DCL 531

Stainless Steel Probe with RS485 Modbus RTU

Stainless Steel Sensor

accuracy according to IEC 60770:
standard: 0.35 % FSO
option: 0.25 % FSO

Nominal pressure

from 0 ... 1 mH_2O up to 0 ... 250 mH_2O

Output signal

RS485 with Modbus RTU protocol

Special characteristics

- diameter 26.5 mm
- small thermal effect
- excellent accuracy
- good long term stability

Optional versions

- drinking water certificate according to DVGW and KTW
- cable protection via corrugated pipe
- different kinds of cables
- different kinds of seal materials

The stainless steel probe DCL 531 with RS485 interface uses the communication protocol Modbus RTU which has found the way in industrial communication as an open protocol. The Modbus protocol is based on a master slave architecture with which up to 247 slaves can be questioned by a master – the data are transferred in binary form.

Basic element is a high quality stainless steel sensor with high requirements for exact measurement with good long term stability.

Preferred areas of use are

Water / filtrated sewage
drinking water system, ground water
level measurement, rain spillway basin
pump and booster stations
level measurement in container
water treatment plants
water recycling

Fuel and oil
fuel storage
tank farm

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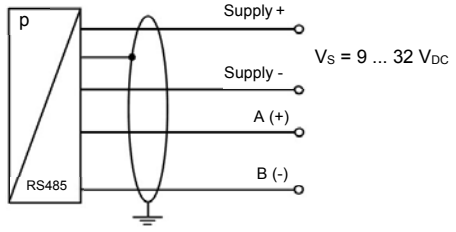
Input pressure range														
Nominal pressure gauge	[bar]	0.1	0.16	0.25	0.4	0.6	1	1.6	2.5	4	6	10	16	25
Level	[mH_2O]	1	1.6	2.5	4	6	10	16	25	40	60	100	160	250
Overpressure	[bar]	0.5	1	1	2	5	5	10	10	20	40	40	80	80

Output signal		
Digital (pressure)	RS485 with Modbus RTU Protocol	
Supply		
Direct current	V_S = 9 … 32 V_{DC}	
Performance		
Accuracy [1]	standard: nominal pressure < 0.4 bar: ≤ ± 0.50 % FSO nominal pressure ≥ 0.4 bar: ≤ ± 0.35 % FSO option: nominal pressure ≥ 0.4 bar: ≤ ± 0.25 % FSO	
Long term stability	≤ ± 0.1 % FSO / year at reference conditions	
Measuring rate	500 Hz	
Delay time	500 msec	
[1] accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)		
Thermal effects (Offset and Span)		
Pressure range P_N [bar]	< 0.40	≥ 0.40
Error band [% FSO]	≤ ± 1	≤ ± 0.75
In compensated range [°C]	0 … 70	
Permissible temperatures		
Permissible temperatures	medium: -10 ... 70 °C	storage: -25 ... 70 °C
Electrical protection [2]		
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]	PUR (-10 … 70 °C) black Ø 7.4 mm FEP (-10 … 70 °C) black Ø 7.4 mm TPE-U (-10 … 70 °C) blue Ø 7.4 mm (with drinking water approval)	
Cable capacitance	signal line/shield also signal line/signal line: 160 pF/m	
Cable inductance	signal line/shield also signal line/signal line: 1 µH/m	
Bending radius	static installation: 10-fold cable diameter dynamic application: 20-fold cable diameter	
[3] shielded cable with integrated ventilation tube for atmospheric pressure reference		
Materials (media wetted)		
Housing	stainless steel 1.4404 (316L)	
Seals	FKM; EPDM (without / with drinking water approval)	others on request
Diaphragm	stainless steel 1.4435 (316L)	
Protection cap	POM-C	
Cable sheath	PUR, FEP, TPE-U	
Miscellaneous		
Drinking water certificate [4]	according to DVGW W 270 and UBA KTW (with order the indication "with drinking water certificate" is necessary)	
Adjustable units	pressure: mmH_2O, mmHg, psi, bar, mbar, g/cm^2, kg/cm^2, Pa, kPa, torr, atm, mH_2O, MPa	
Read out	serial number; date of calibration, min- and max-value for pressure	
Current consumption	max. 7 mA	
Weight	approx. 200 g (without cable)	
Ingress protection	IP 68	
CE-conformity	EMC Directive: 2014/30/EU	
[4] only possible with EPDM seal in combination with TPE-U cable		

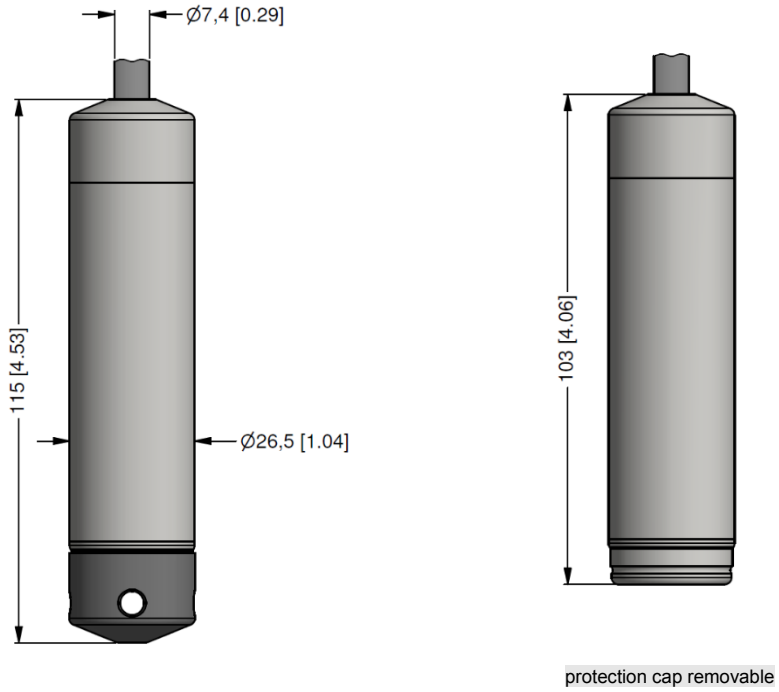
Wiring diagram

RS485 / Modbus RTU



Pin configuration	
Electrical connection	cable colours (IEC 60757)
Supply + Supply – A + B –	WH (white) BN (brown) GN (green) YE (yellow)
Shield	GNYE (green yellow)

Dimensions (mm / in)

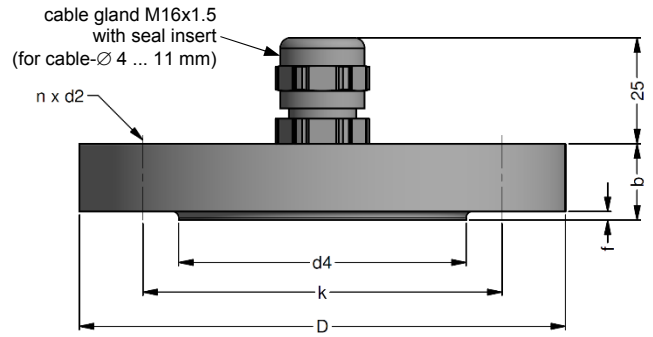


protection cap removable

Configuration Modbus RTU					
Standard configuration	001	-	1	-	1
Address					
address	001				
	…				
	247				
Baud Rate					
4800 Bd			0		
9600 Bd			1		
19200 Bd			2		
38400 Bd			3		
Parity					
None					0
Odd					1
Even					2

Configuration code (to specify with order)		-		-	

Mounting flange with cable gland



dimensions in mm			
size	DN25 / PN40	DN50 / PN40	DN80 / PN16
b	18	20	20
D	115	165	200
d2	14	18	18
d4	68	102	138
f	2	3	3
k	85	125	160
n	4	4	8

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

Ordering type	**Ordering code**	**Weight**
DN25 / PN40 with cable gland brass, nickel plated	ZMF2540	1.4 kg
DN50 / PN40 with cable gland brass, nickel plated	ZMF5040	3.2 kg
DN80 / PN16 with cable gland brass, nickel plated	ZMF8016	4.8 kg

Terminal clamp

Technical data	
Suitable for	all probes with cable ∅ 5.5 ... 10.5 mm
Material of housing	standard: steel, zinc plated optionally: stainless steel 1.4301 (304)
Material of clamping jaws and positioning clips	PA (fibre-glass reinforced)
Dimensions (mm)	174 x 45 x 32
Hook diameter	20 mm

Ordering type	**Ordering code**	**Weight**
Terminal clamp, steel, zinc plated	Z100528	approx. 160 g
Terminal clamp, stainless steel 1.4301 (304)	Z100527	

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pressure measurement

Ordering code DCL 531

DCL 531 ☐☐☐-☐☐☐☐-☐-☐-☐-☐-☐-☐-☐☐☐-☐☐☐

Section			Code	
Pressure				
		in bar	4 5 0	
		in mH_2O	4 5 1	
Input	**[mH_2O]**	**[bar]**		
	1.0	0.10	1 0 0 0	
	1.6	0.16	1 6 0 0	
	2.5	0.25	2 5 0 0	
	4.0	0.40	4 0 0 0	
	6.0	0.60	6 0 0 0	
	10	1.0	1 0 0 1	
	16	1.6	1 6 0 1	
	25	2.5	2 5 0 1	
	40	4.0	4 0 0 1	
	60	6.0	6 0 0 1	
	100	10	1 0 0 2	
	160	16	1 6 0 2	
	250	25	2 5 0 2	
		customer	9 9 9 9	consult
Housing				
		stainless steel 1.4404 (316L)	1	
		customer	9	consult
Diaphragm				
		stainless steel 1.4435 (316L)	1	
		customer	9	consult
Output				
		RS485 Modbus RTU	L5	
Seals				
		FKM	1	
		EPDM	3	
DVGW/KTW:		EPDM [1]	3T	
		customer	9	consult
Accuracy				
standard for $P_N \geq 0.4$ bar:		0.35 % FSO	3	
standard for $P_N < 0.4$ bar:		0.50 % FSO	5	
option for $P_N \geq 0.4$ bar:		0.25 % FSO	2	
		customer	9	consult
Electrical connection				
		PUR-cable (black, Ø 7.4 mm) [2]	2	
		FEP-cable (black, Ø 7.4 mm) [2]	3	
DVGW/KTW:		TPE-U cable (blue, Ø 7.4 mm) [1, 2]	F	
		customer	9	consult
Cable length				
		in m		
Special version				
		standard	0 0 0	
		customer	9 9 9	consult

[1] drinking water certification only possible with EPDM seal (code 3T) in combination with TPE-U cable (code F)
[2] shielded cable with integrated ventilation tube for atmospheric pressure reference

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