

Vibrating level switches for bulk solids

VEGA

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Reliable switching in bulk solids

Level switches in the past and today

In the low-cost area, rotating paddle switches were initially used for level detection of bulk solids. However, these switches were subject to mechanical wear and offered very low fault monitoring performance. VEGA's vibrating level switches are the ideal solution, since they are cost-effective and maintenance-free. They ensure perfect safety in filling and storage by reliably detecting and signalling the full or empty condition of silos, bunkers and material heaps.

Reliable level detection of bulk solids

VEGA can detect the minimum and maximum levels of flaky, powdery, sandy and coarse media, e.g. from flour and cereals to gravel, with a number of different technologies. The selection of the most suitable measuring device depends on the application conditions. These include factors like adhesive products, possible jamming of the tuning fork by coarse materials or the wear on a sensor in abrasive bulk solids.

VEGA – competence at its highest standard

VEGA Grieshaber KG is a worldwide leading company in level, pressure and switching instrumentation. In 1997 VEGA introduced the first two-wire radar instrument to the world. Two years later, VEGA advanced to international market leader in level measurement with radar. With VEGAPULS 68, VEGA ushered in ERA II of contactless bulk solids measurement. With its optimised signal processing for bulk solids, VEGAPULS opens up completely new dimensions. VEGA sets new standards for bulk solids measurement not only with measuring ranges up to 70 m, but also with very high reliability in dust and extreme filling noise.

A comparison of technologies for level detection

Paddle switch

When the medium reaches the rotating paddle, the paddle stops moving and a signal is outputted. The paddle switch doesn't require a filling for set-up. However, it does have moving parts that are subject to wear.

Applications

Simple applications in medium-heavy, fine-grained bulk solids

Application limits

- Moving parts subject to wear
- Sensitive to build-up and dust
- No detection of very light bulk solids
- No monitoring of the rotating paddle

Capacitive probe

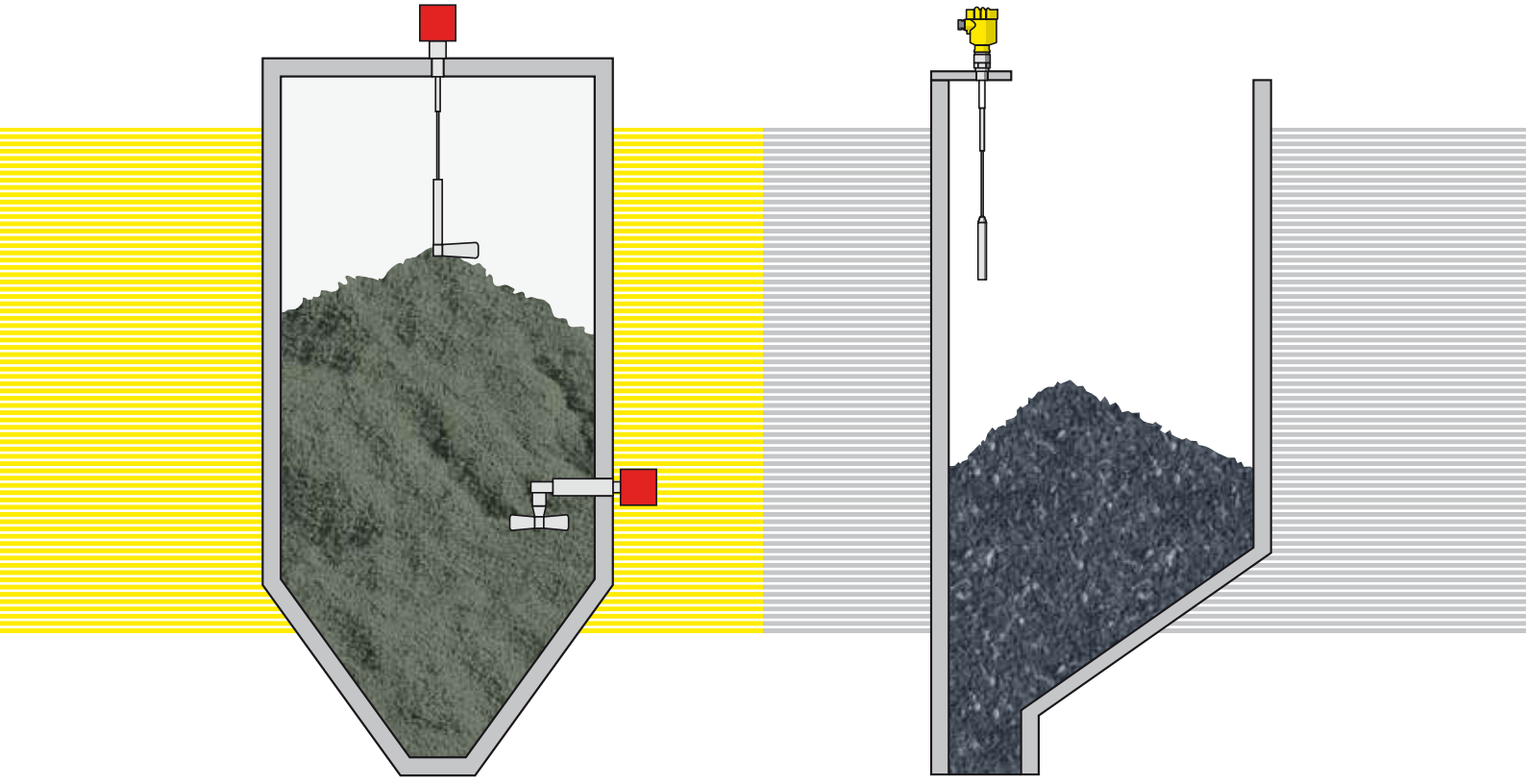
In the capacitive measuring principle, the medium produces a capacitance change in the sensor, which is then converted into a switching signal. The robust construction of the sensor allows applications even in very abrasive media.

Applications

Applications in heavy, fine to coarse bulk solids

Application limits

- Medium usually required for set-up
- Changing media - fresh adjustments necessary
- No detection of light bulk solids
- No monitoring of the probe



Vibrating level switch

The vibrating rod or the tuning fork is made to vibrate at its resonance frequency by piezo-ceramic elements. When the bulk solid covers the sensor, the amplitude is damped and a signal is outputted.

Applications

Applications in all bulk solids

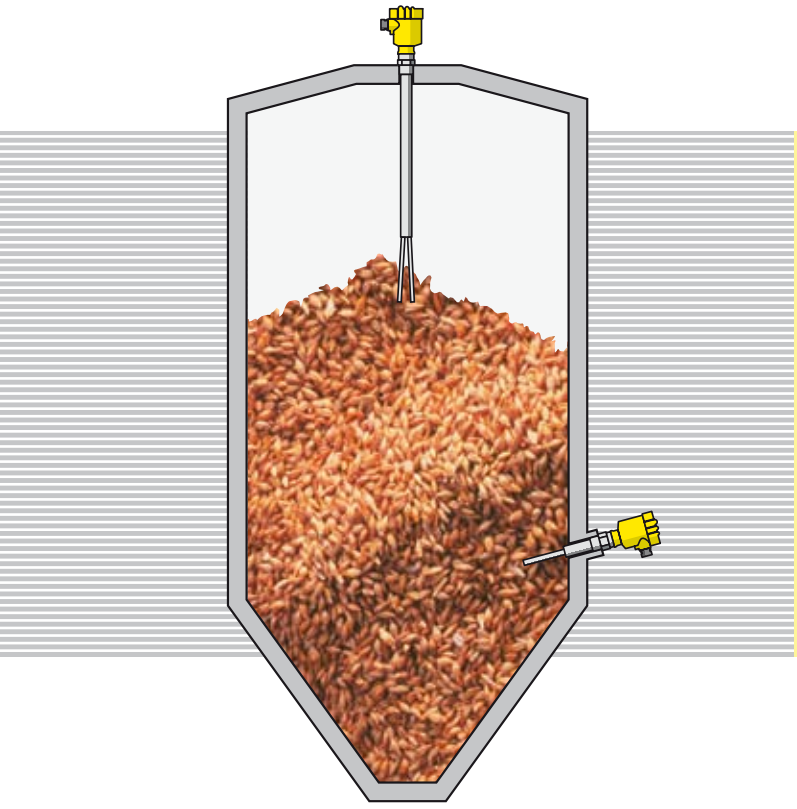
Advantages

- Set-up without medium
- Any mounting position possible
- No moving parts
- Independent of product characteristics
- Universal use
- High-performance fault monitoring

Universal use

The vibrating level switches from VEGA are available in two versions. Both tines of the fork vibrate. When the tines are covered by the medium, a damping occurs which is converted into a switching signal. The rod operates according to the same principle, in this case the tube within a tube corresponds to the tines of the fork. When the probe is covered, damping and signal output occur in the same way.

Typical applications are overfill and low level detection, e.g. in flour, milk powder, sand, cement and plastic granulates. Even products with a very low specific weight, such as polysterene and down feathers are reliably detected. Since mounting position and granulate size do not affect the function, the vibrating level switches lend themselves well to virtually any application.





A comparison of vibrating level switches

VEGAWAVE: The robust tuning fork



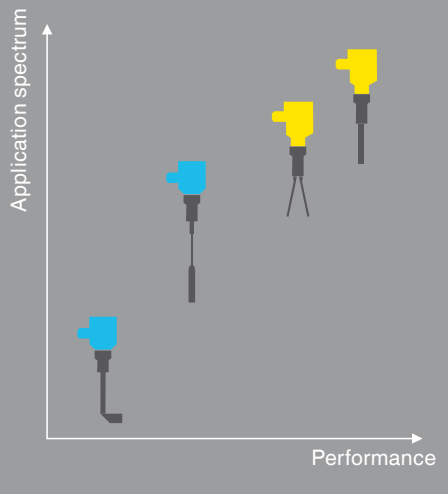
VEGAWAVE switches are extremely robust. The piezo drive is screwed together to make it as reliable as possible. This tuning fork measures limits in practically any bulk solid application. It operates at a frequency of approximately 200 Hz. Adjustment with medium is not required.

VEGAVIB: Vibrating rod for bulk solids



Due to the advantageous rod shape, jamming, e.g. caused by granules, is impossible. Since installation position and granule size do not influence the sensor, adjustment with medium is not necessary. The VEGAVIB vibrating rod operates at a frequency of approximately 350 Hz.

Performance compared



Advantages of the vibrating level switch

- Easy planning
- Simple mounting
- Set-up without medium
- Wear- and maintenance-free
- Independent of product characteristics
- Universally applicable

	Tuning fork VEGAWAVE 	Vibrating rod VEGAVIB
Application in granulates 	- Grain size and shape have to be considered - Stuck granules can interfere the function	- Due to mechanical design, no jamming
Foodstuffs and pharmaceuticals 	- The flat fork shape causes cleaning stains	- Easy cleaning in pourable food and pharmaceutical products due to radially-symmetric vibrating rod - also available in polished version (Ra ≤ 0.8 µm)
Very light bulk solids 	- Higher sensitivity due to larger active surface - Reliable detection from 8 g/l	- Reliable detection from 20 g/l
Build-up and statically charged products 	- Largely insensitive, as long as no bridge forms between the fork tines - Correctly oriented fork provides hardly any surface for statically charged bulk materials to cling to	- Large amounts of build-up bring the vibrating system out of tune and can affect the function - Larger projected surface area (compared to fork) leads to heavier build-up of statically charged products
Lateral mounting on vessel 	- Directing necessary, to prevent material mounds from forming - Experiences only slight lateral loads due to small projected surface area	- Due to structural shape, no directing necessary - Rod construction less rugged than fork
Tight mounting conditions 	- Process fittings from G 1½ - Relatively long installation length	- Process fittings from G 1 - Short installation length

Tuning fork VEGAWAVE

VEGAWAVE – especially for powdery bulk solids

VEGAWAVE is the ideal level switch for almost all bulk solids applications. It detects light bulk solids, even those down to 8 g/l, particularly well. The robust construction also makes it possible to use it in very heavy media, especially as e.g. an empty detector in high silos. And it is just as insensitive to build-up as it is to statically charged products. This makes it the ideal sensor for powdery and light, granulated media.

Typical applications are overfill and low level detection in media like flour, cement, fine-grained plastic granules, sand, fine gravel and styrofoam.

VEGAWAVE 61, 62, 63

- Easy set-up without adjustment
- Product-independent switching point
- Rugged sensor construction
- Insensitive to build-up and statically charged products
- Solid densities from 8 g/l reliably detected
- Wear- and maintenance-free



VEGAWAVE S – the standard solution



For simple standard applications, VEGAWAVE S 61 represents a solution that has proven itself a thousand times over. With two electronics and four predefined lengths the models are indeed restricted. Nevertheless the device fulfils precisely the typical requirements of day-to-day practice. Since these models are frequently asked for, it is possible to apply more favourable production methods, reduce the time and effort and offer them at a correspondingly lower price.

VEGAWAVE 61

Compact vibrating level switch for bulk solids



The robust VEGAWAVE 61, usually mounted laterally, works also in tall silos as a max.- and min. detector. Its strengths lie in powdered and fine-grained bulk goods. Different process connections are available to provide the optimal fit to any application.

Process temperature:	-50 ... +150 °C (-58 ... +302 °F) option -50 ... +250 °C (-58 ... +482 °F)
Material:	316L
Process fitting:	thread from G 1½ A or 1½ NPT
Probe length:	220 mm (8.7 in)

VEGAWAVE 62

Compact vibrating level switch with suspension cable extension for bulk solids



Due to its flexible yet robust suspension cable, VEGAWAVE 62 gives way to any movement of the medium and therefore avoids wear and tear. It is usually used as overfill protection in powdery and fine-grained bulk materials. It can also reliably detect minimum levels in very light bulk materials.

Process temperature:	-20 ... +80 °C (-4 ... +176 °F) option -40 ... +150 °C (-58 ... +302 °F)
Material:	316L, suspension cable of FEP
Process fitting:	thread from G 1½ A or 1½ NPT
Probe length:	up to 20 m (66 ft)

VEGAWAVE 63

Compact vibrating level switch for bulk solids



Mounted from above, VEGAWAVE 63 reaches switching points at a distance of up to 6 m (20 ft). Its solid extension tube makes it the ideal max. and min. detector in powdery and fine-grained bulk materials. When mounted laterally in a long socket, it ensures that the vibrating element protrudes freely into the vessel.

Process temperature:	-50 ... +150 °C (-58 ... +302 °F) option -50 ... +250 °C (-58 ... +482 °F)
Material:	316L
Process fitting:	thread from G 1½ A or 1½ NPT
Probe length:	up to 6 m (20 ft)

Vibrating rod VEGAVIB

VEGAVIB – especially for granulated bulk solids

In coarse granulates and lumpy bulk solids is precisely where VEGAVIB displays its strengths. The optimal rod shape prevents build-up and jamming by the measured product and thus always ensures reliable switching points. But VEGAVIB always delivers reliable switching points in all other applications as well. Its design and size allow its use in cramped installation conditions, especially in the food and pharmaceutical sector. Another plus is the easy cleaning.
Typical applications are overfill and low level detection in media like plastic granulates, styrofoam, down feathers, flour, powdered milk, pellets and cement.

VEGAVIB 61, 62, 63

- Easy set-up without adjustment
- Product-independent switching point
- Small mounting dimensions with thread from 1“
- No directing necessary for lateral mounting
- Optimal rod shape prevents build-up and jamming
- Easy cleaning
- Wear- and maintenance-free

VEGAVIB S – ideal for standard jobs





S stands for standard solutions at VEGA. These are instrument versions that are much in demand. Large quantities enable cheaper production methods, reduce time and effort and bring down prices. Yet with S instruments it's only the number of available versions that's limited, these models otherwise fulfil exactly the requirements of daily practice and have proven themselves a thousand times over.
VEGAVIB S 61 is available in two electronic versions and four fixed lengths and is thus the ideal solution for standard jobs.

VEGAVIB 61

Compact vibrating level switch for bulk solids



Usually mounted laterally, VEGAVIB 61 finds its field of application in fine and coarse bulk solids. Its optimal rod shape prevents the material from getting stuck. Two lengths are available depending on socket size.

Process temperature:	-50 ... +150 °C (-58 ... +302 °F) option -50 ... +250 °C (-58 ... +482 °F)
Material:	316L
Process fitting:	thread from G 1½ A or 1½ NPT
Probe length:	161 mm / 238 mm (6.3 in / 9.4 in)

VEGAVIB 62

Compact vibrating level switch with suspension cable extension for bulk solids



As cable version in lengths up to 20 m (66 ft), VEGAVIB 62 feels quite at home in light to heavy bulk solids. The flexible construction, used mainly as max. detector, assures wear-free operation.

Process temperature:	-20 ... +80 °C (-4 ... +176 °F) option -40 ... +150 °C (-40 ... +302 °F)
Material:	316L, suspension cable of FEP
Process fitting:	thread from G 1½ A or 1½ NPT
Probe length:	up to 20 m (66 ft)

VEGAVIB 63

Compact vibrating level switch for bulk solids



Mounted from above and equipped with an extension tube up to 6 m (20 ft) long, VEGAVIB 63 reaches any desired switching point to provide reliable overfill detection. Whether installed fixed or adjustable via adjustment thread, the optimal vibrating rod functions reliably in all fine to coarse bulk solids.

Process temperature:	-50 ... +150 °C (-58 ... +302 °F) option -50 ... +250 °C (-58 ... +482 °F)
Material:	316L
Process fitting:	thread from G 1½ A or 1½ NPT
Probe length:	up to 6 m (20 ft)



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