Bypass Level Measurement

measuring • monitoring • analyzing

NBK-03, -06, -07, -10, -31, -32

- Measuring Length: 18' Max over 18' Two-Part or Multipart
- Pressure: Max. Class 1500
- Temperature:
  -40... 750 °F (Ceramic rollers)
  32 ... 250 °F (PP-rollers)
  -155 ... 390 °F (Ball display)
- Viscosity: Max. 200 mm^2/s Standard
  (Option: 460 mm^2/s, only NBK-03)
- Connection:
  ANSI Flange ½" ... 2"
  NPT Threads ½" ... 1¼"
- Material: 316-Ti Stainless Steel
- Magnetically Coupled Magnet Roller or Ball Indicating Displays
- Limit Contacts
- Analog Output, HART®, PROFIBUS® PA, Foundation™ Fieldbus, & Digital Display Options

KOBOLD companies worldwide:

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02/09-2014

Description

KOBOLD bypass level indicators are used for continuous measurement, display, and monitoring of liquid levels. The bypass tube is attached to the side wall of the tank. According to the laws of hydrostatic pressure, the level in the bypass tube will equal the level in the tank. A float, with embedded circular magnets, is located in the bypass tube and follows the liquid level, transferring the level in a non-contacting manner to a display attached to the outside of the bypass tube or to a sensing device.

The following indication and sensing 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 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 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 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 bypass 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 bypass tube.

Applications

- Storage tanks
- Tanks on ships
- Agitator vessel
- Water tanks

Technical Details

Process Connection:	Flange ASME B 16.5 RF-2009 ½", ¾", 1", 1¼", 1½", 2" NPT ANSI/ASME B1.20.1 ½", ¾", 1", 1¼"
Bypass Tube:	Ø 2.374", 316-Ti SS (NBK-03/ .../10) Ø 2.8", 316-Ti SS (NBK-31/32)
NBK-03/06/07:	Flat gasket: < 390 °F; PTFE, ≥ 390 °F, Klinger SIL®
NBK-10:	Reinforced graphite
NBK-31/32:	RTJ-seal
Operating Pressure:	ANSI 150/300/400/600/900/1500 PN 16/40/63/100/160/250/320
Operat. Temperature:	32 ...250 °F (PP-rollers) -40 ... 750 °F (ceramic rollers) -155... 390 °F (ball display) (With NBK-31/32, the operating temprature is restricted to 212 °F)
Viscosity:	Max. 200 mm^2/s standard (Option: up to max. 460 mm^2/s for NBK-03)
Max. Meas. Length:	18' over 18', two-part or multipart
Overall Length:	See dimensional drawing
ATEX- and GL-Approval:	See separate description

Roller Display RP	(max. continuous length 18')
Roller Material:	Polypropylene
Display Glass:	Plexiglas®
Carrier Frame Material:	Aluminum, anodized
Operat. Temperature:	32...250 °F
Protection:	IP 54

Roller Display RK	(max. continuous length 18')
Roller Material:	Ceramic
Display Glass:	Borosilicate glass
Carrier Frame Material:	Aluminium, anodized
Operat. Temperature:	-40... 750 °F
Protection:	IP 54

Ball Display - Model KP	(max. continuous length 12.5')
Ball Material:	Ultramid™
Sight Tube:	Plexiglas®
Sealing Plug:	Aluminum
Seal:	Perbunan
Ball Support Rail:	Aluminum, anodized

Carrier Frame:	304 stainless steel
Scale:	Hard-PVC, 304 stainless steel (Option MV)
Operat. Temperature:	-4 ... 175 °F
Protection:	IP 66

Ball Display - Model KM	(max. continuous length 9.8')
Ball Material:	Ultramid B™
Sight Tube:	Makrolon®
Sealing Plug:	Aluminum
Seal:	FKM
Ball Support Rail:	Aluminum, anodized
Carrier Frame:	304 stainless steel
Scale:	Hard-PVC, 304 stainless steel (Option MV)
Operat. Temperature:	-75 ...250 °F
Protection:	IP 66

Ball Display - Model KF	(max. continuous length 12.5')
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:	-155...250 °F
Protection:	IP 66

Ball Display - Model 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... 390 °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. Switching Capacity:	60 W/VA, 230 $V_{AC/DC}$, 1 A
Resistance:	100 mΩ
Media Temperature:	-40...212 °F
Ambient Temperature:	-40... 165 °F
Connection:	3 m PVC-cable
Housing:	Polycarbonate
Protection:	IP 67

Limit Contact High Temperature - Model NBK-RT200/ NBK-RT400

Contact Operation:	Bistable SPDT contact
Switching Hysteresis:	approx. 15 mm
Max. Switching Capacity:	80 VA, 250 $V_{AC/DC}$, 1 A
Resistance:	< 20 mΩ
Media Temperature:	-40... 390 °F/750 °F
Ambient Temperature:	-40...290 °F/660 °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:	-155... 390 °F
Ambient Temperature:	-40...160 °F
Max. Housing Temperature:	175 °F
Max. Operating Voltage U_{max}:	400 V_{DC} / 250 V_{AC}
Max. Load Current I_{max}:	0.5 A
Max. Switching Power P_{max}:	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_{max}:	15 V_{DC}
R_{on}:	1 kΩ
R_{off}:	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 - Model ..W..

Total Resistance:	0.5 ... 5 kΩ
Meas. Circuit Voltage:	Max. 24 V_{DC}
Measuring Current:	Max. 0.1 A
Max. Length:	18'
Media Temperature:	-40...390 °F, -40...750 °F with heat shield (option N)
Ambient Temperature:	Max. 265 °F
Resolution:	0.4" (ML< 6.5') 0.8" (ML≥ 6.5')
Housing:	Aluminum pressure-cast
Protection:	IP65

Reed Contact Resistor Chain with 2-Wire Transmitter - Model ..M

Output:	4...20 mA
Supply Voltage:	16...32 V_{DC}
Max. Length:	18'
Load:	(U_B-9 V)/0.02 A [Ω]
Media Temperature:	-40 °F...250 °F
Ambient Temperature:	-24°F...175 °F
Resolution:	0.4" (ML< 6.5') 0.8" (ML≥ 6.5')
Housing:	Aluminum pressure-cast
Protection:	IP65

Reed Contact Resistor Chain with 2-Wire Transmitter: 4 ... 20 mA - Option ..MS

Like Model:	...M... however with 100 mm thermal stand-off of connection head includes heat shield
Media temperature:	-40...570 °F

Reed Contact Resistor Chain with 2-Wire Transmitter, 4 ... 20 mA - Option MK

Like Model:	...M... however with 16.4' silicone cable between connection box/Bypass
Media Temperature:	-40...750 °F

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

Output:	4...20 mA
Supply Voltage:	24 V_{DC}, max. 150 mA
Load:	Max. 500 Ω
Max. Length:	13.1'
Media Temperature:	-40...250 °F
Ambient Temperature:	-4...175 °F
Accuracy:	±1 mm
Housing:	Aluminum pressure-cast
Protection:	IP65

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

Transmitter Model:	5333D
Common Specifications:	
Power Supply:	8.0...35 V_{DC}
Communication Interface:	Loop Link
Linear Resistance Input:	0...10 kΩ
Current Output:	
Signal Range:	4...20 mA
Min. Signal Range:	16 mA
Updating Time:	135 ms
Load Resistance:	≤ (V_{supply} - 8) / 0.023 [Ω]
Sensor Error Detection:	
Programmable:	3.5...23 mA
Media Temperature:	-40...250 °F (with option N up to 480 °F)
Ambient Temperature:	-4...175 °F
Resolution:	0.4" (ML <6.5') 0.8" (ML ≥6.5')
Housing:	Aluminum pressure-cast
Cable Entry:	M 20 x 1.5
Protection:	IP66

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® - Model H and Display Options HE or HC

Transmitter Model:	5335A
Common Specifications:	
Power Supply:	8.0…35 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
Updating Time:	440 ms
Load Resistance:	≤ (V_{supply} - 8) / 0.023 [Ω]
Sensor Error Detection:	
Programmable:	3.5…23 mA
Media Temperature:	-40…250 °F (with Option N up to 480 °F)
Ambient Temperature:	-4…175 °F
Resolution:	0.4" (ML<6.5') 0.8" (ML ≥6.5')
Housing:	Aluminum pressure-cast
Cable Entry:	M 20 x 1.5
Protection:	IP66
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, - Model F (PROFIBUS®-PA, FOUNDATION™ Fieldbus)

Transmitter Model:	5350A
Common Specifications:	
Supply Voltage:	9…32 V_{DC}
Consumption:	< 11 m
Isolation Voltage, Test / Operation:	1.5 kV_{AC} / 50 V_{AC}
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 Function 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…250 °F (with option N up to 480 °F)
Ambient Temperature:	-4…175 °F
Resolution:	0.4" (ML <6.5') 0.8" (ML ≥6.5')
Housing:	Aluminum pressure-cast
Cable Entry:	M 20 x 1.5
Protection:	IP66

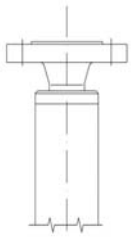
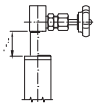
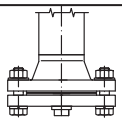
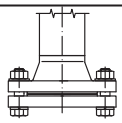
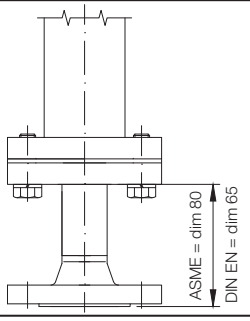
Order Details (Example: **NBK-03 A15 RP 0 A 0**)

Model	Rated pressure	Connection	Nominal Size	Roller/ Ball Indicator	Sensor/ Transmitter	Media Density Float	Options
NBK-03...	Class 150 PN 16	**A** = ASME-flange **F** = DIN-flange **N**[3]= NPT-male thread **R**[3]= R-male thread **S**[4]= welding-nipple	**15** = ½", DN 15 **20** = ¾", DN 20 **25** = 1", DN 25 **32** = 1 ¼", DN 32 **40** = 1½", DN 40 **50** = 2", DN 50 **XX** = special connection[8]	**00** = without **RP** = PP-roller **RK** = ceramic roller **KP** = ball display with Plexiglas sight tube **KM** = ball display with Makrolon® sight tube **KF** = as KM however with oil filling **KG** = ball display with borosilicate sight tube	**0** = without transmitter **T** = magneto-strictive probe/ 4 ... 20 mA, 4-wire **W** = reed chain/ without **M** = reed chain/ 4 ... 20 mA, 2-wire **A**[9] = reed chain/ 4 ... 20 mA, 2-wire **H** = reed chain/ 4 ... 20 mA, HART®, 2-wire **F** = reed chain/ PROFIBUS® PA FOUNDATION™ Fieldbus	**A** = 1.0 kg/dm³, titanium for viscosity up to 200 cP **B** = 0.90 kg/dm³, titanium for viscosity up to 200 cP **C** = 0.80 kg/dm³, titanium for viscosity up to 200 cP **D** = 0.70 kg/dm³, titanium for viscosity up to 200 cP **E** = 0.60 kg/dm³, titanium for viscosity up to 200 cP **F**[6] = 0.54 kg/dm³, titanium for viscosity up to 200 cP **V**[5] = 1.0 kg/dm³, stainless steel for viscosity up to 460 mm²/s **W**[5] = 0.8 kg/dm³, stainless steel for viscosity up to 460 mm²/s **Y** = special density, titanium (specify in clear text)	**0** = without options or options as in list and description (see separate options list)
NBK-06...	Class 300 PN 40						
NBK-07...	Class 400 PN 63						
NBK-10...	Class 600 PN 100						
NBK-31[7]	Class 900 PN 160					**H** = high pressure float, CF340 viscosity up to 200 cP (media S.G.: ≥0.8; specify in clear text)	
NBK-32[7]	Class 1500 PN 250						
NBK-R	standard limit contact (bistable SPDT contact)						
NBK-RT200	limit contact high-temperature max. 390 °F						
NBK-RT400	limit contact high-temperature max. 750 °F						
NBK-RV200NO	limit contact, bistable, N/O, max. 390 °F (suitable for tanks with strong vibrations)						
NBK-RV200NC	limit contact, bistable, N/C, max. 390 °F (suitable for tanks with strong vibrations)						
NBK-RN200NO	limit contact, bistable, NAMUR, N/O, max. 390 °F (suitable for tanks with strong vibrations)						
NBK-RN200NC	limit contact, bistable, NAMUR, N/C, max. 390 °F (suitable for tanks with strong vibrations)						

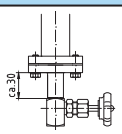
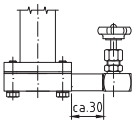
[3] female thread on request
[4] only possible with NBK-03/06 and nominal size 1", DN25
[5] only possible with NBK-03
[6] not possible with NBK-10
[7] only possible for ½", ¾" and 1" ASME DN 15 and DN 25 bzw.
[8] specify in clear text
[9] only with options AE and AC

Please clearly specify: length L, density, and temperature.

Options

Code	Description	Drawing	Availability
	Top Bypass Tube Connections		
V0	Without vent plug		for **NBK-03/06/07,** Standard for **NBK-10/31/32**
VN	With vent plug ½" NPT		**for NBK-10/31/32,** Standard for **NBK-03/06/07**
VA[1) 4)]	Flange connection 2" ASME (pressure rating as process flange)		**NBK-03/06/07/10 NBK-31/32**
VJ[1) 4)]	Flange connection DIN (pressure rating as process flange) with vent plug ½" NPT		**NBK-03/06**
V7[4)]	Vent flange ½" ASME, stainless steel 316Ti (pressure rating as process flange)		**NBK-03/06**
V8[4)]	Vent flange ¾" ASME, stainless steel 316Ti (pressure rating as process flange)		**NBK-03/06**
V9[4)]	Vent flange 1" ASME, stainless steel 316Ti (pressure rating as process flange)		**NBK-03/06**
V2	Vent valve, ½" NPT, stainless steel 316Ti, max. temperature: 250 °F		**NBK-03/06**
	Bottom Bypass Tube Connections		
D0	Without drain plug		**NBK-03/06/07,** Standard for **NBK-10/31/32**
DN	With drain plug ½" NPT	NBK-03/06  NBK-07/10	**NBK-10/31/32,** Standard for **NBK-03/06/07**
DA	Flange connection 2" ASME (pressure rating as process flange), with drain plug ½" NPT		**NBK-03/06**
DD	Flange connection 2" ASME (pressure rating as process flange), without drain plug		**NBK-03/06/07**
E7	Drain flange ½" ASME, stainless steel 316Ti (pressure rating as process flange)		**NBK-03/06**
E8	Drain flange ¾" ASME, stainless steel 316Ti (pressure rating as process flange)		**NBK-03/06**
E9	Drain flange 1" ASME, stainless steel 316Ti (pressure rating as process flange)		**NBK-03/06**

Options

Code	Description	Drawing	Availability
F2	Drain valve, ½" NPT, stainless steel 316Ti, max. temperature: 250 °F		**NBK-03/06**
D2	Drain valve, ½" NPT, horizontally mounted, stainless steel 316Ti, max. temperature: 250 °F		**NBK-03/06**
Process Connection Options			
ST[4)]	1 x process connection side, 1 process connection vertical on top	see drawing	**NBK-03/06/07/10**
TS[4)]	1 x process connection side, 1 process connection vertical at bottom	see drawing	**NBK-03/06/07/10**
TT[4)]	2 x process connection vertical, up to DN 25 or 1" ASME	see drawing	**NBK-03/06/07/10**
Scales			
(Ball displays are always delivered with scales, see technical data/ sketch for resolution)			
M2	Measuring scale, media temperature -40°F ... 300°F, scale backing made of aluminum laser etched	see drawing	**NBK-03/06/07/10/31/32**
M1	Measuring scale, media temperature - 40 °F ... +750 °F, engraved scale made of aluminum	see drawing	**NBK-03/06/07/10/31/32**
MV	Scale made of 304 stainless steel (only with ball display model KP/KM/KF, standard with model KG)	see drawing	**NBK-03/06/07/10/31/32**
Thermal Screening			
N	Heat Shield for sensor	see drawing	**NBK-03/06/07/10/31/32**
Heating Jacket			
LA	Connection for heating jacket ½" Class 150 RF ASME B16.5-2003 (Class 300 flanges on request)	see drawing	**NBK-03/06/07/10**
LB	Connection for heating jacket ¾" Class 150 RF ASME B16.5-2003 (Class 300 flanges on request)		**NBK-03/06/07/10**
LC	Connection for heating jacket 1" Class 150 RF ASME B16.5-2003 (Class 300 flanges on request)		**NBK-03/06/07/10**
LD	Connection for heating jacket 1¼" Class 150 RF ASME B16.5-2003 (Class 300 flanges on request)		**NBK-03/06/07/10**
Electrical Outputs			
MU	Option M with connection box at bottom, for easy access to connection box		**NBK-03/06/07/10/31/32**
MS	Option M including heat shield and connection box at 4" distance, max. media temperature = 570 °F		**NBK-03/06/07/10/31/32**
MK	Option M including heat shield and connection box 16.4' silicone cable, max. media temperature = 750 °F		**NBK-03/06/07/10/31/32**

[1)] not possible with transmitter options H/F
[2)] with NBK-31/32 is flange connection always 2 ½" ASME, as standard without drain plug or vent plug
[3)] only possible with option T (magnetostrictive sensor or option M (reed chain with transmitter)
[4)] not possible with option T

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

Options

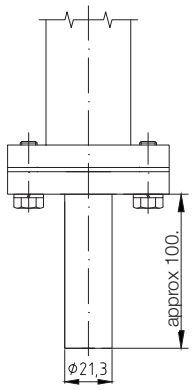
Code	Description	Drawing	Availability
	Display Options		
AE	Aluminum die-cast housing, LED digital display, connection box at bottom (only in combination with transmitter option A)		NBK-03/06/07/10/31/32
AC	Aluminum die-cast housing, LCD digital display, connection box at bottom (only in combination with transmitter option A)	as AE, however with LCD display	NBK-03/06/07/10/31/32
HE	Aluminum die-cast housing, LED digital display, connection box at bottom (only in combination with transmitter option H)		NBK-03/06/07/10/31/32
HC	Aluminum die-cast housing, LCD digital display, connection box at bottom (only in combination with transmitter option H)	as HE, however with LCD display	NBK-03/06/07/10/31/32
C[3]	Indicating unit ADI-1 with bargraph and digital display, rugged aluminium housing, mounted at bypass tube, for description see brochure Z2	see cover page / drawing	NBK-03/06/07/10/31/32
	Additional Options		
A	Connection flange for 2-part version (not possible with sensor), split roller display and scale possible	see drawing	NBK-03/06/07/10/31/32
HL	Retaining plate, centric between process connections, necessary from L 16.4' (alternative option HF)	see drawing	NBK-03/06/07/10/31/32
HF	Retaining flange, centric between process connections, necessary from L > 16.4' (alternative option HL)	see drawing	NBK-03/06/07/10/31/32
K	Armaflex-insulation (heat co-efficient 0.025 kcal / m °C, to 220 °F	-	NBK-03/06/07/10/31/32
	Tests / Certificates		
P	Radiographic examination DIN 54 111 T1	-	NBK-03/06/07/10/31/32
Q	Dye penetration test DIN EN 571-1	-	NBK-03/06/07/10/31/32
X	Pressure test with water 1.5 x PN	-	NBK-03/06/07/10/31/32
Z	3.1-sketch acc. EN 10204	-	NBK-03/06/07/10/31/32
MR	Material acc. to NACE MR 0103/ISO15156 (MR0175), declaration of conformance	-	NBK-03/06/07/10/31/32
WV	Positive Material Identification (PMI)	-	NBK-03/06/07/10/31/32
SF	Oil and fat free	-	NBK-03/06/07/10/31/32

[1] not possible with transmitter options H/F
[2] with NBK-31/32 is flange connection always 2 ½" ASME, as standard without drain plug or vent plug
[3] only possible with option T (magnetostrictive sensor or option M (reed chain with transmitter)
[4] not possible with option T

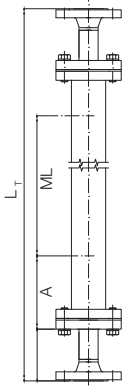
Note: *Please pay attention to max. permissible temperature limits of individual components*

Drawings of Selected Options

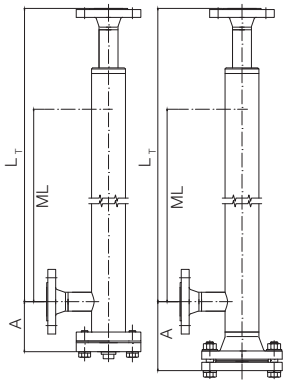
Option DS



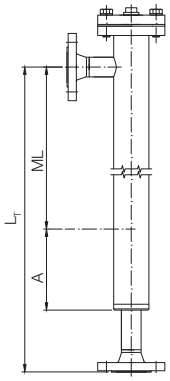
Option TT



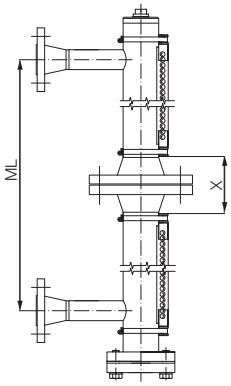
Option ST



Option TS



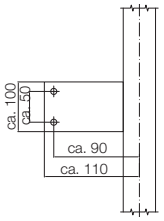
Option A



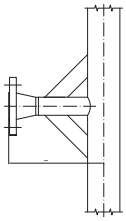
in this range, no display is possible

Model	Dimension X
NBK-03	92
NBK-06	98
NBK-07	127
NBK-10	139

Option HL
(centered to dimens. L)

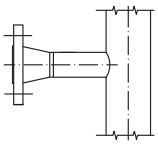


Option HF
(centered to dimens. L)

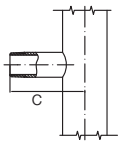


Options Process Connection

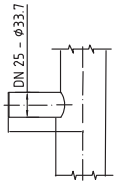
Option F/A



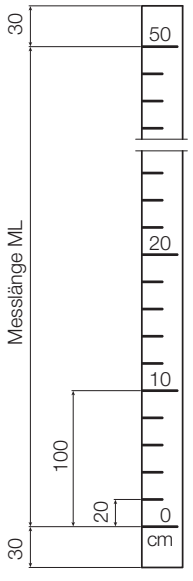
Option N/R



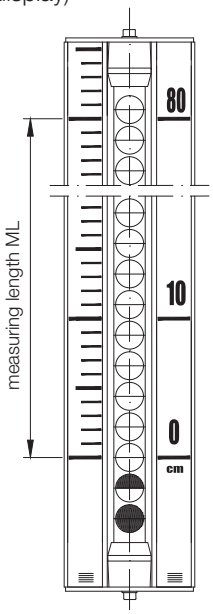
Option S



Measuring Scale, Aluminum
Option M1 - Engraved Scale
Option M2 - Laser Etched



Measuring Scale Screen Print, Stainless Steel Carrier
(standard scope of supply with ball display)



Float Options

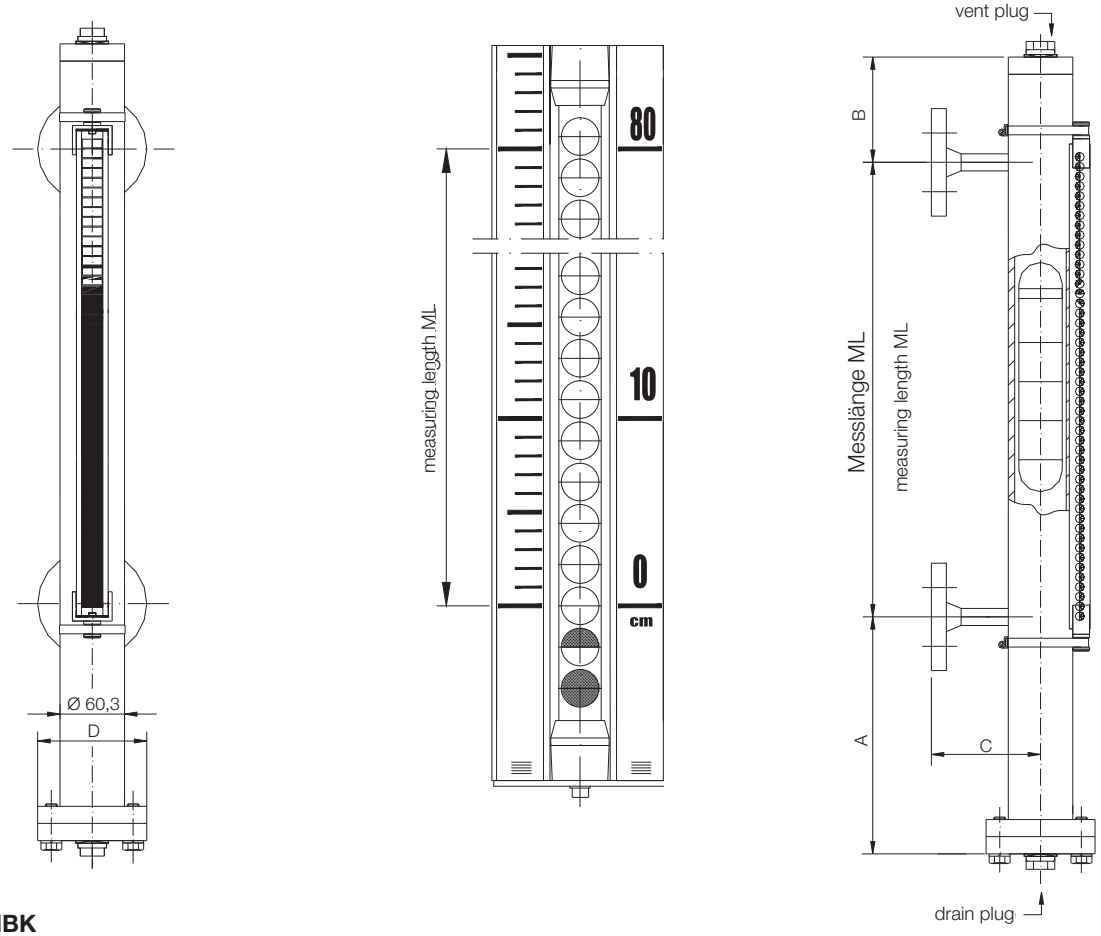
Model	Min. Density [kg/dm³]	Material
A	1.0	titanium
B	0.9	titanium
C	0.8	titanium
D	0.7	titanium
E	0.6	titanium
F*	0.54	titanium
V	1.0	stainless steel
W	0.8	stainless steel
H	0.8	CF340
Interface Float	min. density difference =150 kg/dm³ (indicate both densities)	titanium

*Heat Shield option N not possible and/or not for NBK-10.

Special floats for special media densities (weighting) or reduced length dimension A on request.

Dimensions

NBK-03/06/07 with Roller Indicator/Ball Display

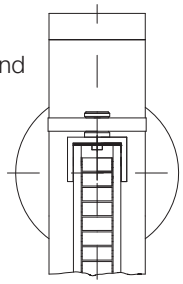


Dimension NBK

Model	Rated Pressure	Dimensions [mm]		
		B	C	D
NBK-03...	Class 150	130	110	115
NBK-06...	Class 300	130	110	115
NBK-07...	Class 400	130	150	180
NBK-10...	Class 600	130	150	195
NBK-31...	Class 900	150	180	244.3
NBK-32...	Class 1500	150	180	244.3

NBK 10/31/32

always without vent plug and without drain plug

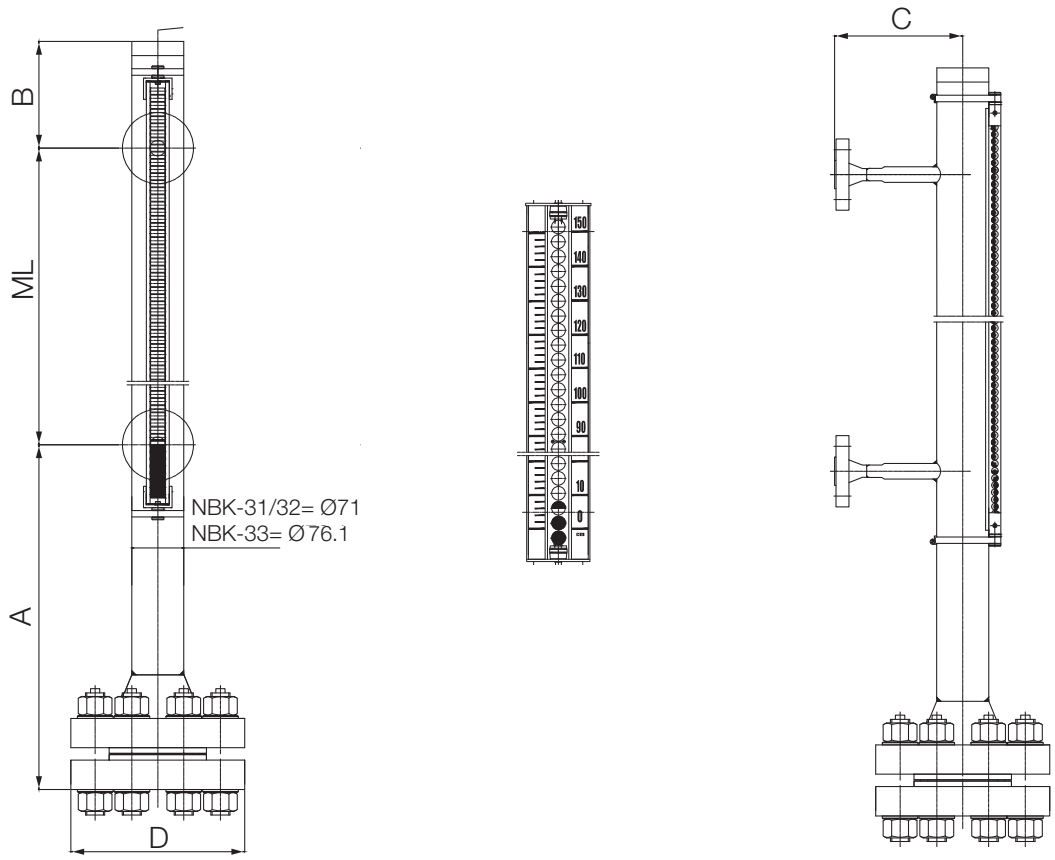


Clearance Dimension A [mm]

Model	Rated Pressure	Media Density					
		0.54 [kg/dm³]	0.6 [kg/dm³]	0.7 [kg/dm³]	0.8 [kg/dm³]	0.9 [kg/dm³]	1 [kg/dm³]
NBK-03...	Class 150	320	320	320	320	320	210
NBK-06...	Class 300	410	410	320	320	320	210
NBK-07...	Class 400	410	410	320	320	320	210
NBK-10...	Class 600	-	700*	410**	320	320	210
NBK-31...	Class 900	-	-	-	540	415	345
NBK-32...	Class 1500	-	-	-	540	415	345

* 800 for units with thermal screening; **450 at apparatus with thermal screening

NBK-31/32 with Roller Indicator/Ball Display



Pressure-Temperature-Assignment for Stainless Steel Flange

ASME B16.5 RF-2009									
Flange Rating	Material	Maximum Temperature TS in °F							
		Ambient	200	300	400	500	600	700	750
		Maximum Pressure PS in PSI							
150	316-Ti Stainless Steel	275	235	215	195	170	140	110	95
300		720	620	560	515	480	450	435	425
400		960	825	745	685	635	600	580	570
600		1440	1240	1120	1025	955	900	870	855
900		2160	1860						
1500		3600	3095						

Remarks:

Ambient = -20...100 °F

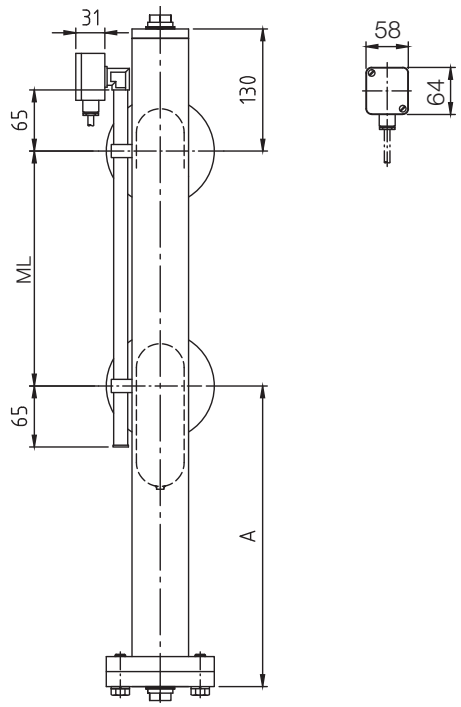
TS = maximum allowable temperature in °F, temperature which is defined by pressure equipment manufacturer, for which the pressure equipment is designed

PS = maximum allowable pressure, pressure which is defined by pressure equipment manufacturer, for which the plant is designed. 316-Ti was calculated with help of creep resistance values of 100000 h acc. to EN-Material Norms considering the safety value.

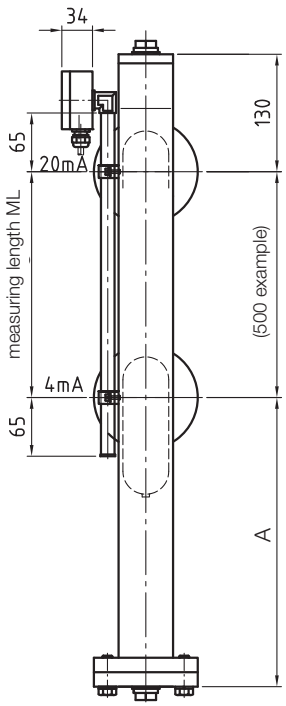
At intermediate temperatures e.g. 250 °F, a linear interpolation is to be carried out between 2 following creep resistance values, e.g. of 212 °F and 300 °F.

The pressure/temperature assignment is valid for the following flange models with sizes up to ASME Class 1500 used by KOBOLD.

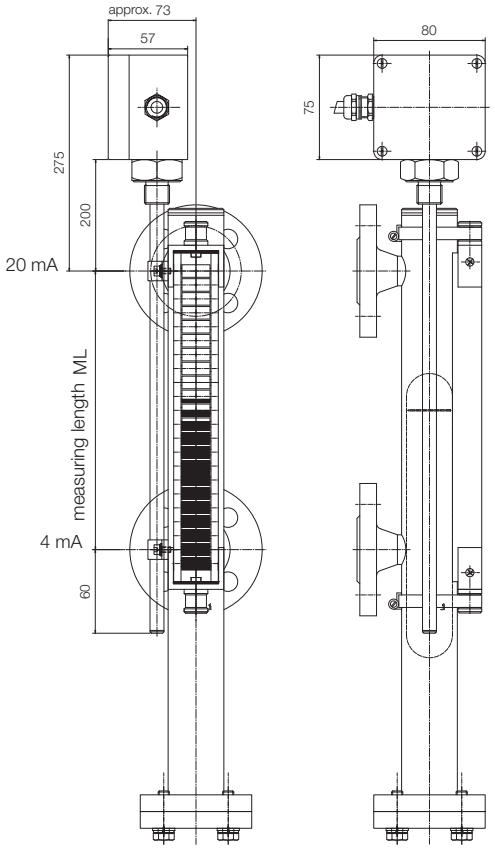
NBK-... with Reed Chain - Model W



NBK-... with Transmitter - Model M

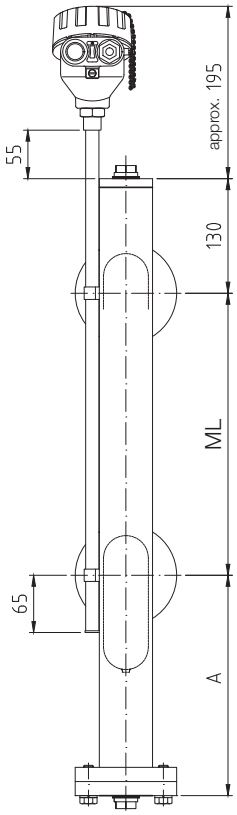


NBK-... with Transmitter - Model T

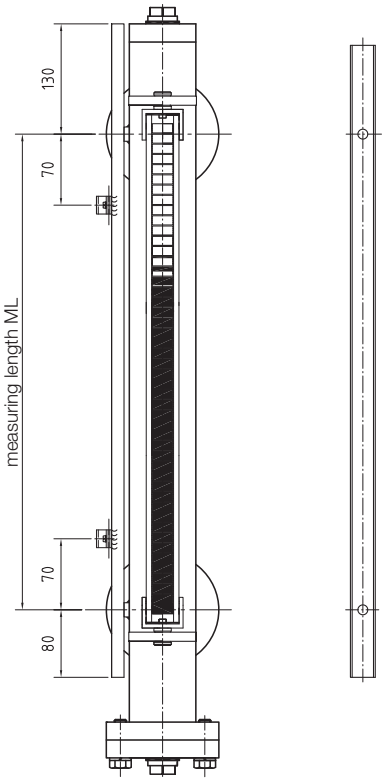


NBK-... with Transmitter - Options H/F

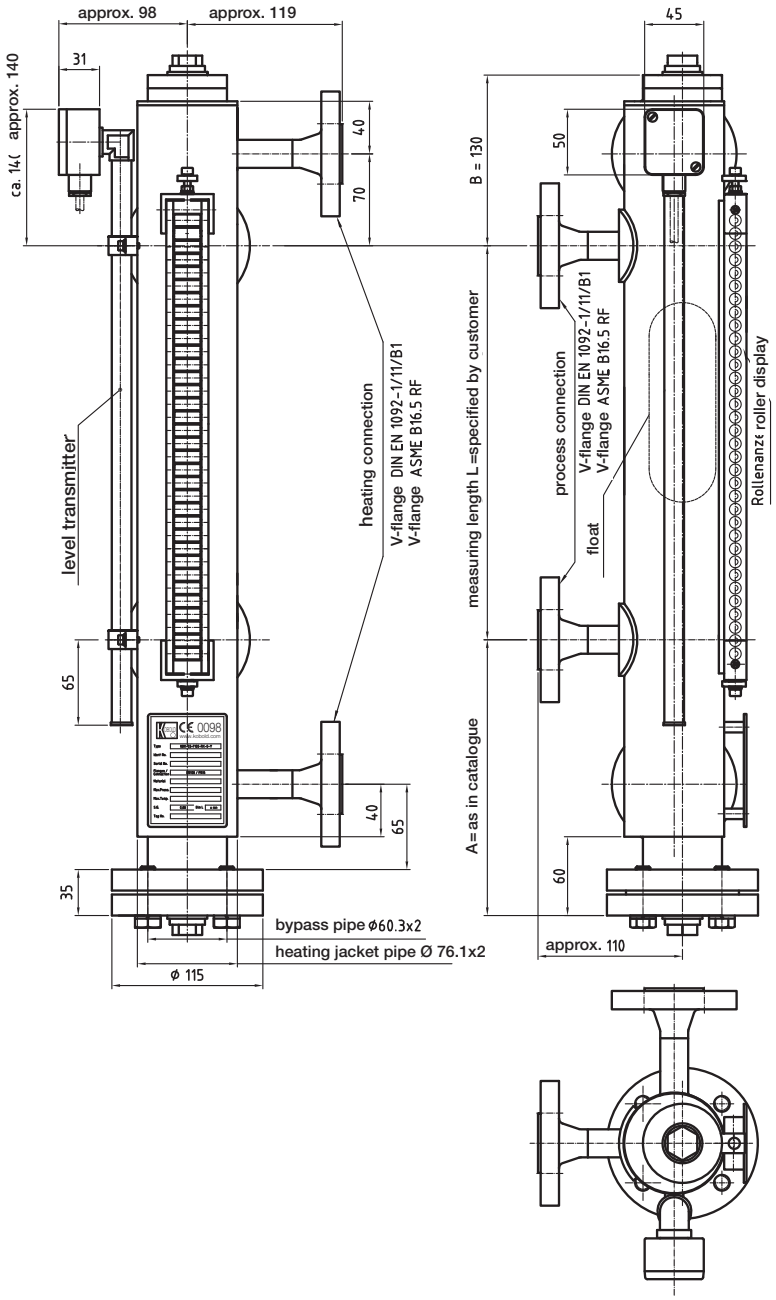
(not possible with options VA/VF)



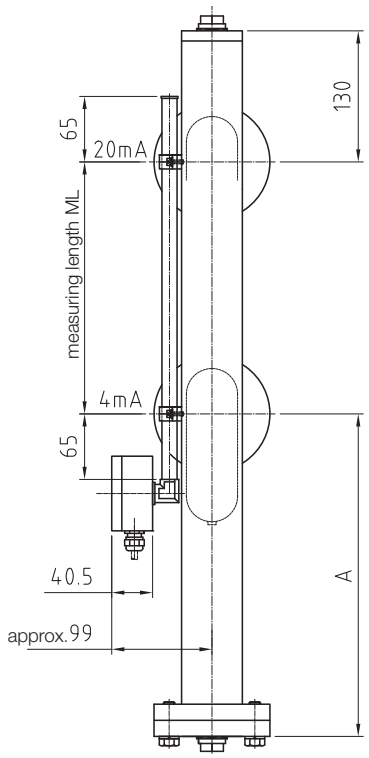
NBK-... with Thermal Screen - Option N



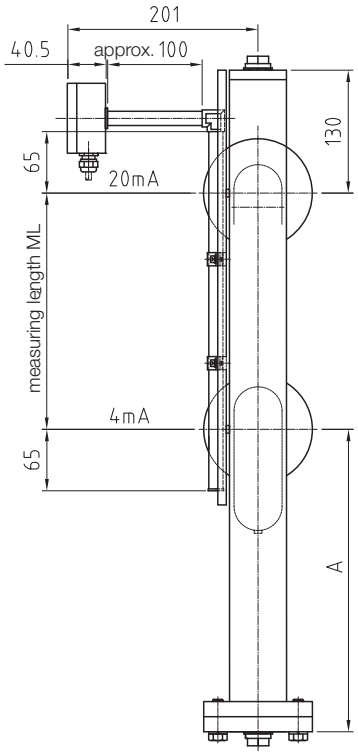
NBK-... with Heating Jacket - Option LX



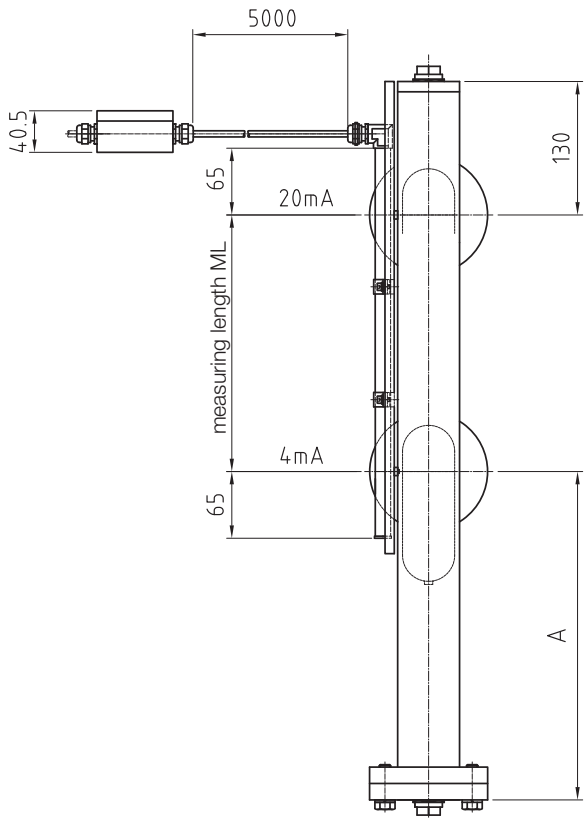
NBK-... with Transmitter - Option MU



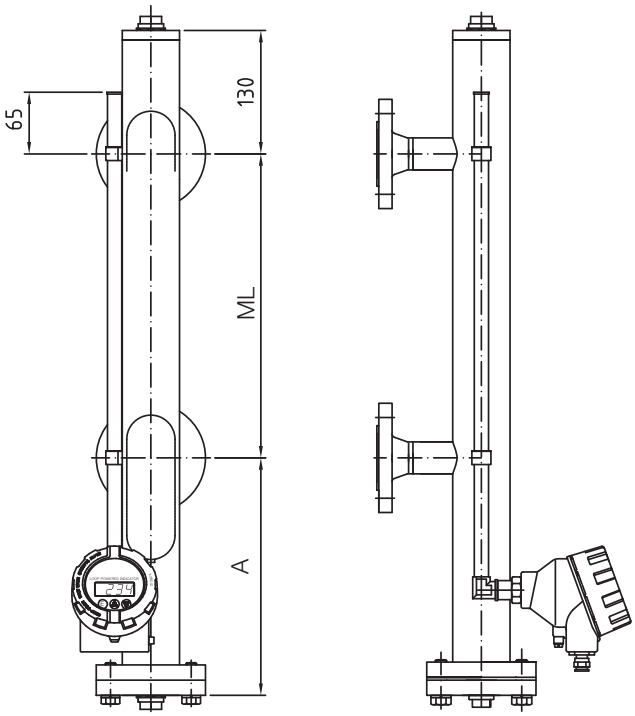
NBK-... with Transmitter - Option MS



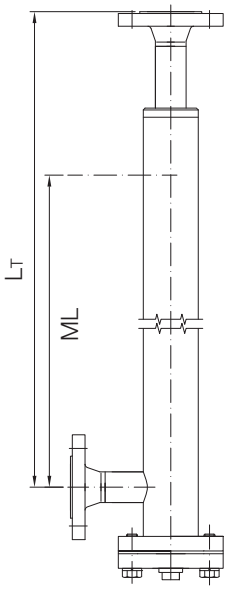
NBK-... with Transmitter - Option MK



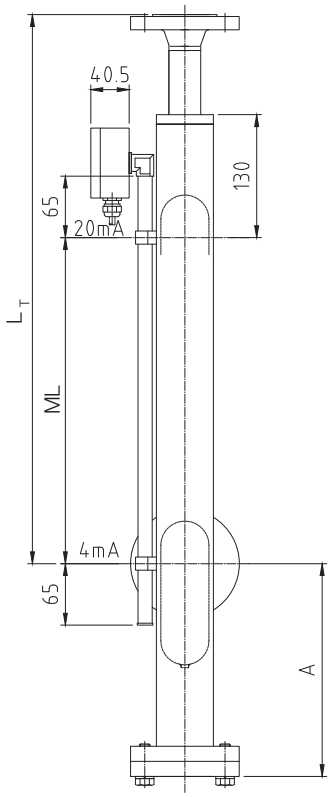
NBK-... with Transmitter Display - Options AE/HE or AC/HC



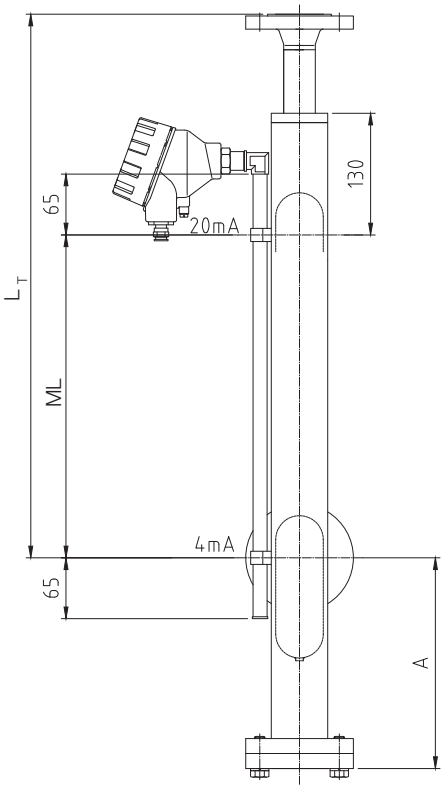
Process Connection - Option ST



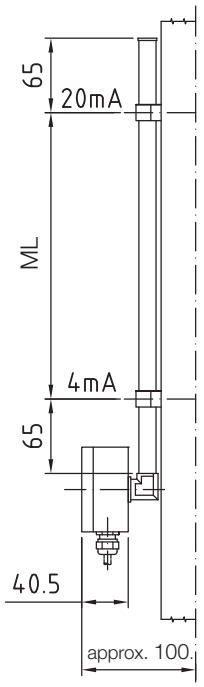
NBK-... with Transmitter - Model M - Option ST



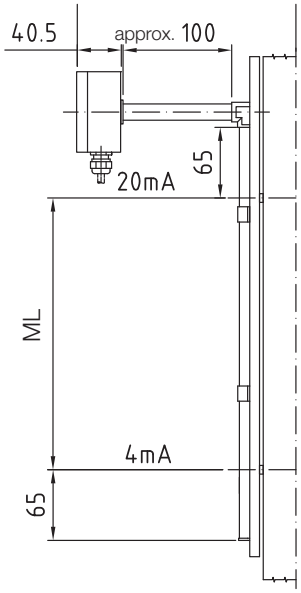
NBK-... with Transmitter - Model H/F - Option ST



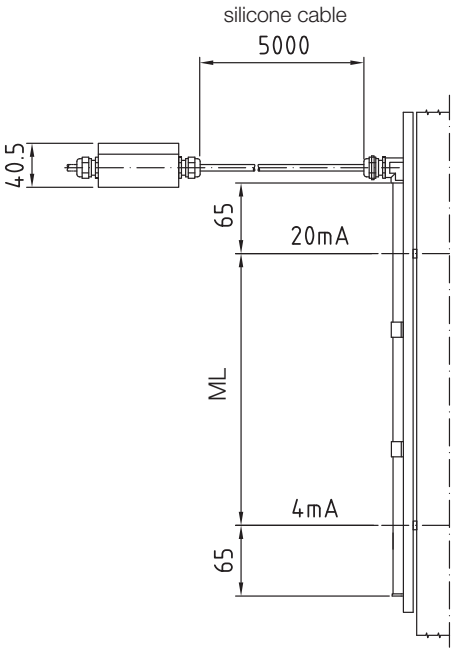
NBK-... with Transmitter - Options MU and ST



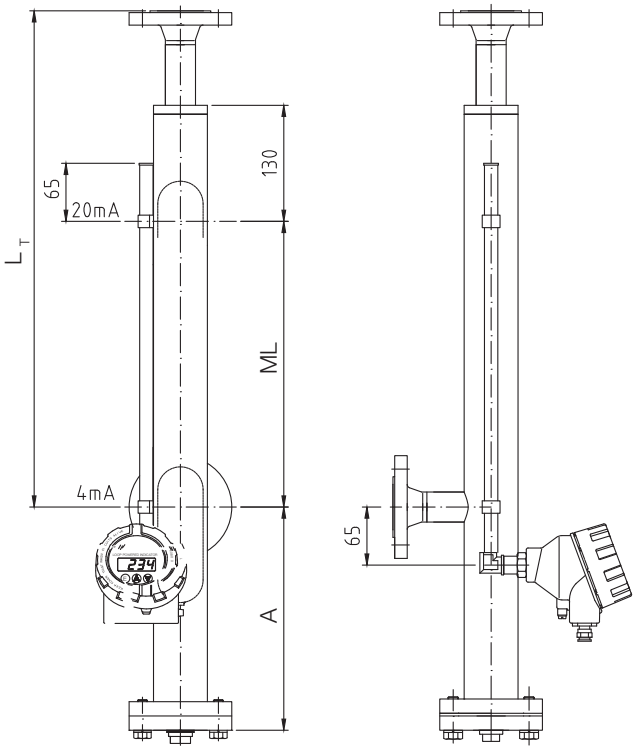
NBK-... with Transmitter - Options MS and ST



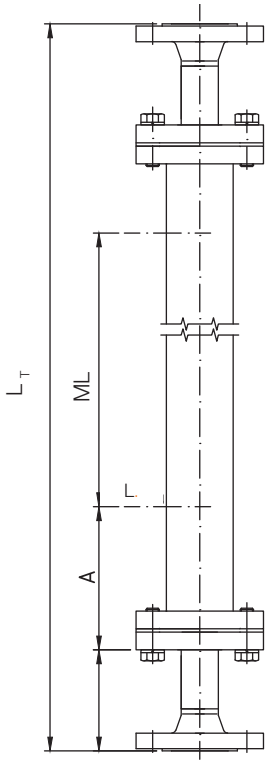
NBK-... with Transmitter - Options MK and ST



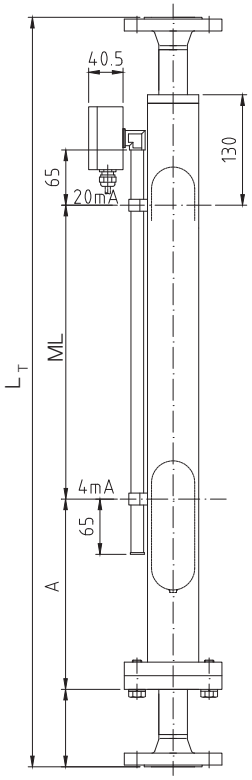
NBK-... with Transmitter
- Display Options AE/HE or AC/HC and Option ST



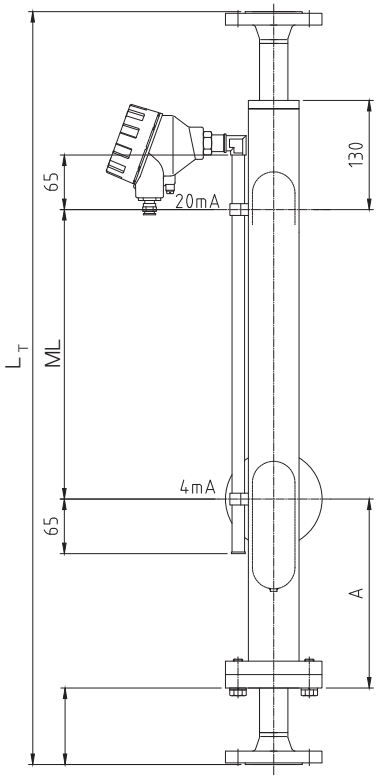
Process Connection - Option TT



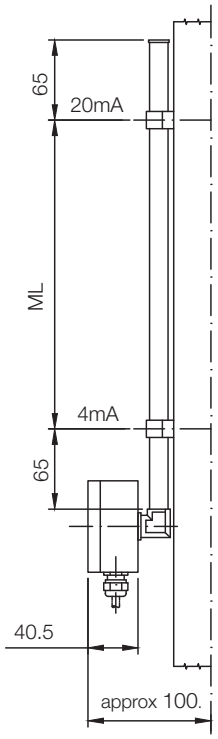
NBK-... with Transmitter
- Model M - Option TT



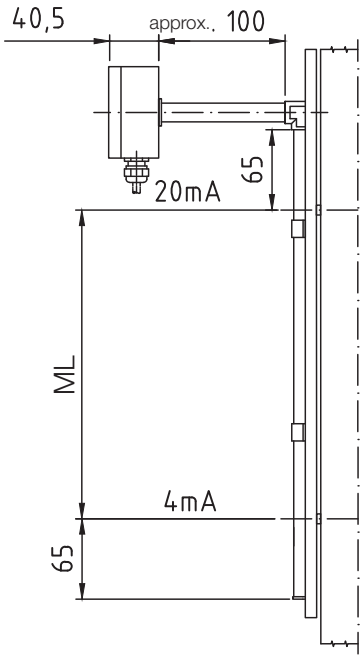
NBK-... with Transmitter
- Model H/F - Option TT



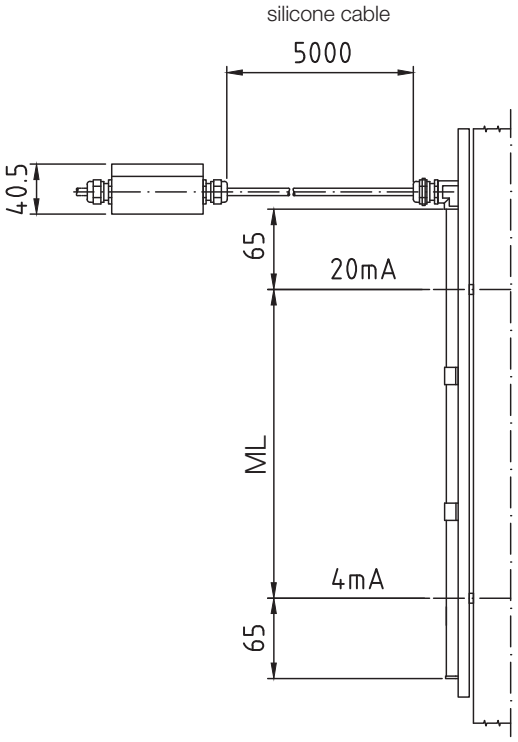
NBK-... with Transmitter
- Options MU and TT



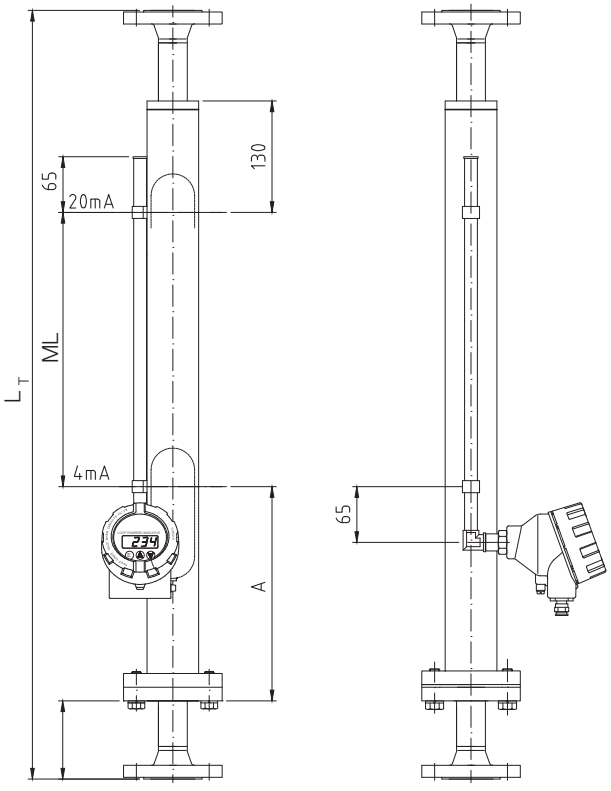
NBK-... with Transmitter - Options MS and TT



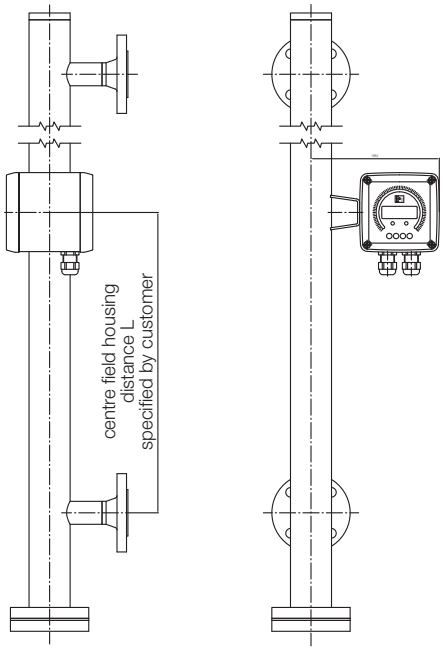
NBK-... with Transmitter - Options MK and TT



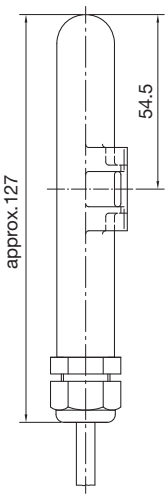
NBK-... with Transmitter - Display Options AE/HE or AC/HC and Option TT



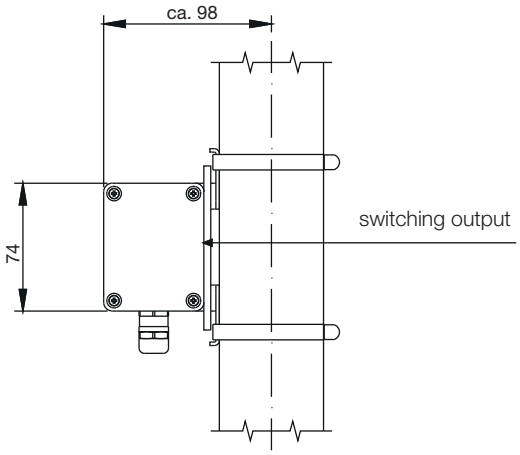
NBK-...with Indication Unit ADI-1 - Option C



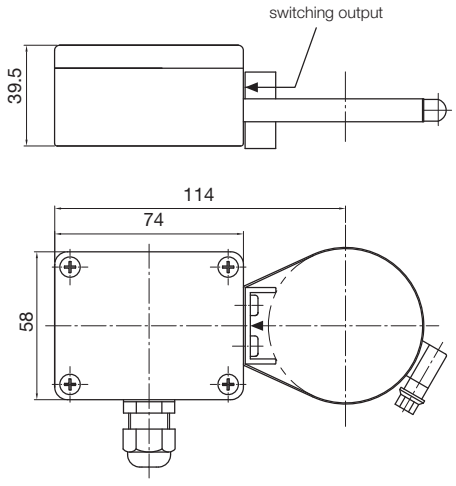
NBK-R



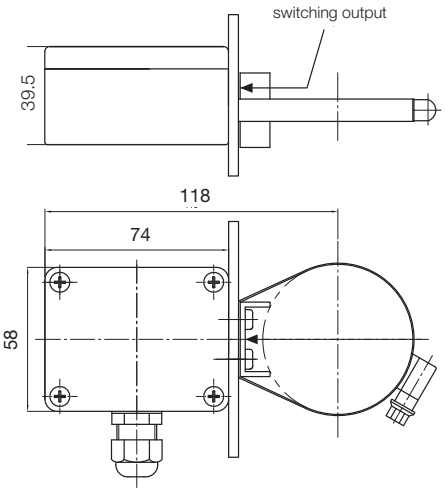
NBK-RV/RN



NBK-RT200



NBK-RT400



Customer Name: _____

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Company Name: _____

Phone: _____ **Fax:** _____

FAX to:
KOBOLD Instruments Inc.
+1.412.788.4890 (USA)
+1.514.428.8899 (Canada)

E-mail: _____

Quotation #: _____ Part Number: _____

Design Conditions (Accurate process information is essential to ensure proper operation of your level indicator. Please fill out accurately and completely)

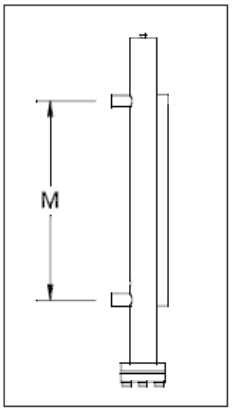
1. Pressure: Normal _____ PSIG Maximum _____ PSIG

2. Temperature: Normal _____ °F Maximum _____ °F

3. Type of Liquid: _____

4. Liquid Specific Gravity at Normal Operating Temp: _____

5. Liquid Viscosity: _____



Mounting Configuration

1. Measuring Length M: _____ Inches (M=center to center length between fittings)

2. Fitting Size: ☐ 1/2" ☐ 3/4" ☐ 1" ☐ 1-1/4" ☐ 1-1/2" ☐ 2"

3. Fitting Type: ☐ NPT Thread (1-1/4" max) ☐ 150 LB ANSI Flange ☐ 300 LB ANSI Flange

☐ 400 LB ANSI Flange ☐ 600 LB ANSI FLANGE ☐ Other (specify): _____

Options - Indicator

☐ Polypropylene Roller (250°F max. temp.) Suffix -RP ☐ Ceramic Roller (750°F max. temp.) Suffix -RK

☐ Ball Display with Plexiglas Sight Tube (max. temp. 175°F) Suffix -KP

☐ Ball Display with Makrolon® Sight Tube (max. temp. 250°F) Suffix -KM

☐ Ball Display with Makrolon® Sight Tube with Oil Filling (max. temp. 250°F) Suffix -KP

☐ Ball Display with Borosilicate Glass Sight Tube (max. temp. 390°F) Suffix -KG

Options - Transmitter

☐ Magnetostrictive Probe (4...20mA, 4-wire) Suffix -T ☐ Reed Chain (0.7...7kΩ) Suffix -W

☐ Reed Chain (4...20mA, 2-wire) Suffix -M ☐ Reed Chain (4...20mA, 2-wire with HART®) Suffix -H

☐ Reed Chain (PROFIBUS® PA FOUNDATION™ Fieldbus) Suffix -F

Options - Switch

☐ NBK-R (250°F max temp) Qty: _____ ☐ NBK-RT200 (390°F max temp) Qty: _____

☐ NBK-RT400 (750°F max temp) Qty: _____

☐ NBK-RV200NO (390°F max temp) Qty: _____ ☐ NBK-RN200NO (390°F max temp) Qty: _____

☐ NBK-RV200NC (390°F max temp) Qty: _____ ☐ NBK-RN200NC (390°F max temp) Qty: _____

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Options - Top Bypass Tube Connections

- ☐ Without Vent Plug (for NBK-03/06/07, standard for NBK-10/31/32) Suffix -V0
- ☐ With Vent Plug (for NBK-10/31/32, standard for NBK-03/06/07) Suffix -VN
- ☐ Flange Connection 2" ASME (pressure rating same as the process flange) Suffix -VA
- ☐ Flange Connection DIN (pressure rating same as the process flange) with vent plug ½" NPT Suffix - VJ
- ☐ Vent Flange 1/2" ASME (pressure rating same as the process flange, NBK-03/06 only) Suffix -V7
- ☐ Vent Flange 3/4" ASME (pressure rating same as the process flange, NBK-03/06 only) Suffix -V8
- ☐ Vent Flange 1" ASME (pressure rating same as the process flange, NBK-03/06 only) Suffix -V9
- ☐ Vent Valve (1/2" NPT max temp 250 °F, NBK-03/06 only) Suffix -V2

Options - Bottom Bypass Tube Connections

- ☐ Without Drain Plug (for NBK-03/06/07, standard for NBK-10/31/32) Suffix -D0
- ☐ With Drain Plug (for NBK-10/31/32, standard for NBK-03/06/07) Suffix -DN
- ☐ Flange Connection 2" ASME with Drain Plug 1/2" NPT (pressure rating same as the process flange) Suffix -DA
- ☐ Flange Connection 2" ASME without Drain Plug (pressure rating same as the process flange) Suffix -DD
- ☐ Drain Flange 1/2" ASME (pressure rating same as the process flange, NBK-03/06 only) Suffix -E7
- ☐ Drain Flange 3/4" ASME (pressure rating same as the process flange, NBK-03/06 only) Suffix -E8
- ☐ Drain Flange 1" ASME (pressure rating same as the process flange, NBK-03/06 only) Suffix -E9
- ☐ Drain Valve (1/2" NPT max temp 250 °F, NBK-03/06 only) Suffix -F2
- ☐ Drain Valve Horizontal Mount (1/2" NPT max temp 250 °F, NBK-03/06 only) Suffix -D2

Options - Process Connections

- ☐ 1x Process Connection Side, 1x Process Connection Vertical on the Top (NBK-03/06/07/10 only) Suffix -ST
- ☐ 1x Process Connection Side, 1x Process Connection Vertical on the Bottom (NBK-03/06/07/10 only) Suffix -TS
- ☐ 2x Process Connections Vertical (NBK-03/06/07/10 only, up to 1") Suffix -TT

Options - Scales (ball indicators are always delivered with scales)

- ☐ Laser Etched Aluminum (-40...300 °F media temperature) Suffix -M2
- ☐ Engraved Aluminum (-40...750 °F media temperature) Suffix -M1
- ☐ Scale Made of 304 Stainless Steel (only with ball display option KP/KM/KF, standard on KG) Suffix -MV

Options - Heat Jacket (ASME Class 300 lb Flanges upon request)

- ☐ Heat Jacket 1/2" ASME 150 lb (NBK-03/06/07/10 only) Suffix -LA
- ☐ Heat Jacket 3/4" ASME 150 lb (NBK-03/06/07/10 only) Suffix -LB
- ☐ Heat Jacket 1" ASME 150 lb (NBK-03/06/07/10 only) Suffix -LC
- ☐ Heat Jacket 1-1/4" ASME 150 lb (NBK-03/06/07/10 only) Suffix -LD

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Options - Electrical Outputs

- ☐ Option M with Junction Box at Bottom, Suffix -MU
- ☐ Option M with Heat Shield & Junction Box at 4" Distance (Max. Temp. 570°F) Suffix -MS
- ☐ Option M with Heat Shield & Junction Box with 16.4' Silicone Cable (Max. Temp. 750°F) Suffix -MK

Options - Display

- ☐ Aluminum Housing with LED Display, Bottom Connection (only with transmitter option A) Suffix -AE
- ☐ Aluminum Housing with LCD Display, Bottom Connection (only with transmitter option A) Suffix -AC
- ☐ Aluminum Housing with LED Display, Bottom Connection (only with transmitter option H) Suffix -HE
- ☐ Aluminum Housing with LCD Display, Bottom Connection (only with transmitter option H) Suffix -HC
- ☐ Indicating Unit ADI-1 with Bargraph & Digital Display (only with transmitter options T or M), Suffix -C

Options - Additional

- ☐ Connection Flange for multi-part design (split roller/split scale, not possible with transmitter) Suffix -A
- ☐ Bracing Plate Centered Between Process Connections (required for lengths above 16.4') Suffix -HL
- ☐ Bracing Flange Centered Between Process Connections (required for lengths above 16.4') Suffix -HF
- ☐ Armaflex-insulation (heat coefficient 0.025 kcal/m °C, to 220°F) Suffix -K

Tests/Certificates

- ☐ Radiographic Examination (DIN 54 111 T1) Suffix -P
- ☐ Dye Penetration Test (DIN EN 571-1) Suffix -Q
- ☐ Pressure Test with Water (1.5x Flange Class Rating) Suffix -X
- ☐ 3.1 Sketch (acc. EN 10204) Suffix -Z
- ☐ Material Certification (acc. NACE MR 0103/ISO 15156 (MR0175), declaration of conformance) Suffix -MR
- ☐ Positive Material Identification (PMI) Suffix -WV
- ☐ Oil and Grease Free, Suffix -SF

Other Options / Custom Configurations / Special Requirements:

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