Conductive Limit Switch
LKL-P1, LKL-P2

Level limit switch for multiple point detection in conductive liquids

Applications
The LKL-P* level limit switch is used in conductive liquids (as of 10 μS/cm) for conductive level limit detection. Depending on the number of measuring points (up to 5 rods or ropes), measuring tasks such as overfill protection, dry running protection, two-point control of pumps or multiple point detection can be implemented with only one process connection.

Your benefits
• Detect up to five point levels with one probe
• Two-point control and additional MAX- and MIN-detection
• Option between rod or rope version for optimum adaptation to the application
• Flexible instrumentation:
  - with built-in electronic insert, either transistor (PNP) or relay output
  - for connection to a separate transmitter power supply unit
• No adjustment required; standard setting for the most common conductive liquids
• No moving parts in the tank:
  - long service life
  - reliable operation with no wear or blockages
• WHG approval
• Simple adaptation to different conductivities
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Function and system design

Measuring principle
An alternating voltage exists between the rod probes in an empty tank. As soon as the conductive liquid in the tank creates a connection between the ground probe rod and, for example, the MAX probe rod, a measurable current flows and the LKL-P* switches. With point level detection, the LKL-P* switches back as soon as the liquid clears the MAX probe.

With two-point control, the LKL-P* does not switch back until the MAX and MIN probe is cleared. Using alternating voltage prevents corrosion of the probe rods and electrolytic destruction of the product.

The material used for the tank walls is not important for measurement because the system is designed as a closed potential-free circuit between the probe rods and the electronics.

There is absolutely no danger if the probe rods are touched during operation.

Measuring system
Probes with integrated electronic insert (compact instrumentation version)
The measuring system consists of:
• LKL-P1 with rods or LKL-P2 with ropes and an electronic insert
• Control units, switches or signal transmitters, e.g. process control systems PLC, relays, etc.

Note!
The compact instrumentation version with three probes or rods is always used in Δs mode.
Probes without integrated electronic insert (separate instrumentation version) for one or two point detection respectively

The measuring system consists of:
- LKL-P1, LKL-P2 with two/three rods or ropes
- One or two switch amplifiers
- Control units, switches or signal transmitters, e. g. process control systems PLC, relays, etc.

Probes without integrated electronic insert for multiple point detection

The measuring system consists of:
- LKL-P1, LKL-P2 with five rods or ropes
- Two or three switch amplifiers
- Control units, switches or signal transmitters, e. g. process control systems PLC, relays, etc.
Conductive Limit Switch LKL-P1, LKL-P2

Input

**Measured variable**
Resistance change between two conductors caused by the presence or absence of a conductive liquid.

**Measuring range (application)**
The measuring range is dependent on the mounting location of the probes.
Rod probes can have a max. length of 4000 mm and rope probes up to 15000 mm.

**Input signal**
Probes covered → a measurable current is flowing between the probes.
Probes uncovered → there is no measurable current flowing between the probes.

Output

**Electronic Insert E5 (FEW52), DC-PNP**

**Output signal**

*Three-wire DC version*
Preferred in conjunction with programmable logic controllers (PLC).
Positive signal at the switch output of the electronics (PNP).
The output is blocked after the point level is reached.

<table>
<thead>
<tr>
<th>Fail-safe mode</th>
<th>Switch point</th>
<th>Output signal</th>
<th>rd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max.</td>
<td>![Switch Point Image]</td>
<td>![Output Signal Image]</td>
<td>![Residual Current Image]</td>
</tr>
<tr>
<td>Min.</td>
<td>![Switch Point Image]</td>
<td>![Output Signal Image]</td>
<td>![Residual Current Image]</td>
</tr>
</tbody>
</table>

*1 = load current (connected); *2 residual current (disconnected); *3 LED not lit; *4 LED lit

If the probe is covered and the red LED flashes continuously, the sensitivity was set to high. Set a smaller sensitivity to ensure a safe switch point even if the conductivity of the medium varies slightly.

**Fail-safe mode**
Selecting the correct fail-safe mode ensures that the output always runs in quiescent current fail-safe.
- MAX fail-safe: the output voltage is 0 V if the switch point is exceeded (probe covered), a fault occurs or the power supply fails.
- MIN fail-safe: the output voltage is 0 V if the switch point is undershot (probe uncovered), a fault occurs or the power supply fails.

**Switching delay**
A switching delay of 2.0 s can be activated or deactivated via a DIL switch.
If the switching delay is set to 0 s, the device switches after approx. 0.3 s.
Conductive Limit Switch LKL-P1, LKL-P2

**Output**

### Sensitivity
The device operates in one of four sensitivity levels (100 Ω, 1 kΩ, 10 kΩ oder 100 kΩ). The sensitivity level can be set with two DIL switches (SENS).
Setting on delivery: 100 Ω (highest sensitivity)

<table>
<thead>
<tr>
<th>MAX</th>
<th>2 s</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIN</td>
<td>0 s</td>
</tr>
</tbody>
</table>

SENS = 100 Ω ... 100 kΩ

### Signal on alarm
In the event of a power failure or a damaged probe: < 100 µA

### Load
The load is switched via a transistor (PNP).
Cycled overload and short-circuit protection, continuous ≤ 200 mA (short-circuit proof).
Residual voltage at transistor at I_{max} < 2.9 V

<table>
<thead>
<tr>
<th>Max.</th>
<th>Min.</th>
</tr>
</thead>
</table>

---

#### Electronic insert WA (FEW54), relay

#### Output signal

**AC/DC connection with relay output**

When connecting a device with high inductance, a spark barrier must be fitted to protect the relay contact. A fine-wire fuse (load-dependent) protects the relay contact in the event of a short-circuit. Both relay contacts switch simultaneously.

<table>
<thead>
<tr>
<th>Fail-safe mode</th>
<th>Switch point</th>
<th>Output signal</th>
<th>rd</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX (Max.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MIN (Min.)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

*1 = relay energised; *2 relay de-energised; *3 LED not lit; *4 LED lit

If the probe is covered and the red LED flashes continuously, the sensitivity was set to high. Set a smaller sensitivity to ensure a safe switch point even if the conductivity of the medium varies slightly.

#### Fail-safe mode

Selecting the correct fail-safe mode ensures that the relay always runs in quiescent current fail-safe.
- MAX fail-safe: the relay de-energizes when the switch point is exceeded (probe covered), a fault occurs or the power supply fails.
- MIN fail-safe: the relay de-energizes when the switch point is undershot (probe uncovered), a fault occurs or the power supply fails.
Sensitivity
The device operates in one of four sensitivity levels (100 Ω, 1 kΩ, 10 kΩ oder 100 kΩ). The sensitivity level can be set with two DIL switches (SENS).
Setting on delivery: 100 Ω (highest sensitivity)

Switching delay
A switching delay of 2.0 s can be activated or deactivated via a DIL switch.
If the switching delay is set to 0 s, the device switches after approx. 0.3 s.

Signal on alarm
Output signal in the event of a power failure or a damaged probe: relay de-energized.

Load
Loads are switched via 2 potential-free change-over contacts.
I– max. 4 A, U– max. 253 V;
P– max. 1000 VA, cos ϕ = 1, P– max. 700 VA, cos ϕ > 0.7;
I– max. 4 A to 30 V, I– max. 0.2 A to 150 V.
When connecting a functional extra-low voltage circuit with double insulation in accordance with IEC 1010: the sum of the relay output and power supply voltages is max. 300 V.

Galvanic isolation
All input channels, output channels and relay contacts are galvanically isolated from each other.

Electronic insert N1 (FEW58), NAMUR

Output signal
For connecting to switch amplifiers acc. to NAMUR (IEC 60947-5-6)
Output signal jump from high to low current on point level (H-L edge).

<table>
<thead>
<tr>
<th>Fail-safe mode</th>
<th>Level</th>
<th>Output signal</th>
<th>LEDs green</th>
<th>yellow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max.</td>
<td></td>
<td>+ 2.2 mA … 6.5 mA</td>
<td>![green light]</td>
<td>![yellow light]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+ 0.4 mA … 1.0 mA</td>
<td>![green light]</td>
<td>![yellow light]</td>
</tr>
<tr>
<td>Min.</td>
<td></td>
<td>+ 2.2 mA … 6.5 mA</td>
<td>![green light]</td>
<td>![yellow light]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+ 0.4 mA … 1.0 mA</td>
<td>![green light]</td>
<td>![yellow light]</td>
</tr>
</tbody>
</table>

Fail-safe mode
Selecting the correct fail-safe mode ensures that the relay always runs in quiescent current fail-safe.
• MAX fail-safe: the output signal is < 1.0 mA when the switch point is exceeded (probe covered), a fault occurs or the power supply fails.
• MIN fail-safe: the output signal is < 1.0 mA when the switch point is undershot (probe uncovered), a fault occurs or the power supply fails.
Sensitivity
The device operates in one of four sensitivity levels (100 Ω, 1 kΩ, 10 kΩ oder 100 kΩ). The sensitivity level can be set with two DIL switches (SENS).
Setting on delivery: 100 Ω (highest sensitivity)

Switching delay
A switching delay of 2.0 s can be activated or deactivated via a DIL switch. If the switching delay is set to 0 s, the device switches after approx. 0.3 s.

Load
Refer to data sheet of the connected switch amplifier acc. to NAMUR (IEC 60947-5-6)

Cable monitoring
For probes without an electronic insert, an additional printed circuit board must be installed in the housing, which enables cable monitoring. It is always switched or connected between rod/rope 1 and 2.

Note!
When using switch amplifiers (transmitters) that do not support cable monitoring, these must be removed.
Power Supply

Electrical connection (wiring diagrams)

Compact instrumentation with E5 (FEW52)

Transistor circuit for load

The load connected to terminal 3 is switched by a transistor, contactless and therefore without bouncing. In normal switching status, terminal 3 has a positive signal.

The transistor is blocked in the event of a level alarm or a power failure.

Protection against voltage peaks

When connecting a device with high inductance, always connect a voltage limiter.

Connecting the FEW52 electronic insert.

- F: Fine-wire fuse 500 mA, semi-time lag
- M: Ground connection to protective earth

Supply voltage E5 (FEW52)

- Supply voltage: U= 10.8 V ... 45 V
- Load connection: open collector; PNP
- Switching voltage: max. 45 V
- Connected load, continuous: max. 200 mA
- Protected against reverse polarity

Power consumption

- P < 1.1 W

Current consumption

- I < 25 mA (without load)
Compact instrumentation with WA (FEW54)

Relay contact circuit for load
The connected load is switched via potential-free relay contacts (change-over contact).
In the event of a level alarm or a power failure, the relay contacts break the connections between terminals 3 and 4 and terminals 6 and 7. The relays always switch simultaneously.

Protection against voltage peaks and short-circuits
When connecting a device with high inductance, fit a spark barrier to protect the relay contact.
A fine-wire fuse (load-dependent) can protect the relay contact in the event of a short-circuit.

Supply voltage WA (FEW54)
- Supply voltage: $U = 20 \text{ V} \ldots 55 \text{ V DC}$ or $U = 20 \text{ V} \ldots 253 \text{ V AC}, 50/60 \text{ Hz}$
- Peak inrush current: max. 2 A, max. 400 $\mu$s
- Output: two potential-free change-over contacts
- Contact load capacity: $U = \text{max. } 253 \text{ V, } I = \text{max. } 4 \text{ A, } U = 30 \text{ V/4 A; 150 V/0.2 A}$

Power consumption
- $P < 2.0 \text{ W}$

Current consumption
- 60 mA
Compact instrumentation with N1 (FEW58)
To be used with a separate switch amplifier acc. to IEC 60947-5-6 (NAMUR);
Output signal jump from high to low current on point level (H-L-edge).
Signal transmission on a two-wire line: H-L-edge 2.2 mA ... 6.5 mA/0.4 mA ... 1.0 mA
When using a multiplexer the cycle time must be set to a minimum of 2 s.

Connecting the FEW58 electronic insert.

**Supply voltage N1 (FEW58)**
Refer to data sheet of the connected switch amplifier acc. to NAMUR (IEC 60947-5-6)

**Signal on alarm**
- Output signal with damaged sensor: < 1.0 mA
Separate instrumentation for two-rod or two-rope probes with cable monitoring

*1 Printed circuit board for cable monitoring (only required for probes with WHG certification.) The power supply and evaluation are provided by switch amplifiers.

Separate instrumentation for three-rod or three-rope probes with cable monitoring

*1 Printed circuit board for cable monitoring (only required for probes with WHG certification.) The power supply and evaluation are provided by a switch amplifier.
Separate instrumentation for five-rod or five-rope probes with cable monitoring

*1 Printed circuit board for cable monitoring (only required for probes with WHG certification.) The power supply and evaluation are provided by a switch amplifier.

Cable entry

**M20 x 1.5**
- Degree of protection: IP66
- Quantity in F24 housing: 1 (separate instrument version)
- Quantity in F16 housing: 2 (compact instrument version)

**1/2 NPT**
- Quantity in F24 housing: 1 (separate instrument version)
- Quantity in F16 housing: 2 (compact instrument version)
- Conductor cross-section (including wire end sleeve): 2.5 mm

Cable specifications

Use a commercially available cable (25 Ω per wire).
# Conductive Limit Switch LKL-P1, LKL-P2

## Accuracy with built-in electronic insert

### Reference operating conditions

- Ambient temperature: 23 °C (296 K)
- Medium temperature: 23 °C (296 K)
- Medium viscosity: medium must release the probe again (drain off).
- Medium pressure $p_e$: 0 bar
- Probe installation: vertically from above

### Measuring error

<table>
<thead>
<tr>
<th>Range</th>
<th>Measuring Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Omega$</td>
<td>± 10 % at 100 $\Omega$ ... 100 $k\Omega$</td>
</tr>
<tr>
<td></td>
<td>± 5 % at 1 $k\Omega$ ... 10 $k\Omega$</td>
</tr>
</tbody>
</table>

### Repeatability

<table>
<thead>
<tr>
<th>Range</th>
<th>Repeatability</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Omega$</td>
<td>± 5 % at 100 $\Omega$ ... 100 $k\Omega$</td>
</tr>
<tr>
<td></td>
<td>± 1 % at 1 $k\Omega$ ... 10 $k\Omega$</td>
</tr>
</tbody>
</table>

### Hysteresis

-10 % for the MAX probe, in reference to the switch point. $\Delta s$ function disabled.

### Switch-on delay

< 3 s

### Influence of ambient temperature

< 0.05 %/K

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## Installation conditions

### Installation instructions

Mounting location

- **Tanks**
  - The rod and rope probes are mounted predominantly in tanks.
- **Piping (partially filled)**
  - Two-rod probes can be used in piping as, for example, dry running protection for pumps.

![Diagram](image_url)
Orientation

*Rod probes*

Point level detection

a. Vertical mounting, MIN-detection; Probe length set to the point level required;
   (Rods must not come into contact with the tank!)

b. Vertical mounting, MAX-detection; Probe length set to the point level required

c. Lateral mounting, MAX-detection; Maximum probe length 200 mm (only applies to two-rod probes).

d. Lateral mounting, MIN-detection; Maximum probe length 200 mm (only applies to two-rod probes).

*Rope probes*

Point level detection

a. Vertical mounting, MIN-detection; Rope length set to the point level required;
   (Rope ends must not come into contact with the tank!)

b. Vertical mounting, MAX-detection; Rope length set to the point level required.
**Example applications**

Point level detection: Two-point control ($\Delta s$)

![Two-point control ($\Delta s$) e.g. pump control](image)

Point level detection: MAX-detection or MAX- and MIN-detection

![Point level detection (MAX), MAX- and MIN-detection for compact instrumentation version only possible with $\Delta s$.](image)
Environment

Ambient temperature range
- Non-hazardous area
  -40 °C ... 70 °C (233 K ... 343 K)
  -40 °C ... 60 °C (233 K ... 333 K) (for FEW58 NAMUR)

Storage temperature
-40 °C ... 80 °C (233 K ... 353 K)

Climate class
Tropicalized as per DIN 60068, part 2-38

Degree of protection
IP66

Shock resistance
Practical test

Vibration resistance
DIN 60068-2-64 / IEC 68-2-64: 20 to 2000 Hz, 1 (m/s²)²/Hz

Electromagnetic compatibility
- Interference Emission to EN 61326, Electrical Equipment Class B
- Interference Immunity to EN 61326, Annex A (Industrial)
- Use for separate instrumented probes a screened cable between the probe and the switch amplifier.

Process

Environment
Permissible ambient temperature $T_1$ at the housing as a function of the measuring material temperature $T_2$ in the vessel:

![Graph showing the relationship between $T_1$ and $T_2$]

**Note!**
For separate instrumented devices (without FEW5*) there are no restrictions in the indicated temperature range.

Conductivity
≥ 10 µS

Limiting medium pressure range
-1 bar ... 10 bar
Mechanical construction

**Note!**
All dimensions in mm! (100 mm = 3.94 in)

**Design, dimensions**

**Rod and rope version with G 1½” (compact instrument version with electronic insert)**

**Rod and rope version with G 1½” (separate instrument version without electronic insert)**
Conductive Limit Switch LKL-P1, LKL-P2

Mechanical construction

Rod and rope version with NPT 1 ½" (compact instrument version with electronic insert)

Rod and rope version with NPT 1 ½" (separate instrument version without electronic insert)
**Conductive Limit Switch LKL-P1, LKL-P2**

**Mechanical construction**

**Weight**

<table>
<thead>
<tr>
<th>Instrumentation Version</th>
<th>Rod, 1 m (3.28 ft) long</th>
<th>Rope, 1 m (3.28 ft) long</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Separate instrumentation version</strong></td>
<td>LKL-P1 with 2, 3 or 5 rods: 415 g, 530 g, 760 g</td>
<td>LKL-P2 with 2, 3 or 5 ropes: 390 g, 470 g, 640 g</td>
</tr>
<tr>
<td><strong>Compact instrumentation version</strong></td>
<td>LKL-P1 with 2 or 3 rods: 600 g, 720 g</td>
<td>LKL-P2 with 2 or 3 ropes: 710 g, 800 g</td>
</tr>
</tbody>
</table>

**Material**

<table>
<thead>
<tr>
<th>Instrumentation Version</th>
<th>Rod, 1 m (3.28 ft) long</th>
<th>Rope, 1 m (3.28 ft) long</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wetted</strong></td>
<td>Seal between probe rod/probe rope and process connection: EPDM</td>
<td>Flat seal for process connection: elastomer fiber, (asbestos-free)</td>
</tr>
<tr>
<td></td>
<td>Spacer: PP</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Process connections:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>G 1 ½: PPS</td>
<td>NPT 1 ½: PPS</td>
</tr>
<tr>
<td></td>
<td><strong>Probe rods:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rod: 316L (1.4404) or carbon fiber</td>
<td>Insulation: PP</td>
</tr>
<tr>
<td></td>
<td><strong>Probe ropes:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rope: 316Ti (1.4571)</td>
<td>Insulation: FEP</td>
</tr>
<tr>
<td></td>
<td><strong>Weight:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>316L (1.4435)</td>
<td></td>
</tr>
<tr>
<td><strong>Not wetted</strong></td>
<td><strong>Housing:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plastic housing F24 (separate instrumentation)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Housing: PPS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Cover: PBT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Polyester housing F16: PBT-FR with PBT-FR cover or with PA12 transparent cover,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Cover seal: EPDM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Adapter: PBT-FR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Nameplate, glued: polyester foil (PET)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Pressure compensation filter: PBT-GF20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ground terminal on housing (outside): 304 (1.4301)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cable gland: polyamide (PA)</td>
<td></td>
</tr>
</tbody>
</table>

**Fitted electrodes**

<table>
<thead>
<tr>
<th>Instrumentation Version</th>
<th>Rod probes</th>
<th>Rope probes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compact instrumentation version:</strong></td>
<td><strong>2 or 3 rods; separate instrumentation version:</strong></td>
<td><strong>2 or 3 rods; separate instrumentation version:</strong></td>
</tr>
<tr>
<td></td>
<td>Diameter without insulation: 4 mm (0.16 in)</td>
<td>Diameter without insulation: 1 mm (0.4 in)</td>
</tr>
<tr>
<td></td>
<td>Maximum rod length: 4000 mm (13 ft)</td>
<td>Maximum rope length: 15000 mm (49 ft)</td>
</tr>
<tr>
<td></td>
<td>Minimum rod length: 100 mm (3.9 in)</td>
<td>Minimum rope length: 250 mm (9.8 in)</td>
</tr>
<tr>
<td></td>
<td>Thickness of insulation: 0.5 mm (0.02 in)</td>
<td>Thickness of insulation: 0.75 mm (0.03 in)</td>
</tr>
<tr>
<td></td>
<td>Length of non-insulated area (tip of rod): 20 mm (0.78 in)</td>
<td>Weight length: 100 mm (not insulated)</td>
</tr>
<tr>
<td></td>
<td>Extraction forces (parallel probe rod): 1000 N</td>
<td>Weight diameter: 10 mm (0.4 in)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Extraction forces (parallel probe rod): 500 N</td>
</tr>
</tbody>
</table>
Human interface

Operating elements
E5 (FEWS2), WA (FEWS4), N1 (FEWS8)
- One DIL switch for MIN or MAX safety
- One DIL switch for 0 s or 2 s switching delay
- Two DIL switches for setting the measuring ranges 100 Ω, 1 kΩ, 10 kΩ, 100 kΩ

Display elements
Separate instrumentation version
Dependent on the connected switch amplifier.
Compact instrumentation version

E5 (FEWS2)
- One red light emitting diode: fault message, switching status
- One green light emitting diode: operation

WA (FEWS4)
- One red light emitting diode: fault message, switching status
- One green light emitting diode: operation

N1 (FEWS8)
- One red light emitting diode: fault message, switching status
- One green light emitting diode: operation

Note!
For E5 (FEWS2), WA (FEWS4)
If the probe is covered and the red LED flashes continuously, the sensitivity was set to high. Set a smaller sensitivity to ensure a safe switch point even if the conductivity of the medium varies slightly.
## Certificates and approvals

<table>
<thead>
<tr>
<th><strong>CE mark</strong></th>
<th>The device meets the legal requirements of the EC directives. Pepperl+Fuchs confirms that the device has been successfully tested by applying the CE mark.</th>
</tr>
</thead>
</table>
| **Overfill protection** | Z-65.13-378 (overspill protection in acc. with WHG)  
Z-65.40-379 (leak detection system) |
| **Other standards and guidelines** | • Directive 73/23/EWG (Low Voltage Directive): EN 61010-1  
• Directive 89/336/EG (EMV):  
  – emitted interference to EN 61326, class B equipment  
  – interference immunity to EN 61326, annex A (industrial sector)  
• Directive 94/9 EG (ATEX): EN 50014, EN 50020  
• Electromagnetic compatibility: NE 21  
• Protection degree: EN 60529  
• Climate class: EN 60068, part 2-38  
• Vibration resistance: EN 60068-2-64 |
| **Ex approval** | TÜV 03 ATEX 2295, for additional certificates see www.pepperl-fuchs.com  
All explosion protection data are given in a separate documentation (see “Supplementary documentation”) which is available upon request. |
| **Ex-Type of protection** | ☑ II 2G EEx ia/ib IIC T6 (TÜV 03 ATEX 2295) (output N1 (FEW58))  
☑ II 3G EEx nA/C (L) IIC T6 (output E5 (FEW52), WA (FEW54)) |
**Ordering information**

### Product structure

<table>
<thead>
<tr>
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### Electrical output

| NA | without electronic insert (separate instrumentation) |
| XX | Electronics retrofittable |
| ES | FEW52, PNP output, 10.8 ... 45V DC |
| WA | FEW54, relay output, 20 ... 253 V AC |
| N1 | FEW58, NAMUR |

### Housing, cable entry

| P1 | Housing synthetic, IP66, M20 x 1.5 |
| P2 | Housing synthetic, IP66, NPT 1/2" |
| P3 | Housing synthetic, IP66, G 1/2" |

### Probe length

| A | mm, probe length 100 mm ... 4000 mm* |
| B | inch, probe length* |
| C | 1000 mm |
| D | 2000 mm |

### Quantity and rod type

| 2 | 2 rods, 316L |
| 3 | 3 rods, 316L |
| 5 | 5 rods, 316L |

### Process connection

| G5 | G 1 1/2" ISO 228 thread, PPS |
| NS | NPT 1 1/2" ANSI thread, PPS |

### Version

1. Rod version, 100 ... 4000 mm  
   * Price is independent from length.

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**Ordering information**

### Product structure

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### Electrical output

| NA | without electronic insert (separate instrumentation) |
| XX | Electronics retrofittable |
| ES | FEW52, PNP output, 10.8 ... 45V DC |
| WA | FEW54, relay output, 20 ... 253 V AC |
| N1 | FEW58, NAMUR |

### Housing, cable entry

| P1 | Housing synthetic, IP66, M20 x 1.5 |
| P2 | Housing synthetic, IP66, NPT 1/2" |
| P3 | Housing synthetic, IP66, G 1/2" |

### Probe length

| A | mm, probe length 250 mm ... 15000 mm* |
| B | inch, probe length* |

### Quantity and rope type

| 2 | 2 ropes, 316Ti |
| 3 | 3 ropes, 316Ti |
| 5 | 5 ropes, 316Ti |

### Process connection

| G5 | G 1 1/2" ISO 228 thread, PPS |
| NS | NPT 1 1/2" ANSI thread, PPS |

### Version

2. Rope version, 100 ... 4000 mm  
   * Price is independent from length.
## Accessories

<table>
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<th>Component</th>
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<tbody>
<tr>
<td>Lock nut</td>
<td>LKL-Z10, G 1 ½&quot;, AF60</td>
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<tr>
<td>Mounting bracket</td>
<td>LZ-1204, G 1 ½&quot;</td>
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<tr>
<td>Electronic insert</td>
<td>E5 (FEW52): output PNP 10.8 V DC ... 45 V DC</td>
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<td>WA (FEW54): output relay 20 V AC ... 253 V AC, 20 V DC ... 55 V DC</td>
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<td>N1 (FEW58): output NAMUR (IEC 60947-5-6)</td>
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## Supplementary Documentation

<table>
<thead>
<tr>
<th>Type</th>
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<tbody>
<tr>
<td>Operating instructions</td>
<td>KA203O (LKL-P* without electronic insert)</td>
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<td>KA204O (LKL-P* with integrated electronic insert)</td>
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<td>Supplementary information</td>
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</tr>
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</table>
Es gelten die Allgemeinen Lieferbedingungen für Erzeugnisse und Leistungen der Elektroindustrie, herausgegeben vom Zentralverband Elektrotechnik und Elektroindustrie (ZVEI) e.V. in ihrer neuesten Fassung sowie die Ergänzungsklausel: „Erweiterter Eigentumsvorbehalt“.

Wir von Pepperl+Fuchs fühlen uns verpflichtet, einen Beitrag für die Zukunft zu leisten, deshalb ist diese Druckschrift auf chlorfrei gebleichtem Papier gedruckt.