



**Operating Instructions
for
Over-Head Level Indicator**

Model: NBK-04

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Manufactured and sold by:

Kobold Messring GmbH
Nordring 22-24
D-65719 Hofheim
Tel.: +49(0)6192-2990
Fax: +49(0)6192-23398
E-Mail: info.de@kobold.com
Internet: www.kobold.com

USA
Kobold Instruments, Inc.
1801 Parkway View Drive
Pittsburgh, PA 15228
PH: 412-788-2830
FAX: 412-788-4890
info@koboldusa.com
www.koboldusa.com

CANADA
KOBOLD Instruments Canada Inc.
9A de l'Aviation
Pointe Claire, QC H9R 4Z2
Telephone: (888) 769-5550 and
(514) 428-8090
Fax: (514) 428-8899
E-mail: kobold@kobold.ca

2. Note

Please read these operating instructions before unpacking and putting the unit into operation. 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 in accordance with local regulations applying to Health & Safety and prevention of accidents.

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.

What's included in the shipment:

The standard delivery includes:

- Over-Head Level Indicator model: NBK-04
- Operating Instructions

Note: If switches were ordered as an option, they will not be attached to the level indicator. They are packed inside the shipping container. Be sure to check the packaging for any extra items.

Please inspect the devices using the packing slip. All options are listed here.

4. Regulation Use

The NBK-04 Over-Head Level Indicator is used for continuous measurement, indication, and monitoring of liquids in tanks, vessels, reservoirs, basins etc. The level will be indicated on a magnetically coupled roller indicator.

The over-head measuring tube system

The over-head tube is attached with the vessel with a connection flange. The installation position is always vertical. The NBK should only be used for liquids with the medium density specified on the unit label. Otherwise the indication may be inaccurate and the float may submerge.

System pressure and temperature should not exceed the specified maximum values, as this can lead to the destruction and malfunction of the over-head system. Ensure that the liquids contacting the level indicator internals are chemically compatible with the materials used in the construction of this unit.

Proper operation is also impaired by:

- High degree of soiling
- Large particulate
- Crystallisation
- Ferrite particles

Electrical limit switches (option)

The optional electrical limit switch serves to signal a preset level.

Attention! Observe the allowed electrical ratings for the limit switch.

Maximum values	Standard contact	Ex-contact*
Switching capacity:	60 VA	20 W / 45 VA
Switching current:	1 A	0.8 A
Switching voltage:	230 V _{AC/DC}	220 V

*in preparation

Transducer Reed contact-resistor chain (option ..M..)

The optional transducer detects and converts the liquid level to a variable resistance value. In this manner, liquid level is transmitted as an electrical quantity. Optional additional signal conditioning electronics transforms the signal to a standard signal (e.g., 4–20 mA), or controls the liquid level.

Magnetostrictive Transducer (option ..T..)

Remote liquid level transmission can be achieved by mounting a magnetostrictive pick-up outside the over-head tube. A continuous, standard 4 to 20 mA signal is obtained with a head mounted measurement transmitter. This signal can then be displayed on analog indicator or digital display or taken as a computer system input.

5. Operating Principle

A float in the submerged portion of the indicator is connected with the magnet carrier inside the over-head tube via a connecting rod.

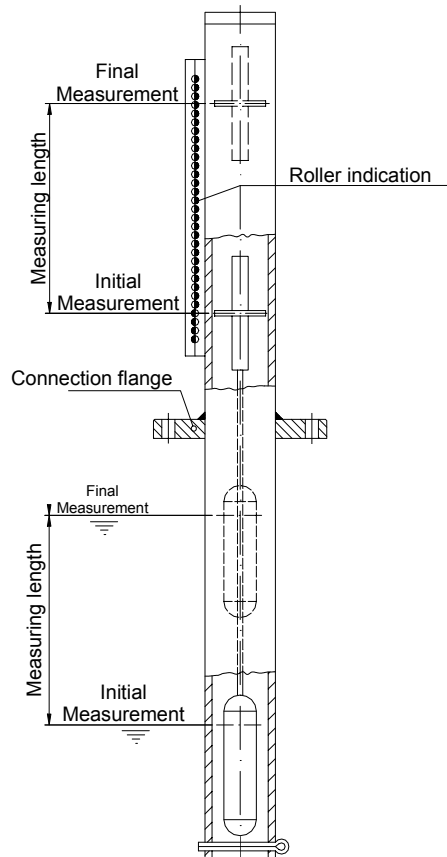
The built-in magnet inside the magnet carrier triggers the mounted local display and other options (e.g. switches/transmitters) attached to the tube externally, in a non-contacting manner.

Magnet roller indication

As the float passes by, the red/white rollers rotate through 180° about their own axis. Red indicates the instantaneous level, whereas white means no level. The tank level is read at the red/white interface.

Since the magnetic field radiates in all directions, the roller indicator, switches and transmitter can be mounted at any spot on the measuring tube at the convenience of the user.

6. Mechanical Connection

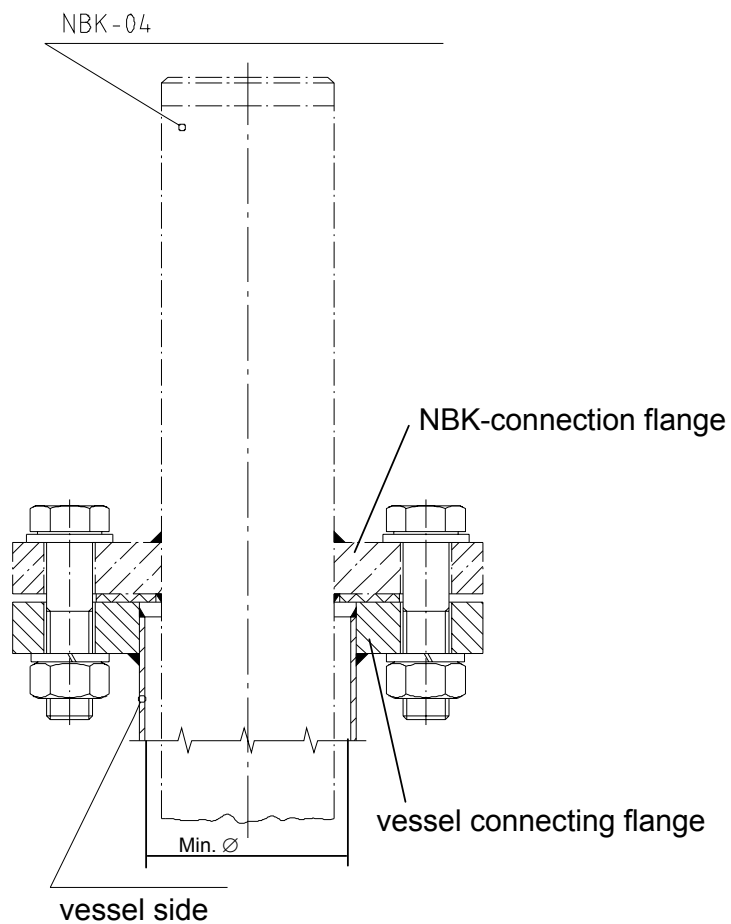


Remove the cotter pin from bottom end of the submerged portion of the measuring tube. Next, remove the transport lock of the float. Fix the float with the magnet system towards top and make sure, there are no remains of packing material or other impurities inside the tube.

Set the cotter pin back and split it to secure. Secure the measurement system by means of a connecting flange on your container/drum/vessel. Should the NBK be subjected to constant shock or strong vibrations, it is recommended that the instrument will be secured with damping-rubber tube clips. In any case, the over-head tube should never be welded onto the tank.

Required Minimum Tank Opening Sizes

Over-Head Level Indicator

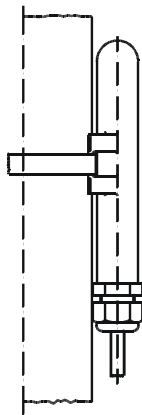


Flange	Diameter Ø NBK-04-tube	Min. required diameter Ø of the vessel opening
PN 16 DN 65/ 2 ½" ANSI	Ø 76,1mm (3.0")	Ø 88,9 x 2 mm (3.7")
PN 16 DN 50/ 2" ANSI	Ø 60,3mm (2.4")	Ø 76,1 x 2 mm (3.2")

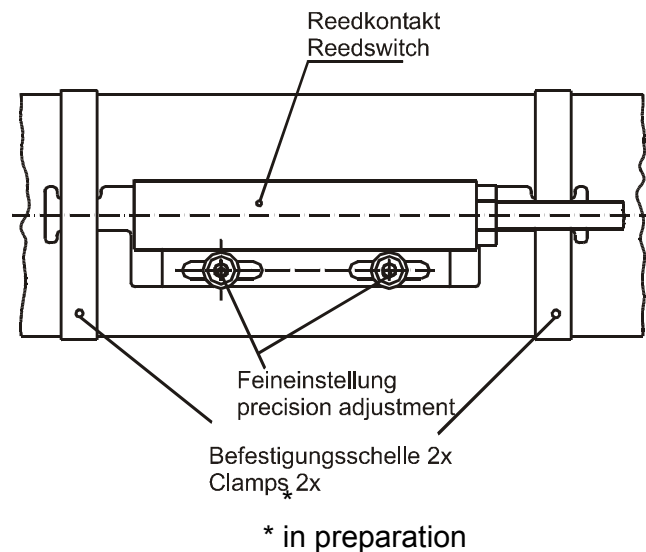
Reed Contacts

- The reed switch, if provided is not mounted on the indicator for shipping. It is to be fastened and secured with the help of supplied pipe clamp (EX-contact: two clamps) which slip beneath the roller display and wrap around the measuring tube of the roller display (see attached: fastening instructions)
- The switch contacts may be installed at any point on the measuring tube to achieve the desired setpoint.
- The cable connection must be pointing downwards.
- The switch must remain firmly positioned against the level tube.
- The switch may not function properly if a gap exists between the switch and the measuring tube.

Standard-Reed-Contact



EX-Contact*

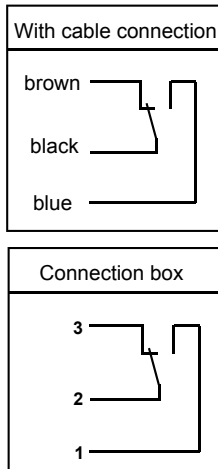


Level Transducer

The transducer is typically mounted at the factory. If it is not, mount and tighten the transducer, on the over-head tube using pipe clamps included with the shipment. The transducer must cover the full measurement range. The cable terminal box is situated at the top of the installation.

7. Electrical Connection

7.1. Switch (option)



Connect switch (if available) according to the diagram.

When switching inductive loads, such as, contactors, relays, etc, electrical limit values should not be exceeded (even for short periods) e.g. by voltage peaks. The use of a contact protection relay is recommended to avoid overloading the reed contacts.

Valid regulations for hazardous areas and installation regulations, should be observed when installing the NBK level indicator in hazardous areas.

7.2. Reed Contact Resistor Chain (option ..W..)

- Ensure that the electrical supply lines are de-energized.
- To avoid faults caused by electrical fields from other circuits, the cable should not be laid in conduits with power cables.
- Unscrew cover and pull supply lines through cable gland.
- Connect the transmitter to the electronics according to the following table.

	Transducer "top"	Transducer "bottom"	Variable Tap	
Silicon cable	White	brown	green	
PVC cable	White	brown	green	
FEP cable	Brown	blue	black	
Terminal box	Terminal 1	terminal 2	terminal 3	
Internal*	Yellow	red	black	

***Please note: The colors of internal cables are for internal connections only and therefore can only be seen in transducers with terminal box.**

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

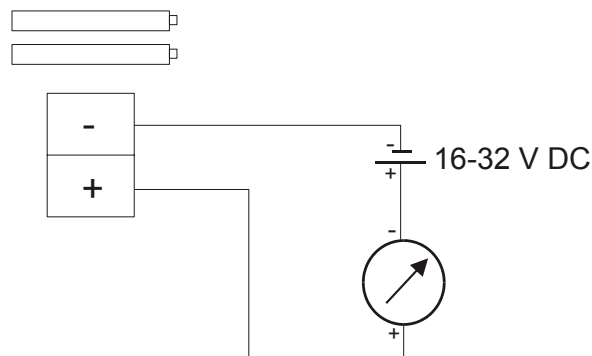
Service in hazardous areas

To operate the transducer in hazardous areas, the measuring circuit must contain the appropriate intrinsic safety barrier to separate intrinsically safe circuits from non-intrinsically safe circuits. Specially designed liquid level transducers with a total resistance of 40 k Ohm are required for this purpose. Only the resistive transducer (option W) can be installed in hazardous locations. Resistive transducers with transmitter and the magnetostrictive transducers are not suitable for installation in hazardous locations.

CAUTION: Installers must be familiar with all local and national codes concerning electrical device installation in hazardous locations.

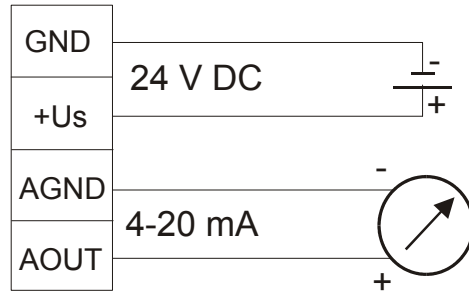
**7.3. Transducer: Resistor Chain with 2-wire
(option ..M..)****Transmitter**

- Ensure that the electrical supply lines are de-energized.
- To avoid faults caused by electrical fields from other circuits, the cables should not be laid in conduits with power cables.
- Unscrew cover and pull supply lines through the cable gland.
- Connect the transmitter according to the terminal connection diagram below.



7.4. Transducer: Magnetostrictive Pick-up with 4-wire Transmitter (option ..T..)

- Ensure that the electrical supply lines are de-energized.
- To avoid faults caused by electrical fields from other circuits, the cables should not be laid in conduits with power cables.
- Unscrew cover and pull the supply lines through the cable gland.
- Connect the transmitter according to the terminal connection diagram below.



8. Startup

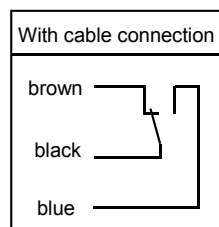
Fill vessel, and switch on the electrical controller, if present.
The entering liquid lifts up the float and thus the coupled magnet actuator. The roller indicator indicates the liquid level.

Commissioning of electrical 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).

	black (2) / blue (1)	black (2) / brown (3)
float above	closed	open
float below	open	closed



The float must pass the switch once in both directions so that the switching function is in line with the wiring diagram and table on page 10.

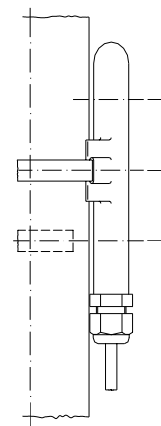
Note that the switch cable must point downwards.

These instructions are often ignored when an alarm lamp is connected and it is assumed that the switch is damaged.

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

Hysteresis

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



9. Trouble Shooting

Error: The tank is full but there is no indication

- Check that the float is present in the system.
- If the float is present, check whether it is being blocked by foreign objects or dirt deposits.
- Check the op. SG of the float and the medium if the liquid density is too low for the float it will sink and not provide indication.

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

- Check that the density of the liquid is in accordance with the density prescribed on the indicator nameplate.
- Check that the float has been correctly installed.
- Check if dirt deposits in the over-head tube are blocking the float.

10. Technical Information

Over-head tube:	Ø 60.3 mm x 2 mm
Dip pipe:	Ø 60.3 mm x 2 mm or Ø 76.1mm x 2mm
Measuring start:	270 mm from tube end
Material:	St. Steel 316
Float:	Titanium
Connecting rod:	rod or tube made of Titanium or St. Steel 1.4571 (dependant on density and measuring length)
Flange:	DIN DN 50 or 65, PN 16 ANSI 2" or 2 1/2", 150 lbs
Max. operating pressure	PN 16/ 230 PSIG
Max. operating temperature:	up to 120 °C / 250°F
Viscosity:	max. 200 Centipoise
Measuring length:	min. 600 mm / 24 inches Max. 4000 mm / (160 inches)
Overall length:	according to meas. length, see dimensions
Min. liquid SG:	0.43
Roller indication:	aluminium section with polypropylene rollers

Limit contacts model NBK-R, NBK-REx*

Contact function:	bistable changeover contact
Switching hysteresis:	approximately 15 mm
Housing:	polycarbonate
Protection class:	IP 67 / NEMA 4X
Max. switching capacity:	60 W/VA; 230 V _{AC/DC} ; 1 A (NBK-R) 20 W/45 VA; 220 V; 0.4A (NBK-REx)
Electrical connection:	3 m PVC cable
Ambient temperature:	max. 75 °C
Protection:	IP 67

Resistive Level Transducer option: ...W...

Total resistance:	approximately 5 k Ω
Measuring-circuit voltage:	max. 24 V _{DC}
Measuring current:	max. 0.1 A
Medium temperature:	max. 200 °C / 390°F
Ambient temperature:	max. 130 °C / 265°F
Resolution:	10 mm (ML<2000 mm) 20 mm (ML \geq 2000 mm)
Protection:	IP 65 / NEMA 4

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

Output:	4-20 mA
Power supply:	16-32 V _{DC}
Load:	(U _B -9V) /0.02A [Ω]
Medium temperature:	max. 130 °C / 265°F
Ambient temperature:	max. 80 °C / 176°F
Resolution:	10 mm (ML<2000 mm) 20 mm (ML \geq 2000 mm)
Protection:	IP 65 / NEMA 4

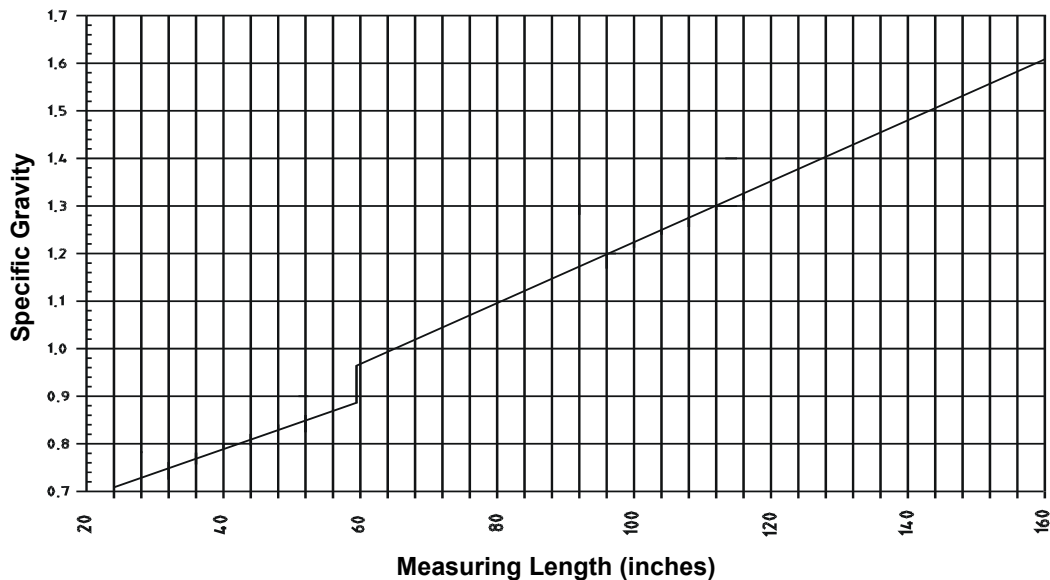
Transducer- model: ...T...**Magnetostrictive pick-up with 4-wire transmitter**

Supply voltage:	24 V _{DC} , max. 150 mA
Output:	4-20 mA, 4-wire
Load:	max. 500 Ω
Accuracy:	\pm 1mm
Max. length:	4000 mm
Medium temperature:	max. 120 °C / 250°F
Ambient temperature:	max. 80° C / 176°F
Protection:	IP 65 / NEMA 4

11. Allowable Density Vs Length of Measuring Tube

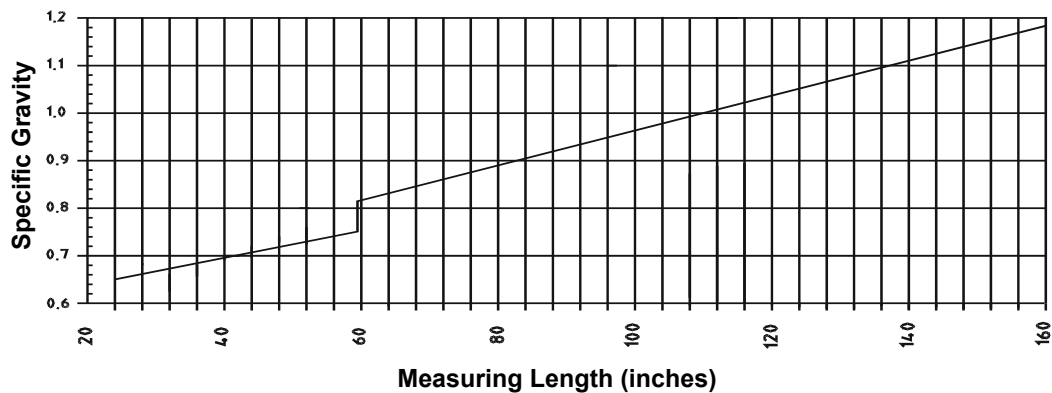
Use the graphs below to determine the proper float/fitting combination based on the process liquid specific gravity and desired measuring length. The graphs give the minimum allowable liquid specific gravity versus desired measuring length for float styles 9, 7 and 5. Choose the float style to ensure that the minimum allowable specific gravity is less than the process liquid specific gravity for the desired measuring length. Acceptable specific gravity per length combinations are located above the line.

NBK-04...9, St. Steel Float



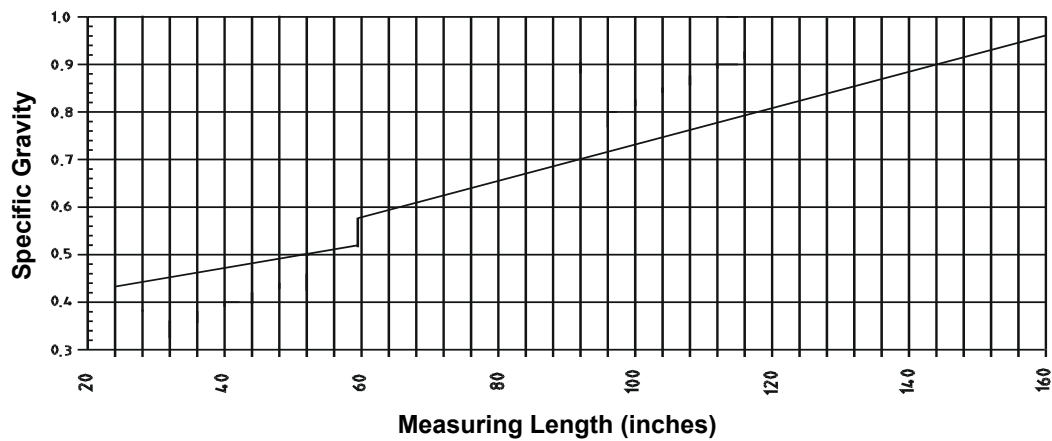
NBK-04 ...8:	Float:	Titanium
	Connecting rod:	316 SS
	Process connection:	DIN flange PN 16, DN 50
		ANSI flange, 150 lbs, 2"
	Bypass tube:	Ø 60.3 mm, continuous
	Min. SG:	0.71 g/cm ³

NBK-04...7, Titanium Float



NBK-04 ...6:	Float:	Titanium
	Connecting rod:	Titanium
	Process connection:	DIN flange PN 16, DN 50
		ANSI flange, 150 lbs, 2"
	Bypass tube:	Ø 60.3 mm, continuous
	Min. SG:	0.65 g/cm ³

NBK-04...5, Titanium Float



NBK-04 ...4:	Float:	Titanium
	Connecting rod:	316 SS
	Process connection:	DIN flange PN 16, DN 65
		ANSI flange, 150 lbs, 2 1/2"
	Bypass tube:	Ø 60.3 mm
	Tank tube:	Ø 76.1 mm
	Min. SG:	0.43

12. Order Codes

Order details: (Example: **NBK-04 F50 000 8**)

Model	Material	Connection and nominal size	Roller indication	Transmitter	Medium density and measuring length
NBK-04...	Stainless steel 1.4571	F50=DIN-flange DN 50 A50=ANSI-flange 2"	00=without RP=PP-rollers	0= without W= chain of resistors M= chain of resistors with head mounted transmitter T= magnetostrictive 6*= without transmitter, ATEX-II 2G EEx d 7*= without transmitter, ATEX-II 1G EEx d 8*= with chain of resistors, ATEX-II 1G EEx ia IIC 9*= with chain of resistors, ATEX-II 1G EEx ia IIC (transmitter) ATEX-II 1G EEx d (standpipe, internal)	8=see diagram 8 6=see diagram 6
		F65=DIN-flange DN 65 A65=ANSI-flange 2 1/2"	00=without RP=PP-rollers		4=see diagram 4
NBK-R	Standard limit contact (bistable changeover contact)				
NBK-REx	Limit contact- EEx d IIC T6				

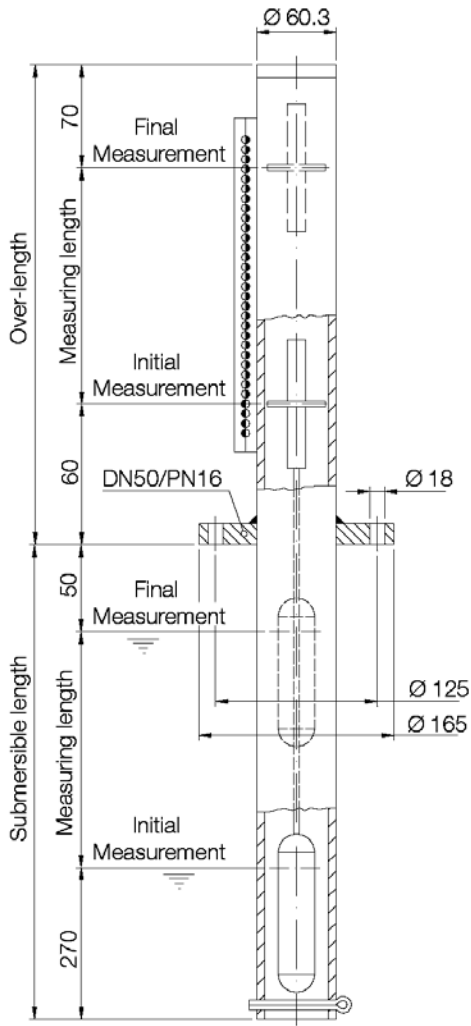
*ATEX-approval in preparation, not in conjunction with PP-roller indication.
Please specify measuring length L, pressure and temperature in writing!

13. Maintenance

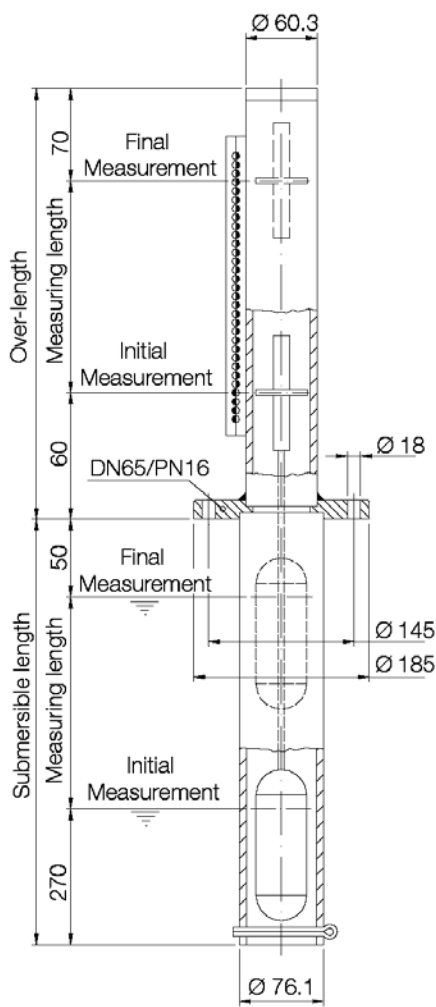
Should any incrustations or crystallisation particles deposit inside the immersion tube, the measuring system must be removed and mechanically cleaned.
The sight glass of the roller indication is made of high-quality plexiglass and it should be cleaned with a suitable detergent if necessary.
The indicator requires no further maintenance.

14. Dimensions (millimetres)

NBK-04...F50...



NBK-04...F65...



15. Declaration of Conformance

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

Over-Head Level Indicator **Model: NBK-04...**

is in conformity with the following EWG guidelines

97/23/EG **PED**
notified body: Germanischer Lloyd Germany

Model	Over-length*	p max [bar]	Medium no dangerous (diagr. 2)	Medium dangerous (diagr. 1)
NBK-04	≤ 645	16	Art.3, Para.3	Art.3, Para.3
NBK-04	≤ 1270	16	Art.3, Para.3	I
NBK-04	≤ 4230	16	I	II

* see dimensions in section 14

Signed:

H. Peters

M. Wenzel

date: 02.10.03