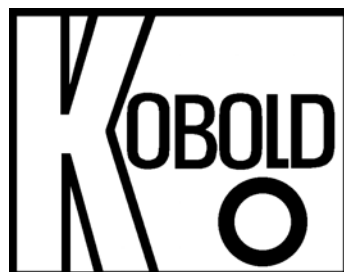


**Operating Instruction  
for  
Bypass Level Indicator**

**Model: NBK**



## 1. Note

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Please read and take note of these operating instructions before unpacking and setting the unit for operation, and follow the instructions precisely as described herein.

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and with the prevailing regulation applying to procedural safety and the prevention of accidents.

When used in machines according to machine guideline EWG commissioning is prohibited until it is established that the machine meets the general requirements of the guideline.

## 2. Contents

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### 3. Specific Application

The NBK bypass level indicator is used for continuous measurement, indication, and monitoring of liquids in tanks, vessels, reservoirs, basins etc. Information is displayed on a magnetically coupled roller indicator.

#### Bypass measuring tube system

The bypass tube is attached at the side of the vessel with a connecting flange or a screw neck. The installation position is always vertical. The NBK should only be used for liquids with the medium density specified on the nameplate. Otherwise the indication will deviate and the float may submerge or float up too high.

Vessel inner pressure and medium temperature should not exceed the specified maximum values, as this can lead to the destruction and maloperation of the bypass system. It is imperative that the materials used are adequately resistant to the liquid being measured.

Proper operation is also impaired by:

- High degree of soiling
- Lumpiness
- Crystallization
- Ferrite particles

#### Electrical limit value controllers (option)

The optional electrical limit value controllers serve to signal a preset level.

Important!

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**Caution! Observe the allowed electrical ratings for the limit value controller.**

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Maximum values	Standard contact	Explosion-protected contact	High temperature contact
Breaking capacity:	40 VA	20W/45 VA	80 VA
Switching current:	0.8 A	0.8 A	1 A
Switching voltage:	230 V	220 V	220 V

#### Remote sensor reed contact chain of resistors (option..M..)

The optional remote electrical sensor converts the liquid level to a resistance value, which serves to teletransmit the level as an electrical quantity. Downstream control electronics transform the signal to a standard signal (e.g., 4–20 mA), or control the level.

Please note max. medium and ambient temperatures.

#### Remote sensor magnetostrictive sensor (option..T..)

Remote level transmission can be achieved by mounting a magnetostrictive sensor outside the bypass tube. A continuous standard 4 to 20 mA signal is obtained with a built-in transmitter. This signal can then be displayed on analog or digital indicators.

## 4. Operating Principles

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The NBK works according to the principle of communicating tubes with a float, that is, the level in the bypass tube corresponds to the level in the vessel. A float with flush-encased magnet in the bypass tube follows the liquid level, and transfers it, in a non-contacting manner, to a roller indicator that is externally attached. As the float passes by, the red/white rollers rotate through 180° about their own axis. Red indicates the actual level, whereas white means no level.

Contact devices and/or remote sensors can also be fitted. The arrangement is not important as the annular magnetic field acts in all directions.

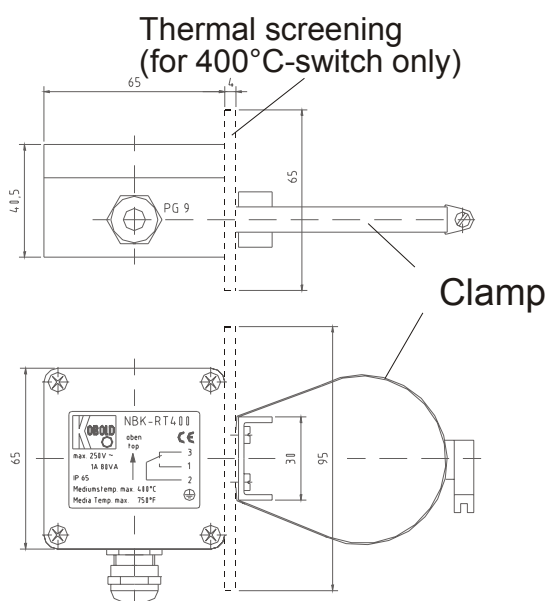
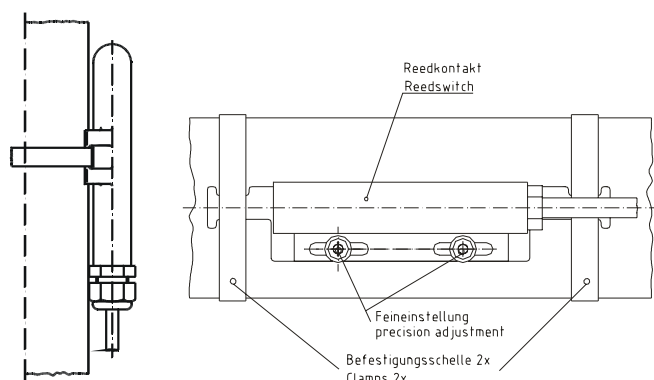
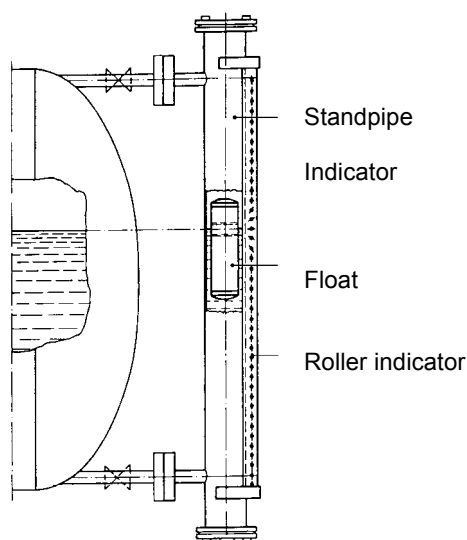
## 5. Instrument Inspection

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These devices are checked before dispatch and sent away in perfect condition. Should the damage to a device be visible, we recommend a thorough inspection of the delivery packing. In case of damage, please inform your parcel service/forwarding agent immediately, since they are responsible for damages during transit.

Please cross-check the instruments with the delivery note where all options are listed.

## 6. Mechanical connection



Remove bottom flange from bypass tube, and insert the cylindrical float in the NBK bypass tube with the designation "TOP" at the top. Re-position the gasket and close the bottom flange again; firmly tighten with screws. Mount and tighten the bypass tube to the vessel to be monitored with process connection and seal.

Normally it is sufficient to fix the complete NBK with both process connections. However should the NBK be subjected to constant shock or strong vibrations it is recommended that the instrument is secured with rubber-damped tube clips.

The bypass tube should never be welded.

Mount and tighten the magnetic roller indicator - if not already mounted at the works - on the bypass tube with the two accompanying taut ribbons.

Mount and tighten the dry-reed switch - if available and not already mounted at the works - on the bypass tube at the opposite side of the roller indicator with the accompanying taut ribbon (ex contact: two taut ribbons).

The height of the switch contacts may be selected at will. The cable connection must point downwards. Tighten the tube clips until the contact cannot be closed any further. The switch must be snug against the stand tube. The switching function of the switch is impaired by an enlarged air gap.

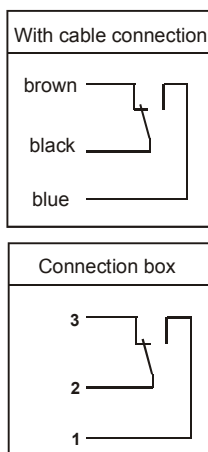
Fasten the high temperature switch to the bypass tube with the tube clip fixed to the tube.

Mount and tighten remote sensor - if available and not already mounted at the works - on the bypass tube with the taut ribbons.

The remote sensor must cover both process connections fully. The cable terminal box is situated at the top.

## 7. Electrical connection

### 7.1. Switch (option)



Connect switch (if available) according to the diagram, and connect to the electrical controller.

When switching inductive loads, such as, contactors, relays, etc, electrical limit values should not be exceeded by glitches, for instance. The use of a contact protection relay is recommended to avoid overloading the reed contacts.

Valid regulations for hazardous areas, and regulations for installation (DIN/VDE 0165), should be observed when installing the NBK level indicator in zone 1 or 2 hazardous areas (no combustible liquids).

### 7.2. Remote sensor

#### Reed contact chain of resistors (option..W..)

- Ensure that the electrical supply lines are dead.
- To avoid faults caused by electrical fields from other circuits, the cables should not be installed with other cables.
- Unscrew cover and run supply lines through cable gland.
- Connect the remote sensor to the electronics according to following table.

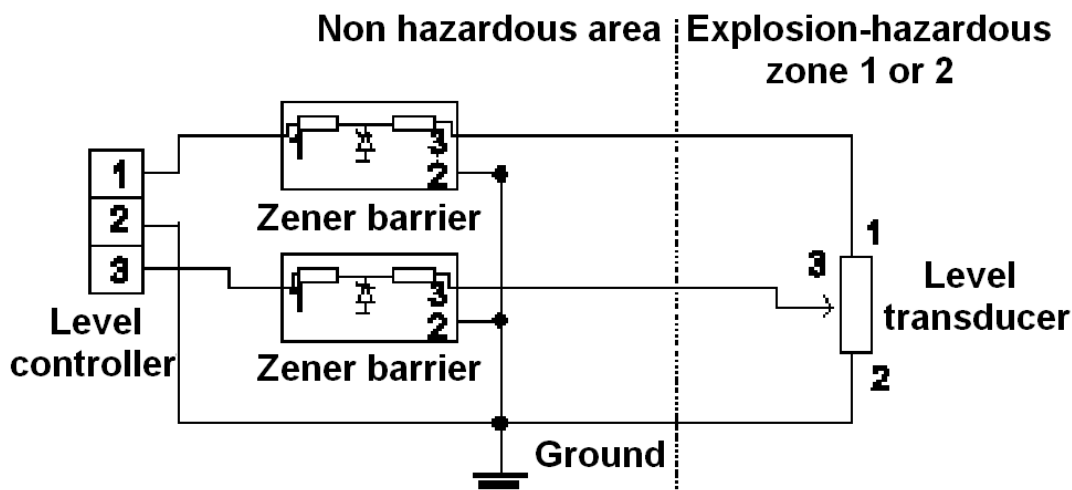
	Transmitter "top"	Transmitter "bottom"	Pick-off	
<b>Silicon cable</b>	white	brown	green	
<b>PVC cable</b>	white	brown	green	
<b>FEP cable</b>	brown	blue	black	
<b>Adapter box</b>	terminal 1	terminal 2	terminal 3	
<b>Internal *</b>	yellow	red	black	

**\*Please note: The colours of internal cables are for internal connections only and therefore are only visible in transmitters with connection box.**

When connecting remote sensors to a Kobold transmitter, for example models DFA, DST or DFM, please read the relevant operating instructions.

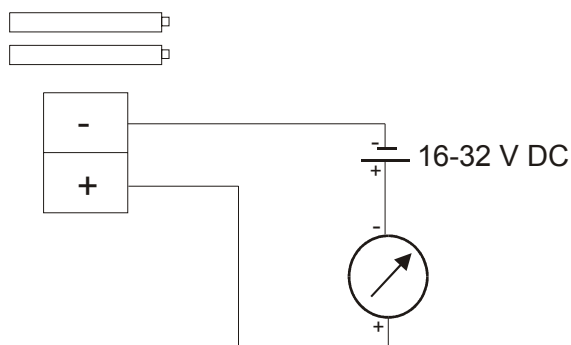
### Service in zone 1 or zone 2 hazardous areas

To operate the remote sensor in zone 1 or zone 2 hazardous areas, the measuring circuit must contain 2 safety barriers to separate intrinsically safe circuits from non-intrinsically safe circuits. Specially designed remote level sensors with a total resistance of 40 kOhm are required for this purpose.



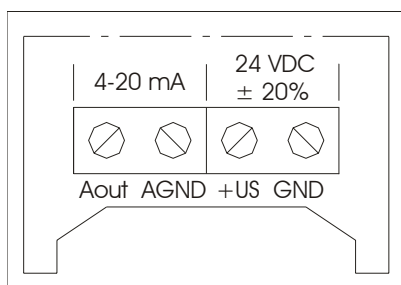
### 7.3. Remote sensor: chain of resistors with 2-wire transmitter (option..M..)

- Ensure that the electrical supply lines are dead.
- To avoid faults caused by electrical fields from other circuits, the cables should not be installed with other cables.
- Unscrew cover and run supply lines through cable gland.
- Connect the remote sensor to the electronics according to the terminal connection diagram below.



## 7.4. Remote sensor: magnetostrictive sensor with 4-wire transmitter (option..T..)

- Ensure that the electrical supply lines are dead.
- To avoid faults caused by electrical fields from other circuits, the cables should not be installed with other cables.
- Unscrew cover and run supply lines through cable gland.
- Connect the remote sensor to the electronics according to the terminal connection diagram below.



## 8. Commissioning

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Fill vessel, and switch on electrical controller, if available. If there are stopcocks between bypass process connection and tank, first slowly open the upper valve (pressure relief) and then the lower valve (liquid side). If vent and drain valves have been installed, close them before filling.

The liquid that now enters the bypass tube raises the float until the level between tank and bypass tube is balanced. The roller indicator indicates the liquid level.

### Commissioning electrical dry-reed switches

#### Function of switches

All switches have three connection poles (black (2), blue (3) and brown (1)).

The black wire (2) is the common pole for both switching functions (N/C and N/O contact).

The float must pass the switch once in both directions so that the switching function is in line with the terminal connection diagram and table below.

Note that the switch cable must point downwards.

These instructions are often ignored when an alarm lamp is connected with the result that the alarm lamp incorrectly indicates a fault.

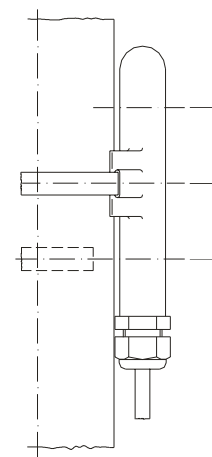


When the switch has been passed, it is ready for operation and requires no maintenance.

	<b>black (2) / blue (1)</b>	<b>black (2) / brown (3)</b>
float above	with signal flow	open
float below	open	with signal flow

### Hysteresis

Hysteresis is the difference between contact closing and opening points. A hysteresis of approximately 15 mm float travel is achieved by factory tuning float magnet and contact strength.



hysteresis of approximately  
15 mm

## 9. Trouble shooting

### Error: The tank is full but there is no indication

- Check that both flanges (process connection) top and bottom are open to the vessel, and that the bypass tube fills with liquid.
- Check that there is a float in the system.
- When the float is installed, check whether it is being blocked by foreign objects or dirt deposits.

### Error: The tank is full but the indication is too low.

- Check that the density of the liquid is the same as the density given on the nameplate.
- Check that the float has been correctly installed with the marking "TOP" at the top.
- Check if dirt deposits in the bypass tube are blocking the float.

## 10. Technical Data

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Bypass tube:	Ø 60.3 mm
Material:	1.4571
Operating pressure:	PN 16/40/64/100
Service temperature:	to 120°C PP rollers to 400°C ceramic rollers
Viscosity:	max. 200 mm <sup>2</sup> /s
Max. measuring length:	to 6000 mm one-piece > 60000 mm two-part or multipart
Overall length:	according to measuring length, see dimension drawing

### **Limit contacts model NBK-R, NBK-REx**

Contact operation:	bistable changeover contact
Switching hysteresis:	approximately 15 mm
Switching capacity:	40 W/VA; 230 V; 0.8 A (NBK-R)
Switching capacity:	20 W/45 VA; 220 V; 0.8A (NBK-REx)
Medium temperature:	max. 100°C
Ambient temperature:	max. 75°C
Protection type:	IP 67
Connection:	3 m PVC cable
Protection category:	EEx-d-IIC-T6 (NBK-REx only)
Case:	plastic

### **Limit contacts model NBK-RT200, NBK-RT400**

Contact operation:	bistable changeover contact
Switching hysteresis:	approximately 15 mm
Switching capacity:	80 VA; 250 VAC; 1A
Medium temperature:	max. 200°C/400°C
Protection type:	IP 65
Design:	aluminium pressure casing, terminal connection

### **Transmitter reed contact chain of resistors model: ...W...**

Total resistance:	approximately 5 kOhm
Measuring-circuit voltage:	max. 24 VDC
Measuring current:	max. 0.1 A
Medium temperature:	max. 200°C
Ambient temperature:	max. 130°C
Protection type:	IP 65
Resolution:	10 mm (ML<2000 mm) 20 mm (ML>2000 mm)

**Transmitter model: ...M...****Reed contact chain of resistors with 2-wire transmitter**

Output:	4-20 mA
Auxiliary power:	16-32 VDC
Load:	(UB -9V) /0.02A [ohm]
Medium temperature:	max. 130°C
Ambient temperature:	max. 80°C
Protection type:	IP 65
Resolution:	10 mm (ML<2000 mm) 20 mm (ML>2000 mm)

**Transmitter model: ...T...****Magnetostrictive sensor with 4-wire transmitter**

Output:	4-20 mA
Load:	max. 500 ohm
Max. length:	4000 mm
Supply voltage:	24 VDC
Power consumption:	< 5 W (without load)
Accuracy:	± 1mm
Medium temperature:	max. 120°C
Ambient temperature:	max. 80°C
Protection type:	IP 65

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## **11. Maintenance**

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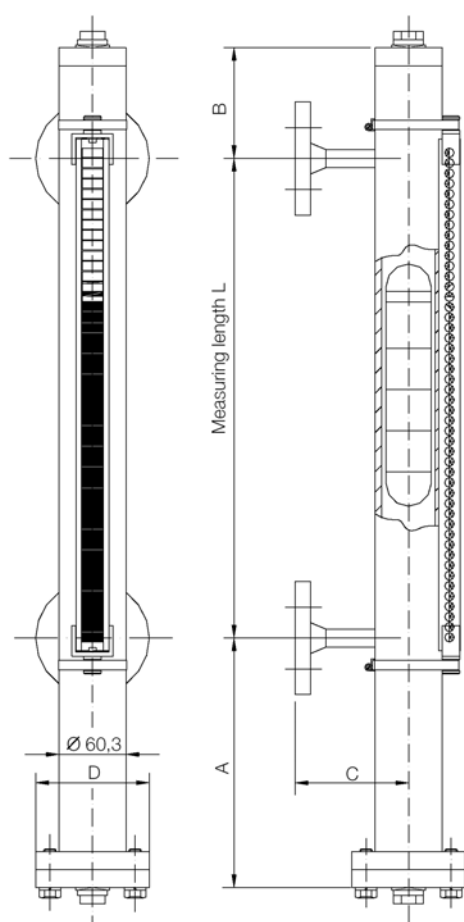
The drain plug should be opened now and again, to wash out any deposits in case the liquid to be measured contains dirt particles, which could settle in the bypass tube. If encrustments or crystallizations have formed, the tank must be emptied or shut off; the lower cover flange must then be removed. The float should then be removed carefully from the vessel. The bypass tube can now be mechanically cleaned.

The inspection window for the roller indication is made of high-quality plexiglass (glass for high-temperature display). It should be cleaned with a suitable cleaning agent.

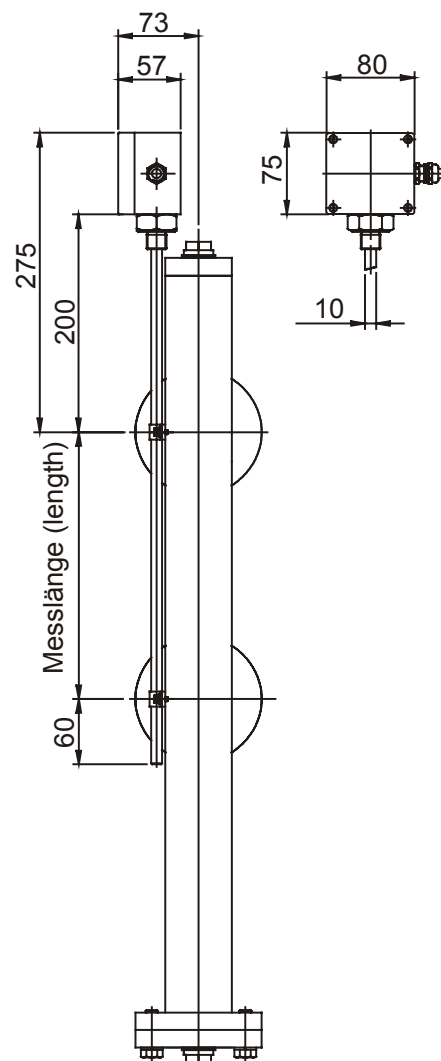
The indicator requires no further maintenance.

## 12. Dimensions

NBK-...  
with roller indication



NBK-...  
with magnetostrictive transmitter



Model	Nominal pressure	Dimensions (mm)			
		A	B	C	D
<b>NBK-03...</b>	PN16	320	130	110	115
<b>NBK-06...</b>	PN40	320	130	110	115
<b>NBK-07...</b>	PN64	320	160	130	180
<b>NBK-10...</b>	PN100	320	160	130	195
<b>NBK-03...</b>	150 lbs	320	130	110	115
<b>NBK-06...</b>	300 lbs	320	130	110	115
<b>NBK-07...</b>	600 lbs	320	160	130	165,1
<b>NBK-10...</b>	1500 lbs	320	160	130	215,9

## **13. Declaration of Conformance**

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

**limit contacts for bypass level indicator      model: NBK-R...**

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

**DIN EN 61010-1 1994-03**

Safety requirements for electrical measuring, control and laboratory instruments

**EN 60529, DIN VDE 0470-1 1992-11**

Protection type through case (IP code)

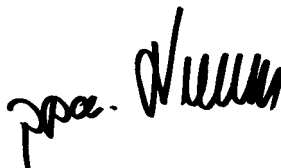
Also the following EWG guideline is fulfilled:

**73/23 EWG**

Signed:



H. Peters



M. Wenzel

Datum: 22.06.01

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

**bypass level indicator with remote sensor**

**model NBK-...M...**

**model NBK-...T...**

**model NBK-...W...**

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

**EN 50081-2 1994-03**

Electromagnetic compatibility basic specification interference emission

**EN 50082-2 1996-02**

Electromagnetic compatibility basic specification noise immunity

**DIN EN 61010-1 1994-03**

Safety requirements for electrical measuring, control and laboratory instruments

**EN 60529, DIN VDE 0470-1 1992-11**

Protection type through case (IP code)

Also the following EWG guidelines are fulfilled:

**73/23 EWG**

**89/336/EWG** Electromagnetic compatibility



Signed:

H. Peters

M. Wenzel

Datum: 22.06.01