Pressure measurement

Process pressure/Hydrostatic

VEGAWELL 52

Product Information

VEGA

Contents

Take note of safety instructions for Ex applications

Please note the Ex specific safety information which you can find on our homepage www.vega.com\services\downloads and which comes with every instrument. In hazardous areas you should take note of the appropriate regulations, conformity and type approval certificates of the sensors and power supply units. The sensors must only be operated on intrinsically safe circuits. The permissible electrical values are stated in the certificate.

35400-EN-090130

1 Description of the measuring principle

Measuring principle

VEGAWELL 52 pressure transmitters work according to the hydrostatic measuring principle, which functions independently of the dielectric properties of the product and is not influenced by foam generation.

The sensor element of VEGAWELL 52 is the dry ceramic-capacitive CERTEC® measuring cell in two sizes. Base element and diaphragm consist of high purity sapphire-ceramic®.

The hydrostatic pressure of the product causes via the diaphragm a capacitance change in the measuring cell. This capacitance change is converted into an appropriate output signal.

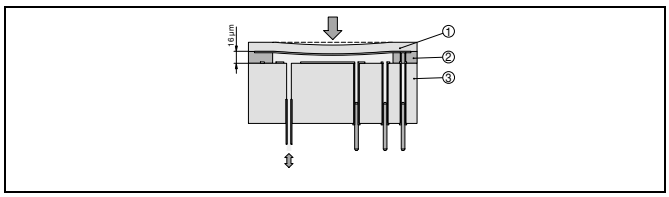


Fig. 1: Configuration of the CERTEC® measuring cell with VEGAWELL 52

1 Diaphragm
2 Soldered glass bond
3 Base element

The advantages of the CERTEC® measuring cell are:
- Very high overload resistance
- No hysteresis
- Excellent long-term stability
- Completely front flush installation
- Good corrosion resistance
- Very high abrasion resistance

Wide application range

VEGAWELL 52 is suitable for level measurement in deep wells and ballast tanks as well as for gauge measurement in open flumes. Typical media are drinking water and waste water as well as water containing abrasive substances. All signal outputs are available in 4 … 20 mA and 4 … 20 mA/HART - Pt 100.

In the 4 … 20 mA/HART - Pt 100 version, a temperature sensor Pt 100 in four-wire technology is integrated in the transducer. Power supply or processing are carried out via an external temperature transducer.

35400-EN-090130

2 Type overview

VEGAWELL 52

Measuring cell:	CERTEC®
Media:	drinking water and waste water
Process fitting:	Straining clamp, screw connection, thread
Material process fitting:	316L
Material, suspension cable:	PE, PUR, FEP
Material transmitter:	316L, 1.4462 (Duplex), each also with PE coating, PVDF, Titanium
Diameter transmitter:	depending on material and version at least 22 mm
Measuring range:	0 … 0.1 bar up to 0 … 25 bar
Process temperature:	-20 … +80 °C (-4 … +176 °F)
Deviation:	< 0.2 %, < 0.1 %
Signal output:	4 … 20 mA, 4 … 20 mA/HART
Operation:	depending on the version via PACTware/PC

35400-EN-090130

3 Mounting instructions

Mounting position

The following illustration shows a mounting example for VEGAWELL 52. The VEGA price list contains suitable mounting brackets under the section Accessories. With these parts, standard mounting arrangements can be realised quickly and reliably.

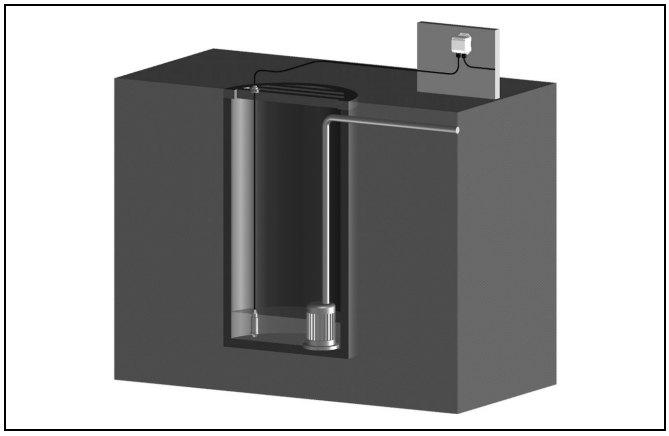


Fig. 3: VEGAWELL 52 in a pump shaft with VEGABOX 02

VEGAWELL 52 must be mounted in a calm area or in a suitable protective tube. This avoids lateral movements of the transmitter and the resulting corruption of measurement data.

Note:
As an alternative to fixing the transmitter, the use of a measuring instrument holder from VEGA's line of mounting accessories is recommended.

Beside the connection and suspension cables, the suspension cable also contains a capillary for atmospheric pressure compensation. All versions can be shortened on site.

With VEGAWELL 52, the electronics is completely integrated in the transmitter. The cable end can be lead directly to a dry connection compartment. Pressure compensation is then carried out via the filter element of the capillaries.

Note:
The pressure compensation housing VEGABOX 02 is recommended for connecting VEGAWELL 52.

It contains a high-quality ventilation filter and terminals. A protective cover is optionally available for use outdoors.

Mounting versions

The following illustrations show the different mounting versions depending on the instrument type.

Mounting with straining clamp

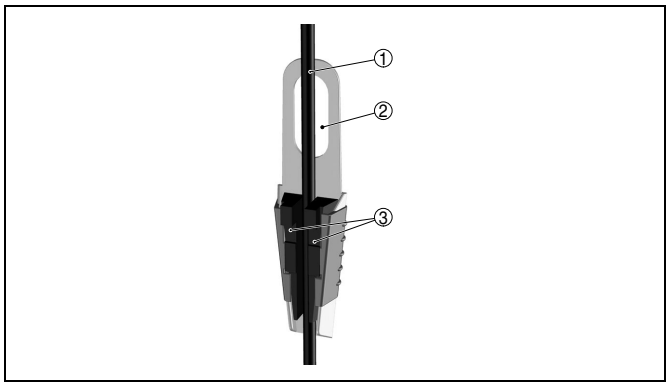


Fig. 5: Straining clamp

1 Suspension cable
2 Suspension opening
3 Clamping jaws

Mounting with screw connection

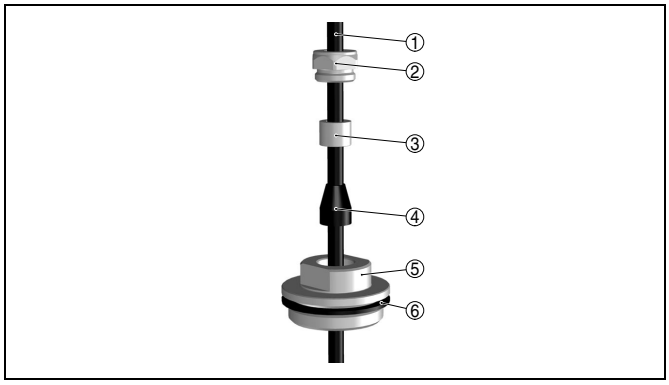


Fig. 6: Screw connection

1 Suspension cable
2 Seal screw
3 Cone bushing
4 Seal cone
5 Screw connection
6 Seal

35400-EN-090130

Mounting with housing and thread

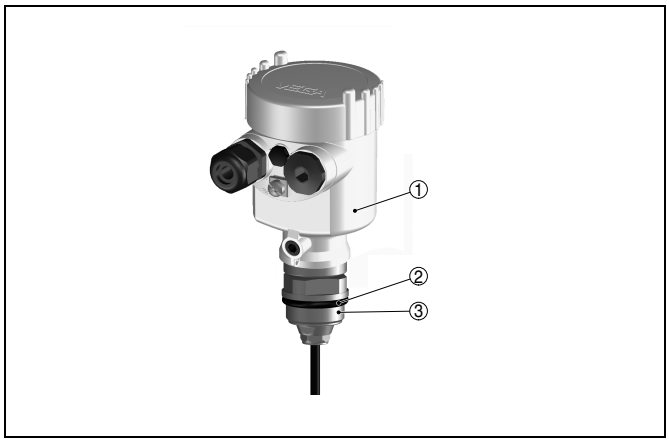


Fig. 7: Housing with thread G1½ A

1 Housing
2 Seal
3 Thread

35400-EN-090130

4 Electrical connection

4.1 General requirements

The supply voltage range can differ depending on the instrument version. You can find exact specifications in chapter "*Technical data*".

The national installation standards as well as the valid safety regulations and accident prevention rules must be observed.

In hazardous areas you should take note of the appropriate regulations, conformity and type approval certificates of the sensors and power supply units.

4.2 Power supply

Supply voltage and current signal are carried on the same two-wire cable. The requirements on the power supply are specified in chapter "*Technical data*".

The VEGA power supply units VEGATRENN 149AEx, VEGASTAB 690, VEGADIS 371 as well as VEGAMET signal conditioning instruments are suitable for power supply. When one of these instruments is used, a reliable separation of the supply circuits from the mains circuits according to DIN VDE 0106 part 101 is ensured.

4.3 Connection cable

In general

An outer diameter of 5 … 9 mm ensures the seal effect of the cable entry. If electromagnetic interference is expected, screened cable should be used for the signal lines.

The sensors are connected with standard two-wire cable without screen.

In Ex applications, the corresponding installation regulations must be noted for the connection cable.

4.4 Cable screening and grounding

If screened cable is necessary, the cable screen must be connected on both ends to ground potential. If potential equalisation currents are expected, the connection on the evaluation side must be made via a ceramic capacitor (e.g. 1 nF, 1500 V).

4.5 Wiring plan VEGAWELL 52 - 4 … 20 mA

Direct connection

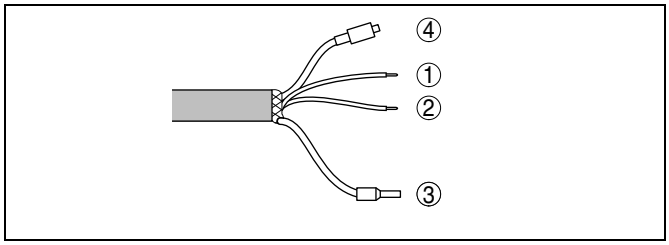


Fig. 8: Wire assignment, suspension cable

1 blue (-): to power supply or to the processing system
2 brown (+): to power supply or to the processing system
3 Shielding
4 Breather capillaries with filter element

Connection via VEGABOX 02

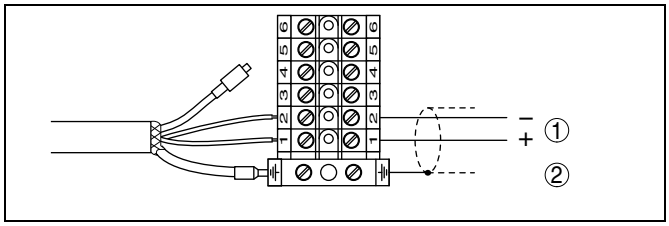


Fig. 9: Terminal assignment VEGABOX 02

1 To power supply or the processing system
2 Shielding[1)]

Connection via housing

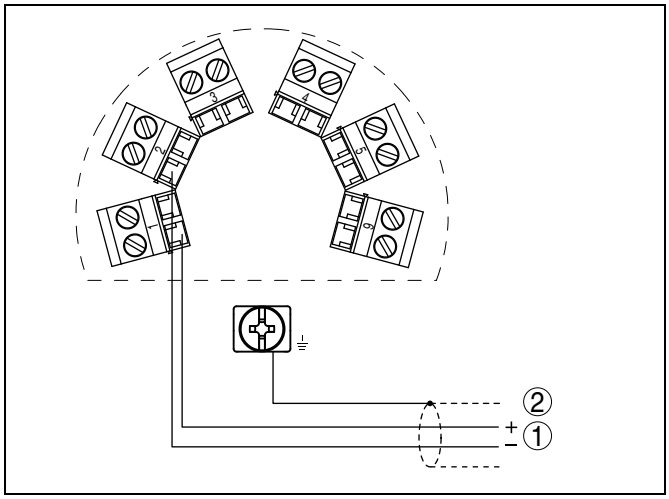


Fig. 10: Terminal assignment of the housing

1 To power supply or the processing system
2 Shielding[2)]

[1)] Connect screen to ground terminal. Connect ground terminal on the outside of the housing as prescribed. The two terminals are galvanically connected.

[2)] Connect screen to ground terminal. Connect ground terminal on the outside of the housing as prescribed. The two terminals are galvanically connected.

4.6 Wiring plan VEGAWELL 52 - 4 … 20 mA/ HART - Pt 100

Direct connection

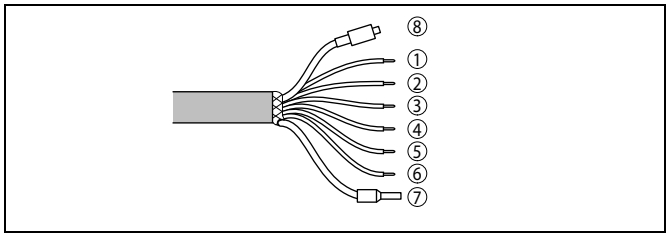


Fig. 11: Wire assignment, connection cable

1 blue (-): to power supply or to the processing system
2 Brown (+): to power supply or to the processing system
3 White: for processing of the integrated Pt 100 (power supply)
4 Yellow: for processing of the integrated Pt 100 (measurement)
5 Red: for processing of the integrated Pt 100 (measurement)
6 Black: for processing of the integrated Pt 100 (power supply)
7 Shielding
8 Breather capillaries with filter element

Connection via VEGABOX 02

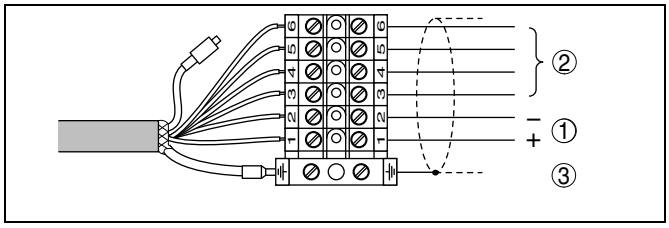


Fig. 12: Terminal assignment VEGABOX 02

1 To power supply or the processing system (signal pressure transmitter)
2 To power supply or the processing system (connection cables resistance thermometer Pt 100)
3 Shielding[3)]

Connection via VEGABOX 02 with integrated temperature sensor

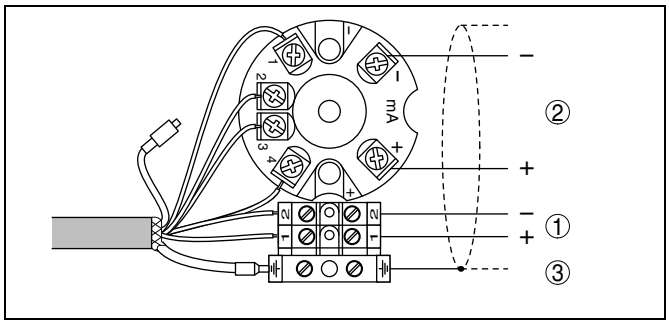


Fig. 13: Terminal assignment VEGABOX 02

1 To power supply or the processing system (signal pressure transmitter)
2 For voltage supply or to processing system (resistance thermometer Pt 100)
3 Shielding[4)]

Connection via housing

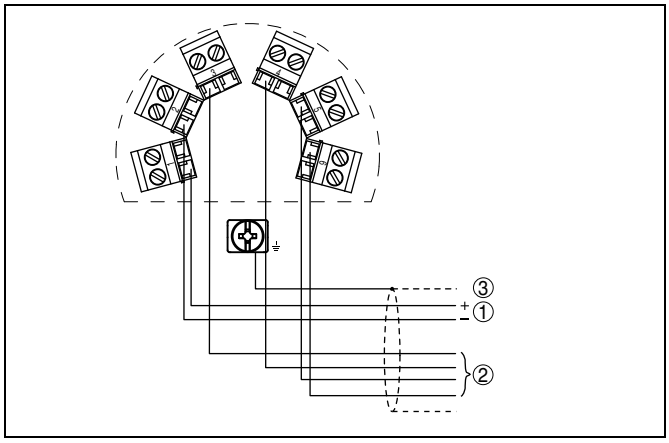


Fig. 14: Terminal assignment of the housing

1 To power supply or the processing system (signal pressure transmitter)
2 For voltage supply or to processing system (resistance thermometer Pt 100)
3 Shielding[5)]

[3)] Connect screen to ground terminal. Connect ground terminal on the outside of the housing as prescribed. The two terminals are galvanically connected.
[4)] Connect screen to ground terminal. Connect ground terminal on the outside of the housing as prescribed. The two terminals are galvanically connected.
[5)] Connect screen to ground terminal. Connect ground terminal on the outside of the housing as prescribed. The two terminals are galvanically connected.

35400-EN-090130

5 Operation

5.1 Overview

VEGAWELL 52 4 … 20 mA
VEGAWELL 52 - 4 … 20 mA has no adjustment options.

VEGAWELL 52 4 … 20 mA/HART - Pt 100
- Adjustment software according to FDT/DTM standard, e.g. PACTware and PC
- HART handheld

5.2 Adjustment with PACTware

Connecting the PC to the signal cable

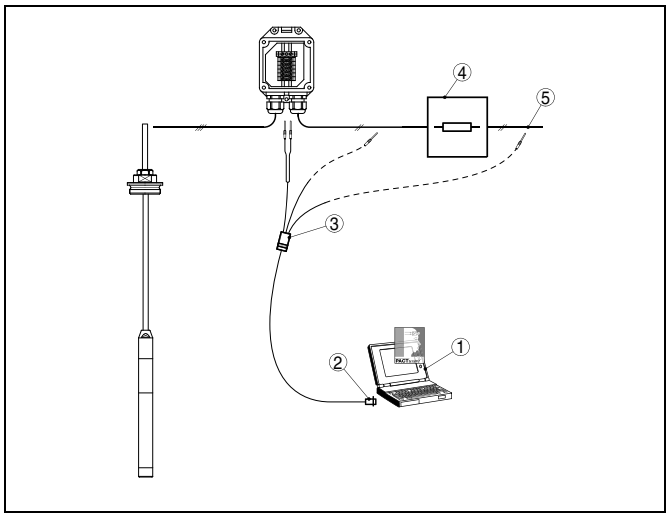


Fig. 15: Connection of the PC to VEGABOX 02 or communication resistor

1 PC with PACTware
2 RS232 interface (with VEGACONNECT 3), USB interface (with VEGACONNECT 4)
3 VEGACONNECT 3 or 4
4 Communication resistor 250 Ω
5 Power supply unit

Necessary components:
- VEGAWELL 52
- PC with PACTware and suitable VEGA DTM
- VEGACONNECT with HART adapter cable
- HART resistor approx. 250 Ω
- Power supply unit

Note:
With power supply units with integrated HART resistance (internal resistance approx. 250 Ω), an additional external resistance is not necessary (e. g. VEGATRENN 149A, VEGAMET 381/624/625, VEGASCAN 693). In such cases, VEGACONNECT can be connected parallel to the 4 … 20 mA cable.

6 Technical data

Materials and weights

Materials, wetted parts	
– Transmitter	316L, 316L with PE coating, 1.4462 (Duplex), 1.4462 with PE coating, PVDF, Titanium
– Diaphragm	sapphire ceramic® (99.9 % oxide ceramic)
– Measuring cell seal	FKM (VP2/A) - FDA and KTW approved, FFKM (Perlast G75S), EPDM (A+P 75.5/KW75F)
– Suspension cable	PE (FDA and KTW-approved), FEP, PUR
– Cable gland on the transmitter	316L
– Process fitting	316L
– Straining clamp	1.4301
– Unassembled screw connection	316L, PVDF
– Threaded connection on the housing	316L
Materials, non-wetted parts	
– Housing	plastic PBT (Polyester), 316L
Weight approx.	
– Basic weight	0.8 kg (1.764 lbs)
– Suspension cable	0.1 kg/m (0.07 lbs/ft)
– Straining clamp	0.2 kg (0.441 lbs)
– Screw connection	0.4 kg (0.882 lbs)
– Plastic housing	0.8 kg (1.764 lbs)
– Stainless steel housing	1.6 kg (3.528 lbs)

Input variable

Measured value	Level
Measuring range	see product code
Recommended max. turn down	10 : 1

Output variable

4 … 20 mA

Output signal	4 … 20 mA
Signal resolution	2 µA
Failure signal	< 3.6 mA
Max. output current	22 mA
Run-up time	2 s
Step response time	100 ms (ti: 0 s, 0 … 63 %)
Fulfilled NAMUR recommendations	NE 43

4 … 20 mA/HART - Pt 100

Output signal	4 … 20 mA/HART
Signal resolution	2 µA
Failure signal	< 3.6 mA; 20.5 mA; 22 mA; unchanged (adjustable via PACTware)
Max. output current	22 mA
Run-up time	15 s
Step response time	200 ms (ti: 0 s, 0 … 63 %)
Fulfilled NAMUR recommendations	NE 43

Additional output parameter - temperature

integrated resistance thermometer	Pt 100 according to DIN EN 60751
Range	-50 … +100 °C (-58 … +212 °F)
Resolution	1 °K

Deviation for 4 … 20 mA version[6)]

Specifications refer to the set span. Turn down (TD) = nominal measuring range/set span.

Deviation with version < 0.2 %	
– Turn down 1 : 1 up to 5 : 1	< 0.2 %
– Turn down > 10 : 1	< 0.04 % x TD

6) Determined according to the limit point method according to IEC 60770, incl. non-linearity, hysteresis and non-repeatability.

35400-EN-090130

Deviation with version < 0.1 %

– Turn down 1 : 1 up to 5 : 1	< 0.1 %
– Turn down > 10 : 1	< 0.02 % x TD

Deviation for version 4 … 20 mA/HART - Pt 100[7)]

Applies to **digital** HART interface as well as to **analogue** current output 4 … 20 mA. Specifications refer to the set span. Turn down (TD) is the relation nominal measuring range/set span.

Deviation with version < 0.2 %

– Turn down 1 : 1 up to 5 : 1	< 0.2 %
– Turn down > 10 : 1	< 0.04 % x TD

Deviation with version < 0.1 %

– Turn down 1 : 1 up to 5 : 1	< 0.1 %
– Turn down > 10 : 1	< 0.02 % x TD

Influence of the product or ambient temperature

Applies to **digital** HART interface as well as to **analogue** current output 4 … 20 mA. Specifications refer to the set span. Turn down (TD) is the relation nominal measuring range/set span.

Average temperature coefficient of the zero signal

In the compensated temperature range of 0 … +80 °C (+32 … +176 °F), reference temperature 20 °C (68 °F).

Average temperature coefficient of the zero signal

– Turn down 1 : 1	< 0.05 %/10 K
– Turn down 1 : 1 up to 5 : 1	< 0.1 %/10 K
– Turn down > 10 : 1	< 0.15 %/10 K

Outside the compensated temperature range

Average temperature coefficient of the zero signal

– Turn down 1 : 1	typ. < 0.05 %/10 K

Long-term stability (similar to DIN 16086, DINV 19259-1 and IEC 60770-1)

Applies to **digital** HART interface as well as to **analogue** current output 4 … 20 mA. Specifications refer to the set span. Turn down (TD) is the relation nominal measuring range/set span.

Long-term drift of the zero signal	< (0.1 % x TD)/year

Ambient conditions

Ambient temperature

– Connection cable PE	-40 … +60 °C (-40 … +140 °F)
– Connection cable PUR, FEP	-40 … +85 °C (-40 … +185 °F)
Storage and transport temperature	-20 … +80 °C (-4 … +176 °F)

Process conditions

Process pressure

Max. process pressure, transmitter[8)]

– Measuring range 0.1 bar (1.45 psig)	15 bar (218 psig)
– Measuring range 0.2 bar (2.9 psig)	20 bar (290 psig)
– Measuring range ≤ 0.4 bar (5.8 psig)	25 bar (363 psig)

Pressure stage, process fitting

– Unassembled screw connection	316L: PN 3, PVDF: unpressurized
– Thread on the housing	PN 3

Product temperature, depending on the version

35400-EN-090130

7) Determined according to the limit point method according to IEC 60770, incl. non-linearity, hysteresis and non-repeatability.
8) Limited by the overpressure resistance of the measuring cell.

Suspension cable	Transmitter	Product temperature
PE	All	-20 … +60 °C (-4 … +140 °F)
PUR	All	-20 … +80 °C (-4 … +176 °F)
PUR	PE coating	-20 … +60 °C (-4 … +140 °F)
FEP	All	-20 … +80 °C (-4 … +176 °F)
FEP	PE coating	-20 … +60 °C (-4 … +140 °F)

Vibration resistance — mechanical vibrations with 4 g and 5 … 100 Hz[9)]

Electromechanical data

Suspension cable
- Configuration — six wires, one suspension cable, one breather capillary, screen braiding, foil, mantle
- Tensile strength — ≥ 1200 N (270 pound force)
- Max. length — 1000 m (3280 ft)
- Min. bending radius — 25 mm (with 25 °C/77 °F)
- Diameter approx. — 8 mm (0.315 in)
- colour (non-Ex/Ex) - PE — black/blue
- colour (non-Ex/Ex) - PUR, FEP — blue/blue

Cable entry housing or VEGABOX 02 — 1 x cable gland M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind stopper M20 x 1.5

Screw terminals — for wire cross section 1.5 mm² (AWG 16), screen up to 4 mm² (AWG 12)

Supply voltage - 4 … 20 mA

Operating voltage — 8 … 36 V DC

Permissible residual ripple
- < 100 Hz — U_{ss} < 1 V
- 100 Hz … 10 kHz — U_{ss} < 10 mV

Load — see diagram

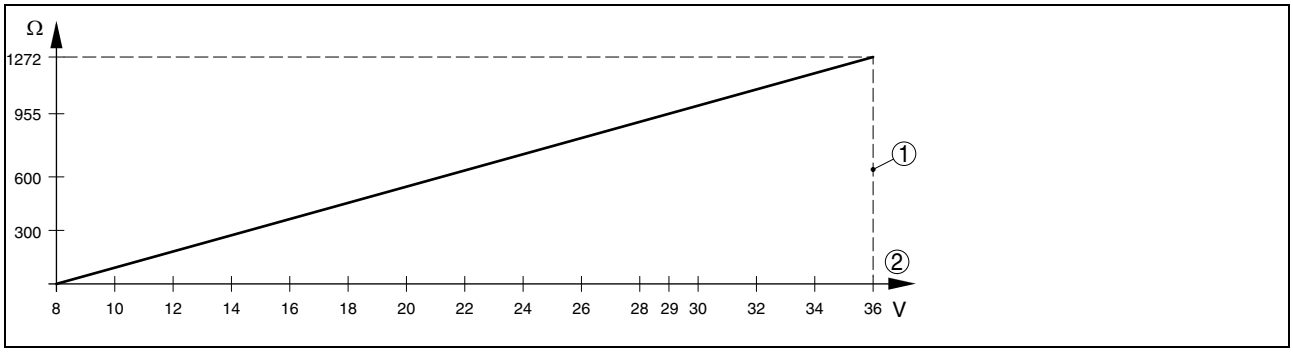


Fig. 16: Voltage diagram

1 Voltage limit
2 Operating voltage

Supply voltage - 4 … 20 mA/HART - Pt 100

Operating voltage — 9.6 … 36 V DC

Permissible residual ripple
- < 100 Hz — U_{ss} < 1 V
- 100 Hz … 10 kHz — U_{ss} < 10 mV

Load — see diagram

9) Tested according to the regulations of German Lloyd, GL directive 2.

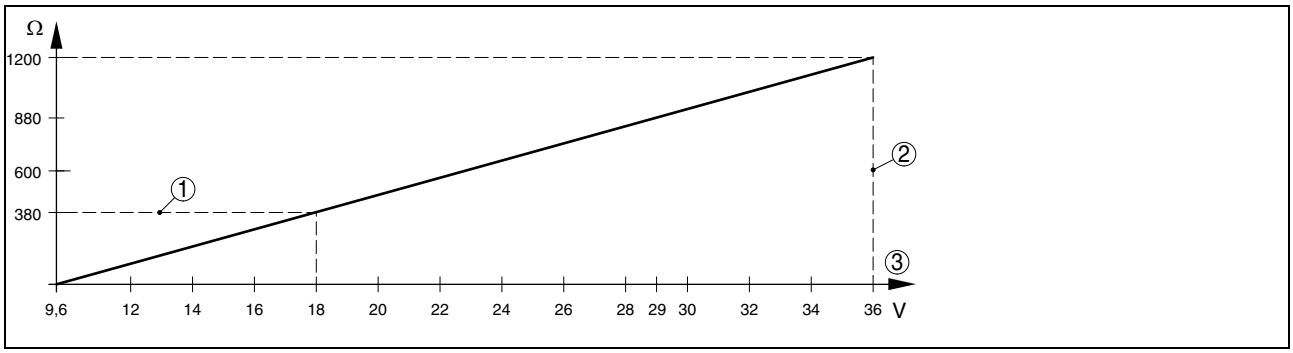


Fig. 17: Voltage diagram

1 HART load
2 Voltage limit
3 Operating voltage

Electrical protective measures

Protection	
– Transmitter	IP 68 (30 bar)
– Housing	IP 66/IP 67
– VEGABOX 02	IP 65
Overvoltage category	III
Protection class	III

Existing approvals or approvals applied for

Gas explosion protection	e.g. according to ATEX and IEC
Fire-damp protection	e.g. according to ATEX
Overfill protection	e.g. according to WHG
Ship approval	e.g. according to GL, LRS, ABS, RINA

The available approvals can be selected via the configurator on www.vega.com.

Depending on the version, instruments with approvals can have different technical data. For these instruments, please note the corresponding approval documents. They can be downloaded in the download section on www.vega.com.

CE conformity

EMC (2004/108/EG)	EN 61326-1: 2006
LVD (2006/95/EG)	EN 61010-1: 2001

Environmental instructions

VEGA environment management system	certified according to DIN EN ISO 14001

You can find detailed information under www.vega.com.

35400-EN-090130

7 Dimensions

VEGAWELL 52 - suspension cable 1

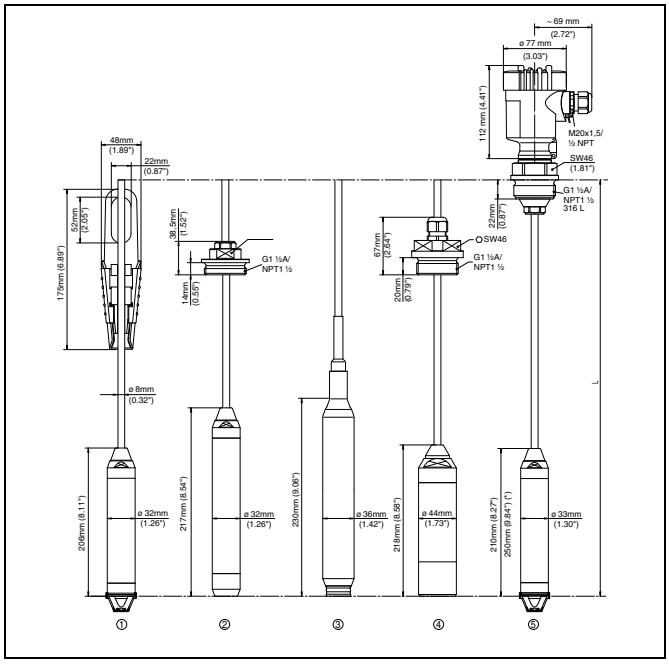


Fig. 18: VEGAWELL 52 - suspension cable

1 *Transmitter Duplex, with straining clamp*
2 *Transmitter Duplex for deep wells, with unassembled screw connection G1½ A (1½ NPT) and closing cap*
3 *Transmitter Duplex, with PE coating*
4 *Transmitter with screwed connection of PVDF*
5 *Transmitter Titanium/Titanium with glass leadthrough, with thread G1 A (1 NPT) and plastic housing*

VEGAWELL 52 - suspension cable 2

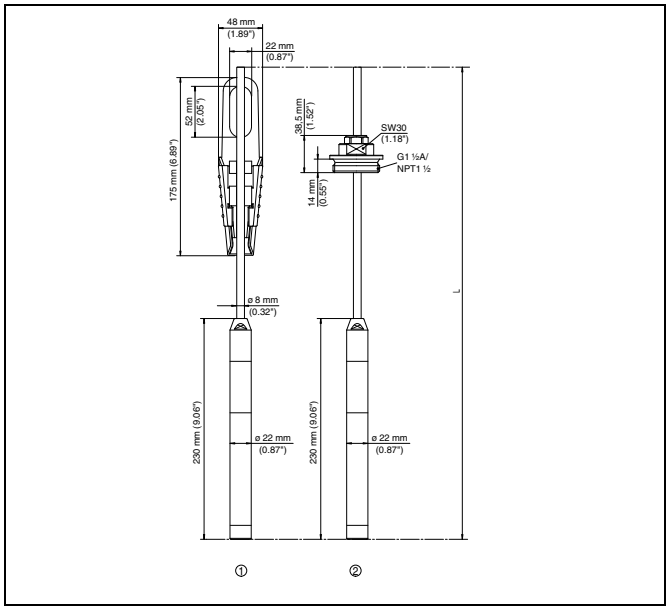


Fig. 20: VEGAWELL 52 - suspension cable

1 *Transmitter 316L, with straining clamp*
2 *Transmitter Titanium, with unassembled screw connection G1 A (1 NPT)*

VEGAWELL 52 - threaded fitting

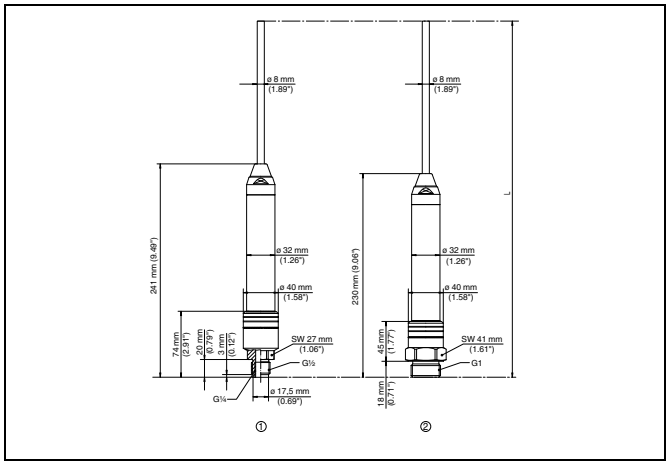
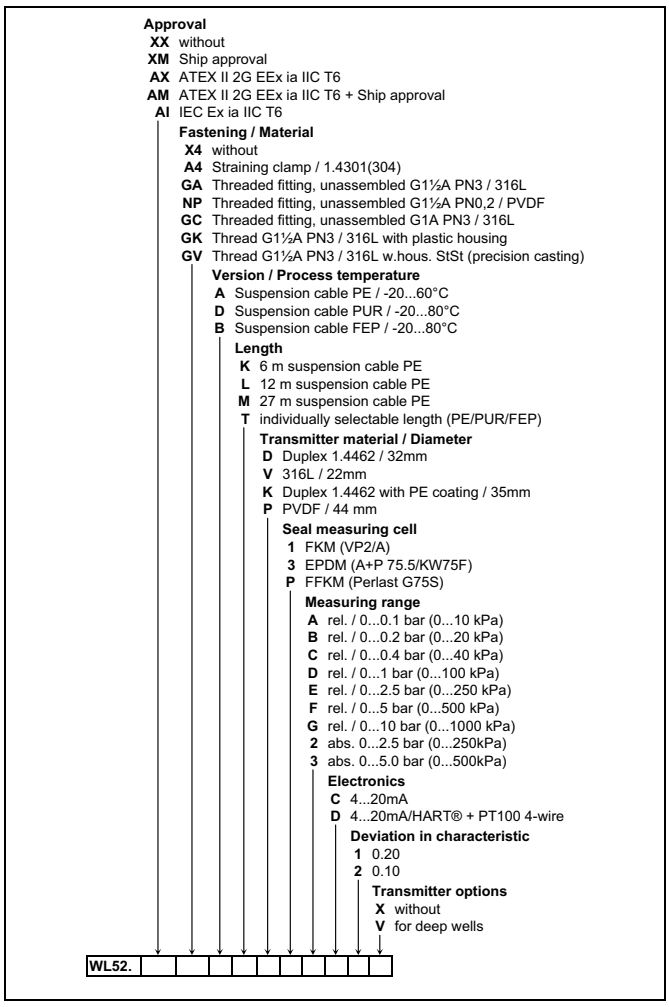


Fig. 22: VEGAWELL 52 - thread

1 *Threaded fitting G½ inner G¼*
2 *Threaded fitting G1*

8 Product code

VEGAWELL 52



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and much, much more

35400-EN-090130