Optoelectronic level switches, models OLS-C

Examples for optoelectronic level switches models OLS-C

Model OLS-C01  Model OLS-C02  Model OLS-C20
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Declarations of conformity can be found online at www.wika.com.

Declarations of conformity can be found at www.tc-fluidcontrol.com.
1. General information

- The level switches described in the operating instructions have been designed and manufactured using state-of-the-art technology. All components are subject to stringent quality and environmental criteria during production. Our management systems are certified to ISO 9001 and ISO 14001.

- These operating instructions contain important information on handling the instrument. Working safely requires that all safety instructions and work instructions are observed.

- Observe the relevant local accident prevention regulations and general safety regulations for the instrument's range of use.

- The operating instructions are part of the product and must be kept in the immediate vicinity of the instrument and readily accessible to skilled personnel at any time. Pass the operating instructions onto the next operator or owner of the instrument.

- Skilled personnel must have carefully read and understood the operating instructions prior to beginning any work.

- The general terms and conditions contained in the sales documentation shall apply.

- Subject to technical modifications.

- Further information:
  - Internet address: www.wika.de / www.wika.com
  - Relevant data sheet: LM 31.31 (OLS-C01), LM 31.32 (OLS-C02), LM 31.33 (OLS-C05), LM 31.34 (OLS-C04), LM 31.02 (OLS-C20), LM 31.03 (OLS-C29)
2. Design and function

2.1 Description
This instrument is used for the detection of limit levels in liquids. The measuring principle is independent of refractive index, colour, density, conductivity and dielectric constant. The switches consist of an infrared LED and a phototransistor. The light of the LED is directed into a prism. So long as the sensor tip of the prism is in the gas phase, the light is reflected within the prism to the receiver. When the liquid in the vessel rises and wets the glass tip, the infrared lightbeam into the liquid is interrupted and only a small portion reaches the receiver.

The integrated switch electronics offer an automatic adjustment so that there is a wide field of application. For the output, there is an O.C. pnp-transistor switching output or a relay switching output.

2.2 Instrument construction
Depending on the switch type, the instruments are fitted with different process connections. These contain a glass prism and the electronics responsible for the evaluation.
2. Design and function

Dimensions in mm

Model OLS-C01

- Function indicator
- LED
- Circular connector M8 x 1, 3-pin
- (alternatively cable connection)
- Glass prism
- SW 30
- Ø 30
- Ø 8.3

Model OLS-C02

- Cable
- Cable outlet M16 x 1.5, PG11
- (alternatively circular or angular connector)
- SW 27
- Ø 26
- G 1/2"
- Ø 13
- 150
- 43
- 10

TC Fluid Control operating instructions Optoelectronic level switches, models OLS-C
2. Design and function

Model OLS-C04

Model OLS-C05

Cable outlet (alternatively circular connector)

Function indicator LED

Glass prism

Cable

Angular connector EN 175301-803 A

(Alternatively cable connection or circular connector)

SW 30

Model OLS-C04

Model OLS-C05
2. Design and function

Model OLS-C20

Legend:
ML fixed measuring length 24 mm

Model OLS-C29

2.3 Scope of delivery
Cross-check scope of delivery with delivery note.
3. Safety

3.1 Explanation of symbols

**WARNING!**
... indicates a potentially dangerous situation that can result in serious injury or death, if not avoided.

**Information**
... points out useful tips, recommendations and information for efficient and trouble-free operation.

3.2 Intended use
The optoelectronic level switches should only be used for level control or monitoring of liquid media. Their scope of application is defined by their technical performance limits and their materials. Improper use is defined as any application that exceeds the technical performance limits or is not compatible with the materials. Checking against improper use is the responsibility of the operator.

- The liquids must not have any large contamination or coarse particulates and must not have a tendency to crystallise. Ensure that the wetted materials of the switch are sufficiently resistant to the medium being monitored. Not suitable for dispersion, abrasive liquids, highly viscous media and colours.

- This instrument is not permitted to be used in hazardous areas!

- The maximum power and voltage values as specified in the operating instructions should be adhered to.
3. Safety

- Do not operate the instruments in the immediate vicinity of strong electromagnetic fields or in the immediate vicinity of equipment that can be affected by magnetic fields (min. clearance 1 m).

- The responsiveness of the instrument is preset and, with models OLS-C20 and OLS-C29, cannot be adjusted. With the models OLS-C01, OLS-C02, OLS-C04 and OLS-C05, the responsiveness can only be adjusted if the switch is fitted with a trimmer.

- The switches must not be exposed to heavy mechanical strain (impact, bending, vibration).

The instrument has been designed and built solely for the intended use described here, and may only be used accordingly.

The manufacturer shall not be liable for claims of any type based on operation contrary to the intended use.

3.3 Improper use

**WARNING!**

Injuries through improper use

Improper use of the instrument can lead to hazardous situations and injuries.

- Refrain from unauthorised modifications to the instrument.
- Do not use the instrument within hazardous areas.

Any use beyond or different to the intended use is considered as improper use.

Do not use this instrument in safety or emergency stop devices.
3.4 Responsibility of the operator
The instrument is used in the industrial sector. The operator is therefore responsible for legal obligations regarding safety at work.

The safety instructions within these operating instructions, as well as the safety, accident prevention and environmental protection regulations for the application area must be maintained.

To ensure safe working on the instrument, the operating company must ensure
- that the operating personnel are regularly instructed in all topics regarding work safety, first aid and environmental protection and know the operating instructions and in particular, the safety instructions contained therein.
- that the instrument is suitable for the particular application in accordance with its intended use.

3.5 Personnel qualification

WARNING!
Risk of injury should qualification be insufficient
Improper handling can result in considerable injury and damage to equipment.
- The activities described in these operating instructions may only be carried out by skilled personnel who have the qualifications described below.

Skilled personnel
Skilled personnel, authorised by the operator, are understood to be personnel who, based on their technical training, knowledge of measurement and control technology and on their experience and knowledge of country-specific regulations, current standards and directives, are capable of carrying out the work described and independently recognising potential hazards.
3. Safety

3.6 Labelling, safety marks

Product label (examples)

Model OLS-C20

![Product label example]

Pin assignment

Model OLS-C04

![Product label example]

Date of manufacture

Symbols

⚠️ 📚 Before mounting and commissioning the instrument, ensure you read the operating instructions!

For further specifications see data sheet LM 31.01 and order documentation.
4. Transport, packaging and storage

4.1 Transport
Check the switch for any damage that may have been caused by transport. Obvious damage must be reported immediately.

4.2 Packaging and storage
Do not remove packaging until just before mounting.

Permissible conditions at the place of storage:
Storage temperature: 0 ... 70 °C

5. Commissioning, operation

When unpacking the switch, check all components for any external damage. Prior to installation, a functional check can also be carried out. For this, the instrument should be connected temporarily and the glass prism dipped in and out of a glass of liquid to test it.

5.1 Mounting

- Before installation, it must be ensured that the mounting hole and the fixing device for the switches in the vessel are correct in size and dimension.

- Mount the switch, pressure-sealed, into the process connection.

- Following installation, the glass tip should have a distance of at least 10 mm to the opposite wall. This minimum clearance can vary dependent upon the geometry and surface finish of the wall. Note: with electropolished pipes, the minimum distance to the opposite surface must be a minimum of 20 mm.
5. Commissioning, operation

Installation instructions

Horizontal installation
- Vessel or pipe wall
- Rubber or metal sealing
- Fitting with sealing face

Vertical installation
- Rubber or metal sealing

Inclined installation
- Fitting with sealing face

Installation in elongated fitting
- Elongated fitting
- Insulation

5.2 Electrical connection

The electrical connection of the switches can be found in the following connection diagrams.
5. Commissioning, operation

Electrical connection diagram

Models OLS-C01, OLS-C02, OLS-C04 and OLS-C05

Model OLS-C20

Model OLS-C29, power supply 230 V

Model OLS-C29, power supply 24 V
Switching delay and blink codes for model OLS-C29

The model OLS-C29 switch features a pre-programmed switching delay of 1 s (optional are other times, up to 12 s), after which time the signal relay's state changes.

This acts to suppress fast changes in the switching status, e.g. with bubbling or wave effects in the tank. The functional check can be carried out in-situ via the built-in LEDs.

Their blink codes are given in the following table.

<table>
<thead>
<tr>
<th>Operating state</th>
<th>LED</th>
<th>Relay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching on</td>
<td>blinks 3 x</td>
<td>deactivated</td>
</tr>
<tr>
<td>Wetted (sensor in the optically denser medium)</td>
<td>goes on 2 x per second</td>
<td>activated</td>
</tr>
<tr>
<td>Dry (sensor in the optically less dense medium)</td>
<td>goes off 2 x per second</td>
<td>deactivated</td>
</tr>
<tr>
<td>Error</td>
<td>blinks 5 x per second</td>
<td>deactivated</td>
</tr>
</tbody>
</table>

6. Faults

The following table contains the most frequent causes of faults and the necessary countermeasures.
# 6. Faults

<table>
<thead>
<tr>
<th>Faults</th>
<th>Causes</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>No function</td>
<td>Failure in power supply</td>
<td>Measure voltage, check cable or plug connection</td>
</tr>
<tr>
<td>Despite a change in level, no alteration in the display and no switching of the output</td>
<td>Glass tip dirty</td>
<td>Clean the glass tip (introduce service intervals)</td>
</tr>
<tr>
<td></td>
<td>Glass tip too close to an opposite surface</td>
<td>Increase the distance, change the mounting location</td>
</tr>
<tr>
<td></td>
<td>Glass tip defective</td>
<td>Exchange the glass tip (model OLS-C29) or return to the manufacturer</td>
</tr>
<tr>
<td>Instrument responds inversely</td>
<td>Wrong switching function (normally open, normally closed)</td>
<td>Replace instrument</td>
</tr>
<tr>
<td></td>
<td>Relay connections inverted (model OLS-C29)</td>
<td>Change relay connections over</td>
</tr>
<tr>
<td>Instrument obviously does not respond or responds too slowly on a level change (model OLS-C29)</td>
<td>Switching delay</td>
<td>Wait for delay time</td>
</tr>
</tbody>
</table>

---

**CAUTION!**

**Physical injuries and damage to property and the environment**

If faults cannot be eliminated by means of the listed measures, the instrument must be taken out of operation immediately.

- Ensure that pressure is no longer present and protect against accidental commissioning.
- Contact the manufacturer.
- If a return is needed, please follow the instructions given in chapter 8.2 “Return”.

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7. Maintenance and cleaning

For contact details, please see chapter 1 “General information” or the back page of the operating instructions.

7.1 Maintenance
The optoelectronic level switches work maintenance-free in normal operation. They must be subjected to visual inspection within the context of regular servicing, however, and included in the tank pressure test.

Repairs must only be carried out by the manufacturer.

7.2 Cleaning

**CAUTION!**
Physical injuries and damage to property and the environment

Improper cleaning may lead to physical injuries and damage to property and the environment. Residual media in the dismounted instrument can result in a risk to personnel, the environment and equipment.

▶ Rinse or clean the removed instrument.
▶ Sufficient precautionary measures must be taken.

1. Prior to cleaning, properly disconnect the instrument from the process and the power supply.
2. Clean the instrument carefully with a moist cloth.
3. Electrical connections must not come into contact with moisture!

**CAUTION!**
Damage to property

Improper cleaning may lead to damage to the instrument!

▶ Do not use any aggressive cleaning agents.
▶ Do not use any pointed and hard objects for cleaning.
8. Dismounting, return and disposal

**WARNING!**

Physical injuries and damage to property and the environment through residual media

Residual media in the dismounted instrument can result in a risk to personnel, the environment and equipment.

- Wash or clean the dismounted instrument, in order to protect personnel and the environment from exposure to residual media.

### 8.1 Dismounting

Only disconnect the measuring instrument once the system has been depressurised and the power disconnected!

If necessary, the measuring line must have strain relief.

### 8.2 Return

Wash or clean the dismounted switch before returning it, in order to protect personnel and the environment from exposure to residual media.

Information on returns can be found under the heading “Service” on our local website.

### 8.3 Disposal

Incorrect disposal can put the environment at risk.

Dispose of instrument components and packaging materials in an environmentally compatible way and in accordance with the country-specific waste disposal regulations.
# 9. Specifications

## General data

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring accuracy</td>
<td>±0.5 mm</td>
</tr>
<tr>
<td>Mounting position</td>
<td>as required</td>
</tr>
<tr>
<td>Visual indication of the switching status</td>
<td>1 LED (not for model OLS-C02)</td>
</tr>
</tbody>
</table>

## Design data

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsiveness</td>
<td>preset</td>
</tr>
<tr>
<td>Medium temperature</td>
<td>Models OLS-C01, OLS-C02: -30 ... +100 °C</td>
</tr>
<tr>
<td></td>
<td>Model OLS-C04: -40 ... +100 °C</td>
</tr>
<tr>
<td></td>
<td>Model OLS-C05: -40 ... +150 °C</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>Models OLS-C01, OLS-C02: -25 ... +70 °C</td>
</tr>
<tr>
<td></td>
<td>Model OLS-C04: -30 ... +70 °C</td>
</tr>
<tr>
<td></td>
<td>Model OLS-C05: -30 ... +80 °C</td>
</tr>
<tr>
<td>Operating pressure</td>
<td>0 … 2.5 MPa (0 … 25 bar)</td>
</tr>
<tr>
<td></td>
<td>Model OLS-C04: 0 … 4 MPa (0 … 40 bar)</td>
</tr>
</tbody>
</table>

## Electrical data

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>DC 12 ... 32 V</td>
</tr>
<tr>
<td>Max. current supply</td>
<td>40 mA</td>
</tr>
<tr>
<td>Output</td>
<td>PNP transistor, protected against reverse polarity</td>
</tr>
<tr>
<td>Switching function</td>
<td>Normally open (closed in medium) or normally closed (open in medium)</td>
</tr>
<tr>
<td>Switching current</td>
<td>200 mA</td>
</tr>
<tr>
<td>Ingress protection</td>
<td>IP 65</td>
</tr>
<tr>
<td>Number of switch points</td>
<td>1</td>
</tr>
</tbody>
</table>
# 9. Specifications

## Model OLS-C20

### General data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring accuracy</td>
<td>±0.5 mm</td>
</tr>
<tr>
<td>Light source</td>
<td>IR light 930 nm</td>
</tr>
<tr>
<td>Ambient light</td>
<td>max. 10,000 Lux</td>
</tr>
<tr>
<td>Mounting position</td>
<td>as required</td>
</tr>
<tr>
<td>Visual indication of the switching status</td>
<td>green LED</td>
</tr>
</tbody>
</table>

### Design data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium temperature</td>
<td>-30 ... +135 °C</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-25 ... +70 °C</td>
</tr>
<tr>
<td>Pressure range</td>
<td>0 ... 50 bar</td>
</tr>
<tr>
<td>Materials</td>
<td></td>
</tr>
<tr>
<td>Sensor housing</td>
<td>Stainless steel 1.4571</td>
</tr>
<tr>
<td>Light guide</td>
<td>Fused quartz</td>
</tr>
<tr>
<td>Packing</td>
<td>Graphite/PTFE</td>
</tr>
<tr>
<td>Case</td>
<td>Stainless steel 1.4301</td>
</tr>
</tbody>
</table>

### Electrical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>DC 24 V, -25 ... +30 %</td>
</tr>
<tr>
<td>Max. current supply</td>
<td>40 mA</td>
</tr>
<tr>
<td>Output</td>
<td>O. C. pnp transistor, short-circuit proof, current, voltage and power limitation</td>
</tr>
<tr>
<td>Switching function</td>
<td>Normally open (closed in medium) or normally closed (open in medium)</td>
</tr>
<tr>
<td>Switching current ((T_u = 70 °C))</td>
<td>0.5 A</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>PVC cable: 3 x 0.14 mm(^2)</td>
</tr>
<tr>
<td></td>
<td>Connector: 4-pin series 712, M12</td>
</tr>
<tr>
<td>Ingress protection</td>
<td>With connector: IP 65</td>
</tr>
<tr>
<td></td>
<td>With cable: IP 66</td>
</tr>
</tbody>
</table>
## 9. Specifications

### Model OLS-C29

#### General data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring accuracy</td>
<td>±0.5 mm</td>
</tr>
<tr>
<td>Material</td>
<td></td>
</tr>
<tr>
<td>■ Electronic case</td>
<td>PA66, glass-fibre reinforced</td>
</tr>
<tr>
<td>■ Process connection</td>
<td>Steel, nickel-plated</td>
</tr>
<tr>
<td>■ Prism</td>
<td>Borosilicate glass</td>
</tr>
<tr>
<td>Mounting of the case to the process connection</td>
<td>Union nut</td>
</tr>
<tr>
<td>Light source</td>
<td>IR light 930 nm</td>
</tr>
<tr>
<td>Ambient light</td>
<td>max. 500 Lux</td>
</tr>
</tbody>
</table>

#### Design data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium temperature</td>
<td>-30 ... +120 °C</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-30 ... +60 °C</td>
</tr>
<tr>
<td>Max. operating pressure</td>
<td>42 bar</td>
</tr>
<tr>
<td>Mounting position</td>
<td>horizontal</td>
</tr>
<tr>
<td>Visual indication of the switching status</td>
<td>red LED</td>
</tr>
<tr>
<td>Switching delay (factory set, fixed)</td>
<td>approx. 1 s, others up to 12 s on request</td>
</tr>
</tbody>
</table>

#### Electrical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>AC 110 ... 230 V ±15 % or DC 24 V ±15 %</td>
</tr>
<tr>
<td>Current supply max.</td>
<td>approx. 22 mA</td>
</tr>
<tr>
<td>Output relay</td>
<td>Change-over contact</td>
</tr>
<tr>
<td>Switching voltage, current, power</td>
<td>AC 250 V, NC = 5 A, NO = 7 A, 1,750 VA</td>
</tr>
<tr>
<td>Connection cable</td>
<td>5 x 0.75 mm², L = 2 m, colour-coded</td>
</tr>
<tr>
<td>Mech. service life</td>
<td>approx. 10⁵ switching cycles</td>
</tr>
<tr>
<td>Ingress protection</td>
<td>IP 54</td>
</tr>
</tbody>
</table>
9. Specifications

For further specifications see WIKA data sheets
LM 31.31 (OLS-C01),
LM 31.32 (OLS-C02),
LM 31.33 (OLS-C05),
LM 31.34 (OLS-C04),
LM 31.02 (OLS-C20) or
LM 31.03 (OLS-C29) and order documentation.
Appendix 1: EC declaration of conformity

EG-Konformitätserklärung
EC Declaration of Conformity

Dokument Nr.: 14127342.01
Document No.

Wir erklären in alleiniger Verantwortung, dass die mit CE gekennzeichneten Produkte
We declare under our sole responsibility that the CE marked products

Typenbezeichnung: OLS-C01, OLS-C02, OLS-C04, OLS-C05
Type Designation:

Beschreibung: Optoelektronischer Füllstandsschalter
Description: Optoelectronic Level Switch

gemäß gültigem Datenblatt:
according to the valid data sheet:


Harmonisierte Normen:
Harmonized standards:

2004/108/EG Elektromagnetische Verträglichkeit
2004/108/EC Electromagnetic Compatibility

2004/108/EG EN 61326-1:2013

Unterzeichnet für und im Namen von / Signed for and on behalf of
WIKA Alexander Wiegand SE & Co. KG
Klingenberg, 2015-04-14

Rene Rode
Factory Manager IN-OP-TE

Bielecka Agnieszka
Dr. Agnieszka Bielecka,
Head of Quality Management IN-OP-TE
Appendix 1: EC declaration of conformity

EG-Konformitätserklärung
EC Declaration of Conformity

Dokument Nr.: 14127342.01
Document No.: 

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We declare under our sole responsibility that the CE marked products

Typenbezeichnung: OLS-C01, OLS-C02, OLS-C04, OLS-C05
Type Designation: 

Beschreibung: Optoelektronischer Füllstandsschalter
Description: OptoelectronicLevel Switch

according to the valid data sheet: 

die grundlegenden Schutzanforderungen der folgenden Richtlinien erfüllen: 2004/108/EG Elektromagnetische Verträglichkeit
comply with the essential protection requirements of the directives: 2004/108/EC Electromagnetic Compatibility

Harmonisierte Normen:
Harmonized standards:
EN 61326-1:2013
EN 61326-2-3:2013

Unterzeichnet für und im Namen von / Signed for and on behalf of

WIIKA Alexander Wiegand SE & Co. KG

Klingenberga, 2015-04-14

Rene Rode
Factory Manager IN-OP-TE

Dr. Agnieska Bielecka,
Head of Quality Management IN-OP-TE
Appendix 3: EC declaration of conformity

EG – Konformitätserklärung
EC Declaration of Conformity
Déclaration de Conformité CE

Wir / We / Nous,

KSR KUEBLER NIVEAU-MESSTECHNIK AG
Heinrich-Kuebler-Platz 1
69439 Zwingenberge / Germany

erklären hiermit, dass das nachfolgende Produkt / hereby declare, that the following product / certifions, par la présente, que le produit suivant

OLS-C29
KSR-OPTO.0029

Beschreibung: Optoelektronischer Füllstandsschalter ; Gemäß gültigem Datenblatt: OLS-C29
Description: Optoelectronic level switch ; According to the actual datasheet: OLS-C29
Description: Capteur de niveau optoélectronique ; Selon la fiche technique actuelle: OLS-C29


Zur Beurteilung wurden folgende harmonisierte Normen angewandt: / To assess compliance the following harmonized standards were applied: / Pour évaluer la conformité, les normes harmonisées suivantes ont été appliquées:


\(^1\) Emission (Gruppe 1, Klasse A) und Störfestigkeit (industrieller Bereich) / Emission (group 1, class A) and immunity (industrial application) / D’émission (Groupe 1, Classe A) et immunitaires (industriel)

Zwingenberge, 22.10.2014

Thomas Gering
Vorstand / CEO / Président