Over-Head Level Indicators

NBK-04-ATEX

NBK-RE

NBK-RD

- Measuring length: max. 4000 mm
- p_{max}: PN 16/CL150
- Temperatur: -20 ... +120 °C (POM roller)
  -104 ... +120 °C (ball display)
- Viscosity: max. 200 mm²/s
- Connection:
  DIN EN 1092-1 flange DN 50/65/80/100
  ASME B16.5 flange 2", 2½", 3", 4"
- Material: stainless steel 1.4571
- Insensitive roller display/ball display without auxiliary energy
- Limit contacts
- Analogue output or resistance output, HART®

N2

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Description

Kobold over-head level indicators are used for continuous measurement, display and monitoring of liquid levels. The float inside the tank is attached by means of a connecting rod to the magnet carrier in the over-head tube. The magnet fitted in the magnet carrier operates, in a non-contacting manner, the display and monitoring devices fitted outside tube.

ATEX version

The bypass level indicators are supplied with ATEX approval. Limit contacts and an immersible magnetic probe (reed contact chain) with ATEX approval are available for level measurement and monitoring. The electrical components have their own ATEX-certification.

ATEX approval:

Bypass-level indicator:
- II 1/2G Ex h IIC T4...T1 Ga/Gb
  -20 °C ≤T_a ≤+80 °C

  or
- II 1G/2D Ex h IIC/IIIC
  T4...T1/T 130 °C ... 445 °C Ga/Db
  -20 °C ≤T_a ≤+80 °C

  or
- II 1/3G Ex h IIC T4...T1 Ga/Gc
  -20 °C ≤T_a ≤+80 °C

  or
- II 1G/3D Ex h IIC/IIIC
  T4...T1/T 130 °C ... 445 °C Ga/Dc
  -20 °C ≤T_a ≤+80 °C

Limit contact:

NBK-RE:
- II 2G Ex ib IIC T6...T3 Gb
- II 2D Ex ib IIIC T80°C/95°C/130°C/150°C Db

NBK-RD:
- II 2G Ex db IIC T6...T3 Gb
- II 2D Ex tb IIIC T80°C/95°C/130°C/150°C Db

Reed contact resistance chain:
- II 1GD Ex ia IIC T6 Ga
- II 1/2G Exd IIC T6 Ga/Gb
- II 1/2D Ex tb IIIC T85 °C Da/Db

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 advantage of a 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 transmit the level a transmitter with a chain of resistors or a magnetostrictive transducer can be mounted outside the bypass 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 analogue or digital indicating devices. Optionally, HART®, PROFIBUS®-PA or Foundation™ Fieldbus® communication protocols are possible.

Universal indicating unit

A universal indicating unit of type series ADI can be mounted on the bypass to display and evaluate the standard signal (4 ... 20 mA) generated by the transmitter.

Limit Contacts

One or more reed contacts for limit-value acquisition or also for level control can be secured to the bypass tube.

Applications

- Storage tanks
- Aggressive media
- Mixing vessels
- Water tanks

Technical Details

Over-head tube:	Ø 60.3 x 2 mm
Tank tube:	Ø 60.3 x 2 mm or 76.1 x 2 mm
Initial measurement:	270 mm from end of tank tube
Material:	stainless steel 1.4571
Float:	titanium
Connecting rod:	rod or tube made of titanium or stainless steel 1.4571 (depending on medium density and measuring length)
Flange nominal size:	DIN DN 50, 65, 80, 100, PN 16 ANSI 2", 2½", 3", 4", Class 150
Max. operating pressure:	PN 16
Operating temperature:	-20 ... +120 °C (POM-roller) -104 ... +120 °C (ball display)
Viscosity:	max. 200 mm²/s
Measuring length:	min. 600 mm max. 4000 mm
Total length:	see dimension drawing
Min. density:	0.43 kg/dm³

Roller display model RP (max. length 4 000 mm)

Material roller:	POM
Display glass:	PMMA
Carrier frame material:	aluminium, black anodised
Operat. temperature:	-20 ... 100 °C
Protection:	IP 54

Ball display model KP (max. length 3 800 mm)

Material ball:	PA
Sight tube:	PMMA
Sealing plug:	aluminium
Seal:	NBR
Ball support rail:	aluminium, black anodised
Carrier frame:	stainless steel 1.4301
Scale:	PVC, stainless steel 1.4301 (option MV)
Medium temperature:	-20 ... + 80 °C
Ambient temperature:	-20 ... +80 °C
Protection:	IP 66

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Technical Details (continuation)

Ball display model KM (max. length 3800 mm)

Material ball:	PA - high temperature strength
Sight tube:	PC
Sealing plug:	aluminium
Seal:	FKM
Ball support rail:	aluminium, black anodised
Carrier frame:	stainless steel 1.4301
Scale:	PVC, stainless steel 1.4301 (option MV)
Medium temperature:	-60 ... +120 °C
Ambient temperature:	-20 ... +80 °C
Protection:	IP66

Ball display model KF (max. length 3800 mm)

Filling:	silicone oil
Material ball:	PA - high temperature strength
Sight tube:	PC
Sealing plug:	stainless steel 1.4571
Seal:	FKM
Ball support rail:	aluminium, black anodised
Carrier frame:	stainless steel 1.4301
Scale:	Hart-PVC, stainless steel 1.4301 (option MV)
Medium temperature:	-104 ... +120 °C
Ambient temperature:	-20 ... +80 °C
Protection:	IP66

Ball display model KG (max. length 3000 mm)

Material ball:	PA - high temperature strength
Sight tube:	borosilicate glass
Sealing plug:	stainless steel 1.4571
Seal:	FKM
Ball support rail:	aluminium, black anodised
Carrier frame:	stainless steel 1.4301
Scale:	stainless steel 1.4301
Medium temperature:	-20 ... + 120 °C
Ambient temperature:	-20 ... +120 °C
Protection:	IP66

ATEX approval

ATEX limit contact, model NBK-RA

Contact sales department

Contact operation:	bistable changeover contact encapsulated
Switching hysteresis:	approximately 15 mm
Max. switch. capacity:	45 VA, 230 $V_{AC/DC}$, 0.6 A
Temperature class:	T5/T6
Max. ambient temp.:	70 °C / 85 °C
Connection:	3 m PVC-cable
Housing: (GD-ZN Al 4 Cu1)	metallic, cast
Protection:	IP67

Limit contact, type NBK-RE/ NBK-RD

Contact function:	bistable changeover switch
Switching hysteresis:	approx. 15 mm
Max. switching capacity:	
NBK-RE:	60 $V_{AC/DC}$, 1A, 60 W/VA
NBK-RD:	230 $V_{AC/DC}$, 1A, 60 W/VA
Contact resistance:	approx. 100 mΩ
Ambient temperature:	See Ex marking
Medium temperature:	See Ex marking
Cable connection:	
NBK-RE:	PVC cable, shielded number-coded 3x0.75 mm^2
NBK-RD:	Silicone cable, colour-coded 4Gx1 mm^2
Cable gland:	NBK-RE: M16x1.5 polyamide NBK-RD: M16x1.5 brass
Housing:	Stainless steel 1.4301
Protection class:	IP67
ATEX marking:	
NBK-RE:	Ⓔx II 2G Ex ib IIC T6...T3 Gb II 2D Ex ib IIIC T80°C/95°C/130°C/150°C Db
NBK-RD:	Ⓔx II 2G Ex db IIC T6...T3 Gb II 2D Ex tb IIIC T80°C/95°C/130°C/150°C Db

Option 2

ATEX reed contact resistor chain, in type of protection intrinsic safety Ex ia IIC only for connection to certified intrinsically safe circuits with the following maximum values:

Total resistance:	0.7 ... 7 kΩ
Max. Voltage:	U_i = 24 V
Max. Power:	P_i = 1.2 W
Temperature class:	T6
Resolution:	10 mm
Housing:	Die-cast aluminium
Protection class:	IP 65
ATEX marking:	Ⓔx II 1GD Ex ia IIC T6 Ga
Application in zone:	0, 1, 2, 20, 21 or 22
Ambient temperature:	-20 ... +60 °C

ATEX transmitter for resistance chain options E and R (only in conjunction with an external intrinsically safe supply isolator)

Option E

ATEX reed contact resistance chain with analogue current output in type of protection intrinsic safety Ex ia IIC

Transmitter type: 5333D

General data:

Supply voltage:	8.0 ... 30 V_{DC}
Communication interface:	Loop Link 5905
Linear Resistance input:	0 ... 10 kΩ

Technical Details (continuation)

Current output:

Signal range:	4 ... 20 mA
Min. signal range:	16 mA
Update time:	135 ms
Load resistance:	≤ (V_{Vers} - 8 V) / 0.023 [Ω]

Sensor error display:

Programmable:	3.5 ... 23 mA
NAMUR NE43	
open-circuit:	23 mA (factory setting)
triggering:	3.5 mA

ATEX approval Transmitter:

ATEX marking: Ⓔx II 1G Ex ia IIC T6...T4 Ga
Ⓔx II 2D Ex ia IIIC Db

Application in zone: 0, 1, 2, 21 or 22

Parameters for the intrinsically safe circuit:	see operating instructions
U_i:	30 V_{DC}
I_i:	120 mA
P_i:	0,75 W / 0,84 W
L_i:	10 µH
C_i:	1,0 nF
Max. ambient temperature:	-20 °C to max.
T4/T5:	60 °C
T6:	47 °C / 50 °C (see operating instructions)
Medium temperature:	-40 ... +120 °C (with option N up to 250 °C)
Resolution:	10 mm
Housing:	Die-cast aluminium
Protection class:	IP 66

Option R

ATEX reed contact resistance chain with analogue current output and HART communication in type of protection intrinsic safety Ex ia IIC

Transmitter type: 5337D

General data:

Supply voltage:	8.0 ... 30 V_{DC}
Communication interface:	Loop Link 5905A and HART®
Linear resistance input:	0 ... 7 kΩ

Current output:

Signal range:	4 ... 20 mA
Min. signal range:	16 mA
Update time:	440 ms
Load resistance:	≤ (V_{Vers} - 8) / 0.023 [Ω]

Sensor error display:

Programmable:	3.5 ... 23 mA 23 mA (factory setting)

ATEX approval Transmitter:

ATEX marking:	Ⓔx II 1G Ex ia IIC T6...T4 Ga Ⓔx II 2D Ex ia IIIC Db
Application in zone: 0, 1, 2, 21 or 22	
Parameters for the intrinsically safe circuit:	see operating instructions
U_i:	30 V_{DC}
I_i:	120 mA
P_i:	0,75 W / 0,84 W
L_i:	0 µH
C_i:	1,0 nF
Max. ambient temperature:	-20 °C to max:
T4/T5:	60 °C
T6:	47 °C / 50 °C (see operating instructions)
Medium temperature:	-40 ... +120 °C (with option N up to +250 °C)
Resolution:	10 mm
Housing:	Die-cast aluminium
Protection class:	IP 66

Option 4

ATEX reed contact resistance chain in type of protection flameproof enclosure Ex d and protection by enclosure Ex t

Total resistance:	0.7 ... 7 kΩ
max. voltage:	U: 24 V_{DC}
max. switching capacity:	125 mW
Temperature class:	T6
Resolution:	10 mm
Housing:	Die-cast aluminium
Protection class:	IP 65
Type of protection:	II 1/2G Ex d IIC T1T6 Ga/Gb II 2D Ex t IIIC T* °C Db (T* according to process temperature)
Application in zone:	0/1, 2, 21 or 22
Ambient temperature:	-20 ... +60 °C
Medium temperature:	≤ 400 °C (see operating instructions)

Option L

ATEX reed contact resistance chain with analogue current output in type of protection flameproof enclosure Ex d and protection by enclosure Ex t

Transmitter type: 5333D

General data:

Supply voltage:	8.0 ... 30 V_{DC}
Communication interface:	Loop Link 5905
Linear Resistance input:	0 ... 10 kΩ

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Technical Details (continuation)

Current output:

Signal range:	4 ... 20 mA
Min. signal range:	16 mA
Update time:	135 ms
Load resistance:	≤ (V_{Vers} - 8 V) / 0.023 [Ω]

Sensor error display:

Programmable:	3.5 ... 23 mA
NAMUR NE43	
open-circuit:	23 mA (factory setting)
activating:	3.5 mA

LED or LCD display (LE/LC options):

Supply:	via current loop
Voltage drop:	LED 3.3 V at 4 mA 3.7 V at 20 mA LCD max. 2.5 V
Medium temperature:	-40 ... +120 °C (with option N up to 250 °C)
Ambient temperature:	-20 ... +60 °C
Resolution:	10 mm
Housing:	Die-cast aluminium
Protection class:	IP 66

Option K

ATEX reed contact resistance chain with analogue current output and HART communication in type of protection flameproof enclosure Ex d and protection by enclosure Ex t

Transmitter type: 5337D

General data:

Supply voltage:	8.0 ... 30 V_{DC}
Communication interface:	Loop Link 5905A and HART®
Linear resistance input:	0 ... 7 kΩ

Current output:

Signal range:	4 ... 20 mA
Min. signal range:	16 mA
Update time:	440 ms
Load resistance:	≤ (V_{Vers} - 8) / 0.023 [Ω]

Sensor error display:

Programmable:	3.5 ... 23 mA 23 mA (factory setting)

LED or LCD display (LE/LC options):

Supply:	via current loop
Voltage drop:	LED 3.3 V at 4 mA 3.7 V at 20 mA LCD max. 2.5 V
Medium temperature:	-40 ... +120 °C (with option N up to 250 °C)
Ambient temperature:	-20 ... +60 °C
Resolution:	10 mm
Housing:	Die-cast aluminium
Protection class:	IP 66

Options: 6/8/P/Q/S/U

Magnetostrictive transducer with 2-wire transmitter 4 ... 20 mA

Output:	4 ... 20 mA with HART® (for options 8/Q/U)
Power supply:	12.5 ... 36 V_{DC}
Resolution:	1 mm or 0.1 mm (for options P/Q/S/U)
Max. length:	4500 mm
Housing:	Die-cast aluminium (standard), stainless steel on request
Protection class:	IP 67
Medium temperature*:	-40 ... +90 °C
Ambient temperature:	-20 ... +70 °C
ATEX marking:	II 1G Ex ia IIB T6...T5 Ga II 2G Ex db IIB T6...T5 Gb II 1/2G Ex db ia IIB T6..T5 Ga/Gb
Application in zone:	0, 1 and 2

(see separate data sheet for special type NMB for further technical specification)

* see temperature diagram

Options

Code	Discription	Sketch/picture	Availability
	Scales		
(Ball displays are always delivered with scales, see technical data/ sketch for resolution)			
MV	Scale made of stainless steel 1.4301 (option for roller display KP/KM/KF (Scale made of stainless steel 1.4301 standard with roller display KG)	see sketch	**NBK-04**
M1	Measuring scale, medium temperature -40 °C ... +120 °C, engraved scale made of aluminium	see sketch	**NBK-04**
M2	Measuring scale, medium temperature -40 °C ... +120 °C, scale backing made of aluminium with polyester foil	see sketch	**NBK-04**
	Tests / certificates		
P	Radiographic examination DIN 54 111 T1	-	**NBK-04**
Q	Dye penetration test DIN EN 571-1	-	**NBK-04**
X	Pressure test with water 1.5 x PN	-	**NBK-04**
Z	3.1 Inspection certificate acc. DIN EN 10204	-	**NBK-04**
MR	Material acc. to NACE MR 0103/ISO15156 (MR0175), declaration of conformance	-	**NBK-04**
WV	Positive Material Identification (PMI)	-	**NBK-04**
SF	Oil and fat free	-	**NBK-04**

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

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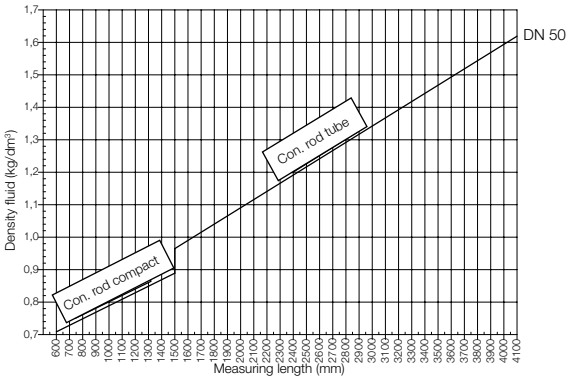
Density/length of measuring tube diagram*

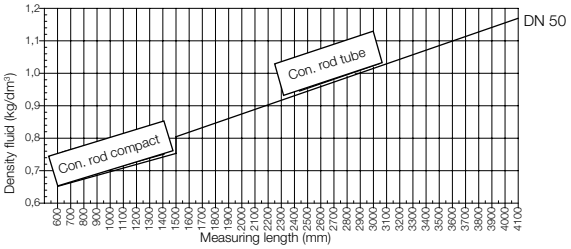
NBK-04...8, Diagram 8



NBK-04...8

Float:	titanium
Connection rod:	stainless steel, 1.4571
Process connection:	DIN EN 1092-1 flange, DN 50, 80, 100 ASME flange, 2", 3", 4"
Overhead and tank tube:	Ø 60.3 mm, continuous
Min. medium density:	0.71 kg/dm³ at ML = 600 mm

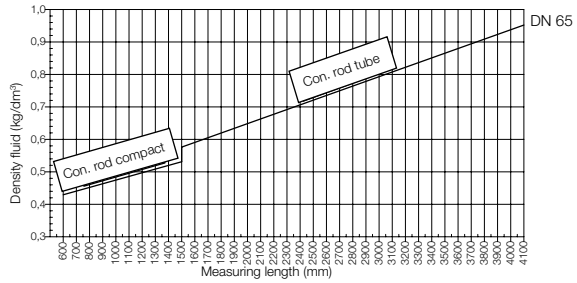
NBK-04...6, Diagram 6



NBK-04...6

Float:	titanium
Connection rod:	titanium
Process connection:	DIN EN 1092-1 flange, DN 50, 80, 100 ASME flange, 2", 3", 4"
Overhead and tank tube:	Ø 60.3 mm, continuous
Min. medium density:	0.65 kg/dm³ at ML = 600 mm

NBK-04...4, Diagram 4



NBK-04...4

Float:	titanium
Connection rod:	stainless steel, 1.4571
Process connection:	DIN EN 1092-1 flange, DN 65, 100 ASME flange, 2½", 4"
Overhead and tank tube:	Ø 60.3 mm
Tank tube:	Ø 76.1 mm
Min. medium density:	0.43 kg/dm³ at ML = 600 mm

* The floats could be adjusted to the densities above the graph (Curve shifts upward)

Order Details (Example: **NBK-04 F50 00 0 8**)

Model	Material	Connection and nominal size	Roller indication/ Ball display	Transducers/ Transmitters	Medium density and meas. length	Options
NBK-04...	Stainless steel 1.4571	**F50** = DIN EN flange DN 50 **F80** = DIN EN flange DN 80 **F1H** = DIN EN flange DN 100 **A50** = ASME flange 2" **A80** = ASME flange 3" **A1H** = ASME flange 4"	**00** = without **RP** = POM roller indication **KP** = ball display with PMMA sight tube **KM** = ball display with PC sight tube **KF** = as KM but with oil filling **KG** = ball display with borosilicate sight tube	**1** = without electrical attached parts ATEX II 1G/2G D **2** = with reed contact chain II 1GD Exia IIC T6 **E** = immersible magnetic probe (reed chain) / 4...20 mA, 2-wire, ATEX Exia **R** = immersible magnetic probe (reed chain) / 4...20 mA, HART®, 2-wire, ATEX Exia **4**[1] = with reed contact chain ATEX II 1/2G Exd IIC T6 Ga/Gb **L**[1] = immersible magnetic probe (reed chain) / 4...20 mA, 2-wire, ATEX Exd **K**[1] = immersible magnetic probe (reed chain)/ 4...20 mA, HART®, 2-wire, ATEX Exd **6**[2] = magnetostrictive probe 4...20 mA, 1 mm, Ex ia **8**[2] = magnetostrictive probe 4...20 mA HART®, 1 mm, Ex ia **P**[2] = magnetostrictive probe 4...20 mA, 0.1mm, Exd **Q**[2] = magnetostrictive probe 4...20 mA HART®, 0,1 mm, Exd **S**[2] = magnetostrictive probe 4...20 mA, 0.1 mm, Ex d ia **U**[2] = magnetostrictive probe 4...20 mA HART®, 0,1 mm, Ex d ia	**8** = see diagram 8 **6** = see diagram 6 **4** = see diagram 4	without = without options or options as in list and description (see separate options list)
NBK-RA	ATEX limit contact, encapsulated, Ex II2G EEx m II T6/T5					
NBK-RE01U03[3]	Limit contact, bistable, Change-over contact, ATEX, Exi, max. +120°C, 3 m PVC cable, weight: 363 g					
NBK-RE01U06[3]	Limit contact, bistable, Change-over contact, ATEX, Exi, max. +120°C, 6 m PVC cable, weight: 567 g					
NBK-RE01U10[3]	Limit contact, bistable, Change-over contact, ATEX, Exi, max. +120°C, 10 m PVC cable, weight: 839 g					
NBK-RD01U03[3]	Limit contact, bistable, Change-over contact, ATEX, Exd, 3 m silicone cable, weight: 544 g					
NBK-RD01U06[3]	Limit contact, bistable, Change-over contact, ATEX, Exd, 6 m silicone cable, weight: 865 g					
NBK-RD01U10[3]	Limit contact, bistable, Change-over contact, ATEX, Exd, 10 m silicone cable, weight: 1293 g					
REL-5114B1A	ATEX transmitter for immersible magnetic probe (Reed contact chain) EX II (1) G [EEx ia] IIC, DIN rail mounting					

[1] See separate ATEX certification of model mm-... [2] Model NMB-TR00UAxxx0 (see separate data sheet for model NMB) [3] Add Suffix „/NBK“, when ordered together with NBK

Please specify measuring length L, density, pressure, temperature and options in writing!

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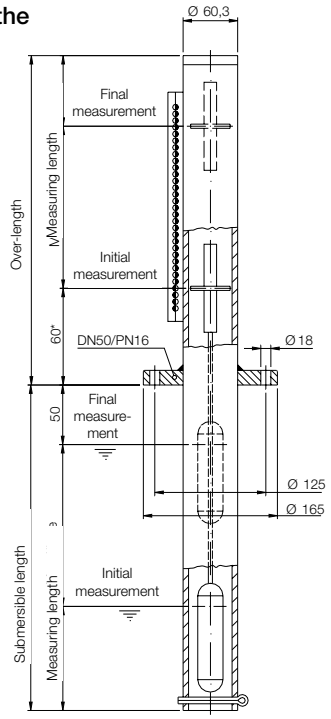
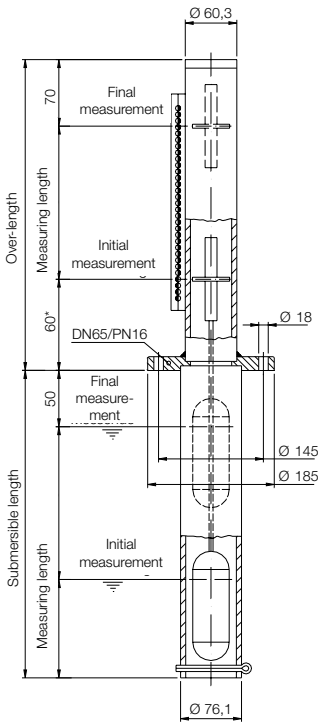
Dimensions

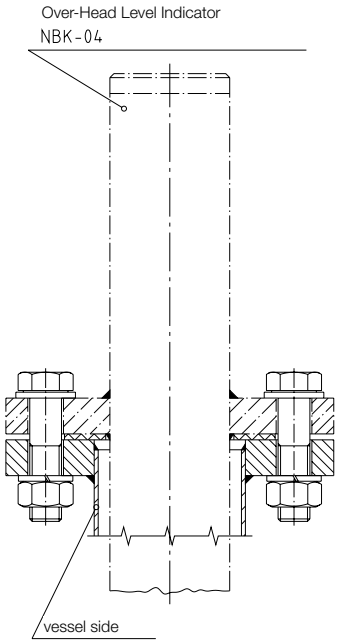
NBK-04...8/6 the



NBK-04...4



Required size of the mounting tube of vessel side

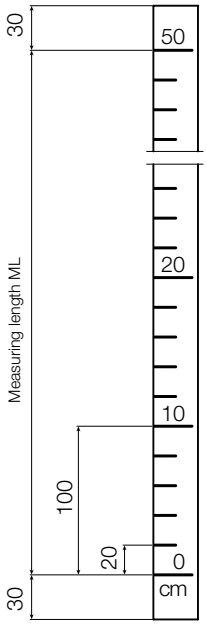


Ø NBK-04 tube	Minimum-Ø of the mounting tube of the vessel side
Ø 76.1 mm	Ø 88.9 mm x 2
Ø 60.3 mm	Ø 76.1 mm x 2

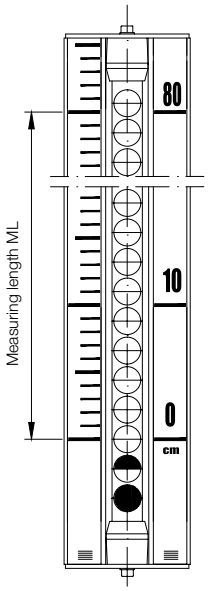
* In case of using a transmitter:
dimension = 100 mm for transmitter option 2/E/R/b/4/L/K/N
dimension = 150 mm for transmitter model 6/8/P/Q/S/U
dimension = 200 mm for transmitter MODEL LE/KE/LC/KC
dimension = 130 mm in case of using a ball display

Submersible length = measuring length +320 mm
Measuring length = submersible length -320 mm

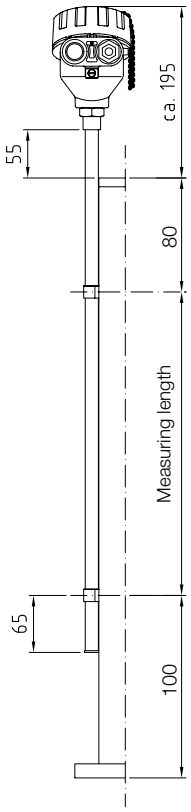
Measuring scale, aluminium
Option M1 - engraved scale
Option M2 - polyester foil



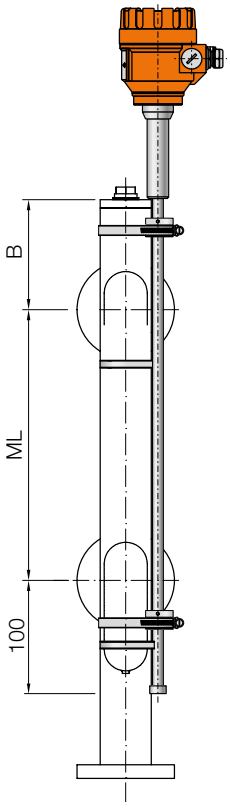
Measuring scale on stainless steel carrier
Scale from hard PVC or print on 1.4301
(standard scale with ball display)



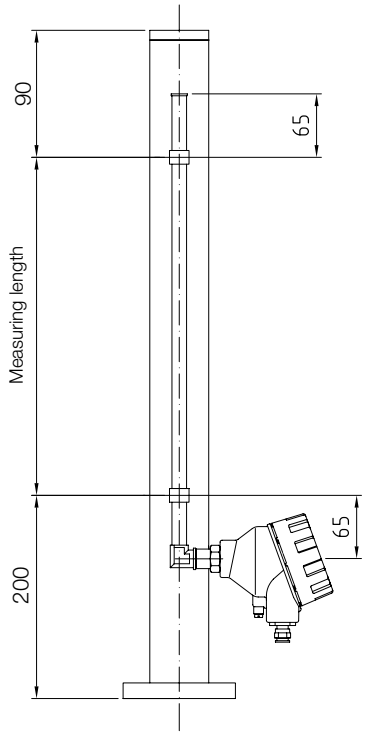
NBK-... with transmitter options 2/E/R/B/4/L/K/N



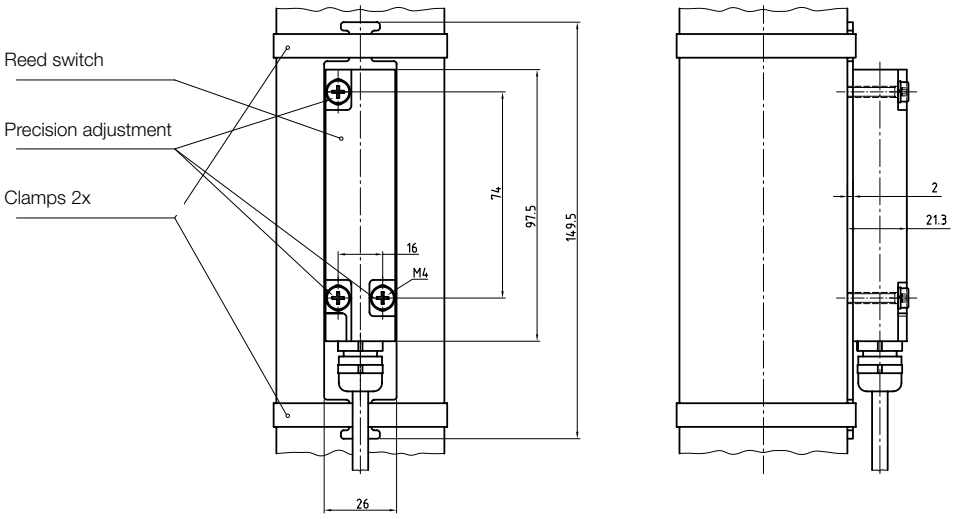
NBK-... with transmitter model 6/8/P/Q/S/U



NBK-... with transmitter display options LE/KE or LC/KC



NBK-RA



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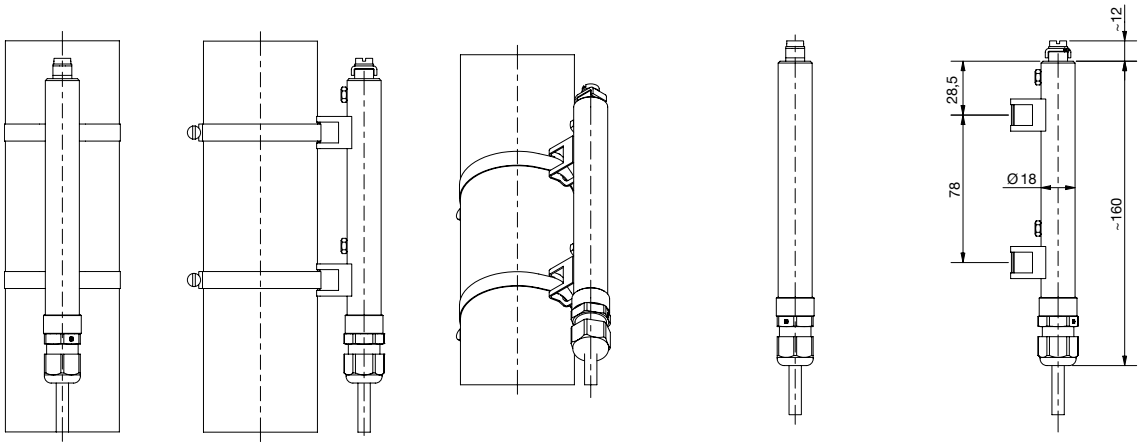

NBK-RD