

# Level Indicator for Tank-Top Mounting



measuring  
•  
monitoring  
•  
analyzing

## NBK-04



- Max. Measuring Length: 13'
- $p_{max}$ : 230 PSI
- $t_{max}$ : 250 °F
- Max. Viscosity: 200 cPs
- Connection: ASME B16.5  
Flange 2" or 2-1/2"
- Material: 316-Ti Stainless Steel
- Roller Display / Ball Display
- Limit Contacts
- Analog Outputs



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### Description

KOBOLD NBK-04 level indicators are used for continuous measurement, display, and monitoring of liquid levels. The measuring/indicating tube is mounted to the top of a tank. According to the laws of hydrostatic pressure, the level displayed on the indicating tube will follow the level in the tank. A float with an attached guide rod and circular magnet, is located within the measuring tube and follows the liquid level, transferring the level in a non-contacting manner via the guide rod and magnet to a display, transmitter, or switch attached to the outside of the indicating tube.

The following indication and sensing devices are available:

### Magnetic Roller Indicator

As the float moves, 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 advantage of ball display is the higher protection category, good visibility of 180° and higher vibration resistance with filled version. The level in a tank or a mixer is continuously displayed as a red column, even when the power fails.

### Transmitter

To remotely sense the level, a transmitter with a chain of resistors or a magnetostrictive transducer can be mounted outside the indicating tube. A continuous standard signal of 4 ... 20 mA is generated by means of a fitted transmitter. This standard signal can then be displayed on analog or digital indicating devices. Optionally, HART®, PROFIBUS®-PA or Foundation™ Fieldbus communication protocols are possible.

### Universal Indicating Unit

A universal indicating unit, series ADI-1, can be mounted on the indicating tube to display and evaluate the standard signal (4 ... 20 mA) generated by the transmitter.

### Limit Contacts

One or more reed contacts, for point level sensing or for level control, can be mounted to the indicating tube.

### Applications

- Storage Tanks
- Tanks on Ships
- Agitator Vessel
- Water Tanks

### Technical Details

<b>Over-Head Tube:</b>	Ø 2.374"
<b>Tank Tube:</b>	Ø 2.374" or Ø 2.996"
<b>Material:</b>	316-Ti Stainless Steel
<b>Initial Measurement:</b>	10.7" from End of Tank Tube
<b>Float:</b>	Titanium
<b>Connecting Rod:</b>	Rod or Tube in Titanium or 316-Ti SS (Depending on Media Density and Measuring Length)
<b>Flange Nominal Size:</b>	2" ANSI Flange or 2-1/2" ANSI Flange
<b>Operating Pressure:</b>	230 PSIG
<b>Operat. Temperature:</b>	-58...248 °F
<b>Viscosity:</b>	Max. 200 cPs
<b>Measuring Length:</b>	23.62" ... 157.4"
<b>Total Length:</b>	See Dimensional Drawing
<b>ATEX Approval:</b>	See Separate Description

<b>Roller Display RP</b>	(Max. Continuous Length 13')
<b>Roller Material:</b>	Polypropylene
<b>Display Glass:</b>	Plexiglas®
<b>Carrier Frame:</b>	Aluminum, Anodized
<b>Operat. Temperature:</b>	32...248 °F
<b>Protection:</b>	IP 54

<b>Ball Display - Model KP</b>	(Max. Continuous Length 12.4')
<b>Ball Material:</b>	Ultramid™
<b>Sight Tube:</b>	Plexiglas®
<b>Sealing Plug:</b>	Aluminum
<b>Seal:</b>	NBR
<b>Ball Support Rail:</b>	Aluminum, Anodized
<b>Carrier Frame:</b>	304 Stainless Steel
<b>Scale:</b>	Hard-PVC, 304 Stainless Steel (Option MV)
<b>Operat. Temperature:</b>	-4 ... 176 °F
<b>Protection:</b>	IP 66

<b>Ball Display - Model KM</b>	(Max. Continuous Length 12.4')
<b>Ball Material:</b>	Ultramid B®
<b>Sight Tube:</b>	Makrolon®
<b>Sealing Plug:</b>	Aluminum
<b>Seal:</b>	FKM
<b>Ball Support Rail:</b>	Aluminum, Anodized
<b>Carrier Frame:</b>	304 Stainless Steel
<b>Scale:</b>	Hard-PVC, 304 Stainless Steel (Option MV)
<b>Operat. Temperature:</b>	-58 ... 248 °F
<b>Protection:</b>	IP 66



**Ball Display - Option KF** (Max. Continuous Length 12.4")  
**Filling:** Silicone Oil  
**Ball Material:** Ultramid B®  
**Sight Tube:** Makrolon®  
**Sealing Plug:** 304 Stainless Steel  
**Seal:** FKM  
**Ball Support Rail:** Aluminum, Anodized  
**Carrier Frame:** 304 Stainless Steel  
**Scale:** Hard-PVC,  
 304 Stainless Steel (Option MV)  
**Operat. Temperature:** -58...248 °F  
**Protection:** IP 66

**Ball Display - Option KG** (Max. Continuous Length 9.8")  
**Material Ball:** Ultramid B®  
**Sight Tube:** Borosilicate Glass  
**Sealing Plug:** 304 Stainless Steel  
**Seal:** FKM  
**Ball Support Rail:** Aluminum, Anodized  
**Carrier Frame:** 304 Stainless Steel  
**Scale:** 304 Stainless Steel  
**Operat. Temperature:** -4...250 °F  
**Protection:** IP 66

\* In case of multi-part design, a display (ball) length of 1.3" is not readable

**Limit Contacts - Model NBK-R**  
**Contact Operation:** Bistable SPDT Contact  
**Switching Hysteresis:** Approx. 15 mm  
**Max. Switch Capacity:** 60 W/VA, 230 V<sub>AC/DC</sub>, 1 A  
**Resistance:** 100 mΩ  
**Media Temperature:** -40...212 °F  
**Ambient Temperature:** -40...167 °F  
**Connection:** 9.8' PVC-cable  
**Housing:** Polycarbonate  
**Protection:** IP 67

**Limit Contact High Temperature - Model NBK-RT200**  
**Contact Operation:** Bistable SPDT Contact  
**Switching Hysteresis:** Approx. 15 mm  
**Max. Switching Capacity:** 80 VA, 250 V<sub>AC/DC</sub>, 1 A  
**Resistance:** <20 mΩ  
**Media Temperature:** -40...248 °F  
**Ambient Temperature:** -40...293 °F  
**Housing:** Aluminum Pressure-cast,  
 Terminal Connection  
**Cable Entry:** M16 x 1.5, Brass Nickel-plated  
**Protection:** IP 65

**Limit Contact - Model NBK-RV200NO**  
**Sensor Type:** Reed Contact  
**Switching Pattern:** Normally Open, Bistable  
**Switching Hysteresis:** Approx. 7 mm  
**Media Temperature:** -58...248 °F  
**Ambient Temperature:** -40...158 °F  
**Max. Housing Temperature:** 176 °F  
**Max. Operating Voltage U<sub>max</sub>:** 400 V<sub>DC</sub> / 250 V<sub>AC</sub>  
**Max. Load Current I<sub>max</sub>:** 0.5 A  
**Max. Switching Power P<sub>max</sub>:** 5 W  
**Housing:** Aluminum Pressure-cast,  
 Terminal Connection  
**Protection:** IP 65

**Limit Contact - Model NBK-RV200NC**  
**Sensor Type:** Reed Contact  
**Switching Pattern:** Normally Closed, Bistable  
**Other Parameters:** Same as NBK-RV200NO

**Limit Contact - Model NBK-RN200NO**  
**Sensor Type:** NAMUR Contact  
**Switching Pattern:** Normally Open, Bistable  
**Max. Operating Voltage U<sub>max</sub>:** 15 V<sub>DC</sub>  
**R<sub>on</sub>:** 1 kΩ  
**R<sub>off</sub>:** 11 kΩ  
**Other Parameters:** Same as NBK-RV200NO

**Limit Contact - Model NBK-RN200NC**  
**Sensor Type:** NAMUR Contact  
**Switching Pattern:** Normally Closed, Bistable  
**Other Parameters:** Same as NBK-RV200NO

**Reed Contact Resistor Chain - Option ..W..**  
**Total Resistance:** 0.7 ... 7 kΩ  
**Meas. Circuit Volt.:** Max. 24 V<sub>DC</sub>  
**Measuring Current:** Max. 0.1 A  
**Max. Length:** 13"  
**Media Temperature:** -40...248 °F  
**Ambient Temp.:** Max. 266 °F  
**Resolution:** 0.4" (ML < 6.5")  
 0.8" (ML ≥ 6.5")  
**Housing:** Aluminum Pressure-cast  
**Cable Gland:** M16x1.5  
**Protection:** IP 65



**Reed Contact Resistor Chain with 2-Wire Transmitter - Option ..M**

Output: 4 ... 20 mA  
 Supply Voltage: 16 ... 32 V<sub>DC</sub>  
 Max. Length: 13.1'  
 Load: (V<sub>Vers</sub> - 9 V) / 0.02 A [Ω]  
 Media Temperature: -40 ... 248 °F  
 Ambient Temp.: -4 ... 176 °F  
 Resolution: 0.4" (ML < 6.5')  
 0.8" (ML ≥ 6.5')  
 Housing: Aluminum Pressure-Cast  
 Protection: IP 65

**Magnetostrictive Sensor with 4-Wire Transmitter, 4..20 mA - Option ..T..**

Output: 4 ... 20 mA  
 Supply Voltage: 24 V<sub>DC</sub>, Max. 150 mA  
 Load: Max. 500 Ω  
 Max. Length: 13.1'  
 Media Temperature: -40 ... 248 °F  
 Ambient Temperature: -4 ... 176 °F  
 Accuracy: ±1 mm  
 Housing: Aluminum Pressure-Cast  
 Protection: IP 65

**Reed Contact Resistor Chain with 2-Wire Transmitter, 4... 20 mA - Option A (Only with Display Options AE or AC)**

Transmitter Model: 5333D  
**Common Specifications:**  
 Power Supply: 8.0 ... 35 V<sub>DC</sub>  
 Communication  
 Interface: Loop Link  
 Linear Resist. Input: 0 ... 10 kΩ  
**Current Output**  
 Signal Range: 4 ... 20 mA  
 Min. Signal Range: 16 mA  
 Updating Time: 135 ms  
 Load Resistance: ≤ (V<sub>supply</sub> - 8) / 0.023 [Ω]  
**Sensor Error Detection**  
 Programmable: 3.5 ... 23 mA  
 Media Temperature: -40 ... 248 °F  
 Ambient Temperature: -4 ... 176 °F  
 Resolution: 0.4" (ML < 6.5')  
 0.8" (ML ≥ 6.5')  
 Housing: Aluminum Pressure-cast  
 Cable Entry: M 20 x 1.5  
 Protection: IP 66  
**LED or LCD Display (Options AE/AC):**  
 Power Supply: Loop-powered  
 Voltage: LED 3.3 V at 4 mA  
 3.7 V at 20 mA  
 LCD max. 2.5 V

**Reed Contact Resistor Chain with 2-Wire Transmitter, 4... 20 mA, HART® - Option H and Display Options HE or HC**

Transmitter Model: 5337D  
**Common Specifications:**  
 Power Supply: 8.0 ... 35 V<sub>DC</sub>  
 Communication  
 Interface: Loop Link 5905A and HART®

Linear Resist. Input: 0 ... 7 kΩ  
**Current Output**  
 Signal Range: 4 ... 20 mA  
 Min. Signal Range: 16 mA  
 Updating Time: 440 ms  
 Load Resistance: ≤ (V<sub>supply</sub> - 8) / 0.023 [Ω]  
**Sensor Error Detection**  
 Programmable: 3.5 ... 23 mA  
 Media Temperature: -40 ... 248 °F  
 Ambient Temperature: -4 ... 176 °F  
 Resolution: 0.4" (ML < 6.5')  
 0.8" (ML ≥ 6.5')  
 Housing: Aluminum Pressure-cast  
 Cable Entry: M 20 x 1.5  
 Protection: IP 66  
**LED or LCD Display (Options HE/HC):**  
 Power Supply: Loop-powered  
 Voltage Drop: LED 3.3 V at 4 mA  
 3.7 V at 20 mA  
 LCD max. 2.5 V

**Reed Contact Resistor Chain with Transmitter, - Option F (PROFIBUS®-PA, FOUNDATION™ Fieldbus)**

Transmitter Model: 5350A  
**Common Specifications:**  
 Supply Voltage: 9 ... 32 V<sub>DC</sub>  
 Consumption: < 11 m  
 Isolation Voltage, Test / Operation: 1.5 kV<sub>AC</sub> / 50 V<sub>AC</sub>  
 Signal / Noise Ratio: Min. 60 dB  
 Response Time (Programmable): 1 ... 0 s  
 Updating Time: < 400 ms  
 Dimension: Ø 44 x 20.2 mm  
 Linear Resistance Input: 0 ... 10 kΩ  
**Output:**  
**FOUNDATION™ Fieldbus Connection:**  
 FOUNDATION™  
 Fieldbus Version: ITK 4.51  
 FOUNDATION™  
 Fieldbus Capability: Basic or LAS  
 FOUNDATION™  
 Fieldbus Func. Blocks: 2 Analog and 1 PID  
**PROFIBUS® PA Connection:**  
 PROFIBUS® PA  
 Protocol Standard: EN 50170 vol. 2  
 PROFIBUS® PA  
 Function Blocks: 2 Analog  
 PROFIBUS® PA  
 Address (at Delivery): 126  
 Media Temperature: -40 ... 248 °F  
 Ambient Temperature: -4 ... 176 °F  
 Resolution: 0.4" (ML < 6.5')  
 0.8" (ML ≥ 6.5')  
 Housing: Aluminum Pressure-cast  
 Cable Entry: M 20 x 1.5  
 Protection: IP 66



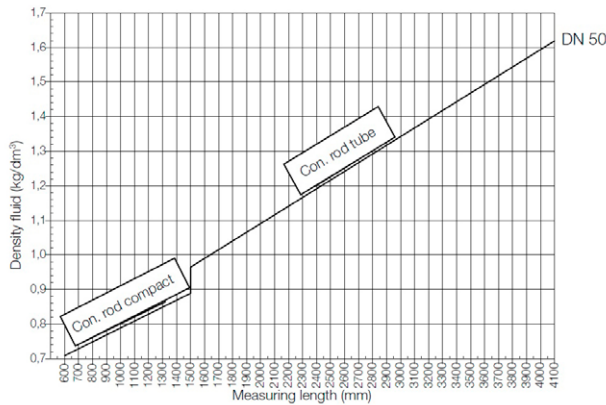
Order Details (Example: NBK-04 F50 00 0 8) (continued on page 6)

Model	Connection Type	Indicator Type	Output Transmitter Type	Media Density per Meas. Length
NBK-04..	..A50.. = ASME Flange 2"	..00.. = without ..RP.. = PP-roller Indication ..KP.. = Ball Display with Plexiglas® Sight Tube	..0.. = without ..W.. = Reed Chain ..M.. = Reed Chain/4...20 mA, 2-wire ..T.. = Magnetostrictive Probe/4...20 mA, 4-wire	..8 = See Diagram 8 ..6 = See Diagram 6
	..A65.. = ASME Flange 2-1/2"	..KM.. = Ball Display with Makrolon® Sight Tube ..KF.. = as KM but with Oil Filling ..KG.. = Ball Display with Borosilicate Sight Tube	..A <sup>1)</sup> .. = Reed Chain/ 4...20 mA, 2-wire ..H.. = Reed Chain/ 4...20 mA, HART® ..F.. = Reed Chain/ Profibus® PA, Fieldbus® FOUNDATION™	..4 = See Diagram 4
<b>Accessory Switches (to be ordered separately)</b>				
NBK-R	Standard limit contact (Bistable SPDT Contact)			
NBK-RT200	High temperature limit contact (Bistable SPDT contact), max temperature 248°F			
NBK-RV200NO	High vibration limit contact (Bistable N/O contact), max temperature 248°F			
NBK-RV200NC	High vibration limit contact (Bistable N/C contact), max temperature 248°F			
NBK-RN200NO	High vibration limit contact (Bistable NAMUR N/O contact), max temperature 248°F			
NBK-RN200NC	High vibration limit contact (Bistable NAMUR N/C contact), max temperature 248°F			

<sup>1)</sup> Only with Options AE or AC

**NBK-04...8:**

Diagram 8\*

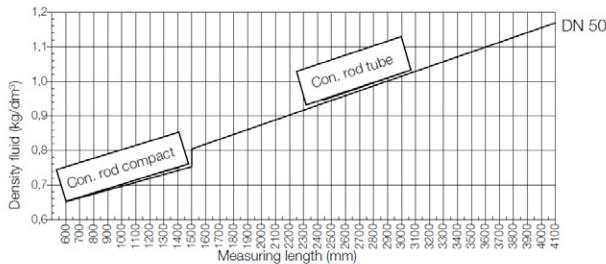


**NBK-04...8**

**Float:** Titanium  
**Connection Rod:** 316-Ti Stainless Steel  
**Process Connection:** ASME Flange, 2"  
**Overhead/Tank Tube:** Ø 2.374", Continuous  
**Min. Media Density:** 0.71 kg/dm<sup>3</sup> at ML = 23.62"

**NBK-04...6:**

Diagram 6\*

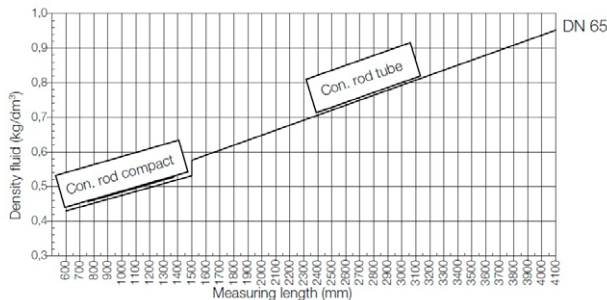


**NBK-04...6**

**Float:** Titanium  
**Connection Rod:** Titanium  
**Process Connection:** ASME Flange, 2"  
**Overhead/Tank Tube:** Ø 2.374", Continuous  
**Min. Media Density:** 0.65 kg/dm<sup>3</sup> at ML = 23.62"

**NBK-04...4:**

Diagram 4\*





**NBK-04...4**

**Float:** Titanium  
**Connection Rod:** 316-Ti Stainless Steel  
**Process Connection:** ASME Flange, 2 1/2"  
**Overhead/Tank Tube:** Ø 2.374", Ø 2.996"  
**Min. Media Density:** 0.43 kg/dm<sup>3</sup> at ML = 23.62"

\* Valid specific gravity per length combinations are located above the line.

No responsibility taken for errors; subject to change without prior notice.

**Options**

Code	Description	Diagram/Picture
<b>Scales</b>		
(Ball displays are always delivered with scales, see technical data / sketch for resolution)		
<b>MV</b>	Scale Made of 304 Stainless Steel (Only with Ball Display Models KP/KM/KF as it's Standard with Model KG)	See Sketch Page 8
<b>M1</b>	Measuring Scale, Media Temperature - 40...250 °F, Engraved Scale Made of Aluminum	See Sketch Page 8
<b>M2</b>	Measuring Scale, Media Temperature - 40...250 °F, Scale Backing Made of Laser-etched Aluminum	See Sketch Page 8
<b>Electrical Outputs</b>		
<b>MU</b>	Option M with Connection Box at Bottom, for Easy Access to Connection Box	See Sketch Page 10
<b>Display Options</b>		
<b>AE</b>	Aluminum Die-cast Housing, LED Digital Display, Connection Box at Bottom (only in Combination with Transmitter Option A)	
<b>AC</b>	Aluminum Die-cast Housing, LCD Digital Display, Connection Box at Bottom (only in Combination with Transmitter Option A)	Same as AE, however with LCD Display
<b>HE</b>	Aluminum Die-cast Housing, LED Digital Display, Connection Box at Bottom (only in Combination with Transmitter Option H)	
<b>HC</b>	Aluminum Die-cast Housing, LCD Digital Display, Connection Box at Bottom (only in Combination with Transmitter Option H)	Same as HE, however with LCD Display
<b>C<sup>1)</sup></b>	Indicating Unit ADI-1V00W2F0 with Bargraph and Digital Display, Rugged Aluminum Housing, Mounted on Indicating Tube	See Sketch Page 10
<b>Tests/Certificates</b>		
<b>P</b>	Radiographic Examination DIN 54 111 T1	
<b>Q</b>	Dye Penetration Test DIN EN 571-1	
<b>X</b>	Pressure Test with Water 1.5 x PN	
<b>Z</b>	3.1 Sketch Acc. EN 10204	
<b>MR</b>	Material Acc. to NACE MR 0103/ISO15156 (MR0175), Declaration of Conformance	
<b>WV</b>	Positive Material Identification (PMI)	
<b>SF</b>	Oil and Fat Free	

<sup>1)</sup> only possible with option T (magnetostrictive sensor or option M (reed chain with transmitter)

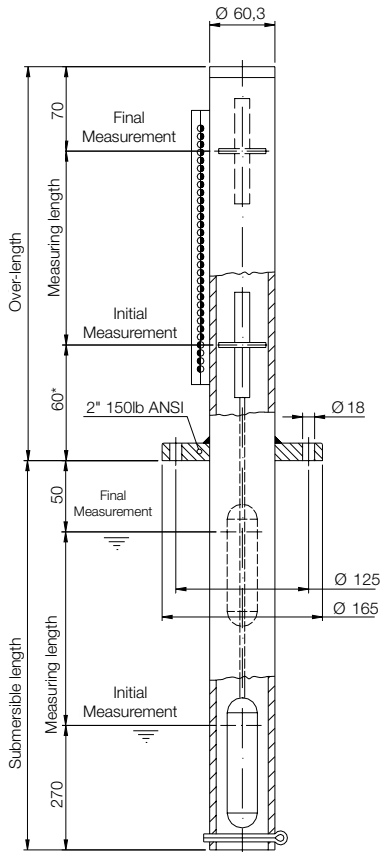
**Note:** Please pay attention to max. permissible temperature limits of individual components

**\*Additional Information Required for Order:**

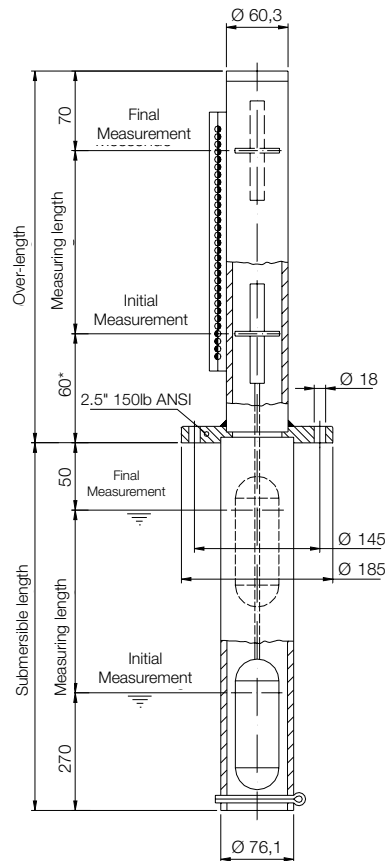
To ensure proper operation, this product requires a completed application guide form to be submitted with any order. Please refer to the 'documentation' tab on the bottom of the product page for this product on our website in order to obtain the correct form. You can also contact your KOBOLD representative for this form.

**Dimensions (mm)**

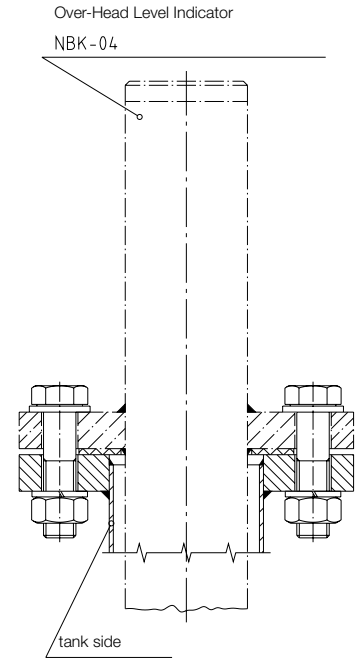
**NBK-04..A50..**



**NBK-04..A65..**



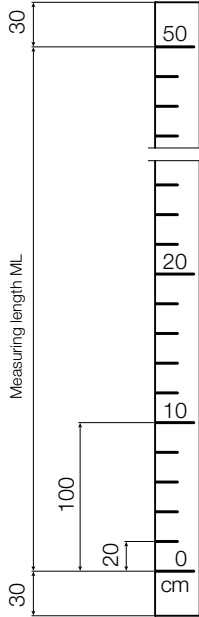
**Required Size of the Mounting Tube of the Vessel Side**



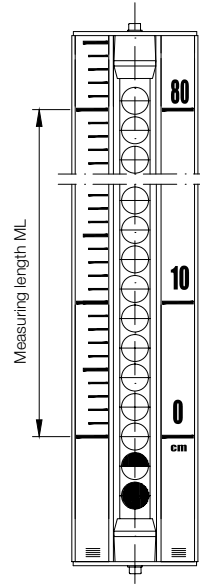
\* In case of using a transmitter: dimension = 80 mm  
 Submersible length = measuring length +320 mm  
 Measuring length = submersible length -320 mm

Flange	Ø NBK-04 Tube	Minimum-Ø of the Mounting of the Tank Side
2.5" ANSI	Ø 76.1 mm	Ø 88.9 mm x 2
2" ANSI	Ø 60.3 mm	Ø 76.1 mm x 2

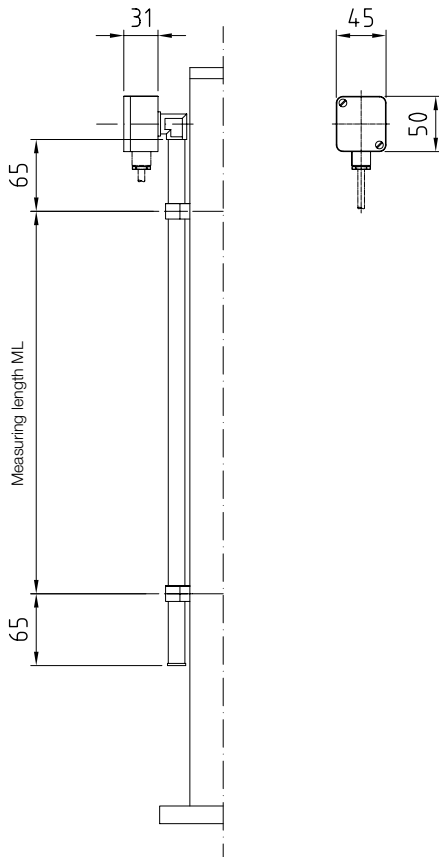
Measuring Scale, Aluminum  
 Option M1 - Engraved Scale  
 Option M2 - Polyester Foil



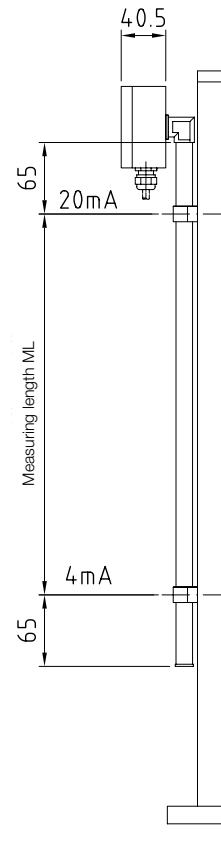
Measuring Scale on Stainless Steel Carrier  
 Scale from Hard PVC or Print on 304 SS  
 (Standard Scale with Ball Display)



NBK-04.. with Reed Chain Model W

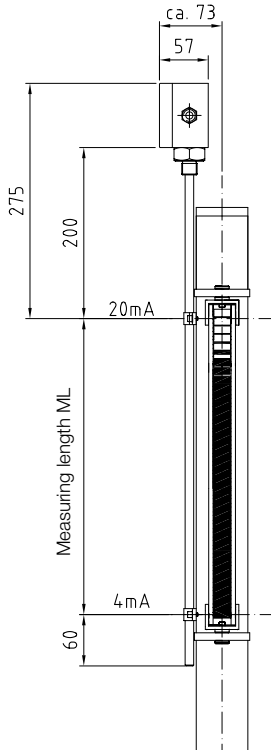


NBK-04.. with Transmitter Model M

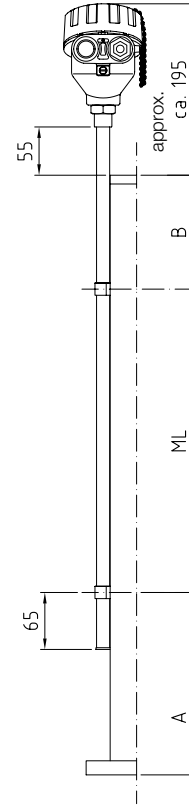




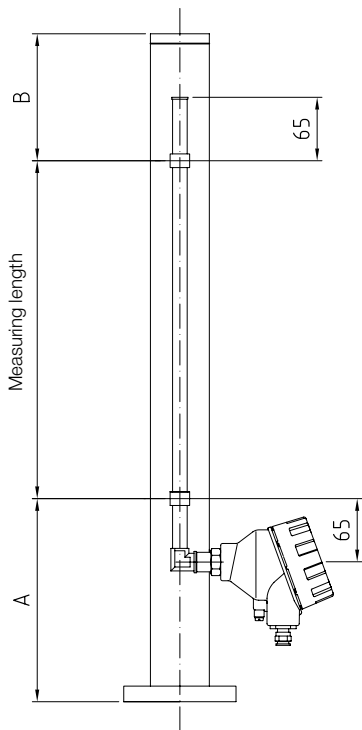
NBK-04.. with Transmitter Model T



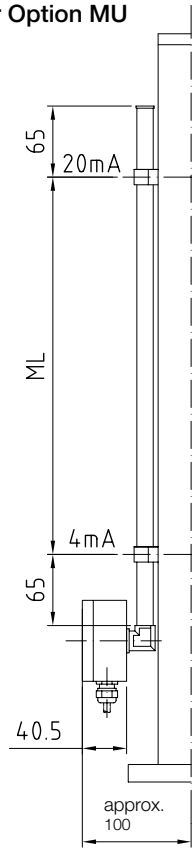
NBK-04.. with Transmitter Options H/F



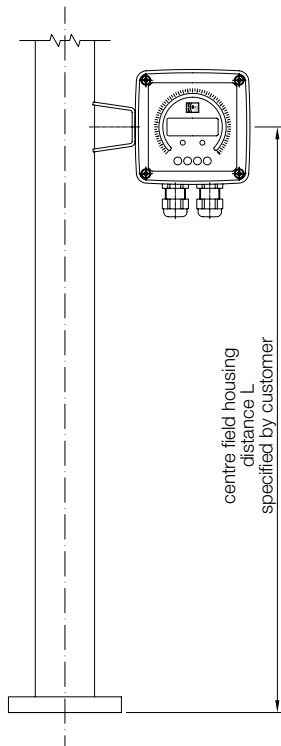
NBK-04.. with Transmitter Display Options AE/HE or AC/HC



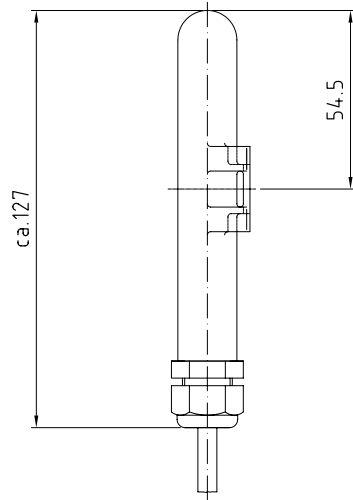
NBK-04.. with Transmitter Option MU



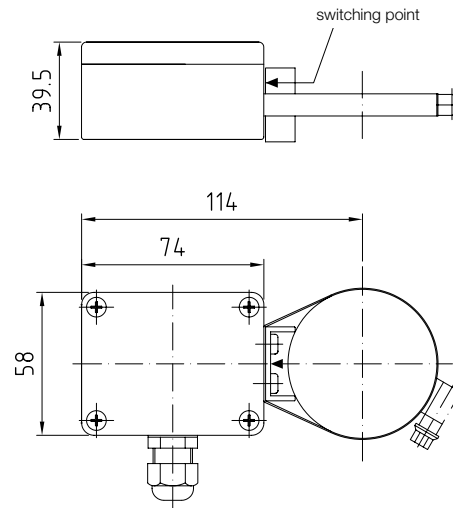
NBK-04...with Indicating Unit ADI-1V..2F, Option C



NBK-R



NBK-RT200



NBK-RV/RN

