

CCA-P-331i-RS / CCA-P-333i-RS



- precision pressure transmitter / screw-in transmitter
- nominal pressure: from 0...400 mbar up to 0...600 bar
- output signals: digital RS-485 / Modbus RTU or HART
- stainless steel sensor
- accuracy 0.1 % span
- thermal error in compensated range -20...80°C: 0.2 % span
- turn down 10:1
- communication interface for adjusting of offset, span and damping

The precision pressure transmitters **CCA-P-331i-RS** and **CCA-P-333i-RS** demonstrate the further development of our industrial pressure transmitters. The signal of the sensor is processed by the intelligent digital electronics with 16-bit A/D converter which is able to do an active temperature compensation and linearization. Due to this we are able to offer the transmitters with excellent measurement parameters and exceptionally attractive price.

PREFERRED AREAS OF USE ARE



Laboratory Techniques



Energy production (gas consumption and thermal energy measurement)

TECHNICAL DATA

Pressure ranges CCA-P-331i-RS ¹

Nominal pressure gauge / absolute [bar]	0,4	1	2	4	10	20	40
Overpressure [bar]	2	5	10	20	40	80	105
Burst pressure [bar]	3	7,5	15	25	50	120	210

¹ On customer request we adjust the device within the turn-down-possibility by software on the required pressure range.

Vacuum ranges

Nominal pressure [bar]	-0,4 ... 0,4	-1 ... 1	-1 ... 2	-1 ... 4	-1 ... 10
Overpressure [bar]	2	5	10	20	40
Burst pressure [bar]	3	7,5	15	25	50

Pressure ranges CCA-P-333i-RS ¹

Nominal pressure gauge / absolute [bar]	60	100	200	400	600
Overpressure [bar]	210	210	600	1050	1250
Burst pressure [bar]	420	420	1000	1250	1250

¹ 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 ²	± 0,1 % span
Long term stability	± 0,1 % span / year
Measurement speed	80/s

² 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	CCA-P-331i-RS: FKM option: welded version ³ (only for CCA-331i-RS); other on request			
Diaphragm	stainless steel 1.4435 (316L)			
Media wetted parts	pressure port, seal, diaphragm			
³ welded version only with pressure ports according to EN 837; welded version not available with pressure ranges > 60 bar				
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 ⁴			
Operational life	100 million load cycles			
CE-conformity	EMC Directive: 2014/30/EU Pressure Equipment Directive: 2014/68/EU (module A) ⁵			
⁴ 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 1 bar.				
⁵ 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 ± 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

*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"> - 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.



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

HART pressure units

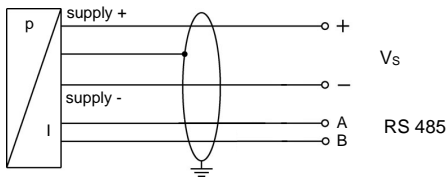
Unit	Code (h)
mmH2O@4°C	0xEF
mmHg@0°C	0x05
psi	0x06
bar	0x07
mbar	0x08
g/cm2	0x09
kg/cm2	0x0A
Pa	0x0B
kPa	0x0C
torr	0x0D
atm	0x0E
mH2O@4°C	0xAB
MPa	0xED

HART temperature units

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

ELECTRICAL CONNECTION

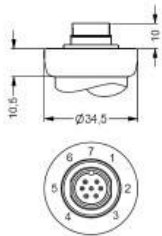
Wiring diagrams



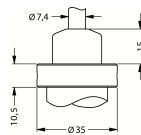
Pin configuration

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)

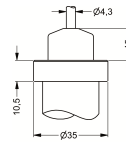
Electrical connections (dimensions in mm / inch)



Binder serie 723 7-pin (IP 67)



cable outlet (IP 68)⁶



cable gland (IP 67)⁷

⁶ different cable types and lengths available, permissible temperature depends on kind of cable
⁷ standard: 2 m PVC cable (without ventilation tube, permissible temperature: -5 ... 70 °C)



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Mechanical connection			
G 1/2" DIN 3852	1	0	0
G 1/2" EN 837	2	0	0
G 1/4" DIN 3852	3	0	0
G 1/4" EN 837	4	0	0
M 20 x 1,5 DIN 3852	5	0	0
M 12 x 1 DIN 3852	6	0	0
M 10 x 1 DIN 3852	7	0	0
M 20 x 1,5 EN 837	8	0	0
G 1/2" DIN 3852 flush ²	F	0	0
M 20 x 1,5 DIN 3852 flush	F	0	4
Customer	9	9	9
Seals			
Viton (FKM)			1
Without sealing - welded (only with EN 837-1/-3) ^{2,3}			2
EPDM			3
Customer			9
Special version			
Interface RS 485, power supply 8 ... 15 V DC		1	4
Interface RS 485, power supply 10 ... 36 V DC		1	4
Interface RS 485, power supply 3,3...5 V DC		1	4
Customer		9	9
Additional informations for communication "1D" RS 485 / HART protocol and for "2D" RS 485 / ModBus RTU protocol			
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			3
Software for set up on site			
Communication module ADAPT-6 (RS 232 / USB) + software			
Software / update code 503498			

- 1 - pressure ranges 60 bar
- 2 - only possible for CCA-331i-RS and P_N 40 bar
- 3 - welded version only with pressure ports according to EN 837

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



Pressure transmitters

ORDER CODE for CCA-P-333i-RS

CCA-P-333i-RS----------

Pressure												
Relative ¹	1	3	0									
Gauge	1	3	1									
Input [bar]												
0 ... 60				6	0	0	2					
0 ... 100 ²				1	0	0	3					
0 ... 200 ²				2	0	0	3					
0 ... 400 ²				4	0	0	3					
0 ... 600 ²				6	0	0	3					
Customer				9	9	9	9					
Output												
Digital output (communication RS 485 / HART protocol)											1D	
Digital output (communication RS 485 / ModBus RTU protocol)											2D	
Customer											9	
Accuracy												
0,1 %											1	
Customer											9	
Electrical connection												
Connector Binder 723 7-pin (IP 67)											A	0 0
Customer											9	9 9
Mechanical connection												
G 1/2" DIN 3852											1	0 0
G 1/2" EN 837											2	0 0
G 1/4" DIN 3852											3	0 0
G 1/4" EN 837											4	0 0
M 20 x 1,5 DIN 3852											5	0 0
M 12 x 1 DIN 3852											6	0 0
M 10 x 1 DIN 3852											7	0 0
M 20 x 1,5 EN 837											8	0 0
Customer											9	9 9
Seals												
Viton (FKM)											1	
EPDM (P _N < 160 bar)											3	
NBR (standard)											5	
Customer											9	
Special version												
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
Additional informations for communication "1D" RS 485 / HART protocol and for "2D" RS 485 / ModBus RTU protocol												
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												3

- 1 - measurement starts with ambient pressure
- 2 - pressure ranges > 60 bar

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

