TDR – Guided Wave Radar

Continuous level measurement

VEGAFLEX

Universal sensors for liquids and bulk solids

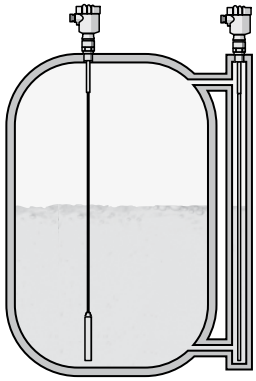
Measuring principle

High frequency microwave pulses are coupled on a cable or rod and guided along the probe. The pulse is reflected by the product surface. The time from emission to reception of the signals is proportional to the distance of the level. The instruments are already preset to the ordered probe length (0 % and 100 %). In many cases, a setup on site is not necessary. In any case you carry out the setup of VEGALFEX without medium. The shortenable, bare cable and rod versions can be simply adapted to the local conditions, if necessary.

Applications

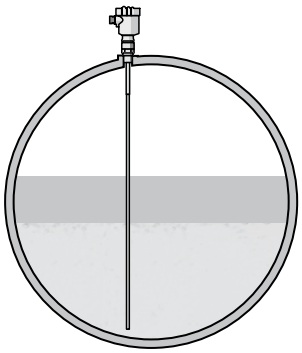
Level in liquids

Density fluctuations, steam generation or strong pressure and temperature fluctuations do not influence the measuring result. Also buildup on the probe or the vessel wall do not influence the measurement. This makes the VEGAFLEX simple in planning and commissioning. An ideal application is level measurement in a bypass tube or standpipe where even products with a dielectric constant of 1.4 can be measured reliably. Weld joints, buildup and corrosion inside the tube do not influence the accuracy of the level measurement. Also in case of overfilling up to the process fitting, your measurement is safe. VEGAFLEX 81 offers also a special solution for ammonia applications.



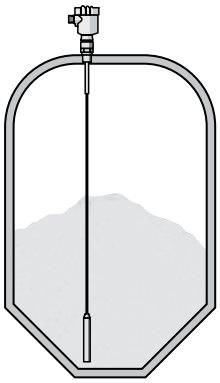
Interface measurement in liquids

Non-conductive products only reflect the energy of the microwave partly. The energy that is not reflected passes the medium and is reflected at the phase interface to a second liquid. This effect is used by the interface measurement. You can simply select this function on VEGAFLEX via the adjustment tools. By doing so, you get reliably the total level as well as the level of the lower menu in your vessel. Typical applications are interface measurements in storage tanks, separators and pump sumps. Generally the VEGAFLEX determines the level of the water layer below a non-conductive medium. The VEGAFLEX is independent of the density of the medium, this means for you a reliable, mantenance-free and precise measurement.



Level in bulk solids

Typical process proporties in bulk solids are strong dust and noise generation, buildup or condensation and of course material cones. With the VEGALFEX you have the ideal measurement for your silo or bunker for such conditions. Also typical product properties such as, e.g. the moisture content, the mixture ratio or the granulation size are not important and make the planning really simple. The intelligent software gives you high measurement certainty and a well monitored probe. Even in products with small dielectric constant (from 1.1), a reliable measurement is ensured thanks to the "thinking" processing.



Overview

Instrument type	Measuring range Accuracy	Process fitting	Process temperature	Process pressure
VEGAFLEX 81 Liquids 	Rod probe up to 6 m Coax probe up to 6 m Cable probe up to 75 m +/- 2 mm	Thread from G¾, ¾ NPT, flanges from DN 25, 1“	-40 … +200 °C -60 … +150 °C for volatile substances, e.g. Ammonia	-1 … +40 bar (-100 … +4000 kPa)
VEGAFLEX 82 Bulk solids 	Rod probe up to 6 m Cable probe up to 75 m +/- 2 mm	Thread G¾, ¾ NPT, flanges from DN 25, 1“	-40 … +200 °C	-1 … +40 bar (-100 … +4000 kPa)
VEGAFLEX 83 Liquids with hygienic requirements and in aggressive media 	Rod probe up to 4 m Cable probe up to 32 m +/- 2 mm	Flanges from DN 25, 1“, hygienic fittings	-40 … +150 °C	-1 … +16 bar (-100 … +1600 kPa)
VEGAFLEX 86 Liquids and bulk solids under extreme process conditions 	Rod probe up to 6 m Coax probe up to 6 m Cable probe up to 75 m +/- 2 mm	Thread G1½, 1½ NPT, flanges from DN 50, 2“	-196 … +450 °C	-1 … +400 bar (-100 … +40000 kPa)

VEGAFLEX 81

SPEED

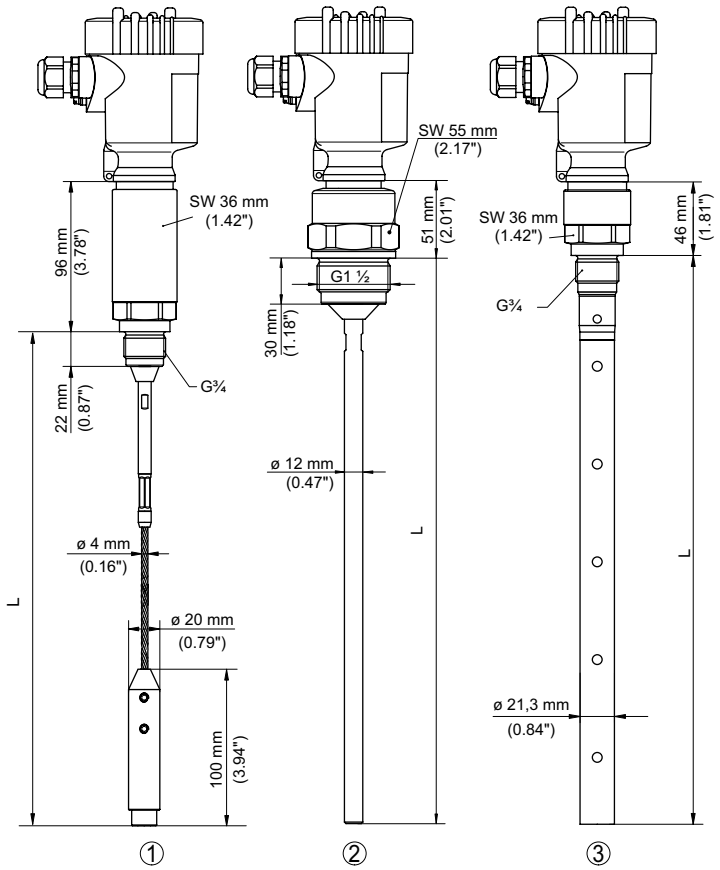
TDR sensor for continuous level and interface measurement of liquids

Application area
The VEGAFLEX 81 level sensor measures maintenance-free all kind of liquids. Even in applications with vapour, buildup, foam generation and condensation, the sensor delivers precise and reliable measured values. The VEGAFLEX 81 is the economical solution for various level and interface measurements.

Your benefit
- The guided adjustment enables a simple, time-saving and reliable setup
- Comprehensive diagnostic possibilities ensure a maintenance-free operation and hence a high plant availability
- Shortenable probes offer a simple standardisation and highest flexibility in the planning

Technical data

Version:	exchangeable cable (ø 2 mm, ø 4 mm) exchangeable rod (ø 8 mm, ø 12 mm) coax (ø 21.3, mm, ø 42 mm)
Measuring range:	cable probe up to 75 m rod probe up to 6 m coax probe up to 6 m
Process fitting:	thread from G¾, ¾ NPT flanges from DN 25, 1"
Process temperature:	-40 … +200 °C -60 … +150 °C for volatile substances, e.g. Ammonia
Process pressure:	-1 … +40 bar (-100 … +4000 kPa)
Accuracy:	+/- 2 mm



1 Cable version für process temperature -20 … +200 °C
2 Rod version
3 Coax version

You will find further process fittings and options under www.vega.com/configurator.
You will find further drawings and tables under www.vega.com/downloads.
You will find mounting accessory, welded sockets and housing overviews in chapter "Accessory".

Scope
- **A** Europe
- **I** Worldwide

Approval
- **X** for Ex-free area
- **W** Overfill protection (WHG, VLAREM)
- **C** ATEX II 1G, 1/2G, 2G Ex ia IIC T6
- **D** ATEX II 1/2G, 2G Ex d ia IIC T6
- **E** ATEX II 1/2G, 2G Ex d IIC T6
- **R** ATEX II 1D, 1/2D, 1/3D, 2D IP66
- **M** Ship approval
- **C** IEC Ex ia IIC T6
- **D** IEC Ex d ia IIC T6
- **E** IEC Ex d IIC T6
- **R** IEC Ex t IIIC T* IP66

Version / Material
- **B** Exchangeable cable (ø2mm) with gravity weight / 316
- **E** Exchangeable rod (ø8mm) / 316L
- **F** Exchangeable rod (ø12mm) / 316L
- **L** Coax (ø21.3mm) with multiple hole / 316L
- **P** Coax (ø42.2mm) with multiple hole / 316L

Process fitting / Material
- **TA** Thread G¾ PN6, DIN3852-A / 316L
- **TS** Thread ¾NPT PN6, ASME B1.20.1 / 316L
- **TB** Thread G¾ PN40, DIN3852-A / 316L
- **TC** Thread G¾ PN40, DIN3852-A / Alloy C22 (2.4602)
- **TI** Thread G1½ PN40, DIN3852-A / 316L
- **DA** Flange DN25 PN40 Form C, DIN2501 / 316L
- **DD** Flange DN50 PN40 Form C, DIN2501 / 316L
- **DF** Flange DN80 PN40 Form C, DIN2501 / 316L
- **AK** Flange 1" 150lb RF, ASME B16.5 / 316L
- **AB** Flange 2" 150lb RF, ASME B16.5 / 316L

Seal / Second line of defense / Process temperature
- **A** FKM (SHS FPM 70C3 GLT) / without / -40...+80°C
- **F** FKM (SHS FPM 70C3 GLT) / without / -40...+150°C
- **K** FFKM (Kalrez 6375) / without / -10...200°C
- **D** FFKM (Kalrez 6375) / without / -20...+150°C
- **L** FFKM (Kalrez 6375) / with / -20...+200°C
- **J** Borosilicate glass / with / -60...+150°C

Electronics
- **H** Two-wire 4...20mA/HART®
- **A** Two-wire 4...20mA/HART® with SIL qualification
- **B** Four-wire 4...20mA/HART®; 90...253V AC; 50/60Hz
- **I** Four-wire 4...20mA/HART®; 9.6...48V DC; 20...42V AC
- **P** Profibus PA
- **F** Foundation Fieldbus

Supplementary electronics
- **X** without
- **Z** Additional current output 4...20mA

Housing / Protection
- **K** Plastic single chamber / IP66/IP67
- **A** Aluminium single chamber / IP66/IP68 (0.2 bar)
- **D** Aluminium double chamber / IP66/IP68 (0.2 bar)
- **8** Stainless steel single chamber (electropolished) / IP66/IP68 (0.2 bar)
- **W** Stainless steel double chamber / IP66/IP68 (0.2 bar)
- **R** Plastic 2-chamber / IP66/IP67

Cable entry / Connection
- **M** M20x1.5 / Cable gland PA black
- **N** ½NPT / Blind plug

Display/Adjustment module PLICSCOM
- **X** Without
- **A** Mounted

Certificates
- **M** yes (e.g. FDA; EN 10204-3.1; NACE)
- **X** no

FX81.												

Length (from seal surface)

Rod ø8 mm/316L (300-6000 mm) per 100 mm
Rod ø12 mm/316L (300-4000 mm) per 100 mm
Coax ø21.3mm/316L (300-6000 mm) per 100 mm
Coax Ø42.2mm/316L (300-6000 mm) per 100 mm

VEGAFLEX 82

SPEED

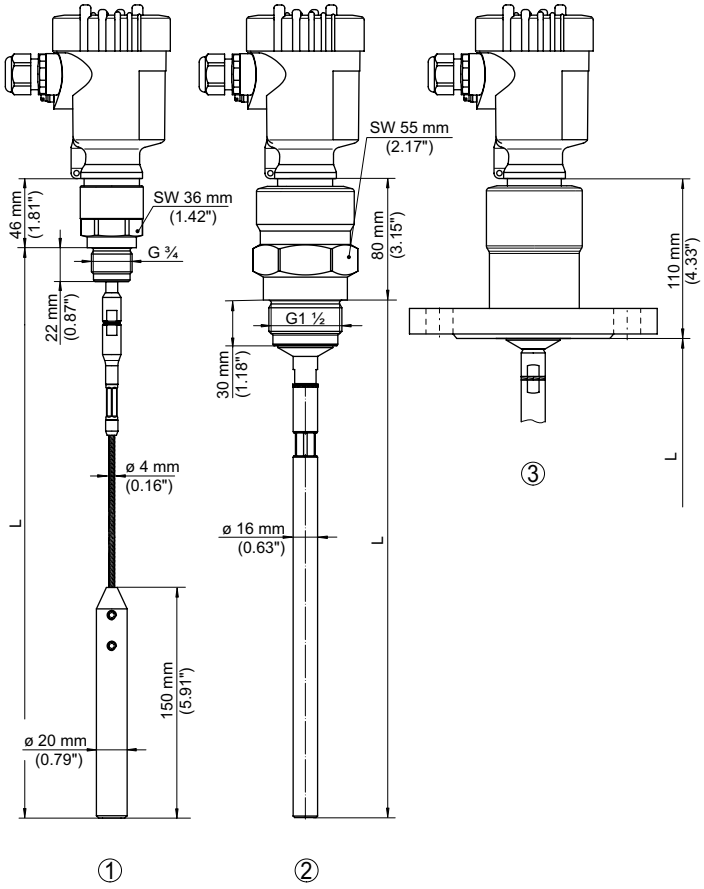
TDR sensor for continuous level measurement of bulk solids

Application area
The VEGAFLEX 82 level sensor measures maintenance-free light and heavy-weight bulk solids. Even in applications with strong dust generation, condensation or buildup, the sensor delivers precise and reliable measured values. The VEGAFLEX 82 is an economical and reliable solution for your application.

Your benefit
- The guided adjustment enables a simple, time-saving and reliable setup
- Shortenable probes offer a simple standardisation and highest flexibility in the planning
- Virtually all bulk solids can be measured with the automatic probe end tracking

Technical data

Version:	exchangeable cable (ø 4 mm, ø 6 mm, ø 11 mm) exchangeable rod (ø 16 mm)
Measuring range:	cable probe up to 75 m rod probe up to 6 m
Process fitting:	thread from G¾, ¾ NPT flanges from DN 25, 1"
Process temperature:	-40 … +200 °C
Process pressure:	-1 … +40 bar (-100 … +4000 kPa)
Accuracy:	+/- 2 mm



1 Cable version
2 Rod version
3 Flange version

You will find further process fittings and options under www.vega.com/configurator.
You will find further drawings and tables under www.vega.com/downloads.
You will find mounting accessory, welded sockets and housing overviews in chapter "Accessory".

Scope
- **A** Europe
- **I** Worldwide

Approval
- **X** for Ex-free area
- **C** ATEX II 1G, 1/2G, 2G Ex ia IIC T6
- **D** ATEX II 1/2G, 2G Ex d ia IIC T6
- **E** ATEX II 1/2G, 2G Ex d IIC T6
- **R** ATEX II 1D, 1/2D, 2D IP6x T
- **C** IEC Ex ia IIC T6
- **D** IEC Ex d ia IIC T6
- **E** IEC Ex d IIC T6
- **R** IEC Ex t IIIC T* IP66

Version / Material
- **A** Exchangeable cable (ø4mm) with gravity weight / 316
- **F** Exchangeable cable (ø6mm) with gravity weight / 316
- **H** Exchangeable rod (ø16mm) / 316L

Process fitting / Material
- **TB** Thread G¾ PN40, DIN3852-A / 316L
- **TD** Thread ¾NPT PN40, ASME B1.20.1 / 316L
- **TF** Thread G1 PN40, DIN3852-A / 316L
- **TG** Thread 1NPT PN40, ASME B1.20.1 / 316L
- **TI** Thread G1½ PN40, DIN3852-A / 316L
- **TH** Thread 1½NPT PN40, ASME B1.20.1 / 316L
- **DD** Flange DN50 PN40 Form C, DIN2501 / 316L
- **DF** Flange DN80 PN40 Form C, DIN2501 / 316L
- **DM** Flange DN100 PN16 Form C, DIN2501 / 316L
- **AB** Flange 2" 150lb RF, ASME B16.5 / 316L
- **AD** Flange 3" 150lb RF, ASME B16.5 / 316L

Seal / Process temperature
- **F** FKM (SHS FPM 70C3 GLT) / -40...+150°C
- **K** FFKM (Kalrez 6375) / -20...+200°C
- **H** EPDM (A+P 75.5/KW75F) / -40...+150°C

Electronics
- **H** Two-wire 4...20mA/HART®
- **A** Two-wire 4...20mA/HART® with SIL qualification
- **B** Four-wire 4...20mA/HART®; 90...253V AC; 50/60Hz
- **I** Four-wire 4...20mA/HART®; 9.6...48V DC; 20...42V AC
- **P** Profibus PA
- **F** Foundation Fieldbus

Supplementary electronics
- **X** without
- **Z** Additional current output 4...20mA

Housing / Protection
- **K** Plastic single chamber / IP66/IP67
- **A** Aluminium single chamber / IP66/IP68 (0.2 bar)
- **D** Aluminium double chamber / IP66/IP68 (0.2 bar)
- **8** Stainless steel single chamber (electropolished) / IP66/IP68 (0.2 bar)
- **W** Stainless steel double chamber / IP66/IP68 (0.2 bar)
- **R** Plastic 2-chamber / IP66/IP67

Cable entry / Connection
- **M** M20x1.5 / Cable gland PA black
- **N** ½NPT / Blind plug

Display/Adjustment module PLICSCOM
- **X** Without
- **A** Mounted

Certificates
- **M** yes (e.g. FDA; EN 10204-3.1; NACE)
- **X** no

FX82.											

Length (from seal surface)

Cable ø4 mm/316 (500-75000 mm) per 100 mm
Cable ø6 mm/316 (500-75000 mm) per 100 mm
Rod ø16 mm/316L (300-6000 mm) per 100 mm

VEGAFLEX 83

SPEED

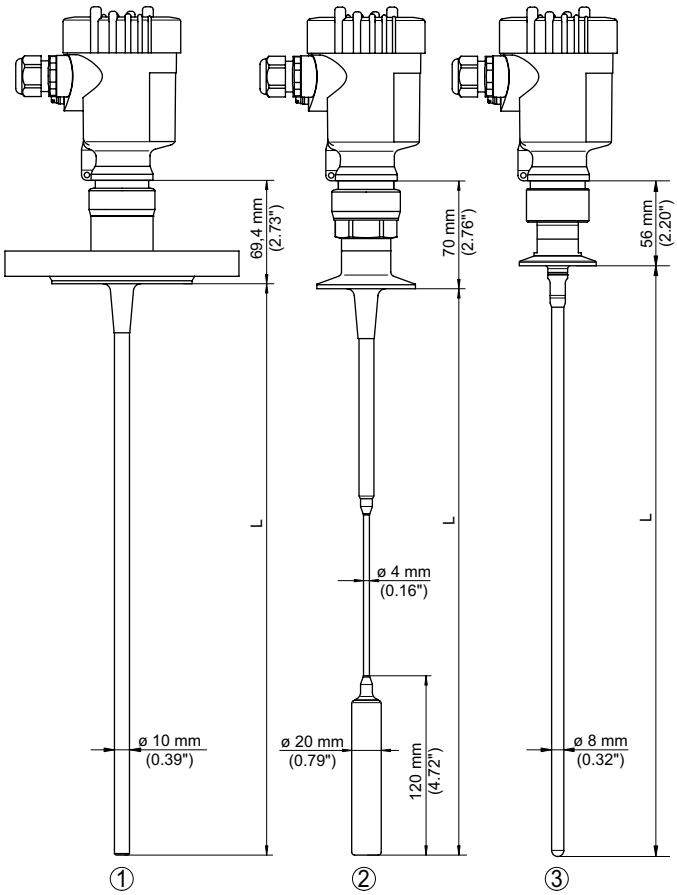
TDR sensor for continuous level and interface measurement of liquids

Application area
The VEGAFLEX 83 level sensor measures maintenance-free agressive liquids or liquid media with highest hygienic requirements. Even in applications with vapour, buildup, foam generation and condensation, the sensor delivers precise and reliable measured values. The VEGAFLEX 83 is the economical and ideal solution for your application.

Your benefit
- The guided adjustment enables a simple, time-saving and reliable setup
- The gap-free hygienic design ensures simple and reliable cleanability
- The maintenance-free operation increases the plant efficiency

Technical data

Version:	cable (ø 4 mm) rod (ø 8 mm, ø 10 mm)
Measuring range:	cable probe up to 32 m rod probe up to 4 m
Process fitting:	flanges from DN 25, 1" hygienic fittings
Process temperature:	-40 … +150 °C
Process pressure:	-1 … +16 bar (-100 … +1600 kPa)
Accuracy:	+/- 2 mm



1 Version / Material:
Rod (ø 10 mm) / PFA
2 Version / Material:
Cable (ø 4 mm) with gravity weight / PFA
3 Version / Material:
Exchangable rod (ø 8 mm) / 1.4435
(Basle Standard 2)

You will find further process fittings and options under www.vega.com/configurator.
You will find further drawings and tables under www.vega.com/downloads.
You will find mounting accessory, welded sockets and housing overviews in chapter "Accessory".

Scope
- **A** Europe
- **I** Worldwide

Approval
- **X** for Ex-free area
- **W** Overfill protection (WHG, VLAREM)
- **C** ATEX II 1G, 1/2G, 2G Ex ia IIC T6
- **D** ATEX II 1/2G, 2G Ex d ia IIC T6
- **R** ATEX II 1D, 1/2D, 2D IP6x T
- **C** IEC Ex ia IIC T6
- **D** IEC Ex d ia IIC T6
- **R** IEC IP6x T tD

Version / Material
- **B** Cable (ø4mm) with gravity weight / PFA
- **F** Exchangeable rod (ø8mm) / 1.4435 (BN2), (Ra<0.76 µm)
- **E** Rod (ø10mm) / PFA
- **H** Exchangeable rod (ø8mm) / 1.4435 (BN2), electropolished (Ra<0.38µm)

Process fitting / Material
- **LA** Clamp 2" PN16 (ø64mm) DIN32676, ISO2852 / 1.4435 (BN2)
- **PA** Clamp 2" PN16 (ø64mm) DIN32676, ISO2852 / PTFE-TFM 1600
- **LC** Clamp 3" PN10 (ø91mm) DIN32676, ISO2852 / 1.4435 (BN2)
- **PC** Clamp 3" PN10 (ø91mm) DIN32676, ISO2852 / PTFE-TFM 1600
- **LF** Slotted nut DN40 PN40, DIN11851 / 1.4435 (BN2)
- **PF** Slotted nut DN40 PN40, DIN11851 / PTFE-TFM 1600
- **LG** Slotted nut DN50 PN25, DIN11851 / 1.4435 (BN2)
- **PG** Slotted nut DN50 PN25, DIN11851 / PTFE-TFM 1600
- **PJ** Flange DN50 PN40 Form C, DIN2501 / PTFE-TFM 1600
- **PO** Flange 2" 150lb RF, ASME B16.5 / PTFE-TFM 1600
- **PQ** Flange 3" 150lb RF, ASME B16.5 / PTFE-TFM 1600

Seal / Process temperature
- **X** without / -40...+150°C
- **E** FFKM (Kalrez 6221) / -20...+150°C
- **C** EPDM (Freudenberg 70, EPDM 291) / -20...+130°C

Electronics
- **H** Two-wire 4...20mA/HART®
- **A** Two-wire 4...20mA/HART® with SIL qualification
- **B** Four-wire 4...20mA/HART®; 90...253V AC; 50/60Hz
- **I** Four-wire 4...20mA/HART®; 9.6...48V DC; 20...42V AC
- **P** Profibus PA
- **F** Foundation Fieldbus

Supplementary electronics
- **X** without
- **Z** Additional current output 4...20mA

Housing / Protection
- **K** Plastic single chamber / IP66/IP67
- **A** Aluminium single chamber / IP66/IP68 (0.2 bar)
- **D** Aluminium double chamber / IP66/IP68 (0.2 bar)
- **8** Stainless steel single chamber (electropolished) / IP66/IP68 (0.2 bar)
- **W** Stainless steel double chamber / IP66/IP68 (0.2 bar)
- **R** Plastic 2-chamber / IP66/IP67

Cable entry / Connection
- **M** M20x1.5 / Cable gland PA black
- **N** ½NPT / Blind plug

Display/Adjustment module PLICSCOM
- **X** Without
- **A** Mounted

Certificates
- **M** yes (e.g. FDA; EN 10204-3.1; NACE)
- **X** no

FX83.											

Length (from seal surface)

Cable ø4 mm / PFA isolated (500-32000 mm) per 100 mm
Rod ø10 mm/PFA insulated (300-4000 mm) per 100 mm
Rod ø8 mm/1.4435 Ra < 0.76 µm (BN2) (300-4000 mm) per 100 mm

VEGAFLEX 86

SPEED

TDR sensor for continuous level and interface measurement of liquids

Application area

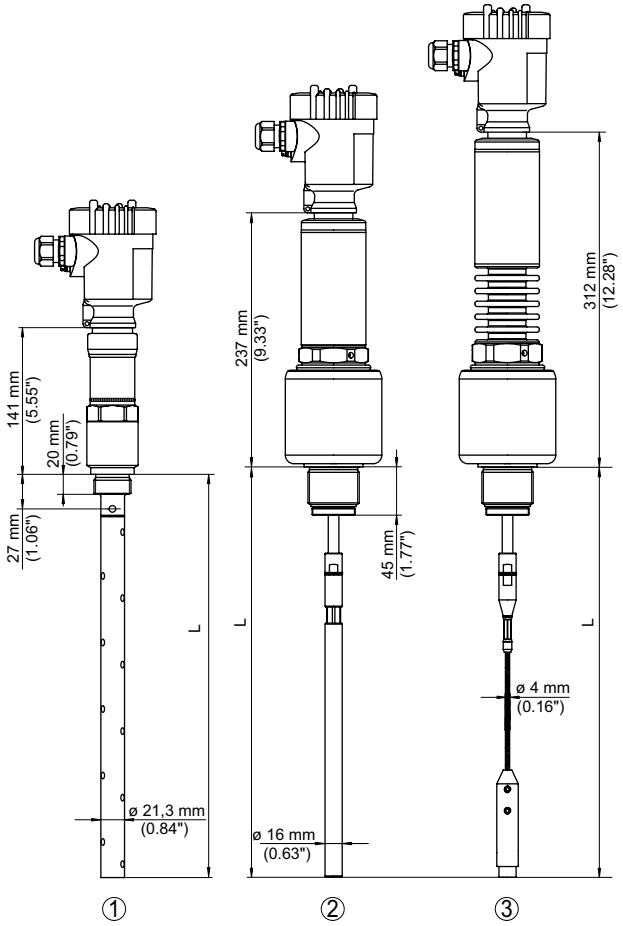
The VEGAFLEX 86 level sensor measures maintenance-free all liquids under extreme pressure and temperature conditions. Even in applications with buildup, foam generation and condensation, the sensor delivers precise and reliable measured values. In saturated steam applications, a special reference probe ensures a density-independent measurement. The VEGAFLEX 86 offers an economical level and interface measurement for your application.

Your benefit

- The guided adjustment enables a simple, time-saving and reliable setup
- Comprehensive diagnostic possibilities ensure a maintenance-free operation and hence a high plant availability
- The maintenance-free operation increases the plant efficiency

Technical data

Version:	exchangebale cable (ø 2 mm, ø 4 mm) exchangeable rod (ø 16 mm, ø 8 mm) coax (ø 42 mm, ø 21.3 mm)
Measuring range:	cable probe up to 75 m rod probe up to 6 m coax probe up to 6 m
Process fitting:	thread from G¾ , ¾ NPT flanges from DN 25, 1"
Process temperature:	-196 … +450 °C
Process pressure:	-1 … +400 bar (-100 … +40000 kPa)
Accuracy:	+/- 2 mm



1 Version: -20 … +250 °C; coax
2 Version: -196 … +280 °C; rod
3 Version: -196 … +450 °C; cable

You will find further process fittings and options under www.vega.com/configurator.
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Scope
- **A** Europe
- **I** Worldwide

Approval
- **X** for Ex-free area
- **W** Overfill protection (WHG, VLAREM)
- **C** ATEX II 1G, 1/2G, 2G Ex ia IIC T6
- **D** ATEX II 1/2G, 2G Ex d ia IIC T6
- **E** ATEX II 1/2G, 2G Ex d IIC T6
- **R** ATEX II 1D, 1/2D, 2D IP6x T
- **M** Ship approval
- **C** IEC Ex ia IIC T6
- **D** IEC Ex d ia IIC T6
- **E** IEC Ex d IIC T6
- **R** IEC Ex t IIIC T* IP66

Version / Material
- **A** Exchangeable cable (ø4mm) with gravity weight / 316
- **H** Exchangeable rod (ø16mm) / 316L
- **L** Coax (ø21.3mm) with multiple hole / 316L
- **P** Coax (ø42.2mm) with multiple hole / 316L
- **4** Coax (ø42.2mm) with multiple hole and reference distance / 316L

Process fitting / Material
- **TN** Thread G1½ PN400, DIN3852-A / 316L
- **TO** Thread 1½NPT PN400, ASME B1.20.1 / 316L
- **DD** Flange DN50 PN40 Form C, DIN2501 / 316L
- **DF** Flange DN80 PN40 Form C, DIN2501 / 316L
- **DJ** Flange DN100 PN40 Form C, DIN2501 / 316L
- **HA** Flange DN50 PN40 Form B1, EN1092-1 / 316L
- **AB** Flange 2" 150lb RF, ASME B16.5 / 316L
- **AL** Flange 2" 600lb RF, ASME B16.5 / 316L
- **AF** Flange 3" 300lb RF, ASME B16.5 / 316L
- **AM** Flange 3" 600lb RF, ASME B16.5 / 316L

Seal / Second line of defense / Process temperature
- **3** PEEK-FFKM (Kalrez 6375) / with / -20...+250°C
- **1** Ceramic graphite / with / -196...+280°C
- **2** Ceramic graphite / with / -196 ... +450°C

Electronics
- **H** Two-wire 4...20mA/HART®
- **A** Two-wire 4...20mA/HART® with SIL qualification
- **B** Four-wire 4...20mA/HART®; 90...253V AC; 50/60Hz
- **I** Four-wire 4...20mA/HART®; 9.6...48V DC; 20...42V AC
- **P** Profibus PA
- **F** Foundation Fieldbus

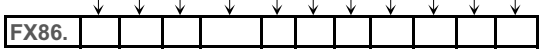
Supplementary electronics
- **X** without
- **Z** Additional current output 4...20mA

Housing / Protection
- **K** Plastic single chamber / IP66/IP67
- **A** Aluminium single chamber / IP66/IP68 (0.2 bar)
- **D** Aluminium double chamber / IP66/IP68 (0.2 bar)
- **8** Stainless steel single chamber (electropolished) / IP66/IP68 (0.2 bar)
- **W** Stainless steel double chamber / IP66/IP68 (0.2 bar)
- **R** Plastic 2-chamber / IP66/IP67

Cable entry / Connection
- **M** M20x1.5 / Cable gland PA black
- **N** ½NPT / Blind plug

Display/Adjustment module PLICSCOM
- **X** Without
- **A** Mounted

Certificates
- **M** yes (e.g. FDA; EN 10204-3.1; NACE)
- **X** no



Length (from seal surface)

Cable ø4 mm / 316 (500-60000 mm) per 100 mm
Rod ø16 mm/316L (300-4000 mm) per 100 mm
Coax ø42.2mm/316L (300-6000 mm) per 100 mm