Instruction Manual

FB06

Bypass - Level Indicator

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1. General information

- The bypass level indicators 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.
- 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.pkp.de
  - Relevant data sheet: FB06

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2. Design and function

2.1 Description

The bypass level indicators work according to the principle of communicating vessels. The bypass vessel contains a float with a built-in permanent magnet. This changes its position depending on the level of the medium. Magnetic indicators, switches and level sensors are mounted to the outside of the bypass tube and actuated by the magnetic field. Measurement of the level by guided wave radar is also possible.
The fitting of these options is carried out according to customer specifiactions in the factory. The principle structure is described in chapter 5.3 “Commissioning”. Customer-specific versions are manufactured to order.

2.2 Scope of delivery

Cross-check scope of delivery with delivery note.

3. Safety

3.1 Explanation of symbols

DANGER!
... indicates a directly dangerous situation resulting in serious injury or death, if not avoided.

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

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3. Safety

CAUTION!
... indicates a potentially dangerous situation that can result in light injuries or damage to property or the environment, if not avoided.

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

3.2 Intended use

The bypass level indicator serves for continuously measuring the level of liquids in vessels.

The scope of application is defined by the technical performance limits and materials.

- 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 bypass level indicator are sufficiently resistant to the medium being monitored. Not suitable for dispersions, abrasive liquids, highly viscous media and colours.
- This instrument is not permitted to be used in hazardous areas! For these areas, bypass level indicators with approval (e.g. in accordance with ATEX) are required.
- The operating conditions specified in the operating instructions must be observed.
- Do not operate the instrument in the direct vicinity of ferromagnetic environments (min. distance 50 mm).

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3. Safety

- Do not operate the instrument 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 bypass level indicators 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.

DANGER!
Work on containers involves the danger of intoxication and suffocation. No work is allowed to be carried out unless by taking suitable personal protective measures (e.g. respiratory protection apparatus, protective outfit etc.).

3.3 Improper use

Improper use is defined as any application that exceeds the technical performance limits or is not compatible with the materials.

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 the following:

- 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.
- The operating personnel have read the operating instructions and taken note of the safety instructions contained therein.
- The intended use for the application is complied with.
- Following testing, improper use of the instrument is excluded.

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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.

3.6 Personal protective equipment

The personal protective equipment is designed to protect the skilled personnel from hazards that could impair their safety or health during work. When carrying out the various tasks on and with the instrument, the skilled personnel must wear personal protective equipment.

Follow the instructions displayed in the work area regarding personal protective equipment!

The requisite personal protective equipment must be provided by the operating company.

4. Transport, packaging and storage

4.1 Transport

Check the bypass level indicator 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 commissioning.

5. Commissioning, operation

- Observe all instructions given on the shipment packaging for removing the transportation safety devices.
- Remove the bypass level indicator carefully from the packaging!
- When unpacking, check all components for any external damage.

5.1 Mounting preparation

- Detach the float attached to the bypass level indicator from the bypass chamber and remove the transport sleeve.
- Remove the protection caps of the process connections.
- Ensure that the sealing faces of the vessel or bypass level indicator are clean and do not show any mechanical damage.
- Check the connection dimensions (centre-to-centre distance) and the alignment of the process connections on the vessel.

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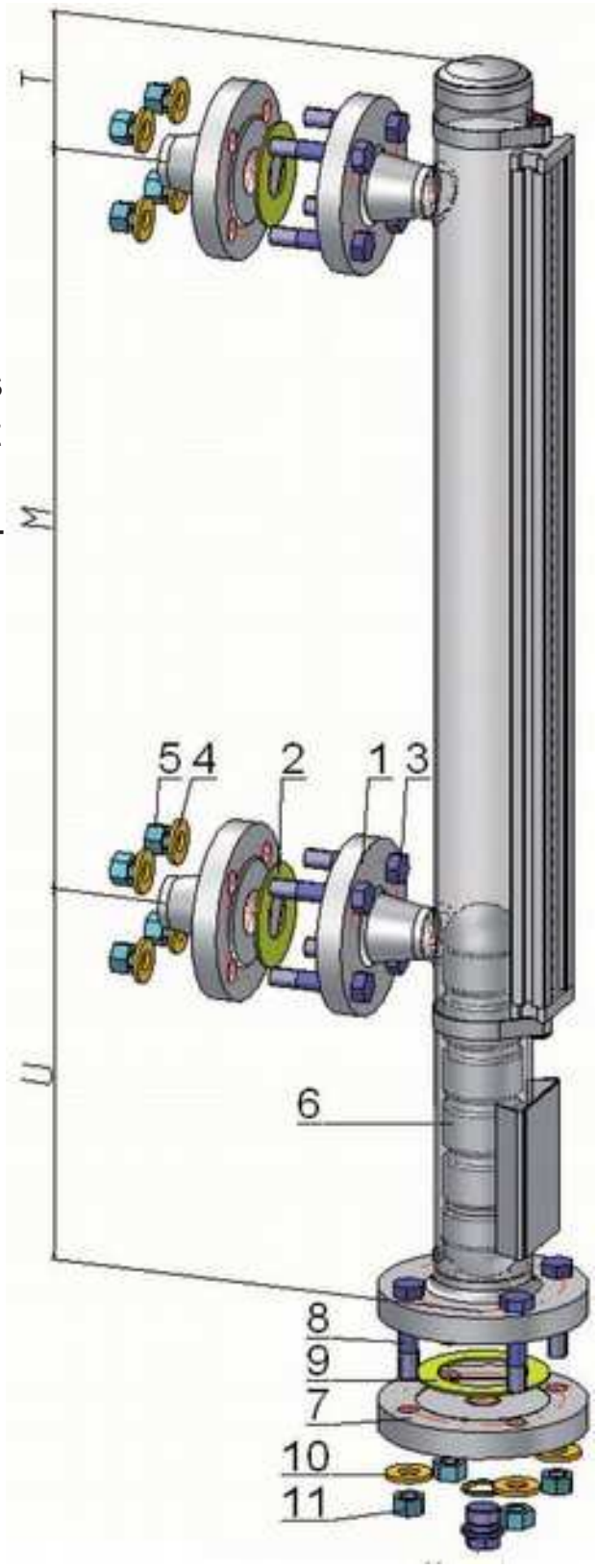
Initialisation of magnetic display and magnetic switch

Slowly move the enclosed float from bottom to top on the magnetic display and then back down again.
Align additionally mounted magnetic switches on the basis of the same principle. For bypass level indicators with insulation and magnetic displays with Plexiglass attachments, the float must be moved up and down inside the tube.
For magnetic displays with purge gas connections, these connections must have an airtight seal. Please refer in this case to the mounting and operating instructions for magnetic displays with purge gas connections as well.

5.2 Mounting

- Observe the torque values of screws specified in pipefitting work.
- Install the bypass level indicator without tension.
- In the selection of the mounting material (sealings, screws, washers and nuts), take the process conditions into account. The suitability of the sealing must be specified with regard to the medium and its vapours.



T = upper projection
M = centre-to-centre distance
U = lower projection

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In addition, ensure it has corresponding corrosion resistance.
The bypass level indicator is mounted in a vertical position on the vessel to be monitored using the **process connections (1)** provided. **Seals (2)**, **screws (3)**, **washers (4)** and **nuts (5)** suitable for the process connection must be used for mounting. If necessary, shut-off valves must be mounted between the vessel and the bypass.

Installing the float

- Clean the float of anything stuck on it in the area of the float magnet system
- Remove the **bottom flange (7)** and insert the **float (6)** into the tube from the bottom (the marking “top” or a legible model code marks the top side of the float)
- Place the **seal (9)** onto the bottom flange. Replace the bottom flange and fix it in place using the **screws (8)**

5.3 Commissioning

If the bypass level indicator is fitted with shut-off valves between process connections and tank, proceed as follows:

- Close drain and vent fittings on the bypass level indicator
- Slowly open the shut-off valve at the upper process connection
- Slowly open the shut-off valve at the lower process connection
  As liquid flows into the bypass chamber, the float rises to the top. The magnetic system turns the elements of the magnetic display from “light” to “dark”. The current filling level is shown after liquid equalisation between the vessel and the bypass level indicator.
- **Always observe the mounting and operating instructions of accessories before putting them into operation**

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5. Commissioning, operation

Bypass level indicator with heating jacket
In this version, the bypass tube is surrounded by a second tube. Heated liquid or vapour (heat carrier) can flow through this interspace via two connections. The materials used must be designed for these conditions.

WARNING!
The heating jacket of the bypass level indicators may only be used according to the specified maximum values for pressure and temperature.

Attachment of accessories to the bypass level indicator

For the mounting of accessories the relevant maximum values for the instrument must be considered.
The applicable laws and directives for the assembly and the planned purpose of application must be observed.

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6. Faults

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

Faults	Causes	Measures
Bypass level indicator cannot be fitted at the planned place on the vessel	The thread sizes or flange sizes for the bypass level indicator do not match	Modification of the vessel
		Return to the factory
	Thread on the screwed coupling on the vessel is faulty	Rework the thread or replace the screwed coupling
	Mounting thread on the bypass level indicator is faulty	Return to the factory
	Centre-to-centre distance of the vessel does not correlate with the bypass level indicator	Modification of the vessel
		Return to the factory
	Process connections are not attached parallel to one another	Modification of the vessel

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 there is no longer any pressure present and protect against being put into operation accidentally.
- ▶ 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

7.1 Maintenance

When used properly, bypass level indicators work maintenance-free. They must be subjected to visual inspection within the context of regular maintenance, however, and included in the tank pressure test.

DANGER!
Work on containers involves the danger of intoxication and suffocation. No work is allowed to be carried out unless by taking suitable personal protective measures (e.g. respiratory protection apparatus, protective outfit etc.).

Repairs must only be carried out by the manufacturer.

Perfect functioning of the bypass level indicator can only be guaranteed when original accessories and spare parts are used.

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 persons, 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!

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7. Maintenance and cleaning

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.

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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 persons, the environment and equipment.

- ▶ Wash or clean the dismounted instrument, in order to protect persons 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!

8.2 Return

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

Please send us the detailed information about the reason of return to following address:

PKP Prozessmesstechnik
Service
D-65205 Wiesbaden-Nordenstadt
Germany

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.

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9. Specifications

Bypass level indicator	Material	Max. pressure in bar	Max. temperature in °C
Compact version	Stainless steel 1.4571 (316Ti)	40	-196 ... +150
Standard version	Stainless steel 1.4571 (316Ti), 1.4404 (316L), 1.4401/1.4404 (316/316L)	64	-196 ... +450
High-pressure version	Stainless steel 1.4571 (316Ti), 1.4404 (316L)	400	-196 ... +450
Plastic version	PP, PVDF	6	-10 ... +100
DUPlus version standard	Stainless steel 1.4571 (316Ti), 1.4404 (316L), 1.4401/1.4404 (316/316L)	64	-196 ... +450
DUPlus version, high pressure	Stainless steel 1.4571 (316Ti), 1.4404 (316L), 1.4401/1.4404 (316/316L)	160	-196 ... +450
Liquid gas/ KOPlus version	Stainless steel 1.4571 (316Ti), 1.4404 (316L)	25	-60 ... +300
Special materials	Stainless steel 6Mo 1.4547 (UNS S31254)	250	-196 ... +450
	Stainless steel 1.4571 (316Ti) with internal coating E-CTFE, ETFE or PTFE	16	depending on the medium
	Titanium 3.7035	64	-196 ... +450
	Hastelloy C276 (2.4819)	160	-196 ... +450
Heating jacket version	Stainless steel 1.4571 (316Ti), 1.4404 (316L)	64	-60 ... +450

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10. Magnetic Switch

Functional description
Bypass magnetic switches are non-contact switches. They are mainly made of a switch housing with a built-in reed contact, proximity switch or rotational switch. They are triggered by the magnetic field of a permanent magnet.

The Bypass magnetic switches are used to provide a switching function at a pre-determined level in connection with PKP bypass level indicators of type BNA or comparable products. For this, one or several switches can be mounted on the level indicator

Note:
Magnetic Switches and bypass level indicators with built-in float are designed for each other and ensure reliable functioning and trouble-free operation.
When mounting on level indicators of other manufacturers, malfunctions can occur due to a different arrangement of the magnetic fields.

Scope of delivery
Compare the contents of the delivery with the delivery certificate.

Proper intended use

The Bypass magnetic switches are solely intended for monitoring the liquid level of fluids. The area of use is based on the technical performance limits and materials.

- The fluids must not be contaminated nor contain coarse particles nor tend to crystallize. It must be ensured that the magnetic switch materials that come into contact with the media are sufficiently resistant to the monitored medium. Not suitable for dispersion, abrasive fluids, highly viscous media and paints.
- Compliance with the usage conditions specified in the operating instructions is required.
- Do not operate the unit in direct proximity of ferro-magnetic environments (distance min. 50mm).

- Do not operate the unit in direct proximity of strong electromagnetic fields or in direct proximity of facilities that can be impacted by magnetic fields (distance min. 1m).
- The magnetic switches may not be subjected to strong mechanical stresses (impact, bending, vibrations). The unit is exclusively designed and constructed for the intended use described here and may only be used accordingly.
- The switching points of the magnetic switch cannot be adjusted.
- These instructions are intended for technicians who execute the installation and calibration.
- Compliance with the relevant safety regulations for the use is required.
- Compliance with the technical specifications in these operating instructions is required. Improper use or operation of the unit outside the technical specifications requires immediate shut-down and inspection by an authorized PKP service technician.

Claims of any kind due to improper use are excluded.

DANGER!
When working on containers, there is a risk of poisoning or suffocation. Work may only be performed using suitable personal safety equipment (e.g. respiratory protection, protective clothing, etc.).

Improper use
Any use that exceeds the technical performance thresholds or that is incompatible with the materials is considered improper use.

WARNING!
Injury due to improper use
Improper use of the unit can result in hazardous situations and injuries.

- Do not modify the unit without authorization
- Do not use the unit in potentially explosive areas.

Commissioning, operation

Comply with all of the instructions on the packaging pertaining to removing the transport locks.

Remove the magnetic switch from the packaging carefully!

When unpacking, check all parts for external damage.

Functional test before assembly:

The functional test is carried out to determine the proper functioning of the switching contacts. You should disconnect the power connection between the control and the switch before the test. You can determine the switching condition e.g. with a continuity tester. You can carry out the functional test by actuating the contact with a permanent magnet with a radial magnetic field in the switching area. For this, you should move the magnet alongside the Magnetic Switch from the bottom towards the top. When doing so, the contact should switch over. Afterwards, you should move the magnet again from the top towards the bottom. The contact is falling back into its initial position. Instead of the magnet, you can also use the built-in float of the bypass level indicator

During the functional test, unintentional processes can be triggered off in the downstream control. Risk of physical injuries and property damage. Competent technical staff only should connect and disconnect power lines. Do not operate Magnetic Switches in the immediate proximity of powerful electromagnetic fields (distance should be at least 1m).
Do not expose Magnetic Switches to strong mechanical loads.

Mounting preparations

- Ensure the sealing surface of the container or the switch is clean and has no mechanical damage.

Mounting of Bypbass magentic switch

Before mounting in an aggressive environment, you should ensure that the Magnetic Switch's case is resistant to it accordingly. When choosing the place for mounting, you should take into account the system of protection of the used switch.
Magnetic Switches, which have been supplied together with PKP bypass level indicators, are pre-assembled already and should just be adjusted to the desired switching height only.

Mounting occurs on magnetic roller indicator on bypass level indicator or directly with tightening straps.

Type	Description (Switch, housing)	Attachment with T-slot	Attachment with tightening straps
KA	Reed, aluminium case, cable outlet	X	X
KB	Reed, aluminium connection housing, cable gland	X	X
KC	Reed, aluminium case, connector M12	X	
KD	Reed, stainless steel case, cable outlet		X
KE	Reed, high temperature, aluminium case, cable gland	X	X

Mounting the Magnetic Switch on magnetic indicator

The Magnetic Switches will be mounted on the magnetic roller level indicator of the bypass level indicator by means of t-slot stones.

1. Unscrew the fastening screws at the Magnetic Switch with a hexagon socket screw key WAF 3mm by about one turn.
2. Insert the t-slot block(s) into the slot of the magnetic roller indicator from top or bottom.
3. Shift the Magnetic Switch to the level of the desired switching point and fasten it by tightening the screws (the switching point is marked).

The Magnetic Switches can be mounted on both sides of the magnetic roller level indicators optionally. For this, you should mount the t-slot block on the switch's opposite side. The assembly at works is done on the by-pass level indicator's right side.

When mounting several Magnetic Switches on the bypass level indicator, we recommend mounting them on both sides of the magnetic roller indicator alternately. Thus, it is ensured that any desired switching height can be adjusted.

Attention!

The Magnetic Switch KB is designed to be mounted on the right side of the magnetic roller indicator. When mounted on the left side, the switching function is reversed. The switch should be mounted upside down (the name plate is turned upside down).

Mounting of Magnetic Switch with tightening straps

1. Open the fixing band by loosening the adjustment screw.
2. Slide the fixing band through the opening on the magnetic switch
3. Attach the fixing band to the bypass chamber and tighten via adjustment screw, so that the magnetic switch can still be moved.
4. Slide the magnetic switch to the desired switching height and fix into position by tightening the screw. (The switch point is marked).

Note!

1. When mounting, please pay attention to that the cable entry faces downwards. In order to ensure a safe switching function, the Magnetic Switch's case should sit close to the bypass pipe.
2. The Magnetic Switches do only work in the area between the bypass level indicator's process connections. We cannot guarantee a safe functioning if a switching point is set outside that area.

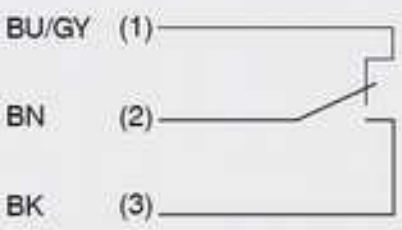
Electrical connection

The electrical connection must be established in accordance with the application construction regulations in the country of installation and may only be performed by specialist personnel.

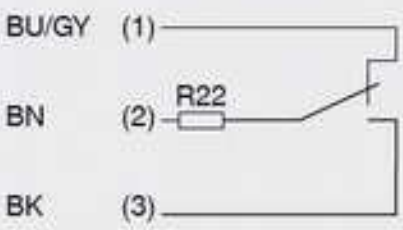
The connection should be carried out pursuant to the connection diagram with at least 3 x 0,75mm² according to the desired switching function. When selecting the cable, please pay attention to that it is suitable for the planned area of application (temperature, weather influences, aggressive atmosphere etc.).

Reed contact, micro switch, rotation magnet

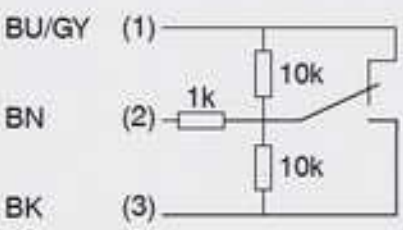
1 switch point

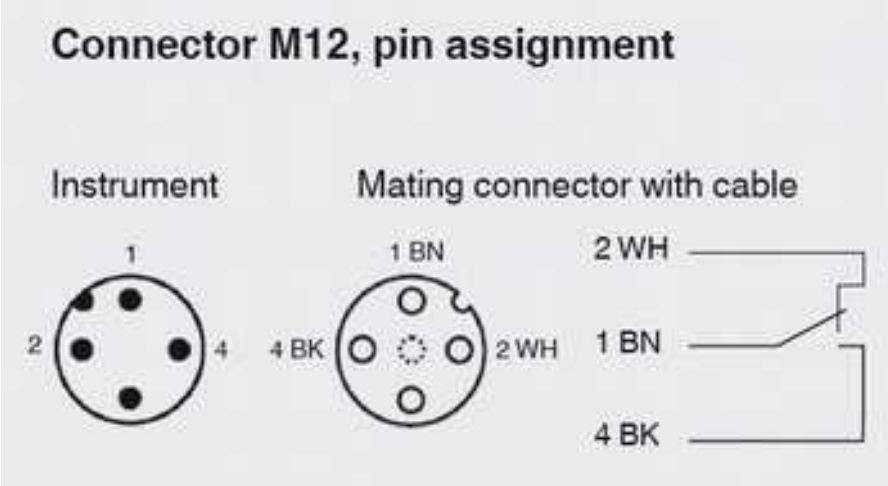


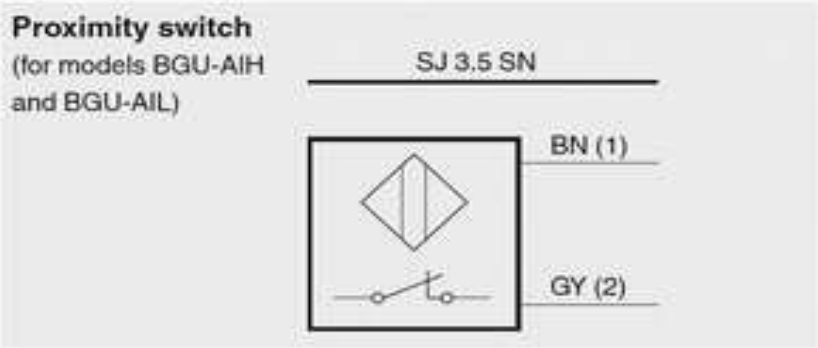
1 switch point
Wiring for operation with a PLC



1 switch point
NAMUR circuit per DIN EN 60947-5-6







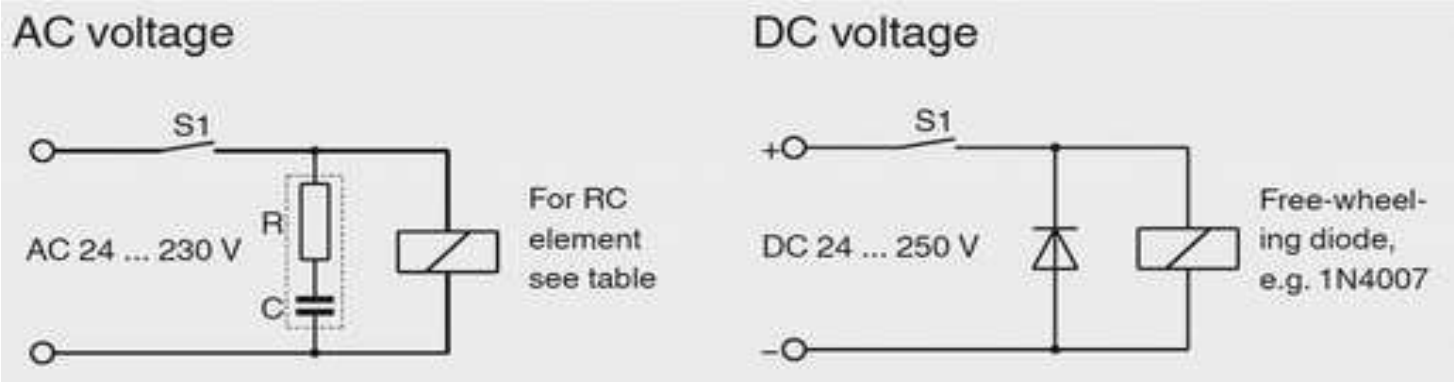
Protection Class according to VDE 0702-1

Model KA: Class II
Model KB: Class I
Model KC: Class III
Model KD: Class II
Model KE: Class III

Warnung!

The operation of the Magnetic Switches at inductive or capacitive load can result in the destruction of the reed contact. This can lead to a malfunction of the downstream control and to physical injury or property damage.

With inductive load, please protect the Magnetic Switches by wiring with a RC module (see appendix) or with a shunt diode. The use of varistors protective wiring is not permitted for the reed contact can be destroyed by occurring peaks.
With capacitive load, line lengths above 50m, or connection to process control systems with capacitive input a protective resistor of 22 Ω should be connected in series to the to limit the peak current.



RC modules for switch protection
Depending on the operating voltage, RC modules should only be used in accordance with the table below.
Other RC modules that those listed here will result in the destruction of the Reed switch.

For reed contacts from 10 - 40VA

Voltage	Resistance	Capacity
AC 24 V	100 Ω	0,33 µF
AC 48 V	220 Ω	0,33 µF
AC 115 V	470 Ω	0,33 µF
AC 230 V	1500 Ω	0,33 µF

For reed contacts from 40 - 100VA

Voltage	Resistance	Capacity
AC 24 V	47 Ω	0,33 µF
AC 48 V	100 Ω	0,33 µF
AC 115 V	470 Ω	0,33 µF
AC 230 V	1000 Ω	0,33 µF

Commissioning

You should set the Magnetic Switches to their defined initial state before putting them into operation. For this, you should push the bypass level indicator's float inside the pipe slowly from the bottom towards the top and afterwards to the bottom again. If this is not possible anymore, you may even pass the float alongside the Magnetic Switch from the bottom towards the top and afterwards to the bottom again. Pay attention to the identification „top“ at the float.
When retrofitting Magnetic Switches, you should set these to their defined initial state in the same way. If a float is not available, you may even use a permanent magnet of any radial polarity for this procedure.

Due to the bistable switching behaviour of the Magnetic Switches, a defined initial state before putting them into service is mandatory. Otherwise, there is a risk that a defective switching function is triggered off in the downstream control through a false contact position upon initial start-up.

Adjustment of the Magnetic Switch

Unscrew the fastening screw(s) and shift the Magnetic Switch to the level of the desired switching point.
Tighten the fastening screw again afterwards.

Faults

The most frequent root causes and required countermeasures are listed in the following table.

Fault	Cause	Measure
Bypass magnetic switch cannot be mounted at the intended position on the Bypass	Collision with other attachments	Modification of the attachments or return shipment to the factory
No or undefined switching function	Electrical connection incorrect	correct the connection
	Reed contact defective	Return shipment to factory
	Incorrect switching function	Change terminal assignment
	Switching position incorrect	New positioning of the switch
	Ragged cable	Return shipment to factory
	Switch are not triggered by the float magnet	

CAUTION!
Bodily injuries, property and environmental damages
If faults cannot be rectified with the help of the listed measures, immediately shut the unit off.

- Ensure the pressure is switched off and secure the unit against unintentionally being switched on.
- Contact the manufacturer.
- If return shipment is necessary, follow the instructions in Chapter “Return Shipment”.

Maintenance and cleaning

Maintenance

Bypass magnetic switches Type K do not require maintenance if operated properly.

The switches should be repaired by the manufacturer or by persons authorized by the manufacturer only. You should observe the international and national regulations regarding the implementation of the repair. Please use KSR-Kuebler spare parts only, for otherwise the conformity with the approval of the type of protection cannot be guaranteed.

DANGER!
When working on containers, there is a risk of poisoning or suffocation. Work may only be performed using suitable personal safety equipment (e.g. respiratory protection, protective clothing, etc.).

Cleaning

CAUTION!
Bodily injuries, property and environmental damages
Improper cleaning may result in bodily injuries, property and environmental damages. Measurement material residues in the disassembled unit can result in risks to persons, the environment and equipment.

- Flush and clean the disassembled unit.
- Implement sufficient precautionary measures.

1. Prior to cleaning the unit, properly disconnect it from the process and the power supply.
2. Carefully clean the unit with a damp cloth.
3. Do not let electrical connections come into contact with moisture!

CAUTION!
Property damage
Improper cleaning will damage the unit!

- Do not use any aggressive cleaning agents.
- Do not use any hard or sharp objects for cleaning.

Dismounting, return and disposal

WARNING!
Bodily injuries, property and environmental damages due to measuring material residues
Measuring material residues in a disassembled unit can result in risks to persons, the environment and equipment.

- Wear the necessary protective equipment
- Flush and clean the disassembled unit in order to protect persons and the environment from risks posed by adhering measuring material residues.

Disassembly

Only disassemble the measuring unit when it has been disconnected from the pressure and voltage!
If necessary, the container must be relaxed.

Return shipment

Use the original packaging or suitable transport packing for the return shipment of the unit.
Please send us the detailed descrpition of the failure.

Address: PKP Prozessmesstechnik
Borsigstraße 24
D-65205 Wiesbaden-Nordenstadt, Germany

Disposal

Incorrect disposal can result in risks to the environment.

Dispose of unit components and packaging materials in an environmentally compatible manner in accordance with the country-specific waste management and disposal regulations.

Specifications

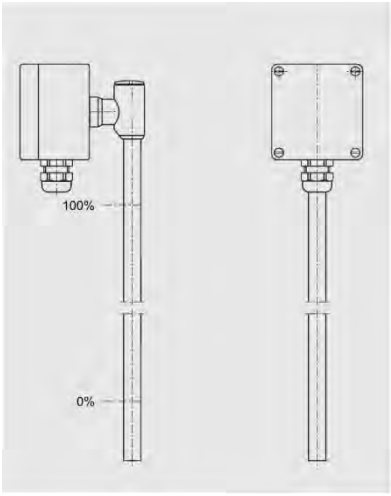
Code	Description	Approval					Switching power	Temperature range
		without	Ex-i	Ex-d	GL	Ex-i+GL		
KA	Reed, aluminium housing, cable outlet	x	x	x	x	x	AC 230 V, 60 VA, 1 A	-50 °C...+180 °C
KB	Reed, aluminium connection housing, cable gland	x	x		x	x		-50 °C...+180 °C
KC	Reed, aluminium housing, connector M12	x	x					-40 °C...+80 °C
KD	Reed, st. steel housing, cable outlet	x	x	x				-50 °C...+180 °C
KE	Reed, high temperature, aluminium housing, cable gland	x						-196 °C...+380 °C

11. REED Transmitter M

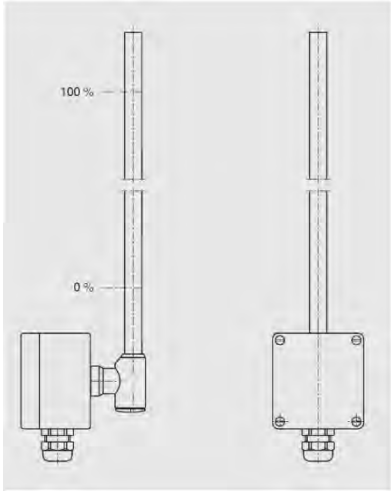
Functional description

Reed sensors series M are used for continuous monitoring and recording of the liquid level in connection with transmitters. They operate on the float principle with magnetic transmission in a 3-wire potentiometer circuit.

A magnetic system built into the float actuates reed contacts, through the walls of the bypass chamber and of the sensor tube, in a resistance measuring chain (potentiometer). The float changes its height with the level of the medium it is monitoring. The measured resistance signal is proportional to the level. The measurement voltage is very finely stepped due to the contact separation of the resistance measuring chain and is thus virtually continuous.



Housing top



Housing bottom

Scope of delivery

Cross-check scope of delivery with delivery note.

- The fluids must not be contaminated nor contain coarse particles nor tend to crystallize. It must be ensured that the magnetic switch materials that come into contact with the media are sufficiently resistant to the monitored medium. Not suitable for dispersion, abrasive fluids, highly viscous media and paints.
- Compliance with the usage conditions specified in the operating instructions is required.
- Do not operate the unit in direct proximity of ferro-magnetic environments (distance min. 50mm).
- Do not operate the unit in direct proximity of strong electromagnetic fields or in direct proximity of facilities that can be impacted by magnetic fields (distance min. 1m).
- The level sensors must not be exposed to heavy mechanical strain (impact, bending, vibration).
- Compliance with the relevant safety regulations for the use is required.
- Compliance with the technical specifications in these operating instructions is required. Improper use or operation of the unit outside the technical specifications requires immediate shut-down and inspection by an authorized PKP service technician.

Claims of any kind due to improper use are excluded.

DANGER!

When working on containers, there is a risk of poisoning or suffocation. Work may only be performed using suitable personal safety equipment (e.g. respiratory protection, protective clothing, etc.).

An explosive atmosphere may develop in a container. Measures must be taken to prevent sparking. Work in such areas must be done by qualified personnel in accordance with the relevant safety regulations and guidelines.

Transport, packaging and storage

Transport

Check the magnetic Level sensor for any damage that may have been caused by transport. Obvious damage must be reported immediately.

CAUTION!

Damage due to improper transport

With improper transport, a high level of damage to property can occur.

- Observe the symbols on the packaging.
- Handle packed goods with care

Transport and storage

Do not remove packaging until just before commissioning.

Commissioning, operation

- Observe all instructions given on the shipment packaging for removing the transportation safety devices.
- Remove the magnetic Level sensor carefully from the packaging!
- When unpacking, check all components for any external damage.

Functional check

Prior to installation, a functional test of the level sensor can be carried out with a resistance measuring instrument and manual movement of the float.

The following table describes the measurements and the expected measured values for the movement of the float, starting from the float stop in the direction of the tank opening.

Resistance measurement of the wire colours	Measured value
BK — BN (R1)	Resistance value rises proportionally with the position of the float.
BU — BN (R2)	Resistance value drops in inverse proportion to the position of the float.
BK — BU (Ri)	Resistance value remains constant, irrespective of the position of the float.

WARNING!
Ensure that the functional check does not start any unintended processes.

Functional tests must only be carried out with equipment that is approved for use in hazardous area. Tests must be conducted by qualified personnel in accordance with the relevant safety regulations and guidelines.

Mounting

Normally, the reed sensor is pre-mounted on the bypass or on the top-mounted level indicator. With this, please pay attention to the position of the measuring range marking as well as the distance between the reed sensor and the bypass chamber. The distance should be as low as possible.

Electrical connection

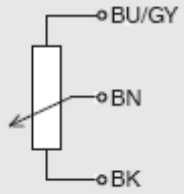
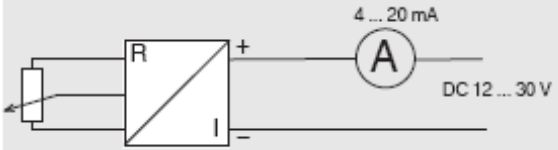
Warning!

Never open cover in hazardous areas while circuits are energized. Follow all safety work procedures and lock out circuits before servicing or inspection.

- The electrical connection must only be made by qualified skilled personnel.
- Wire the level sensor in accordance with the connection diagram of the electrical output (see product label). The connection terminals are appropriately marked.
- Seal the cable gland at the connection housing.
- Install a pour-seal (conduit seal) fitting within 18 inches of the housing to prevent water from entering the housing and for compliance with the National Electrical Code.
- Transmitters with integral electronics (puck and/or display) must be connected in a series loop with the readout or data acquisition device and the power supply. Shielded cable must be used for noise immunity and for Intrinsically Safe applications an agency approved safety barrier must be installed. A ground wire must be provided and connected to the ground block inside the housing.
- To connect a transmitter with a built-in digital display, unscrew and remove the housing cover and carefully remove the plastic label from around the display by grasping each side and pulling upwards. Remove the digital display by carefully pulling up on two diagonal sides of the display. The indicator is held in place by two banana plugs which plug

into the baseboard where the 4 to 20 mA puck is mounted. Field wiring connections are made to a two point, compression type, terminal block located on the baseboard (see Fig. 2 for Explosion Proof or drawing 095-3201-001 Pg. 1 for Intrinsically Safe applications). Attach a ground wire directly to the ground screw inside the housing.

- To connect a transmitter without a built-in display, unscrew and remove the housing cover. Field wiring connections are made directly to the puck (see Fig 3 for Explosion Proof, drawing 095-3201-001 Pg. 2 for single puck Intrinsically Safe applications, or drawing 095-3201-001 Pg. 4 for dual puck Intrinsically Safe applications). Attach a ground wire directly to the ground screw inside the housing.

Electrical output	Connection diagram
The entire assembly corresponds to a 3-wire potentiometer circuit	
Head-mounted transmitter with 4 ... 20 mA	

WARNING!
Malfunctions through voltage spikes due to running cables together with mains connection leads or due to large cable lengths.

This can lead to a malfunction in the plant and thus lead to injury to personnel or damage to equipment.

- Use shielded connection leads
- Ground connection leads at one end

Always observe the mounting and operating instructions of accessories when commissioning them.

Faults

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

Faults	Causes	Measures
No signal, non-linear or undefined signal	Electrical connection incorrect	See chapter “Electrical connection”. Check assignment with the aid of the connection diagram.
	Measuring chain defective	Return to the factory
	Head-mounted transmitter defective	Return to the factory
	Head-mounted transmitter adjusted incorrectly	Change settings acc. to manual of head-mounted transmitter or return to the factory

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 there is no longer any pressure present and protect against being put into operation accidentally.
- Contact the manufacturer.
- If a return is needed, please follow the instructions given in chapter “Return”.

Maintenance and cleaning

Maintenance
When used properly, the level sensors work maintenance-free. They must be subjected to visual inspection within the context of regular maintenance, however, and included in the vessel pressure test.

DANGER!
Work on vessels involves the danger of intoxication and suffocation. No work is allowed to be carried out unless by taking suitable personal protective measures (e.g. respiratory protection apparatus, protective outfit etc.).

Repairs must only be carried out by the manufacturer.

Perfect functioning of the level sensors can only be guaranteed when original accessories and spare parts are used.

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 persons, the environment and equipment.

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

1. Prior to cleaning the unit, properly disconnect it from the process and the power supply.
2. Carefully clean the unit with a damp cloth.
3. Do not let electrical connections 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.

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 persons, the environment and equipment.

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

Dismounting

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

Return

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

Please send the device with a detailed error description to the following address:

PKP Prozessmesstechnik GmbH
Service
Borsigstraße 24
D-65205 Wiesbaden Nordenstadt

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.