Operating Instructions
VEGAMIP R61
Receiving unit
- Transistor

Document ID: 40694
Contents

1 About this document
   1.1 Function .......................................................... 4
   1.2 Target group ....................................................... 4
   1.3 Symbolism used .................................................. 4

2 For your safety
   2.1 Authorised personnel ............................................... 5
   2.2 Appropriate use ................................................... 5
   2.3 Warning about misuse .............................................. 5
   2.4 General safety instructions ....................................... 5
   2.5 CE conformity ..................................................... 6
   2.6 Radio license for Europe .......................................... 6
   2.7 Radio license for USA/Canada .................................... 6
   2.8 Environmental instructions ....................................... 7

3 Product description
   3.1 Structure ........................................................... 8
   3.2 Principle of operation ............................................. 8
   3.3 Packaging, transport and storage ................................ 10
   3.4 Accessories and replacement parts ............................. 11

4 Mounting
   4.1 General instructions ............................................... 13
   4.2 Instructions for installation ..................................... 13

5 Connecting to power supply
   5.1 Preparing the connection ......................................... 23
   5.2 Connection procedure ............................................. 23
   5.3 Wiring plan, single chamber housing ........................... 25

6 Setup
   6.1 Adjustment elements ............................................. 27
   6.2 Adjustment .......................................................... 28

7 Maintenance and fault rectification
   7.1 Maintaining ......................................................... 33
   7.2 Remove interferences ............................................. 33
   7.3 Exchange of the electronics ..................................... 34
   7.4 How to proceed in case of repair ............................... 34

8 Dismounting
   8.1 Dismounting steps ................................................ 35
   8.2 Disposal ............................................................ 35

9 Supplement
   9.1 Technical data ..................................................... 36
   9.2 Dimensions ........................................................ 40
Safety instructions for Ex areas

Please note the Ex-specific safety information for installation and operation in Ex areas. These safety instructions are part of the operating instructions manual and come with the Ex-approved instruments.

Editing status: 2012-02-14
1 About this document

1.1 Function

This operating instructions manual provides all the information you need for mounting, connection and setup as well as important instructions for maintenance and fault rectification. Please read this information before putting the instrument into operation and keep this manual accessible in the immediate vicinity of the device.

1.2 Target group

This operating instructions manual is directed to trained qualified personnel. The contents of this manual should be made available to these personnel and put into practice by them.

1.3 Symbolism used

Information, tip, note
This symbol indicates helpful additional information.

Caution: If this warning is ignored, faults or malfunctions can result.
Warning: If this warning is ignored, injury to persons and/or serious damage to the instrument can result.
Danger: If this warning is ignored, serious injury to persons and/or destruction of the instrument can result.

Ex applications
This symbol indicates special instructions for Ex applications.

- List
The dot set in front indicates a list with no implied sequence.

- Action
This arrow indicates a single action.

1 Sequence
Numbers set in front indicate successive steps in a procedure.
2 For your safety

2.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained specialist personnel authorised by the plant operator.

During work on and with the device the required personal protective equipment must always be worn.

2.2 Appropriate use

The VEGAMIP 61 is a sensor for level detection.

You can find detailed information on the application range in chapter "Product description".

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

2.3 Warning about misuse

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

2.4 General safety instructions

This is a state-of-the-art instrument complying with all prevailing regulations and guidelines. The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for the trouble-free operation of the instrument.

During the entire duration of use, the user is obliged to determine the compliance of the necessary occupational safety measures with the current valid rules and regulations and also take note of new regulations.

The safety instructions in this operating instructions manual, the national installation standards as well as the valid safety regulations and accident prevention rules must be observed by the user.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

The safety approval markings and safety tips on the device must also be observed.
The emitting frequencies of the sensors depend on the model, but are all in the K band range. The low transmitting power lies far below the internationally permitted limit value. When the instrument is used correctly, it presents no danger to human health. It may be operated without restriction outside of closed vessels.

### 2.5 CE conformity

The device fulfills the legal requirements of the applicable EC guidelines. By affixing the CE marking, VEGA confirms successful testing of the product.

**Only with class A instruments:**
The device is a class A instrument designed for use in an industrial environment. When used in a different environment, e.g., in a living area, the electromagnetic compatibility must be ensured by the user. If necessary, suitable screening measures against conducted and emitted disturbances must be taken.

You can find the conformity certificate in the download section under www.vega.com.

### 2.6 Radio license for Europe

The instrument is approved according to EN 300440-1 V1.5.1 (2009-03) and EN 300440-2 V1.531 (2009-03) and can be used without radio limitations.

### 2.7 Radio license for USA/Canada

Operation is only permitted if the following two conditions are fulfilled:

- The instrument must not emit interference radiation
- The instrument must operate without being affected by incoming interference radiation, including such that may trigger unwanted operating conditions.

The instrument is in conformity with the following regulations:

FCC: Part 15 of the FCC regulations

IC: RSS-210 Issue 7, RSS-GEN Issue 2 and RSS-102 Issue 4 of the IC regulations.

Conversions or modifications of the instrument not expressly approved by the manufacturer will lead to loss of the approval.

Before use, make sure that the respective approval numbers are stated on the type label (see chapter “Configuration”).
2.8 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Please help us fulfil this obligation by observing the environmental instructions in this manual:

- Chapter "Packaging, transport and storage"
- Chapter "Disposal"
3 Product description

3.1 Structure

Type label
The type label contains the most important data for identification and use of the instrument:

- Article number
- Serial number
- Technical data
- Article numbers, documentation

With the serial number, you can access the delivery data of the instrument via www.vega.com, "VEGA Tools" and "serial number search". In addition to the type label outside, you can also find the serial number on the inside of the instrument.

Serial number
With the serial number of the instrument on the type label you have access to the following data on our homepage:

- Article number of the instrument (HTML)
- Delivery date (HTML)
- Order-specific instrument features (HTML)
- Operating instructions at the time of shipment (PDF)
- Order-specific sensor data for an electronics exchange (XML)
- Test certificate "Measuring Accuracy" (PDF)

Go to www.vega.com, "Service" "VEGA Tools" and "serial number search".

Scope of delivery
The scope of delivery typically includes the following parts.

- Point level sensor VEGAMIP R61 (receiving unit)
- Documentation
  - this operating instructions manual
  - Supplementary instructions manual "Plug connector for level sensors" (optional)
  - Ex-specific "Safety instructions" (with Ex versions)
  - if necessary, further certificates
- The corresponding emitting unit VEGAMIP T61 is described in a separate operating instructions manual.

3.2 Principle of operation

Application area
VEGAMIP 61 is a microwave barrier for level detection.

It is designed for industrial use in all areas of process technology and can be used in bulk solids and liquids.

Typical applications are overfill and dry run protection. With an operating distance of 100 m, VEGAMIP 61 can be used, for example, in bulk solids silos with large diameters. Thanks to its simple and rugged measuring system, VEGAMIP 61 is virtually unaffected by the process and the chemical and physical properties of the medium.
VEGAMIP 61 can also be used for detection of vehicles and ships or for material recognition on conveyor belts.

It works even under extremely difficult conditions: different grain sizes, contamination, extreme filling noise, high temperatures, strong dust generation and abrasive products are all no problem for the instrument.

The VEGAMIP 61 consists of the following components.

**Fig. 1: VEGAMIP 61 with plastic housing**

1. Emitting unit VEGAMIP T61
2. Receiving unit VEGAMIP R61 with control electronics
3. Housing cover
4. Housing with control electronics
5. Process fitting
Several antenna versions are available for different applications.

**Fig. 2: Antenna versions**
1. Threaded version - internal horn antenna with PTFE cover
2. Plastic encapsulated antenna with PP cover
3. Horn antenna/316L
4. VEGAMIP 61 with angled antenna extension
5. Encapsulated horn antenna with PTFE cover

**Functional principle**

The emitting unit transmits a focused microwave signal via horn antenna to the receiving unit on the opposite side. If there is medium between emitting and receiving unit, the signal is damped. This change is detected by the built-in electronics module and converted into a switching command.

### 3.3 Packaging, transport and storage

**Packaging**

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test according to DIN EN 24180.

The packaging of standard instruments consists of environment-friendly, recyclable cardboard. For special versions, PE foam or PE foil is also used. Dispose of the packaging material via specialised recycling companies.

**Transport**

Transport must be carried out under consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

**Transport inspection**

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.
Storage

Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.

Unless otherwise indicated, the packages must be stored only under the following conditions:

- Not in the open
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration

Storage and transport temperature

- Storage and transport temperature see chapter "Supplement - Technical data - Ambient conditions"
- Relative humidity 20 … 85 %

3.4 Accessories and replacement parts

Protective cap

The protective cover protects the sensor housing against soiling and intense heat from solar radiation.

You will find additional information in the supplementary instructions manual "Protective cover" (Document-ID 34296).

Flanges

Flanges are available in different versions according to the following standards: DIN 2501, EN 1092-1, ANSI B 16.5, JIS B 2210-1984, GOST 12821-80.

You can find additional information in the supplementary instructions manual "Flanges according to DIN-EN-ASME-JIS" (Document-ID 31088).

Electronics module

The electronics module VEGAMIP R61 is a replacement part for microwave barriers of VEGAMIP series 60.

You will find additional information in the following operating instructions manual:

- "Electronics module VEGAMIP R61 (receiving unit)" (Document-ID 36428)
Mounting adapter

With high process temperatures exceeding 80 °C, you have to use a mounting adapter for the emitting and the receiving unit. The mounting adapter can only be used with the threaded version (internal horn antenna with PTFE cover).

Fig. 3: VEGAMIP 61 with high temperature mounting adapter
4 Mounting

4.1 General instructions

Screwing in

With instruments with threaded process fitting, suitable tools must be applied for tightening the hexagon.

Warning:
The housing must not be used to screw the instrument in! Applying tightening force can damage internal parts of the housing.

Suitability for the process conditions

Make sure that all parts of the instrument exposed to the process, in particular the active measuring component, process seal and process fitting, are suitable for the existing process conditions. These include above all the process pressure, process temperature as well as the chemical properties of the medium.

You can find the specifications in chapter "Technical data" and on the type label.

Moisture

Use the recommended cables (see chapter "Connecting to power supply") and tighten the cable gland.

You can give your instrument additional protection against moisture penetration by leading the connection cable downward in front of the cable entry. Rain and condensation water can thus drain off. This applies mainly to outdoor mounting as well as installation in areas where high humidity is expected (e.g. through cleaning processes) or on cooled or heated vessels.

4.2 Instructions for installation

Switching point

If possible, install VEGAMIP 61 in a position where strong signal damping by the medium is expected.

Avoid mounting the instrument too close to the vessel wall. Reflections from the vessel wall or from vessel installation can influence the switching accuracy.

Fig. 4: Installation position (top view)
**Product strength**

The VEGAMIP 61 requires a minimum product strength to detect different products.

Dependent on the medium there will be a respective product thickness.

The properties of the medium are also dependent on the granulation size, the bulk density and the moisture content.

Some exemplary reference values for the min. strength of the medium:

<table>
<thead>
<tr>
<th>Product type</th>
<th>Medium</th>
<th>Min. product strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic granules</td>
<td>PTFE, PS</td>
<td>&gt; 1000 mm</td>
</tr>
<tr>
<td></td>
<td>PP, PE, HDPE, POM</td>
<td>&gt; 500 mm</td>
</tr>
<tr>
<td></td>
<td>PA, PVC, PVDF</td>
<td>&gt; 250 mm</td>
</tr>
<tr>
<td>Foodstuffs and wood</td>
<td>Flour</td>
<td>&gt; 100 mm</td>
</tr>
<tr>
<td></td>
<td>Cereals, corn, rice</td>
<td>&gt; 100 mm</td>
</tr>
<tr>
<td></td>
<td>Wood chips (dry)</td>
<td>&gt; 500 mm</td>
</tr>
<tr>
<td></td>
<td>Wood chips (moist)</td>
<td>&gt; 100 mm</td>
</tr>
<tr>
<td>Mineral products / Ore</td>
<td>Stones (e.g. limestone)</td>
<td>&gt; 100 mm</td>
</tr>
<tr>
<td></td>
<td>Cement, clinker</td>
<td>&gt; 100 mm</td>
</tr>
<tr>
<td></td>
<td>Glass (crushed)</td>
<td>&gt; 100 mm</td>
</tr>
<tr>
<td></td>
<td>Coal</td>
<td>&gt; 50 mm</td>
</tr>
<tr>
<td></td>
<td>Bauxite</td>
<td>&gt; 100 mm</td>
</tr>
<tr>
<td></td>
<td>Ore</td>
<td>&gt; 100 mm</td>
</tr>
</tbody>
</table>

**Inflowing medium**

If VEGAMIP 61 is mounted in the filling stream, unwanted false measurement signals can be generated. For this reason, mount VEGAMIP 61 at a position in the vessel where no disturbances, e.g. from filling openings, agitators, etc., can occur.

**Non-metallic vessels**

Microwaves can penetrate non-conductive materials. Hence, it is possible to measure through the wall of non-conductive vessels.
In metal vessels, you have to mount VEGAMIP 61 on flanges or threaded sockets. It is also possible to measure through a window. In general, all products such as glass, ceramic and plastic are suitable as window material.

Max. thickness of the window material:

<table>
<thead>
<tr>
<th>Type of material</th>
<th>Window material</th>
<th>Max. thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastics</td>
<td>PTFE, PS</td>
<td>&lt; 5000 mm</td>
</tr>
<tr>
<td></td>
<td>PP, PE, HDPE, POM</td>
<td>&lt; 1000 mm</td>
</tr>
<tr>
<td></td>
<td>PA, PVC, PVDF</td>
<td>&lt; 500 mm</td>
</tr>
<tr>
<td></td>
<td>Rubber</td>
<td>&lt; 50 mm</td>
</tr>
<tr>
<td>Glass or ceramic</td>
<td>Inspection glass</td>
<td>&lt; 200 mm</td>
</tr>
<tr>
<td></td>
<td>Aluminiumoxide ceramic</td>
<td>&lt; 200 mm</td>
</tr>
<tr>
<td></td>
<td>Al₂O₃</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Abrasion protection (ceramic)</td>
<td>&lt; 100 mm</td>
</tr>
<tr>
<td>Insulation material</td>
<td>Mineral wool</td>
<td>&lt; 1000 mm</td>
</tr>
<tr>
<td></td>
<td>Ceramic fibre plates</td>
<td>&lt; 1000 mm</td>
</tr>
<tr>
<td></td>
<td>Fireclay bricks</td>
<td>&lt; 500 mm</td>
</tr>
</tbody>
</table>

**Fig. 5: Bulk solids vessel of plastic**

**Metal vessels**
Concrete vessel

In general, the same as for metal vessels applies to concrete vessels due to the steel braining.

Wood vessels

In general, the same as for metal vessels applies to wood vessels due to the liquid absorption of the wood.

Pipelines

VEGAMIP 61 can be used for detection of products in pipelines. In pipelines of non-metallic products such as plastic or glass, the measured product can be detected through the pipe wall.

Threaded version

Mount the threaded version of VEGAMIP 61 in the following way:
**Fig. 8: VEGAMIP 61 - threaded version G1½ A**

1. **Polarisation marking**
2. **Instrument hexagon**
3. **Locknut**
4. **Process seal**

1. Insert the supplied process seal (1) before screwing it in.
2. To screw VEGAMIP 61 in, use the instrument hexagon (3) below the housing.
   - Screw the instrument in and hand-screw it a flat wrench.
3. Turn the sensor back (max. 180°) to reach the required orientation of the polarisation marking (4).
4. Hold the instrument in this position and tighten with the counter nut (2).

**Caution:**
The housing must not be used to screw the instrument in! Applying tightening force can damage internal parts of the housing.

**Note:**
In the case of VEGAMIP 61 with NPT thread, the instrument seals in the thread itself. Hence, no counter nut is necessary for these versions.

**Buildup**
Avoid long sockets in which the medium can remain and if possible, mount VEGAMIP 61 front-flush. This applies mainly if buildup and dust are expected.
Fig. 9: Front flush installation

1  Unfavourable installation - bulk solid can settle in front of the sensor
2  Correct front flush installation

If a front-flush installation is not possible, you can fill long sockets with a plastic or ceramic cylinder to avoid build up of bulk solids and dust deposits. Select the material according to the diameter of the socket and adapt the length as far as possible to the shape of the vessel wall.

Secure the filling material against falling out or turning. If using a fixing screw is technically not possible, you can secure the material in the socket with an adhesive.
Fig. 10: Front flush installation
1 Plastic or ceramic material
2 Fixing screw (if technically possible)

Abrasive medium
In very abrasive products, VEGAMIP 61 should be installed with a mounting adapter or in front of a suitable window. In this case, you have to use a window material which is appropriately resistant.

Vibrations
In case of strong vessel vibrations, the VEGAMIP 61 should be mounted with anti vibration blocks or rubber buffers.
Orientation of the sensor

**Angle**
For an optimum switching signal, the two sensors must be adapted to each other. The accuracy must be in a range of ±5°.

**Offset**
The two sensors can have an offset of up to < 5 % of the sensor distance (d) to each other. Example: with a sensor distance of 1000 mm, the two sensors must have an offset of max. 50 mm to each other.

General rule: the bigger the antenna and the better it focusses, the more precise the orientation has to be.
**Polarisation direction**

The emitting unit emits electromagnetic waves. The polarisation plane is the direction of the electrical wave component. Its position is marked on the instrument hexagon by polarisation markings.

For a reliable function, the emitting and receiving unit must be installed in the same polarisation direction.

If several instrument pairs are installed in a vessel, the instrument pairs can be coded by different polarisation positions to avoid that they influence one another.

---

**Fig. 13: Orientation according to the polarisation direction**

1. Polarisation marking on top
2. Polarisation marking lateral

---

**Special mounting options**

In tight mounting spaces or spaces subject to high temperatures, the signal of VEGAMIP 61 can be guided via a deflector. For this you can use a metal plate or an angled antenna extension on the side of the emitting unit. In products with low dielectric value, we recommend using an instrument version with antenna extension because it focusses the signal optimally and has no signal loss. With instrument versions with detachable horn antenna, the antenna extension can be retrofitted.
Fig. 14: Possibilities for signal deflection
1 Metal plate for signal deflection of the microwave signal
2 Bent antenna extension
5 Connecting to power supply

5.1 Preparing the connection

Safety instructions
Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage
- If voltage surges are expected, install overvoltage arresters

Voltage supply
Connect the operating voltage according to the following diagrams. Take note of the general installation regulations. As a rule, connect VEGAMIP 61 to vessel ground (PA), or in case of plastic vessels, to the next ground potential. On the side of the instrument housing there is a ground terminal between the cable entries. This connection serves to drain off electrostatic charges. In Ex applications, the installation regulations for hazardous areas must be given priority.

The data for power supply are specified in chapter "Technical data".

Connection cable
The instrument is connected with standard two-wire cable without screen. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used.

Use cable with round cross-section. A cable outer diameter of 5 … 9 mm (0.2 … 0.35 in) ensures the seal effect of the cable gland. If you are using cable with a different diameter or cross-section, exchange the seal or use a suitable cable gland.

Cover all housing openings conforming to standard according to EN 60079-1.

5.2 Connection procedure

Connection technology
The voltage supply and signal output are connected via the spring-loaded terminals in the housing.

Connection procedure
Proceed as follows:

1 Unscrew the housing cover
2 Loosen compression nut of the cable entry
3 Remove approx. 10 cm (4 in) of the cable mantle, strip approx. 1 cm (0.4 in) of insulation from the ends of the individual wires
4 Insert the cable into the sensor through the cable entry

5 Insert the wire ends into the terminals according to the wiring plan

**Information:**
Solid cores as well as flexible cores with cable end sleeves are inserted directly into the terminal openings. In case of flexible cores without end sleeves, press the terminal with a small screwdriver; the terminal opening is freed. When the screwdriver is released, the terminal closes again.

6 Check the hold of the wires in the terminals by lightly pulling on them

7 Connect the screen to the internal ground terminal, connect the outer ground terminal to potential equalisation

8 Tighten the compression nut of the cable entry. The seal ring must completely encircle the cable

9 Screw the housing cover back on

The electrical connection is finished.

**Information:**
The terminal block is pluggable and can be removed from the electronics. To do this, lift the terminal block with a small screwdriver and pull it out. When inserting the terminal block again, you should hear it snap in.
5.3 Wiring plan, single chamber housing

Wiring plan

We recommend connecting VEGAMIP 61 in such a way that the switching circuit is open when there is a level signal, line break or failure (safe condition).

The terminals 1 and 5 as well as 2 and 8 are internally connected. Hence PNP or NPN action can be selected through the electrical connection.

Connection - PNP action

![Diagram of PNP action wiring plan]

Fig. 16: Wiring plan receiving unit - VEGAMIP 61 (receiver) - PNP action
1 Voltage supply
2 Load

Connection - NPN action

![Diagram of NPN action wiring plan]

Fig. 17: Wiring plan receiving unit - VEGAMIP 61 (receiver) - NPN action
1 Voltage supply
2 Load
Fig. 18: Wiring plan receiving unit - VEGAMIP 61 (receiver) - floating

1  Voltage supply

$U_H$  Auxiliary voltage
6 Setup

6.1 Adjustment elements

The figures in brackets refer to the following illustration.

![Diagram of adjustment elements](image)

**Fig. 19: Electronics module MP6X S receiver unit - Transistor output**

1. Mode switch for selecting the switching behaviour (min./max.)
2. Control lamp (LED) for indication of a fault (red)
3. Signal lamp (LED) for indication of the switching condition (yellow)
4. Control lamp (LED) for indication of the instrument function (green)
5. Connection terminals
6. Ground terminal
7. Key for adjustment of the sensitivity and the switching delay (\(\rightarrow\))
8. Key for adjustment of the sensitivity and the switching delay (\(\leftarrow\))
9. LED indicating board for indication of reception strength (yellow)

**Signal lamps (2, 3, 4)**

There are three control lamps (LED) on the electronics module:

- **Control lamp (red) for indication of a fault (2)**
  This signal lamp shows the fault status of the instrument.

- **Control lamp (yellow) for indication of the switching condition (3)**
  The signal lamp signals the switching condition of the switching output.

- **Control lamp (green) for indication of the instrument function (4)**
  The green signal lamp (on) shows the operating state of the instrument as soon as voltage supply is connected correctly.
**Mode switch (1)**

With the mode adjustment (min./max.) you can change the switching condition of the transistor output. You can set the required mode according to the "Function chart" (max. - max. detection or overflow protection, min. - min. detection or dry run protection).

**Sensitivity adjustment (7, 8)**

With these keys (7 and 8) you can adjust the switching point to the medium. Depending on the process, the sensitivity of VEGAMIP 61 must be set higher or lower.

Pressing the "<--" key makes the sensor more sensitive. Pressing the "-->" key makes the sensor less sensitive.

You can also adjust the switching delay with the two keys.

**LED indication strip - receiving level (9)**

By means of the LED indicating board, you can see the actual receiving level during adjustment.

When the indication moves to the right, the instrument will be more insensitive, to the left more sensitive.

### 6.2 Adjustment

**Prerequisites**

The microwave barrier can only be adjusted when being uncovered. Make sure that there is no measured medium or vessel installations between the emitting and receiving unit.

**Mode**

Select the requested mode (min./max.) according to the function chart.

The following function chart provides an overview of the switching conditions depending on the set mode and level.

<table>
<thead>
<tr>
<th>Level</th>
<th>Switching status</th>
<th>Signal lamp - Switching output (yellow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode max. Overflow protection</td>
<td>closed</td>
<td>![Signal lamp - Switching output (yellow)]</td>
</tr>
<tr>
<td>Mode max. Overflow protection</td>
<td>open</td>
<td>![Signal lamp - Switching output (yellow)]</td>
</tr>
<tr>
<td>Mode min. Dry run protection</td>
<td>closed</td>
<td>![Signal lamp - Switching output (yellow)]</td>
</tr>
<tr>
<td>Level</td>
<td>Switching status</td>
<td>Signal lamp - Switching output (yellow)</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Mode min. Dry run protection</td>
<td>open</td>
<td>o</td>
</tr>
<tr>
<td>Failure of the supply voltage (max./min. mode)</td>
<td>any</td>
<td>open</td>
</tr>
<tr>
<td>Malfunction</td>
<td>any</td>
<td>open</td>
</tr>
</tbody>
</table>

Depending on the switching function your output should carry out, you can determine the switching direction by means of the slide switch.

- For maximum indication or overfill protection set the slide switch to position max.
- For minimum indication or dry run protection, set the slide switch to position min.

The transistor output is closed when the yellow signal lamp lights.

**Sensitivity adjustment**

With the two keys you can change the LED indication strip and adjust the switching point to the medium.

The keys are lowered to avoid unintentional changes of the setting. For adjustment, use for example, a small screwdriver.

If you press one of the keys for more than two seconds, the adjustment range shifts automatically in the respective direction. The greater the distance between emitting and receiving unit, the greater the adjustment range of the indication. The LED indication strip always shows a small section of the actual measuring range.

Pressing the "<--" key makes the sensor more sensitive. Pressing the "-->" key makes the sensor less sensitive.
Press the respective key until the indication is within the LED indication strip. This means one or two LEDs on the LED indication strip will light up.

Set the indication approximately to the middle of the LED indicating board until the yellow status indication changes condition.

Depending on the vessel size, process and/or medium, you have to adjust the sensitivity of VEGAMIP 61 more or less sensitive. In products with low signal damping, in small vessels or pipelines or with buildup, it can be necessary to test the switching function.

**Receiving level**

By means of the LED indicating board, you can see the actual receiving level during adjustment.

When the indication moves to the right, the instrument will be more insensitive, to the left more sensitive.

**Medium delivers good signal damping**

In applications with products having a good signal damping (for example stones, ore, sand, cement) and where buildup and contamination is expected, you should adjust the instrument more insensitive. In this case, the VEGAMIP 61 switches only with a relatively high signal damping by the medium. Probable buildup does not influence the measurement.

In case of buildup, press the key (to the right) until the flashing LEDs are at the right edge of the LED indication strip. For strong buildup, you can press the key several times to make the instrument less sensitive. The indication of the LED indication board does not change, but the instrument will become a little less sensitive with each pressing of the key.
Fig. 29: LED indication strip - Setting for products with good signal damping

If there is strong buildup during operation, adjustment with buildup is recommended. A short period of operation is probably sufficient to create buildup, or buildup can be created artificially or imitated.

**Product delivers low signal damping**

In applications with products having a low signal damping (for example plastic granules, cereals), you should adjust the instrument more sensitive. Hence, the VEGAMIP 61 switches very sensitive, even with relatively low covering by the product.

Fig. 30: LED indication strip - Setting for products with low signal damping
**Switching delay**

By means of the LED indicating board, you can adjust the switching delay.

Push the two keys (7) and (8) simultaneously for approximately 2 s until the LED indication flashes.

With the two keys you can select the requested switching delay according to the following illustration.

The switching delay can be adjusted in seven steps between 100 ms and 20 s.

![Diagram of LED indicating board with adjustable switching delay](image)

*Fig. 31: Adjust switching delay - LED indication flashes*

If the indication moves to the right, the switching delay will be longer, to the left shorter.

The indication returns automatically to the indication of the actual receiving level after approximately 10 s.

**Simulation**

If possible, you can simulate a filling between emitting and receiving unit by using the hand or a metal sheet and check if the switching point is adjusted correctly. If the control lamp changes the switching condition, then the switching function is correct.
7 Maintenance and fault rectification

7.1 Maintaining

If the device is used correctly, no maintenance is required in normal operation.

7.2 Remove interferences

Reaction when malfunctions occur

The operator of the system is responsible for taking suitable measures to rectify faults.

Fault rectification

The first measure to be taken is to check the output signal. In many cases, the causes can be determined this way and the faults rectified.

Checking the switching signal

<table>
<thead>
<tr>
<th>Error</th>
<th>Cause</th>
<th>Rectification</th>
</tr>
</thead>
<tbody>
<tr>
<td>VEGAMIP 61 signals &quot;covered&quot; without being submerged (overfill protection) or VEGAMIP 61 signals &quot;uncovered&quot; when being submerged (dry run protection)</td>
<td>Operating voltage too low</td>
<td>Check operating voltage</td>
</tr>
<tr>
<td></td>
<td>Buildup on the sensor</td>
<td>Check if there is buildup on the two sensors, and if so, remove it.</td>
</tr>
<tr>
<td></td>
<td>Wrong mode selected</td>
<td>Set the correct mode on the mode switch (max.: overflow protection, min.: dry run protection). Wiring should be carried out according to the quiescent current principle.</td>
</tr>
<tr>
<td></td>
<td>Unfavourable installation location</td>
<td>Mount the sensor (emitter/receiver) in a position where there is a lot of measured product between emitting and receiving unit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mount the sensor (emitter/receiver) in a position where there are no interfering installations or moving parts.</td>
</tr>
<tr>
<td></td>
<td>Electronics defective</td>
<td>Push the mode switch. If the instrument then does not change the mode, the electronics module may be defective. Exchange the electronics module.</td>
</tr>
<tr>
<td></td>
<td>Sensor defective</td>
<td>Push the mode switch (min./max.). If the instrument switches over, the sensor can be covered or mechanically damaged. Should the switching function on the correct mode be wrong again, the you should return the instrument for repair.</td>
</tr>
<tr>
<td>Signal lamp lights red</td>
<td>Operating voltage too low</td>
<td>Check operating voltage</td>
</tr>
<tr>
<td></td>
<td>Electronics module has detected an internal failure</td>
<td>Exchange the instrument or send it in for repair</td>
</tr>
<tr>
<td>Instrument switches delayed</td>
<td>Check switching delay</td>
<td>Adjust switching delay correctly</td>
</tr>
</tbody>
</table>
### Reaction after fault rectification

Depending on the reason for the fault and the measures taken, the steps described in chapter "Setup" must be carried out again or must be checked for plausibility and completeness.

### 24 hour service hotline

Should these measures not be successful, please call in urgent cases the VEGA service hotline under the phone no. **+49 1805 858550**.

The hotline is also available outside the normal working hours on seven days a week around the clock.

Since we offer this service worldwide, the support is in English language. The service is free-of-charge, only the standard telephone costs will be charge.

#### 7.3 Exchange of the electronics

If the electronics module is defective, it can be replaced by the user.

In Ex applications only an electronics module with respective Ex approval may be used.

You find all information to the electronics exchange in the operating instructions of the new electronics module.

#### 7.4 How to proceed in case of repair

If a repair is necessary, please proceed as follows:

You can download a return form (23 KB) from our homepage at **www.vega.com** under: "Downloads - Forms and certificates - Repair form".

By doing this you help us carry out the repair quickly and without having to call back for needed information.

- Print and fill out one form per instrument
- Clean the instrument and pack it damage-proof
- Attach the completed form and, if need be, also a safety data sheet outside on the packaging
- Please ask the agency serving you for the address of your return shipment. You can find the competent agency on our website **www.vega.com**.

---

<table>
<thead>
<tr>
<th>Error</th>
<th>Cause</th>
<th>Rectification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrument switches frequently with certain levels</td>
<td>Wave movements in the vessel</td>
<td>Adjust or increase switching delay</td>
</tr>
<tr>
<td></td>
<td>Effects through interfering reflections</td>
<td>Adjust the instrument more insensitive</td>
</tr>
</tbody>
</table>
8 Dismounting

8.1 Dismounting steps

Warning:
Before dismounting, be aware of dangerous process conditions such as e.g. pressure in the vessel, high temperatures, corrosive or toxic products etc.

Take note of chapters "Mounting" and "Connecting to power supply" and carry out the listed steps in reverse order.

8.2 Disposal

The instrument consists of materials which can be recycled by specialised recycling companies. We use recyclable materials and have designed the electronics to be easily separable.

Correct disposal avoids negative effects on humans and the environment and ensures recycling of useful raw materials.

Materials: see chapter "Technical data"

If you have no way to dispose of the old instrument properly, please contact us concerning return and disposal.

**WEEE directive 2002/96/EG**
This instrument is not subject to the WEEE directive 2002/96/EG and the respective national laws. Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points. These may be used only for privately used products according to the WEEE directive.
9 Supplement

9.1 Technical data

General data
Material 316L corresponds to 1.4404 or 1.4435

Materials, wetted parts
- Process fitting - thread 316L
- Process fitting - flange 316L

<table>
<thead>
<tr>
<th>Antenna</th>
<th>Instrument seal</th>
<th>Cover or wetted materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threaded version - internal horn antenna with PTFE cover</td>
<td>FKM (A+P 70.16.-06) Process seal: Klinger sil C-4400</td>
<td>PTFE 316L</td>
</tr>
<tr>
<td>Plastic encapsulated antenna with PP cover</td>
<td>-</td>
<td>PP</td>
</tr>
<tr>
<td>Horn antenna/316L</td>
<td>FKM (SHS FDM 70C3 GLT) FFKM (Kalrez 6375) Process seal: Klinger sil C-4400</td>
<td>PTFE 316L</td>
</tr>
<tr>
<td>Encapsulated horn antenna with PTFE cover</td>
<td>-</td>
<td>PTFE</td>
</tr>
<tr>
<td>Mounting adapter (option)</td>
<td>Graphite</td>
<td>Ceramic Al$_2$O$_3$ 316L</td>
</tr>
</tbody>
</table>

Materials, non-wetted parts
- Plastic housing plastic PBT (Polyester)
- Aluminium die-casting housing Aluminium die-casting AlSi10Mg, powder-coated - basis: Polyester
- Stainless steel housing - precision casting 316L
- Stainless steel housing, electropolished 316L
- Seal between housing and housing cover NBR (stainless steel housing, precision casting), silicone (aluminium/plastic housing; stainless steel housng, electropolished)
- Ground terminal 316L
- Mounting adapter (option) 316L

Sensor length
See chapter "Dimensions"

Instrument weight (depending on process fitting)
0.8 ... 4 kg (0.18 ... 8.82 lbs)

Process fittings
- Pipe thread, cylindrical (ISO 228 T1) G1½ A
- American pipe thread, tapered 1½ NPT
- Flanges DIN from DN 50, ANSI from 2"
- Mounting adapter G2 A or 2 NPT
### Frequency range
K band, 24.085 GHz (ISM band)

### Measuring range
0.1 … 100 m (0.33 … 328 ft)

### Beam angle

- Threaded version - internal horn antenna (PTFE cover) 20°
- Plastic encapsulated antenna with PP cover 10°
- Horn antenna (316L) - ø 40 mm (1.575 in) 22°
- Horn antenna (316L) - ø 48 mm (1.89 in) 18°
- Encapsulated antenna with PTFE cover - Flange DN 50, ANSI 2" 18°
- Encapsulated antenna with PTFE cover - Flange DN 80 … DN 150, ANSI 3" … 6" 10°

### Output variable

<table>
<thead>
<tr>
<th>Output</th>
<th>Floating transistor output$^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load current</td>
<td>&lt; 400 mA</td>
</tr>
<tr>
<td>Voltage loss</td>
<td>&lt; 0.5 V</td>
</tr>
<tr>
<td>Turn-on voltage</td>
<td>&lt; 55 V DC</td>
</tr>
<tr>
<td>Blocking current</td>
<td>&lt; 10 µA</td>
</tr>
<tr>
<td>Modes (adjustable)</td>
<td>min./max.</td>
</tr>
</tbody>
</table>

### Measuring accuracy

| Hysteresis | approximately 1 dB |
| Switching delay | adjustable from 0.1 … 20 s (on/off) |
| Min. distance | 100 mm (3.94 in) |

### Ambient conditions

-40 … +80 °C (-40 … +176 °F)

### Process conditions

<p>| Measured variable | Limit level of bulk solids and liquids |</p>
<table>
<thead>
<tr>
<th>Process pressure$^3$</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>VEGAMIP 61, threaded version - internal horn antenna with PTFE cover</td>
<td>-1 … 4 bar/-100 … 400 kPa (-14.5 … 58 psig)</td>
</tr>
<tr>
<td>VEGAMIP 61, plastic encapsulated antenna with PP cover</td>
<td>-1 … 2 bar/-100 … 200 kPa (-14.5 … 29 psig)</td>
</tr>
</tbody>
</table>

---

1) Outside the specified beam angle, the energy of the radar signal has a level of -3 dB (50 %)
2) Not overload resistant and not short-circuit proof
3) Note max. pressure of the process fitting
VEGAMIP 61, horn antenna/316L
-1 ... 40 bar/-100 ... 4000 kPa (-14.5 ... 580 psig)
VEGAMIP 61, encapsulated horn antenna with PTFE cover
-1 ... 16 bar/-100 ... 1600 kPa (-14.5 ... 232 psig)
VEGAMIP 61 with mounting adapter
unpressurized (IP 67)

Process temperature (thread or flange temperature)
VEGAMIP 61, threaded version - internal horn antenna with PTFE cover
-40 ... +80 °C (-40 ... +176 °F)
VEGAMIP 61, plastic encapsulated antenna with PP cover
-40 ... +80 °C (-40 ... +176 °F)
VEGAMIP 61, horn antenna/316L - seal: FKM (SHS FDM 70C3 GLT)
-40 ... +130 °C (-40 ... +266 °F)
VEGAMIP 61, horn antenna/316L - seal: FFKM (Kalrez 6375)
-20 ... +130 °C (-4 ... +266 °F)
VEGAMIP 61, encapsulated horn antenna with PTFE cover
-40 ... +200 °C (-40 ... +392 °F)
VEGAMIP 61 with mounting adapter 150 mm (optional)
-40 ... +250 °C (-40 ... +482 °F)
VEGAMIP 61 with mounting adapter 300 mm (optional)
-40 ... +450 °C (-40 ... +842 °F)

Electromechanical data
Cable entry/plug (dependent on the version)
Single chamber housing
1 x cable entry M20 x 1.5 (cable: ø 5 ... 9 mm),
1 x blind stopper M20 x 1.5; attached 1 x cable entry M20 x 1.5
or:
1 x cable entry ½ NPT, 1 x blind stopper ½ NPT,
1 x cable entry ½ NPT
or:
1 x plug M12 x 1; 1 x blind stopper M20 x 1.5
for wire cross-section up to 1.5 mm² (AWG 16)

Spring-loaded terminals

Voltage supply
Operating voltage
20 ... 55 V DC
Power consumption
max. 0.8 W

Electrical protective measures
Protection rating
IP 66/IP 67
Overvoltage category
III
Protection class
II

Approvals
Instruments with approvals can have different technical data depending on the version.
That's why the associated approval documents have to be noted with these instruments. They are part of the delivery or can be downloaded under www.vega.com via "VEGA Tools" and "serial number search" as well as via "Downloads" and "Approvals".
9.2 Dimensions

VEGAMIP 61 - housing versions

Fig. 32: Housing versions
1 Plastic housing
2 Stainless steel housing, electropolished
3 Stainless steel housing - precision casting
4 Aluminium housing

VEGAMIP 61

Fig. 33: VEGAMIP 61 - threaded version
1 Threaded version - internal horn antenna with PTFE cover - G1½ A
2 Threaded version - internal horn antenna with PTFE cover - 1½ NPT
Fig. 34: VEGAMIP 61, encapsulated antennas
1 Encapsulated horn antenna with PTFE cover - flange version
2 Plastic encapsulated antenna with PP cover
3 Mounting strap
4 Adapter flange
VEGAMIP 61 - Mounting adapter (-40 ... +450 °C)

Fig. 35: VEGAMIP 61, horn antenna/316L

Fig. 36: Mounting adapter with ceramic cover for VEGAMIP 61 - threaded version G2 A with PTFE cover (also with 2 NPT thread)

x 150 mm (5.9 in) or 300 mm (11.8 in)
9.3 Industrial property rights

VEGA product lines are global protected by industrial property rights. Further information see http://www.vega.com.
Only in U.S.A.: Further information see patent label at the sensor housing.

VEGA Produktfamilien sind weltweit geschützt durch gewerbliche Schutzrechte.

Les lignes de produits VEGA sont globalement protégées par des droits de propriété intellectuelle. Pour plus d'informations, on pourra se référer au site http://www.vega.com.


VEGA系列产品在全球享有知识产权保护。
进一步信息请参见网站<http://www.vega.com>。

9.4 Trademark

All the brands as well as trade and company names used are property of their lawful proprietor/originator.
### Index

**A**
- Abrasion 19
- Accessory
  - Flanges 11
  - Protective cap 11
- Adjustment 28
- Application area 8

**B**
- Bending 21
- Buildup 17

**C**
- Cable 23
- Cable screening 23

**E**
- Electronics module 11, 34
- Emitting unit 9
- Encapsulated antennas 41

**F**
- Fault rectification 33
- Filling opening 14
- Functional principle 10

**H**
- Horn antenna 42

**M**
- Medium 14
- Mode 28
- Moisture 13
- Mounting adapter 12, 42

**O**
- Operation 27
- Orientation of the sensor 20

**P**
- Packaging 10
- Pipelines 16
- Polarisation direction 20
- Potential equalisation 23

**R**
- Receiving unit 9, 25, 27

**S**
- Scope of delivery 8
- Sensitivity adjustment 29
- Service hotline 34
- Shielding 23
- Simulation 32
- Storage 11
- Switching delay 32
- Switching point 13

**T**
- Threaded version 16, 40
- Type label 8
- Type of vessel
  - Concrete vessel 16
  - Metal vessels 15
  - Non-metallic vessels 14
  - Wood vessels 16

**V**
- Vibrations 19

**W**
- Wiring plan 25

**Repair** 34
VEGA Grieshaber KG
Am Hohenstein 113
77761 Schiltach
Germany
Phone +49 7836 50-0
Fax +49 7836 50-201
E-mail: info.de@vega.com
www.vega.com

All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.

© VEGA Grieshaber KG, Schiltach/Germany 2012

Subject to change without prior notice