

**Operating Instructions
for
Plastic
Bypass Level Indicator**

**Model: NBK -16
-17**



1. Contents

1. Contents.....	2
2. Note	3
3. Instrument Inspection.....	3
4. Regulation Use	3
5. Operating Principle.....	4
6. Mechanical Connection.....	5
6.1 Mounting	5
7. Electrical Connection	6
7.1 General.....	6
7.2 Magnetic Switches	7
7.3 Level Transmitter (Type ...W)	8
7.4 Two-wire Head transducer (Type ...M).....	8
8. Configuration / Adjustments	9
8.1 Setting the Magnetic Switches.....	9
8.2 Adjustment of the level sensor (Type ...W)	9
8.3 Setting Limit Values (Model – RPVC)	9
8.4 Two-wire Head Transducer (Type ...M)	9
9. Commissioning.....	10
9.1 Function Test	10
10. Assembly	11
11. Maintenance	12
12. Technical Information.....	13
13. Order Codes	15
14. Dimensions	16
15. Disposal	18
16. EU Declaration of Conformance	19

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2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.

The instruction manuals on our website www.kobold.com are always for currently manufactured version of our products. Due to technical changes, the instruction manuals available online may not always correspond to the product version you have purchased. If you need an instruction manual that corresponds to the purchased product version, you can request it from us free of charge by email (info.de@kobold.com) in PDF format, specifying the relevant invoice number and serial number. If you wish, the operating instructions can also be sent to you by post in paper form against an applicable postage fee.

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EC-machine guidelines.

as per PED 2014/68/EU, category I

3. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition.

Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:

The standard delivery includes:

- Bypass Level Indicator model: NBK-16/ -17

4. Regulation Use

Any use of the Bypass Level Indicator, model: NBK-16 or 17, which exceeds the manufacturer's specification may invalidate its warranty. Therefore, any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage.

5. Operating Principle

Kobold plastic level indicators are used for continuous measurement, display and monitoring of liquid levels. The bypass tube is attached to the sidewall of the vessel. According to the hydrostatic pressure principle the level in the bypass tube equals the level in the vessel. A float with embedded circular magnets in the bypass tube follows the liquid level and transfers it in a non-contacting manner to a display on the tube. Additionally, the NBK can be fitted with level switches or transmitters for remote indication and monitoring of liquid levels. The following indication and monitoring devices are available:

Magnetic roller indicator

As the float passes by, the red/white rollers are rotated in succession by 180° around their own axes. The rollers change from white to red as the level rises and from red to white as the level falls. The level is continuously displayed as a red column. As the indicator is magnetically activated and requires no power to operate, it will continue to provide local indication even in the event of power failure.

Transmitter

A resistive transmitter can be mounted outside the bypass tube to remotely transmit the level. A continuous standard signal of 4 to 20 mA is generated by means of an integral transmitter.

Limit contacts

Adjustable reed contacts for alarms or for level control can be secured to the bypass tube.

6. Mechanical Connection

6.1 Mounting

- The maximum rated pressure and temperature values specified on the type plate may not be exceeded.
- Prior to system start up, the bypass level indicator must be included in the vessel pressure test.
- The float is designed for the medium density specified on the type plate. The measurement deviates if it is used in liquids with a different specific gravity.
- The medium to be monitored may not be heavily contaminated or contain large particles. The media should not have a tendency to crystallize.
- At medium temperatures below - 20°C, the bypass level indicators must be insulated and a plexiglas attachment must be fitted to the magnetic roller display.
- The magnetic roller display and attached magnetic switches must be aligned with the supplied float before installation.
- The bypass level indicator may not be placed in the immediate vicinity (< 1 meter) of strong electromagnetic fields.

7. Electrical Connection

7.1 General



Caution! Make sure that the voltage and current values of your system are within the limits of the bypass level indicator electrical specifications.



Note! In order to guarantee safe, reliable operation, bypass level indicators which are operated at medium temperature below -20 °C must be insulated and a plexiglas attachment must be fitted to the magnetic roller display. Insulation must be as specified in the „General Insulation List“ (AGI List).



Warning! If floats with pressure equalization are fitted, care must be taken that the operating pressure at the bypass level indicator is raised slowly. Sharp variations and sudden changes in pressure can result in destruction of the float.

7.1.1 Installation of the Float

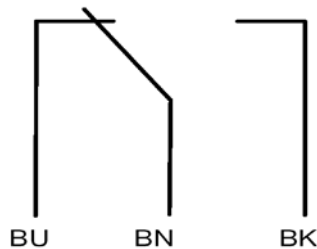
1. Remove the fitting at the bottom of the bypass tube and insert the float into the pipe from the bottom.
(Pay attention to the marking "top" (above). Ensure that the end marked "top" is inserted first.)
2. Replace the base fitting, insert the gasket and fix with screws.



Note! All cabling and electrical connections must be carried out in accordance with the regulations applicable in the country where the equipment is installed and by qualified personnel.

7.2 Magnetic Switches

The connection should be made with cable at least $3 \times 0.75\text{mm}^2$ according to the wiring diagram. The contact should be connected according to the desired switch logic.

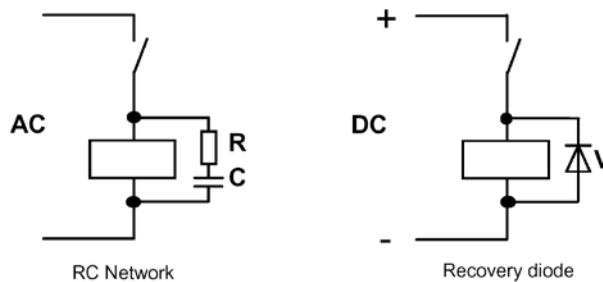


Connecting diagram magnetic switch

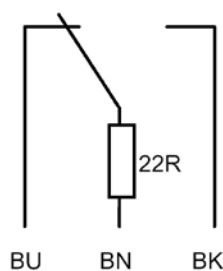
Operation via a contact protection relay is recommended to prolong the life of the contacts.



Warning! Use of magnetic switches with inductive or capacitive load may lead to the destruction of the reed switch. This may cause a malfunction to the control circuitry and harm to persons or goods. With inductive load, magnetic switches have to be connected to a RC Network (AC loads) or a suppression diode.



With a capacitive load, connecting cables longer than 50m or connection to a PLC with capacitive input circuit, a 22. resistor is required to be connected in series to limit current spikes.

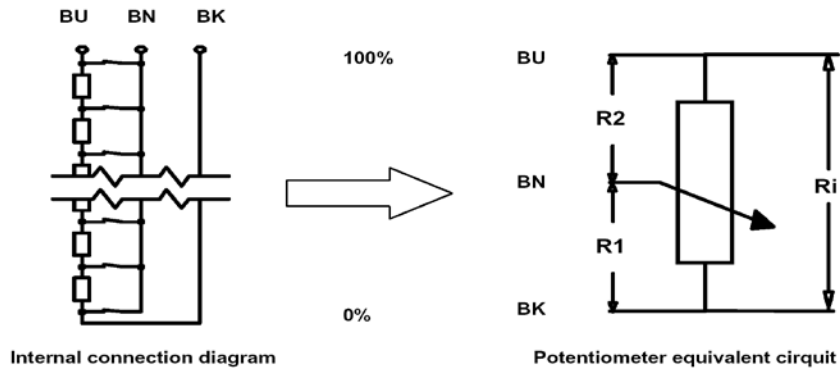




Warning! Overloading the magnetic switches may lead to the destruction of the reed switch, which may cause a malfunction to the control circuitry and harm to persons or goods. The maximum switch capacity values given on the tag label must not be exceeded.

7.3 Level Transmitter (Type ...W)

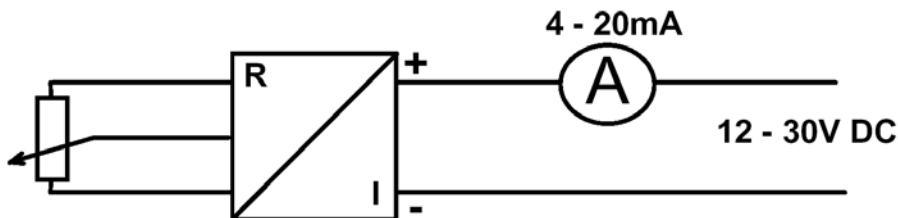
The level transmitter must be connected according to the wiring diagram printed on the transmitter and wired to the electronic evaluation unit in series. A shielded cable must be used and the shield should be grounded at one end for long lines or if the cables are laid together with power cables.



The cable gland must then be sealed and the lid of the terminal box be closed tightly.

7.4 Two-wire Head transducer (Type ...M)

The principal connection of Two-wire 4-20 mA transmitter is shown in the wiring diagram below. The wiring diagram of the actual used transmitter should always be observed.



8. Configuration / Adjustments

8.1 Setting the Magnetic Switches

The magnetic switches can be set to the desired switch point by sliding them up or down the bypass tube. The set screws must be loosened to do this. The switch point of the switch is in the center of the contact block unless specified otherwise. The set screws must be re-tightened after setting the switch point.



Note! Magnetic switches are fitted as standard on the right-hand side of the magnetic roller display. If switches are transferred to the other side, the contact function is reversed.

8.2 Adjustment of the level sensor (Type ...W)

The level sensors are factory pre-calibrated. Further adjustments are not necessary. Please follow the instructions for the control unit used in conjunction with the sensor.

Please do not unlock and move the transducer as this may change calibration.

8.3 Setting Limit Values (Model – RPVC)

See the operating instructions of the limit value transmitters used for setting limit values.

8.4 Two-wire Head Transducer (Type ...M)

Level sensors and transmitters are matched at the factory. No adjustment is necessary.

9. Commissioning

9.1 Function Test

9.1.1 Magnet Roller Indicator

1. Move the removed float slowly from bottom to top on the face of the indicator. The indicator must change evenly from white to red.
2. Move the float slowly from top to bottom. The indicator changes from red to white.

This test is not possible for indicators with Plexiglas attachments.

9.1.2 Magnetic Switch

1. Activate the magnetic switch by moving the float from bottom to top. The contact should switch.
2. Move the float from top to bottom. The contact drops back to its rest position.

9.1.3 Level Transmitter (Type ...W)

1. Disconnect the cable.
2. Connect ohmmeter to two wires.
3. Move the float by hand from the Min. to Max. position.
4. The displayed resistance changes depending on the connected wire colours:

Black - Brown (R1)	Blue - Brown (R2)	Black - Blue (Ri)
Resistance increases proportionally to the height of the float.	Resistance drops from the value of the total resistance inversely proportional to the height of the float.	Display of the total Resistance (Ri)



Warning! During functional testing, certain actions in the control circuit may be triggered unintentionally resulting in possible harm to persons or goods. Control circuits have to be switched off or components have to be disconnected for testing.

10. Assembly

Alignment of the magnetic roller display

Before installation, align the magnetic roller display and any installed magnetic switches to ensure that they are all set to the rest position prior to starting the system. To do this, slowly move the supplied float from bottom to top along the outside of the magnetic roller display and then back down again. Installed magnetic switches must be aligned on the basis of the same principle. In the case of bypass level indicators with insulation and magnetic roller display with Plexiglas attachments, the float must be moved up and down inside the tube. For magnetic roller displays with flushing connections, these connections must have an air-tight seal.

Mounting the Bypass Level Indicator

Mount the bypass level indicator on the vessel to be monitored with the appropriate process connections. Gaskets, screws, washers and nuts suitable for the process connection must be used for assembly. Choose a gasket with a suitable corrosion resistance. Isolation valves should be mounted between the vessel and the bypass tube if possible.

11. Maintenance

Bypass level indicators, magnetic switches and level transmitters operate free of maintenance and wear if used properly. The float should be checked visually for corrosion damage and leakage during tank inspection. The bypass chamber must be completely emptied before removing the float. Shut-off devices must be closed.



Warning! Pressurised bypass chamber, possibly containing hot, toxic, or caustic liquid presents a potential hazard due to splashing liquid. Burns to hands, legs and face, as well as chemical burns or poisonings are possible. Chamber pressure has to be released before opening. Please use protective wear (gloves, safety mask, gas mask and breathing equipment).

The float can be removed after dismantling the bottom fitting. The float should be reinstalled as described in the Assembly Section after being checked visually.

12. Technical Information

Measuring length:	200 mm – 4000 mm
Bypass tube:	Ø 63 x 3 mm
Material:	PP or PVDF
Process connection (loose flange):	DIN flange according to Din EN 1092-1 form B1 DN 20...DN 50, PN 10 ANSI flange B16.5 ¾"-2", 150 lbs, RF
Operating pressure:	max. 4 bar
Operating temperature:	PP: max. 60 °C PVDF: max. 80 °C
Min. density:	590 kg/m ³ (NBK-16) 790 kg/m ³ (NBK-17)
Seal:	O-ring, EPDM (FPM, PTFE, FEP on request)
Bypass pipe top:	pipe cap (dished boiler end DIN 2617)
Bypass pipe bottom:	threaded connection with drain screw, threaded connection with loose drain flange (without counter flange)
Overall length:	depending on measuring length, see dimension drawing
Installation position:	vertical
Roller indication:	
Housing:	aluminium anodized
Indication rollers:	PBT red/white
Front cover:	Makrolon PC
Max. ambient temperature:	200 °C
Limit Contacts (NBK-RPVC):	
Housing:	Aluminium anodized
Contact operation:	bistable changeover contact (reed contact)
Max. switch capacity:	230 V _{AC} , 60 VA, 1 A 230 V _{DC} , 30 W, 0,5 A
Cable:	1 m PVC (NBK-RPVC) 3 x 0.75 mm ²
Ambient temperature:	max. 90 °C
Protection:	IP 65
Reed contact resistor chain model...W:	
Housing:	Aluminium painted
Measuring principle:	Reed contact chain
Sensor tube:	stainless steel 1.4571
Total resistance:	3.2...50 kΩ (depending on length)
Measuring-circuit voltage:	max. 24 V _{DC}
Measuring current:	max. 0,1 A
Resolution:	10 mm
Protection:	IP 65
Cable entry:	M20 x 1.5

NBK-16/ -17

Reed contact resistor chain with 2-wire transmitter model...M:

Housing:	Alumium painted
Output:	4...20 mA
Supply Voltage:	11...30 V _{DC}
Max. load:	1000 Ω at U _B = 30 V _{DC} 700 Ω at U _B = 24 V _{DC} 50 Ω at U _B =12 V _{DC}
Ambient temperature:	-20... +60 °C
Resolution:	10 mm
Protection:	IP 65
Cable entry:	M20 x 1.5

13. Order Codes

Model ¹⁾	Material	Connection ²⁾	Nominal size	Roller indication	Transmitter	Media density/Float ³⁾ (kg/m ³)	Bypass pipe (bottom)
NBK-16...	PP	F = DIN flange A= ANSI flange	20=DN 20, ¾"	00 = without RP = PBT rollers	0 = without W = Reed contact chain M = Reed contact chain with transmitter 4...20 mA 2-wire	1 = Nom. Density 1320, Min. Density 1200 2 = Nom. Density 970, Min. Density 910 3 = Nom. Density 790, Min. Density 750 4 = Nom. Density 680, Min. Density 660 5 = Nom. Density 610, Min. Density 590	1 = Threaded connection with drain screw G ½ 2 = Threaded connection with drain screw ½ " NPT 3 = Threaded connection with drain flange DIN DN 15/PN16 A = Threaded connection with drain flange ANSI ½ " 150 lbs
NBK-17...	PVDF		32=DN 32, 1 ¼" 40=DN 40, 1 ½" 50=DN 50, 2"			A = Nom. Density 1480, Min. density 1340 B = Nom. Density 1140, Min. density 1070 C = Nom. Density 980, Min. density 930 D = Nom. Density 890, Min. density 850 E = Nom. Density 810, Min. density 790	
NBK-RPVC	Standard limit contact (bistable changeover contact), 1 m PVC cable						

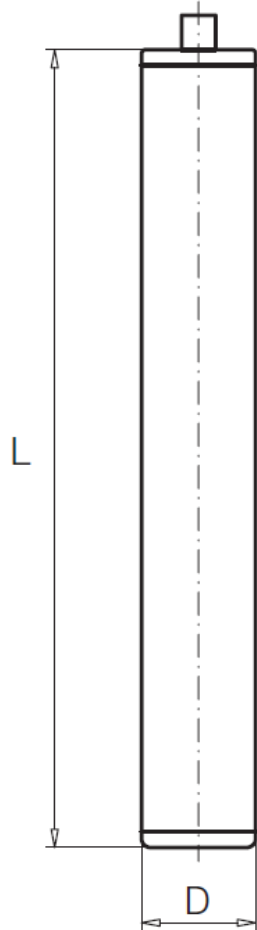
¹⁾ Please specify in writing: measuring length 'L', medium density, operating pressure (max. 4 bar) and operating temperature

²⁾ Flange connection pressure rating standard is PN10. (PN16, PN25, PN40 on request)

³⁾ Tared/balanced float according to media density is optional available at extra charge. Float tare must be specified. Standard is without tare. Any deviation between media density and floats nominal causes an additional error in measurement. Without float tare the minimum float density is stated on the instrument label.

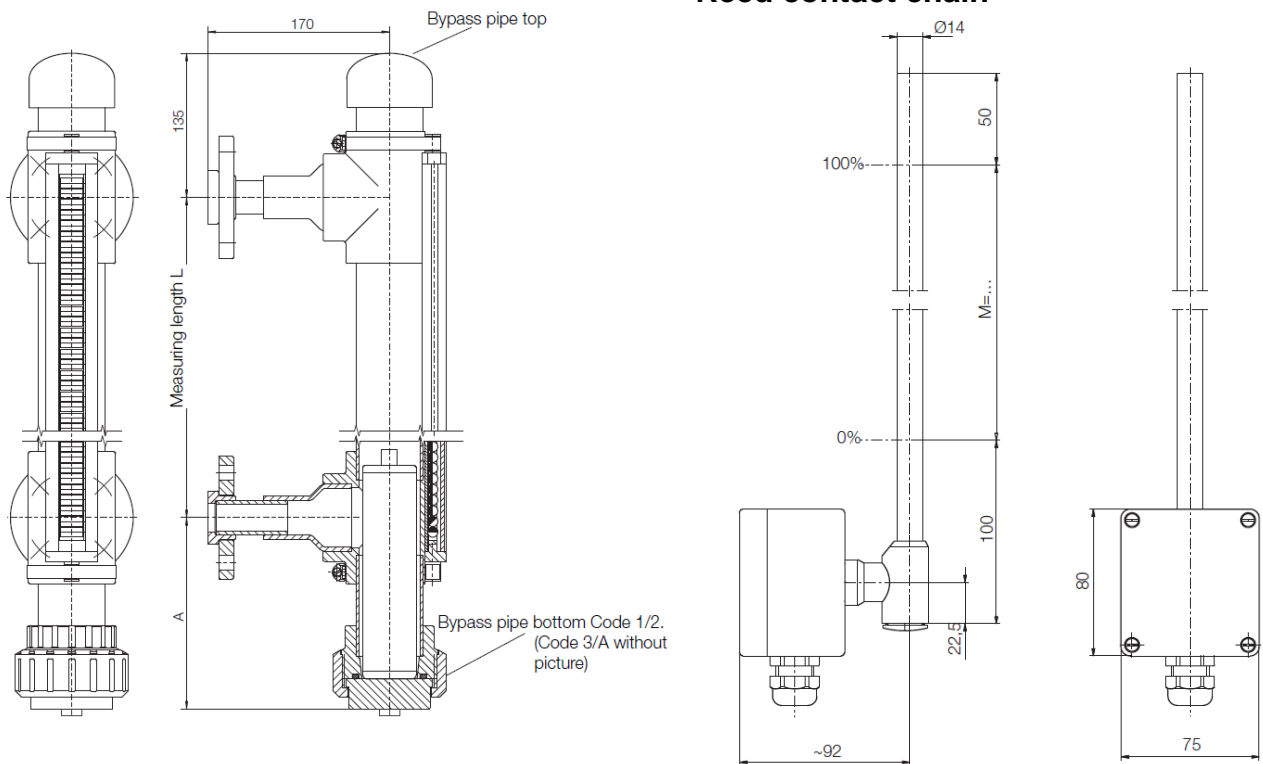
14. Dimensions

Bypass Float



Model	Diameter D [mm]	Length L [mm]	Material
1	50	150	PP
2	50	200	PP
3	50	250	PP
4	50	300	PP
5	50	350	PP
A	50	150	PVDF
B	50	200	PVDF
C	50	250	PVDF
D	50	300	PVDF
E	50	350	PVDF

Reed contact chain

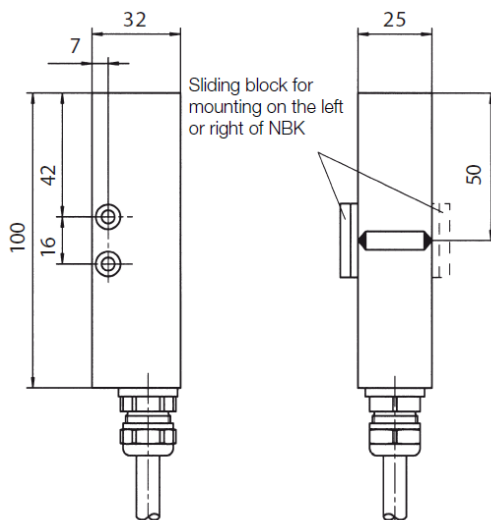


Clearance dimension A [mm]

Model	Material	Medium density				
		590 kg/m ³	660 kg/m ³	750 kg/m ³	910 kg/m ³	1200 kg/m ³
NBK-16	PP	320	270	220	170	170

Model	Material	Medium density				
		790 kg/m ³	850 kg/m ³	930 kg/m ³	1070 kg/m ³	1340 kg/m ³
NBK-17	PVDF	320	270	220	170	170

NBK-RPVC



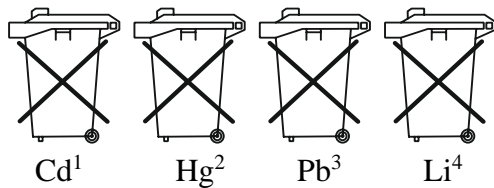
15. Disposal

Note!

- Avoid environmental damage caused by media-contaminated parts
- Dispose of the device and packaging in an environmentally friendly manner
- Comply with applicable national and international disposal regulations and environmental regulations.

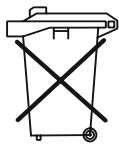
Batteries

Batteries containing pollutants are marked with a sign consisting of a crossed-out garbage can and the chemical symbol (Cd, Hg, Li or Pb) of the heavy metal that is decisive for the classification as containing pollutants:



1. „Cd" stands for cadmium
2. „Hg" stands for mercury
3. „Pb" stands for lead
4. „Li" stands for lithium

Electrical and electronic equipment



16. EU Declaration of Conformance

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Bypass Level Indicator model: NBK -16/ -17

to which this declaration relates is in conformity with the standards noted below:

EN 13445 Unfired pressure vessels

Also, the following EC guidelines are fulfilled:

2014/68/EU PED, category I, module A
2011/65/EU RoHS

The **standard limit contact model: NBK-RPVC**

is in conformity with the standards noted below:

EN 61010-1:2010 Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements

EN 50581:2012 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Also, the following EC guidelines are fulfilled:

2014/35/EU Low Voltage Directive, U ≥50 VAC/75 VDC
2011/65/EU RoHS



Hofheim, 21. Sept. 2017

H. Peters
General Manager

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Proxy Holder