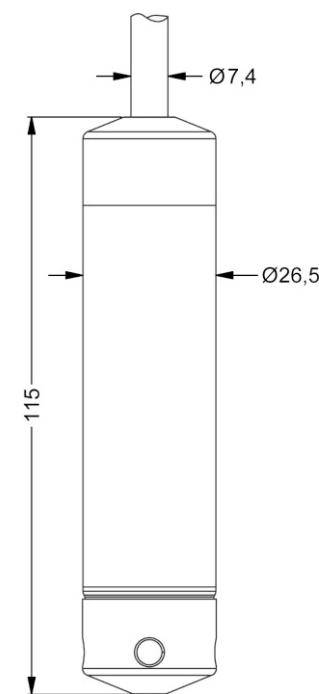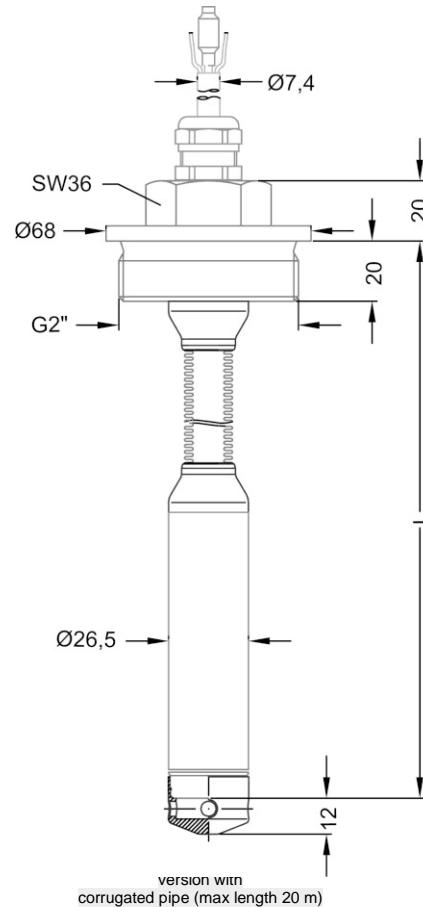
ACCESSORIES

| Mounting flange with cable gland		
Technical data		
Suitable for	all probes	
Flange material	stainless steel 1.4404 (316L)	
Material of cable gland	standard: brass, nickel plated on request: stainless steel 1.4305 (303); plastic	
Seal insert	material: TPE (ingress protection IP 68)	
Hole pattern	according to DIN 2507	
Version	**Size (in mm)**	**Weight**
DN25 / PN40	D = 115, k = 85, b = 18, n = 4, d= 14	1.4 kg
DN50 / PN40	D = 165, k = 125, b = 20, n = 4, d= 18	3.2 kg
DN80 / PN16	D = 200, k = 160, b = 20, n = 8, d= 18	4.8 kg
Ordering type	**Ordering code**	
DN25 / PN40 with cable gland brass, nickel plated	ZMF2540	
DN50 / PN40 with cable gland brass, nickel plated	ZMF5040	
DN80 / PN16 with cable gland brass, nickel plated	ZMF8016	

cable gland M16x1.5 with
seal insert (for cable- 4 ... 11 mm)

n x d2

25

b

d4

k

D

Cable clamp		
Technical Data		
Suitable for	all probes with cable 5.5 ... 10.5 mm	
Material	standard: steel, zinc plated optionally: stainless steel 1.4301 (304)	
Weight	approx. 160 g	
Ordering type	**Ordering code**	
Terminal clamp, of steel, zinc plated	1003440	
Terminal clamp, of stainless steel 1.4301 (304)	1000278	

Level transmitters
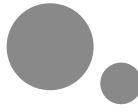
ORDER CODE

CPA-P-307i-RS- ☐☐☐ - ☐☐☐☐ - ☐ - ☐ - ☐☐ - ☐ - ☐ - ☐ - ☐☐☐ - ☐☐☐

Pressure									
in bar		4 5 0							
in m H_2O		4 5 1							

[mH_2O]	[bar]								
0 … 4	0 … 0,4	4 0 0 0							
0 … 10	0 … 1	1 0 0 1							
0 … 20	0 … 2	2 0 0 1							
0 … 40	0 … 4	4 0 0 1							
0 … 100	0 … 10	1 0 0 2							
0 … 200	0 … 20	2 0 0 2							
Customer		9 9 9 9							

Housing material								
Stainless steel 1.4404 (316L)	1							

Diaphragm material								
Stainless steel 1.4435 (316 L)	1							

Output signal								
Digital output (communication RS 485 / HART protocol)	1 D							
Digital output (communication RS 485 / ModBus RTU protocol)	2 D							
Customer	9 9							

Seals							
Viton (FKM)	1						
Customer	9						

Accuracy						
0,1 %	1					
Customer	9					

Electrical connection					
PVC - cable (grey, Ø 7,4 mm, price for 1 m)[1]	1				
PUR - cable (black, Ø 7,4 mm, price for 1 m)[1]	2				
FEP - cable with PTFE sheath (black, Ø 7,4 mm, price for 1 m)[1]	3				
TPE-U - cable, up to 125 °C (blue, Ø 7.4 mm, price for 1 m)[1]	4				
Customer	9				

Cable length				
in m	9 9 9			

Special version				
RS 485 interface, supply 8…15 V DC	1 4 1			
RS 485 interface, supply 10…36 V DC	1 4 2			
RS 485 interface, supply 3,3…5 V DC	1 4 3			
Customer	9 9 9			

Additional information for "1D" RS 485 / HART and for "2D" RS 485 / ModBus RTU			
Parity			
Even	2		
Odd	1		
No Parity	0		
Baud Rate			
4800 Bd		0	
9600 Bd (standard)		1	
19200 Bd		2	
38400 Bd		3	
1200 Bd		4	
2400 Bd		5	
Temperature compensation			
0 … 70 °C (standard)			1
-20 … 80 °C (PUR and TPE-U cable)			3
-20 … 70 °C (PVC and FEP cable)			4

Accessories for submersible transmitter	
Terminal clamp - zinc plated	1003440
Terminal clamp - Stainless Steel 1.4301	1000278
Mounting screw PG16 - plastic	5002200

1 - shielded cable with integrated ventilation tube for atmospheric pressure reference

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

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