Operating Instructions
VEGAMIP T61
Emitting unit
## 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 ............................ 14
5.2 Connection procedure ............................... 14
5.3 Wiring plan, single chamber housing ............. 16

### 6 Setup
6.1 Adjustment elements ................................ 17

### 7 Maintenance and fault rectification
7.1 Maintenance .......................................... 18
7.2 Remove interferences ............................... 18
7.3 Exchange of the electronics ....................... 18
7.4 How to proceed in case of repair ................. 18

### 8 Dismounting
8.1 Dismounting steps .................................. 19
8.2 Disposal .............................................. 19

### 9 Supplement
9.1 Technical data ...................................... 20
9.2 Dimensions ......................................... 23
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.

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 T61 (emitting 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 receiving unit VEGAMIP R61 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 cover**

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 T61 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 T61 (emitting unit)" (Document-ID 36429)
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

**Installation**
You can find the mounting instructions for VEGAMIP 61 in the operating instructions of the receiving unit.
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 connection diagrams. The electronics module is designed in protection class I. To maintain this protection class, it is absolutely necessary that the earth conductor be connected to the inner earth conductor terminal. Keep the general installation regulations in mind. Take note of the corresponding installation regulations for hazardous areas with Ex applications.

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

Connection cable The instrument is connected with standard three-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

Fig. 4: Connection steps 4 and 5

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).

![Wiring diagram](image-url)

Fig. 5: Wiring plan emitting unit - VEGAMIP 61 (transmitter)

1  Voltage supply
6 Setup

6.1 Adjustment elements

You can find the adjustment of VEGAMIP 61 in the operating instructions of the VEGAMIP R61 (receiving unit).
7 Maintenance and fault rectification

7.1 Maintenance

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

You can find information on fault rectification in the operating instructions manual of the receiving unit.

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.
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: Klingsersil 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: Klingsersil 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 Al₂O₃ 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°

### Ambient conditions
Ambient, storage and transport temperature -40 ... +80 °C (-40 ... +176 °F)

### Process conditions
**Measured variable**
Limit level of bulk solids and liquids

**Process pressure**
- VEGAMIP 61, threaded version - internal horn antenna with PTFE cover -1 ... 4 bar/-100 ... 400 kPa (-14.5 ... 58 psig)
- VEGAMIP 61, plastic encapsulated antenna with PP cover -1 ... 2 bar/-100 ... 200 kPa (-14.5 ... 29 psig)
- 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)

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1) Outside the specified beam angle, the energy of the radar signal has a level of -3 dB (50 %)
2) Note max. pressure of the process fitting
- 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)

**Performance data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emitted power</td>
<td>&lt; 3 mW</td>
</tr>
<tr>
<td>Max. power density in a distance of 1 m</td>
<td>&lt; 1 µW/cm²</td>
</tr>
</tbody>
</table>

**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

- Spring-loaded terminals
  
  for wire cross-section up to 1.5 mm² (AWG 16)

**Voltage supply**

- Operating voltage
  
  20 ... 253 V AC, 50/60 Hz, 20 ... 72 V DC (at U >60 V DC, the ambient temperature can be max. 50 °C/122 °F)

- Power consumption
  
  2 VA (AC), approx. 0.8 W (DC)

**Electrical protective measures**

- Protection rating
  
  IP 66/IP 67

- Overvoltage category
  
  III

- Protection class
  
  I

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

VEGAMIP 61

Fig. 7: 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. 8: 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

Fig. 9: VEGAMIP 61, horn antenna/316L

VEGAMIP 61 - Mounting adapter (-40 ... +450 °C)

Fig. 10: 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.

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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
Accessory
– Flanges 11
– Protective cover 11
Application area 8

C
Cable 14
Cable screening 14

E
Electronics module 11, 18
Emitting unit 9, 16
Encapsulated antennas 24

F
Fault rectification 18
Functional principle 10

H
Horn antenna 25

M
Moisture 13
Mounting adapter 12, 25

O
Operation 17

P
Packaging 10
Potential equalisation 14

R
Receiving unit 9
Repair 18

S
Scope of delivery 8
Shielding 14
Storage 11

T
Threaded version 23
Type label 8

W
Wiring plan 16
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.

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