

Pressure measurement

Process pressure

VEGABAR 14
VEGABAR 17



Product Information

VEGA

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Take note of safety instructions for Ex applications



With Ex applications, please note the Ex-specific safety information on our homepage www.vega.com/services/downloads and in the documentation that 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.

1 Description of the measuring principle

Measuring principle

VEGABAR 14

The sensor element of VEGABAR 14 is the dry ceramic-capacitive CERTEC[®] measuring cell. Base element and diaphragm consist of high purity sapphire-ceramic[®].

The process pressure causes via the diaphragm a change in an elec. parameter of the measuring cell. This change is converted into an appropriate output signal.

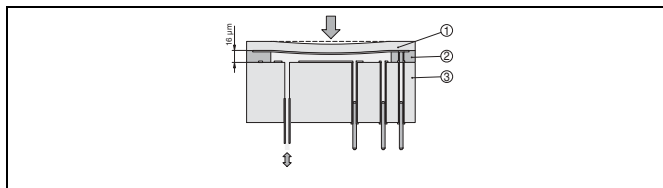


Fig. 1: Configuration of the CERTEC[®] measuring cell in VEGABAR 14

- 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

VEGABAR 17

In VEGABAR 17, a measuring cell with piezoresistive sensor element containing an internal transmission liquid is used for measuring ranges up to 16 bar. The process diaphragm is made of stainless steel.

For measuring ranges from 25 bar, there is a dry strain gauge (DMS) mounted on the back side of the stainless steel process diaphragm.

The process pressure causes via the diaphragm a change in an elec. parameter of the measuring cell. This change is converted into an appropriate output signal.

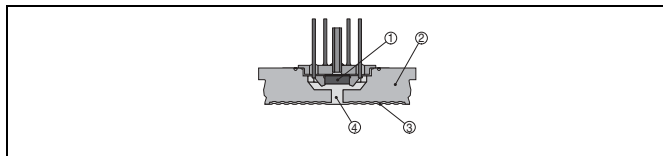


Fig. 2: Configuration of a piezoresistive measuring cell with VEGABAR 17

- 1 Sensor element
- 2 Base element
- 3 Diaphragm
- 4 Silicone oil

The advantages of the piezoresistive measuring cell are:

- Elastomere-free
- Wetted parts of stainless steel
- small diameter, therefore small process fittings possible
- small hysteresis

Wide application range



VEGABAR 14 and 17 pressure transmitters are suitable for process pressure measurement of gases, vapours and liquids. Suitable versions are also available for viscous liquids and corrosive or aggressive products. The main area of application is mechanical engineering and plant construction.

VEGABAR 14 and 17 pressure transmitters are cost-effective instruments with small dimensions for standard applications with 4 ... 20 mA signal output. They offer sufficient accuracy as well as flush process fittings, but have limited adjustment options.

2 Type overview

VEGABAR 14



VEGABAR 17



Measuring cell:	CERTEC®	Piezoresistive/DMS
Diaphragm:	Ceramic	Metal
Products:	Gases, vapours and liquids	gases, vapours and liquids, also viscous products and foodstuffs
Process fitting:	G½ A or M20x1.5 acc. to EN 837, G½ A inner G¼ A, ½ NPT inner ¼ NPT	G1 B or G½ B front flush, G½ B, G¼ B, ½ NPT or ¼ NPT manometer connection
Material:	316L	316Ti
Oil and grease-free/for oxygen applications	--/--	yes/yes
Measuring range:	-1 ... 0.6 bar up to 0 ... 60 bar (-14.5 ... 8.7 psi up to 0 ... 870 psi)	-1 ... 0 bar up to 0 ... 600 bar (-14.5 ... 0 psi up to 0 ... 8702 psi)
Process temperature:	-40 ... +100 °C (-40 ... +212 °F)	-40 ... +150 °C (-40 ... +312 °F)
Deviation in characteristics:	<0.5 %	<0.5 %
Signal output:	4 ... 20 mA	4 ... 20 mA
Connection:	Plug acc. to DIN 43650, plug M12x1, cable outlet	Plug acc. to DIN 43650, plug M12x1, cable outlet, terminal housing
Adjustment option:	zero/--	zero/span

3 Mounting information

Installation position

VEGABAR functions in any installation position. Depending on the measuring system, the installation position can influence the measurement. This can be compensated by a position correction.

The instruments with manometer connection acc. to EN 837 are mounted acc. to the directives for manometers (DIN EN 839-2).



Information:

We recommend using lock fittings, measuring instrument holders and siphons from the line of VEGA accessories.

4 Electrical connection

4.1 General requirements

The supply voltage range can differ depending on the instrument version. The exact range is stated in the "Technical data".

Take note of country-specific installation standards (e.g. the VDE regulations in Germany) as well as prevailing safety regulations and accident prevention rules.



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 Voltage supply

Power supply and current signal are carried over the same two-wire connection cable. The requirements on the power supply are stated in the Technical Data of this Product Information manual.

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

4.3 Connection cable

General

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

Ex applications



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

4.4 Cable screening and grounding

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 provided via a ceramic capacitor (e.g. 1 nF, 1500 V).

4.5 Wiring plans - VEGABAR 14

Angle plug connector acc. to DIN 43650A

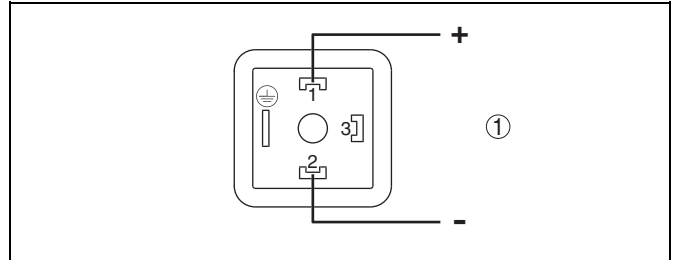


Fig. 3: Wiring plan, angle plug connector acc. to DIN 43650A, bottom view of the plug

1 Power supply and signal output

Round plug connector M12x1

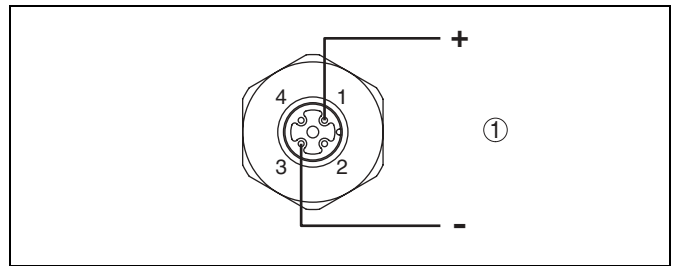


Fig. 4: Wiring plan circular plug connector M12x1

1 Power supply and signal output

Cable outlet

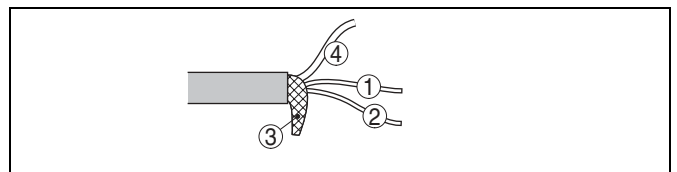


Fig. 5: Wiring plan cable outlet¹⁾

- 1 br (+) power supply and signal output
- 2 bl (-) power supply and signal output
- 3 Cable screen
- 4 Breather capillaries

¹⁾ The cables bl, ge, sw, ws are not connected.

4.6 Wiring plans - VEGABAR 17

Angle plug connector acc. to DIN 43650A

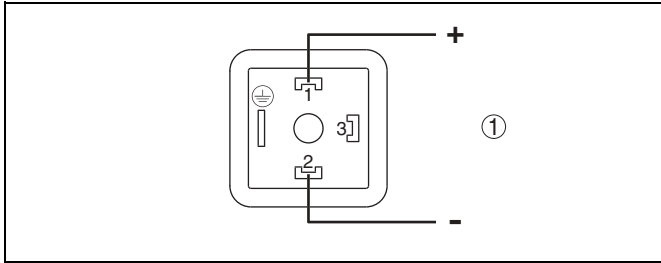


Fig. 6: Wiring plan, angle plug connector acc. to DIN 43650A, bottom view of the plug

- 1 Power supply and signal output

Round plug connector M12x1

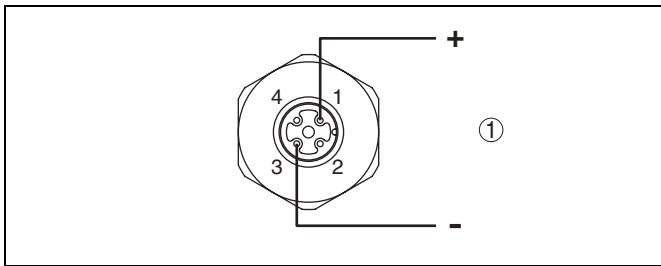


Fig. 7: Wiring plan circular plug connector M12x1

- 1 Power supply and signal output

Cable outlet

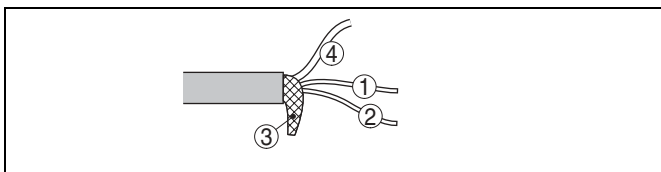


Fig. 8: Wiring plan cable outlet²⁾

- 1 br (+) power supply and signal output
- 2 gn (-) power supply and signal output
- 3 Cable screen
- 4 Breather capillaries

Terminal housing

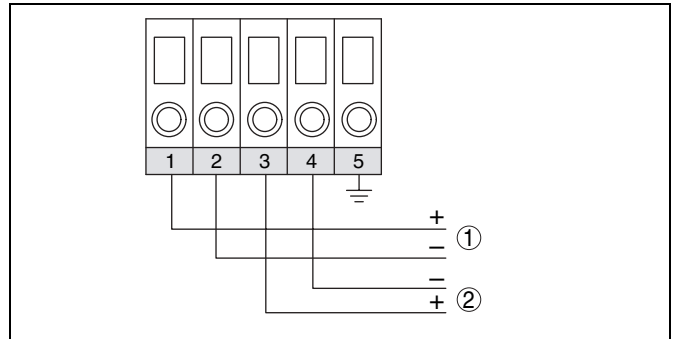


Fig. 9: Wiring plan, terminal housing

- 1 To power supply or processing system
- 2 Control instrument (4 ... 20 mA measurement)

²⁾ The cables bl, ge, sw, ws are not connected.

5 Adjustment

5.1 Zero point correction on VEGABAR 14

VEGABAR 14 with angled plug connector enables a zero point adjustment ± 1 mA via an integrated potentiometer.

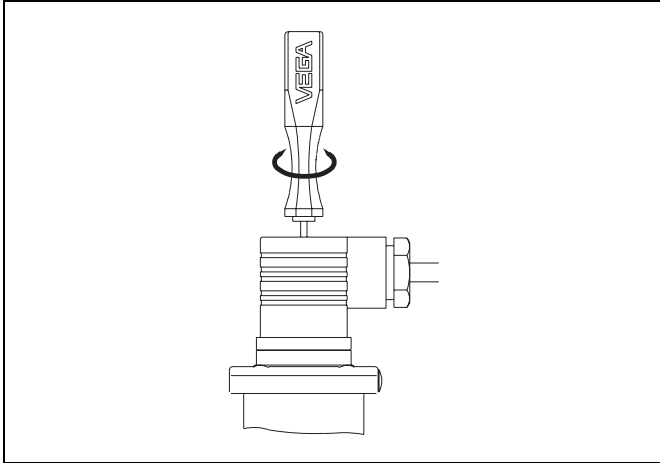


Fig. 10: Adjustment of the zero point

5.2 Zero/span adjustment with VEGABAR 17

VEGABAR 17 offers a zero/span adjustment ± 10 % via two integrated potentiometers.

Angle and circular plug connector, cable outlet

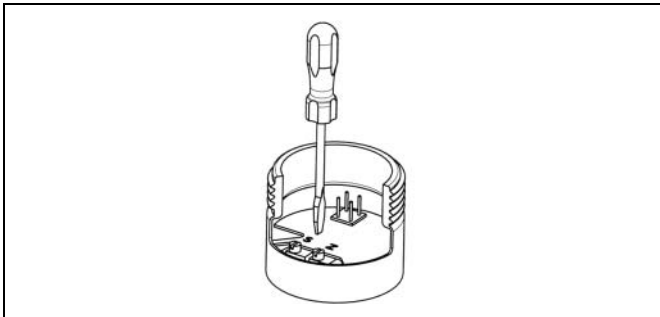


Fig. 11: Adjustment zero and span

S span
Z zero

Terminal housing



Fig. 12: Adjustment zero and span

Z zero
S span

6 Technical data

General data

VEGABAR 14

Materials, wetted parts

- Process fitting 316L
- Diaphragm sapphire ceramic® (99.9 % oxide ceramic)
- Process seal Viton, EPDM

Materials, non-wetted parts

- Housing brass nickel-plated

Materials, non-wetted parts, plug connector DIN 43650A

- Contact, housing plug PA
- Contact surface Sn
- Plug seal NBR

Materials, non-wetted parts, plug connector M12x1

- Carrier material for contacts PA
- Contact CuZn, nickel layer and 0.8 µm gold-plated
- Plug seal FKM

Materials, non-wetted parts, cable outlet

- Cable gland PA
- Cable PUR

Weight approx. 0.5 kg (1.1 lbs)

VEGABAR 17

Materials, wetted parts

- Process fitting 316Ti
- Diaphragm 316Ti
- Diaphragm with front flush version 316Ti, Hastelloy C4
- Seal ring, O-ring Viton, EPDM, NBR

Materials, non-wetted parts

- Internal transmission liquid Synthetic oil, Halocarbon oil³⁾⁴⁾
- Housing 316Ti
- Terminal housing 316Ti
- Ground terminal 316Ti
- Plug PA
- Cable gland PA, 316Ti
- Plug seal silicone
- Connection cable PUR

Weight

- Version with plug connector, cable outlet approx. 0.2 kg (approx. 0.44 lbs)
- Version with terminal housing approx. 0.35 kg (approx. 0.77 lbs)

Output variable

VEGABAR 14

- Output signal 4 ... 20 mA
- Zero point adjustable⁵⁾ 4 mA, ±1 mA
- Range 3 ... 23 mA
- Current limitation 23 mA
- Rise time (0 ... 63 %) 5 ms

VEGABAR 17

- Output signal 4 ... 20 mA
- Zero and span adjustable via potentiometer ±10 %
- Adjustment time
 - Standard <=1 ms
 - Medium temperature < -30 °C, measuring ranges <25 bar <=10 ms
 - Medium temperature <-30 °C, front flush diaphragm <=10 ms

³⁾ Synthetic oil: For measuring ranges up to 16 bar, FDA listed for the food processing industry. For measuring ranges up to 25 bar dry measuring cell.
⁴⁾ Halocarbon oil: Generally for oxygen applications, not with vacuum meas. ranges, not with absolute meas. range < 1 bar_{abs}.
⁵⁾ Only for version with plug.

Permissible load	
– with 11 V	0 Ohm
– with 30 V	950 Ohm

Input variable

Parameter	Pressure
Measuring ranges	see product code

Reference conditions and influencing variables (similar to DIN EN 60770-1)

Reference conditions acc. to DIN EN 61298-1	
– Temperature	+18 ... +30 °C (+64 ... +86 °F)
– Relative humidity	45 ... 75 %
– Atmospheric pressure	860 ... 1060 mbar/86 ... 106 kPa (12.5 ... 15.4 psi)
Determination of characteristics	limit point adjustment acc. to DIN 16086
Characteristics	Linear
Calibration position	upright, diaphragm points downward
Influence of the installation position	depending on the isolating diaphragm version

Deviation in characteristics

VEGABAR 14	
Deviation in characteristics ⁶⁾	<0.5 %
VEGABAR 17	
Deviation in characteristics ⁷⁾	<=0.5 %

Influence of the ambient temperature

VEGABAR 14	
Average temperature coefficient of the zero signal ⁹⁾	<0.15 %/10 K
VEGABAR 17	
Average temperature coefficient of the zero signal ⁹⁾	
– Standard	<0.2 %/10 K
– Meas. ranges 0 ... 0.1 and 0 ... 0.16 bar	<0.4 %/10 K
Average temperature coefficient of the span	<0.2 %/10 K

Long-term stability

Long-term drift of the zero signal ¹⁰⁾¹¹⁾	
– VEGABAR 14	<0.1 %/2 years
– VEGABAR 17	<0.2 %/1 year

Ambient conditions

VEGABAR 14	
Ambient temperature	
– Version with plug connector	-20 ... +85 °C (-4 ... +185 °F)
– Version with cable outlet	-20 ... +60 °C (-4 ... +140 °F)
Storage and transport temperature	
– Version with plug connector	-40 ... +100 °C (-40 ... +212 °F)
– Version with cable outlet	-40 ... +60 °C (-40 ... +140 °F)

⁶⁾ Relating to the nominal range, incl. hysteresis and repeatability, determined acc. to the limit point method.
⁷⁾ Relating to the adjusted span, incl. linearity, hysteresis and reproducibility.
⁸⁾ In the compensated temperature range of 0 ... 80 °C (176 °F), reference temperature 20 °C (68 °F).
⁹⁾ In the compensated temperature range of 0 ... 80 °C (176 °F), reference temperature 20 °C (68 °F).
¹⁰⁾ Similar to DIN 16086, DINV 19259-1 and IEC 60770-1.
¹¹⁾ Acc. to IEC 60770-1, relating to the nominal measuring range.

VEGABAR 17

Ambient temperature	
– Standard	-20 ... +80 °C (-4 ... +176 °F)
Storage and transport temperature	-40 ... +100 °C (-40 ... +212 °F)

Process conditions

VEGABAR 14

Product temperature with measuring cell seal	
– Viton	-20 ... +100 °C (-40 ... +212 °F)
– EPDM	-40 ... +100 °C (-40 ... +212 °F)
Vibration resistance	mechanical vibrations with 4 g and 5 ... 100 Hz ¹²⁾

VEGABAR 17

Product temperature	
– Standard	-30 ... +100 °C (-22 ... +212 °F)
– extended	-40 ... +125 °C (-40 ... +257 °F)
– with cooling element	-20 ... +150 °C (-4 ... +302 °F)
– EEx ia version	-20 ... +80 °C (-4 ... +176 °F)
– Version for oxygen applications	-30 ... +60 °C (-22 ... +140 °F)
Calibration position	upright, diaphragm points downward
Shock resistance	600 g acc. to IEC 60068-2-27 (mechanical shock)
Vibration resistance	10 g acc. to IEC 60068-2-6 (vibration at resonance)

Electromechanical data

Angled plug connector	4-pole acc. to DIN 43560A
Cable gland	PG 9 (cable-ø 4.5 ... 7 mm)
Circular plug connector	4-pole M12x1
Cable outlet (VEGABAR 14 only 5 m)	1.5 m; 3 m; 5 m; 10 m; cable with inner ventilation
Spring-loaded terminals (VEGABAR 17)	for wire cross-sections up to 2.5 mm ²
Cable gland, terminal housing (VEGABAR 17)	M20x1.5 (cable-ø 5 ... 9 mm)

Voltage supply

VEGABAR 14

Supply voltage	12 ... 30 V DC
– Permissible residual ripple	U _{ss} < 1 V

VEGABAR 17

Supply voltage	11 ... 30 V DC
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Electrical protective measures

VEGABAR 14

Protection (acc. to EN 60529/IEC 529)	
– with plug acc. to DIN 43650A	IP 65
– with direct cable outlet	IP 67
Protection class	III
Overvoltage category	III

VEGABAR 17

Protection (acc. to EN 60529/IEC 529)	
– with plug connector	IP 65
– with cable outlet	IP 67, IP 68
– with terminal housing	IP 67
Other protective measures	Reverse battery, overvoltage and short-circuit protection
Voltage resistance	0.5 kV DC

29730-EN-060411

¹²⁾ Tested acc. to the regulations of German Lloyd, GL directive 2

Approvals¹³⁾¹⁴⁾**VEGABAR 14**
PTB

Ex-Zone 2

VEGABAR 17
ATEX

ATEX II 1/2G EEx ia IIC T6; ATEX II 2G EEx ia IIC T6; ATEX II 1/2G 2G EEx ia IIC T6; ATEX II 1/2G 2G EEx ia IIC T6 + ATEX II 1/2D IP6X T + M1

Ship approval

GL

CE conformity**VEGABAR 14**
EMC (89/336/EWG)
LVD (73/23/EWG)

Emission EN 500081-1: 1992, Susceptibility EN 580082-2: 1995

EN 61010-1: 1993

VEGABAR 17
EMC (89/336/EWG)
DGRL (97/23/EG)

EN 61326: 2002

Module H

Environmental instructionsVEGA environment management system¹⁵⁾

certified acc. to DIN EN ISO 14001

¹³⁾ Deviating data in Ex applications: see separate safety instructions.¹⁴⁾ You can find detailed information under www.vega.com.¹⁵⁾ You can find detailed information under www.vega.com.

8 Product code

VEGABAR 14

Approval
 X without

Pressure / Measuring range
 1S rel. / 0...0.1 bar (0...10 kPa)
 1T rel. / 0...0.25 bar (0...25 kPa)
 1U rel. / 0...0.4 bar (0...40 kPa)
 1V rel. / 0...0.6 bar (0...60 kPa)
 1A rel. / 0...1 bar (0...100 kPa)
 1B rel. / 0...1.6 bar (0...160 kPa)
 1C rel. / 0...2.5 bar (0...250 kPa)
 1D rel. / 0...4 bar (0...400 kPa)
 1E rel. / 0...6 bar (0...600 kPa)
 1F rel. / 0...10 bar (0...1000 kPa)
 1G rel. / 0...16 bar (0...1600 kPa)
 1H rel. / 0...25 bar (0...2500 kPa)
 1I rel. / 0...40 bar (0...4000 kPa)
 1J rel. / 0...60 bar (0...6000 kPa)
 3T rel. / -0.1...+0.1 bar (-10...+10 kPa)
 3U rel. / -0.2...+0.2 bar (-20...+20 kPa)
 3A rel. / -0.5...+0.5 bar (-50...+50 kPa)
 3B rel. / -1...+0.6 bar (-100...+60 kPa)
 3W rel. / -1...+1 bar (-100...+100 kPa)
 3C rel. / -1...+1.5 bar (-100...+150 kPa)
 3D rel. / -1...+3 bar (-100...+300 kPa)
 3E rel. / -1...+5 bar (-100...+500 kPa)
 3F rel. / -1...+9 bar (-100...+900 kPa)
 3G rel. / -1...+15 bar (-100...+1500 kPa)
 2A abs. / 0...1 bar (0...100kPa)
 2B abs. / 0...1.6 bar (0...160kPa)
 2C abs. / 0...2.5 bar (0...250kPa)
 2D abs. / 0...4 bar (0...400kPa)
 2E abs. / 0...6 bar (0...600kPa)
 2F abs. / 0...10 bar (0...1000kPa)
 2G abs. / 0...16 bar (0...1600kPa)

Electrical connection / Protection
 A1 4-pole plug connection DIN43650-A PG9 / IP65
 C1 Direct cable outlet with 5 m cable / IP67
 M1 Circular plug conn., 4-pole w. screwed plug M12x1 / IP65

Process connection / Material
 GV G $\frac{1}{2}$ A, manometer connec. EN837 PN60 / 316Ti
 GP G $\frac{1}{2}$ A, inner G $\frac{1}{4}$ A PN60 / 316Ti
 GN $\frac{1}{2}$ NPT inner $\frac{1}{4}$ NPT PN60 / 316Ti
 GB M20x1,5 manometer connection EN837 PN60 / 316Ti
 GG Thread G1 $\frac{1}{2}$ A PN60 / 316L

Seal measuring cell
 1 FKM (Viton)
 3 EPDM

BAR14

VEGABAR 17

Approval
 Z without
 A ATEX II 1/2G, 2G EEx ia IIC T6
 D ATEX II 1/2G, 2G EEx ia IIC T6+ATEX II 1/2D IP6X T+M1¹⁾
 S ATEX II 1/2G, EEx ia IIC T6 + Ship approval

Process connection / Material
 GD \times G $\frac{1}{2}$ B, manometer connection / 316Ti
 TB \times G $\frac{1}{2}$ A inner G $\frac{1}{4}$ A / 1.4571(316Ti)
 861 Thread G $\frac{1}{2}$ B, flush / 316Ti w. o-ring, >1.6 bar / NBR
 86L Thread G $\frac{1}{2}$ B, flush / 316Ti w. o-ring, >1.6bar / Viton
 86B Thread G $\frac{1}{2}$ B, flush / 316Ti w.o-ring, >1.6 bar / EPDM
 851 Thread G1B, flush / 316Ti w.o-ring, up to 1.6bar / NBR
 85L Thread G1B, flush/316Ti w.o-ring, up to 1.6bar / Viton
 85B Thread G1B, flush / 316Ti w.o-ring, up to 1.6bar / EPDM
 84L Thread G1B, hygienic / 316Ti, max.25 bar / Viton²⁾
 84B Thread G1B, hygienic / 316Ti, max.25 bar / EPDM²⁾
 GB \times G $\frac{1}{2}$ B manometer connection / 316Ti
 NB \times Thread $\frac{1}{2}$ NPT / 316Ti
 ND \times Thread $\frac{1}{4}$ NPT / 316Ti

Pressure
 B Gauge pressure
 S Absolute pressure³⁾

Measuring range
 LA -0.1...0 bar (-10...0 kPa)
 KA -0.16...0 bar (-16...0 kPa)
 GA -0.25...0 bar (-25...0 kPa)
 FA -0.4...0 bar (-40...0 kPa)
 DA -0.6...0 bar (-60...0 kPa)
 CA -1...0 bar (-100...0 kPa)
 AL 0...0.1 bar (0...10 kPa)
 AM 0...0.16 bar (0...16 kPa)
 AN 0...0.25 bar (0...25 kPa)
 BB 0...0.4 bar (0...40 kPa)
 BC 0...0.6 bar (0...60 kPa)
 BD 0...1 bar (0...100 kPa)
 BE 0...1.6 bar (0...160 kPa)
 BF 0...2.5 bar (0...250 kPa)
 BG 0...4 bar (0...400 kPa)
 BH 0...6 bar (0...600 kPa)
 BI 0...10 bar (0...1000 kPa)
 BK 0...16 bar (0...1600 kPa)
 BL 0...25 bar (0...2500 kPa)
 BM 0...40 bar (0...4000 kPa)
 BN 0...60 bar (0...6000 kPa)
 BO 0...100 bar (0...10000 kPa)
 BP 0...160 bar (0...16000 kPa)
 BQ 0...250 bar (0...25000 kPa)
 BS 0...400 bar (0...40000 kPa)
 BT 0...600 bar (0...60000 kPa)

Electrical connection / Protection
 A4 Angle plug connector DIN43650 / IP65
 M4 Circular plug connector, 4-pole w. screwed plug M12x1
 DL Cable outlet / IP67
 DM Cable outlet / IP68
 FW Terminal housing 316L, plastic cable gland / IP67
 FV Terminal housing 316L, stainless steel cable gland/IP67

Cable length
 Z without
 C 1.5 m
 E 3 m
 G 5 m
 I 10 m

Features / Cleaning procedure
 Z without
 E oil and grease-free
 A oil and grease free for oxygen applications⁴⁾
 G Fill fluid and materials suitable for foodstuffs

Temperature range
 A -30...100°C (standard product temperature)
 B -40...125°C (product temperature)
 C -20...150°C (product temperature, with cooling element)
 U -20...80°C (ambient temperature with EEx ia)⁵⁾

Test certificate
 Z no
 1 yes⁶⁾

BR17

¹⁾ Only with Electrical connection/Protection "DM"
²⁾ Only with Temperature range " C "
³⁾ Only for Measuring ranges 0...0.25 bar up to 0...16 bar
⁴⁾ Medium temperature max. 60°C
⁵⁾ See EC type approval certificate
⁶⁾ Price and delivery time on request



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You can find at www.vega.com downloads of the following

- operating instructions manuals
- menu schematics
- software
- certificates
- approvals

and much, much more