PKP Prozessmesstechnik GmbH

Borsigstraße 24

D-65205 Wiesbaden-Nordenstadt

Tel.: ++49-(0)6122-7055-0

Fax: ++49-(0)6122-7055-50

Email: info@pkp.de

Instruction Manual

FOS01

Optoelectronic Levelswitch

Table of Contents

1. General information

- The mini limit switch described in the operating instructions has been 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.
- These operating instructions contain important information on handling the mini limit switch. 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 mini limit switch's range of use.
- The operating instructions are part of the instrument and must be kept in the immediate vicinity of the mini limit switch and readily accessible to skilled personnel at any time.
- Skilled personnel must have carefully read and understood the operating instructions, prior to beginning any work.
- The manufacturer's liability is void in the case of any damage caused by using the product contrary to its intended use, non-compliance with these operating instructions, assignment of insufficiently qualified skilled personnel or unauthorised modifications to the mini limit switch.
- The general terms and conditions contained in the sales documentation, shall apply.
- Subject to technical modifications.
- Further information:

- Internet address:	www.pkp.de	
- Application concultant:	Tel.:	(+49) 6122 – 70 55 0
	Fax:	(+49) 6122 – 70 55 50
	E-Mail:	info@pkp.de

Explanation of symbols

WARNING!

... indicates a potentially dangerous situation, which can result in serious injury or death, if not avoided.

CAUTION!

... indicates a potentially dangerous situation, which can result in light injuries or damage to equipment or the environment, if not avoided.

Information

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

DANGER!

...identifies hazards caused by electric power. Should the safety instructions not be observed, there is a risk of serious or fatal injury.

WARNING!

... indicates a potentially dangerous situation that can result in burns, caused by hot surfaces or liquids, if not avoided.

2. Safety

WARNING!

Before installation, commissioning and operation, ensure that the appropriate instrument has been selected in terms of measuring range, design and specific measuring conditions.
Non-observance can result in serious injury and/or damage to equipment.

Further important safety instructions can be found in the individual chapters of these operating instructions.

2.1 Intended use

This instrument is designed to detect limit levels of liquids. The values given in chapter "3. Specifications" must not be exceeded. The mini limit switch is not suitable for milky, turbid, outgassing, sticky and crystallising media.

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

The technical specifications contained in these operating instructions must be observed. Improper handling or operation of the mini limit switch outside of its technical specifications requires the instrument to be shut down immediately.

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

2.2 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.
- Keep unqualified personnel away from hazardous areas.

Skilled personnel

Skilled personnel 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.

Special operating conditions require further appropriate knowledge, e.g. of aggressive media.

2.3 Special hazards

WARNING!

For hazardous media such as oxygen, acetylene, flammable or toxic gases or liquids, and refrigeration plants, compressors, etc., in addition to all standard regulations, the appropriate existing codes or regulations must also be followed.

WARNING!

To ensure safe working on the instrument, the operating company must ensure

- that suitable first-aid equipment is available and aid is provided whenever required.
- that the operating personnel are regularly instructed in all topics regarding work safety, first aid and environmental protection and knows the operating instructions and, in particular, the safety instructions contained therein.

DANGER!

Danger of death caused by electric current

Upon contact with live parts, there is a direct danger of death.

- Electrical instruments may only be installed and mounted by skilled electrical personnel.
- Operation using a defective power supply unit (e.g. short circuit from the mains voltage to the output voltage) may result in life-threatening voltages on the instrument!

WARNING!

Residual media in dismounted instruments may result in a risk to people, the environment and the system. Take sufficient precautionary measures.

Do not use this instrument in safety or Emergency Stop devices. Incorrect use of the instrument can result in injury.

Should a failure occur, aggressive media with extremely high temperature and under high pressure or vacuum may be present at the instrument.

CE, Communauté Européenne

Instruments bearing this mark comply with the relevant European directives.

3. Specifications

General Data

Measuring accuracy	±0.5 mm
Ambient light	max. 10,000 Lux (immersed)
Mounting position	any
Weight	0.15 kg

Design Data

Medium temperature	-30 ... +140 °C
Ambient temperature	-25 ... +70 °C
Working pressure	0 ... 5 MPa (0 ... 50 bar)
Measuring length	see drawing on page 9
Process connection	G ½ A, M16 x 1.5, ½ NPT etc. see drawings
Materials	
■ Sensor	Stainless steel 1.4571
■ Tip	Quartz
■ Electronics housing	Stainless steel 1.4301

Electrical Data

Supply voltage	DC 24 V -25 ... +30 %
Supply current max.	40 mA
Power consumption	1 W
Output	
■ Voltage	DC 24 V
■ Current	0.5 A at Tu 70 °C
■ other	short-circuit protection, reverse voltage protection, current, voltage and power limitation
Switching current (Tu = 70 °C)	0.5 A
Electrical connection	■ PVC cable 3 x 0.14 mm² ■ Plug 4-pole series 713, M12
Ingress protection	
■ With plug	IP 65 per EN 60 529
■ With cable	IP 66 per EN 60 529

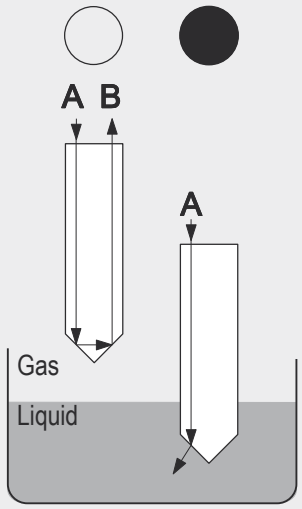
4. Design and function

4.1 Description

This instrument is designed to detect limit levels of liquids. For this purpose the sensor is equipped with a V-shaped glass-tip. The model is also ideally suited for level control, particularly in applications requiring high precision. The measurement principle is independent of the colour, refractive index, density, conductance and dielectric constant of the liquid.

Integrated electronics include limit sensing and self-calibration. The output is an open-collector pnp-transistor.

Principle of operation

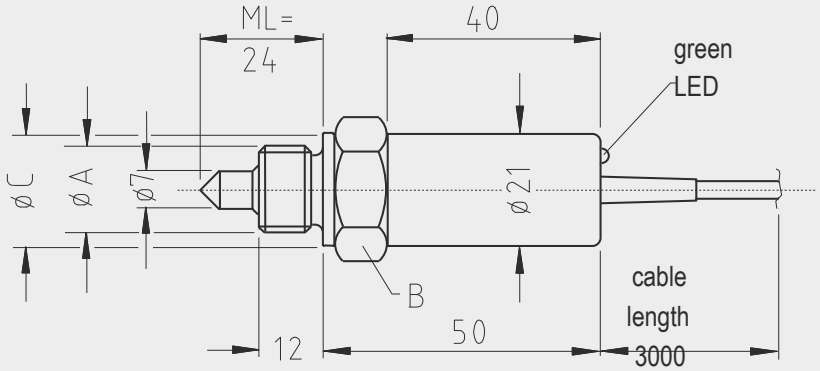


4.2 Instrument design

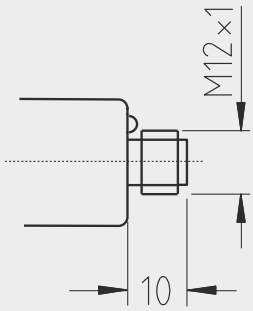
The sensor is a one-piece device consisting of a mechanical connection which depends on the type of sensor, and integrated electronics built into a stainless steel housing. The measuring length, ML, to the sealing face is always 24 mm.

Dimensions in mm

Model with cable connection



Plug connection



Selectable process connections

Process connection Ø A	Spanner width B	Sealing face Ø C
M16 x 1.5	SW24	Ø 21
G ½ A	SW30	Ø 26
½ NPT	SW24	-

4.3 Scope of delivery

Cross-check scope of delivery with delivery note.

5. Transport, packaging and storage

5.1 Transport

Check instrument for any damage that may have been caused by transport.

Obvious damage must be reported immediately.

5.2 Packaging

Do not remove packaging until just before mounting.

Keep the packaging as it will provide optimum protection during transport (e.g. change in installation site, sending for repair).

5.3 Storage

Permissible conditions at the place of storage:

- Storage temperature: -25 ... +70 °C
- Humidity: 35 ... 85 % relative humidity (no condensation)

Avoidance of exposure to the following factors:

- Proximity to hot objects
- Mechanical vibration, mechanical shock (putting it down hard)
- Soot, vapour, dust and corrosive gases
- Potentially explosive environments, flammable atmospheres

Store the instrument in its original packaging in a location that fulfills the conditions listed above. If the original packaging is not available, package and store the instrument as described below:

1. Wrap the instrument in an antistatic plastic film.
2. Place the instrument, along with shock-absorbent material, in the packaging.
3. If stored for a prolonged period of time (more than 30 days), place a bag, containing a desiccant, inside the packaging.

WARNING!

Before storing the instrument (following operation), remove any residual media. This is of particular importance if the medium is hazardous to health, e.g. caustic, toxic, carcinogenic, radioactive, etc.

6. Commissioning, operation

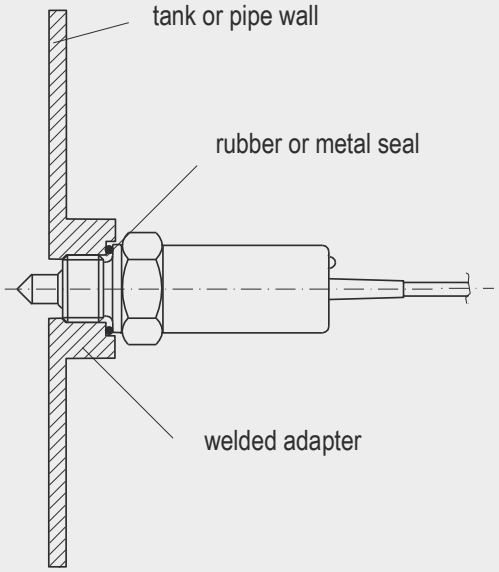
When unpacking the mini limit switch check all items for external damage. A functional test may be carried out prior to the installation. To do this, the device should be temporarily connected and the sensor-tip immersed in and then withdrawn from a glass of water.

WARNING!

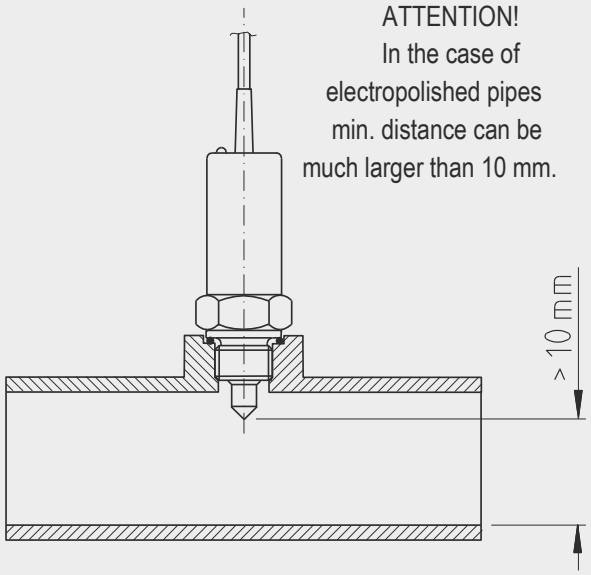
The electrical connection must only be carried out by qualified skilled personnel. Observe the relevant VDE regulations.

6.1. Installation instructions

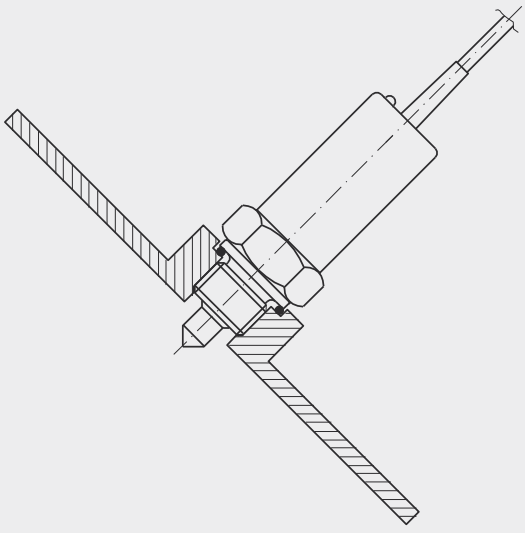
horizontal installation



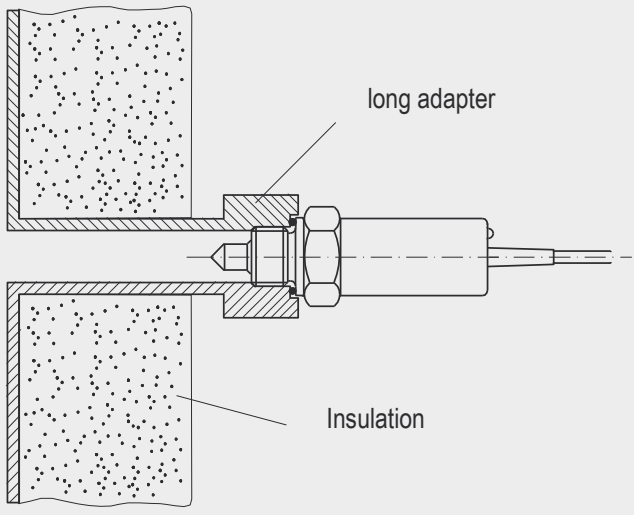
vertical installation



inclined installation



high-temperature medium



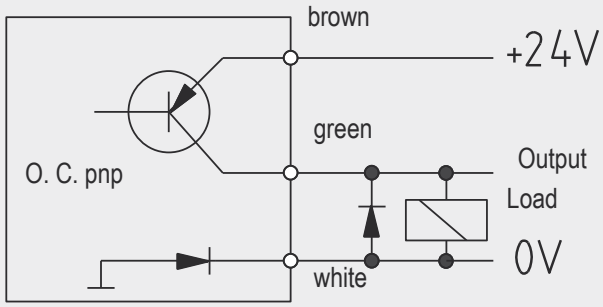
6.2 Mechanical installation of the Mini Limit Switch

Mount the mini limit switch, pressure tight, into the process connection. The distance between sensor-tip and opposite surface of the pipe should be greater than 10 mm. If the pipe is electropolished, the distance should be increased accordingly.

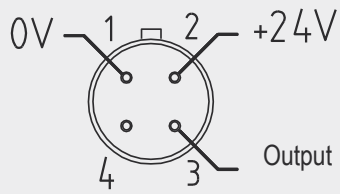
6.3. Electrical connection of the mini limit switch

The sensor must be connected as shown in the connection diagram.

Electrical connection diagram



Connector assignment



Switching direction

The switching direction is factory set:

Model	Function	Condition	LED	Output transistor	Ext. relay
SE	Normally open	immersed	on	switch on	connect
SE	Normally open	not immersed	off	switch off	disconnect
SA	Normally closed	immersed	off	switch off	disconnect
SA	Normally closed	not immersed	on	switch on	connect

7. Maintenance and cleaning

7.1 Maintenance

As a rule, the Mini Limit Switch is maintenance-free.

If the plant is subject to heavy contamination or scale, it is advisable to set up periodic maintenance. This depends on the optical condition of the glass tip and the switch operation.

Repairs must only be carried out by the manufacturer.

7.2 Cleaning

CAUTION!

- Before cleaning, correctly disconnect the instrument from the pressure supply, switch it off and disconnect it from the mains.
- Clean the instrument with a moist cloth.
- Electrical connections must not come into contact with moisture.
- Wash or clean the dismounted instrument before returning it, in order to protect staff and the environment from exposure to residual media.
- Residual media in dismounted instruments can result in a risk to persons, the environment and equipment. Take sufficient precautionary measures.

For information on returning the instrument see chapter "10.2 Return".

8. Faults

Faults	Possible causes	Measures
No function	No power supply	Measure power supply, check connection to cable or plug
No function in spite of liquid level change	Contamination or scale on the glass-tip	Clean glass-tip (set up periodic maintenance)
Sensor works to reverse logic	SA instead of SE or SE instead of SA specified	Change sensor

CAUTION!

If faults cannot be eliminated by means of the measures listed above, the instrument must be shut down immediately, and it must be ensured that pressure and/or signal are no longer present, and it must be prevented from being inadvertently put back into service.

In this case, contact the manufacturer.

If a return is needed, please follow the instructions given in chapter "10.2 Return".

9. Warranty

The warranty period is 24 months.

Under the condition that this Mini Limit Switch has been handled and operated in accordance with these operating instructions. For consumable and spare parts the warranty is restricted to faults in material or construction.

10. Dismounting, return and disposal

WARNING!
Residual media in dismounted instruments can result in a risk to persons, the environment and equipment. Take sufficient precautionary measures.

10.1 Dismounting

WARNING!
Risk of burns!
Let the instrument cool down sufficiently before dismounting it!
When dismounting it, there is a risk that dangerously hot pressure media may escape.

Only disconnect the mini limit switch once the system has been depressurised!

10.2 Return

WARNING!
Absolutely observe when shipping the instrument:
All instruments delivered to PKP Prozessmesstechnik GmbH must be free from any kind of hazardous substances (acids, bases, solutions, etc.).

When returning the instrument, use the original packaging or a suitable transport package.

To avoid damage:

1. Wrap the instrument in an antistatic plastic film.
2. Place the instrument, along with the shock-absorbent material, in the packaging.
   Place shock-absorbent material evenly on all sides of the shipping box.
3. If possible, place a bag, containing a desiccant, inside the packaging.
4. Label the shipment as transport of a highly sensitive measuring instrument.

10.3 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.

FOS01

Optoelectronic Level Switch

- for liquids
- small and compact, no mechanics
- easy installation
- switching status indication by LED
- low maintenance
- max. pressure: 50 bar
- max. temperature: 135 °C

Description:

An optical sensor is mounted in a robust stainless steel housing. It consists of a quartz glass tip with an infrared diode as transmitter and a light-sensitive semiconductor as receiver. If no liquid wets the sensor tip, the infrared light is completely reflected from the inside of the quartz glass.
However, as soon as it is immersed in the medium, a large part of the transmitted light can be escape into the liquid. This is registered by the receiver, which then initiates a switching process at the PNP transistor output of the device, which is indicated directly by a green LED.

Typical applications:

The field of application for optoelectronic level indicators is the detection of limit values in a large number of liquids. The advantage here is that the measurement method is largely independent of physical variables such as refractive index, color, density, dielectric constant or conductivity. The very compact design guarantees minimal space requirements, making measurement in very small volumes possible. The arbitrary mounting position as well as the high pressure and temperature ranges offer a wide range of applications.

PKP Prozessmesstechnik GmbH
Borsigstr. 24 • D-65205 Wiesbaden
+49 (0) 6122-7055-0 • +49 (0) 6122 7055-50
info@pkp.de • www.pkp.de

Models:

FOS01 Optoelectronic level switch

Process connection:
G 1/2 A threaded connection (standard)
optional: M16 x 1,5 and 1/2" NPT

Electrical connection:
3 m PVC cable (standard)
optional: plug connection Binder 713 available.

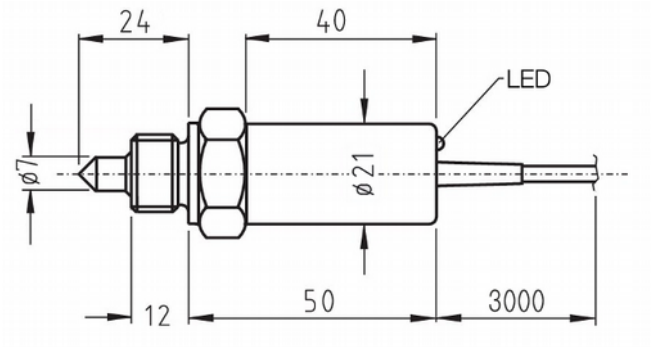
Output:
The factory setting of the switch is either immersion or submersible.

Sensor housing material:
The switch housing material is always stainless steel 1.4301, the sensor housing is optionally available in various stainless steels.

Technical Data:

Max. pressure:	0 to 50 bar
Max. media temp.:	–30 °C to +135 °C
Max. ambient temp.:	–25 °C to +70 °C
Switch housings:	stainless steel 1.4301
Sensor housings:	stainless steel 1.4301, 1.4541 or 1.4571
Light conductor:	quartz glass
Gasket:	graphite / PTFE
Switch status display:	green LED
Weight:	0,10 kg to 0,15 kg
Precision:	± 0,5 mm
Light source:	IR light 930 nm
Ambient light:	max. 10.000 Lux
Min. distance to an opposite surface:	>10 mm > 20 mm if electropolished
Mounting position:	any

Dimensions:



Order Code:

Order number:	FOS01.	3.	2.	1.	1.	0

Optoelectronic level switch

Process connection:
1 = M16 x 1,5
2 = 1/2" NPT (with cable connection only)
3 = G 1/2 A (standard)

Electrical connection:
1 = 3 m cable PVC
2 = round plug M12x1

Output:
1 = immersion switching (N/O with rising level)
2 = submerging switching

Sensor housing material:
1 = stainless steel 1.4571

Options:
0 = without
9 = please specify in plain text

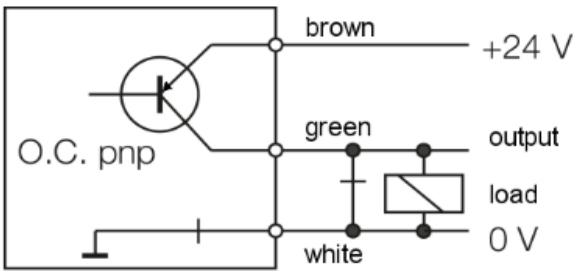
Accessory:

SM12: M12 connector plug with PVC- cable

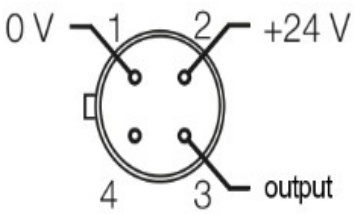
Electrical Data:

Power supply:	24 VDC ± 30 %
Current consumption:	max. 40 mA
Output:	PNP open collector, short-circuit-proof, current, voltage and power limitation
Switching current:	(Tu = 70 °C): 0,5 A
Connection:	PVC cable 3 x 0,14 mm² or plug 4-pole acc. to DIN 41524
Protection class:	IP 66 acc. to EN 60529 with cable, IP 65 acc. to EN 60529 with plug

Electrical Connection:



Pin assignment:



Level

PKP Prozessmesstechnik GmbH
Borsigstr. 24 • D-65205 Wiesbaden
+49 (0) 6122-7055-0 • +49 (0) 6122 7055-50
info@pkp.de • www.pkp.de